Customers'perception of the digital transformation in the banking sector

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CUSTOMERS' PERCEPTION OF THE DIGITAL TRANSFORMATION IN THE BANKING SECTOR

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II. Acknowledgements

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III. List of abbreviations

AI	Artificial Intelligence
AISP	Account Information Service Provider
ATM	Automated Teller Machine
BCBS	Basel Committee on Banking Supervision
DLT	Distributed Ledger Technology
DT	Digital Transformation
ECF	Equity crowdfunding
EBA	European Banking Authority
FSI	Financial Services Industry
FinTech	Financial Technologies
GFC	Global Financial Crisis
G-SIBs	Global Systemically Important Banks
ICT	Information and Communication Technologies
P2P	Peer-to-peer
PISP	Payment Initiation Service Provider
R&D	Research and Development
VC	Venture Capital
WWW	World Wide Web

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1. Introduction

The first chapter serves as an introduction to the study and provides an overview of the underlying research motivation and specifies the research focus. Furthermore, the structure of the research thesis is presented.

1.1. Relevance of the topic

Over the past several years, the world has seen disruptive innovations that have changed whole industries' business models. As Uber and Airbnb reversed the transportation and touristic sectors, Netflix and Spotify the movie and music ones integrating both new technologies and the changes in customers' behavior. The digital transformation is crossing all areas of life entering likewise the financial sector. Starting from the 1950s, ATMs were created to substitute humans and allowed customer self-service banking, followed by cards to avoid carrying cash. Technology was increasingly and incrementally entering the financial industry. In the 1990s, internet connection enabled 24/7 online banking and, in the new century, technologies such as cryptocurrencies and blockchain facilitate the elimination of traditional centralized intermediaries (Breidbach et al., 2019).

Remarkably, over six decades of technological innovations, the financial sector has never been really threatened by them, instead, it has significantly grown (Basole and Patel, 2018). Financial services have continued to adapt according to customer demands and not solely established players, such as big banks, had to apply new strategies, but also new companies took the opportunity to provide those services that traditional banks could not or were too slow in doing. The new players or FinTech companies provide financial services using modern and innovative technologies. As a result, the new wave of mobile wallets, payment apps, crowdfunding platforms, or automated retirement planning advisors shook the banking industry at its core.

Digitization, process disruption, and business transformation resulted in a new services market that has been targeted in every banking segment by FinTech which can improve specific parts of the "universal" model of a bank (Alt and Ehrenberg, 2016).

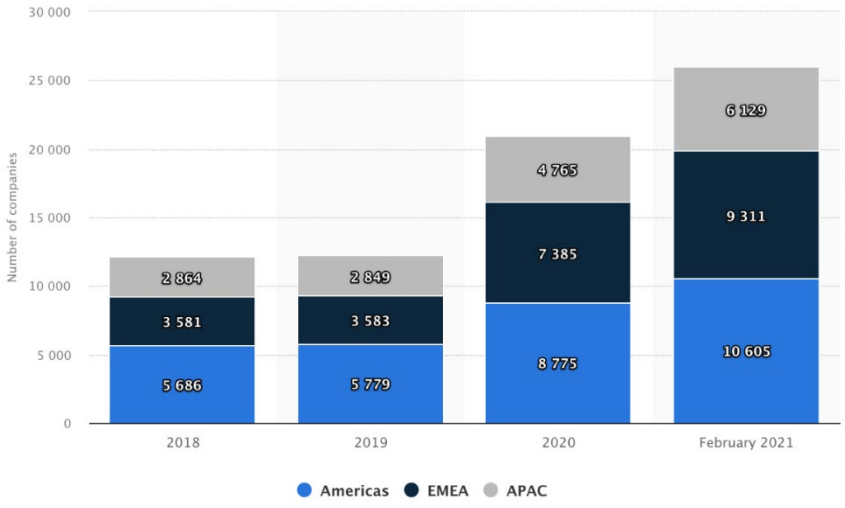
The drastic change in the world of financial services can be seen starting with the famous warning pointed by Bill Gates in 1994, founder of Microsoft, who said, "*Banking is necessary, banks are not*" and the applicability of his phrase becomes more tangible twenty years later thanks to the Millennial Disruption Index, which investigates the industries' most likely to be transformed by Millennials. The research found that 33% of respondents don't need banks, while 73% would be far more excited about a new financial service provided by Google or Apple or Amazon (the so-called Tech Giants) than one announced by their national bank (BBVA, 2013). The literature suggests that financial service provisioning is expected to open up,

integrating FinTech and Tech Giants financial products, while the future of traditional financial services providers is uncertain as the transformation towards an open banking system is empowering customers to change and combine providers in an easier way (Feyen et al.,2021).

The focus of this paper will be on positioning and integrating old and new players by explaining the dynamics of the evolving scenario the banking world is experiencing and to find out customers' expectations and feelings in this developing scenario.

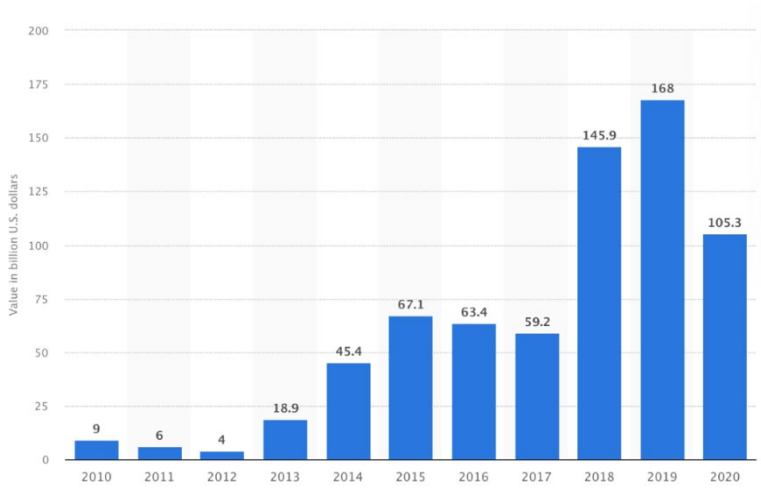
1.2. Research question

Big banks are considered the most powerful providers of financial services. However, this condition is now shifting due to the new emerging FinTech companies competing with the established market players. The compound term "FinTech" became visible on a large scale, making the transformation of the financial industry visible to everybody only in 2014, having its peak in September 2019. This is revealed through a simple query on Google Trends (Arner et al., 2016) and makes room for investigation of the current landscape within the financial industry and, for the purpose of this research, the banking sector. Statistics (Statista, 2021a) show that from 2019 to 2021 the number of FinTech start-ups doubled, jumping from 12,211 to 26,045 as of February 2021 (for further details see figure 1). Additionally, the total value of investments into FinTech companies worldwide from 2010 to 2020 went from 9 to 105.3 billion U.S. dollars increasing dramatically until 2019 when it reached 168 billion U.S. dollars (Statista, 2021b), as shown in figure 2. Furthermore, customers have changed their preferences and search for innovative ways to make payments, get loans, invest, etc., and the adoption of financial technology innovations implies cost reductions for the customers and high transparency standards.



Source: Statista, 2021a

Figure 1: Number of Fintech start-ups worldwide 2021, by region



Source: Statista, 2021b

Figure 2: Total investments into fintech companies globally 2010–2020.

The potential disruption in the provision of financial services due to the development of the financial technology infrastructure, summed up with the socio-economic shift in customer behavior and the entrance of new players, is driving traditional banks to rethink how to provide banking services, and customers find themselves in a changing environment. This research contributes with an in-depth analysis of the impact and the positioning of FinTech companies within the banking sector and the perception of the customers.

This thesis aims at answering the following questions:

Q1. Where can customers be positioned in the current landscape?

Q2. Which future scenario is more likely to happen based on customers' feelings?

Q3. The tip of the balance is more in favor of risks or opportunities in the customer sector?

1.3. Structure and approach

The starting point will be the analysis of the changing environment, with a focus on the key drivers for innovation, how to process the FinTech companies' phenomenon, their definition and evolution. The first chapter ends with a classification of the impacted services and business functions and a deep investigation on the different actors' roles - conventional financial service providers, FinTech, and Tech Giants (i.e., GAFA) - to draw a current landscape where the customers find themselves in.

The second step will be a broad investigation of the cross-sectoral consolidation focusing on the integration process between financial and technological industries, while highlighting the strategies taken by the

incumbents to face the new competition which are creating different possible future scenarios. Finally, opportunities and risks for the customers coming from this cross-sectoral consolidation will be analyzed.

To answer the above-mentioned questions, the research will analyze the collected data to explore possible existing relationships between the variables. The research will follow the following steps:

1. Find clusters with homogeneous characteristics based on demographic data.
2. Explore clusters to find correlations and the most statistically significant variables to position the respondents in the current digital landscape based on interest, usage, and readiness for the transition.
3. Investigate the shared feeling towards the future scenarios and find if there is an existing pattern within the clusters.
4. Compute an average value for the risk feeling and one for the benefits valorization to find an average value to establish where the tip of the balance falls.
5. Investigate each cluster value with a critical point of view.

Lastly, results and conclusions will be presented, followed by limitations and further research to be pursued.

2. Changing environment: digital transformation and emergence of FinTech

The financial and banking sectors have undergone significant changes in recent decades. Underlying reasons are the GFC (Global Financial Crisis) of 2008 when trust in banks has been eroded, changes in consumer needs that adapt to the new generations, and regulation that continues to grow along with financial technology innovations. The latter is having significant impact due to the presence of new entrants: FinTech companies (Arner et al., 2016). The so-called FinTech revolution impacted the financial markets pushing the need for incumbents to quickly adapt their business model to the new competition. The phase initiated after the GFC has two new foundations such as, on the one hand, the evolution and convergence of new and multiple technologies and, on the other hand, innovation and customer focus (Alt et al., 2018).

In this scenario, developments in FinTech have the potential to erode the brand equity of the incumbent players and eat into market shares, although banks also have an opportunity to embrace FinTech innovation and offer new solutions to their customers. In this chapter, the FinTech landscape is presented and the way the new entrants are disrupting the banking sector will be given.

2.1. Key drivers for innovation

Based on the European Banking Authority's (EBA) risk assessment questionnaire (EBA, 2017), the major reasons which conducted to the adoption by incumbents of technologically enabled financial innovations rely on the opportunity to maintain existing customers, attract new ones, increase revenues, decrease costs, reduce future competition pressure, and follow market trends.

In this context of adoption, four broad drivers shaping and inducing changes in traditional banks' business models were identified:

1. customer expectations and behavior;
2. profitability concerns;
3. regulatory changes;
4. increasing competition.

2.1.1. Customer expectations and behavior

Through the years, customers' needs and expectations with regards to financial and banking services changed dramatically. Clients have become more discerning, entitled to engage in some activities that were before handled only by banks, they are now more informed, sophisticated, conscious of possible alternatives, autonomous, and able to consult different service providers (Heinonen, 2014). "*Customers now demand easy access, fast service and intuitive interfaces*" (EBA, 2018), which means that clients are looking for fully digital 24/7 access to financial services, with stress on mobile digital communication channels. The amount of users

who benefit from payment or investment services by FinTech providers is growing (Kang, 2018) and the clients' mobility augmented thanks to, for example, Application Programming Interfaces (APIs), software intermediaries that allows two applications to talk to each other providing programmatic access to service functionality and data within a database.

However, as banking has always been a business of trust (Boatright, 2011), traditional banks benefit largely from the fidelity of their customers and this represents a substantial benefit for incumbents that are trying to keep competitiveness and the pace with technological innovations.

In this sense, organizations, to be more ready for the interdisciplinary and cross-functional coordination required to design, understand, and manage customer experience (Fader, 2020), shifted from product-centricity to customer-centricity. The latter is a corporate strategy that aligns a company's products and services with the needs of its customers to maximize their long-term financial value. A comparison of the distinguishing features of product-centricity and customer-centricity is summarized in the following table:

	PRODUCT - CENTRIC APPROACH	CUSTOMER – CENTRIC APPROACH
Basic philosophy	Sell products to whoever will buy	Serve customers, all decisions start with the customer
Business orientation	Transaction-oriented	Relationship-oriented
Product positioning	Highlight product features and advantages	Highlight product's benefits in term of meeting customer needs
Organizational structure	Product profit centres, product mangers, product sales team	Customer segment centres, customer relationship managers, customer segment sales team
Organizational focus	Internally focused	Externally focused
Performance metrics	Number of new products, profitability per product, market share by product	Customer satisfaction, customer lifetime value, customer equity
Selling approach	How many customers can we sell this product to?	How many products can we sell this customer?

Source: Own representation based on Lemon and Verhoef (2016)

Table 1: A comparison between the product-centric approach and the customer-centric approach

Consequently, banks need to focus on the improvement of the customer experience in order to maintain competitiveness. Indeed, a survey revealed that 93 percent of the financial services industry firms with a

digital strategy agree that their strategy's scope is to improve customer experience and engagement (Deloitte, 2016).

2.1.2. Profitability concerns

Following the GFC, traditional banks faced low profitability driven by the low-interest-rate environment, issues with legacy assets, higher provisioning costs, and low-interest income. In this context, the necessity to put in place cost-cutting programs grew while embracing technological change creates an opportunity to improve profitability and flexibility. Additionally, digital banking gives space to financial service automation and could reduce overheads and staffing costs.

