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**Entrepreneurship, technology and sustainability:
The Italian FinTech**

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Academic Year 2023/2024

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Introduction

Over the past thirty years, the global financial sector has undergone a profound transformation driven by progressive technological innovation. This evolution has significantly changed how clients access financial products and services, revolutionizing supporting infrastructures and analytical methods. This real-world observation sets the stage for a critical inquiry into the rise of "financial technology," or Fintech, which has emerged to describe advancements aimed at improving and automating the delivery and use of financial services.

The rapid development of Fintech has not only created new business opportunities but also dramatically reduced the cost of launching new ventures. These advancements assist businesses, entrepreneurs, and consumers in managing their financial operations more efficiently, leveraging specialized software and algorithms often used on computers and increasingly on smartphones. Consequently, the financial landscape now includes numerous innovative startups that blend financial and technological expertise, moving from experimentation to achieving tangible business objectives.

Despite the opportunities presented by Fintech, significant challenges remain. Traditional financial institutions must adapt to compete with more agile and technologically advanced services, while regulators strive to keep pace with the evolving landscape. This is particularly relevant in Italy, where the digitalization of the financial sector offers significant potential but also faces unique challenges in fully embracing these innovations.

Given this context, this thesis seeks to answer the primary research question: "How has the progression of FinTech influenced the financial services sector, and in what ways is Italy responding to these developments?" This question addresses a critical managerial, political, and societal problem, highlighting the need to understand the impact of Fintech on traditional financial practices and regulatory frameworks.

This thesis aims to fill the gap in understanding how Fintech's evolution specifically impacts the Italian financial services sector. Employing a methodological approach that incorporates the analysis of secondary data, targeted case studies, and expert interviews, this study aims to provide a comprehensive and nuanced perspective on the transformative effects of Fintech advancements. It will examine how these technological

innovations are redefining financial operations, customer engagement, risk management, and regulatory compliance within Italy. The research seeks to identify the balance between fostering technological innovation and ensuring financial stability and integrity, providing a unique vantage point to evaluate potential evolutionary trajectories for regulatory and market strategies.

In sum, this investigation aims to provide a holistic view of Fintech's influence on the Italian financial sector, identifying challenges and opportunities that arise from the intersection of technological innovation and financial practice. It aspires to chart the future prospects for the Italian financial ecosystem, proposing paths for an effective and sustainable transition towards an innovative and resilient financial paradigm.

The subsequent chapters are organized as follows: The first chapter provides an overview of the Fintech sector, its main characteristics, and the evolution of the phenomenon from its inception to the present day, including regulatory approaches and the emerging field of Green Fintech. The second chapter explores the technological underpinnings of contemporary financial services, focusing on artificial intelligence, blockchain, and big data, and their impact on digital banking, payment services, crowdfunding, and cryptocurrencies. The third chapter examines the practical applications of Fintech innovations in the financial sector, covering digital banking, invisible payments, P2P payments, eWallets, and wearable technology, as well as the impacts of crowdfunding and cryptocurrencies on traditional finance. The fourth and final chapter presents an in-depth analysis of the Fintech environment in Italy, highlighting leading companies and their contributions to the sector, future scenarios, and expected benefits of continued Fintech growth in the country.

Literature Review

The FinTech sector has fundamentally transformed the financial services landscape, introducing innovative solutions that have revolutionized how individuals and companies conduct transactions, manage investments, and handle various financial activities. Automation and digitalization, core components of FinTech, have significantly enhanced the efficiency of financial processes, allowing for faster and more cost-effective transactions compared to traditional methods (Puschmann, 2017). This shift has led to widespread adoption of these technologies by traditional banks, underscoring the positive

impact of FinTech on competitiveness and customer satisfaction (Gomber, Kauffman, Parker, & Weber, 2017).

In Italy, the growth of FinTech has been met with both technological adoption and regulatory development aimed at ensuring financial sector security and stability. Regulatory measures, such as those detailed by the European Commission (2018), have played a crucial role in fostering a secure and innovative environment. A report by McKinsey & Company (2023) highlights the substantial market capitalization of publicly traded FinTech companies, which reached \$550 billion in July 2023, doubling the 2019 figure. However, the market correction in 2022 resulted in a slowdown in FinTech growth, marked by a decline in funding, IPOs, and the emergence of new "unicorns". This uncertain economic environment prompted FinTech companies to adopt more moderate growth strategies, focusing on sustainability, optimizing costs, and diversifying products and services (McKinsey & Company, 2023).

A notable trend within FinTech is the increasing interest in cryptocurrencies and blockchain technology. Platforms such as Satispay and Nexi are integrating these technologies into their services, offering new opportunities for managing financial transactions. However, the "Rapporto Blockchain Italia 2022" emphasizes the regulatory uncertainties and environmental concerns that impede the broader adoption of cryptocurrencies in the Italian financial system. In response, Italian authorities, including the Bank of Italy and Consob, have developed regulations and "sandbox" environments that allow FinTech startups to test innovative solutions in a controlled setting (Rapporto Blockchain Italia, 2022).

Understanding the current dynamics of FinTech requires a look at its historical evolution. Initially, the term FinTech referred to the application of computing technology within the back-office functions of banks and commercial entities (Arner, Barberis, & Buckley, 2016). Over time, its scope expanded dramatically, driving the innovation of new business models, financial products, and operational methodologies. This expansion now includes services such as payment account management, crowdfunding platforms, investment services, and automated advice through robo-advisors, alongside the incorporation of advanced technologies like blockchain and smart contracts (Gomber et al., 2017).

The evolution of FinTech can be categorized into three main phases: FinTech 1.0, FinTech 2.0, and FinTech 3.0 (Arner et al., 2016). FinTech 1.0, spanning the late 19th century to the mid-20th century, was characterized by foundational technologies like the telegraph and early computing systems, which revolutionized global finance by enabling rapid transmission of information and funds. FinTech 2.0 began in the 1960s and saw significant advancements such as ATMs, credit cards, electronic trading, and online banking. Innovations during the 1980s and 1990s, including the creation of NASDAQ, SWIFT, and online banking portals, marked this period. FinTech 3.0, the current era starting around 2008, is characterized by the emergence of FinTech startups offering alternatives to traditional banking activities. Key innovations in this phase include blockchain, AI, and big data analytics, which are transforming financial services by enhancing efficiency, transparency, and security.

Regulation plays a critical role in the development and stability of the FinTech sector. In Europe, major regulatory efforts include the Second Payment Services Directive (PSD2), which promotes competition and innovation in the payment sector by allowing third-party access to bank data (European Commission, 2018). Other significant regulations include the Electronic Money Directive (EMD2), the Payment Accounts Directive (PAD), and anti-money laundering directives (AMLD4 and AMLD5), all aimed at ensuring consumer protection and financial system stability. The European Banking Authority (EBA) has issued Regulatory Technical Standards (RTS) that set detailed requirements for strong customer authentication and secure communication standards, essential for the security of online financial transactions (European Banking Authority, 2017). The EU's commitment to fostering a secure and innovation-friendly environment is further evidenced by initiatives such as the Digital Finance Package and the Markets in Crypto-Assets (MiCA) regulation, which seek to harmonize rules for crypto-assets (European Commission, 2020).

Green FinTech, which integrates sustainability into financial technology, focuses on innovations that support environmental goals. This sector aligns financial services with sustainable development goals (SDGs) outlined by the UN, promoting an evolution of financial services that prioritize environmental care. Green FinTech is projected to create economic opportunities worth \$12 trillion annually and generate 400 million new jobs by 2030 (International Monetary Fund, 2020). Green FinTech initiatives include

microfinance models for underserved populations, behavior-based models that promote sustainable practices, and sustainability data valorization for optimizing ESG ratings. Regulatory frameworks such as the Paris Agreement and the EU's Taxonomy Climate Delegated Act emphasize the importance of developing technologies that support the fight against climate change (European Commission, 2019).

Despite the dynamic growth and significant potential of FinTech, challenges related to regulation, data security, and consumer trust persist. Collaboration between traditional financial institutions and FinTech startups, supported by robust regulatory frameworks, is crucial for sustainable sector growth. The "Rapporto Blockchain Italia 2022" highlights the need to address regulatory uncertainties and environmental concerns to ensure a safe transition towards a more decentralized and transparent financial system.

In conclusion, FinTech represents a dynamic and evolving sector that faces challenges but also offers significant opportunities for innovation and growth. Collaboration between traditional banks and FinTech startups, coupled with a solid regulatory framework, is essential for ensuring the sustainable development of the sector. The continuous evolution of FinTech technologies and the growing emphasis on sustainability position FinTech as a fundamental driver for the future of finance.

Chapter 1: The FinTech System

1.1 Overview and characteristics of the sector

In today's economic ecosystem, FinTech stands out as an innovative pillar that merges the world of finance with advanced technology. The term, a contraction of "finance" and "technology," is generically defined as "technology applied to finance" (European Central Bank, 2017). It has become very popular and represents the union between the development of digital technology and financial, banking, and payment services.

This dynamic sector facilitates and transforms traditional financial management methods, providing entrepreneurs, consumers, and companies with a new philosophy of accessing financial services characterized by increased speed, transparency, and efficiency.

Originally, the term FinTech referred exclusively to the application of computing technology within the back-office functions of banks and commercial entities. However, the scope of FinTech has dramatically expanded, now serving as a driving force behind

the innovation of new business models, financial products, and operational methodologies. This expansion has encompassed the integration of a multitude of services, including the management of payment accounts and the facilitation of a spectrum of payment services, both traditional and novel, such as crowdfunding platforms for equity and lending, alongside investment services, financial management, and automated advice provided by Robo-advisors. Furthermore, the FinTech sector has extended its reach to include the distribution and trading of a wide array of financial and insurance products, capitalizing on advanced technologies like blockchain and smart contracts.

In the current landscape, the range of services offered under the FinTech umbrella continues to broaden, covering payment services and transfers that may include digital currencies such as stablecoins, cryptocurrencies, and crypto assets, in addition to groundbreaking activities like Initial Coin Offerings (ICOs)¹. Artificial Intelligence (AI) assumes a critical role within FinTech, being extensively employed in the analysis and processing of large data sets for comprehensive statistical and predictive insights.

Moreover, the FinTech industry seamlessly incorporates technologies that assist businesses in navigating the complexities of regulatory, legal, and compliance issues, a realm collectively known as RegTech. This integration underscores the sector's commitment to facilitating a comprehensive approach to financial innovation, regulatory adherence, and customer service enhancement.

In parallel, the FinTech domain engages extensively in operations related to the procurement, administration, and reevaluation of data. This encompasses services specifically designed for the protection of personal data, extending further to encompass strategies aimed at bolstering cybersecurity² defenses.

According to Dan Green, a principal at BlackFin Group, FinTech companies are typically characterized by the following attributes:

¹ Initial Coin Offerings (ICOs) are fundraising mechanisms for new projects where investors purchase tokens or digital coins as a form of investment in the project. ICOs provide startups with a platform to raise capital directly from investors and enthusiasts without the need for traditional financial intermediaries.

² "Cybersecurity (or information security) encompasses the set of technologies, processes, and protective measures designed to reduce the risk of cyber attacks. Most cyber attacks are automated and indiscriminate, meaning that once they identify a vulnerability, they exploit it to target any organization rather than a specific company. As a result, having the right cybersecurity measures in place to protect one's organization is crucial." (<https://www.itgovernance.eu/it-it/what-is-cyber-security-it>)

- **Service Scope:** FinTech entities serve a diverse array of markets, encompassing business-to-consumer (B2C), business-to-business (B2B), and hybrid models that blend elements of both. Unlike traditional bespoke technology solutions, FinTech offerings are generally designed for broad application, adaptable across various organizations and sectors, thereby transcending the limitations of custom-made solutions tailored for individual entities.
- **Nature of Innovation:** The hallmark of FinTech innovation is the refinement and enhancement of existing financial products and services. The objective is to augment efficiency, speed, and in certain instances, cost-effectiveness, as opposed to the introduction of entirely unprecedented concepts. This evolutionary approach underpins the FinTech industry's commitment to improving the financial ecosystem.
- **Innovation versus Disruption:** Although FinTech is often associated with the notion of disruption, true disruption is not deemed essential for success within this domain. The focus is predominantly on the innovation introduced and the consequent value added to the market. This perspective underscores that the primary goal is enhancing and augmenting existing frameworks rather than completely uprooting established systems.
- **Process Consideration:** Effective FinTech firms prioritize the transformation of processes in tandem with technological progress. They meticulously assess the influence of their innovations on users' daily operations and strive to ensure that the transition to new systems is seamless. This approach emphasizes the user-centric nature of FinTech developments, ensuring that technological advancements translate into tangible benefits for end-users.

Irrespective of these factors, it is insightful to explore what has catalyzed the widespread adoption of FinTech and subsequently, what factors have contributed to its significant growth.

Firstly, the capacity for computational processing has more than doubled every two years since 1965, while the associated costs have reduced to nearly negligible levels.

Additionally, data storage capabilities have expanded exponentially, to the point where today's smartphones possess the same computing power as NASA did in 1969³.

The explosive growth of FinTech has been also facilitated by the ubiquitous adoption of the internet and smartphones, which have made financial services accessible to a broader segment of the population, especially in areas less served by traditional banks. Furthermore, the frustration and distrust generated by the financial crisis of 2008⁴ have led many consumers to seek alternatives to traditional banking institutions, finding in FinTech a more transparent, affordable, and user-friendly option.

In this regard, the International Organization of Securities Commissions (IOSCO) highlighted in its report⁵ that, in 2016 alone, investments in FinTech companies reached a total of approximately \$19 billion. Moreover, the entry of several major technology firms into the sector, commonly referred to as BigTech⁶ — including Amazon, Google, Apple, Facebook, and Alibaba — has had a profound impact. These companies, known for their advanced technological capabilities, have expanded their focus and made significant investments to provide these types of services to their clients.

The agile and innovative approach of FinTech startups, along with their ability to respond quickly to consumer needs, is imposing an unprecedented push for innovation in the sector.

Startups can be considered in all respects the real driving force behind this digital revolution in the finance world. These innovative companies play a crucial role in the digitization of the financial market by offering new and targeted services. The market is densely populated with technology startups that vary in potential and stages of development. Specifically, within the domain of payment services, these enterprises have swiftly acquired significant market shares and attained substantial valuations. These entities represent the new entrants to the market, frequently operating with limited capital,

³ Susskind, R., & Susskind, D. (2015). *The Future of the Professions*. Oxford University Press. Shrier, D., & Pentland, A. (Eds.). (2016). *Frontiers of Financial Technology: Expeditions in Future Commerce, from Blockchain and Digital Banking to Prediction of Markets and Beyond*. Visionary Future, MIT.

⁴ The financial crisis of 2008 was a global economic downturn triggered primarily by the collapse of the housing bubble in the United States, leading to significant losses for financial institutions worldwide and resulting in a severe global recession. It exposed critical vulnerabilities in the financial system and led to widespread reforms.

⁵ IOSCO. (2017). *Research Report on Financial Technologies (Fintech)* (p. 8). February 2017.

⁶ These are companies with a huge customer base, highly capitalized, technologically advanced, that possess a vast amount of their customers' data and can easily access cloud computing, artificial intelligence, and machine learning services.

yet they have innovated and introduced novel technologies capable of challenging and transforming established financial and banking service paradigms.

