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Fintech Innovations and Digital Platforms: Strategies, network effects and impacts on competitiveness.

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1. INTRODUCTION

1.1 Research Objectives

The primary objective of this study is to investigate how financial institutions are leveraging fintech innovations and digital-platform architectures to enhance their competitive positioning. In particular, the research seeks to elucidate the strategic choices that incumbent banks and emerging fintech firms make when adopting technologies such as blockchain, artificial intelligence, and peer-to-peer payment systems. Drawing on both a comprehensive review of the existing literature and an original qualitative analysis, the thesis aims to uncover the mechanisms through which network effects arise on single-sided and multi-sided platforms, and to assess the implications of these effects for revenue models, operational efficiency, and stakeholder collaboration. By focusing on the interplay between technological capability, regulatory constraints, and market dynamics, the work aspires to provide actionable insights for managers and policymakers who must navigate an environment of rapid digital disruption.

1.2 Research Questions

To achieve these objectives, the study is guided by four central research questions. First, which fintech technologies are being integrated into banks' core processes, and what organizational factors facilitate or hinder their adoption? Second, how do single-sided versus multi-sided platform models differ in their capacity to generate direct and indirect network effects within the financial services sector? Third, in what ways do evolving regulatory frameworks – such as PSD3, MiCA, and GDPR – shape the strategic options available to incumbents and challengers alike? Finally, what are the consequences of platform-driven digitalization for firms' revenue structures, competitive advantage, and collaborative relationships between traditional banks and fintech start-ups? By addressing these questions, the thesis seeks to bridge the gap between high-level theoretical constructs and the concrete experiences of banking practitioners.

1.3 Relevance of the Topic and Rationale for the Study

The relevance of the investigation fintech and digital platforms in banking stems from the profound transformation currently reshaping the global financial landscape. Incumbent banks face simultaneous pressures: margin compression in interest-based businesses, heightened customer expectations for seamless digital experiences, and the rapid expansion of nimble fintech competitors. At the same time, regulators are striving to strike a balance between fostering innovation and safeguarding financial stability and data privacy. Despite growing scholarly attention to individual technologies or business models, there exists a paucity of research that jointly considers strategic platform design, network effects, and regulatory influences in a holistic framework. Moreover, most empirical studies concentrate on large-scale quantitative surveys or narrow case studies, leaving a need for in-depth qualitative insights into managerial decision-making. This study responds to that need by combining thematic analysis of executive interviews with a rigorous synthesis of academic and industry sources, thereby offering a nuanced perspective on how firms can harness digital platforms to sustain competitiveness in an era of disruptive change.

1.4 Structure of the Thesis

The thesis is organized into seven chapters. Following this introduction, Chapter 2 reviews the pertinent literature in digital transformation, fintech innovation, platform business models, and the interplay between traditional banks and fintech entrants. Chapter 3 outlines the research methodology, detailing the qualitative approach, interview protocol, and thematic analysis procedures employed to collect an interpret primary data. Chapter 4 presents the results of the empirical investigation, structured around the adoption of fintech technologies, platform strategies, network effects, revenue model shifts, and collaboration patterns. Chapter 5 offers a critical discussion of the key findings, examines their implications for the banking sector and policy-making, identifies study limitations, and proposes avenues for future research. The thesis concludes with a comprehensive list of references in Chapter 6 and supplementary materials, including the full interview protocol, in the appendices of Chapter 7. This progression ensures a logical flow from theoretical foundations to empirical evidence and practical recommendations.

2. LITERATURE REVIEW

2.1 Digital Transformation and Innovation in the Banking Sector

Before addressing the topic, it is necessary to make a brief excursus on the concept of digital transformation, in order to carefully deal with its evolution and its impacts on the banking sector. Digital transformation is a process through which technology and digital solutions are integrated in every business area within companies. It is a technological and even cultural change, because it forces organizations to adjust completely their operations and customer relation in terms of experience and benefit. Furthermore, digital solutions contribute to increase workforce and can lead to process and business models transformation. But digital transformation is the last evolving phenomenon on subject; digitizing is the conversion of information and documents from analog to digital formats, while digitalization is the integration of digital technologies into existing business processes. Digital transformation is the radical change of customer experience, business models and operations and aims to increase value, income and efficiency. It is necessary to outline the different typologies of this phenomenon:

- Business processes transformation:

This involves changing and adapting long-established processes and workflows to meet evolving business objectives, competition, and customer demands, often through process automation. While the terms are often used interchangeably, digital transformation is a subset of business transformation: it creates a connected technological framework that underpins and supports process changes. Thanks to improvements in workflow management, evidence of business process transformation can be seen from one point to another within business operations. For example, by implementing a cloud-based digital supply chain management system, companies can reduce downtime, streamline production, and increase profitability.

- Business model transformation:

Business process transformation focuses on workflows and areas related to business tasks, while business model transformation aims at the fundamental building blocks of how value is delivered in a specific industry. It has impacts on the value chain, from where the value is created to where is transferred to the customer. Essentially, companies use digital transformation to change traditional business models.

- Organizational and cultural transformation:

For digital transformation to be successful, it should align with the culture and values of the organization. An internal loss of trust in the corporate culture can affect productivity, initiative, and employee well-being. If carried out slowly and without optimism, the adoption of new digital technologies risks failing to achieve its goals, resulting in a loss of competitiveness, revenue, and brand value. The goal of organizational transformation is more easily achieved through collaboration and open dialogue that moves from the top down, clearly indicating the impact of digital transformation on roles, workflows, and the reasons why leadership teams believe the long-term risk and commitment are justified.

Digital transformation integrates every level and function of a modern business. Smart technologies provide organizations with the essential tools to survive and succeed. Here are some possible benefit of transformation:

- Generates deep insights to inform real-time decision-making:

For many businesses, evaluating performance and ROI often meant engaging in a process focused on the past. By the time data was collected, processed, and manually analyzed, the opportunity train had long since left the station. With an advanced ERP system and advanced analytics, businesses have real-time data visibility and can customize powerful analytics algorithms to make optimal decisions in the moment.

- Increases efficiency and productivity levels:

Devices and machines in IoT networks continuously transmit data, machine logs, and operational reports. Through the application of advanced analytics, this data can be used to support predictive maintenance and reduce downtime, offering insights for more productive and efficient workflows.

- Strengthens the customer experience:

Your customers want their demands met on their terms. Personalization, omnichannel access, customized support plans, and real-time data access can help you keep up with their ever-changing expectations while increasing leads, promoting customer loyalty, and retention.

- Contributes to driving business model innovation:

It is undeniable that a situation where consumers and the market present new demands prompts greater attention to business model innovation as a tool for value creation. However, to fundamentally change and modernize business models and customer experiences, companies need to be able to gather and

analyze real-time data and develop automated, intelligent processes to manage new business models, payment methods, and services.

- Supports a solid and competitive growth strategy:

When companies decide to digitalize operations and optimize services with connected technologies, they find new ways to interact, collaborate, and simplify future growth strategies, such as:

1. Developing new products and services
2. Increasing profitability and strengthening revenue channels
3. Attracting and retaining new leads and customers

- Fosters agility and crisis resilience:

The COVID-19 pandemic highlighted numerous vulnerabilities inherent in modern processes and business models. But it was just one of many cultural, economic, political, and market changes that businesses have increasingly faced in recent years. More advanced companies are now focusing on digital transformation to equip themselves with tools that enable the rapid development of new products and services and predictive analytics to recognize signs of impending crises or anticipate market changes and opportunities. They want to be able to grow or scale down with ease and have a complete suite of connected cloud solutions to foster innovation without needing to switch from one provider to another.

After a brief review, it is possible now to dive into of how digital transformation and innovations are evolving the banking sector. It is reported an intriguing article addressing how digital transformation and innovation are disrupting banking sector and financial industries. From exploiting of advanced and digital technology to transforming their business model, incumbents and fintech start-ups are catching the wave of digitalization and e-platforms, allowing them to take advantage of some benefits. According to this study, titled “Disruptions and Digital Banking Trends” and published by Wewege L., Lee J., & Thomsett M.C., in 2020, through the provision of customer-centric, quicker, easier, more accessible, and cost-free financial services, technology-telecommunication businesses and "fintech" entrants have quickly transformed into the traditional banking sector. Digital-only neo-banks facilitate technical innovation like digital wallets and peer-to-peer messaging while concentrating on payment, money transfer, lending for small and medium-sized businesses, and microfinance. From the standpoint of the consumer, fintech banks typically lack scale and trust, are unregulated in some situations, and are exposed to credit or liquidity risk. As big, established banks move toward faster digital transformation, fintechs are

increasingly seen as a source of value creation through technical advancements and innovations. As the fintech industry develops, many of the cutting-edge technologies that have set the stage for significant disruption in the current digital banking revolution also present an unprecedented path of cooperation and consolidation. With their emphasis on customer-centric financial services, fintechs have digitally revolutionized the banking sector and expanded for SMEs. While established retail banks quickly move their business models toward digital mobilization for a quicker, more secure, and more individualized customer banking experience, traditional investment banks are restructuring their operations by expanding their core platform to retail and commercial banking due to the innovations and advancements of fintechs and technology firms. Over the past few years, nearly all traditional banks have worked with fintech industry newcomers integrating cutting-edge technologies, utilizing their strengths in existing customers and regulations. The banking and fintech sectors will continue to expand as we approach the new decade through joint ventures, mergers, and acquisitions, leading to a convergence of banks, fintechs, technology companies, and social media network providers. In the banking industry of the completely digitally changed financial ecosystem, digital technologies like artificial intelligence (AI) and blockchain, data platforms, cybersecurity regtech, and strategic alliances will fundamentally be well positioned to be retained. (Martins & Khanna, 2018). Prior to the advent of digital banking with the branch-based banking model in the early 1990s, traditional banking was essentially unaffected and uncontested (see Figure 1 below). In 1994, Stanford Federal Credit Union in the United States became the first online bank. The number of local bank branches has drastically decreased globally with the advent of online banking. Simultaneously, the global number of digital banks has been steadily rising. The first digital disruptor was ING Direct, which began as a fully online bank in 1996 and, in just over ten years, attracted over 20 million clients across nine countries without having to make any investments in physical infrastructure. In 2013, the fintech bank "N26" received its first banking license approval.

In 2018 and 2019, all of these partnerships and collaborations—including M&A, VC, and PV—reached a record deal value, indicating that the fintech sector is entering a mature market. Traditional banking institutions face competition from digital-only banks, often known as challenger banks. User-friendly interfaces, competitive pricing, commission-free stock trading, cryptocurrency for premium accounts, virtual identity verification, Apple Pay and Google Pay, and P2P transfers via phone or email to other bank customers are typical features of these neo-digital mobile banks. In 2019, these customer-focused fintech businesses raised more than $2.5 billion. Because they provide convenience and comfort in banking—for example, a nearly 40% decrease in bank visits—these new digital banks are the fintech

start-up industry with the quickest rate of growth. Customers prefer to communicate with their financial institution by phone (26%), smartphone (55%), ATM (52%), in-person at a branch (57%), and online (67%), per the Time Survey (2016). (2020, Pilcher). Globally, the number and income of digital-only banks are increasing (Bhutani & Wadhwani, 2018). They are the main cause of the 36% decline in bank branch locations (about four visits annually) between 2017 and 2022, as well as the 121% increase in mobile transactions over same time, which results in a 63% decline in banking interactions on laptop and desktop devices. (2020, Pilcher).

Figure 1: Timeline of Digital Retail Banking (1472 – 2021)

Source: History of digital banking by Verdict (2020) .

Mobile wallets, contactless payments, blockchain technology, smart speaker systems, identity verification technologies, and artificial intelligence (AI) for security are all handled by payment advancements in fintech banks and banking apps. These are already making significant progress in increasing the number of cashless transactions. Online and mobile banking platforms and apps, peer-to-peer (P2P) payment apps for individuals, digital wallets, robo-advisers, budgeting apps, cryptocurrencies, international transfers, foreign exchanges, savings, mobile brokerage and trading apps, personal financial

management, automation of accounting/tax support for SMEs, cloud banking, fraud protection, and cybersecurity are just a few examples of the wide range of applications that fall under the umbrella of financial technology. The financial transactions inside fintech banks are depicted in Figure 1 below. 84% of payments, fund transfers (68%), personal loans (56%), personal finance (60%), traditional deposits/savings accounts (49%), insurance (38%), and wealth management (38%) are all considered fintechs (KPMG, 2018). Given these potential uses for fintechs and digital ecosystems, the way banks can use their core capabilities to support innovation strategy with fintech start-ups through business-to-business (B2B) partnerships will have an impact on fintech trends in the years to come.

The fintech with consumer-centric start-ups or infrastructure providers may huddle coping with customer acquisition costs or regulatory challenges while incumbent banks may lack a speedy execution of new technology at the space of fintech's (Wewege et al., 2020).