2.1.3. Regulatory changes

The regulatory framework incorporates several new dispositions such as the PSD2 (Payment Services Directive 2) that enhances competition through AISP (Account Information Service Provider) and PISP (Payment Initiation Service Provider) licenses that enable third-party providers to furnish customers with payment services within all Europe. Furthermore, the GDPR (General Data Protection Regulation) controls the use of personal data, and it is crucial in such an environment where data represents one of the most powerful drivers.

2.1.4. Increasing competition

The new entrants put competitive pressure on incumbents and present different strengths next to traditional providers like new technologies, a developed network, costs efficiency, flexibility, scalability, or data-based information and represent a danger as well as an opportunity for the conventional slow-moving industry fostering competition and innovation by likewise creating new issues deriving from the cross-sectoral consolidation (Bilotta & Romano, 2019). For example, some fields like payment services are threatening traditional banks' competitiveness as they are offering a better user experience.

Based on Paulet & Mavoori's (2019) analysis, the pressure of the new entrants, starting from the subprime crisis, already changed the business models of traditional banks in three dimensions. Firstly, the FinTech influence moved at the core of traditional banks' strategy clients and services; secondly, innovations drove to lower costs for clients improving their satisfaction; thirdly, the size does not matter anymore, and it has been replaced by information availability.

2.2. How to react to FinTech

Before analyzing the evolution crossing the financial industry and the change of traditional banks' business models, it is essential to take a step back and define the progression from the business model framework to

the digital ecosystem one. Moreover, the approaches to react to FinTech undertaken by incumbent institutions, digital transformation next to digital disruption, will be discussed based on the existing literature. Lastly, this subchapter will conclude with the related implications.

2.2.1. From a business model to a digital ecosystem

Different business models coexist within the banking sector depending on the size, the specificities, and the type of the considered institution. As digitalization is crossing the industry, the actors' approach is shifting from a focus on its own value creation to an ecosystem where an interdependent group of actors sharing standardized digital platforms to achieve a mutually beneficial purpose.

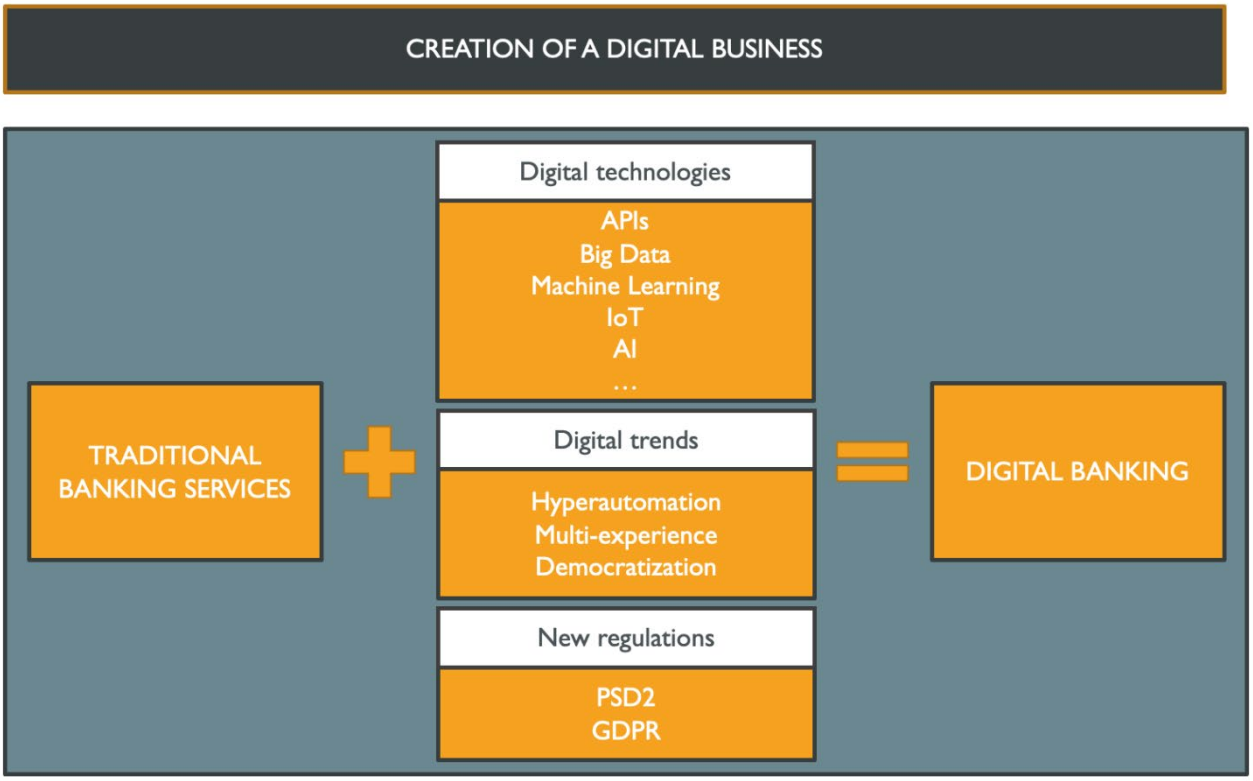
From a business model framework

In a nutshell, a business model is the crucial rationale of an organization that depicts the sources of revenues considering the costs, the expected customer base, channels, products, and details of financing. A business model answers the question of how a business creates, delivers, and captures value. The created value enables differentiation from competitors, the consolidation of customer relationships, and the achievement of competitive advantage.

Through digital business creation

Financial institutions, focusing on banks, are creating their digital businesses summing up digital technologies, trends, and new regulations to their traditional business (see figure 3). As per Gartner Inc.'s definition, digital business is the creation of new business designs by blurring the digital and physical worlds.

Digital banking, or the digital business of banking services, had its peak in 2010 after the GFC, when people were looking for alternatives to the traditional system that had failed and in which customers had lost confidence (Google Trends, 2021).



Source: Own representation based on Gartner Inc.

Figure 3: Representation of banking services as digital business

On the one hand, FinTech and BigTech firms provide innovative and extremely digitalized financial services enhancing easy access, fast service, and intuitive interfaces to meet customers' preferences, traditional banks are reacting in different ways.

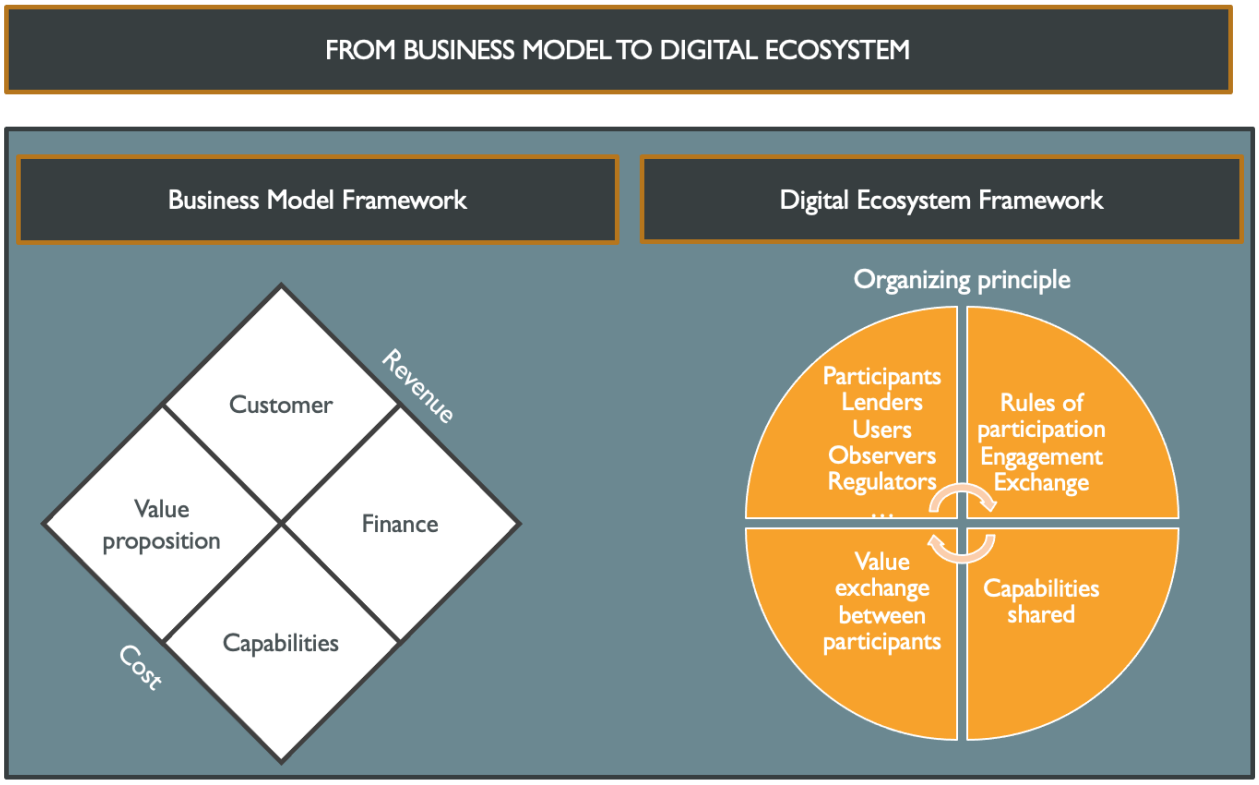
On the other hand, different levels of engagement and innovation characterize the digitization of big banks' business models. While the strategies differ, they mainly involve internal development and partnerships with FinTech and BigTech companies. Despite the number of initiatives, most focus on digitizing channels, while only a few pursue true "digital disruption" of the models. Diversely, smaller banks appear to be striving to implement meaningful strategy and business model changes, partnering with FinTech companies could be crucial for their survival. In addition, how banking and financial services are provided is influenced by the new business models offered by digital native banks, which push customers to have different expectations.

To a digital ecosystem framework

Digitization has evolved value chains into digital ecosystems. Given the restless nature of digital ecosystems, corporate management must take this into account when planning for the future, considering the role they will play in the ecosystem and whether the organization should lead, partner, or both.

The positioning of FinTech and TechFin companies in the banking industry creates a digital ecosystem. Following the definition of Gartner, Inc. the latter is a "*concept that represents how advanced technologies change the way value is exchanged, what value can be exchanged, the speed at which it is exchanged, and where and with whom it can be exchanged*".

As shown in figure 4, if the focus in a business model framework was on the value proposition of its own institution, within a digital ecosystem the stress is now on the value exchange between participants. Moreover, the customer has been superseded by a wider range of participants, the finance by rules of participation, and the capabilities by shared capabilities.



Source: Own representation adapted from Gartner Inc.

Figure 4: Representation of the shift from business model to digital ecosystem

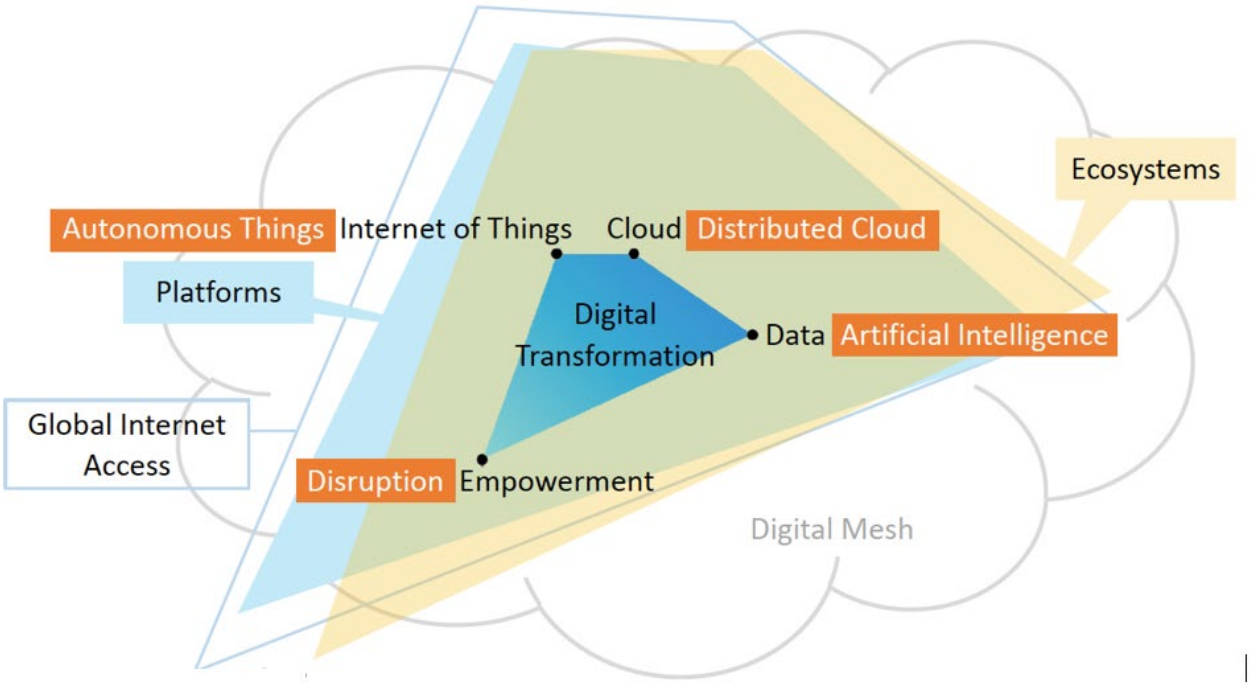
2.2.2. Digital transformation and digital disruption

Considering the technological evolution, incumbents have been implementing innovation and digitization strategies in the attempt to seize the FinTech lineup and delve into its power, boost digitization across their operations, and put customer needs at the center. To learn more about crucial approaches to FinTech, the EBA identified two main trends in these different strategies pursued by traditional banks, namely digital transformation and digital disruption, which diverge in their key drivers, their strategic objectives, and the scale and scope of organizational change and business model alteration they entail (EBA, 2018).