The topic of Fintech opens the gateway to exploring Insurtech⁷, highlighting the intersection between financial technology and innovations within the insurance sector, primarily driven by digital advancements. In addition to reshaping traditional financial services, Insurtech, buoyed by the FinTech wave, is revolutionizing the insurance industry by adopting and adapting these transformative technologies. Insurtech leverages digital advancements to overhaul traditional insurance models, making processes more customer-friendly, efficient, and transparent. By utilizing data analytics, machine learning, and IoT devices⁸, Insurtech companies offer personalized insurance products that better match individual risk profiles and preferences. They streamline claims processing, making it faster and more user-friendly, thereby enhancing customer satisfaction and trust. Moreover, Insurtech's integration with FinTech enables seamless financial transactions, facilitating easier premium payments and claims settlements. This synergy between Insurtech and FinTech is creating a more interconnected and coherent financial and insurance ecosystem, delivering comprehensive services that meet the evolving needs of modern consumers while also improving risk management and fraud prevention.

The FinTech sector is poised for further growth, driven by significant investments and growing interest from both consumers and industry operators. In fact, data show an exponential increase in investments in FinTech startups, highlighting the recognition of the potential of these technologies to revolutionize the financial sector.

However, the long-term success of FinTech will depend on the ability of companies to tackle challenges such as regulation, data security, and consumer trust. Indeed, data privacy and security become increasingly pressing concerns as online transactions rise, forcing FinTech companies to invest in advanced cybersecurity solutions.

Moreover, collaboration between traditional actors and innovators will be crucial to create a financial ecosystem that is both innovative and stable.

⁷ Insurtech refers to the use of technology innovations designed to squeeze out savings and efficiency from the current insurance industry model. It's a subset of fintech that focuses on enhancing and streamlining the insurance sector through technological advancements.

⁸ IoT (Internet of Things) devices are interconnected digital gadgets that can collect and exchange data, enabling remote monitoring and control. They include a wide range of products, from smart home appliances and wearable health monitors to industrial sensors and smart city technologies.

FinTech is sculpting the future landscape of the financial sector through its innovative approach, merging advanced technology, novel business models, and a focus on user-centricity. This adaptation not only aligns with the increasing expectations of modern consumers but also lays the groundwork for a new era in finance, distinguished by enhanced inclusivity, efficiency, and innovation. Both traditional enterprises and FinTech startups are collaboratively drafting a new financial blueprint, signifying a pivotal shift from conventional systems to the forward-thinking financial solutions of tomorrow.

1.2 Evolution of the phenomenon

In recent years, the FinTech sector has experienced unprecedented growth, supported by significant technological advancements and changes in consumer behavior. With a turnover of \$143 billion and investments reaching \$115 billion in 2021 alone, the sector continues to redefine the contours of the global financial industry, with an expected growth rate of 14% by 2025⁹. This trend is highlighted by the latest figures from the CB Insights State of FinTech Report (2021), indicating strong interest in innovative financial solutions in the post-pandemic period, underlining the sector's resilience and its critical role in shaping the future of finance. During the period heavily influenced by the pandemic, particularly during the lockdown months, consumers faced more or less unforeseen financial needs, and with traditional interaction significantly compromised, FinTech's unique features were greatly appreciated by consumers, who significantly increased the use of some innovative services.

The FinTech services market, according to observations made in 2023, has surpassed previous records, demonstrating dynamism and an even greater ability to attract capital. Although the exact numbers may vary, it is undeniable that the volume of turnover and investments in this sector have reached new milestones, reflecting a continuous innovative drive and growing investor confidence. The regulatory landscapes have also evolved in response to the FinTech boom and its implications for data security and consumer protection. This includes the European Commission's Digital Finance Package and advancements in open banking¹⁰ regulations, exemplifying efforts to promote innovation while ensuring customer safety and market integrity.

⁹ KPMG. (2021). “Pulse of Fintech H2'21”.

¹⁰ Open Banking is a financial services concept that uses APIs to let third-party developers access financial data. This approach promotes innovation and competition in the financial sector by enabling the development of new apps and services. It also provides

The trajectory of FinTech's evolution can be outlined through three main periods: FinTech 1.0, FinTech 2.0, and FinTech 3.0. These phases represent the sector's growth from its initial establishment to its current state, highlighting the significant shifts in technology, consumer demand, and regulatory frameworks that have shaped its development.

1.2.1 FinTech 1.0

This period began in the latter half of the 19th century and was notably marked in 1866 by the laying of the first transatlantic cable by the Atlantic Telegraph Company, continuing until the outbreak of World War I. The introduction of the telegraph and subsequently other technological innovations such as railways, canals, and steamships revolutionized global finance, enabling rapid transmission of information and funds internationally.

In the post-war period, technological development advanced rapidly with the arrival of the first computers and financial calculators, while in 1950 in the United States, the first credit cards were introduced, marking a real financial revolution. A few years later, in 1966, a global telex network was born and in 1967, in the UK, Barclays Bank established the first automatic teller machine, effectively initiating the Fintech 2.0 era.

1.2.2 FinTech 2.0

Since 1967, there has been such development that the financial sector, especially from the 1980s onwards, has become an industry primarily based on digital technology. There were multiple innovations that profoundly changed the world of finance; the most relevant are listed below:

- 1971: Creation of NASDAQ¹¹ with the shift to dematerialized securities trading;
- 1973: Establishment of the Society of Worldwide Interbank Financial Telecommunications (SWIFT)¹², which led to the creation of a cross-border payment system;

¹¹ NASDAQ (National Association of Securities Dealers Automated Quotations) is a global electronic marketplace for buying and selling securities, as well as the benchmark index for U.S. technology stocks. It is known for its high concentration of technology and biotech companies.

¹² The Society for Worldwide Interbank Financial Telecommunication (SWIFT) is a global member-owned cooperative and the leading provider of secure financial messaging services, facilitating communication and transaction processing among financial institutions worldwide. It is crucial for international trade and finance transactions.

- 1983: Introduction by the Nottingham Building Society (NBS)¹³ of online banking in the United Kingdom. In the same year, the first mobile phone was marketed;
- 1986: Implementation of the Single European Act, which established a framework for creating a single financial market in the EU. In the UK, the so-called Big Bang, a process of financial liberalization, began;
- 1987: Stock market crash (Black Monday). The first risks arising from market interconnections came to light;
- 1995: Use of the World Wide Web (WWW)¹⁴ by Wells Fargo for online account management. This marked the definitive emergence of the Internet;
- 2005: Birth of the first branchless banks in the United Kingdom;
- 2008: Outbreak of the global financial crisis that changed the market and represents the transition to Fintech 3.0.

1.2.3 FinTech 3.0

The current era, inaugurated by the outbreak of the global financial crisis in 2008, has marked a radical change in the sector. This period is characterized by deep skepticism towards traditional banks and intense post-crisis regulation that has paved the way for new players.

FinTech startups, armed with innovations such as blockchain, artificial intelligence, and big data, are responding to the changed needs of consumers by offering alternatives to traditional banking activities and redefining the financial landscape.

Already in 2015, Jamie Dimon, CEO of J.P. Morgan, intended to highlight the emergence of a new wave of innovation in this sector, mainly driven by startups based in Silicon Valley. In fact, he stated: "Silicon Valley is coming. There are hundreds of startups with a lot of brains and money working on various alternatives to traditional banking".¹⁵

His statement reflected the awareness of the potential impact of FinTech on the financial world, anticipating a sector transformation driven by technology and innovation. These

¹³ The Nottingham Building Society (NBS) is a UK-based mutual building society that offers a range of financial services including savings accounts, mortgages, and financial advice. It is committed to supporting its members with their financial needs and community development.

¹⁴ The World Wide Web (WWW) is an information system where documents and other web resources are identified by Uniform Resource Locators (URLs), which are interlinked by hypertext, and can be accessed via the Internet. It has become the primary tool billions use to interact on the Internet.

¹⁵ Levy, A. (2018). JP Morgan's Jamie Dimon makes his biggest bet on Silicon Valley with new 'fintech campus'. *CNBC*, 1.

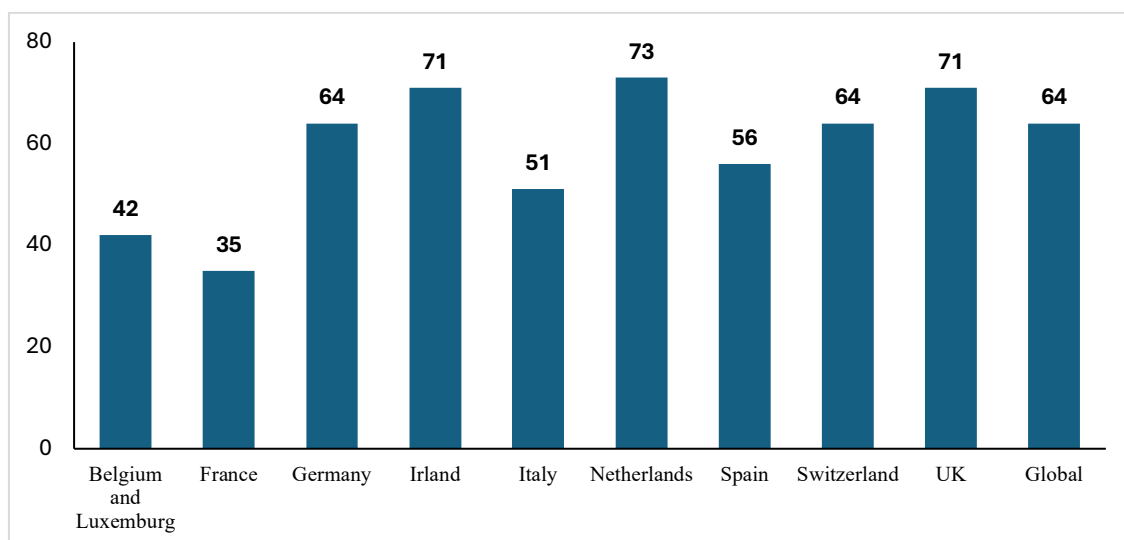
companies, characterized by a strong technological background and significant capital investments, were indeed starting to develop products and services alternative to those offered by traditional banks.

1.2.4 The figures in Europe and Italy

The fintech landscape in Europe and Italy reflects a significant digital transformation in the financial services sector. The increase in annual transactions from 1.5 billion dollars in 2013 to 22.6 billion in 2020 underlines the rapid growth of the fintech platform market, with the United Kingdom leading the European scene¹⁶.

Despite such impressive growth, online banking penetration across Europe remains diverse, with countries like Norway boasting adoption rates as high as 93%, while others, such as Romania and Bulgaria, lag behind. This diversity reflects varying levels of digitalization and underscores the need for targeted strategies to promote financial inclusion and accessibility across the continent.

The 2019 Global Fintech Adoption Index by Ernst & Young¹⁷ found that fintech adoption is particularly high among millennials, with countries like the Netherlands, Ireland, and the United Kingdom exceeding 70% adoption, as shown in the chart below¹⁸.



Graph 1 – “European Countries and Global Adoption (%)”, source: EY FinTech Adoption Index

¹⁶ Banca d'Italia. (2022). “*Questioni di economia e finanza*”

¹⁷ The EY Global FinTech Adoption Index is a survey conducted by EY that measures the adoption and usage of financial technology (FinTech) services by consumers across different countries. It provides insights into the growth of FinTech markets globally and identifies emerging trends and consumer preferences within the FinTech sector.

¹⁸ Ernst & Young & Fintech District. (2020). “*Fintech waves*”.

While Europe has made significant strides in fintech innovation, it still trails behind North America and Asia Pacific in certain areas, notably mobile money penetration and fintech lending. This discrepancy reflects regional differences in regulatory frameworks, consumer behavior, and market dynamics.

In contrast to the emphasis on digital payments, online lending, and cryptocurrencies in North America, Europe's fintech landscape prioritizes open banking and collaboration between traditional banks and startups. This collaborative approach, facilitated by supportive regulatory environments, has led to innovative solutions and enhanced customer experiences.

The FinTech phenomenon also affects Italy, a country historically anchored to significant pillars such as household savings, bank credit, and small and medium-sized enterprises. Certain features of FinTech and Insurtech services have been decisive, as mentioned before in the delicate moments experienced during the health emergency and the subsequent lockdown.

According to the Fintech & Insurtech Observatory of the School of Management of the Politecnico di Milano¹⁹, there are 622 active Italian Fintech realities, most of which are based in Northern Italy. Lombardy confirms itself as the most active region in terms of the number of operations and capital raised, consolidating itself as fertile ground for Italian fintech startups.

In the last two years, the number of Italian consumers who have interacted with their bank through digital channels has skyrocketed. Italian consumers are increasingly willing to use the digital functions provided by traditional banks. As the number of physical branches across the country decreases, 66% of clients use at least one digital channel (up by 3 percentage points from 2022) and 57% use mobile banking (up by 2 percentage points)²⁰.

¹⁹ The Fintech & Insurtech Observatory of the Politecnico di Milano is the reference point in research on frontier themes of digital innovation in the Italian and European financial and insurance sectors. It interacts with supply-side actors (banks, insurance companies, tech providers, startups, Big Tech, non-financial service operators), demand-side actors (consumers, micro-enterprises, SMEs, corporates) and with the Authorities of the financial and insurance ecosystem, driven by the goal of generating and disseminating knowledge in the country, creating the conditions for the emergence of real collaborative ecosystems also in Italy.

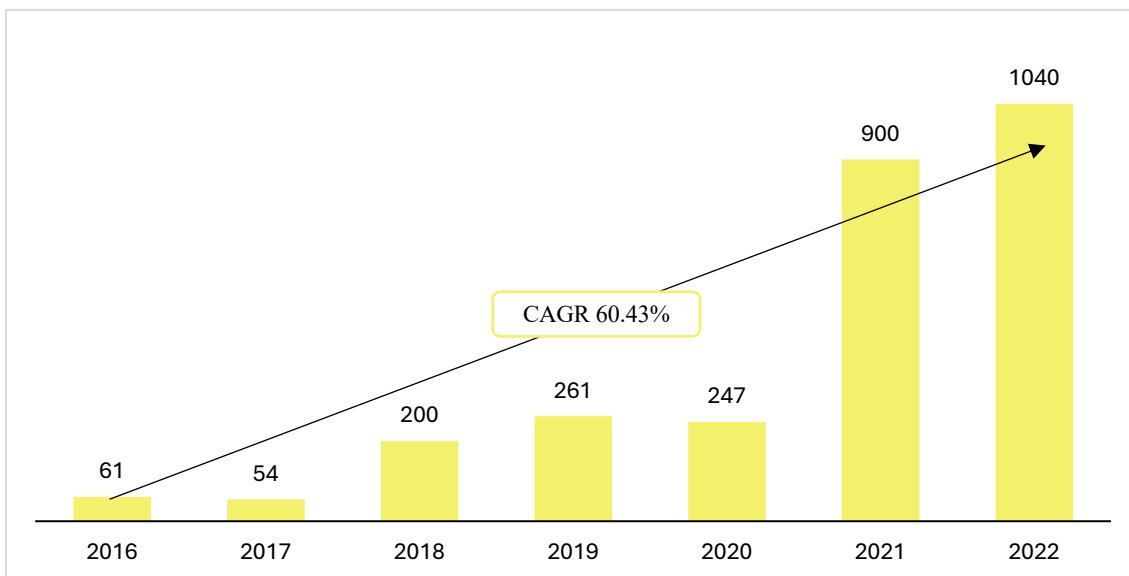
²⁰ Italian Banking Association. (2023). Annual Report on Digital Banking in Italy.

"A significant number of Italian customers are already predisposed to a digital banking experience," explains Filippo Renga, Director of the Fintech & Insurtech Observatory. "Our data show a steady growth in the use of digital channels even in 2023, with growth rates similar to those of the previous year, demonstrating common usage across all banking user demographics. The number of Italians using home banking or mobile banking has increased by 6%, online transactions by 18%, and new customers acquired through entirely digital subscriptions by 7%. However, the transition from a physical to a hybrid or completely digital model must always be carefully considered, consistent with the preferences and availability of the customer"²¹.