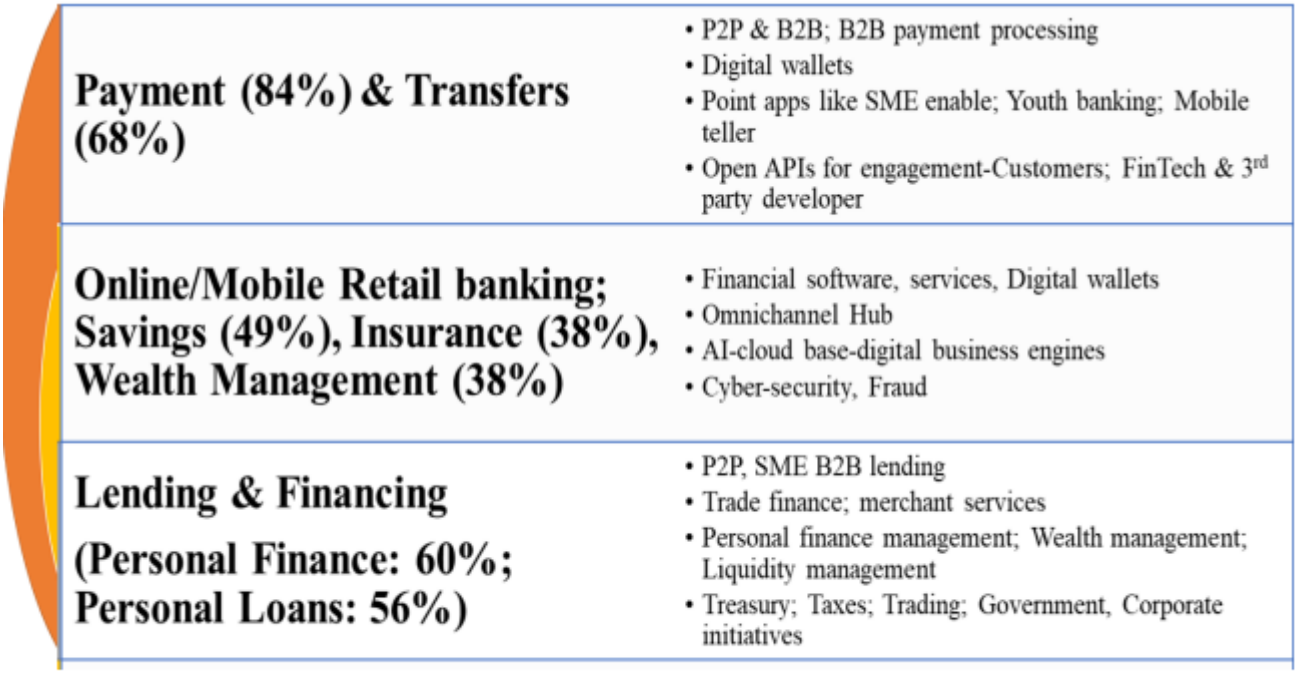

Figure 1: The FinTech Ecosystem

Fintech disruptors may not have banking licenses or hold deposit insurance, and they are likely to be prime targets for financial fraudsters, cybercriminals, or hackers. Digital-only banks may be more cost-effective because they do not open branches and only maintain their websites and administrative staff due to automation of the applications and greater convenience, but occasionally customers encounter issues and are unable to settle everything online. The solution is to partner with traditional banks. From

1996 to 2015, the first stage of fintech challengers brought disruption and threat with new technologies to large banks; following the 2016–2017 transition period, since 2018, the collaboration between large banks and fintechs has brought both disruption and synergies. Table 1 below (Galvin et al., 2018) divided fintechs into four categories:

I. Fintechs are new entrants, start-ups, and attackers seeking to enter the financial services industry with customer-centric financial technologies; the main obstacle for this group is the cost of customer acquisition;
II. Fintechs are incumbent financial institutions or traditional banks that are making significant investments in technology to improve customer experience and respond to partnership opportunities and competitive threats; examples include Citibank, BBVA, JPMorgan & Chase, Goldman Sachs, BNP Paribus, ABN AMRO bank, BNP Paribus, and other large banks.
III. Fintechs are fintech-ecosystem-networks run by technology companies such as "ApplyPay" and "Mastercard networks," which provide financial services to facilitate existing platforms with materializing user data or relationships.
IV. Fintechs as infrastructure providers sell services to financial institutions for real-time digital channel provision (e.g., H2 Holding), for automating legal and compliance of accounting systems (e.g., Blackline), for a portfolio management platform (e.g., SS&C Technologies), and for a core-insurance operation platform (e.g., Guidewire) (see Table 1 below) (Galvin, et al., 2018).

As the fintech industry matures, large banks and incumbent financial institutions should strategically engage with fintech disruption, whether by investing in a form of JV or M&A. The four fintech categories would further consolidate for scale and regulatory provisions, while new fintech entrants (e.g. on cybersecurity) would unstoppable.

Table 1: Types of FinTech Banking Examples from Listed Companies

[1] Fintechs as new entrants, start-ups	'Square': The credit card reader offering payment processing services to smaller businesses that could not traditionally afford card acceptance services. Hold 'Square Capital;, a microloan platform for small businesses, deploys a specific point-of-sale (POS) platform Square for Restaurants, 'Caviar', Square's food delivery and Cash App is a digital wallet P2P payments. (See above Figure 2)
[2] Fintechs as incumbent financial institutions	'JPMorgan Chase': Acquired WePay, a platforms to integrate payment solutions, new all-mobile bank, Finn
[3] Fintechs as fintech-ecosystem-networks	'PayPal': The world's first digital wallet showing growth and innovation in the area of mobile commerce. Mobile payments, 'One Touch' had more than 120 million consumers and 10 million merchants registered on the platform. 'Mastercard': Exhibits acquisitions 'APT', which stands for Applied Predictive Technologies, is a cloud-based analytical tool; 'NuData Security' creates digital identities for consumers based on passive biometrics; 'Brighterion' is an AI-powered platform that helps detect fraudulent transactions; 'Oltio' is a South African mobile payments start-up; and 'Vocalink' provides Fast ACH transactions in a number of different geographical markets.
[4] Fintechs as infrastructure providers selling services to financial institutions	'Guidewire': Provides property and casualty insurers with software platforms that enable insurance core services, from data analytics and digital engagement to underwriting and claims management. 'SS&C 'Technologies': Provides software platforms for trading and portfolio management, with back-office functions, to financial institutions, asset managers, and trusts. 'Blackline': A cloud-based software platform to automate regulatory compliance in accounting practices, reconciling financial data, in real time. 'Q2 Holdings': Offer cloud-based platforms for smaller banks and credit unions to apply digital channels.

Note: Authors own compiling of the examples, the second column.

An intriguing fact is that, by implementing online and mobile banking platforms, traditional banks are moving toward digital channels and working with fintech companies to increase the number of people using the Internet and smartphones. This cooperation is done in order to lower operating costs, offer better banking experiences, such as quicker, safer, and more convenient payment methods, and provide more customer-centric products. One of the main issues with digital banking is preventing cyberattacks. In 2017, the retail banking sector accounted for more than 75% of the entire digital banking market, with transactional services accounting for over 90%. This led to banks creating *new business models* to adapt to changing client needs by connecting or merging distribution channels. The existence of fintech start-ups and global corporations makes the digital banking sector extremely competitive. To increase their market share, certain fintechs in digital banking concentrate on working with banks. Fintech start-ups are being acquired by global TMTs and banking institutions in order to create their own omni-channel digital banking products that would satisfy their clients' needs and lower fees.

Another interesting study analyzed main fintech innovations and their impacts on banks business models, defining basis to explore disruption dynamics in the sector. In their landmark study "On the Fintech

Revolution: Interpreting the Forces of Innovation, Disruption, and Transformation in Financial Services," Gomber and colleagues (2018) offer a richly layered perspective on how emerging technologies are fundamentally reshaping banking. They begin by showing that true transformation goes well beyond installing new software: it requires a complete overhaul of internal processes. For example, by embedding blockchain-enabled settlement systems alongside machine-learning credit-scoring engines, banks can automate tasks that once took days - such as trade reconciliation and compliance checks - and reduce costly manual interventions to near zero. The introduction of smart contracts transforms labor-intensive workflows into transparent, auditable streams of data, cutting reconciliation times from days to minutes and greatly enhancing security controls. Gomber et al. then turn to the evolution of business models, explaining how fintech newcomers leverage cloud infrastructures to develop "asset-light" offerings and expose modular services via open APIs. In this new paradigm, launching a peer-to-peer lending platform, a real-time foreign-exchange tool, or a robo-advisor can take weeks rather than months, thanks to micro-services architectures. Legacy banks, by contrast, often find their monolithic IT stacks too rigid to compete on such rapid timelines. Faced with this challenge, many incumbents are now building their own API marketplaces, partnering with third-party developers or even spinning off in-house fintech units in order to reclaim agility and avoid being outpaced. A third axis of change concerns customer engagement. The authors describe how data captured across mobile apps, web portals, social-media integrations and AI-driven chatbots fuels personalized, context-aware experiences. Robo-advisors dynamically rebalance portfolios in response to real-time market movements and individual risk profiles, while conversational AI handles routine inquiries around the clock, freeing human advisors to focus on complex, high-value consultative tasks. This omni-channel approach not only heightens customer satisfaction but also builds a continually growing, rich profile of each client's preferences and behavior. Beyond process and product, Gomber et al. highlight the rise of collaborative ecosystems, analyzed in the fourth paragraph of this chapter. They argue that banks no longer operate in isolation but rather as nodes within open innovation networks that include fintech startups, Big Tech firms and even regulators through sandbox environments. These ecosystems allow banks to pilot novel use cases - such as tokenized asset exchanges or central-bank-digital-currency proofs of concept - in a controlled setting, diluting risk and accelerating time to market. Such partnerships foster a co-creative model whereby diverse stakeholders share expertise, infrastructure and regulatory insights.

This four-dimensional framework aligns seamlessly with the three-stage progression - digitization, digitalization and full digital transformation - outlined in the beginning of this paragraph. Whereas

digitization focuses on converting paper-based records into digital formats, and digitalization emphasizes automating existing workflows, the "fintech revolution" underscores the need for a more radical shift: reimagining an institution's value proposition, governance structures and ecosystem roles in a holistic manner. Gomber et al. caution against purely "technology-centric" initiatives that ignore cultural and change-management imperatives, noting that without strong governance, clear performance metrics and an agile mindset, digital pilots often become nothing more than expensive "innovation theater." In operational terms, the study reinforces the move toward data-driven risk management. Machine-learning models that ingest alternative datasets - from social-media sentiment to real-time transactional metadata - can enhance credit assessments and detect fraud patterns earlier than traditional methods. Meanwhile, blockchain networks not only expedite cross-border transfers but also create immutable audit trails that simplify regulatory reporting and bolster anti-money-laundering efforts. Equally crucial is the organizational transformation that must accompany these technologies. Gomber et al. describe the emergence of cross-functional squads - composed of software engineers, data scientists, compliance officers and product managers - working under agile methodologies to deliver minimum-viable products, learn from iterative failures and continuously refine solutions. This cultural pivot away from rigid hierarchies toward empowered, multidisciplinary teams is foundational to sustaining innovation over the long term.

Finally, the authors outline the need to settle key performance indicators - such as Net Promoter Score, time to market for new digital services, digital-channel adoption rates and return on digital-technology investments - must be clearly defined and monitored. By linking every technological pilot to measurable objectives, banks can ensure that their transformation efforts yield both operational efficiencies and revenue growth rather than costly pilots that go nowhere.

In their comprehensive review, untitled "Financial Institutions Digital Transformation: The Stages of the Journey and Business Metrics to Follow", Papathomas and Konteos (2023) map out the step-by-step progression that incumbent banks must traverse on the path to becoming truly digital-driven institutions. They first emphasize the importance of a rigorous diagnostic phase, in which legacy systems, organizational capabilities and customer touchpoints are thoroughly assessed to establish a clear baseline. Only by quantifying current levels of process automation, digital-channel usage and data-governance maturity can banks set realistic transformation targets and avoid pursuing fragmented technology pilots that fail to align with strategic objectives. Building on this foundation, the authors describe a design phase that focuses on redefining operating models around customer-centricity and agility. Here, banks

develop roadmaps for modernizing core platforms - often by migrating to cloud-native architectures and modular micro-services - and for embedding analytics engines into front-line channels. By establishing clear success metrics during this stage - such as digital adoption rates, cycle-time reductions for key workflows and percentage share of digitally originated revenue - institutions can apply disciplined stage-gates to govern investment decisions and track incremental value creation. Once the architecture and governance frameworks are in place, Papathomas and Konteos turn to execution and scaling. They highlight that initial pilot programs - ranging from AI-powered credit-scoring models to low-code customer-onboarding tools - must be rigorously measured against pre-defined KPIs like time-to-market, cost-to-serve and customer-satisfaction scores. Successful pilots are then expanded across additional product lines and geographies, while continuous-improvement cycles embed user feedback and real-time analytics into iterative releases.