Digital transformation

Currently, there is not a commonly accepted definition for the term digital transformation (DT), while the terms digitalization and digitization are often used interchangeably (Berger, 2015).

Based on Schallmo et al. (2020), "the DT framework includes the networking of actors like businesses and customers across all value-added chain segments (Bowersox et al., 2005; Bouée and Schaible, 2015), and the application of new technologies (Westerman et al., 2011). Therefore, DT requires skills that involve the extraction and exchange of data as well as the analysis and conversion of that data into actionable information. This information should be used to calculate and evaluate options, to enable decisions and/or initiate activities (Bouée and Schaible, 2015)". DT involves remodeling internal processes by using new technologies in order to digitalize and optimize procedures, aiming at reducing incumbents' operating costs and enhancing efficiency gains (EBA, 2018).



Source: Representation of Gartner Inc./Digital Wallonia

Figure 5: Representation of the digital transformation

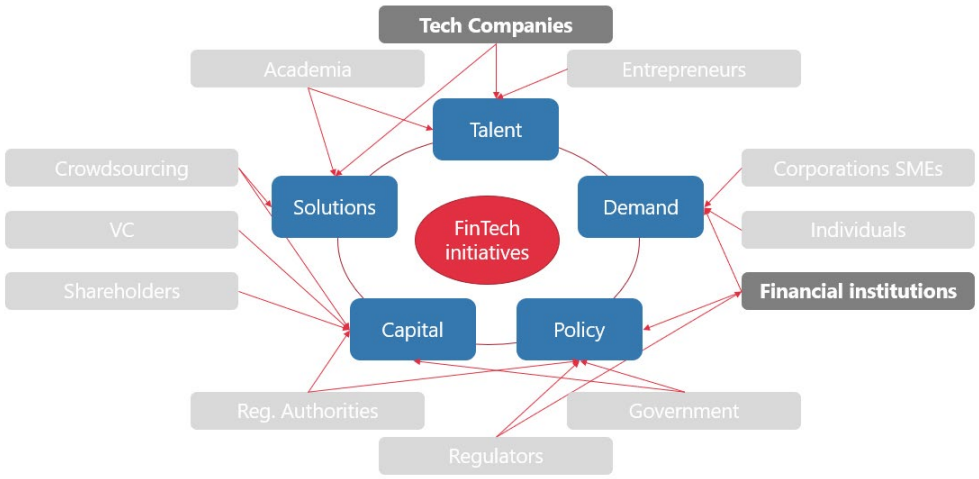
Digital disruption

Digital disruption, defined by Gartner, Inc. as the "*effect that changes the fundamental expectations and behaviors in a culture, market, industry or process that is caused by, or expressed through, digital capabilities, channels or assets*", aims at using innovative technologies to realize a new market in banking that could potentially replace the traditional one either developing new ways of enhancing customer experience or offering more convenient financial services and products.

2.2.3. Implications

The new players focus on specific parts of the banking value chain thus in designing, developing, and executing services less expensive and faster than what traditional banks are currently offering. On the other side, incumbents have made strategic decisions to launch new digital banks to have more mobility and flexibility to serve new or existing customers attracted by digital solutions to remain competitive and relevant (EBA, 2018).

As a result, the shift from a business model to a digital ecosystem combined with DT and digital disruption pushed incumbent financial institutions to switch towards to a banking-FinTech ecosystem that is represented in figure 6, adapted from EY and Nicoletti et al. (2017).



Source: Own representation based on Nicoletti et al. (2017)

Figure 6: Banking-FinTech ecosystem

In this digital ecosystem, Financial Institutions and Tech Companies are stakeholders in a bigger picture where the focus is on the value exchange between participants.

2.3. Evolution of FinTech

As the ecosystem the banking sector is included in is defined, in this section a clear definition of FinTech is introduced, followed by the new players' impact on incumbents' business lines and the evolution of the financial system due to financial technologies' growth.

2.3.1. Defining FinTech

FinTech is defined as "*technology-enabled innovation in financial services that could result in new business models, applications, processes or products with an associated material effect on the provision of financial*

services" from FinTech, F. S. I. (2017). This definition highlights FinTech's implications on the existing structure of financial markets, and places activities and results at the center rather than the underlying technologies. Historically, derived from abbreviating and combining the words finance and technology, the term "FinTech" arose in the scientific literature in 1972. Almost fifty years ago, Bettinger formulated the following definition for FinTech: "*an acronym which stands for financial technology, combining bank expertise with modern management science techniques and the computer*". Alternatively, Arner et al. (2016) states that the term Fintech can be detected back to Citigroup's "*Financial Services Technology Consortium*", an industry initiative from the 1990s.

While the term FinTech initially appeared to describe how incumbents in financial services used a range of information technologies to optimize efficiency, to lower costs or to make their services more customer centric (Dapp et al., 2014), another point of view stresses that FinTech has the attributes of disruptive innovations as financial services remain surprisingly expensive, explaining the emergence of new entrants (Philippon, 2016). The angle of FinTech as disruptive new market entrants include within the latter both start-ups and technology companies previously uninvolved with financial services like Apple or Google (Gimpel et al., 2018) resulting in "new models of collaboration and a significant shift in power" (Basole and Patel, 2018).

Moreover, based on **Christensen's (1997)** categorization of innovations, **Lee (2015b)** adds a technicality differentiating between "sustaining FinTech", i.e., established financial services providers that try to protect their market position by the use of information technologies, and "disruptive FinTech", i.e., new companies and start-ups that challenge established providers by offering new products and services.

Alternatively, Gomber et al. (2018) present the term "digital finance" by describing the digitalization of the financial industry in general.

2.3.2. Evolution in technological innovations

Over the course of time, the financial services industry (FSI) has been characterized by the interconnection between finance and technology which has a long history and has evolved over three different periods, during which both have grown together. The transformation began with an analog context (FinTech 1.0), followed by a process of digitalization of finance with the diffusion of ATMs until 2008 (FinTech 2.0) and, finally, a new and final era has been establishing driven not that much by the financial products or services provided, but by who and with what intent provides them together with the application of innovative technology (FinTech 3.0) (Arner et al., 2016).

FinTech 1.0 (1866 – 1967)

Being FinTech a term which broadly stands for the application of technology to finance, the fundamental infrastructure necessary for the digital age of financial services dates to 1838 with the introduction of the telegraph and laying of the first transatlantic cable in 1866.

This era came to its climax with the spread of credit cards in 1950, the first portable financial calculator, and the introduction of the first ATM in 1967, which marked the end of the so-called FinTech 1.0 period.

FinTech 2.0 (1967 – 2008)

In 1967 in the United Kingdom, Barclays deployed the world's first ATM, and over the next decade, electronic payment systems gained momentum, supporting more domestic and international payments and financial flows.

In addition, the United Kingdom in 1968 and the United States in 1970 saw the creation of automated clearinghouses, and in 1973, to support international finance and trade, the Society of Worldwide Interbank Financial Telecommunications (SWIFT) was created by and for its users (Swift description, 2021). The growing international financial interconnectedness began to be regulated in 1975 with the establishment of the Basel Committee on Banking Supervision of the Bank for International Settlements (BIS). Meanwhile, in the securities industry, NASDAQ, founded in 1971, inaugurates electronic securities trading platforms. In the consumer banking industry, online banking was introduced in the early 1980s as financial institutions increasingly used the development of new information technology in their internal operations, gradually replacing most forms of paper-based mechanisms. By the late 1980s, financial services had largely become a digital industry, relying on electronic transactions between financial institutions, financial market participants, and customers around the world. Wells Fargo was the first bank to offer an online checking account in 1995, using the World Wide Web (WWW) to provide online banking services to consumers. By 2005, the first direct banks without physical branches emerged and gained wider public acceptance (e.g., ING Direct, HSBC Direct) in the United Kingdom.

By the beginning of the 21st century, banks' internal processes, interactions with outsiders, and more of their interactions with retail customers had become fully digitized. And as digitization became ubiquitous, the financial services industry's IT expenses increased accordingly.

FinTech 3.0 (2008 – present)

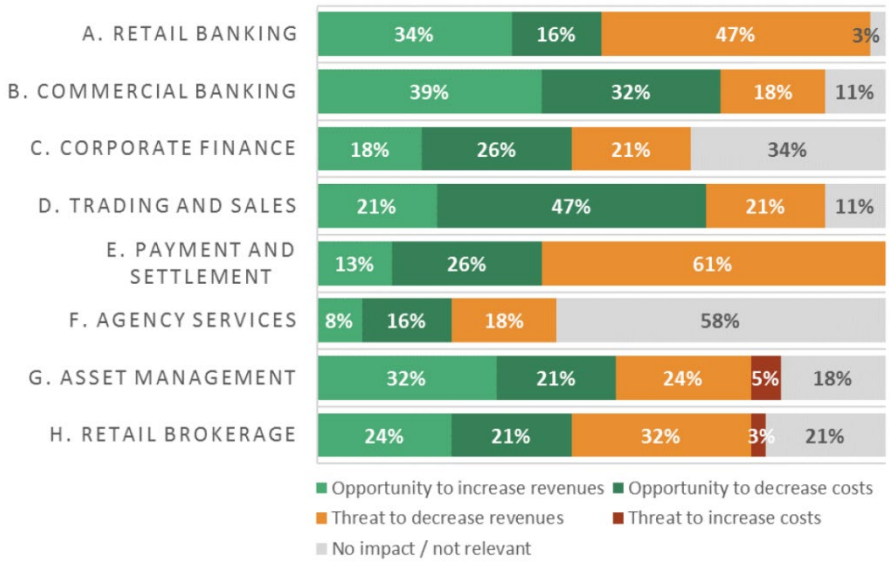
The 2008 financial crisis has been the turning point for FinTech. Distrust of banks in the minds of the public, large groups of highly skilled financial professionals out of work, and regulatory factors led to the creation of the perfect incubator to allow the FinTech industry to flourish in a hyper-growth market.

In the current era, where FinTech is flourishing, traditional banks are facing the impact of new entrants in the market and must adapt to the entrance of new players.

2.3.3. Impact on incumbents' business lines

Moving to the incumbents' perspective, a study investigated which services lines are the most impacted by FinTech companies and results showed that payments and settlement business represent the major concern for a decrease in revenue, followed by the retail banking services (EBA, 2018). The threat coming from the new entrants is depicted by the lower and lower fees linked to payment services and commission income.

On the opposite side, opportunities are foreseen in commercial banking and trading and sales businesses thanks to the possible advantages coming from the technology-based innovations like a better use of data analytics or robo advisors.



Source: Representation from EBA, 2018

Figure 7: Impact on incumbents' business lines

2.4. Current landscape

As the landscape is evolving fast, the concept of Digital Finance Cube, developed by Gomber et al. (2017), which incorporates the digitalization of the financial industry in all its forms and figuratively displays the

integration between the financial and technological industries, has been identified, analyzed, classified, and adapted for the purpose of this research to clarify:

1. who are the actors leading the banking sector;
2. which and how functions and departments are affected by them; and
3. which are the new technologies that enable the disruption of the banking sector.

These three layers will be the basis to create the questions to capture the customers' positioning in the current landscape.

2.4.1. Actors and their role

The FinTech arena counts several key players which were previously not engaged with the financial sector, these new entities are currently entering the market threatening the positioning of the incumbents. In this section, actors and their roles are presented.

Incumbents

Traditional banks are the incumbents in this process of disruption. Incumbent institutions are credit institutions that provide the full range of banking services through their network of established physical branches and online distribution channels. Incumbent institutions vary significantly in terms of their current level of digitalization and application of FinTech solutions, as well as their governance capacity and financial capability to adopt innovative financial solutions (EBA, 2018).

This study concentrates on retail banking services as payments, savings, current account management, investment (consultancy in investment products), lending (consumer and small enterprises loans) and mortgage lending. Insurance or other advisory services will not be considered for the purpose of the research.

FinTech players

On the other side, the entrants include both FinTech companies and TechFin.

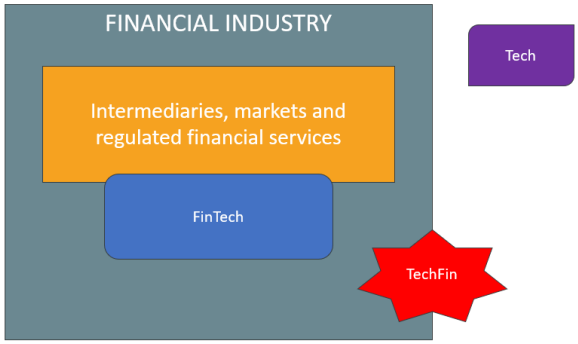
FinTech are new intermediaries set up to deliver financial services that implement innovative digital technologies. Within this category, one can find digital-based institutions and FinTech start-ups (EBA, 2018). The former (digital-based institutions) are digital-only institutions or challenger banks that present innovative business models, providing digital-based banking services, and hold a license as a credit institution or payment or e-money institution. These focus primarily on the mobile app experience and have no physical branches. The second are start-ups without a banking/payment/electronic money license that offer technology-based financial innovation solutions that could result in new business models, applications, or products.