As the complexity of the service increases, the willingness to use digital options decreases. To activate a bank overdraft, the majority (56%) prefer to visit a branch and interact with a staff member, only 29% opt for digital channels such as websites or apps, and 20% wish to handle the process remotely but with traditional tools such as telephone or email. To activate a mortgage, as many as 70% of consumers would like the option to visit a branch. The choice is strongly influenced by age, with a preference for apps and websites among younger groups, while the 55-74 age group predominantly chooses the branch option. The dynamics are similar in the insurance sector, which is still strongly tied to the agency channel. For simpler policies, such as travel insurance, the majority prefer activation via an app or website (62%), while for more complex policies like life insurance, the majority (57%) prefer physical interaction in an agency.

According to EY Fintech Waves, realized in collaboration with the Fintech District, which aims to analyze the health status of the country's fintech ecosystem, the funding raised in 2022 reached a total amount of 1.040 billion euros, compared to 900 million in 2021 and 247 million in 2020, with an average annual growth of over 60% since 2016.

²¹ Renga, F. (Director). (2023). *Report on Digital Banking in Italy*. Fintech & Insurtech Observatory, Politecnico di Milano.



Graph 2 – “Funding to Italian FinTech by year, 2016-2022 (€ m, including all types of equity funds)”, source: EY Intelligence based on BeBeez Private Data, Crunchbase, and Dealroom.com

The high number of projects in production or under development, and the high managerial skills that are not lacking in a country always inclined to entrepreneurship like Italy, have contributed to generating strong interest from intermediaries, a quality ecosystem, and fertile ground for the growth of Fintech companies.

Despite these positive figures, the sector still faces challenges, especially in terms of closing the gap with other European nations. To further enhance the Italian fintech sector, it would be appropriate to focus efforts on innovation, regulatory improvement, increasing specific training, expanding international collaborations, and focusing on market niches where Italy can distinguish itself globally.

1.3 Regulatory approaches

In recent years, the financial sector has experienced intense regulatory activity at the European level, driven by the need to support technological innovation, particularly from the Fintech sector, while also ensuring consumer protection and the stability of the financial system. This balance is crucial as innovation introduces new opportunities and services, it also brings new risks and challenges.

The PSD2²², or Second Payment Services Directive, is one of the most significant regulatory efforts, broadening the scope of the previous directive and introducing the concept of open banking, which requires banks to provide access to account data to authorized third parties, thus promoting competition and innovation in the payment sector. Additionally, the EMD2²³ updates the regulations concerning electronic money, aiming to facilitate the issuance and use of electronic currency and ensuring adequate consumer protection levels. The PAD²⁴, Payment Accounts Directive, aims to ensure that consumers have access to basic payment accounts, while also improving the transparency and comparability of associated account fees. The AMLD4²⁵ and AMLD5²⁶ Directives on combating money laundering and terrorism financing aim to prevent the financial system's use for money laundering or terrorism financing. These directives strengthen customer due diligence rules and the transparency of financial information.

The Regulatory Technical Standards (RTS)²⁷ issued by the European Banking Authority (EBA) set detailed requirements for strong customer authentication and open and secure communication standards, essential for the security of online financial transactions.

The SEPA Regulation²⁸ and the Cross-Border Payments Regulation²⁹ aim to harmonise payments within the EU, making national and international transactions equally easy, secure, and efficient. The Interchange Fees Regulation (IFR)³⁰ seeks to make payment

²² EU Directive 2015/2366 of the European Parliament and of the Council of 25 November 2015 on payment services in the internal market, amending Directives 2002/65/EC, 2009/110/EC, and 2013/36/EU and Regulation (EU) No 1093/2010, and repealing Directive 2007/64/EC.

²³ Directive 2009/110/EC of the European Parliament and of the Council of 16 September 2009 on the taking up, pursuit, and prudential supervision of the business of electronic money institutions, amending Directives 2005/60/EC and 2006/48/EC and repealing Directive 2000/46/EC.

²⁴ Directive 2014/92/EU of the European Parliament and of the Council of 23 July 2014 on the comparability of fees related to payment accounts, the switching of payment accounts, and access to payment accounts with basic features.

²⁵ EU Directive 2015/849 of the European Parliament and of the Council of 20 May 2015 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing, amending Regulation (EU) 648/2012 of the European Parliament and of the Council, and repealing Directive 2005/60/EC of the European Parliament and of the Council and Commission Directive 2006/70/EC.

²⁶ EU Directive 2018/843 of the European Parliament and of the Council of 30 May 2018, amending EU Directive 2015/849 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing and amending Directives 2009/138/EC and 2013/36/EU, following which the AMLD6 was subsequently adopted.

²⁷ EU Delegated Regulation 2018/389 of the Commission of 27 November 2017, supplementing EU Directive 2015/2366 of the European Parliament and of the Council with regard to regulatory technical standards for strong customer authentication and common and secure open standards of communication.

²⁸ EU Regulation 260/2012 of the European Parliament and of the Council of 14 March 2012, establishing technical and business requirements for credit transfers and direct debits in euros and amending Regulation (EC) No 924/2009.

²⁹ EU Regulation 2019/518 of the European Parliament and of the Council of 19 March 2019, amending Regulation (EC) No 924/2009 as regards certain charges on cross-border payments within the Union and currency conversion charges.

³⁰ EU Regulation 2015/751 of the European Parliament and of the Council of 29 April 2015, on interchange fees for card-based payment transactions.

costs more transparent and reduce fees for card payments, fostering greater fairness and competitiveness.

The Consumer Rights Directive and the GDPR (General Data Protection Regulation)³¹ focus, respectively, on consumer protection in commercial contracts and on the protection of personal data, which are crucial aspects in the digital financial context.

Finally, the MiFID Directive³² and the ELTIF Regulation³³ target the investment sector, aiming to improve transparency and investor protection.

These measures, while only a part of the extensive regulatory landscape, highlight the dynamic context in which Fintech actors operate, demonstrating the authorities' commitment to creating a safe and innovation-friendly environment, while maintaining high standards of protection for users and stability for the financial system as a whole.

The above aims to prevent regulatory arbitrage and ensure that both traditional financial actors and new entrants in the Fintech market operate on a level playing field, fostering fair competition and promoting innovation.

In addition to supranational regulations, individual Member States have implemented their own measures to regulate specific and innovative aspects of the Fintech sector. For instance, in Italy, laws have been adopted to regulate equity crowdfunding platforms, providing a legal structure for collective investment in startups and SMEs³⁴ through online platforms. Additionally, Italian legislation has introduced norms for the use of smart contracts and the application of blockchain technology, recognizing the legal validity of these contracts and promoting the use of these innovative technologies in various economic and social areas.

Efforts have also been made to integrate emerging phenomena such as ICOs and cryptocurrencies within the existing regulatory framework, addressing issues related to security, transparency, and investor protection.

³¹ EU Regulation 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation).

³² Directive 2004/39/EC of the European Parliament and of the Council of 21 April 2004 on markets in financial instruments, amending Council Directives 85/611/EEC and 93/6/EEC and European Parliament and Council Directive 2000/12/EC and repealing Council Directive 93/22/EEC.

³³ EU Regulation 2015/760 of the European Parliament and of the Council of 29 April 2015 on European long-term investment funds.

³⁴ SME stands for Small and Medium-sized Enterprises. These are businesses whose personnel numbers fall below certain limits. The EU definition of an SME is a business with fewer than 250 employees, and with an annual turnover not exceeding €50 million or an annual balance sheet total not exceeding €43 million. They are considered crucial for economic growth, innovation, and employment.

The regulatory dynamism in the Fintech sector, as well as in financial and banking regulation, is significantly influenced by the European Union's intention to establish a coherent and organic regulatory framework. This commitment is materialized in the introduction of targeted laws to regulate activities that have become critically important due to technological advancements over the last decade.

Efforts towards regulating artificial intelligence systems and crypto-assets are also noteworthy. The MICA project (Markets in Crypto-Assets)³⁵ aims to harmonize European rules related to the issuance and services of crypto-assets, while DORA (Digital Operational Resilience Act)³⁶ focuses on cybersecurity, introducing uniform standards for digital operational resilience in the financial sector. These initiatives aim to foster innovation while ensuring fairness between traditional operators and new entrants in the market. In the future, we may also witness a revision of PSD2 with the introduction of a potential PSD3, which could further adapt the European regulatory framework to the rapid changes in the fintech sector and the new consumer needs.

Within this framework, the necessity for an innovative regulatory approach becomes apparent: the concept known as the "Regulatory Sandbox" is gaining traction as a means to more effectively regulate Digital Finance. Since July 17, 2021, following the example of the United Kingdom (where it has been active since 2014)³⁷, the Sandbox has also become a reality in Italy. The aim of this legislation, contained in the Growth Decree³⁸, was to ensure that Italian FinTech companies do not have to go abroad to grow but can

³⁵ The MICA (Markets in Crypto-Assets) project refers to a proposed regulation by the European Union aimed at establishing a legal framework for crypto-assets, including cryptocurrencies, stablecoins, and other types of digital tokens. The objective of MICA is to provide clarity on the regulatory treatment of crypto-assets, enhance consumer and investor protection, ensure market integrity, and address potential risks associated with the crypto-asset market. This regulation is part of the EU's broader digital finance strategy.

³⁶ The Digital Operational Resilience Act (DORA) is a legislative proposal by the European Union aimed at strengthening the operational resilience of the digital systems used by financial entities within the EU. DORA sets out requirements for financial institutions to ensure that they can withstand, respond to, and recover from all types of information and communication technology (ICT) related disruptions and threats. This act covers risk management, reporting of major ICT-related incidents, digital operational resilience testing, and managing third-party ICT service providers, including cloud services.

³⁷ The UK's regulatory sandbox, initiated by the Financial Conduct Authority (FCA) in 2014, serves as a pioneering framework designed to foster innovation within the financial sector. It permits FinTech companies to trial new products, services, and business models in a safe, controlled setting while ensuring regulatory oversight. This approach enables businesses to identify and mitigate risks before full market launch, while also providing the FCA with insights into emerging technologies and their implications. Consequently, the sandbox supports the evolution of financial services, balancing innovation with consumer protection and system integrity.

³⁸ legislative measure aimed at promoting economic growth and recovery

find a favourable context in their own country, a competitive ecosystem capable of attracting foreign actors as well.

The concept of a "Sandbox," literally translated as "sand enclosure," establishes a highly innovative regulatory support framework, revolutionizing the landscape of digital innovations in the financial sector. Its primary goal is to catalyze the growth and development of FinTech startups in Italy, providing a safe and controlled environment for the experimentation of innovative financial products and services.

The concept of a regulated perimeter arises from the need to channel and monitor activities of public interest, such as consumer protection or anti-money laundering. This scope, therefore, includes financial activities that require authorization or registration by a competent authority, such as banking and payment services. However, there are areas like Peer to Peer Lending³⁹ that are not yet included in this regulated perimeter in Italy and do not require specific authorization. Depending on the configuration of the Sandbox, the supervisory authority organizing it may allow promoters to waive certain rules in the project's realization or provide assistance in interpreting and applying the regulations as issues and doubts emerge during the experimentation.

Despite this, the general characteristics of the Sandboxes include:

- A maximum duration of eighteen months
- Reduced capital requirements
- Simplified and proportionate compliance according to the intended activities
- Reduced times for authorization procedures
- Definition of operational perimeters

In Italy, the Sandbox is useful not only to startups but also to investors, who are more encouraged to fund fintech projects in Italy thanks to the presence of a simplified regulatory framework (as bureaucracy acts as a brake) and at the same time regulated (since regulatory uncertainty is a risk for investments). In this context, startups can equally attract large players in the industry, namely banks, for whom fintech innovation is fundamental to survive and compete.

³⁹ Peer-to-Peer (P2P) Lending is a form of direct lending of money between individuals or businesses without the official intermediation of a traditional financial institution. This process typically occurs online on P2P platforms that connect borrowers directly with investors or lenders. P2P lending enables borrowers to secure financing that might not be available or is more expensive through traditional banking channels, while offering lenders potentially higher returns on their investments compared to savings or other investment products.

1.4 Green FinTech

The term "Green Fintech" refers to all technological innovations that are actively engaged in pursuing one or more "SDGs" (Sustainable Development Goals)⁴⁰ outlined by the UN. This field is based on the union of the potential offered by technology and sustainability to promote an evolution of financial services that respects the paradigm of sustainable development and environmental care. Sustainable finance, a rapidly expanding sector, aims to reconcile economic growth and social progress with environmental protection.

Marco Giorgino, the Scientific Director of the Fintech & Insurtech Observatory, highlights the current necessity for the sector to face interconnected challenges, including the advancement of new technologies like generative artificial intelligence and the transition towards more sustainable models that are redefining strategies and processes, with the statement: "Today all players in the sector are called to confront interconnected challenges, between the advancement of new technologies such as generative artificial intelligence and the transition towards more sustainable models that are redefining strategies and processes"⁴¹.

Fintech and Insurtech startups in Italy represent an interesting case study as they demonstrate increasing maturity but at the same time are navigating the turbulent waters of a challenging macroeconomic context. Giorgino emphasizes the importance of transforming concepts such as sustainability, ecosystem, and the value of data into tangible actions capable of generating a real impact.

Fintechs operate through various business models in the vast sea of sustainability with the common goal of optimizing the use of data to inform and guide investors' decisions towards more sustainable choices, thus promoting greater transparency and institutional control. Among the various business models implemented, the "Microfinance" model stands out prominently. This model is closely linked with "green crowdfunding" platforms, utilized by enterprises that aim to extend services or alternative channels to segments of the population underserved by conventional financial systems. Principally,

⁴⁰ The "SDGs" (Sustainable Development Goals) are a universal set of goals, targets, and indicators that UN member states are expected to use to frame their agendas and political policies over the next 15 years. The 17 SDGs were adopted by all UN Member States in 2015 as part of the 2030 Agenda for Sustainable Development and are aimed at ending poverty, protecting the planet, and ensuring prosperity for all.

⁴¹ Giorgino, M. (2022). *The impact of generative AI and sustainability on financial services*. Financial Technology Research Institute.

these companies offer micro-loans or micro-insurance policies, employing entirely innovative digital channels to facilitate access and inclusion. Subsequently, there is the "Behaviour-Based" model, which encapsulates FinTechs dedicated to developing services and products designed to enhance customer awareness and promote the adoption of sustainable practices. Additionally, the "Sustainability Data Valorization" model represents a strategic approach focusing on the optimization and utilization of all data related to sustainability within the ecosystem. In this context, FinTechs engage in the aggregation and analysis of data, offering solutions aimed at facilitating the calculation of ESG (Environmental, Social, and Governance) ratings⁴². The primary goal of this model is to provide insightful information and guidance to investors, thereby enabling more informed decision-making and fostering enhanced oversight by institutions. This, in turn, aims to cultivate a more transparent financial system, capable of delivering accurate and comparable data.

The growth of this sector is highlighted by optimistic forecasts. According to NASDAQ and the International Monetary Fund (IMF), by 2030, this sector could create economic opportunities worth \$12 trillion per year and create 400 million new jobs.

The regulatory framework emphasizes the importance of developing technologies and financial practices that support the fight against climate change and promote fair and sustainable industrialization, and specifically includes:

- The Paris Agreement (2015), a treaty signed among the member states of the United Nations Framework Convention on Climate Change (UNFCCC) that identifies the guidelines to be followed to make technological development functional in the fight against climate change;
- The 2030 Agenda for Sustainable Development (2015), an action plan signed by the 193 member states of the United Nations that includes 17 goals to be achieved by 2030, including "Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation"⁴³.