Crucially, the authors underscore two persistent barriers that can derail even the most thoughtfully planned journeys. First, entrenched legacy infrastructures and siloed data repositories often impose hidden technical debt, slowing new deployments and impeding holistic customer views. Second, organizational resistance - rooted in risk-averse cultures and rigid hierarchies - can sap momentum unless addressed through concerted change-management initiatives and targeted upskilling programs. Papathomas and Konteos recommend establishing cross-functional "transformation offices" with clear executive sponsorship to maintain alignment between digital ambitions and day-to-day operations.

Their work confirms that the journey toward a digitally driven bank is neither linear nor purely technological: it demands integrated planning, measurable targets and a sustained cultural shift - all of which resonate with the strategic imperatives outlined at the outset of this thesis.

To conclude, the ongoing digital transformation and innovations in the banking sector are reshaping the financial landscape, creating both disruption and opportunities. As fintech start-ups and traditional banking institution collaborate to leverage advanced technologies such as AI, blockchain, and mobile platforms, the sector is becoming increasingly customer-centric and digital-first. The rise of digital-only banks and the integration of payment advancements, such as mobile wallets and contactless payments, are enhancing convenience and reducing operational costs, while presenting new challenges in areas like cybersecurity and regulatory compliance. The convergence of banks and fintechs, through partnerships, mergers, and acquisitions, signals a maturing fintech market and a more integrated financial ecosystem. In this context, traditional banks are not merely responding to disruption but are actively participating in it, enhancing their service offerings and expanding into new market segments. The fintech sector's rapid

growth and ability to offer user-friendly, efficient financial products further illustrate the ongoing transformation of banking services. Moving forward, the continued focus on innovation, collaboration, and strategic alliances[1] will determine how both fintechs and traditional banks can navigate the evolving digital banking ecosystem to meet the dynamic needs of consumers.

2.2 The impact of Fintech on Financial Services

With the exponential growth of innovations and the emergence of new technologies, financial and credit intermediaries are taking advantage. A current trend in banking and financial sector is the combination of financial technology (FinTech) and blockchain[2], which is revolutionizing the financial services sector. An interesting study has been conducted by Kumari, A. and N. Chitra D., whose focus is the impact of fintech and blockchain on financial services, which have strong influence on the digitalization trends, as the study shows. Around the world, new technologies are developing and evolving. For many people, having an internet connection and smartphone-enabled services has made it easy to access high-speed technological breakthroughs. According to the concept of Industry 4.0 (Brettel et al.; Davies 2015; Sheng, 2018; Mekinji, 2019; Badr Machkour, 2020; Yulius et al. 2020), technological advancements worldwide are reforming internal and external application models for positive interactions in the digital process, indicating significant innovations to the economy and society at large. Globally, the number of FinTech businesses is rapidly growing and provides services in a wide range of sectors, including asset management, credit solutions, insurance services, and payment systems. This technology is well-suited to help companies quickly and effectively adjust to regulations (Karaçallık, 2018). There are numerous features that blockchain distributed ledger technologies can provide for new financial services. Internet communications are beginning to be impacted by blockchain. Networks have the power to completely change how things operate and are an integral component of the digital technologies that are revolutionizing the majority of businesses. Similar to how information technology has made peer-to-peer (P2P) and mass media communications possible, blockchain technology will significantly alter the banking and financial industry. Because blockchain eliminates or minimizes the possibility of hacking, it enables the public to send and receive money quickly, securely, and at a minimal transfer fee for quick transactions without the involvement of third parties. Blockchain networks and financial technology

[1] The topic regarding cooperation between financial players is better deepen in the fourth paragraph of this chapter.
[2] Blockchain is a distributed ledger technology (DLT), or rather a decentralized database in which records ("blocks") are linked to each other by cryptography. The first blockchain has been introducted by Satoshi Nakamoto on 2008.

businesses' readiness for the digital platform and other services are two more elements of the fourth industrial revolution that complete the digitalization of banking and financial services. With quicker reaction times and greater ability to provide secure and straightforward payment transactions, digital banking services closely examine traditional business structures and procedures (Mekinji, 2019).

The article explores fintech and blockchain features in banking and financial services, analyzing the impact they have on the outlined industry. Over the past few decades, fintech has altered how it competes and works with banks. The digital financial economy currently heavily relies on fintech companies. Leading the way in digital innovation is the banking sector. Customers have a great chance of receiving affordable, practical, and safe financial services via digital finance (Ozili, 2018). Digital finance has begun to provide users improved services as a result of the improvements in digital banking that banks are offering. With today's technologies, digitalization has altered the current economic structure (North, 2020). What are the main Fintech features and innovations? FinTech companies have offered mobile wallet solutions that are dependable, quick, and simple to use. FinTech offers an electronic platform that can make accessing these services more convenient. Using only the mobile number as the primary identifier, an e-wallet conducts direct payment transactions to move money between wallets. To transfer money, no account information is needed.

FinTech solutions are more suited than banks and other lending organizations to give people with low or no income rapid access to loans and reserve cash (Ozili, 2018). Peer-to-peer (P2P) digital lending platforms facilitate transactions between debtors and shareholders. Through a digital platform, anyone having chargeable funds can lend them directly to an insolvent party and receive interest. FinTech has also transformed the traditional role of financial investment advisory. Digital finance is reshaping the finance industry by producing an outcome that was predicted by the financial system. FinTech companies in this role can help customers invest in financial products by providing high-tech financial advice through a digital platform; these online platforms are typically referred to as digital advice platforms and robo-advisors because they encourage investments in an automated manner.

FinTech in banking services has mainly affected payments and the mode by which transactions are executed. It is designed to encourage customers to switch to electronic banking, mobile banking, and digital payment services to eradicate the need to visit bank buildings for such tedious tasks. FinTech aims for the banking sector to reshape profit-making conditions for industries and produce new revenue channels through online payments. FinTech develops cutting-edge products and services to satisfy consumer needs that conventional financial institutions are unable to satisfy (Pousttchi, 2018). FinTech

performers have committed to putting in place business procedures that are responsible for safeguarding customers. The goal of fintech is to provide bank clients with ongoing access to financial services. Because the privacy of their clients' data is vulnerable to hacking, the banking industry must concentrate on verifying safer transactions. FinTech has begun to provide banks and financial service providers with dynamic and efficient solutions for loans, remittances, insurance, and transfers. Banks and financial services are facing the growing need to achieve strong, quick, and flexible results. FinTech companies are entrusting the finance sector to respond to technological and market disruption and focus on customer services. FinTech in banking focuses on data analytics to manage the provision of individualized financial services and products to customers, guaranteeing full operation via the internet and mobile devices. The banking sector is concentrating on updating its policies by utilizing the newest technologies. In order to create software and applications, open banking solutions are necessary protocols and tools. They contribute to identifying FinTech's importance in banking and financial services. FinTech's best features are carried out by a parallel technology. Without the involvement of a trusted party or centralized control, blockchain technology enables a distributed peer-to-peer network involving all of the counterparties in a transaction series. Blockchain technology will help create safer transactions and lessen phishing and fraud. The effectiveness of digital payment systems in banking procedures, customer requirements, and customized product and service offerings will be supported by big data combined with machine learning and artificial intelligence (North, 2019). To sum up, Fintech has changed payment services, improved customer services, enhanced reachability, provided smart solutions and integrated blockchain technology in its operations.

Now it is time to analyze closer this disruptive and efficient technology. The impact of blockchain technology on banking and financial services is currently being examined in relation to various businesses and sectors. Blockchain technology is *transparent*, *decentralized*, *unchangeable*, and *anonymous* (or pseudonymous). Blockchain creates digital currencies using encryption technology, a beneficial new medium of exchange that is superior to and safer than cash. Today's digital transaction ledgers are maintained via blockchain technology. In recent years, blockchain technology has been used in practically every industry, including financial services, supply chain management, and manufacturing. There are several ways in which blockchain technology could upend the financial services industry. Unquestionably, this technology can lessen problems, disruptions, and setbacks in a variety of financial technology service areas. As a result, blockchain technology holds great promise for addressing major issues that have plagued the banking and finance sector for many years (Nasscom, 2020). Identity theft

is a major problem in the banking and financial sector. Identity theft issues in the financial services industry can be eliminated by blockchain. In a distributed ledger system that permits real entities to conduct network-based transactions, the technology safeguards digital identities. Blockchain promises to enable safe, trusted transactions over an irreversible network between two parties that do not trust or even know one another. This eliminates the requirement for trusted party intervention to verify user identity, hence eliminating the possibility of identity theft. To detect fraud, such as money laundering, it is usually necessary to use transactional logs, time-series data, a location-based approach, and transaction terms transferring relational data (Krishnapriya, 2020). One of the biggest challenges facing the sector is financial fraud and money laundering, which have an international influence. With financial services searching for unclear financial transactions including exchanges between several parties with varying currency denominations and settlement times, distributed ledger solutions may be in charge of fraud prevention capabilities. For many years, the banking and financial industry has also faced challenges with efficient and reliable accounting, auditing, and recordkeeping. Using a distributed ledger system secured by cryptography, blockchain technology provides disruptive innovation that can eliminate obsolete data and make financial reporting and audits public in real time. In today's commercial services, blockchain technology completely changes the nature of accounting and auditing. A cryptographic protocol is used in blockchain transactions. Due to the banking sector's high operating expenses and delayed transaction clearance and settlement deadlines, this changes how the banking and finance business operates effectively. Blockchain technology has the potential to significantly speed up transactions. Blockchain does away with the need for numerous ledgers, middlemen, and time-consuming, costly, and frequently unsuccessful transactions. Cryptocurrency-based distributed ledger networks ensure quicker settlement of cross-border transactions. With contrast to the usual clearance period of one to two weeks with earlier techniques, transaction times can be as short as ten minutes, which is unrealistic. Currently, banks have mostly failed to produce innovative goods and services. However, there is now a new method to provide their customers with more value through the exchange of digital assets and excellent service offers provided by blockchains. By enabling several banks to significantly improve their banking services for their clients, distributed ledger technology holds promise for resolving persistent issues with business services. Additionally, banks might provide their clients the chance to gradually trade a variety of different financial assets on or via a blockchain network.

As blockchain continues to upend the banking and financial industry, it will continue to have an impact on the financial technology landscape as an underlying technology. Preferred methods are now

accessible, including distributed ledger databases, consensus-building, and cryptographic hashes of each block. This makes it possible for blockchain solutions to create a potent new kind of data sharing, doing away with third-party invention, facilitating asset transfers more easily, and expediting reconciliation procedures. Blockchain technology in banking can assist in enabling customers to receive payments more quickly through automated banking systems. Cross-border payments and other blockchain technology operations will become increasingly convenient. Peer-to-peer lending, peer-to-peer insurance, real-time and cross-border payments, trade finance, auditing, compliance reporting, and core banking solutions are just a few of the financial services use cases that the global banking sector has been experimenting with in recent years by implementing blockchain technologies. Beginning with the bitcoin cryptocurrency, it has evolved into a system that has the potential to revolutionize numerous banking settlement processes. Promising predictions have been made on the typical cost savings of financial transactions. Settlements have historically been measured and complex because they involve numerous trustworthy parties. Settlement has significant operational risk and the potential for fraud.
The use of blockchain technology in this industry has the potential to increase efficiency and safety while lowering settlement costs. Visualizing business models with interconnected producer-consumer networks and implementing code agreements on trade incentives to guarantee governance, in addition to swift and expanding adoption, seem to be key components of the future of blockchain technology adoption (Doshi, 2021). Although blockchain technology is used in many different businesses, the banking sector has been one of the most adopting. To settle their conflicts, banks began spending enormous sums of money on research and development procedures for blockchain-based solutions. As a result, the introduction of blockchain technology into the banking industry is thought to have the potential to resolve numerous financial services concerns and improve the transparency and dependability of the banking system (Bitdeal, 2020). Because blockchain is a particularly digital venue for disruptive innovation, its effects may extend well beyond bringing financial services back to life (Doshi, 2021).