On the other hand, TechFin companies started out in other industries and only later began to develop and distribute financial products. Included in this context are Tech Giants or BigTechs, i.e., high-tech companies that offer financial products as part of their digital ecosystems, such as GAFA (Google, Apple, Facebook, Amazon). Typically, these companies provide technology support to institutions in terms of software and/or hardware applications, focusing primarily on technology development and manufacturing. BigTech companies are usually large and globally active with a relative advantage in terms of digital technology. They often have a large customer base and are engaged in the provision of various online services, for example retail customer-oriented e-commerce platforms, search engines and social networks, business customer-oriented data storage or computing services (BCBS, 2018).

FinTech vs TechFin

Both FinTech and TechFin companies are digital native companies which develop innovative financial services through technology (applications or digital platforms). FinTech companies' evolution is distinguished by "digital proximity" and it is reshaping the nature of the relationship between the customer and the business. The physical proximity of traditional banks is taken over by financial service user friendliness. All in all, cross-border networks can emerge, geographical boundaries can be shortened, and information is available more quickly and cheaply. In this scenario, technological investment for both entrants and incumbents, is key to development.

It is important to clarify that FinTech and TechFin, next to the above-mentioned similarities, rely on different strengths and features to compete with the incumbents. First, FinTech companies depend on rather simple and specific technologies for their business, while TechFin and, particularly, BigTech already have highly sophisticated and advanced technological infrastructures (CB Insights 2017). Second, their different underlying "birth" entails diverse accessibility to information and data. On the one hand, FinTech companies are born and specially designed to support financial services aiming at the procurement of consumers' information and they must acquire their own reputation to obtain operational trustworthiness stabilizing their databases. On the other hand, TechFin companies, firms characterized by pre-existing businesses, can take advantage of former clients' trust and leverage their large data assets (Zetzsche et al. 2017). Information is processed and proposals to services, financial ones likewise, are put forward through algorithms fed by the enormous amount of information available. In such a way, clients' needs can be met quickly and efficiently as TechFin, and BigTech particularly, react to their demands and anticipate their financial needs. As a critical growth element is the availability and practical use of data and information on customers, BigTech firms through their global platforms are an impressive threat.



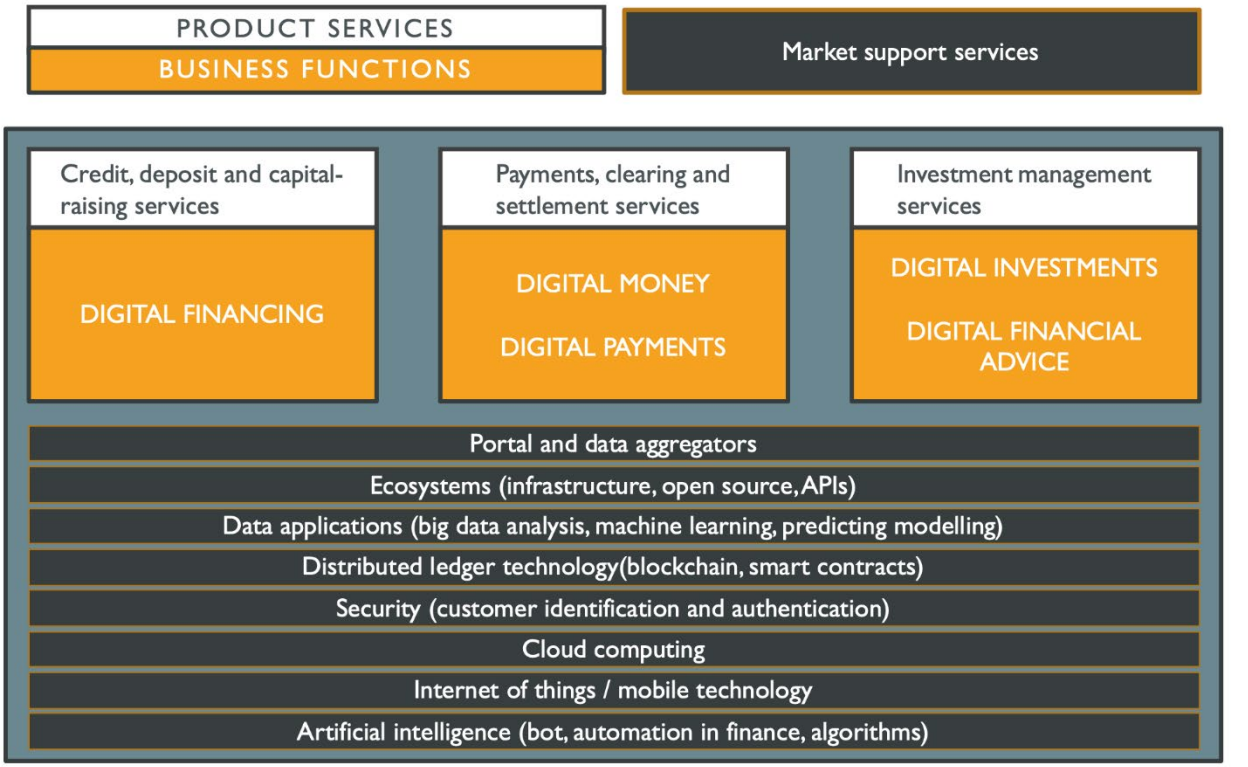
Source: Own representation based on Schena et al. (2018)

Figure 8: Positioning of FinTech and TechFin in the FSI

2.4.2. Product services and related business functions

Based on the Basel Committee on Banking Supervision's (BCBS) depiction of key FinTech products and services and the digital finance cube (Gomber et al., 2017), a clear classification of the current FinTech landscape can be drawn.

Three product sectors englobing five business functions are identified, complemented with market support services. The three product sectors subdivided in the five business functions are connected directly to core banking services, while the market support services relate to innovations and new technologies that are not specific to the financial sector but also play a significant role in FinTech developments.



Source: Own representation based on BCBS (2018) and Gomber et al. (2017)

Figure 9: Representation of product services, business functions and market support services

Credit, deposit and capital-raising services

Digital financing allows individuals, firms, and start-ups to become independent from the traditional ways of obtaining credit or acquiring funds through capital-raising services by using the Internet. It embraces all digital types of making available financial capital relying on platforms that offer digitalized services in the area of factoring, invoicing, leasing, and crowdfunding. Innovations are crowdfunding platforms, lending marketplaces, mobile banks, and credit scoring.

Payments, clearing and settlement services

Payments, clearing and settlement services include both digital money and digital payments, which are strongly correlated. *Digital payments* cover the transfer of a certain amount of money from the payer to the payee through an electronic, location-independent payment mechanism (Weir et al., 2006). Next to the increase of online shops, the demand for e-payment has risen. Even if the first solutions, such as online banking, are deeply inspired by the traditional account-based bank transfer, there have been innovative and easy-to-use solutions that better fit the needs of merchants and customers (Dahlberg et al. 2008).

Digital money serves as a medium of exchange, a unit of account, and a store of value but it exists only digitally. Virtual currencies are exchanged on the Internet and, by being independent of fiat currencies or bank accounts, are non-regulated, meaning that these are distributed from and controlled by their creators. Usually, the currency is based on a decentralized organized network, and, in such a way, its value is based on demand and supply on respective digital currencies exchanges. Innovations are mobile wallets, P2P (peer-to-peer) transfers, digital currencies, value transfer networks, FX wholesale and digital exchange platforms.

Investment management services

Investment management services include both digital investments and digital finance advice. *Digital investments* support investors in their asset allocation and in arranging the required investment transactions on their own through the use of devices and technologies. It includes mobile trading, social trading, online brokerage, and online trading in the B2C area and high-frequency, algorithmic, copy and e-trading in the B2B context.

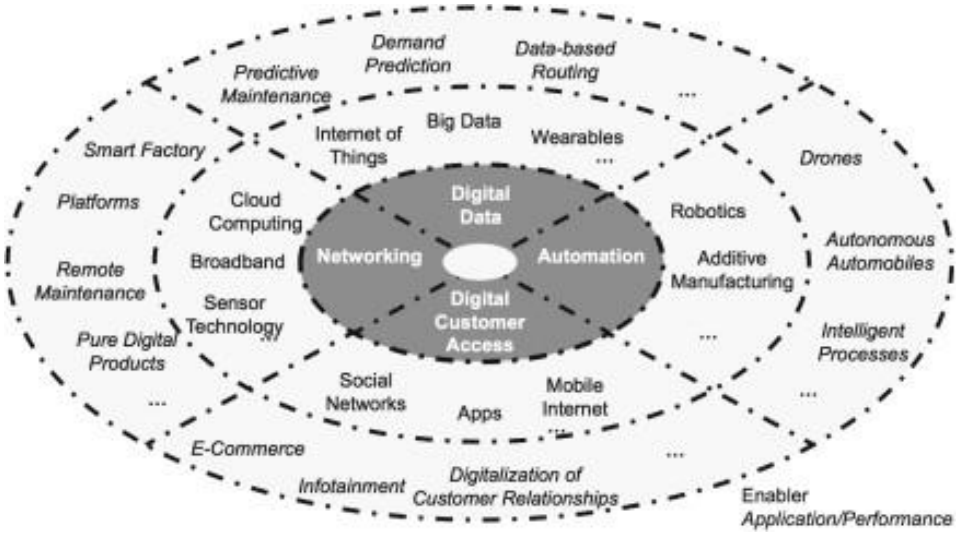
While *digital financial advice* can be found in robo-advisory or in platforms in which products and services are rated, scored, ranked, evaluated, and compared. Research has already shown that these ratings have influence on the behavior of customers (Hu et al. 2008).

2.4.3. Market support services

Market support services are technological enablers for digital transformation which serve to allow technological applications (and services) to be used for the digital transformation of business models. Four general categories of enablers are detailed below:

- Digital Data: The collection, processing, and analysis of digitized data to facilitate and improve predictions and decisions.
- Automation: The combination of classical artificial intelligence technologies that enables autonomous work and self-organizing systems. This reduces error rates, increases speed, and makes it possible to reduce operating costs.
- Digital Customer Access: The mobile internet enables direct access to the client, who are thus provided with high levels of transparency and new services.
- Networking: Mobile or wired networking of the entire value-added chain via high-speed broadband telecommunications allows for the synchronization of supply chains, which leads to a reduction in production times and innovation cycles

Enablers are listed with their applications (and services) in a digital radar, which is shown in the figure below:



Source: Schallmo et al. (2020)

Figure 10: Representation of the shift from business model to digital ecosystem

The above-described drivers to the market situation and the mentioned new digital technologies led to the current situation in which incumbents are moving towards an open system that integrates the unavoidable entrants (Standaert et al., 2020).

3. Cross-sectoral consolidation

In this chapter, a clear overview of the ongoing integration process will be shown, and several scenarios will be proposed. On the basis of these scenarios, risks and opportunities impacting the consumer sector will be identified.

3.1. The ongoing integration process: inter-organizational innovation patterns

Following a structured overview of the digital transformation within the financial industry as an ecosystem, different inter-organizational innovation patterns have been identified within the provision of banking services (Riasanow et al., 2018). These can be listed as follows: the elimination of intermediaries, enhancement in transparency, cloud-based services, service aggregation, and prosumption.

3.1.1. Elimination of intermediaries

Some technological innovations have allowed the elimination of banks as intermediaries. For example, in the traditional financial industry, customers could only access loans from banks if they met specific requirements, whereas through crowdlending there is no longer a need for one to borrow money.

3.1.2. Enhance in transparency

Transparency in payments, wealth management, and financing is being improved primarily to increase security. Starling Bank, for example, has built a mobile platform that "gives their customers the ability to instantly check their spending habits, apply overdraft checks directly from their app, and eliminate all fees when traveling abroad" (Biermann, 2017).

3.1.3. Cloud-based services

Cloud-based services are constructed on a cloud infrastructure composed of standardized units that facilitates rapid scalability, which gets rid of the barriers of traditional financial products or services that are tied to the magnitude of the financial institution. In this direction, scalability is tied to the computing power of the cloud infrastructure provider (Youseff et al. 2008).

3.1.4. Service aggregation

In this case, the provider aggregates multiple services and makes them accessible in a single solution. For example, the Spendee application provides app users with the ability to keep track of balances by connecting all one's bank accounts (Spendee, 2021).

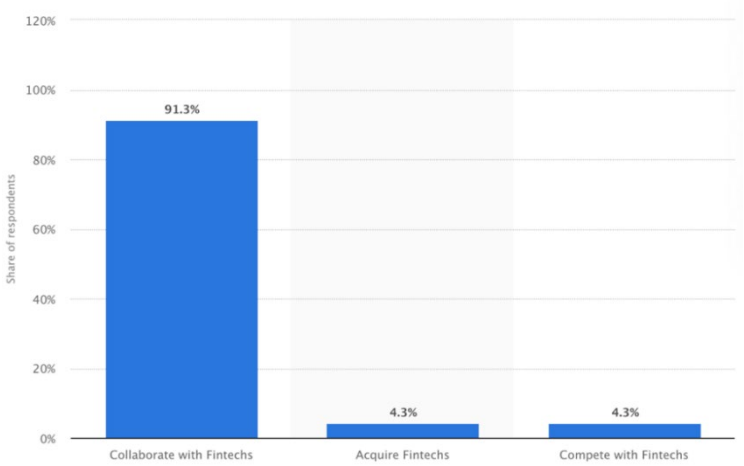
3.1.5. Prosumption

Prosumption is the combination of production and consumption and refers to when a consumer simultaneously uses and creates a service, such as when a user is connected to GoogleMaps to get directions but at the same time the smartphone's GPS gives real-time traffic information to other users. In financial services the same principle can be found within a Lending Club, in fact, thanks to participation the network increases, making it easier to lend money later.