⁴² ESG (Environmental, Social, and Governance) ratings are assessments used to measure a company's performance in areas related to environmental stewardship, social responsibility, and corporate governance. These ratings are utilized by investors, stakeholders, and regulatory bodies to evaluate the sustainability and ethical impact of a company, influencing investment decisions and strategies. ESG ratings help identify the risks and opportunities a company faces from an environmental, social, and governance perspective.

⁴³ United Nations, General Assembly. (2015). Transforming our world: The 2030 Agenda for Sustainable Development, p. 14.

FinTech companies are playing diverse roles in enhancing the sustainability of financial services, with the reduction of environmental impacts serving as a prime illustration. The digitization of financial services, exemplified by eco-friendly banking applications, facilitates paperless transactions, thereby contributing to enhanced environmental sustainability. Concurrently, certain blockchain initiatives are specifically aimed at monitoring carbon emissions and facilitating the trade of carbon credits. This dual approach not only assists companies in tracking their environmental footprint but also promotes the reduction of emissions through a transparent and secure framework. Similarly, insurance products are being redefined to promote environmental resilience, offering premiums that reflect the sustainability of the insured assets.

One of the main areas where green fintech is making an impact is in green investments. Platforms and apps now allow users to direct their funds towards ecologically sustainable projects, such as renewable energy sources, sustainable agriculture, and green buildings. These investments not only promise attractive returns but also contribute to reducing carbon footprints and environmental degradation. To give examples of startups operating in Green Fintech destined to change the planet, we can mention Enfuce, a Finnish startup that has developed “My Carbon Action”, a service that allows banks to calculate the total CO2 emitted by clients for every purchase made, or, to stay within the national scope, we have Flowe, a company owned by Banca Mediolanum that offers an account service and a debit card that allows tracking the environmental impact of one’s purchases, and through a point accumulation system allows customers to obtain discounts and offers.

According to research conducted by The European House, Ambrosetti in collaboration with Microsoft Italy on the impact of digital technology on the sustainable development of our country, it emerged that between 2020 and 2030, digital technology will contribute to reducing up to 10 percent of emissions compared to 2019 levels, with an impact equivalent to that of renewable energies.

In this context, a concrete example is provided by Aspiration, a green financial services company that offers its customers banking and investment products with a sustainable mission at their core. Aspiration stands out for its "Plant Your Change" checking account, which automatically rounds up card purchases to the nearest dollar and uses the difference to contribute to reforestation.

Furthermore, Aspiration offers a debit card made of recycled steel, aiming to reduce the use of plastic and promote sustainability. From an investment perspective, it offers eco-friendly investment funds that are focused on companies committed to reducing their carbon footprint, producing renewable energy, and other sustainable practices.

Aspiration thus emphasizes the importance of a financial approach that aims not only for economic gain but also for environmental improvement, demonstrating how green fintech can concretely contribute to a more sustainable future.

The growth of this sector is expected to be supported by increasing awareness of environmental and social issues, which is driving the demand for financial products and services that respect principles of sustainability. Companies that meet ESG criteria, meaning those that ensure maximum attention to environmental impact, social issues, and corporate governance, are receiving increasing support from investors (so much so that they raise about 25% more funds compared to "normal" ones) as well as from the European Union (EU), which has created the EU Taxonomy Climate Delegated Act, a regulatory framework aimed at directing investments towards sustainable technologies and businesses. This initiative aims to transform the European Union into a "climate-neutral" economy by 2050, marking a significant step forward in recognizing the crucial role that finance can play in the fight against climate change.

In parallel, Italian political and academic institutions are actively contributing to the research and implementation of sustainable financial strategies, participating in the Green Finance Study Group created by the G20. This collective commitment aims to provide clear answers on how sustainability factors influence financial stability and long-term investments, emphasizing the importance of ongoing dialogue between governments, regulatory bodies, and the banking sector.

Ultimately, the success of green fintech will depend on the ability to translate sustainability ideals into concrete and measurable financial practices that can be effectively integrated into the broader fabric of the global economy. This will not only help to mitigate climate-related financial risks but will also maximize the potential economic benefits derived from a more responsible and sustainable approach. With the continuous development of new financial technologies and a growing emphasis on sustainability, green fintech is positioned as a fundamental driver for the future of finance and the wellbeing of our planet.

Chapter 2: Technological Foundations of Modern Finance

2.1 Artificial Intelligence

Artificial Intelligence (AI) represents an advanced field of computer science focused on creating hardware and software systems capable of emulating distinctive human characteristics such as learning, adapting, planning, and reasoning. This discipline aims to develop solutions that operate autonomously to achieve specific goals and make decisions that would traditionally require human intervention. Fundamentally, AI is devoted to the study and application of methodologies and technologies that enable electronic devices to exhibit capabilities previously considered exclusively human. This encompasses not only the ability to process large volumes of data for autonomous decision-making but also the ability to acquire, process, and utilize knowledge in ways that mirror human reasoning, such as inference, deduction, and learning⁴⁴. Specifically, machine learning, a subset of artificial intelligence, is the process through which machines improve their performance over time, similar to the human brain, thereby expanding the capabilities of AI.

Currently, Artificial Intelligence is bringing epochal changes to virtually every area of human activity. Entire sectors have been revolutionized by its introduction, and many professions are experiencing profound changes directly linked to its emergence.

In the FinTech field, the use of Artificial Intelligence is being observed with great interest and is undergoing a phase of significant expansion, becoming an increasingly indispensable component for the industry. There are at least eight classes of solutions already available today:

- Virtual Assistant (Chatbot)
- Intelligent Data Processing

⁴⁴ Amigoni, F., Schiaffonati, V., & Somalvico, M. (n.d.). Intelligenza artificiale. In *Enciclopedia della scienza e della tecnica*. Treccani. Retrieved from https://www.treccani.it/enciclopedia/intelligenza-artificiale_%28Enciclopedia-della-Scienza-e-della-Tecnica%29/

- Recommendation Systems
- Image Processing
- Intelligent Object
- Language Processing
- Autonomous Robot
- Autonomous Vehicle

Not all applications of fintech technology are fully operational. While some are still in development, others have moved beyond the prototyping stage to actual implementation. It is well-known that artificial intelligence has become a fundamental component in the banking sector, especially regarding applications related to identity verification and data security. This is particularly important in the context of the increase in cybercrimes⁴⁵, which has made credit card fraud the most common type of personal information theft. Artificial intelligence-based systems enhance the monitoring of customers' financial habits, quickly identifying and blocking unusual or suspicious transactions, thus raising the level of cybersecurity. Furthermore, these systems make the analysis of the credit profiles of loan applicants more accurate and efficient, speeding up and refining the estimation and assessment of the risk of default.

Chatbots, or software agents that interact with users via textual or vocal commands, have become extensively utilized in the FinTech industry, particularly in providing post-sale assistance. These AI-driven tools significantly improve the efficiency of customer service by delivering instant and tailored responses to user queries, ensuring continuous and easily accessible interaction. Within FinTech, chatbots not only streamline the resolution of support issues but also enhance the overall customer experience by simplifying intricate processes and delivering real-time, relevant financial information.

The banking sector is increasingly leveraging the capabilities offered by Artificial Intelligence, particularly in the collection and analysis of large volumes of critical data. This approach is essential due to the impracticality of manually managing the massive influx of information generated by banking activities. Advanced AI algorithms enable

⁴⁵ Cybercrimes refer to illegal activities conducted through computers or the internet, including hacking, identity theft, and online fraud, targeting individuals, corporations, or government networks to steal data, money, or disrupt operations.

fast and efficient collection and analysis of Big Data, significantly reducing the likelihood of errors and increasing profitability.

Within this context, algorithmic trading stands out as one of the fields most transformed by AI. The development of increasingly sophisticated algorithms has enabled the automation of market operations, allowing for real-time analysis and extremely fast trading actions, cutting transaction times down to fractions of a second.

AI applications in predictive analysis are also noteworthy. Advanced data mining techniques now allow for market predictions with unprecedented accuracy. These methodologies extend to the assessment of credit risks and the prevention of defaults, providing banking institutions with crucial strategic advantages. Algorithms and mathematical models applied to market and customer data significantly improve financial advisory services, introducing so-called Robo-Advisors: systems that integrate data analysis in customer assistance, providing precise and timely investment recommendations available 24/7.

Essentially, the Fintech sector benefits from the implementation of AI solutions because this technology offers the possibility to deeply understand both existing customers and prospects. This results not only in a significant reduction of risks but also in the provision of increasingly targeted, coherent, and personalized services for each risk profile, as well as in more precise strategic decisions.

2.1.1 Robot Advisor

Robot-advisors represent a new generation of financial advisors born in the digital age, aimed at making wealth management accessible to a broader audience. Emerging as an alternative to self-managed investments, which require significant expertise and time commitment, and to traditional financial consulting, often burdened by high management costs and investment thresholds prohibitive for small savers, robot-advisors have introduced a radical change in the financial sector, supported by technological innovation and the spread of the web.

These digital platforms provide automated financial consulting and planning services, minimizing human intervention through the use of advanced algorithms. Users are guided

in defining their risk profile and investment objectives through online questionnaires, enabling robot-advisors to propose personalized portfolios. These may include investment strategies based on passive indexing⁴⁶, in line with Modern Portfolio Theory (MPT)⁴⁷, and ethical options such as socially responsible investments or halal investments⁴⁸ (i.e., those complying with the principles of Islamic finance), in addition to services like tax loss harvesting and retirement planning.

With a legal status equivalent to that of traditional financial advisors, robo-advisors are subject to stringent regulatory standards, ensuring a high level of reliability and security for investors. For example, in the United States, they must be registered with the Securities and Exchange Commission (SEC)⁴⁹, in Italy, they are under the supervision of CONSOB⁵⁰, and in other jurisdictions, they are overseen by equivalent authorities. Their efficiency and the use of digital technologies enable the reduction of management costs, making investment accessible even to those with limited capital.

The automated platform of robot-advisors intuitively understands the investment needs of users, offering customized and easily adjustable solutions. The aim is to provide financial planning that supports individuals at every stage of life, enhancing their ability to manage savings and increase financial awareness. Indeed, what robot-advisors accomplish is what any dedicated consultant can do, but thanks to innovation and the use of online portals, they manage to reduce the fees charged for the service, making sophistication previously available to a select few accessible to all. The primary advantage of robot-advisors, therefore, lies in their significantly lower cost compared to human alternatives. Most charge fixed annual fees of less than 0.5% of the managed

⁴⁶ Passive indexing is an investment strategy where a portfolio is constructed to mirror the components of a market index, aiming to replicate its performance with minimal buying and selling, thereby reducing transaction costs and management fees.

⁴⁷ Modern Portfolio Theory (MPT) is a financial model that aims to maximize portfolio returns for a given level of risk by carefully choosing the proportions of various assets. It emphasizes the benefits of diversification, combining various asset types to reduce risk and improve returns, often implemented alongside passive indexing strategies to achieve balanced and efficient portfolios.

⁴⁸ Halal investments are financial activities that comply with Islamic law (Shariah), which prohibits earning interest and investing in businesses involved in prohibited activities like alcohol, tobacco, gambling, and non-halal food products. These investments focus on ethical and socially responsible practices, promoting profit-sharing and risk-taking that align with Islamic principles.

⁴⁹ The Securities and Exchange Commission (SEC) is a U.S. government agency responsible for regulating the securities markets and protecting investors. It oversees the enforcement of federal securities laws, regulates securities exchanges, and ensures that companies provide accurate and transparent financial information to the public.

⁵⁰ CONSOB (Commissione Nazionale per le Società e la Borsa) is the public authority responsible for regulating the Italian financial markets. Its main functions include protecting investors, ensuring transparency and integrity in the financial markets, and supervising the activities of financial intermediaries to ensure compliance with the law.

amount, compared to the typical 1% or 2% charged by traditional consultants. Additionally, they are more accessible, being available 24/7, and require a lower amount of capital to start (usually from \$1,000 to \$5,000). On the other hand, using such a service might not meet the needs of those seeking a direct (face-to-face) relationship with their consultant. They also limit the investment options available to users, who cannot select specific mutual funds, ETFs⁵¹, stocks, or bonds.

According to an analysis by BackEnd Benchmarking⁵², which evaluated 20 digital advisors in 2021, the net annualized three-year returns varied between 7.44% and 12.1%. Compared to their reference benchmarks, the normalized three-year returns ranged from -3.98% to 0.38%, with only four out of twenty robo-advisors surpassing their benchmarks.

In Italy, the rise of robot-advisors is marking an era of transformation in financial consultancy, making investment access more democratic and innovative. The launch of MoneyFarm in 2012 heralded the advent of robot-advisory in the country, offering investors the unprecedented opportunity to benefit from personalized investment portfolios tailored to their risk profiles, bypassing the barrier of substantial initial capitals required by traditional financial consulting. This innovation represented a break from the conventional financial advisory model, characterized by high management costs and entry thresholds prohibitive for smaller investors. By 2023, MoneyFarm continued to consolidate its position, managing several billion euros and reinforcing confidence in the effectiveness of robot-advisory among Italian clients.

Following MoneyFarm's lead, a wide array of platforms, such as ETFmatic and Scalable Capital, have expanded the automated investment offering in the Italian market. These platforms range from strategic ETF allocations to highly customized investment solutions, always focusing on ease of access and commission reduction, which are fundamental principles of robot-advisory.

⁵¹ Exchange-Traded Funds (ETFs) are investment funds traded on stock exchanges, much like stocks. They hold assets such as stocks, commodities, or bonds and generally operate with an arbitrage mechanism designed to keep the trading close to its net asset value, though deviations can occasionally occur. ETFs offer a cost-effective way for investors to diversify their portfolios without having to buy all the individual components.

⁵² BackEnd Benchmarking is a research company known for its detailed analysis and reports on various financial products, particularly in the wealth management and investment advisory sectors. They are well-known for the Robo Report, which tracks and analyzes the performance and offerings of robo-advisors to provide insights into their investment strategies, returns, fees, and other critical performance metrics.

The surge in robot-advisors has highlighted curious trends and data, revealing exponential growth in terms of assets under management and a demographic diversification among users. Contrary to initial expectations that saw robot-advisory as a tool favored by younger generations, platforms like Scalable Capital and ETFmatic have attracted a diverse audience, including mature investors eager to optimize their pre-retirement savings through tailored solutions that also encompass sustainable investments and ESG standards.

Particularly noteworthy is the emergence of a preference for portfolios that integrate ESG criteria or focus on sustainable investments, reflecting an evolution in investor awareness increasingly inclined to consider the social and environmental implications of their financial choices.

Simultaneously, robot-advisors have played a crucial role in financial education in Italy, with platforms like Oval Money providing not only investment tools but also educational content aimed at enhancing understanding of markets, investment strategies, and risk management. This commitment to education has sparked a marked interest in topics such as retirement planning and market fluctuation management.

Traditional banks, recognizing the added value of robot-advisors, have begun to integrate automated consulting services or to establish strategic partnerships with existing platforms. A notable example is Intesa Sanpaolo, which has skillfully combined the digital innovation of robot-advisors with the reliability and solidity of the banking institution, offering customers an optimal synergy between technology and security.

Finally, the adoption of advanced technologies allows platforms like Directa to offer unprecedented customization in investment portfolios, adaptable not only to risk preferences but also to specific needs such as sustainability or compliance with ethical and religious principles.

The following table presents a comparison between the main robot-advisors in Italy for the year 2023/2024, according to the analysis published by Forbes.