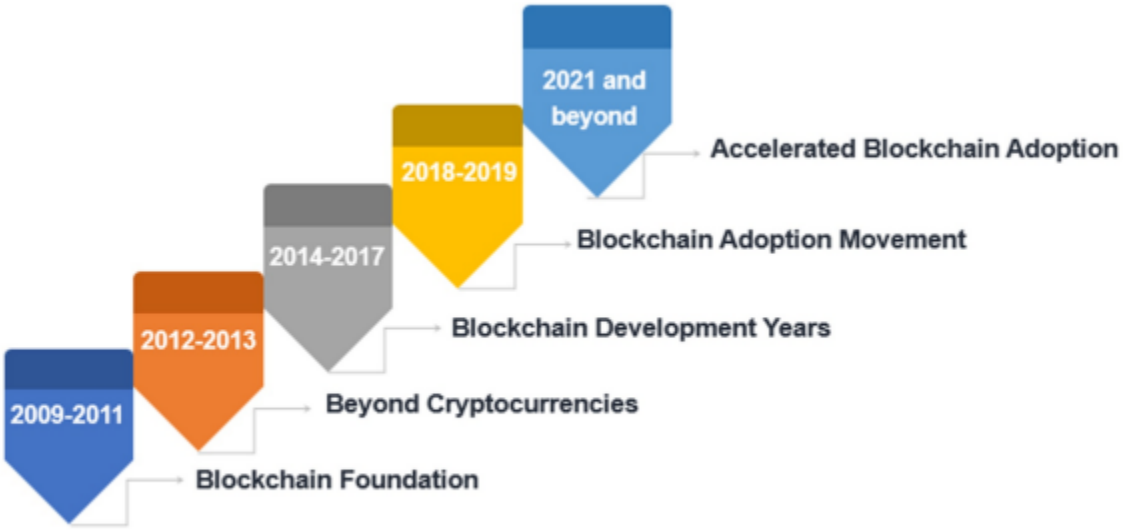

Figure 1. Blockchain adoption - general overview

New digital banking models are being influenced by the decentralization of financial services and the banking industry's adoption of blockchain technology. Due to its controlled regulatory governance and external financial tools, decentralized finance (DeFi)[3] has the potential to upend the established financial system. Compared to traditional banks, DeFi offers greater open transparency and challenges the existing financial system (Stably, 2019). The financial system of today is centralized. A safer, globally enabled system with cheaper transactions would pose a threat to it. The primary monetary authorities in the current system issue money, which powers the financial strategy of the government, banks, trade, and corporations. The cutting-edge digital product of the finance sector, which has existed since the beginning of time, is *cryptocurrency*. This kind of digital asset is enabling users to earn money via decentralized applications and bringing money online. Observers find it fascinating that everyone with the ability to create or download software holds the key to decentralized finance and the future of money (Bharadwaj, 2020). The writers of the article reported two tables, table 1 and 2, based on studies that have been done on banking and finance, technological advancements, benefits, and challenges associated with the intervention of FinTech and blockchain technologies in the banking and financial services sector

[3] DeFi is the organization of services, similar to banking, on infrastructures without omnipotent intermediaries. It operates on blockchain and aims to offer less centralized services than those of the classic financial system. Particularly, the automation allows transactions to be carried out without external intervention, often based on smart contracts.

(Hershkovitz, 2021). It is intriguing not only because they distinguish the classification by banking and finance and tech advancements, but they even show benefit and challenges of the two.

Table 1. Classification of FinTech in Banking and Finance

FinTech	Classification	References
Banking and finance	Facilitates transactions, safety, transparent, financial inclusion, convenience, financial start-ups	Gupta (2019); Milne (2016); Pollari (2016); Medeiros & Chau (2016); Schueffel (2016); (Ozili, 2018); North (2020); Pousttchi (2018)
Technological advancement	Commoditization of technology, market penetration, competitive edge, transactions, broad-range applications	Pollari (2016); Dandapani (2017); Arner, Barberis and Buckley (2017); Kauffman et al. (2017); Karaçallık (2018); Iman (2019)
Benefits	Operational, managerial, strategic, transaction cost, service delivery, and innovation	Milne (2016); Pollari (2016); Medeiros & Chau (2016); Arner, Barberis and Buckley (2017); Teja (2017); Dandapani (2017); Folkinshteyn and Lennon (2017); Pousttchi (2018)
Challenges	Organization, culture, regulation and governance, security and privacy, technology and standards	Milne (2016); Pollari (2016); Medeiros & Chau (2016); Teja (2017); Arner, Barberis and Buckley (2017); Mekinjić (2019)

FinTech, which is primarily a start-up technology, offers industrial-based business services that are already provided by a number of traditional financial services, including asset management firms, banks, and insurance. FinTech often offers services through products, business models, business processes, and applications in the banking and finance sector. FinTech's primary target markets in the banking industry include consumer and business lending as well as payments. Both developed and developing nations are seeing an increase in digital technologies. From internet banking to mobile banking, it has progressively advanced and is currently taking a different approach to banking. With more people using cellphones, telecoms, and affordable data services, a new technological landscape is emerging. Secure e-commerce platforms and new market participants with more consumer awareness and banking sector opportunities are brought about by this. FinTech's growth indicates that financial services will continue to advance. In addition to reduced transaction costs, improved service delivery, and innovation, FinTech offers banks high-value business benefits in operational, managerial, and strategic domains. FinTech provides consumers with additional options, reduced costs, easier transaction chains, improved customer service,

and more efficient operating costs as a result of information flows. Issues with FinTech services were noted in this evaluation. Competing financial institutions' inability to agree on standards, guidelines, and laws governing access to banking systems is a factor in coordination. A business need a strong technological infrastructure, flexibility, and security to increase a system's stability. This implies that businesses who want to invest in new technologies and learn more about FinTech should be conscious of their operational issues. Collaboration is one of FinTech's biggest obstacles. For every new business, choosing the ideal partner may be a difficult and time-consuming endeavor. FinTech more effectively delivers digital banking services (Yulius et al., 2019). The tension between the challenge of innovation and how contemporary businesses handle technological advancements is managed by a methodical strategy (Wonglimpiyarat, 2017). Payment systems, insurance, loans, and investments are all available to the public through digital banking and financial services.

Table 2. Classification of Blockchain in Banking and Finance

Blockchain	Classification	References
Banking and finance	Digitalization, Efficient, trust, transparency, secure transactions, reduces cost and fraud, economic growth	Huckle & White (2016); Underwood (2016); Collomb & Sok (2016); Swan (2016); Low & Teo (2017); Prybila et al. (2017); Dandapani (2017); Wolfond (2017); Zignuts (2020)
Technological advancement	Computation, security, technology maturity, permissions, smart contract, scalability, interoperability	Folkinshteyn and Lennon (2017); Underwood (2016); Ryan (2017); Evans (2017); Kshetri (2017); Dandapani (2017); Khan & Salah (2017); Rubaiyat (2018)
Benefits	Operational, managerial, strategic, infrastructure, trust, transaction cost, transparency and accountability	Collomb & Sok (2016); Medeiros & Chau (2016), Folkinshteyn and Lennon (2017); Wolfond (2017); Cocco et al. (2017); Swan (2016); Doshi (2021)
Challenges	Organization, awareness and understanding, cost efficiency, regulation and governance, security and privacy, technology and standards, environment and energy	Collomb & Sok (2016); Folkinshteyn and Lennon (2017); Cocco et al. (2017); Khan & Salah (2017); Prybila et al. (2017); Swan (2016); Ryan (2017); Kshetri (2017); Nasscom (2020); Krishnapriya (2020)

Blockchain technology reduces costs and ensures regulatory compliance while making a company more transparent, decentralized, efficient, and safe. Blockchain technology reduces or eliminates theft and

other illegal fraudulent activity by producing an unchangeable record of transactions through end-to-end encryption. Traditional banking services have changed significantly as a result of blockchain technology advancements. Nevertheless, real-time applications of blockchain have yet to broadly adopt its promise features. Blockchain applications' benefits and strengths are still being worked out. Blockchain technology offers banks operational, managerial, strategic, and infrastructure advantages from a commercial standpoint. Blockchain facilitates identity management, trust, improved recordkeeping accuracy, transparency, fraud reduction, privacy, and financial services efficiency. It also requires less physical infrastructure to move products and services. Similar to storing data in a database in a manner that shields the central database from threats, blockchain also offers improved security (Park & Park, 2017). Wamba et al. (2019) claim that behavioral intent to use blockchain technology is highly predicted by the system's openness. Because the transactions are shared among all nodes, transparency is promoted, which increases user confidence (Osmani et al., 2020). Adopters of blockchain technology should be aware that there are now very few norms and regulations and that the technology is still in a major stage of development. Blockchain still faces regulatory challenges and demands processing power, costly IT infrastructure, and transaction security. Implementing blockchain technology in the banking industry requires more time due to issues with identity verification, scalability, energy consumption, consensus process, adoption cost, and setup. Although it has long been seen as a cornerstone of economic stability, the banking sector is currently undergoing significant upheaval. All types of transactions can be encrypted using blockchain technology to safeguard the integrity and identity of all parties. Banks are interested in learning how blockchain can assist solve issues with the current financial system. Cryptocurrencies like Bitcoin and Ethereum are no longer the only ones that use distributed ledgers. Because distributed ledgers are immutable, every transaction in a network has multiple concurrent versions of the truth shared. In the global economy, blockchain technology is being utilized to streamline product features, reorganize market processes, and enhance the user experience. Blockchain will eventually make it possible to exchange goods and services in a more economical and safe manner. Blockchain technology can help banks and other financial organizations make international and bank-to-bank payments faster and cheaper. Blockchain technology may also facilitate the development of a decentralized client identity system, however this idea is still in its infancy (Hershkovitz, 2021). Banks have confirmed their increasing interest in implementing blockchain technology, which has shown promise in a number of industries.

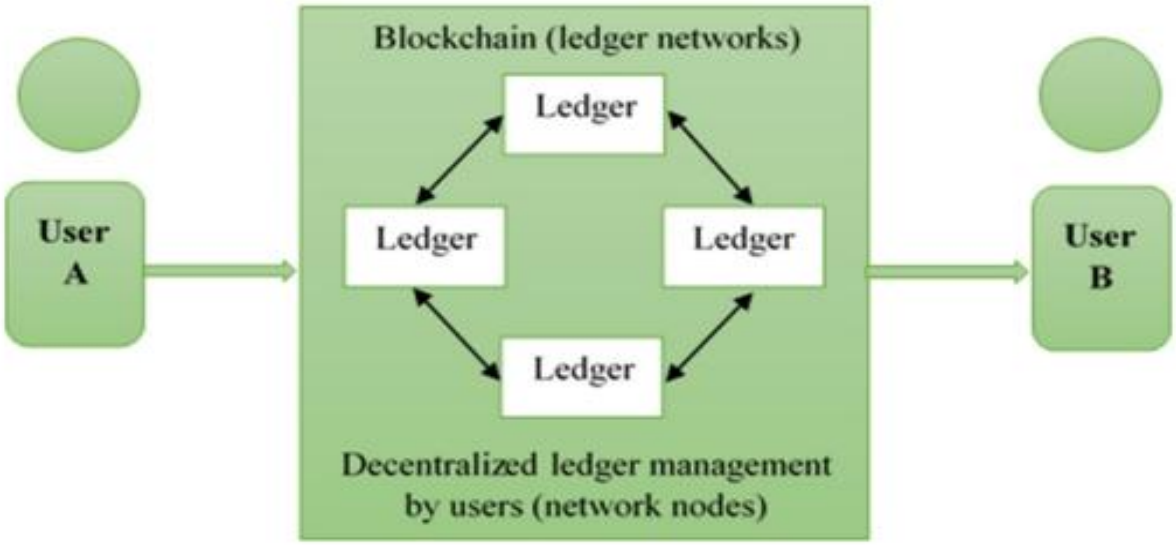

Figure 2. Decentralized payment system

The authors concluded that traditional banks will move to the digital banking direction due to the need for technical change, teamwork, and cost savings. To enhance customer experiences, banking and financial services are constantly searching for cutting-edge technology. The financial sector's needs are being driven by the emergence of new technologies and rising consumer expectations, and digital transformation is essential to growing the consumer base. Business and financial services will probably undergo significant changes as a result of fintech advancements. Even while blockchain technology is currently the most promise in the banking and finance industry, it still confronts a number of obstacles. Blockchain is not seen as a technological enemy for currency or central banks. "Thus, the future for blockchain technology can only get brighter." – stated Kumari, A., & N. Devi, C.