These five inter-organizational innovation patterns are instrumental to understand the strategies incumbent banks engaged in and in delineating future possible scenarios, more in one than in others, of how actors in the ecosystem will position themselves.

3.2. Incumbent banks' business strategies with respect to FinTech

Driven by the innovation patterns, incumbent banks approached and engaged with the new entrants in different ways which encompass partnering with or investing in the FinTech players, including Tech Giants, or developing their own technologies in-house. According to Statista (see figure 12), the results of the survey carried out among banking executives revealed that 91.3% of banks planned to collaborate with FinTech companies, while 4.3% and again 4.3% aim at acquiring and at competing with FinTech firms (Statista, 2020). Each traditional bank has those opportunities ahead and could decide to pick one and exclude the others or combine them, diversifying the strategy based on the willingness to undertake specific or more innovation patterns within its business model.



Source: Statista, 2020

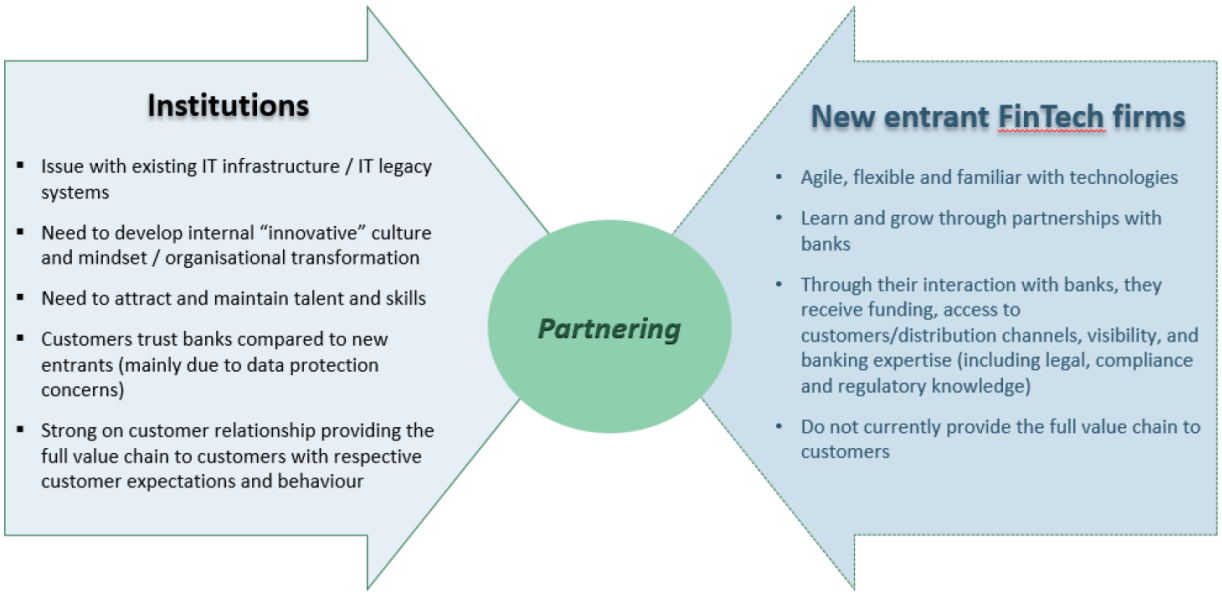
Figure 11: Representation of banks' business strategies with respect to FinTech in 2017

3.2.1. Partnering

As of today, partnering with new players is the predominant way to engage with them, research conducted by the EBA witnesses that 95% of the interviewees, fifteen global systemically important institutions, have an ongoing relationship with FinTech firms.

The partnership between incumbent institutions and FinTech firms may be the "win-win" solution to establish a relationship that is beneficial. On the one hand, the former brings experience, customer base, and capital, on the other hand, the latter provides cutting-edge technological innovations which can improve the customer experience, fasten processes, or exploit the data analysis. As the benefit is mutual, depending on their interest, banks look for FinTech firms with whom they can collaborate on the development of innovative proposals which are in line with their business strategy and nature, while the new players are usually highly motivated and actively approach incumbents to form alliances. In this regard, events such as hackathons, competitions, challenge programs, and other networking events are launched by banks. In this way, like in the hiring process, institutions seek to identify potential partners and explore opportunities in specific topics. In a second step, incumbents provide in-house incubators or dedicated accelerators to make collaboration easier.

Figure 8. *Key drivers that encourage partnership between incumbent institutions and new entrant FinTech firms*



Source: EBA, 2018

Figure 12: Key drivers that encourage partnership between incumbent institutions and new entrant FinTech firms

3.2.2. Investing

Investing in the FinTech players is a second option for incumbents which can be undertaken in two main different ways: via venture capital (VC) funds and via direct acquisitions. The former seems to be preferred by traditional banks, with a positive response by the incumbent institutions having invested indirectly into

FinTech firms of 76%, while only 34% of incumbent institutions acquired existing Fintech firms to offer new services and products (EBA, 2018).

Venture capital funds

On the one hand, venture capital funds allow banks to acquire shares of a FinTech startup to have more decisional power, more gain, but also more risk than a partnership. On the other hand, it is less risky and less remunerative in the case of positive returns than a direct acquisition.

Generally, choosing to have shareholdings in FinTech companies follows the strategic plans of banks, which, for example, aim to acquire majority stakes in spin-off entities and/or minority stakes in external companies. However, new players may prefer collaboration to acquire minority stakes, as the independence and flexibility required for development and creativity may be limited when investors are part of the management. Finally, data show that venture capital fund investments have increased from 1.89 billion U.S. dollars in 2010 to 53.3 billion U.S. dollars in 2019. As of the first half of 2020, VC investments in fintech amount to 23.1 billion U.S. dollars (Statista, 2021c).

Direct acquisitions

An alternative is a direct acquisition but integrating FinTech firms into the banking group could be complex from a business perspective. Acquired FinTech firms can be kept separate from the banking group to avoid undermining innovative thinking and agility (EBA, 2018). However, this remains a lesser option because of the risk and the difficulties.

3.2.3. Developing

To embrace the change, several institutions increased their investment in research and development (R&D). In this sense, internal accelerators are designed for a team that constantly examines and evaluates FinTech developments in the market and seeks to identify potential FinTech solutions that the institution may apply. Moreover, in order to encourage solutions that could replace existing time-consuming, inefficient, or ineffective procedures and processes, financial institutions have created internal innovation labs and incubators. Proposals are submitted by internal staff, analyzed, tested, and, if successfully approved, solutions are disseminated throughout the institution. In addition, banks can also leverage their large customer base to gather feedback on their clients' needs and directly inform their internal labs so that they can modulate their service offerings.

3.3. Overview of banking industry identified future scenarios

Banks find themselves in different stages of digitalization, and the role they are playing in the banking-FinTech ecosystem helps identify which scenario they can be part of. Following the BCBS research, these

scenarios are not considered mutually exclusive and comprehensive, and in fact, the evolution of the banking industry may result in a combination of them. To analyze the digital transformation within the banking sector, five types of scenarios are presented with a stress on the positioning of the actors through the answer to these two questions: (i) who manages the interface or the customer relationship? (ii) Who is providing the final service assuming the risk? The aim is to detect the different roles incumbent banks and FinTech companies, including BigTech, may play in either owning the customer relationship or, as service providers, supporting the processing of banking activities. The following future scenarios will be challenged by the survey. Which scenario is most likely to happen based on customers' views on who they prefer to interface with regarding their finances?

3.3.1. The "better bank"

In this first case, incumbents modernize and digitalize themselves completely preserving both the core of banking services and the customer base with the help of technology enablers to change their business models. However, this is not an easy goal to achieve while dealing with cost-efficiency. Traditional banks' potential relies on their market expertise and their strong investment competencies, which means that incumbent institutions can provide better services by adopting technological innovations, such as Cloud Computing, Big Data, artificial intelligence (AI), and distributed ledger technology (DLT). Thereby, incumbents use new technologies to develop their value propositions that are not completely supported by their current infrastructure. For example, many banks instead of developing branded mobile payment services have leveraged third-party-provided payment services that integrate with legacy platforms operated by banks. In this scenario, both the interface and the service are provided only by incumbent institutions.

3.3.2. The new bank

An opposing viewpoint is the new bank scenario, where incumbent institutions are unable to keep up with the technological disruption and are replaced by "new banks" that can be either neo-banks or financial institutions created by Tech Giants, which have obtained their banking licenses, are fully digital and deviate from the branch-centric customer relationship model. The services provided are more cutting edge and more cost-effective as retail banking services are offered predominantly through a smartphone app and internet-based platform. Moreover, neo-banks and challenger banks are not constrained by pre-existing infrastructure and can boost the use of new technologies with less cost, faster, and in a more modern way leveraging scalable infrastructure through cloud providers or API-based systems to better interact across online, mobile, and social media-based platforms. Nonetheless, customer acquisition costs can be high in competitive banking systems, and their aggressive pricing strategies may threaten new banks' revenues.
Their emergence is increasingly evident through initiatives like Atom Bank, Fidor Bank, Mondo, WeBank, Starling, Tandem Bank, N26, Varo Money, or many others (KPMG, 2016; Team L., 2016; Fintechnews

Switzerland, 2021). In such a case, the interface role and the provision of the service assuming product and risk management are furnished by the new players only that replaced traditional banks.

Example: N26
A banking license is a legal requirement for a company that wishes to call itself a bank. Before July 2016, N26 was a FinTech company for which a partner bank provided the core banking platform. Since July 2016, N26 has been a fully licensed bank that complies with all the regulations set forth by the European Central Bank as with other traditional banks and can provide all the services expected from a bank. This includes retail banking basics like managing deposits in everyday personal and business bank accounts and extends to more advanced banking activities like lending. N26 had to successfully satisfy prerequisites like the minimum capital requirement, regulatory compliance, and security and data protection to get this license. As a result of having the license, N26 can provide convenient, 100% mobile personal and business banking products as a fully recognized bank. N26 can lend money in consumer credit loans in Germany and France with N26 Credit and provide extra financial flexibility when you need it with N26 Overdraft in Germany and Austria. It can offer local IBANs for N26 bank accounts in Spain and Italy or enter into a network of partner banks that allow earning high interest on customers' funds with N26 Savings. Moreover, it also means that every customer's deposit with N26 is protected up to €100,000, all thanks to the German Deposit Protection Scheme.

3.3.3. The distributed bank

This third scenario shows the fragmentation of the FSI among specialized FinTech players, including BigTech, and incumbents. In this case, incumbents know how to carve out enough of a niche to not be excluded from the financial services industry. Both service provisioning and interfacing can be provided by either incumbents or FinTech or BigTech companies. In the distributed banking scenario, banks and new players operate with a structure in which service delivery is shared between parties. To retain the customer, whose expectations are continuously increasing in terms of transparency and quality, traditional banks are more inclined to offer products and services from third-party providers. As a result, consumers use multiple financial service providers. The increasing use of open APIs, the association of credit platforms with banks, services of innovative payment and of automated investment advisory as joint ventures with banks reveal this trend.

Example: Satispay
Satispay is a free app for digital payment and online money transfer, allowing customers to send money to friends and pay in stores via smartphone. In addition, it provides a series of services like cashback, i.e.

(as indicated on the app site itself) "a partial refund of a payment made via Satispay" credited directly to the user's application after the payment is made".

The Satispay app was born in 2015, and it is available on any device. It allows making online payments and payments in all partner shops and businesses. In a few moments, it will enable customers to purchase mobile phone top-ups and pay bills and taxes, including car and motorcycle-related taxes. It is also possible to send money to friends to split a dinner bill.

A user needs to download the app and enter the phone number and IBAN code. This way, the app will connect directly to the customers' bank account, and it will be possible to make payments safely without getting out your credit card. Once the data has been entered, it will take 3 to 5 working days for Satispay to carry out all the necessary checks. The incumbents provide the service, while FinTech owns the customer interface.