	Scalable Capital	eToro	Moneyfarm	Tinaba	Revolut
Management fees	0.99€/operation 2.99€/month 4.99€/month	No	2000/19.999€ = 1% 20.000/199.999€ = 0,7% 200.000/999.999€ = 0,5% ≥ 1.000.000€ = 0,4%	2000€ – 19.999€ = 1,00% 20.000€ – 199.999€ = 0,70% 200.000€ – 999.999€ = 0,50% ≥ 1.000.000€ = 0,40%	0.75% of the portfolio value
Trading fees	0	0	0	0	0
Contract	Managed and administered savings	Declarative regime	Managed savings	Managed savings	Declarative regime
PAC	Yes	No	Yes	Yes	Yes
Demo account	No	Yes	No	No	No
Minimum initial deposit	1	500	5000	2000	100
Instruments beyond ETFs	Stocks Money market funds Bonds Commodities Cryptocurrencies Exchange-Traded Products	Stocks Cryptocurrencies Commodities Currencies Indices	PIP Insurance Money market funds	Cryptocurrencies Deposit account	Stocks Bonds Cryptocurrencies

Table 1 - "The 5 best robot-advisors in Italy in 2024", source: Forbes

Upon examining the data, it's clear that certain platforms stand out from the others for various reasons. For instance, eToro and MoneyFarm occupy distinct niches within the FinTech market, providing unique experiences to investors. eToro is recognized as a social trading platform where users can trade a wide array of assets and mimic the strategies of successful traders. Uniquely, eToro does not impose management fees, which sets it apart from other investment services. Instead, eToro earns revenue through trading spreads, overnight fees, and withdrawal charges. Conversely, MoneyFarm functions as a financial advisory and asset management service, offering tailor-made investment portfolios predicated on a management fee model that is proportional to the amount of assets under management. This cost structure makes MoneyFarm an appealing option for investors who prefer a managed investment experience with a long-term strategic plan.

The progression of robot-advisors in Italy represents not merely an alternative to traditional financial consultancy but signifies a profound cultural shift, guiding investors towards a more informed, aware, and personalized approach in managing their assets. This evolution underscores the growing importance of technology and innovation in shaping the future of financial investment in the country.

2.2 Blockchain

Blockchain technology represents a transformative advancement in the FinTech and insurance industries, profoundly impacting the way financial transactions and data management are conducted globally. As a shared, immutable ledger, blockchain

facilitates the recording of transactions and asset tracking across business networks, allowing for the seamless exchange of valuable assets while mitigating risks and reducing costs for all parties involved. In the financial sector, blockchain's decentralized nature eliminates the need for intermediaries, establishing a transparent, public ledger system that validates and records transaction data. A set of information produced over a specific period of time creates a block of transparent, immutable, and permanent information, identified by a unique hash⁵³. Software validates this information and records it in a sort of public ledger where participants (either all or only a portion) in the network have access, thereby exercising control over it. Once new information is accepted, it cannot be altered or deleted. In this way, the system becomes its own guarantor. Subsequently, when new money transactions or information occur, a new block connected to the previous one is created, more up-to-date than the latter but less so than the next. This complex system ensures enhanced security within the network.

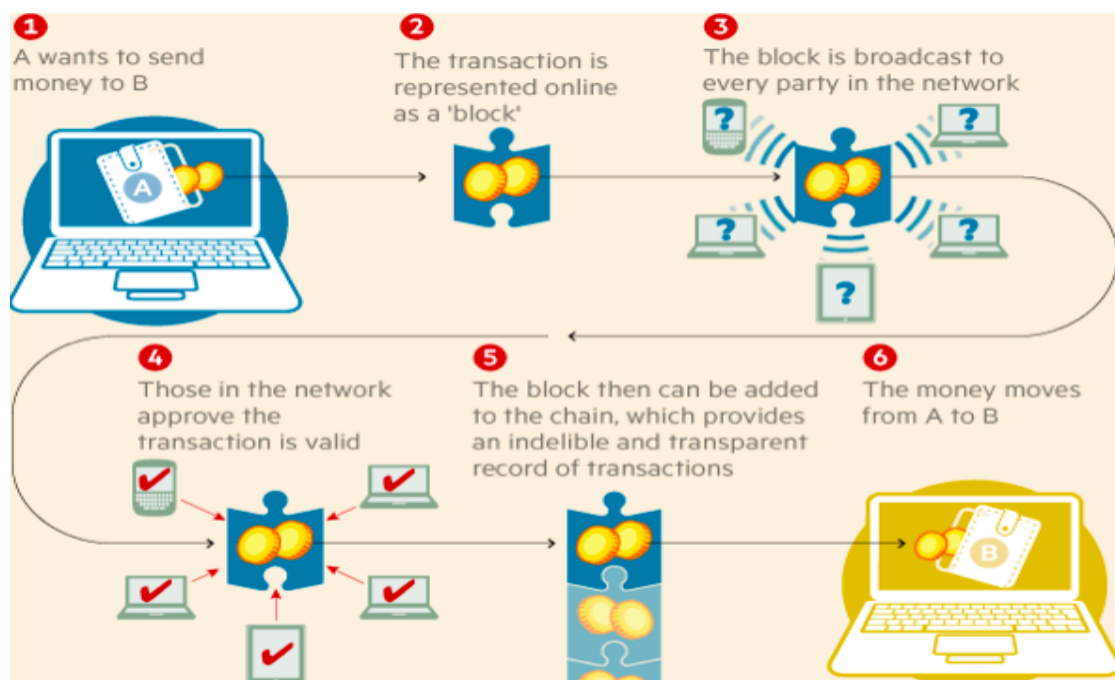


Figure 1 – “How a blockchain works”, Source: Behavioral Economics, "Blockchain, the Future in Blocks"

In the figure above, the process in which user A makes a money transaction to user B is illustrated, schematically representing the entire process that characterizes blockchain

⁵³ "Hashing is a cryptographic function based on a mathematical algorithm that maps data of arbitrary length into a fixed-size binary string. Hashing represents the most secure way to identify a specific block without tracing back to the text that generated it" (Vergine, S., & Bortolotti, A., 2021). *Blockchain, the future in blocks*. Behavioral Economics.

technology. As can be observed, the action of control is fundamental for the operation of the entire system, and it is the organization itself that guarantees this phase without centralizing this task in the hands of third parties.

In the realm of international payments, blockchain has significantly expedited international payment processes, reducing transaction times from days to mere seconds, a significant transformation considering the transaction volume, which the World Bank reported as \$689 billion in 2018. Innovative startups like Ripple have leveraged this efficiency, employing blockchain to streamline cross-border payments effectively. Beyond payment processing, blockchain's influence extends to sectors like supply chain management and identity verification, where its capacity for ensuring data integrity and security is unparalleled. Remarkably, investments in blockchain startups soared to \$2.6 billion in just the first quarter of 2021, indicating growing confidence and interest in this technology within the FinTech sector.

The impact of blockchain extends well beyond the payment sector, penetrating the core of finance. In the stock market, for instance, the technology is streamlining clearing and settlement processes, exemplified by the Australian Stock Exchange's initiative to replace its clearing system with a blockchain-based solution. The traceability and immutability provided by blockchain are also paving new avenues in the digital assets sector, where the tokenization of tangible assets and the creation of digital currencies are gaining momentum. A notable example is the rising popularity of Security Token Offerings (STO), which aim to democratize investment in high-value assets.

In the insurance domain, blockchain has fostered innovation through the development of smart insurance policies, which automate claim processing and payments based on verifiable blockchain criteria. This not only streamlines the insurance process but also significantly diminishes fraud risks, exemplified by companies like Etherisc that are pioneering automated insurance solutions based on blockchain-recorded data.

Therefore, in conclusion, it is possible to identify six common characteristics inherent to blockchain technology.

1. Decentralization: Information is recorded by distributing it across multiple nodes to ensure cybersecurity and resilience of systems.
2. Traceability of transfers: Each item in the ledger is traceable in its entirety, allowing for the precise origin to be determined.

3. Disintermediation: The platforms enable transactions to be managed without the need for intermediaries.
4. Transparency and verifiability: The contents of the ledger are transparent and visible to all and can be easily consulted and verified.
5. Immutability of the ledger: Once data is written to the ledger, it cannot be altered without the consensus of the network.
6. Programmability of transfers: The ability to program certain actions that are executed upon the fulfillment of specific conditions.

2.3 Big Data

Big Data refers to extremely large data sets that are analyzed computationally to reveal patterns, trends, and associations, especially relating to human behavior and interactions. It encompasses data collected from sources like social media, transaction records, and IoT devices, which is too vast or complex for traditional data processing methods. Big Data is characterized by its volume, variety, and velocity—the three Vs—requiring advanced technologies and techniques for efficient processing and analysis. It enables organizations to gain deep insights, make informed decisions, and optimize processes.

In the FinTech sector, Big Data is not just about amassing vast volumes of data; its transformative power lies in the analytical prowess that converts this data into actionable insights. This capability is essential as traditional data processing tools are inadequate for the scale and complexity of Big Data.

Big Data Analytics (BDA) is at the forefront of driving innovation in the FinTech sector, enabling organizations to decipher complex patterns, correlations, and trends from vast data sets. This analytical prowess fuels informed decision-making and uncovers new avenues for business opportunities. The remarkable investment surge in Big Data, which reached \$2.6 billion in the first quarter of 2021 alone, underscores the growing recognition of its transformative impact on FinTech.

Beyond financial analytics, Big Data is making significant inroads into the stock market, streamlining clearing and settlement processes, and catalyzing financial innovations such

as Security Token Offerings (STOs)⁵⁴. These offerings represent a democratization of investment in high-value assets, illustrating the expansive influence of Big Data in modernizing financial markets.

In customer service, FinTech enterprises are capitalizing on Big Data to construct intricate user profiles and segmentation strategies, thereby enhancing service personalization. This strategic use of data enables FinTech firms to meet the unique needs of each customer, thereby elevating service quality and solidifying their competitive advantage over traditional banking entities. The demand for personalized services is substantial, with 76% of consumers expecting services tailored to their individual needs. Big Data empowers FinTech companies to meet these expectations, offering customized services that resonate with consumers' personal preferences, thus fostering deeper customer engagement and loyalty.

The predictive capabilities of Big Data also allow FinTech firms to anticipate market trends and consumer behaviors, sharpening their strategic decision-making. This leads to an unparalleled level of service customization, where offerings are meticulously aligned with individual customer needs, thereby bolstering customer satisfaction and loyalty. This strategic alignment not only meets the immediate needs of customers but also sets the stage for long-term business success in the dynamic world of FinTech.

Fraud prevention is another critical area where Big Data has a significant impact, with machine learning algorithms effectively detecting and mitigating suspicious activities in real-time. This integration not only safeguards customer assets but also underpins the trust that is fundamental to financial transactions. Through the identification of unusual patterns and behaviors, Big Data enables swift and effective responses to potential security threats and fraud, thus maintaining the integrity of financial operations.

For investors, the insights derived from Big Data are invaluable, offering a robust framework for evaluating market opportunities and risks, thus profoundly shaping investment strategies. Beyond its analytical capacity, Big Data is a key driver of financial inclusion, broadening access to financial services across various population segments,

⁵⁴ Security Token Offerings (STOs) are a type of public offering in which tokenized digital securities, backed by real assets, are sold on blockchain platforms, combining elements of traditional securities with the technological advantages of blockchain. STOs provide investors with ownership rights and are subject to regulatory governance, offering a more secure and regulated investment option in the digital asset market.

and setting the stage for sustainable growth and innovation in the dynamic FinTech industry.

As Big Data continues to evolve, it places the FinTech sector at the epicenter of a transformation that emphasizes service personalization, advanced security, and increased financial inclusion. This ongoing evolution underscores the central role of Big Data in driving innovation and comprehensive market understanding in the FinTech industry.

Chapter 3: How Finance is Changing Through Technologies

3.1 Digital Banking

Digital Banking embodies the digital evolution of traditional banking services, granting users access to a broad spectrum of financial functionalities via the internet. This paradigm shift has fundamentally redefined the banking sector, empowering consumers to manage their finances through devices such as computers, smartphones, tablets, and wearable technology. This transformation has rendered banking services accessible 24/7, obviating the need for physical branch visits. The concept of Digital Banking is predicated on the integration of online banking and mobile banking, merging these platforms to provide a seamless, comprehensive digital banking experience⁵⁵.

Online banking enables customers to access banking services through their bank's website from a computer, facilitating activities such as viewing account statements, applying for loans, and conducting fund transfers. This concept originated in the United States during the 1990s when, in October 1994, Stanford Federal Credit Union became the first institution to allow its customers to access banking functions via the newly developed World Wide Web. Within a few years, it is estimated that 80% of U.S. banks provided their customers with the capability to conduct banking transactions online.

Mobile banking, on the other hand, expands this accessibility through mobile apps, typically associated with the bank where the user holds an account. These apps generally use the same login credentials as the online banking portal, enhancing the seamlessness

⁵⁵ Napoletano, E., & Foreman, D. (2021). "What Is Digital Banking?" Forbes. Retrieved from <https://www.forbes.com/advisor/banking/what-is-digital-banking/>

and convenience of digital banking services. Specifically designed for dynamic users who are constantly on the move, mobile banking apps integrate essential banking functions, prioritizing convenience and speed of use. A distinctive feature of mobile banking is its ability to facilitate smart payments⁵⁶. This functionality enables customers to conduct transactions and make purchases intuitively and immediately from their mobile devices. A prominent example is the use of contactless payments, which obviate the need for physical cards, allowing for secure transactions by simply bringing the device close to a payment terminal (POS). Additionally, mobile banking supports money transfers via QR codes, further simplifying the payment process and making it faster and more accessible. The surge in Digital Banking adoption, fueled by its numerous benefits, has become a cornerstone of daily financial activities for individuals and businesses alike. For banks, it has led to significant operational cost reductions by streamlining back-office functions and automating transaction processes, thus minimizing human error and financial discrepancies. Customers, on the other hand, enjoy the flexibility and cost-effectiveness of managing their finances digitally, benefiting from lower fees, immediate service access, and an improved banking experience.

Key technologies like AI, Blockchain, and Big Data have been instrumental in this evolution, enhancing the operational efficiency, security, and customer engagement of digital banking. Personalization in digital banking, driven by AI, has allowed banks to offer customized services like automated budgeting, expense tracking, and savings notifications, increasing customer engagement and satisfaction. The progression towards FinTech innovations like invisible payments, peer-to-peer transfers, eWallets, and wearable technology has not only advanced Digital Banking but also transformed the global financial ecosystem, signifying a shift towards technology-driven, user-centric financial services. These developments underscore FinTech's role as a driving force in shaping the future of Digital Banking. The COVID-19 pandemic accelerated the transition to digital platforms, as more consumers and businesses sought digital solutions for their financial needs, highlighting Digital Banking's escalating significance and adoption in today's economic landscape. The evolving customer expectations and the integration of FinTech innovations have enabled digital banks to expand their influence and reshape the financial

⁵⁶ EconomyUp. (n.d.). "Smart payments refer to various forms of innovative payments that utilize new technologies." Retrieved from <https://www.economyup.it/retail/smart-payment/>

sector significantly. The synergy of these technologies within Digital Banking creates a robust framework that supports the continuous innovation and development of the financial sector. A study conducted by Accenture in collaboration with N26 has revealed a significant increase in the adoption of digital banking between 2018 and 2020 across major European countries, with growth rates exceeding 50% and peaks of 82% in Switzerland. This trend extends globally, with countries like Brazil showing high adoption rates and forecasts pointing to China and the United States as future frontrunners in the adoption of fully digital banking systems.