2.3 The Role of Digital Platforms: Single-sided vs. Multi-sided

With the race for innovation and the evolution of digital platforms, the latter have seen a structural change that also involves user interaction in their use. In fact, digital platforms can be distinguished into two types: single-sided and multi-sided. This section addresses the aforementioned issue, exploring and analyzing the differences between the different types. First, it is good to start with the definition of the two types in order to understand the differences and explore them in their broader concept. Single-sided platforms are digital technologies in which interaction between users affects only one category of users; social networks such as Facebook and Instagram are platforms in which interacting users all have the same role: sharing and interacting to other users' content. Whereas, in multi-sided platforms there is interaction between different groups and categories of users with different roles and interests. Good examples are Uber and JustEat; drivers and passengers interact in a single platform in the former, and suppliers and consumers in the latter. Therefore, a single-sided model involves only one user group, while a multi-sided model connects multiple groups with distinct roles. Hence, we report on a very interesting study related to the business model dimension of digital platforms, which therefore analyzes their evolution and development process over time. The study, conducted by Parmentier, G., and Gandia, R., and titled "Redesigning the Business Model: from one-sided to multi-sided," introduces the topic by pointing out how the spread of information and communication technologies have created new business opportunities with the emergence of multi-sided platforms. With the reduction of costs for information acquisition and intermediation, many multi-sided platforms such as eBay, Amazon, YouTube, and Airbnb have emerged on the Internet, relying on business models (BMs) that facilitate connection between different complementary and interdependent user groups, generating indirect network effects.

Multi-sided platforms combine the sides of one or more markets with a technical platform. A technology platform is a collection of parts and interfaces that together give a group of goods a common framework. Because it can be separated into interconnected subparts, a technological platform's architecture is modular (Simon, 1965). At the product level (product architecture), organization level (processes), industry level (value chain architecture and value network architecture), and market level (customization of product/service offerings), this modularity enables addressing strategic reflections to maximize performance (Fixson, 2005). Therefore, from a strategic standpoint, a multi-sided platform promotes innovation since it offers a modular structure for connecting several technologies and agents, enabling economies of scale in both supply and demand (Gawer, 2014). Because of their accessibility, networking capabilities, and low cost of material duplication, digital technologies (software, the Internet,

communications networks, etc.) are frequently the foundation of this system (Shuen, 2008). According to economic theory, a multi-sided platform is a shared market area with many sides that engage with complementing clientele to gain from network effects (Rochet and Tirole, 2003; Evans, 2012). In this way, a side is defined as a homogeneous group of consumers, in one or more markets, with needs, behaviors and willingness to pay similar fees (Evans and Schmalensee, 2007). Within a multisided platform, the value of a product or service depends on direct network effects on the same side (the value of goods varies with the number of users) and indirect or cross-side network effects (the value of goods increases with the number of users on the other sides and vice versa) (Eisenmann et al., 2006). In a multi-sided platform, direct network effects provide economies of scale whereas indirect network effects provide economies of scope in innovation (Gawer, 2014). Finally, a multi-sided platform can be defined as a technological platform in which each side can be characterized by a specific process of value creation, value proposition and value capture - and based on a specific BM architecture that we propose calling a multi-sided BM. Thus, a multi-sided BM can be defined as a strategic design model in which: (1) the value proposition is delivered to complementary and interdependent customer groups in one or more market segments and (2) value creation and value capture are organized with a technological platform that connects the sides and produces network effects. The figure below shows perfectly how MSDs work and how user category interact to each other.

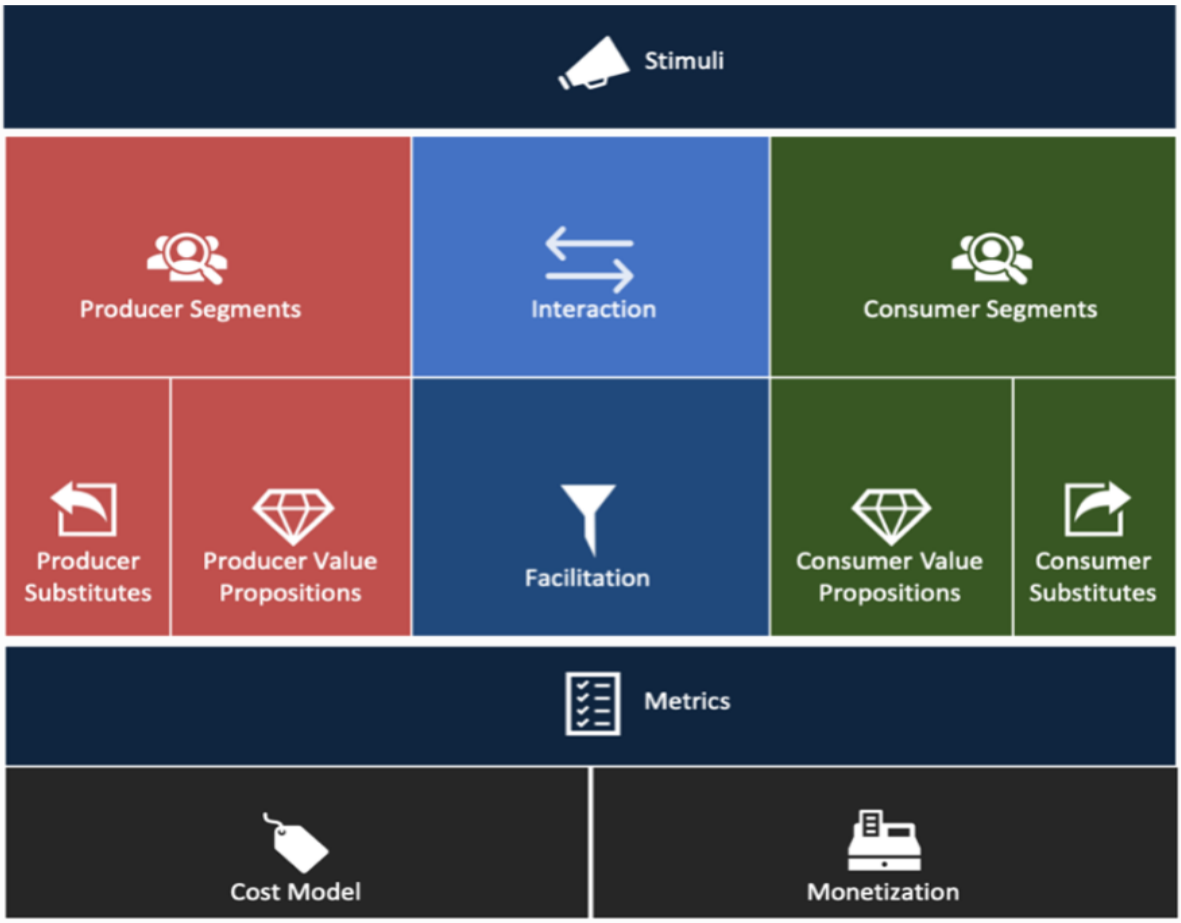

Figure 1: https://www.forbes.com/sites/tedladd/2019/11/26/designing-and-analyzing-multi-sided-platform-companies-with-the-platform-canvas/

Another interesting study regarding the same topic has been conducted by Øverby, H.; Audestad, J.A. Called "Multisided Platforms: Classification and Analysis", this study approaches the multisided platforms (MSPs) dimension. A specific section of this refers to the concept of multisided digital platforms, exploring details concerning market feedback, pricing, competition, business ecosystem, and market regulations. The first one involves network effects. Positive feedback from the many MSP market segments creates network effects, also known as network externalities. Same-side network effects can occur when users in one user group provide feedback to other users in that same user group. Cross-side network effects are feedback flows from one user group to another. Same-side and Cross-side network effects can be either positive, meaning they raise the likelihood that other users will use the service, or negative, meaning they decrease the likelihood that other users will sign up for the service or even convince current users to discontinue their use. Only positive network effects are taken into account in this article.

The pricing strategy and, thus, the revenue-generating process may be intricate. In the digital economy, several instances of price regimes for multisided platforms include:

• "All user groups pay for the services they receive, for example, sellers and buyers using eBay and property owners and renters on Airbnb.

• Some users of a user group may pay for the services they receive, and other users may receive downscaled services for free, while other user groups (e.g., advertisers) may pay for all services they receive (e.g., advertisements and marketing). Examples of businesses applying such payment methods are electronic newspapers and Spotify.

• One or several user groups receive the services for free while other user groups pay for the services (e.g., Facebook and Google Search)." – as they report in the article.

If there is a significant network effect across user groups (for instance, between Facebook users and companies creating targeted ads), MSPs typically utilize the last two pricing models. By encouraging the growth of users in the other user group or groups, subsidizing one of the user groups may boost rather than decrease the platform's revenue.

The platform may face competition from other platforms that provide similar services (like Facebook and Myspace) or from completely distinct platforms that aim to draw in certain clientele (like Facebook and Google Search vying for advertising). Although it may seem counterintuitive, for many platform operators, this kind of rivalry is the biggest obstacle to success. Customers of the same user group may also compete with one another (for example, drivers providing services via the Uber platform).

The ecosystem for MSPs is more complicated than that of other companies due to competition. Because of this, the MSP occasionally needs to include stakeholders in its ecosystem analysis that don't seem to be connected to the platform's main business domain. As a result, not all of the strategic problems the MSP is facing may be captured by conventional business modeling methods. For instance, business models may consider the different business sectors independently and improperly account for cross-side network effects.

Finding a single regulatory framework that promotes fair competition and prevents market failures like monopoly formation is challenging when there are several user groups and significant network effects

within and across the user groups. The MSP has a monopoly in one market segment but not in others, which is one specific issue. Facebook, for instance, has a monopoly in the social media services market but not in the advertising market. It may be challenging to determine what can be regulated, the true impacts of the regulation, and, in particular, how to prevent market failures due to the complexity of the ecosystem and competition.

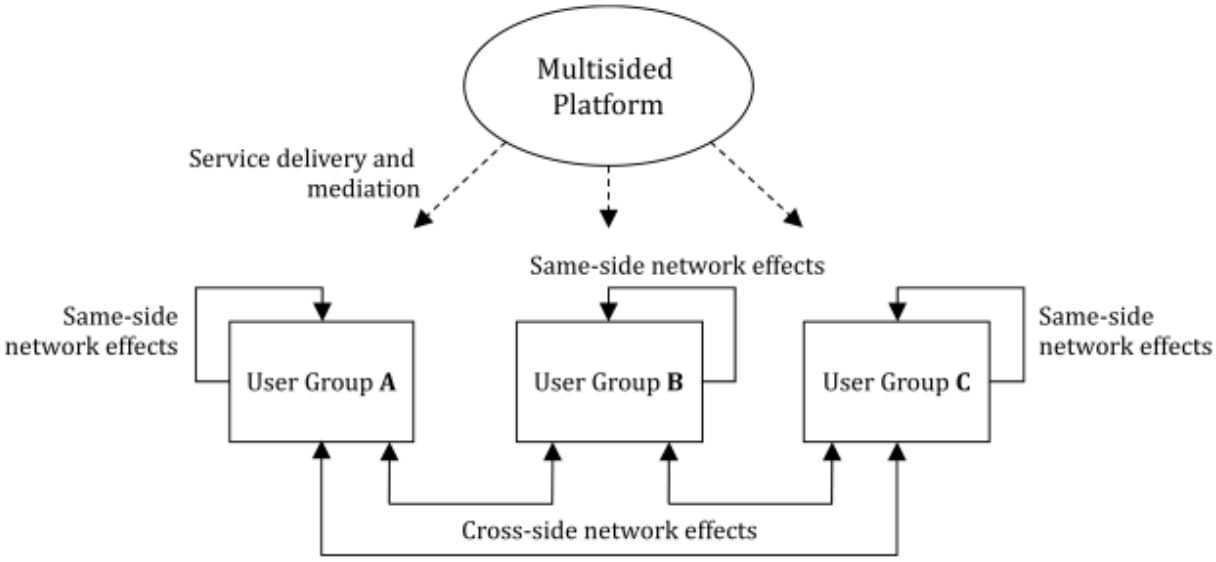

Figure 1. A multisided platform with three user groups—A, B, and C. Same-side and cross-side network effects within and between user groups, respectively, are indicated.

Fintech platforms tend to be multi-sided. This is because, as it is said before, they usually connect different groups of users with distinct roles, facilitating interactions between them. For example:

- **Private users** (consumers), who use the platform to manage their finances, make investments, obtain loans, or make transactions.

- **Financial institutions** (banks, insurance companies, investment funds), who offer services such as loans, insurance, or investment products through the platform.

- **Investors**, who provide capital for peer-to-peer loans or investments.

Fintech platforms, therefore, facilitate the flow of capital, information, and services between these different user groups, which makes them multi-sided. A well-known example might be PayPal, which connects consumers, vendors, and banking institutions.

In conclusion, the evolution of digital platforms from single-sided to multisided models has significantly reshaped how users interact within the digital economy. Single-sided platforms, such as social networks, focus on a single user group where interactions and content sharing occur within the same category of users. In contrast, multisided platforms, such as Uber and JustEat, connect distinct user groups with complementary roles, facilitating interactions between them and generating network effects. These platforms thrive by enabling economies of scale and scope trough their modular architecture and the strategic design of their business models, fostering innovation and broadening market reach. Multisided platforms, especially in the fintech sector, create value by facilitating capital, services and information flow across various user groups – consumers, financial, institutions, and investors – thereby promoting more complex and dynamic interactions. However, the intricacy of managing these ecosystem bring challenges in terms of competition, pricing, strategies, and regulation, particularly with the presence of cross-side network effects. As multi-sided platforms continue to dominate industries like fintech, their capacity to generate externalities and foster cooperation between different user groups will play a critical role in shaping the future of digital business models.