3.3.4. The relegated bank

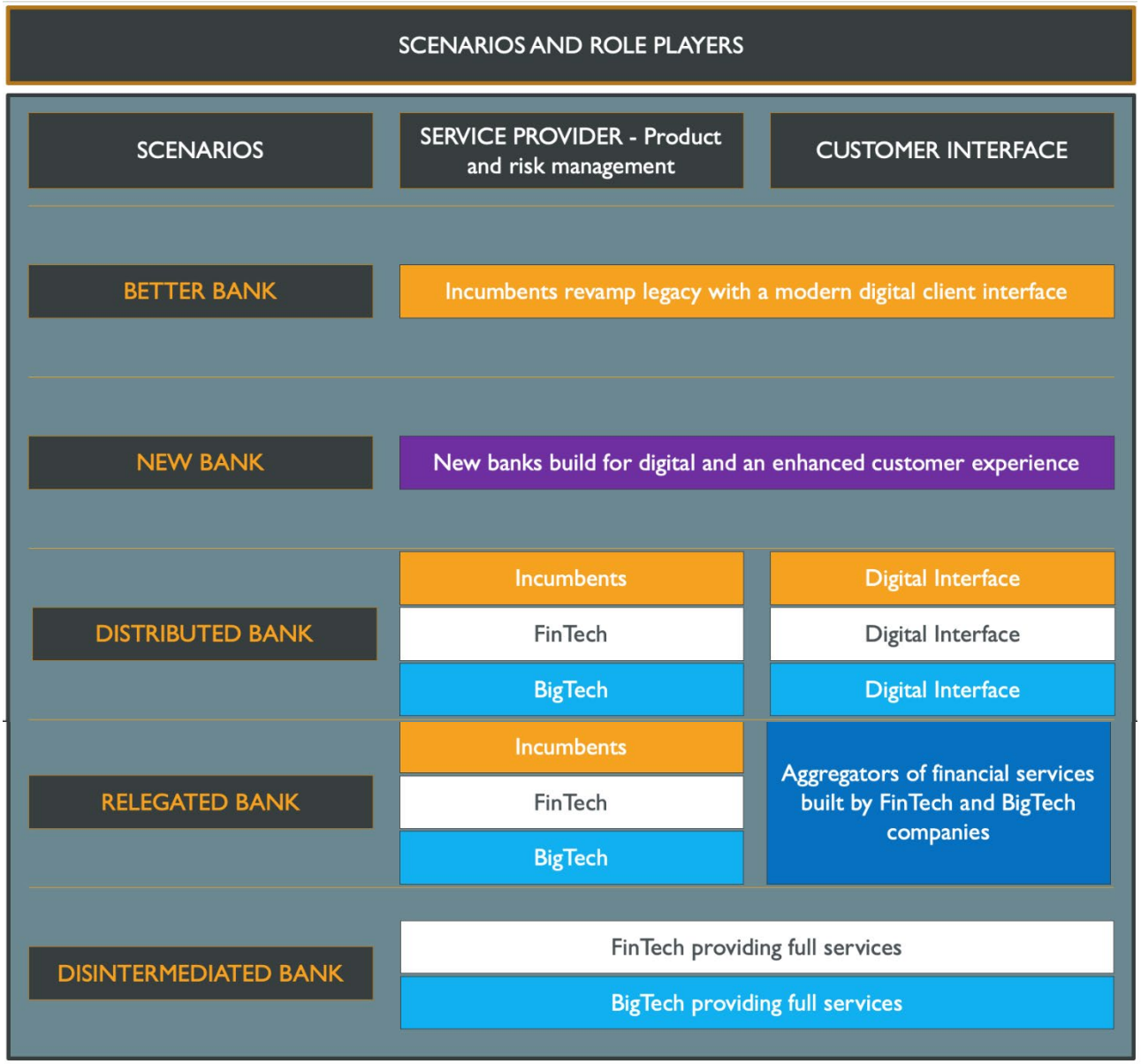
In the relegated bank scenario, incumbents become standardized service providers next to FinTech and BigTech companies, while the direct customer relationship is handed over to aggregators built by the new players. The latter use front-end customer platforms to offer an array of financial services from different providers. In different words, incumbents retain their banking licenses maintaining the financial risk of these activities and aggregators provide the banking services to the clients curing the interface and the customer relationship. In this scenario, big data, cloud computing, and AI are fully leveraged by front-end platforms to enhance the customer experience (BCBS, 2018). For example, data collectors allow users to manage different financial accounts on a single platform. Hence, banks are confined to being suppliers of common functions like operational processes and risk management, while platform service providers manage the direct customer relationships.

Example: Envestnet Yodlee

Envestnet Yodlee Retail Solutions is a set of financial applications designed for retail bank customers. It brings the power of real-time account data from over 15,000 financial sources and more than 100,000 different account types globally to deliver unique money management capabilities. Yodlee Retail Solutions creates a detailed customer view and enables more innovative opportunities for targeted cross-sell and up-sell of revenue-generating products and services. This scalable app-based solution enables customers to consolidate all their financial account information in one place, giving them a clear picture of their financial lives with the personalized tools to manage, and meet their financial goals.

3.3.5. The disintermediated bank

In this fifth and final scenario of disintermediated banks, as the term implies, there is no longer a need for an intermediary bank, which has been removed. Banks have been moved away from customer financial transactions by more agile technologies able to ensure that end consumers are directly matched according to their needs, for example through the use of cryptocurrencies or P2P lending. Incumbents are irrelevant here as customers interact directly with individual financial services providers. The quintessential example of decentralized finance is the use of blockchain technology, a type of DLT, which allows for the exchange of cryptocurrencies on platforms that do not need intermediaries. In this way, clients would have more decision-making power in the choice of services and providers, in lieu of undertaking financial services through an intermediary bank, but they assume more risks, as in the case of P2P lending, for example, it will be the lenders who potentially assume the credit risk instead of the intermediary.



Source: Own representation based on BCBS (2018)

Figure 13: Representation of five scenarios and the role players

3.4. Investigation of potential risks and opportunities

The evolution of the banking industry is changing the owner of the customer relationship which leads to the research question whether the customer is ready to interface with new players and situations. The fact that technology and digital reality is incrementally more and more a part of consumers' daily lives is undeniable, but will users be ready to radically change the way they manage their finances? A description of the risks and opportunities impacting the consumer sector is presented here and the survey will point out if customers are more scared or eager to embrace the entrance of FinTech and TechFin.

3.4.1. Opportunities

Opportunities arising from the entry of FinTech and TechFin within the financial and banking sector have been widely discussed and a focused summary of existing global specialized literature (BCBS (2018), Financial Stability Board (2017)) follows, having the consumer at the center of attention.

Financial inclusion

Since technology can reach remote locations, better access to financial services can be provided to underserved groups. Moreover, inclusion of new asset classes is another side of this opportunity, for example the 'tokenization' of commodities, energy products, pieces of art, real estate and private shares that are expensive to source, transact and deliver, they are now available for trading via DLT (Al-Ajlouni et al., 2018).

Better and more tailored banking services

To support customers enhancing their traditional offerings to deliver them in a cost-effective and flexible way and creating a better and personalized customer experience, banks can benefit from the specialization of FinTech companies.

Lower transaction costs and faster banking services

As FinTech offers lower transaction costs and faster banking services, transfers and payments can be accelerated, and their costs reduced.

Potential positive impact on financial stability

A potential positive impact on financial stability is due to the increase in competition. The entrance of FinTech and TechFin competing with incumbents could fragment the banking services market and reduce the systemic risk associated with players of systemic size (Al-Ajlouni et al., 2018).

Easier access to capital

Borrowers who have limited access to bank loans and cannot access traditional financing can turn to different channels and lenders, through P2P and equity crowdfunding (ECF) platforms that increase and facilitate access to capital.

3.4.2. Risks

Like any evolution, the entry of Fintech and TechFin also holds a wide variety of risks for the consumer sector.

Data privacy

The risk of non-compliance with data privacy regulations (compliance risk) increases because of the development of big data, links with FinTech leading to greater outsourcing and the associated competition for ownership of the customer relationship.

Data security

New technologies that facilitate greater interconnectivity, such as APIs or cloud computing, could make the banking system more vulnerable to cyber threats and expose large volumes of sensitive data to potential breaches by increasing cyber-risk. There is also a risk of collapse, fraud or negligence on the part of the platform or some of its users.

Discontinuity of banking services

Sources of bank funding may be more discontinuous as customers can automatically switch between different savings accounts or mutual funds to get a better return. The result might be higher liquidity risk for banks and volatility of bank funding sources.

Inappropriate marketing practices

Banks are fighting for the customer, not only with other banks but also with non-banks. As there is a marketing skills gap between e-commerce players and banks, the latter should master digital media and inexperience may result in inappropriate marketing practices.

4. Data collection and analysis

Since the digital transformation within the financial sector is an ongoing process and FinTech is a young industry and thus substantial data is limited, the research methodology will rely on data collected through a survey. The latter intends to validate the literature research findings and extend the assessment of the end-users' perception.

4.1. Research methodology

Survey research is a method for collecting information from a pool of respondents by asking multiple survey questions. This research includes the recruitment of individuals, collection, and data analysis.

4.1.1. Case description

The following macro-questions will be investigated through a survey proposed to pool respondents from different countries, ages, and backgrounds (*see Appendix 1*). The aim is to conclude how the integration between financial and technological industries, incumbents, FinTech and TechFin is perceived by end-users to depict the respondents' point of view.

Q1. Where can the respondents be positioned in the current landscape?
Q2. Which future scenario is more likely to happen?
Q3. The tip of the balance is more in favor of risks or opportunities in the customer sector?

4.1.2. Sampling

The survey gathered data related to four main categories:

1. Demographic data: the respondents have been classified based on demographic characteristics to capture if patterns exist.
2. Data about current usage and interest in business functions provided in a digital environment.
3. Data about trust and confidence regarding the possible future service providers of banking services.
4. Data about the feeling towards risks and opportunities that arise from the digital disruption of the banking services.

4.1.3. Data collection and analysis

The research will analyze the collected data to explore possible relationships between the variables to answer the aforementioned questions.

1. Find clusters with homogeneous characteristics based on demographic data.

2. Explore clusters to find correlations and the most statistically significant variables to position the respondents in the current digital landscape based on interest, usage, and readiness for the transition.
3. Investigate the shared feeling towards the future scenarios and find if there is an existing pattern within the clusters.
4. Compute an average value for the risk feeling and one for the benefits valorization to find an average value to establish where the tip of the balance falls.
5. Investigate each cluster value with a critical point of view.

4.2. Data analysis

The survey has been proposed in four different languages to reach a more significant number of respondents; the collected data has undergone a pre-processing stage to normalize the values, followed by a clustering stage and personas creation. Finally, the personas are the base to answer the research questions, and the results are analyzed from a statistical and critical business point of view.

4.2.1. Pre-processing stage

The pre-processing stage of the data analysis considers the surveys in the four different languages independently. A dictionary per language has been created, and each value has been mapped to a standard set of values. In this phase, the translation of demographic data has been vital to set the ground for a proper analysis. Age of the respondents, gender, education level ("SCHOOL"), gross salary per year ("INCOME"), and if the respondents are providing financially or not for someone else ("HoH", Head of House) have been translated into numerical variables to allow the data analysis to provide mean, standard deviation, minimum value, percentiles, and maximum value. While for AGE and INCOME the numeric values speak on their own, the GENDER has been set as 1 for men and 0 for women; the education level has been appointed as 0 for respondents having less than a high school diploma, 1 for respondents having a high school diploma, 2 for a bachelor's degree, 3 for a master's degree, and 4 for respondents with a doctorate. Moreover, the HoH has been set as 1 when the respondents provide financially for someone else and as 0 in the opposite case.

	AGE	GENDER	SCHOOL	INCOME	HoH
count	454.000000	454.000000	454.000000	454.000000	454.000000
mean	36.008811	0.473568	1.876652	29030.837004	0.242291
std	15.009781	0.499852	1.011078	14627.348081	0.428942
min	16.000000	0.000000	0.000000	15000.000000	0.000000
25%	25.000000	0.000000	1.000000	15000.000000	0.000000
50%	28.000000	0.000000	2.000000	25000.000000	0.000000
75%	48.000000	1.000000	3.000000	35000.000000	0.000000
max	78.000000	1.000000	4.000000	65000.000000	1.000000

Figure 14: Statistical measures of the numeric variable values of the sample

On the other hand, country, academic background, and employment status have been considered categorical variables to enable the data analysis to focus on frequency patterns and cardinality.

	COUNTRY	ACAD_BG	EMPLOY
count	454	454	454
unique	13	13	7
top	IT	ECO	FT
freq	316	161	247

Figure 15: Statistical measures of the categorical variable values of the sample

Following the separation between numeric and categorical variables, specific assumptions have been taken to reduce the cardinality of some columns. First, for the country where the respondents are living. Since most of the respondents are located in European countries - only 3 data points show countries outside of the European continent (Brazil, Uruguay, and Mauritius) – the EX (Extra-Europe) category has been created to aggregate them.

Second, to analyze the respondents' background, which gave the possibility to provide multiple answers, the column has been exploded. This means that every time a respondent provided a set of answers, such as "Economic, Artistic", two lines were created to better investigate the impact of the background in the cluster.

Third, most of the demographic questions left the possibility to the respondents to mark "Prefer not to say", being a small part of the dataset, those values have been replaced with the mode (for non-numerical data) and the median (for numeric data) to avoid data noise. Across the whole survey, the percentage of the marked "Prefer not to say" in the columns allowing it has been calculated per each language, and its weighted average between the different languages has a value of 0,3%.

Finally, the demographic dataset counts 454 columns x 8 columns. Looking into the numeric variables, the average age is 36 years old; the youngest respondent is 16 years old, while the oldest is 78. The gender split counts 47% male respondents and 53% females. The income average is around 40,000.00 EUR gross per year. The education level average is 1,87, with 1 as secondary school diploma and 2 as bachelor's degree. Ultimately, the 24% have someone for whom they are providing financially (ex. kids).

Looking closely at the categorical variables, most of the respondents are living in Italy (316), the most frequent academic background is economic (161), and the employment status is full-time (247).

4.2.2. Clustering stage

Once the dataset has been cleaned, the first step of the analysis before clustering is to scale numerical values in a common and standard range. To do so it has been decided to use standard scaling, meaning that every variable has been fitted to a normal distribution with mean equal to zero and standard deviation equal to one.

One-hot encoding has been applied to categorical variables, creating a new set of dummy (binary) variables that is equal to the number of categories (k) in the variable. For example, considering the country the respondents are living in, there are different categories called "IT", "DE" and "LU", we need to use, in this example, three dummy variables to encode this variable using one-hot encoding. A dummy (binary) variable just takes the value 0 or 1 to indicate the exclusion or inclusion of a category.

Following the above-mentioned processing, the dataset now has still 454 rows but 35 columns.

To decide how to better cluster the dataset, combinations from 2 to 8 clusters have been created using the K-means algorithm and for each of them the SSE (sum of squared distances) - the lower the better - and the silhouette coefficient for each single point (to analyze how "good" it has been classified) - the higher the better.