In Italy, the transition to digital banking has followed a similar trajectory, witnessing a notable rise in users relying on online banking services. Italian financial institutions have responded to this increasing demand by enhancing their digital platforms and introducing new innovative services to meet the needs of an increasingly connected and technologically sophisticated public.

COUNTRY	Customer with a digital account in 2018 (%)	Customer with a digital account in 2020 (%)	Customer interested only in a fully digital account type (%)	Potential market share of fully digital banking services in the overall market (%)	Increase (%)
Netherlands	7	8.4	42.4	50.7	20%
Germany	7.5	10.1	44.2	54.3	35%
Belgium	9.6	12.5	43.5	56	30%
Spain	10.6	15.3	48.2	63.5	44%
United States	14.3	18.7	40.7	59.4	31%
Canada	16	18.8	37.8	56.6	18%
France	12.9	19.7	34.9	54.6	53%
Italy	20.5	26.1	45.6	71.7	28%
Russia	27.6	32.2	48.5	80.7	17%
Japan	36.4	41.2	37.4	78.6	13%
China	34.6	42.5	41.1	83.6	23%
Hong Kong	15.6	24.3	50.3	74.6	55%
Brazil	25.4	44	43.4	87.4	73%

Table 2 – “Adoption of Digital Banking in various countries”, source: N26 x Accenture, “Global Digital Banking Index 2021”

An emerging trend in the digital banking sector, gaining increasing popularity, is the "Buy Now, Pay Later" (BNPL) service model. This mechanism allows consumers to purchase products on e-commerce platforms and defer payment through installments, thereby facilitating immediate consumption. In Italy, BNPL is gaining momentum, with numerous fintech and banking institutions introducing installment payment options to

boost customer conversion rates and increase average cart value. The success of BNPL in the Italian market is reflected in its potential to reduce shopping cart abandonment and enhance customer loyalty, establishing it as one of the fastest-growing fintech services in the country.

3.1.1 Invisible Payments

In the FinTech sector, the rise of invisible payments signifies a pivotal transformation in the financial services industry, presenting a transaction mechanism that smoothly integrates technology and convenience. Eliminating manual interactions, these payment methods utilize voice recognition, facial biometrics, and QR codes for transaction authentication, showcasing FinTech's creativity in refining financial operations.

In Italy, the adoption of invisible payments reflects a dedicated approach to embracing these innovations, thereby enhancing efficiency and customer experience, especially in retail and transportation sectors.

Investments in FinTech startups and collaborations with technology providers indicate a shift towards a digitally focused, user-centric financial ecosystem. The national regulatory framework is evolving to support the integration of invisible payments, maintaining a balance between innovation and consumer protection, consistent with European regulations.

Invisible payments aim to simplify financial transactions while enhancing security and reducing fraud through authentication methods that leverage unique biometric identifiers. This evolution heralds a future where technology and digital user demands merge to create an optimized, personalized financial environment. Italy, by staying ahead of international trends, is positioning itself as a pivotal player in defining the future of digital payments, showcasing a willingness to adopt progressively advanced technologies in finance. Research indicates that over 25% of global financial transactions may be conducted via invisible payments in the coming years, driven by the increasing use of mobile and wearable technology to facilitate this shift. In Italy, the development of systems that enable direct payments for services, such as fueling vehicles directly from the car, without the need for physical interaction at stations, underscores the growth and burgeoning interest in invisible payments, even in traditionally less digitized sectors.

Economically, these payment methods are reducing operational costs and enhancing efficiency for businesses, improving transaction security, and minimizing errors and

fraud. For consumers, they lead to an improved purchasing experience, positively affecting customer loyalty and overall sales.

In the global context of advancements in invisible payments, China and Russia stand out as notable examples of how different regions are adopting this technology. In China, Alipay is at the forefront of promoting facial recognition payment systems, highlighting the country's swift embrace of FinTech innovations that prioritize convenience and security in financial transactions. This approach not only streamlines the payment process but also improves the user experience by making transactions quicker and more secure. Similarly, in Russia, the well-known supermarket chain Azbuka Vkusa is implementing payment services via fingerprint scanning, integrating biometric technology to enable smooth and secure payment transactions. This method exemplifies the growing trend of utilizing unique biological characteristics for transaction authentication, reducing the reliance on traditional payment methods and enhancing transaction security.

These developments emphasize the global momentum towards more integrated and user-friendly payment solutions, with countries like China and Russia leading the way in deploying cutting-edge technologies that redefine the landscape of digital payments.

3.1.2 P2P payments (peer to peer payments)

In the FinTech sector, the development of peer-to-peer (P2P) payment systems has triggered a significant transformation in the financial industry, enhancing its agility, user-friendliness, and cost-effectiveness. These systems enable the instant transfer of funds between individuals via digital platforms, typically mobile applications, with funds drawn from bank accounts, credit or debit cards, or cash top-ups. Such services are delivered through digital wallets, which stand out from traditional payment methods due to their lower costs, often being free in their basic versions, and their straightforward setup and use.

The adoption of P2P payment solutions, a subset of alternative payments, has seen rapid growth in recent years. According to research by Statista⁵⁷, global transactions involving alternative payments were expected to reach approximately fourteen trillion dollars by

⁵⁷ Statista is a leading provider of market and consumer data, offering statistics, reports, and industry insights across various sectors. It aggregates data from reputable sources to provide research and analysis for businesses, academics, and professionals.

2022, driven by the rise of e-commerce and the increased use of proximity payments in physical stores, such as self-service kiosks and other unmanned points of sale.

P2P payments attract users with their speed, simplicity, and low cost, as opening an account and transferring money usually incur no fees. This cost advantage contributes to the versatility of P2P payments, making them suitable for various situations, such as:

- Transferring money to someone who is physically distant
- Reimbursing small amounts without needing exact cash
- Splitting expenses among a group

A major advantage of P2P payment applications is their ease of use. Registration typically involves a few simple steps after downloading the app, with activation often occurring quickly, depending on the specific service. Once activated, users can fund their digital wallets through credit/debit card transactions, bank transfers, or cash top-ups at ATMs or designated locations. The time it takes for funds to be credited can range from instant to a few days, depending on the method used. Once funded, users can make payments to their contacts. If the recipient is already using the service, the transfer is immediate; otherwise, they receive an SMS notification inviting them to sign up to claim the funds. FinTech has played a pivotal role in fostering the emergence of P2P payments through various transformative factors. The sector's adoption of advanced technologies, such as sophisticated encryption and mobile applications, has facilitated secure and instant fund transfers, enabling the development of P2P platforms that are both accessible and efficient.

Technology has redefined the traditional approach to financial services, shifting towards a more flexible, consumer-centric model. This shift has encouraged the creation of payment solutions that emphasize simplicity, speed, and convenience—all core features of P2P payments. A further driver has been the reduction in costs, as FinTech solutions generally incur lower expenses compared to traditional methods, owing to automation and digital infrastructure. This cost reduction has significantly boosted the appeal of P2P payments, drawing a broader user base.

Additionally, FinTech has promoted the development of integrated ecosystems, allowing P2P payments to connect with other financial services such as budgeting, savings, and investment tools. This level of integration has provided users with a more comprehensive financial experience, fostering an environment conducive to the growth of P2P payments.

Globally, peer-to-peer (P2P) payments have become a critical component of the digital economy, driven by the demand for instant, convenient, and cost-effective financial solutions. Platforms like PayPal, Venmo, and Cash App in the United States have pioneered P2P transactions, while Alipay and WeChat Pay in China have achieved massive user bases, extending their services far beyond simple fund transfers.

In 2022, the global value of P2P payment transactions exceeded 14 trillion dollars, largely fueled by the surge in e-commerce and the growing prevalence of mobile payments for proximity transactions in physical retail settings.

In Italy, the adoption of P2P payments has accelerated, with platforms like Satispay at the forefront. In 2023, Satispay processed transactions totaling 500 million euros, with an impressive 40% annual growth rate, reflecting Italy's commitment to digital financial transformation. Compared to other nations, Italy's P2P payment landscape has benefited from strong support from financial regulatory authorities and active collaboration between traditional banks and FinTech startups. This cooperative approach has facilitated seamless integration between conventional banking services and innovative digital platforms. While countries like the United States and China have been leaders in P2P payments, Italy's rapid expansion aligns with a broader European trend towards digitalization in financial services. Italy's emphasis on building a secure and consumer-friendly digital payments infrastructure is positioning the country as a significant player in the global P2P payment ecosystem. The collaboration between Italian banks and FinTech firms has fostered a more flexible and user-centric approach, potentially providing a blueprint for other European nations looking to advance their digital financial systems.

3.1.3 eWallet

Electronic wallets, or eWallets, represent a crucial innovation within the realm of digital financial services, serving as secure virtual repositories for users' payment information and funds. These digital platforms simplify transactions by consolidating multiple payment methods into one accessible location, accessible via smartphones or other connected devices. This modern convenience eliminates the need for physical wallets, enabling users to make in-store payments, transfer funds, and manage transactions with just a few taps on their screens. The surge in eWallet usage has been driven by the advancement of mobile technology and a growing preference for contactless payment

options. These platforms are equipped with robust security features such as encryption, tokenization, and biometric verification, significantly mitigating the risk of fraud and theft. Furthermore, the integration of loyalty programs and personalized offers within eWallets has boosted consumer engagement, offering a seamless shopping experience that surpasses that of traditional payment methods.

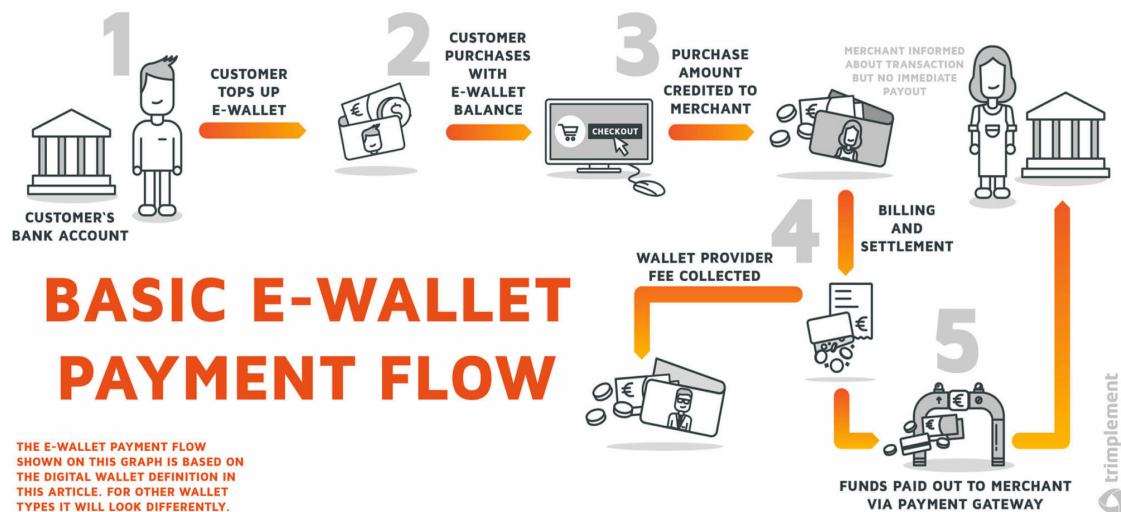


Figure 2 – “A digital wallet in (trans)action”, source: trimplement,

The image shows the basic payment flow for an electronic wallet (e-wallet), outlining the journey from loading the balance to transferring funds to the merchant. The process begins with the customer topping up their e-wallet from a bank account, as indicated in the first step. The customer then makes a purchase using the e-wallet balance. Once the transaction is completed, the amount is credited to the merchant, as shown in the third step. In the fourth step, the merchant is informed that the transaction has occurred, although the funds are not immediately available for use. This step represents the billing and settlement phase. Finally, the fifth step indicates that the funds are transferred to the merchant through a payment gateway after the e-wallet provider has collected its fee. This sequence of steps demonstrates the key role e-wallets play in facilitating digital transactions, highlighting how the system is designed to ensure security and transparency. The process includes verification steps and notifications that ensure a smooth and reliable

experience, providing merchants and customers with an efficient way to manage online transactions.

The global eWallet market is witnessing exponential growth, with substantial adoption rates in regions like Asia-Pacific, notably in China and India, where mobile payments have become prevalent. The convenience offered by eWallets is transforming consumer behavior, shifting the paradigm from cash and card-based transactions to a predominantly digital economy. Consequently, businesses across the globe are recognizing the necessity of integrating eWallet options to meet customer expectations and remain competitive in the evolving digital landscape. Beyond serving as mere payment methods, eWallets are comprehensive financial tools that facilitate budgeting, expense tracking, and financial planning. They support multiple currencies and enable international transactions, thus removing geographical barriers to commerce. As financial technology continues to advance, eWallets are set to become integral to the global payment ecosystem, promoting a cashless society and expanding the horizons of digital commerce and finance. At the intersection of digital banking and the broader FinTech revolution, eWallets act as one of the most tangible interfaces for consumers engaging with financial technology. They are a hallmark of FinTech innovation, merging convenience with the robust security and sophistication of digital banking. By enabling customers to perform banking transactions without the need to visit a physical branch or ATM, eWallets epitomize the FinTech promise of delivering banking services "anytime, anywhere." The symbiotic relationship between eWallets and digital banking platforms is essential; eWallets facilitate various financial transactions, enhancing user engagement, which in turn, drives the development and refinement of digital banking services. Banks and FinTech companies work collaboratively to ensure that eWallet functionality adheres to strict regulatory standards and security protocols, while also pushing the boundaries in user experience design and financial product innovation. In the FinTech ecosystem, eWallets are crucial for providing access to financial services for unbanked and underbanked populations, fostering financial inclusion and economic participation. This inclusivity is transformative, allowing eWallets to act as catalysts for financial empowerment. They embody the FinTech ideal of democratizing finance by leveraging technology to bridge the gaps in traditional banking systems.

Additionally, eWallets enable the integration of diverse FinTech services such as peer-to-peer lending, microfinancing, and cryptocurrency transactions, broadening their role from basic payment tools to comprehensive financial management hubs. This integration allows for a convergence of FinTech innovations, enhancing the financial services landscape and contributing to the growth of digital economies. As eWallet adoption increases, the feedback loop with digital banking tightens. Consumer expectations, molded by the ease of use of eWallets, establish new benchmarks for digital banking services. In response, banks are prompted to innovate, leveraging FinTech partnerships to enhance their digital offerings. This dynamic interplay significantly impacts not just consumer habits but also the structure and strategy of financial institutions as they navigate digital transformation. In Italy, the government's robust support for digital transformation initiatives positions eWallets to play a pivotal role in shaping the digital economy's future and facilitating a seamless transition to a cashless society. The rapid growth of the eWallet market, projected to increase from \$1 trillion in transaction value in 2019 to over \$4 trillion by 2025, underscores their growing influence on economic trends, consumer behavior, and financial innovation worldwide. As this technology continues to evolve, its integration into the daily lives of millions, facilitating a broad range of financial services, will likely expand further, solidifying eWallets as a cornerstone of the digital financial landscape.