2.4 The Interaction Between Traditional Banks and Fintech: Competition or Cooperation?

After including a literature background about digital platforms, innovations and fintech, analyzing the evolution of technological finance and its impacts on banking and financial services, it is important to understand whether or not new market players, which are changing the competition and traditional business model of companies in the financial industry, by strategy or survival, tend to cooperate or not with the big incumbents in the market. In this regard, it is reported the article cited above in the first paragraph of this chapter, "Disruption and Digital Banking Trends." In fact, a specific section of this study explores the topic of the above paragraph. It is equally necessary to specify that data in the referred article date back to the publication date, 2020. The authors reported very interesting information, suggesting a strong demand for financial services of a technological nature. But there are conditions and customer needs that hold them close to the big, old banks.

Although the demand for fintech services and products is growing from the standpoint of banking customers, according to the PYMNTS (2019) survey report, 90.6% of US consumers said that their primary banks met their needs. The most frequently mentioned response from respondents was still trust (63%). Other responses, such as user-friendly mobile apps (44.4%) and online banking services (57.5%) from customers who would be interested in banking with non-financial organizations (i.e., digital-only banks), came next. Big tech and fintechs were the top five banking brands among respondents: PayPal accounts for 30.5%, Amazon.com for 24.8%, Walmart for 17.5%, Google for 14.9%, Apple for 13%, Mastercard, and Square for 13.5%. For the comparatively flat years between 2009 and 2017, fintech start-ups and incumbent banks and card companies recognized the need and advantage of combining strengths in partnership models between fintechs, start-ups, and incumbent financial and technology institutions. In 2018, they partnered with fintechs and redefined the financial industry through various forms of strategic leveraged collaboration. Most international financial institutions worry that if they don't work with fintechs to integrate all the new developments, they would lose money. In order to take advantage of technological advancements and frequently save money and time through partnerships, venture capital, private equity, or mergers and acquisitions, banks are obviously **shifting to collaborate** with fintechs rather than creating their own internal solutions. By managing their internal capabilities and rivals' partnership plans, banks believed that working with fintechs would provide value at the heart of their financial innovation initiatives through agile digital transformations. In high-margin industries like lending, financing, and investing, banks are moving to further digitize. They are also collaborating with

artificial intelligence (AI) firms (AI-techs) to enhance customer service by sharing embedded analytics and AI, which includes digital engines of big data, omnichannel hubs, and digital experiences. Online and mobile banking, digital wallets, point apps such as SME Enable, youth banking, and mobile teller, as well as fintech and third-party providers (TPPs) and open APIs for user involvement are examples of digital experiences. Core, liquidity management, wealth management, payments, trade finance, and treasury are examples of digital business engines. To give consumers simple, one-stop access to financial products and the capacity to handle various financial demands through integrated channels, banks can provide a combination of internal and TTPs (such as fintechs) offers. (Barreto, Volin, & de Freitas, 2020). As investors or through strategic partnerships for value creation, the majority of established banks, insurers, and investment firms have worked with at least one fintech business since 2018, up from 55% in 2016. They plan to make additional investments in their fintech relationships in the coming years. Global venture capital (VC) fintech investment increased from $1.8 billion in 2011 to $30.8 billion in 2018, according to McKinsey (2019). According to a 2017 PwC survey, 82% of present financial service providers want to expand their partnerships, investments, acquisitions, and global expansion during the next five years (McKinsey, 2018, 2019). The capacity and capability of compliance and regulatory capabilities, as well as the enormous customer data sets that the traditional banks have in their core current account mortgage products, are extremely beneficial to fintechs, especially smaller and newer players. Big banks believe that fintech firms are powerful sources of information and innovation from an outside technology, giving them the opportunity to disrupt themselves. The article presents some cases of this collaboration between fintech start-ups and incumbents financial players:

I. In order to add an advisor-led tech-enabled platform, Goldman Sachs partnered with Elinvar 13 and acquired United Capital and its FinLife CX digital customer-service platform. The purchase of Final by Goldman Sachs is an augmentation tactic. Final adds digital capabilities for fraud and theft protection, such as those that let customers track their spending in real time, to Goldman Sachs' collaboration with Apple Card.

II. JPMorgan Chase set aside $11.5 billion for technology initiatives in 2019 alone. The firm also acquired InstaMed to strengthen its position in the payments industry. additional strategic alliances the bank has with fintechs, such as Symphony, a secure messaging app; Roostify, a mortgage fintech; and OnDeck, a small business lender. JPMorgan Chase's payments platform is supported by its recent $400 million acquisition of WePay.

III. Demyst Data and Citibank teamed to provide plug-and-play financial capabilities and credit scoring for the lending division. Citi Ventures made investments in big data and analytics firms as well as Betterment, Blue Vine, C2FO, and Chain. Citibank created Citicoin, a digital currency that is now in pre-production.

3. RESEARCH METHODOLOGY

The research methodology adopted for this thesis is based on a qualitative approach, which allows for an in-depth exploration of participants' perceptions and experiences, focusing on the context and dynamics related to the adoption of fintech technologies in the financial sector, with a focus on banking. The qualitative approach was chosen for its ability to elicit rich responses of meaning and understanding through an interpretive analysis of bank managers' opinions.

3.1 Methodological Approach: Qualitative vs. Quantitative

The research focuses on a qualitative approach, as it aims to understand and analyze phenomena related to digital innovation in banks and the adoption of fintech solutions. Unlike a quantitative approach, which focuses on numerical and generalizable data, the qualitative method allows to explore the significance of individual experiences, gaining a deeper understanding of the motives, challenges, and opportunities that bank managers see in the integration of these technologies. As this is a current topic, it is interesting to conduct a qualitative analysis on it as it allows to delve deeper into how technological progress and the adoption of tech tools and platforms in the financial sector is evolving over the years and to understand the position of the Italian market with respect to the topic.

Therefore, this study employs a qualitative methodology because it enables an in-depth exploration of banking managers' lived experiences, perspectives, and decision-making processes - dimensions that cannot be fully captured through numerical measurement alone. As Creswell and Poth (2018) point out, qualitative inquiry is especially suited to uncover "how individuals interpret their experiences, construct their social worlds, and assign meaning to those experiences", which aligns directly with the goal of understanding the nuanced attitudes toward fintech adoption.

Case study design further supports this endeavor by situating the phenomenon within its real-world context. Yin (2014) emphasizes that case studies are optimal for examining contemporary events where the boundaries between phenomenon and context are blurred, thus allowing researchers to trace the interplay between organizational environment and managerial choice. Building on this, Eisenhardt's (1989) grounded theory approach demonstrates how iteratively comparing data and emerging concepts can yield robust theoretical insights. To manage and interpret the rich qualitative data, it was adopted the

coding frameworks and analytical strategies outlined by Miles, Huberman, and Saldaña (2014), which provide structured techniques for identifying themes, patterns, and relationships across interview transcripts and field notes (Miles et al., 2014). Their step-by-step guidance on data display and cross-case synthesis ensures transparency and rigor in how to transform complex narratives into coherent findings.

Finally, Silverman (2021) reminds that qualitative analysis demands reflexivity - continuously evaluating one's own preconceptions and engaging in an ongoing dialogue between data and existing literature. This reflexive stance underpins our entire process, from interview protocol design to final interpretation, safeguarding the credibility and trustworthiness of the conclusions. The entire development and process of data elaboration and interpretation are explored in the third paragraph of this chapter.

3.2 Data Collection Tools (Interviews with Banking Managers)

To collect qualitative data, semi-structured interviews were conducted with a sample of managers from various banks and asset managers. The participants, 5 major players in the banking industry, were selected based on their direct experience with the adoption of fintech technologies within their institutions. The questions provided, were developed to explore various aspects of fintech adoption, includes ones aimed at investigating the integration of innovative technologies, growth strategies, the impact of regulations, and the effects of digital platforms in the banking environment.

Therefore, the main tool for data collection is the protocol of interviews, some completed by individual participants while others via an online meeting, with bank managers. The interviews were designed to gather detailed, qualitative information regarding banks' approach toward fintech adoption, regulatory challenges, and implications for competitiveness and innovation. The interview questions were developed to stimulate in-depth reflection and elicit responses that could reveal new perspectives on the adoption of digital platforms.

3.3 Data Analysis Methods

The analysis of the collected data was conducted using qualitative analysis techniques, particularly thematic coding, which enabled the identification and interpretation of themes emerging from respondents' answers. As outlined by S., K., Ahmed, 2025, in its article named "Using thematic analysis in qualitative research", based on the milestone of Braun & Clarke, 2006, six steps are identified to develop a complete and detailed data analysis:

1. Familiarizing yourself with the data
2. Generating initial codes
3. Searching for themes
4. Reviewing potential themes
5. Defining and naming themes
6. Writing up

These are necessary to avoid personal pre-judgements and interpreting data properly. By generating codes and relating them to specific themes, it is possible to discover clear trend in the answers allowing

the research to captivate intriguing and meaningful insights. This method allows for in-depth categorization and analysis of the data, identifying recurring patterns and distinguishing key areas of interest, such as the adoption of specific fintech technologies, regulatory barriers, and cooperation between traditional and fintech banks.

Building on the six-step thematic coding framework mentioned above, the development of the thematic analysis unfolded as a deliberate, reflexive journey designed to minimize bias and maximize interpretive depth. After the interview collection, all of them were read in full to absorb not only the semantic content but also the affective texture of participants' words. This familiarization phase served a dual purpose – first, to attenuate the risk of premature judgements by lingering over nuance, and second, to generate a rich collection of analytic memos charting initial hunches and emergent curiosities. Armed with these reflections, the next phase consisted into the generation of open codes, systematically segmenting the text into the smallest meaningful units – often a clause or single sentence – and assigning provisional labels that captured each unit's essence. With open codes generated, the third step was the search for themes by clustering codes that spoke to related phenomena – grouping, for example, all instances of "regulatory friction" and "compliance complexity" under a provisional theme of "institutional barriers". This clustering was guided by constant comparison, continuously moving between code clusters and the full transcripts to ensure that themes remained anchored in participants' own language. The subsequent review phase involved two levels of scrutiny. At the first level, each candidates theme against its constituent codes were examined, collapsing or subdividing as needed to achieve both internal coherence and clear distinction from other themes. At the second level, themes related to one another across the dataset were mapped, constructing a thematic network that revealed, for instance, how "digital literacy gaps" intersected with "customer adaptation challenges" to amplify service-delivery risks. Once the thematic structure had stabilized, themes were defined and named, crafting concise labels that encapsulated each theme's central meaning. Finally, in the write-up phase, the last one, thematic map were turned into a cohesive narrative, demonstrating how each theme logically arose from the data and illuminating the interplay among technological, organizational, and regulatory dimensions. This transparent, step-by-step account not only strengthens the study's credibility but also equips future researchers to trace, or replicate, the analytic path from raw interview to insight.

4. RESULTS OF THE EMPIRICAL ANALYSIS

This section aims to provide the results given by the qualitative analysis conducted on the basis of the collected interviews to 5 managers of different big player in the financial services sector. Data analysis relies on the implementation of the six processes tackled in the previous chapter, Braun & Clarke (2006) one. The chapter is articulated into 6 paragraphs, each of them touching specific topics, whose scope was particularly detailed in the interview protocol: adoption of fintech technologies, digital platform strategies in the banking sector, the impact of network effects in financial platforms, performance of traditional banks in the fintech Era, regulation and governance of the fintech sector, and competitive advantage of digital platforms in financial services. The following approach allows for a more comprehensible and fluent reading.

4.1 Adoption of Fintech Technologies

4.1.1 Blockchain, AI, P2P Payments, and Other Innovations

All five institutions are actively piloting a range of emerging fintech innovations - captured by the codes "Asset tokenization," "Blockchain experimentation," "AI for compliance and portfolio analysis," "P2P payments trials" and "Advanced analytics" - and these codes collectively underpin the emergent themes of exploratory blockchain experimentation for asset management, AI-driven decision support and compliance, and targeted P2P payment trials for under-banked niches. In practice, the blockchain experimentation for asset management theme comes to life when, as one asset-management director recalls, "With the platform, we were attempting - via Allfunds – a blockchain solution for securities transfers, aiming to streamline settlement processes," anchoring the understanding of how decentralized ledgers can reduce reconciliation times. In parallel, the AI as decision-support and compliance tool theme is illuminated by the AI for compliance and portfolio analysis code when the head of risk emphasizes that "we are already using AI to enhance the AML process and optimize portfolio analysis," illustrating how artificial intelligence automates routine tasks, flags anomalies in real time, and frees staff for higher-value work. Meanwhile, pilot projects in peer-to-peer payments - tagged under the P2P payments trials code - "We launched a pilot peer-to-peer payments project in partnership with a local fintech, targeting international corporate clients" - demonstrate the P2P payments trials for under-banked niches theme in

action. To sum up, all five organizations are running exploratory use cases in blockchain and AI, focusing on reducing reconciliation times and supporting compliance activities. P2P projects remain in pilot stage and concentrate on vertical market segments (e.g., corporate), while advanced analytics emerge as a cross-cutting lever for decision-making and customer insights.