After a critical look at the different combinations of clusters, an in-depth cluster analysis has been performed on 3, 4 and 6 clusters based on the SSE and average silhouette coefficient showing a "better" pattern.

	AGE	GENDER	SCHOOL	INCOME	HoH
	mean	mean	mean	mean	mean
CL_3					
1	54.81	0.28	0.98	23699.19	0.58
2	26.31	0.44	1.97	23189.66	0.00
3	35.36	0.80	2.76	49343.43	0.38

	COUNTRY				ACAD_BG				EMPLOY			
	count	unique	top	freq	count	unique	top	freq	count	unique	top	freq
CL_3												
1	123	4	IT	113	123	9	CRA	25	123	5	FT	53
2	232	11	IT	178	232	11	ECO	87	232	6	FT	112
3	99	10	DE	34	99	11	ECO	53	99	5	FT	82

Figure 16: Three clusters' characteristics

	AGE	GENDER	SCHOOL	INCOME	HoH
	mean	mean	mean	mean	mean
CL_4					
1	27.10	1.00	2.02	24032.26	0.05
2	55.17	0.28	0.92	23448.28	0.60
3	26.91	0.00	2.05	25000.00	0.00
4	38.11	0.78	2.80	53783.78	0.46

	COUNTRY				ACAD_BG				EMPLOY			
	count	unique	top	freq	count	unique	top	freq	count	unique	top	freq
CL_4												
1	124	9	IT	89	124	11	ECO	47	124	6	FT	72
2	116	3	IT	107	116	9	CRA	25	116	5	FT	48
3	140	8	IT	102	140	9	ECO	56	140	7	FT	69
4	74	9	DE	30	74	10	ECO	38	74	5	FT	58

Figure 17: Four clusters' characteristics

	AGE	GENDER	SCHOOL	INCOME	HoH
	mean	mean	mean	mean	mean
CL_6					
1	60.40	0.23	0.83	21981.13	0.00
2	49.44	0.34	1.03	23970.59	1.00
3	27.06	1.00	1.94	22115.38	0.01
4	25.55	0.00	2.02	23984.38	0.00
5	46.07	0.73	2.80	49634.15	1.00
6	30.18	0.77	2.72	49666.67	0.00

	COUNTRY				ACAD_BG				EMPLOY			
	count	unique	top	freq	count	unique	top	freq	count	unique	top	freq
CL_6												
1	53	3	IT	47	53	9	CRA	11	53	5	RE	22
2	68	3	IT	64	68	8	CRA	14	68	5	FT	37
3	104	7	IT	83	104	11	ECO	36	104	6	FT	53
4	128	7	IT	97	128	9	ECO	50	128	6	FT	60
5	41	6	IT	16	41	9	ECO	16	41	4	FT	30
6	60	9	DE	25	60	7	ECO	37	60	4	FT	52

Figure 18: Six clusters' characteristics

The choice of the clustering that will be used to answer the research questions is the division between the respondents into 4 clusters.

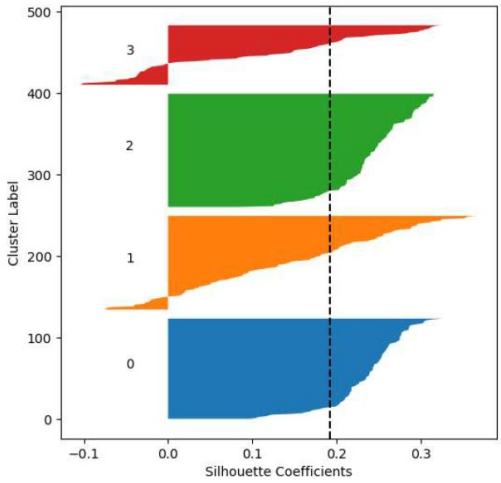


Figure 19: Four clusters' separation

Four personas have been developed based on each cluster characteristics:

Francesco: the first cluster comprises only males, with an average age of around 27 years old with an average educational level above a bachelor's degree, an income of about 25,000 EUR gross per year, and only 5% of the components are providing financially for someone else. Moreover, circa 70% of them are living in Italy, almost 40% have an economic background, and the majority have a full-time job.

Francesco		
	Sex	**100% males**
	Average age	**27 years old**
	Education	**Bachelor's degree**
	Income	**25,000 EUR**
	HoH	**5%**
	Living country	**Italy**
	Background	**Economic**

Maria: the second cluster comprises mostly women (72%), with an average age above 55 years old with an average educational level below a secondary school diploma, an income of a bit less than 25,000 EUR gross per year, and more than half of the components are providing financially for someone else. Moreover, circa 92% of them are living in Italy, the most shared background is artisanal, covering 22% of the cluster, and 41% have a full-time job.

Maria		
	Sex	**72% females**
	Average age	**55 years old**
	Education	**High school**
	Income	**25,000 EUR**
	HoH	**60%**
	Living country	**Italy**
	Background	**Artisanal**

Alessandra: the third cluster comprises only females, with an average age of around 27 years old with an average educational level above a bachelor's degree, an income of about 25,000 EUR gross per year, and none of the components are providing financially for someone else. Moreover, circa 72% of them live in Italy,

40% have an economic background, and the majority have a full-time job. Alessandra has almost identical characteristics as Francesco, the former being a female and the latter a male.

Alessandra 		
	Sex	**100% females**
	Average age	**27 years old**
	Education	**Bachelor's degree**
	Income	**25,000 EUR**
	HoH	**0%**
	Living country	**Italy**
	Background	**Economic**

Jasper: the fourth cluster comprises mostly males (78%), with an average age of about 38 years old with an average education slightly below a master's degree, an income of about 55,000 EUR gross per year, and 46% of the components are providing financially for someone else. Moreover, circa 41% of them are living in Germany, more than half have an economic background, and the majority have full-time jobs.

Jasper 		
	Sex	**78% males**
	Average age	**38 years old**
	Education	**Master's degree**
	Income	**55,000 EUR**
	HoH	**46%**
	Living country	**Germany**
	Background	**Economic**

The personas mentioned above will help in answering the three research questions.

4.2.3. (Q1) Where can the respondents be positioned in the current landscape?

For each cluster, the specific digital services usage and the interest have been analyzed to position the respondents in the current landscape. The questions asked to rate both the usage and the interest of five different digital services from 1 (not interested) to 5 (very interested).

Digital financing shows that the usage among the respondents goes from 9% to 31%, where the most interested are Francesco, Jasper and Alessandra, while Maria is less keen. The usage keeps up with interest, except for Alessandra, who shows high interest (3.04 out of 5) and low usage 12% (12% of the respondents being part of the cluster of Alessandra used any means of digital financing).

Digital payment usage is 67% for Maria, and it ranges from 91% to 99% for the younger personas. The interest matches the usage, consistently above 4 (out of 5) for the younger personas.

Digital money is used mainly by Francesco (41%), and his interest is the highest as well (3.40 out of 5), while Maria is positioned on the opposite side (1.78). Meanwhile, Alessandra has a high interest (2.76) close to Jasper (2.85) but lower usage (13%) closer to Maria (6%) than to Jasper (27%).

Digital investing has similar usage and interest as digital money, with a clear gap in age and gender. Jasper (49%) and Francesco (45%) are closer in terms of usage, and the same goes for Alessandra (10%) and Maria (5%). Looking at the correlation between the income and each digital service, the highest correlation (0.25) is between the income level and the digital investments ("DI_BOOL"), explaining why Jasper is getting closer to Francesco in terms of usage. International professionals with a higher average salary make the most use of this service.

	INCOME	DF_BOOL	DI_BOOL	DP_BOOL	DM_BOOL	DFA_BOOL
INCOME	1.00	0.10	0.25	0.06	0.05	0.04

Figure 20: Correlation between income and digital banking services

The digital financial advisory follows the same trend; however, Jasper leads in usage.

Each persona has interest and usage in line; Francesco is leading in terms of interest and usage, followed by Jasper, and Alessandra. Finally, Maria is less ready and interested. Despite the high interest, Alessandra shows a usage much lower than expected, with a difference in ten points basis value of 3.3 (while it is in between 2.0 and 2.2 for the others). Reasons might be seen in women's higher risk adversity than men.

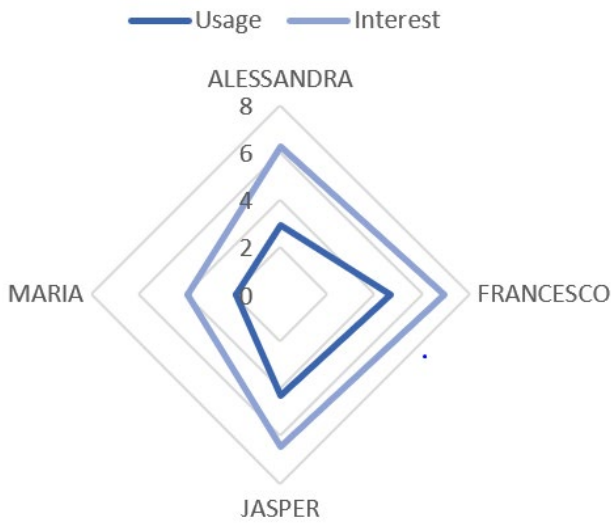


Figure 21: Interest and usage in digital banking services

Looking into the readiness to switch from a traditional to a digital banking services provision, the range of positive answers is wide, going from 12% for Maria up to 73% for Francesco. A correlation matrix has been computed to investigate the factors that primarily affect readiness.

	AGE	GENDER	SCHOOL	INCOME	HoH	SWITCH_BOOL
SWITCH_BOOL	-0.51	0.14	0.23	0.10	-0.20	1.00

Figure 22: Correlation between readiness and demographic data

The correlation between the "readiness" ("SWITCH_BOOL") to switch to digital financial services and the age is negative with a 0.51 coefficient, meaning that the older the respondents, the lower the readiness to change. The same happens with a coefficient of -0.20; if respondents provide financially for anyone else, they are less eager to transition. With a 0.23 correlation, the more one has studied, the more eager one will be to change. On the other hand, income (0.10) and gender (0.14) are less correlated.

4.2.4. (Q2) Which future scenario is more likely to happen?

There are five future scenarios. Based on the full range of answers, there is no prevailing opinion on what respondents are more comfortable with, from 2.8 to 3.1.

BETTER	3.167401
NEW	2.903084
DISTRIBUTED	2.909692
RELEGATED	3.165198
DISINTERMEDIATED	2.808370

Figure 23: Statistical measures of customers' feelings towards the future scenarios

When looking closely into the clusters, the situation provides further insights.

CL_4	BETTER	NEW	DISTRIBUTED	RELEGATED	DISINTERMEDIATED
ALESSANDRA	3.29	3.19	3.14	3.42	2.98
FRANCESCO	3.32	3.43	3.46	3.77	3.36
JASPER	3.41	2.97	3.05	3.22	2.89
MARIA	2.71	1.95	1.95	2.17	1.96

Figure 24: Statistical measures of personas' feelings towards the future scenarios

Francesco is slightly more eager for the scenarios where traditional banks are out of the equation, even though it is the situation where Maria and Jasper are most comfortable with (for Alessandra, it is in second place).

Moreover, in general, the trust in sharing financial information has been investigated for each cluster. Maria has a lower average trust, while Francesco is the most eager to.

CL_4	AVG_TRUST
ALESSANDRA	3.20
FRANCESCO	3.47
JASPER	3.11
MARIA	2.15

Figure 25: Personas' average trust

Looking at the correlation matrix, as the cluster trends suggest, the most correlated variable with the average trust is the age (-0,57); the older, the less confident in sharing personal financial information. The educational level follows (0.31), the more elevated the education, the higher the confidence in sharing financial information.

	AVG_TRUST	INCOME	AGE	GENDER	SCHOOL	HoH
AVG_TRUST	1.00	0.10	-0.57	0.16	0.31	-0.21

Figure 26: Correlation between average trust and demographic data

4.2.5. (Q3) The tip of the balance is more in favor of risks or opportunities in the customer sector?

To identify if the tip of the balance is more in favor of risks or opportunities in the customer sector, an average value for each benefit and risk has been computed. The lowest value is given to the worry of having discontinuity in the provided services (3.09), while the highest value is given to the opportunity for lower transaction costs and faster banking services (3.67).

Looking closer into the clusters, an average value for the risks and one other for the benefits is given. The data show that for Alessandra, Francesco, and Jasper the benefits have a higher weight with respect to risks, on the other hand, Maria is more worried for the risks than the eagerness for the benefits.

CL_4	AVG_BENEFIT	AVG_DRAWBACK	NET
ALESSANDRA	3.65	3.36	0.28
FRANCESCO	3.89	3.22	0.67
JASPER	3.57	3.23	0.34
MARIA	2.24	3.07	-0.83

Figure 27: Statistical measures of personas' net value of risks and benefits

Francesco has the highest net difference between risks and benefits (0.67), followed by Jasper (0.34) and Alessandra (0.28). As mentioned, Maria is more worried for the risks with a net difference of -0.83. Moreover, Maria has also overall the lowest fear and the lowest eagerness.

4.3. Encountered difficulties

To answer research questions through a survey, it is critical to have enough respondents to draw conclusions. In order to reach a large sample in different countries with different backgrounds, the questionnaire must be not too long, and at the same time understandable to everyone. Being the subject of economics and focused on banking services, it has not been easy to reach out to people who felt out of the scope as not vastly informed about the topic. However, their opinion mattered as much as one of the people on the subject. Thanks to a personal network, most of the "out of the topic" respondents' opinions have been caught but the older respondents live mainly in Italy and Germany.