3.1.4 Wearable

In the FinTech domain, wearable devices represent an innovative frontier redefining the intersection of technology and financial services. Smartwatches, fitness trackers, and other wearable gadgets equipped with internet connectivity and contactless payment capabilities are transforming how we access banking services and manage personal finances. Equipped with NFC (Near Field Communication) technology⁵⁸, these devices allow payments simply by being brought close to a compatible POS terminal, similar to

⁵⁸ Near Field Communication (NFC) is a wireless communication technology that allows devices to exchange data over short distances, typically a few centimeters. It's commonly used in contactless payment systems, such as mobile payment apps and credit cards, enabling users to make transactions by simply tapping their device or card on an NFC-enabled terminal. NFC technology also supports data sharing, authentication, and pairing between devices, with applications in access control, public transportation, and smart device interactions. Its low power consumption and ease of use have made NFC a popular choice for convenient and secure transactions in various industries.

using a contactless credit or debit card. This functionality not only offers superior convenience but also enhances security, reducing the need to carry physical cards that could be lost or stolen. The adoption of wearable devices in the financial sector extends beyond mere payments. They also provide advanced features such as spending tracking, consumption habits analysis, and the ability to receive real-time financial notifications. This enables users to have more direct and immediate control over their finances, promoting greater financial awareness and responsibility. Furthermore, the integration of advanced technologies like artificial intelligence and machine learning into wearable devices opens new possibilities for personalizing financial services. Users can receive customized suggestions based on their spending patterns, investment advice, or alerts about significant market movements, all through their wearable device.

From the perspective of the banking and financial sector, wearables offer an additional channel for customer interaction, enhancing engagement and providing extra services that can differentiate a financial institution from its competitors. This is an important strategic lever in an era where customer experience and service customization have become crucial competitive aspects in the financial industry. As technology advances and their adoption increases, wearable devices will continue to play a significant role in shaping the future of FinTech. As more consumers get accustomed to the convenience and functionality of these devices, we are likely to see an expansion of their capabilities and further integration into daily financial life, pushing towards an increasingly digital and interconnected financial ecosystem.

3.2 Crowdfunding

Crowdfunding has become an essential funding model for individuals, startups, and organizations seeking capital through the collective contribution of many people. It generally relies on online platforms that connect project promoters with a broad network of potential investors. This financing method provides an alternative to traditional routes, such as bank loans or venture capitalist investments, by democratizing access to capital. Instead of approaching a few large investors, crowdfunding allows those seeking funds to reach a wider audience of supporters, each contributing varying amounts according to their capacity and willingness. Crowdfunding operates by presenting a project on a dedicated platform, where the promoters describe the product or service they intend to

develop and the amount needed to realize it. Investors, known as "backers," can review the proposal and decide if they want to contribute financially. There are various types of crowdfunding: reward-based, where supporters receive products or services in return for their support; equity crowdfunding, where investors gain ownership stakes in the company; donation-based, where funds are given without the expectation of financial return; and lending-based or peer-to-peer lending, where lenders give money to project promoters in exchange for interest. Crowdfunding platforms play a central role in aggregating projects and facilitating the fundraising process. Due to their online nature, these platforms have a broad reach, allowing projects to connect with a global audience. However, crowdfunding also carries risks, such as failing to meet funding goals or issues related to the delivery of promised products or services.

Transparency and effective communication are thus crucial to the success of crowdfunding campaigns. Crowdfunding is closely linked to the FinTech world, as it employs advanced digital technology to facilitate transactions and connect investors with project promoters. The use of algorithms, data analysis, and even artificial intelligence allows for better management of crowdfunding campaigns, improving efficiency and reducing costs compared to traditional methods. An interesting aspect of crowdfunding is the growing interest in sustainable crowdfunding, driven by increasing environmental and social awareness. These platforms promote projects related to renewable energy, sustainable agriculture, and social initiatives, demonstrating that crowdfunding can be a powerful tool to support projects with a positive environmental and social impact. Globally, the crowdfunding market has seen significant growth, from around \$13 billion in 2020 to a projected \$39 billion by 2026. North America leads the sector with platforms like Kickstarter and GoFundMe, while in Europe, equity crowdfunding has taken hold with Seedrs and Crowdcube. The Asia-Pacific region, with platforms like Indiegogo and Campfire, is quickly gaining ground. Italy has embraced this trend enthusiastically, positioning itself as a center of innovation with targeted regulations introduced by CONSOB in 2013.

In 2020, the Italian market reached approximately €65 million, with steady growth. Regarding sustainability, Italy has shown a keen interest in crowdfunding for environmental and socially responsible projects. Platforms like Produzioni dal Basso host a wide range of sustainable initiatives, including renewable energy projects and organic

farming. One curiosity is the role of crowdfunding in preserving Italian cultural heritage, with platforms like Eppela funding the restoration of historic monuments and artistic activities. Comparing Italy with other countries, the Italian market is smaller than crowdfunding giants like the United States, but it is growing rapidly and diversifying its approaches. The focus on sustainability and cultural heritage points to a unique approach, indicating Italy's potential to become a significant player in the global crowdfunding landscape. Additionally, the ability to adapt to local needs and promote projects reflecting Italian culture and values further underscores Italy's flexibility and potential for innovative crowdfunding applications. This adaptability opens new opportunities for artists and creative communities, allowing them to preserve and promote the country's rich cultural heritage. Another area where Italian crowdfunding stands out is supporting small businesses and local initiatives. This decentralized funding approach enables entrepreneurs and small companies to access capital without depending on financial institutions or large investors, promoting greater economic inclusion. This inclusive approach to funding can help foster a circular economy and support sustainable business models, contributing to a fairer and more accessible financial system. Regarding regulation, Italy has been at the forefront, with CONSOB establishing a solid regulatory framework for crowdfunding, ensuring the sector operates safely and transparently. This regulatory structure helps minimize crowdfunding-related risks and provides greater investor protection, encouraging participation and contributing to the sector's growth. Italy is also emerging as a leader in promoting sustainable crowdfunding. The growing focus on eco-friendly and socially responsible projects reflects increased environmental awareness and a willingness to support initiatives with a positive social impact. This alignment with global sustainability goals places Italy in a favorable position to become a reference point for sustainable crowdfunding.

3.3 Cryptocurrencies

Cryptocurrencies are reshaping the financial landscape by providing a decentralized alternative to traditional money like the euro and the dollar. These assets, powered by blockchain technology, are known for secure and transparent transactions.

Cryptocurrencies are digital or virtual currencies that use cryptographic techniques to secure transactions and control the creation of new units. Unlike traditional currencies

issued by central banks, cryptocurrencies operate on decentralized networks, typically blockchain technology, ensuring transparency, security, and immutability of transaction records. Each cryptocurrency is maintained by a distributed network of computers (nodes) that validate transactions through consensus mechanisms like proof-of-work⁵⁹ or proof-of-stake⁶⁰. These mechanisms ensure the integrity and security of the network without the need for intermediaries like banks. Users store cryptocurrencies in digital wallets, allowing peer-to-peer transactions across borders with reduced fees and greater efficiency compared to traditional financial systems. Transactions are direct, without intermediaries, leading to faster and cheaper payments, especially in cross-border scenarios. One of the key benefits of digital money is its versatility.

Digital currencies have quickly gained traction as an emerging asset class, with the market surpassing \$2 trillion in total value in 2021.

Bitcoin, the most recognized digital asset and a pioneer in the cryptocurrency sector, hit a record high of around \$69,000 in November 2021. This remarkable surge in value coincided with a global increase in the adoption of digital currencies, as numerous companies, including tech giants like Tesla and PayPal, began accepting these assets for payments.

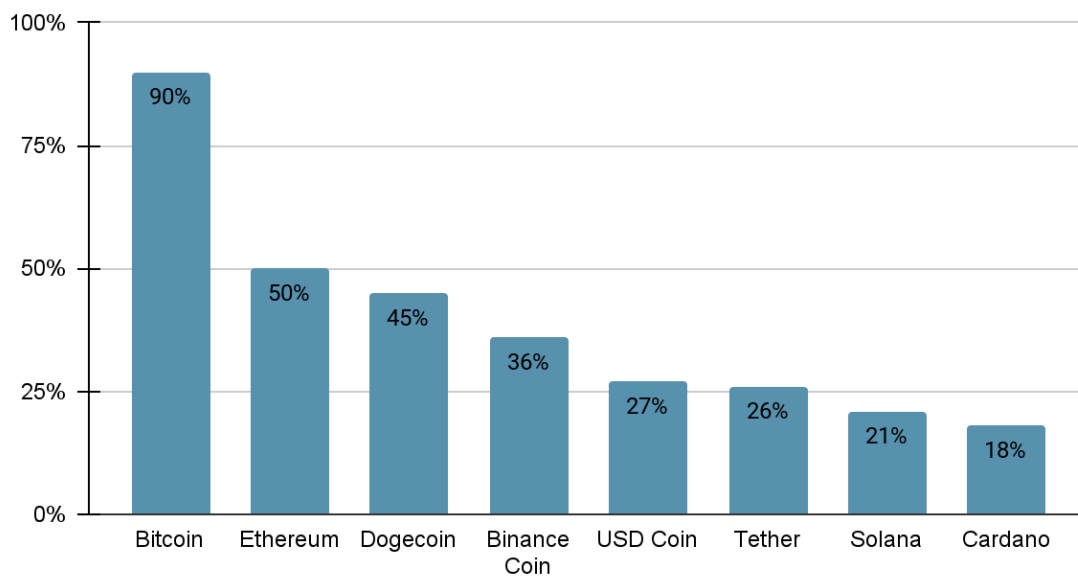
Ethereum, the second-largest digital asset by market capitalization, has driven the expansion of decentralized finance (DeFi) platforms⁶¹, with over \$100 billion in value locked in smart contracts by 2021. Platforms like Uniswap and Compound use smart contracts to automate financial transactions on the blockchain, removing the need for traditional banks or intermediaries. This automation enables users and developers to create financial applications directly on the blockchain, revolutionizing how financial services are delivered.

The following graph shows various cryptocurrencies and their corresponding levels of awareness.

⁵⁹ Proof-of-work (PoW) is a consensus algorithm where miners solve complex mathematical puzzles to validate transactions and add new blocks to the blockchain. It ensures network security and immutability but requires significant computational power and energy, raising concerns about scalability and environmental impact.

⁶⁰ Proof-of-stake (PoS) is a consensus algorithm in which validators are chosen to create new blocks and confirm transactions based on the number of coins they "stake" or lock up as collateral. Unlike proof-of-work, PoS consumes less energy and encourages participants to act in the network's best interest, offering a more scalable and environmentally friendly alternative.

⁶¹ DeFi platforms are decentralized finance systems built on blockchain technology, providing financial services like lending, borrowing, and trading without traditional intermediaries. They use smart contracts to automate transactions and increase financial accessibility, but they also carry risks related to security and regulation.



Graph 3 – “Cryptocurrencies and their corresponding levels of awareness”, source: Forbes, “Cryptocurrency Awareness”

In 2023, the cryptocurrency market capitalization surpassed \$1.2 trillion, with Bitcoin accounting for over half of the market share. Cryptocurrencies have streamlined cross-border payments, offering a more efficient and cost-effective alternative to traditional methods. Coins like XRP and Stellar are specifically designed to enable fast and low-cost international transactions. In addition, the rise of non-fungible tokens (NFTs)⁶² has transformed the digital art and collectibles market by providing a unique way to prove authenticity and ownership for digital creations such as art, music, and videos. This innovation has opened new revenue streams for artists and content creators, allowing them to monetize their work in creative ways. The global cryptocurrency landscape is rapidly growing, fueled by evolving regulatory frameworks and the innovative influence of fintech. As more businesses adopt cryptocurrencies, these digital assets are shifting from niche to mainstream. The European Union's Markets in Crypto-Assets (MiCA)

⁶² non-fungible tokens (NFTs) are unique digital assets on a blockchain, representing ownership or authenticity of items like art, music, or virtual collectibles. Each NFT is distinct, unlike cryptocurrencies, which are fungible and interchangeable. NFTs are often traded on platforms like Ethereum, with smart contracts verifying their uniqueness. Despite their popularity, NFTs can raise concerns about copyright, environmental impact, and speculation.

regulation⁶³ seeks to bring clarity and stability, offering a roadmap for investor protection. Fintech companies are central to this transformation, bridging traditional finance and the decentralized world through digital wallets, payment gateways, and decentralized finance (DeFi).

Italy's digital currency market is growing rapidly, mirroring the global trend toward blockchain technology adoption. Although Italy's cryptocurrency sector is smaller than those in other European countries like the UK and Germany, interest is mounting, especially among retail investors and businesses acknowledging the potential of digital assets. The number of Italians investing in Bitcoin, Ethereum, and other cryptocurrencies is increasing, with platforms like Bitpanda and The Rock Trading simplifying access to the Italian market by enabling users to buy, sell, and trade a wide range of digital currencies.

However, regulation presents a significant challenge for the Italian cryptocurrency market. The Bank of Italy and CONSOB are focused on crafting a regulatory framework that emphasizes security and anti-money laundering. In 2021, Italy introduced requirements for cryptocurrency service providers to register with the appropriate authorities and meet specific standards, enhancing market transparency and investor confidence. Despite these advancements, ongoing issues like market volatility and environmental concerns highlight the need for balanced regulation and sustainable practices. The future success of cryptocurrencies in Italy will rely on addressing these challenges while fostering innovation and ensuring compliance.

Chapter 4: Italy's Fintech Landscape

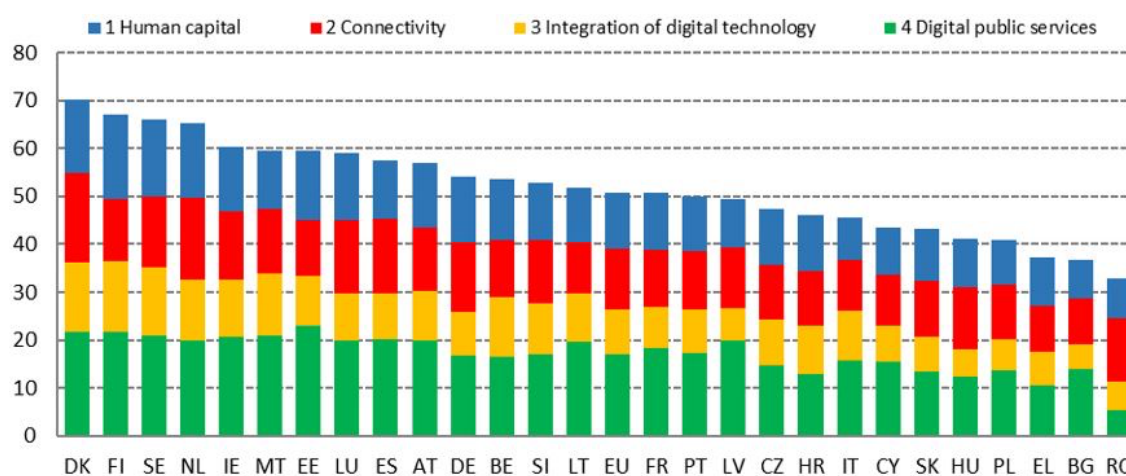
4.1 The Italian Fintech Path

The Italian banking sector, traditionally characterized by business models typical of large industrial corporations, has had to rapidly adapt to the changes imposed by the digital era. In recent decades, the emergence of platform firms, including fintech companies, has

⁶³ The European Union's Markets in Crypto-Assets (MiCA) regulation creates a unified framework for regulating cryptocurrencies, covering stablecoins, initial coin offerings (ICOs), and crypto-asset service providers. It aims to ensure investor protection and market integrity while promoting innovation and compliance across EU member states.

revolutionized the way banks operate, which now must compete with more agile and technologically advanced services. This has triggered a digitalization process within the Italian banking sector, aimed at aligning the infrastructure and service offerings of credit institutions with those of major international competitors.