Experimental blockchain adoption in securities transfer aligns with a recent systematic review showing that smart-contract–based and tokenization applications improve transparency and reduce settlement times by up to 60% versus traditional systems (Shankar & Radhakrishnan, 2024). Indeed, blockchain's decentralized and immutable nature enhances transaction security and mitigates data-fraud risks, ensuring data integrity. AI analyzes transaction patterns in real time to detect anomalies and suspicious activities and automates routine tasks such as credit assessment and customer service, thereby reducing operational costs. Meanwhile, B2B blockchain use increases counterparty trust through an immutable ledger, as highlighted in a meta-analysis covering over 100 fintech studies between 2020 and 2024. Emerging technologies are redefining the financial sector, creating a more efficient, secure, and customer-centric ecosystem. However, success hinges on balancing innovation with risk management and fostering collaboration among stakeholders alongside sustained R&D investments (Kou & Lu, 2025).

4.1.2 Challenges in Technology Adoption (Regulatory, Customer Adaptation, Complexity)

Despite enthusiastic experimentation, firms confront a cluster of interrelated barriers - encoded as "Regulatory barriers (GDPR, PSD3, MiCA)," "Legacy-system complexity," "Internal skills gap," "Resistance to change," and "Privacy and data governance" - which give rise to the emergent themes of regulatory compliance as the principal brake, complex legacy-system integration, and the necessity of comprehensive change-management and training programs. As the first candidate notes, "The technological complexity is enormous, especially when ensuring full GDPR compliance on sensitive data," directly illustrating the Regulatory barriers code and the theme of regulatory compliance as the principal brake. Compounding this, the Internal skills gap and Resistance to change codes emerge when another manager observes, "Our primary user base is aging: customer adaptation among senior users is definitely a challenge in terms of skills gap and awareness," underscoring the change-management and training theme. A senior manager adds that "corporate clients, often multi-layered, require dedicated change-management paths and specific training," reinforcing that theme, while another reflects that "there are hundreds of initiatives and a huge time commitment to study and adopt technologies.

Sometimes it's better to launch a new product with old technology. It's a trade-off," which exemplifies the integration with legacy systems theme.

Therefore, the most recurring obstacles relate to data governance and stringent regulatory policies, compounded by a significant internal skills gap that necessitates ongoing training programs. Legacy infrastructure integration slows time-to-market and increases project costs. Customer adaptation proves a major hurdle: according to Eurostat, nearly a quarter (24.3%) of the Italian population is 65 or older. Age is thus a critical factor in the adoption of technologies in general, and fintech in particular. Organizations must implement tools not solely to boost efficiency and cut operating costs but also to facilitate service usage for customers, thereby contributing to social welfare.

4.2 Digital Platform Strategies in the Banking Sector

4.2.1 Business Models: Single-sided vs. Multi-sided

When it comes to platform architecture, incumbent asset managers overwhelmingly adhere to a single-sided model (captured by the "Single-sided predominance" code) that engages exclusively in B2B relationships and delegates retail-facing activities to distribution partners - embodying the emergent theme of single-sided B2B focus. "Our core remains a single-sided model: we are a B2B asset manager and do not interact directly with retail," explains the first participant. In contrast, challenger banks are beginning multi-sided experiments (the "First experiments multi-sided" code) "some challengers aim for multi-sided platforms to offer cross-side services between merchants and retail users" - which points to the nascent theme of multi-sided platform exploration and the quest for data-monetization potential (from the "Data monetization potential" code). It arises that asset managers maintain a vertical focus and delegate customer relationships to distribution partners. Pure-play fintechs alone explore multi-sided platforms, seeking to leverage cross-side network effects and new data-monetization revenue lines. In asset management, the single-sided model stays dominant, consistent with findings that such platforms favor point-to-point B2B relationships and subscription-fee monetization. Multi-sided platforms, though more ambitious, demand upfront investments in ecosystem governance to overcome the "chicken-and-

egg" problem[4] (Cong, Tang, Xie & Zhao, 2024). Data monetization is acknowledged as a future opportunity, yet only 35% of active platforms fully exploit it, due to data-privacy regulatory constraints (Sharma, Sharma & Dhingra, 2024).

4.2.2 International Expansion and Market-Entry Strategies

Across the board, internationalization is viewed through the lens of the "Expansion in Europe and UK" and "No targeted extra-EU entry" codes, yielding the emergent themes of domestic and continental consolidation and the deliberate avoidance of extra-EU expansion. "We operate primarily in Europe and the UK: the group's strategies are extended to our branches," remarks one executive, while another confirms, "For now, we do not plan to launch services outside the EU perimeter." By replicating proven parent-company models rather than venturing into extra-EU markets, organizations minimize regulatory and cultural risks and leverage established operational frameworks.

It is clear that the internationalization strategy is perceived as low priority: organizations prefer to stabilize the Italian and, some of them, the European markets, avoiding regulatory and cultural-local risks. Geographic scalability occurs by replicating validated group models.

4.2.3 Scalability and Key Growth Factors

Scalability emerges as a crucial determinant of platform success, driven by the codes "Cloud-native & API economy," "UX and digital onboarding," "Infrastructure elasticity," and "Data quality," which inform the themes of cloud-native architecture for elasticity, seamless digital onboarding and open APIs, and UX as a competitive lever. As one digital officer observes, "Scalability depends on the number of users, data volume, and the robustness of the API layer," linking the Cloud-native & API economy code to the cloud-native architecture for elasticity theme. Equally, "a fully digital, end-to-end onboarding reduces friction and speeds time-to-market for new products," reflects the UX and digital onboarding code and its associated theme.

Evidenced above is that cloud-native architectures and the API economy are prerequisites for rapid scaling: recent studies show that platforms adopting microservices and containerization reduce

[4] The chicken and egg paradox represents a situation in which in a specific environment, like a two-sided marketplace, the parties are dependent one on another. For example, an e-commerce platform needs the presence of both sellers and buyers, otherwise its existence would be worthless.

deployment times by 40% and enhance resilience to load peaks (Cusumano, 2022). Moreover, a seamless end-to-end digital onboarding experience correlates with an 85% completion rate versus 60% in hybrid (online/offline) processes (Gratton, 2024). Collectively, these factors shape a blueprint for sustainable platform expansion, underscoring the interplay of technical architecture, user experience, and operational scalability.

4.3 The Impact of Network Effects on Financial Platforms

4.3.1 Growth and Value-Added with Increases in Users and Providers

The analysis revealed that, even within predominantly single-sided B2B models, indirect network effects significantly amplify platform value. Initial codes such as "Indirect network effect," "Third-party integrations," and "Value amplification" converged into the themes indirect network effects in B2B contexts, value added by fintech-partner integrations, and virtuous cycles of value creation. As one manager noted, "The more third parties integrate our APIs, the greater the features available to institutional clients," vividly illustrating how each additional provider enriches the platform's proposition.

An intriguing insight is the value added served by network effects even without a pure multi-sided model. In fact, managers recognize the potential of indirect network effects based on the number of partner integrations: each new provider enriches the overall value proposition. That is perfect aligned with literature and recent studies; an empirical analysis of marketplace-lending platforms shows that each new integration increases perceived value by 12%, measured as average dashboard usage time by institutional clients (Cong, Tang, Xie & Zhao, 2024). This confirms that in B2B environments, ecosystem growth generates a virtuous circle of provider–client value added.

4.3.2 Challenges in Managing and Amplifying Network Effects

At the same time, leaders acknowledged that - because most institutions remain single-sided - the usual "chicken-and-egg" barriers do not apply. Codes like "Chicken-and-egg problem (not applicable)," "Lack of ecosystem governance," and "Scarce formal incentive mechanisms" gave rise to the themes absence of chicken-and-egg concerns, gaps in ecosystem governance, and limited incentive structures.

One interviewee affirmed, “We have not encountered significant network-effect barriers: our model is single-sided,” highlighting the need for more formal governance and rewards to sustain partner engagement, but at the same time is it not so applicable due to the prevalence of single-sided models. For this reason, network effects are limited in a certain sense due to the platform nature. In conclusion, the topic of managing network effects - and thus the related challenges - is marginal, given the prevalence of the single-sided model. There is no dedicated governance or formal incentive programs.

4.4 Performance of Traditional Banks in the Fintech Era

4.4.1 Changes in Revenue Models (Fee-based vs. Interest-based)

Traditional banks are recalibrating their revenue mix under pressure from fintech entrants. The codes “Shift toward fee-based services,” “Resonance of interest margins,” and “Hybrid models” crystallized into the themes move to commission-based revenues, decline in traditional spreads, and experimentation with hybrid models. One executive explained, “Margin pressure is strong: we are increasing our fee-based offerings to offset the squeeze on interest margins,” demonstrating how banks deploy fees to stabilize income. The analysis reveals a growing trend in offering fee-based services - i.e., commission-driven revenue - to maintain competitive positioning and adapt to new customer needs. The rapid spread of advanced tools and technologies has generated new user demands, shaping market requests. Users require smart, fast, and user-friendly technologies for every activity, including platform interfaces and functionalities. The transition from spread-based income to fee-based services (robo-advisory, B2B platforms) is global: from 2018 to 2023, the non-interest revenues of the top 50 institutions grew by an average of 7% per year, against a 1.5% decline in interest margins (Javaid et al., 2022). Banks with a consolidated hybrid model manage to stabilize ROE and mitigate interest-rate volatility.

4.4.2 Cooperation vs. Competition Between Banks and Fintech

Partnerships with fintech firms have emerged as the dominant strategy, reflected in the codes “Strategic partnerships,” “Product co-creation,” and “Build-versus-buy trade-off.” These informed the themes predominant collaborative approach, co-creation in compliance and digital payments, and balancing internal development with acquisitions. As one manager put it, “Partnerships with fintech allow us to co-

create digital solutions while maintaining control over the customer experience," underscoring how incumbents leverage fintech agility to innovate rapidly without ceding core capabilities. Co-creation is the norm: banks and fintech work alongside each other on digital payments and compliance, carefully choosing when to develop internally or acquire external expertise. Incumbents' partnerships with challenger banks - and vice versa - are strategic choices, embodying a fair exchange of knowledge: fintech bring agility, API expertise, data analytics, and blockchain, while banks contribute operational know-how and service networks. Both parties leverage synergies to strengthen brand image, capture market share, and enhance efficiency. Mingazzini (2022) describes this in "Fintech and Incumbent: Collaboration as Mantra," based on the Italian Fintech Index—a composite indicator of collaboration propensity and investment distribution, rated 5.7/10. Although 69% of incumbents have launched at least one initiative with fintech startups or SMEs, the market is highly polarized: 14.8% of operators account for 80% of total investments.

Collaboration enables incumbents to mobilize large capital pools for financial solidity, while PSD2-driven fintech fill banks' technology gaps. The pandemic accelerated digital adoption—mobile banking, payment apps, insurtech—demonstrating that cooperation with innovators is essential for rapid response to evolving customer needs. Such synergy has also fostered "packager" business models, unbundling value chains to offer modular, personalized services, surpassing traditional banking and insurance verticals. Finally, fintech partnerships bolster ESG initiatives: combining incumbents' distribution networks with startups' digital functionalities (carbon-footprint tracking, offset programs, sustainable-reward mechanisms) creates more effective value propositions and reduces development time and operational risks by integrating remote ID and cybersecurity solutions externally.

4.5 Regulation and Governance of the Fintech Sector

4.5.1 Key Regulatory Challenges for Fintech and Digital Platforms

Banks face stringent compliance demands - captured by codes like "KYC/AML stringency," "License-adequacy requirements," "Privacy and GDPR," and "Ambiguity on token/NFT treatment" - which coalesce into themes of stringent KYC/AML & GDPR compliance, barriers to entry for new players, and regulatory uncertainty around digital assets. One interviewee lamented, "Fintechs in asset management face major regulatory challenges, including obtaining proper licenses, ensuring strong KYC/AML compliance, and adhering to data privacy laws like GDPR. They must also navigate unclear rules around digital assets" highlighting how complex PSD3, MiCA, and GDPR regimes create operational bottlenecks and high compliance costs.