It has not been easy to reach out to a large audience, but finally, the survey reached out to more than 400 respondents. The demographic data of the respondents show a clear majority of people living in Italy (70%), followed by Germany (13%), Luxembourg (8%), France (3%), Belgium (2%) and others (4%). The clusters helped identify patterns that have been objectively analyzed, but three clusters out of four have a majority of Italian respondents.

4.4. Further research

This thesis studies the digital transformation in the banking sector perceived by the customers, where they stand, their expectations regarding theoretical possibilities, and their fears and confidence. There are plenty of practical applications for the results of this study. Future work includes an in-depth investigation of the service providers' expectations and feasibility to shape the future scenarios and the application of the customers' point of view within their business models.

In addition, a fascinating future project is to research the different applications existing in each digital service and analyze the newly proposed business models to catch the link between those and the trends determined by this current study.

Another interesting field of further research is a measurement of the customers' feelings regarding the transition outside of Europe, with a focus on a different continent sample that might rise to different conclusions.

For real-time applications, it may be interesting to study how the customers feel about one same application that is completely changing the service provision, such as ApplePay, which aggregate all the bank accounts into one single payment app, or Sunday app that allows you to pay without a waiter in a restaurant disrupting the classical restaurant experience.

The above mentioned two Apps are also examples of applications where traditional banks disappear from the scene, and the customer interface is provided only by a BigTech or FinTech initiative. The method used in this thesis may be employed to understand the dynamics on the customer side better.

5. Conclusions

Starting from the famous quote of Bill Gates in 1994, "Banking is necessary, banks are not", it has been a long journey for banks to keep up with the pace of digitalization next to the FinTech and BigTech competitors. The change is happening, and the current landscape is diverse, including different actors, five main business functions and a multitude of market support services. In addition, the way the banking services are provided is shifting due to strategic decisions taken by the actors, separating more and more the owner of the product and risk management on one side and the customer interface on the other. Furthermore, COVID-19 accelerated the shift to digital. The current research wants to add insights to the literature of the customers' feelings toward the shift to digital, being the clients' the center of the services.

To answer customers' positioning in the current landscape, retail clients have diverging interests and usage of different digital business functions. The usage ranking sees in the first place the digital payments (88% of the respondents), followed by digital investments (27%), digital money (22%), digital financing (19%) and lastly, digital financial advisory (16%). Except for digital payments, only one person out of five already uses other digital services on average. Next to the usage, the interest in digital financing climbs the leaderboard. It goes to the second position, meaning that retail customers are attracted by the new digital ways of financing, such as peer-to-peer lending and crowdfunding.

To conclude, the most affecting variable is the age; the older the customers, the less interest and usage in digital banking services. The sex of the respondents shows that males are more prone to the change than females, that despite their high interest, the usage stays lower, given women's higher risk adversity than men. Finally, digital services such as digital investments are more widely used by customers with higher incomes. The last-mentioned trend is confirmed by the high correlation between income and digital investments usage.

The investigation of the customers' feelings towards the future scenarios, being the ones using the customer interface and sharing personal financial data, shows that the better bank is the preferred scenario, followed by relegated bank, distributed bank, new bank, and finally, the disintermediated bank. Again, the most substantial variable is age; the higher the age, the lower the trust in sharing financial information, no matter with which entity. Another significant variable is the education level; the more elevated the education, the higher the confidence in sharing financial information. It is worth mentioning that the group with average higher age and the one with an average higher educational level are the ones for which the preferred scenario is the better bank, where incumbents digitalize and keep on their shoulders both the mere service provision and the customer interface. The second-placed scenario, the relegated bank, is preferred by young Italian respondents with a bachelor's degree, no kids, an income of about 25,000 EUR gross per month, and

economic background. These groups prefer data collectors allowing users to manage different financial accounts on a single platform. This data may lead to the fact that one of the possible reasons to explain is that the time-saving possibility drives them. Moreover, they are the ones that show an overall higher trust in sharing financial information.

Ultimately, in the customer sector, the tip of the balance is more in favor of opportunities arising from the digital transformation of banking services for all clusters, with exceptions made for the older one for whom the drawbacks have a higher impact. Overall, the more attractive benefit is the offering of lower transaction costs and faster banking services. At the same time, the one that represents a minor threat is the risk of discontinuity of banking services.

Are the customers ready to transition from traditional to digital banking services provision? Age is clearly a factor that splits the answer to the question. The new generations are born in the digital era, and, based on the data collected, 63% of the younger clusters are ready to embrace the technology pace in the financial services. In the following years, empirical evidence will show what the future holds.

VI. Appendices

Appendix 1: Survey in English

I'd really like to find out how you feel about the changes in the service provision of banking services and how you think that they will impact our financial future.
Don't worry, you will remain completely anonymous as the demographic information will only be used to find statistical results.
I realize how precious your time is. That's why I made sure this survey will only take a quick 360 seconds.
I personally want to thank YOU for every second invested in this research.

1. What is your age?
- _____
- *Prefer not to answer*

2. 2. Which gender do you identify as?
- *Male*
- *Female*
- *Other*
- *Prefer not to answer*

3. In which country do you live?
- _____
- *Prefer not to answer*

4. What is the highest degree or level of education you have completed?
- *Less than high school or secondary school degree*
- *High school or secondary school degree*
- *Bachelor's degree*
- *Master's degree or diploma*
- *Doctorate*
- *Other*
- *Prefer not to answer*

5. Which is your academic/professional background? Please select all that apply.
- *Economic*
- *Scientific*
- *Humanistic*
- *Client-facing*
- *Philosophic*
- *Psychologic*
- *Technical*
- *Artisanal*
- *Artistic*
- *Other*
- *Prefer not to answer*

6. What is your current employment status?
- *Employed Full-Time*

- *Employed Part-Time*
- *Self-Employed*
- *Seeking Opportunities*
- *Retired*
- *Student*
- *Prefer not to say*

7. Which income group do you fall under?

- *Less than €20,000 gross per year*
- *€21,000 – €30,000 gross per year*
- *€31,000 to €40,000 gross per year*
- *€41,000 to €50,000 gross per year*
- *€51,000 to €60,000 gross per year*
- *Above €60,000 gross per year*
- *Prefer not to answer*

8. Do you provide financially for other people in your household (e.g. kids)?

- *Yes*
- *No*
- *Prefer not to answer*

9. Have you ever used any means of digital financing? It allows individuals, firms, and start-ups to become independent from the traditional ways of obtaining credit or acquiring funds through capital-raising services by using the Internet (ex. crowdfunding platforms, lending marketplaces).

- *Yes*
- *No*

10. On a scale from 1 to 5, how much would you rate your interest towards the means of digital financing?

- *1*
- *2*
- *3*
- *4*
- *5*

11. Have you ever used any means of digital payments? We are talking about payments that are conducted over the internet and mobile channels and hence, any payment that is sent online or through mobile computing and internet-enabled devices (ex. Online payments, PayPal, Apple Pay, etc.).

- *Yes*
- *No*

12. On a scale from 1 to 5, how much would you rate your interest towards the means of digital payments?

- *1*
- *2*
- *3*

- *4*
- *5*

13. Have you ever used digital money? We are talking about virtual currencies exchanged on the Internet (ex. Bitcoin, NFTs, etc.) which are not regulated by the traditional central regulator but distributed from and controlled by their creators.
- *Yes*
- *No*

14. On a scale from 1 to 5, how much would you rate your interest towards digital money?
- *1*
- *2*
- *3*
- *4*
- *5*

15. Have you ever used any means of digital investments? They support investors in their asset allocation and in arranging the required investment transactions on their own using devices and technologies, such as mobile trading, social trading, or online brokerage.
- *Yes*
- *No*

16. On a scale from 1 to 5, how much would you rate your interest towards the means of digital investments?
- *1*
- *2*
- *3*
- *4*
- *5*

17. Have you ever used any means of digital financial advice? We are talking about robo-advisory or platforms in which products and services are rated, scored, ranked, evaluated, and compared.
- *Yes*
- *No*

18. On a scale from 1 to 5, how much would you rate your interest towards the means of digital financial advice?
- *1*
- *2*
- *3*
- *4*
- *5*

19. Overall, do you feel ready to switch from a traditional provision of financial services to a digital one?
- *Yes*

- *No*

20. In 20 years, would you still feel comfortable to keep sharing your financial information only to traditional banks (ex. ING, BNP Paribas, Santander, etc.) from 1 to 5?

- *1 (not comfortable)*
- *2*
- *3*
- *4*
- *5 (very comfortable)*
- *I don't have an opinion*

21. Assuming that traditional banks will be replaced by "new banks" with banking licenses (N26, Revolute, Google, Apple, Alibaba, etc.), all the retail banking services will be offered mostly through a smartphone app and internet-based platform. How comfortable would you feel to share your financial information only to new banks from 1 to 5?

- *1 (not comfortable)*
- *2*
- *3*
- *4*
- *5 (very comfortable)*
- *I don't have an opinion*

22. If, in 20 years, banking services will be fragmented among FinTech, BigTech, and traditional banks together, how comfortable would you feel to share your financial information to all those actors from 1 to 5?

- *1 (not comfortable)*
- *2*
- *3*
- *4*
- *5 (very comfortable)*
- *I don't have an opinion*

23. Assuming that in 20 years you will have many accounts in many traditional banks, but some Apps will allow you to manage different financial accounts on a single platform. How comfortable would you feel to share your financial information to that App from 1 to 5?

- *1 (not comfortable)*
- *2*
- *3*
- *4*
- *5 (very comfortable)*
- *I don't have an opinion*

24. If banks as intermediaries will be removed and only new technologies will keep ensuring that consumers continue to have access to funding services, payment services, etc., for example through the use of cryptocurrencies or lending in between peers. How comfortable would you feel to interact directly with individual financial services providers?

- *1 (not comfortable)*
- *2*

- *3*
- *4*
- *5 (very comfortable)*
- *I don't have an opinion*

25. To what extent would you like to move from traditional banking services to digital ones pushed by the opportunity of financial inclusion? This may happen since technology can reach remote locations, better access to financial services can be provided to underserved groups.
- *1 (I do not care much)*
- *2*
- *3*
- *4*
- *5 (I am very eager to)*

26. To what extent would you like to move from traditional banking services to digital ones pushed by the opportunity of having better and more tailored banking services? Banks can benefit from the specialization of FinTech companies to create a better and personalized customer experience.
- *1 (I do not care much)*
- *2*
- *3*
- *4*
- *5 (I am very eager to)*

27. To what extent would you like to move from traditional banking services to digital ones pushed by the opportunity of having lower transaction costs and faster banking services?
- *1 (I do not care much)*
- *2*
- *3*
- *4*
- *5 (I am very eager to)*

28. To what extent would you like to move from traditional banking services to digital ones pushed by the opportunity of potential positive impact on financial stability?
- *1 (I do not care much)*
- *2*
- *3*
- *4*
- *5 (I am very eager to)*

29. To what extent would you like to move from traditional banking services to digital ones pushed by the opportunity of easier access to capital? This may happen thanks to the different financing channels and lenders.
- *1 (I do not care much)*
- *2*
- *3*
- *4*
- *5 (I am very eager to)*

30. To what extent wouldn't you like to move from traditional banking services to digital ones held back by the risk of data privacy and data security? Are you concerned by the possibility that the banking system could be more vulnerable to cyber threats?

- *1 (I do not care much)*
- *2*
- *3*
- *4*
- *5 (I am very concerned)*

31. To what extent wouldn't you like to move from traditional banking services to digital ones held back by the risk of discontinuity of banking services? This may happen since customers can automatically switch between different savings accounts.

- *1 (I do not care much)*
- *2*
- *3*
- *4*
- *5 (I am very concerned)*

32. To what extent wouldn't you like to move from traditional banking services to digital ones held back by the risk of inappropriate marketing practices? This may happen since banks are fighting for the customer, not only with other banks but also with non-banks.

- *1 (I do not care much)*
- *2*
- *3*
- *4*
- *5 (I am very concerned)*

Thank you very much for your participation!

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VIII. Executive summary

The research focuses on the digital transformation within the banking industry. This thesis explains how financial technologies integrate into the traditional banking sector and how customers perceive the transition based on their experience and expectations.

The first chapter describes the changing environment starting from the key drivers for innovation and introduces the FinTech companies' phenomenon, their definition, and evolution. It ends with a classification of the impacted services and business functions, with a deep investigation of the different actors' roles - conventional financial service providers, FinTech companies, and Tech Giants (i.e., GAFA) - to depict the current landscape customers are facing.

The second chapter examines the cross-sectoral consolidation concentrating on the integration process between the financial and the technological industries, highlighting the strategies taken by the incumbents facing the new competition creating different possible future scenarios (better bank, relegated bank, distributed bank, new bank, and disintermediated bank). Finally, moving the analysis to the customers' perspective, opportunities and risks coming from this evolution are inspected.

The third chapter challenges the resulting notions through a survey that answers the following research questions: where can the respondents be positioned in the current landscape? Which future scenario is more likely to happen? The tip of the balance is leaning more in favor of risks or opportunities in the customer sector? These questions are answered by consumers of different ages and backgrounds, providing further insights about the customers' perception and involvement in the digital transformation of the banking sector.

To conclude, the digital transformation within the banking sector displays 63% of the respondents being ready for the transition, with age being the most relevant variable contributing to the results, while the different backgrounds and levels of education provide a lower significant impact. Overall, digital payments are the business service that captures the most interest and usage.

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