In March 2012, the Italian Banking Association (ABI) proposed the Digital Agenda, a plan of interventions and guidelines aimed at accelerating the country's digitalization process, structured around three macro-initiatives: the creation of a digital-friendly regulatory framework to facilitate digital interaction between banks and customers; the modernization of Public Administrations (PAs) and businesses through a public digital ecosystem; and the encouragement of digital behaviors among Italian citizens. However, one of the main challenges remains the digital divide. According to the EU's 2021 Digital Economy and Society Index (DESI), Italy ranks twentieth in digital literacy, with only 42% of the population aged 16 to 64 possessing basic digital skills.



Graph 4 – “Digital Economy and Society Index (DESI)”, source: European Commission (2021). Digital Economy and Society Index (DESI), Italy, Brussels, p.3.

Digitalization has led to significant developments in the services offered by Italian banks. A study by the Bank of Italy published in April 2022, "The Digital Transformation in the Italian Banking Sector," analyzed 280 credit institutions between 2007 and 2018. The results show growth, particularly from 2013 onwards, with 90% of banks offering digital access to payment services by 2018. However, only 30% of loans to households were available through web portals. The study also found that a higher level of digitalization

corresponds to greater profitability, measured in terms of return on assets (ROA) and return on equity (ROE). However, there is no significant correlation with operational cost savings, as banks continue to largely rely on traditional channels for credit activities.

In November 2021, the Bank of Italy published "Fintech Survey in the Italian Financial System," a study conducted in the first half of that year, involving 59 banking groups, 53 banks not belonging to groups, and 51 non-bank intermediaries, selected based on their operating volumes or business models. The survey revealed an increase in investments in fintech technologies for the 2021-2022 period, amounting to 530 million euros compared to 456 million euros in the previous two years, with further increases expected starting in 2023. However, the spending is concentrated among a limited number of operators: the share of the top 10 intermediaries rose from 77.2% to 84.7%, while the top 20 account for 94.4%. The digitalization projects not completed, identified in the previous survey, were 33, with a total value of almost 3 million euros. The reasons for abandoning projects are economic (low demand and high costs) and technological (poor interoperability between old and new systems). 58% of the spending is concentrated on investments in application interfaces and technological infrastructures (APIs), a trend already observed in the previous two-year period, influenced by compliance with PSD2 and the spread of open banking. Projects based on biometrics and cloud computing have increased, while those on artificial intelligence (AI) have grown in terms of spending despite decreasing in number. Projects related to Big Data have experienced the largest contraction both in terms of number and spending. The pandemic has had a relatively limited impact on the projects, with only 11% of investments being readjusted. Regarding implementation methods, less than one-fifth of the projects are carried out in-house; most are developed in collaboration with third parties or entirely outsourced to them. According to the participants, the new investments do not significantly alter strategic, credit, and market risks, but greater effects are expected on operational risks, particularly regarding potential legal disputes arising from collaborations with third parties.

In terms of collaborations, 46% of the intermediaries surveyed have formed at least one partnership in the fintech sector, with a total of 330 agreements involving 199 companies, although few companies have relationships with more than one intermediary. The collaborations are mainly focused on credit, payments, and business operations. Another crucial area concerns the customer experience. For the recipients of these innovations,

families and businesses, an overall improvement in the customer experience is expected. Factors such as the dematerialization of documentation, automated assistance, and digital signatures should facilitate the relationships between customers and intermediaries, making the use of apps and websites more user-friendly.

4.2 The Most Fintech Companies

As of today, the Italian fintech sector boasts over 500 active entities, with 53% identifying as startups, while the remaining portion falls into the category of innovative small and medium-sized enterprises (SMEs) and scaleups⁶⁴. This thriving ecosystem is characterized by key players that have made significant contributions and introduced groundbreaking innovations. Among these, Nexi stands out as a leading payment services provider and a cornerstone of the Italian digital payment ecosystem. Nexi offers a comprehensive suite of advanced solutions for e-commerce and card management, addressing the growing demand for secure and efficient digital transactions. Their cutting-edge technology and extensive network have positioned them as pivotal players in facilitating Italy's transition to a cashless economy.

Satispay, another prominent company previously mentioned, has gained widespread traction with its mobile payment app. Known for its user-friendly interface and broad acceptance among merchants, Satispay allows users to make instant payments, split bills, and manage their finances with unparalleled ease. Its innovative approach to mobile payments has made it a favorite among consumers and businesses alike, contributing to a more seamless and convenient financial experience.

In addition to these major players, several other fintech companies are making significant strides in their respective niches. Credimi is revolutionizing the lending sector by providing quick and flexible financing options to small and medium-sized enterprises (SMEs). Through its streamlined digital platform, Credimi simplifies the application and approval process, enabling SMEs to access much-needed capital swiftly and efficiently. This approach not only supports business growth but also fosters economic resilience. Founded in 2015, Credimi is a leading digital lender in Europe. The company makes

⁶⁴ A scaleup differs from a startup in that it has already passed through some of the typical phases of a startup (searching for a scalable business model) and can focus on controlled and sustainable growth (Wikipedia, the Free Encyclopedia, "Scaleup company").

accessing credit simple and fast for businesses. The entire process is conducted online: the platform receives the request, assesses the creditworthiness, and within 48 hours provides a response and a quotation for the company. If the company accepts the quotation, the funds are credited within a few hours. In 2015 alone, Credimi disbursed nearly 2 billion euros to over 60,000 Italian businesses.

Moneyfarm has emerged as a key player in the investment and wealth management sector, offering digital wealth management services that blend robo-advisory with human expertise. This hybrid model provides personalized investment strategies that cater to individual financial goals and risk profiles, democratizing access to sophisticated investment tools and advice. Founded in 2012, Moneyfarm specializes in medium-to-long-term investments. The use of digital technologies has enabled Moneyfarm to create an innovative model that assists thousands of clients in managing their savings through a simple, transparent, and low-cost service. Since 2016, Moneyfarm has also operated in the United Kingdom and has raised over \$127 million to date.

Hype, another noteworthy digital banking service, offers a comprehensive suite of banking solutions designed to meet the needs of the digital-savvy generation. With features such as budgeting tools, savings goals, and instant money transfers, Hype empowers users to take control of their financial lives through an intuitive and engaging platform.

Expanding the fintech landscape further, Walliance has made a significant impact in the real estate investment sector. As a pioneer in equity crowdfunding for real estate, Walliance provides a transparent and accessible platform for users to invest in real estate projects. This innovative approach democratizes real estate investment, allowing a broader audience to participate in and benefit from this traditionally exclusive market. Founded in 2017, Walliance is a crowdfunding portal active in real estate, industry, services, fintech, and digital sectors. Walliance is one of Italy's leading equity crowdfunding companies and the first to receive authorization from Consob. The platform allows clients and businesses to invest in real estate starting from just 500 euros. Currently, there are 38 real estate projects listed on the platform, all funded with a total of over 60 million euros raised.

Yolo focuses on insurtech, offering on-demand insurance products that are tailored to the digital lifestyle. Yolo's flexible and accessible insurance solutions address the evolving

needs of modern consumers, making it easier for individuals to obtain coverage that fits their specific circumstances. This customer-centric approach has the potential to transform the insurance industry by prioritizing convenience and personalization. Founded in 2017, Yolo is a startup active in the insurance sector, distributing innovative policies such as microinsurance and on-demand insurance. Yolo collaborates with traditional banks and insurance companies, having established significant partnerships with these institutions. It is the only Italian company featured in the annual top 100 Insurtech list by Fintech Global.

In the burgeoning field of cryptocurrency, Young Platform is making waves with its intuitive platform for buying, selling, and learning about digital assets. By providing a user-friendly interface and comprehensive educational resources, Young Platform aims to make cryptocurrencies more accessible to the public. This effort not only promotes greater understanding and adoption of digital assets but also positions Italy as a competitive player in the global crypto market. Founded in Turin in 2018, Young Platform specifically targets the younger generation, making cryptocurrency trading more approachable and engaging. Today, the company is valued at approximately 20 million euros.

In 2021, Italian fintech companies raised a total of 2 billion euros in funding, a figure that is still not sufficiently significant on an international level, especially considering the high concentration of these funds in a few entities (50% of Italian fintech companies have not raised any capital). According to the Italian Fintech Index, an index created by the Fintech & Insurtech Observatory, the Italian fintech sector has not yet reached a satisfactory level, highlighting a sector that is expanding but still far from reaching the levels of its competitors abroad.

However, collectively, these fintech companies are driving a transformative wave in the Italian financial services industry. They are fostering innovation, enhancing financial inclusion, and significantly improving customer experiences. By leveraging cutting-edge technology and customer-centric approaches, these companies are not only reshaping the financial landscape in Italy but also contributing to the broader European fintech ecosystem. Their efforts are instrumental in creating a more dynamic, inclusive, and efficient financial system that benefits consumers, businesses, and the economy as a whole.

4.3 Future Scenarios and Expected Benefits

The future of fintech in Italy looks promising, with numerous developments poised to reshape the financial landscape. As the sector continues to evolve, several key trends and scenarios are expected to drive growth and innovation. One significant trend is the increasing adoption of artificial intelligence (AI) and machine learning technologies. These advancements will enhance predictive analytics, enabling more personalized financial services and improving risk management. Additionally, blockchain technology is anticipated to revolutionize various aspects of the financial industry, from secure and transparent transaction processing to smart contracts and decentralized finance (DeFi) applications.

Another key development is the expansion of open banking, facilitated by the Revised Payment Services Directive (PSD2). This regulatory framework promotes greater competition and innovation by allowing third-party providers to access banking data with customer consent. Consequently, consumers will benefit from a broader range of financial products and services tailored to their specific needs. Moreover, the integration of fintech solutions into traditional banking systems will continue to accelerate, fostering a more collaborative ecosystem that leverages the strengths of both sectors.

The rise of insurtech is also expected to play a crucial role in the future of fintech in Italy. Companies like Yolo are pioneering on-demand and microinsurance products that cater to the evolving needs of modern consumers. This trend will likely lead to more flexible and accessible insurance solutions, enhancing overall financial inclusion and protection. Furthermore, the growth of digital payment platforms, such as Nexi and Satispay, will drive Italy towards a cashless society, improving the efficiency and security of transactions.

Despite a global downturn in fintech investments, with a 7.5% decrease from \$34.04 billion in the last quarter of 2021 to \$31.48 billion in the first quarter of 2022, the fintech market still has highly positive growth forecasts. According to Global Fintech Market Research, the fintech market is expected to reach a global value of \$324 billion within the next four years, with an annual growth rate of approximately 25%. In Italy, the January-February 2022 period was quite positive, with €255 million raised (notably by Scalapay: €188.1 million; and Moneyfarm: €53 million). Key trends expected to drive fintech include:

Embedded Finance: the integration of financial services with non-financial service providers. This trend began with PSD2 and the opening of banking APIs to third parties, and it is expected to grow as more non-financial players integrate payments, loans, and insurance products into their offerings.

Buy Now Pay Later (BNPL): a popular service allowing customers to make interest-free installment payments for e-commerce purchases.

Vertical Banking: niche banks offering personalized banking services based on specific customer segments.

AI for Financial Crime: increasingly important for reducing fraud risk and improving cybersecurity.

Highlighting the country's commitment to fintech growth, the Ministry of Economic Development allocated €45 million to the Fund for the Development of Technologies and Applications of Artificial Intelligence, Blockchain, and the Internet of Things in late 2021. Additionally, the Strategic Program for Artificial Intelligence (2022-2024) sets out objectives for advancing AI across financial, industrial, cultural, health, environmental, and national security sectors.

Looking to the long term, it is reasonable to foresee a cashless society by 2050, supported by measures like the 2020 Budget Law's Italy Cashless Plan and the National Recovery and Resilience Plan (PNRR) mandating POS and electronic invoicing to discourage cash use. The 2020 medical sector saw a 250% increase in POS sales compared to the previous year, driven by the pandemic and hygiene concerns. The Coffee and Restaurant sector reported a 25% growth in contactless payments in early 2022 compared to pre-pandemic levels, now accounting for 79.7% of total payments. The EY Digital Payments survey indicates that by 2025, 50% of payments in Italy will be cashless, up from 33% in 2020 according to the Politecnico di Milano's Innovative Payments Observatory. However, 60% of respondents do not anticipate a significant increase in cryptocurrency payments in the next three years, citing low awareness among merchants and consumers, inadequate technology for large transactions, and high volatility.

The future challenges for traditional payment sector actors will necessitate strategic partnerships with innovative fintech companies to stay competitive. Alberto Dalmaso, CEO of Satispay, said: "The role of banks may be at risk of disintermediation, particularly in certain specific segments, by digital payment companies, fintechs, and new operators

from other sectors”⁶⁵, warning about the potential disintermediation risks for banks in specific segments by digital payment companies, fintechs, and new operators from other sectors. Structural investments will be crucial to developing a robust payment ecosystem and supporting sector growth. In conclusion, fintech in Italy is on the cusp of a transformative era, with promising growth, innovation, and integration prospects that will reshape the financial landscape and drive economic development.

Conclusions

This thesis has explored the profound transformation induced by FinTech in the global financial sector, focusing on the specific context of Italy. Over the past thirty years, technological innovations have dramatically altered the delivery of financial services, emphasizing efficiency, transparency, and customer-centric approaches. The primary research question addressed was: "How has the progression of FinTech influenced the financial services sector, and in what ways is Italy responding to these developments?"

The findings reveal that FinTech has significantly impacted the financial services landscape. Innovations in digital banking, insurtech, blockchain, and artificial intelligence have enhanced efficiency and improved customer experiences. In Italy, the adoption of FinTech solutions has been notable, though the country still faces challenges such as low investment levels and digital literacy.

Italy's response to the growth of FinTech has been multifaceted. Regulatory authorities have introduced comprehensive rules and guidelines to ensure the financial sector's security and stability. Initiatives like the Digital Agenda by the Italian Banking Association (ABI) have set the stage for a more digitally inclusive financial system. However, issues such as the digital divide and the concentration of funding among a few key players remain significant challenges.

Despite these challenges, the continuous growth of FinTech investments and proactive regulatory measures suggest a promising future for the sector. The potential benefits of FinTech in Italy include enhanced financial inclusion, improved access to capital for SMEs, and a more dynamic, customer-centric financial services industry. Collaboration

⁶⁵ Ferretti, A. (2022). The future of the payment ecosystem. EY.

between traditional financial institutions and FinTech startups is crucial for leveraging these opportunities and ensuring sustainable growth.

The ongoing innovation and collaboration with traditional financial institutions are essential to remain competitive and drive growth within the FinTech sector. The integration of technology in various sectors can improve efficiency and customer engagement, providing valuable insights for other industries. Future research should focus on the long-term impacts of FinTech innovations and the effectiveness of regulatory frameworks in adapting to technological advancements. Enhancing financial inclusion and efficiency highlights the societal benefits of FinTech. Addressing the digital divide is critical to ensuring these benefits are widespread.

As FinTech continues to evolve, its role in shaping a new financial paradigm in Italy becomes increasingly clear. The sector's growth and integration into the broader financial ecosystem promise to drive economic development, enhance financial inclusion, and create a more efficient and resilient financial system. The collaboration between traditional banks and FinTech startups, supported by a robust regulatory framework, will be essential in ensuring the sustainable growth of the sector. This collaboration will ultimately benefit consumers, businesses, and the economy as a whole, positioning FinTech as a fundamental driver for the future of finance in Italy and beyond.

In conclusion, the evolution of FinTech is reshaping the financial landscape in Italy. The advancements within the sector offer significant opportunities for innovation and growth, although challenges related to regulation, data security, and consumer trust persist. By fostering collaboration between traditional financial institutions and FinTech startups, supported by a strong regulatory framework, the sustainable development of the FinTech sector can be ensured, ultimately benefiting all stakeholders involved.

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