Interviewees express significant concern over regulatory ambiguity around AI implementation and digital-platform adoption, as compliance and data privacy are paramount to regulators aiming to protect users and institutions from fraud and money laundering. Although well-intentioned, such regulations can hinder startups' and incumbents' innovation. GDPR, PSD3, and MiCA complexity create an operational bottleneck: a Deloitte report estimates fintech compliance costs reached €25 billion in 2023, growing at 15% annually. Unclear guidelines on tokens and NFTs stall crypto-based solutions in up to 45% of startups awaiting definitive authority guidance (Basdekidou & Papapanagos, 2024).

Shankar & Radhakrishnan (2024) confirm compliance as a bottleneck affecting launch times and operating costs, and regulatory ambiguity on digital assets inhibits more innovative use cases. Their study highlights three key points for the future of financial transactions: blockchain regulations are evolving and create uncertainty; ethical concerns over AI bias may influence financial decisions; addressing these challenges is essential for widespread blockchain and AI adoption in finance, enhancing sector efficiency and economic performance.

4.5.2 The Impact of Regulation on Fintech Growth

Regulation both constrains and reinforces market positions. Codes such as "Time-to-market delays," "Incumbent-shielding effect," and "Regulation as trust driver" yielded the themes product-launch delays, competitive advantage for large players, and regulation building customer trust. Managers observed that,

while MiCA and PSD3 harmonize standards, they extend internal approval timelines and favor well-capitalized incumbents, raising barriers for startups. This is proven by the declaration of the first interviewee, which stated: "Compliance with existing regulations often requires asset managers to approach fintech solutions with caution. This results in a slower pace of adoption, especially when integrating new technologies like blockchain, AI, or robo-advisory tools." What managers complain about is that regulation slows the launch of new digital products due to longer internal approval processes; however, it simultaneously enhances end-user trust, benefiting well-structured incumbents that can absorb compliance costs. The BIS report "Fintech and the Digital Transformation of Financial Services" (Feyen et al., 2021) shows that traditional banks already have legal teams, compliance officers, monitoring systems, and regulatory capital in place for KYC, licensing, capital requirements, and AML reporting, whereas emerging fintech must build from scratch, incurring significant costs and delays. Fixed compliance costs (process implementation, training, audits, IT systems) and capital requirements scale more efficiently over a large customer base, whereas startups face higher per-unit costs, slowing go-to-market and compressing margins.

Incumbents also enjoy a "shielding effect" from established brand trust: having passed multiple regulatory checks, they accumulate trust capital that mitigates information asymmetries with consumers. Empirical studies show that trust in traditional lenders acts as a barrier to fintech entry. For instance, Yang (2023) finds that regions with greater post-Wells Fargo trust erosion saw increased fintech mortgage adoption, underscoring trust's pivotal role in shaping competition.

In summary, stricter regulations raise entry barriers and fix high compliance costs, reinforcing incumbents over new entrants.

4.5.3 Future Evolution of the Regulatory Landscape

Looking forward, institutions call for more adaptive frameworks. Initial codes "Regulatory sandboxes" and "EU-fintech passport" informed the themes demand for regulatory sandboxes and a unified EU fintech passport. As one respondent suggested, "Regulatory sandboxes could become the fastest way to test regulated prototypes," while a single European passport promises to overcome fragmentation and expand on the crowdfunding passport's success. Managers call for a harmonized, dynamic regulatory ecosystem with dedicated sandboxes and shared EU standards to lower innovation barriers. Regulatory sandboxes serve as controlled environments for low-risk fintech prototype testing; recent European

Parliament research stresses the need for shared technical criteria, common guidelines, and uniform KPIs to maximize learning value and enable cross-border scaling (Parenti, 2020). Complementing sandboxes, the EU fintech passport - already trialed for crowdfunding platforms - promises to overcome member-state fragmentation and foster innovative service offerings across the single market (Aben & Etti, 2022).

4.6 Competitive Advantage of Digital Platforms in Financial Services

4.6.1 Operational Efficiency and Cost Reduction Through New Technologies

The factors that confer a strong competitive advantage to digital-platform players - identified in the interviews - are operational cost reduction, scalability, enhanced service personalization, and data-driven insights enabled by automation. Digital platforms secure a competitive edge through enhanced efficiency and cost discipline. Codes such as "Cloud-native architectures," "Automation of routine tasks," "Data-driven decision-making," and "Elastic scalability" crystallized into the themes efficiency through automation, cost reduction via cloud-native operations, and scalability as a strategic lever. That emerged by the affirmation of the first candidate, which stated: "Lower costs, scalability, data-driven insights, and personalization give a competitive edge in financial services."

The literature extensively explains each of these points. The ability to reduce operational costs through automation and the elimination of manual processes is crucial for competitive advantage in financial services (Chen & Zhu, 2020). Scalability, enabled by cloud architectures and modular platforms, allows digital firms to match resources and compute capacity to demand without proportionate increases in fixed costs (Lee, 2019). Data-driven insights, powered by predictive analytics and machine learning, optimize pricing, risk management, and real-time offer personalization (Li & Agarwal, 2019). Advanced personalization, supported by behavioral profiles built on big data, improves conversion rates and customer loyalty, raising customer lifetime value (Gomber et al., 2018). API and automated-workflow integration cuts transaction processing times, minimizes manual errors, and streamlines back-office tasks (Kapoor & Dwivedi, 2021). Digital platforms also benefit from economies of scope by bundling services (payments, lending, investments), reducing marginal costs per customer (Gomber et al., 2018). Network effects further strengthen competitiveness: more users generate more data, refining algorithms and raising entry barriers for newcomers (Evans & Schmalensee, 2016). Continuous feedback loops from digital channels fuel machine-learning cycles, enhancing predictive models and operations over the long term (Wang & Wang, 2020). However, adopting complex infrastructures necessitates robust cybersecurity and compliance measures to mitigate operational and regulatory risks (Kshetri, 2018). Ultimately, the synergy of automation, scalability, data analytics, and personalization creates a sustainable competitive advantage for digital platforms in financial services (Arner, Barberis & Buckley, 2016).

5. DISCUSSION AND CONCLUSIONS

5.1 Summary of key findings

From the empirical investigation, tackled in the previous chapter, based on five semi-structured interviews with senior managers of leading financial institutions, an intense experimentation with fintech technologies—primarily in B2B contexts—first and foremost emerges. Distributed-ledger solutions have reduced settlement and reconciliation times for securities by up to 60 percent compared to traditional systems, while artificial intelligence is being leveraged mainly to enhance compliance processes (KYC/AML), support credit decisions, and perform portfolio analysis. These automation efforts have already yielded a significant reduction in operating costs and faster response times. Peer-to-peer payment projects remain in pilot phases, targeting niche corporate segments, whereas advanced-analytics dashboards have established themselves as a cross-cutting lever to improve both customer experience and internal decision-making. However, full adoption of these innovations faces notable challenges: compliance with GDPR, PSD3, and MiCA demands substantial investments in data security and privacy management; integration with legacy core systems is complex and slows time-to-market; and internal skills gaps require ongoing training programs. Finally, the low digital literacy among users over 65 constrains interface design choices and necessitates dedicated user-training pathways.

5.2 Implications for the Banking Sector and Regulatory Policies

The analysis suggests an urgent need for banks to radically rethink their operational and governance models. It is essential to accelerate migration toward cloud-native architectures and micro-services exposed via open APIs to ensure elastic scalability and rapid integration of external partners, while modularizing legacy processes through DevOps practices and automation. On the product side, shifting revenue streams toward fee-based services - such as robo-advisory, analytics-as-a-service, and ESG reporting - becomes strategic, requiring digital product-management expertise and clear upgrade roadmaps. From a regulatory standpoint, public-private collaborations should be strengthened through proportional frameworks and expanded regulatory sandboxes, promoting shared interoperability standards and transparent rules for digital assets. Multi-actor platforms also call for structured incentives (token awards, revenue sharing) to attract and retain technology partners and distributors, transforming the bank into an orchestrator of synergetic ecosystems among fintechs, big tech, and real-economy players. Finally, the internal skills shortage demands reskilling and upskilling programs in AI, blockchain, and data governance, supported by change-management initiatives and top-management engagement, while banks should spearhead financial-education campaigns to narrow the digital divide among older clients.

5.3 Limitations of the Study

Despite the richness of the qualitative data collected, this study presents certain limitations. The empirical base rests on interviews with only five senior managers, which limits generalizability to other financial sectors (e.g., insurance) or to non-EU markets. The qualitative methodological design does not permit statistical inference or causal testing; to strengthen and broaden the conclusions, a large-scale quantitative survey or analyses of usage data would be beneficial. Moreover, the interviews were conducted before the finalization of key regulations such as PSD3 and MiCA, the evolution of which could significantly alter the barriers and opportunities identified. Finally, the maturity levels reached by AI and blockchain experiments vary considerably among participants; additional case studies on both successes and failures could provide more detailed insights into adoption patterns.

5.4 Recommendations for the Future of Digital Transformation in Banks

In light of the evidence gathered, institutions should undertake several key initiatives. First, adopting a modular "API-first" IT framework by reconfiguring infrastructure around micro-services accessible via open APIs will enable rapid third-party integrations and co-development of value-added services, eliminating bottlenecks of monolithic architectures. Simultaneously, banks should establish one or more internal regulatory sandboxes—controlled environments in which to test innovative solutions under real conditions while mitigating compliance risks. On the data front, strategic investments in advanced analytics platforms—adopting lakehouse architectures and real-time analytics tools—are crucial to enhance risk management processes, offer predictive services, and continuously monitor fraudulent behavior. To fuel innovation, banks ought to launch fintech acceleration and investment programs, expanding corporate venture capital initiatives and thematic accelerators (e.g., green finance, cybersecurity, regtech) to renew digital skills across generations. Socially, a nationwide digital and financial literacy campaign leveraging omnichannel channels (webinars, mobile branches, interactive tutorials) is desirable to broaden the digital user base. Finally, aligning digital strategy with ESG objectives—with dedicated KPIs on paperless operations, green data centers, AI governance, and social inclusion—will allow digitalization to become a driver for sustainability and long-term value creation.

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7. APPENDICES

7.1 Data Collection Tools (Interview Protocol)

Interview Protocol – Digitalization and Fintech in Financial Services
Purpose: This interview aims to explore how financial institutions are adopting fintech technologies, the strategies they use, the role of regulation, and the influence of network effects on their competitiveness.

1. Adoption of Fintech Technologies

- How is your company integrating fintech innovations such as blockchain, AI, or P2P payments?
- What are the main fintech technologies you rely on, and how do they contribute to your business model?
- What challenges have you faced in adopting these technologies? (e.g., regulatory hurdles, customer adaptation, technological complexity)

2. Digital Platform Strategy

- How would you describe your platform business model? Do you primarily operate as a single-sided or multi-sided platform?
- To what extent has your company expanded internationally? What strategies have worked best in entering new markets?
- What factors have influenced your platform's scalability and growth?

3. Network Effects

- In what ways do network effects influence the growth and international expansion of your platform?
- How do increases in user numbers or third-party providers impact the overall value of your platform?
- Have you encountered any challenges in maintaining or amplifying network effects?

4. Traditional Banking Performance

- How has the rise of fintech affected the competitive position of traditional banks?
- Have you observed any significant shifts in revenue structures, such as changes in fee-based versus interest-based income?
- How do traditional banks and fintech companies interact? Are partnerships becoming more common, or is competition intensifying?

5. Regulation and Governance

- What are the key regulatory challenges fintech companies and digital platforms face in your market?
- Have you observed any regulatory developments that have either facilitated or hindered fintech growth?
- How do you see the regulatory landscape evolving in the coming years?

6. Competitive Advantage of Digital Platforms

- What factors give digital platforms a competitive edge in financial services?
- How has fintech adoption improved efficiency or reduced operational costs in your organization?
- What strategies do you use to retain customers and enhance user experience?

7. Cooperation vs. Competition

- In your opinion, is the relationship between digital platforms and traditional banks becoming more cooperative or competitive?
- Are there specific areas where collaboration between fintech companies and banks is proving successful?
- How do competitive pressures from fintech impact traditional banking strategies?

8. Regulatory Impact on Fintech Innovation

- In what ways does regulation shape how fintech firms develop and operate innovative business models?
- Have you had to adjust your business approach due to regulatory constraints? If so, how?
- What regulatory changes or policies would you suggest to encourage innovation in fintech?

9. Internationalization Strategies

- What strategies have worked best for your company in expanding fintech services internationally?
- How do you adapt your operations to different regulatory environments?
- Can you share any key successes or challenges you've encountered in international expansion?

10. Fintech Adoption by Traditional Banks

- How has regulation influenced how quickly and extensively traditional banks adopt fintech solutions?
- Have you seen any regulatory incentives that encourage banks to integrate fintech?

- What are the biggest obstacles for traditional banks in adopting fintech innovations?