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Chapter 1: The evolution of banking in the digital age and its intersection with technological innovation

1.1. Introduction

The banking sector's evolution has recently gained more density and profundity, since the transition to the digital age and the coming of the Fourth Industrial Revolution. We are living in the digital age—a digital intelligent world—a process that started with the Digital Revolution in the mid-20th century. Such a process is characterized by the rapid adoption of digital technologies since then, initial informal digital tool use, from the 1970s to 1990s, to a digital formal organization, between the mid-1990s and early 2000s, followed by the transition to the digital age, within the more advanced economies, around the early 2010s. If we focus on the financial sector as a whole, with the approach of the Fourth Industrial Revolution, its productivity has either stagnated or increased very slowly, according to the data. The banking industry, along with monitored financial institutions, has been one of the most important parts of the financial sector. Specifically, it plays a fundamental role within the current capitalist economy (Gomber et al., 2018; Arner et al., 2020; Bălănescu & Stefan, 2020).

The banking sector has been evolving thanks to a combination of factors. Historical actions such as the monetization of the economy, credit and payment system organization and coordination, risk management, and customer services have persisted through time. At the same time, conditions have constantly changed, thanks to the external pressure of clients, potential innovators, and different institutions, as well as the expansion of international finance and the internal demand of managers, labor unions, and workers. Monetary technology as well as banking organization supervision and regulation have evolved as well. The new technological capacity in the digital age is passing through two important degrading processes; one for the physical and manual dimension, and the other, a more demanding one, axiomatically for the human internal

dimension. These elements that explain the banking sector's evolution are going to be in the spotlight within the context of the Fourth Industrial Revolution (Zohar & Harari, 2018; Narula & Dunning, 2019).

1.1.1. Overview of the Banking Sector's Evolution

The evolution of banking illustrates the anticipative character of this activity. In a continuous change of paradigms, according to the economy's dynamics, banks and other financial intermediaries, at a worldwide scale, redefine their strategies, products, and services, adapting to the nuances of the financial environment. In modern economies, banks and financial intermediaries are at the heart of the financial system and support economic and commercial activities, often called the engine of economic growth. Their specialized functions allow the mitigation of conflicts between creditors and debtors. In time, the banking system has evolved a lot on the commercial side, with the bureaucratic activities only supported through computerized networks. Through services offered to clients and on the financial markets, banks mediate the flow of funds in the economy. On the market for financial services at a global level, banks stand out through the increasing volume and diversity of services they offer. Their state of health, but also the general stability of the economy depends on the equilibrium of this market. As a consequence of the economic and financial development, but especially of the technological revolution, the banking system has evolved considerably in the last years. Globalization has been an additional factor that has greatly influenced the development of the banking system .

Fig 1 . 1 : Banking in the Digital Age and Its Intersection

Throughout the years, globalization has generated multiple commercial regulations or local standards on different continents. The establishment of these global organizations led to an excessive amelioration of the commercial standards in the countries with a developed banking system, followed by a decline in the banking activity's profitability. The changes in the global economy and the fast development of the new wave of technological progress have imposed fresh chances but also new challenges on the commercial bank system globally. The last decades of the previous century and the first of the present one have been as well a period of tectonic shifts within the banking services sector, where opportunistic banks took advantage of the latest technologies to invent novel ways to deal with clients. As the financial service's structure is continuously altered by the changes in the client's exigencies and technological breakthroughs, the traditional manners of offering banking services become obsolete.

1.2. Historical Overview of Banking

The history of banking dates back to the emergence of currency in the tenth century BCE, with the evolution of banking informed by various social, political, and economic factors. The concept of borrowing from a money lender in exchange for an asset pledge can be traced as far back as Mesopotamia and Hebraic jurisprudence. Acceptance of the promise to pay a sum in the future, resulting from the sale of goods, was also common during this period. The Greek temples performed some banking functions due to their safe depositories, but Italy is credited with the establishment of banks. The term "bank" is said to have originated from the banchi that were used in Florence during the Renaissance. The Temple of Juno Moneta, from which the word "money" is derived, is often cited as the first bank.

In Italy, the term "bank" was used to describe the money lenders that established benches in the marketplace to conduct business. These lenders also engaged in currency exchange, a practice that soon proved profitable and enabled them to lend more and charge higher rates. The lenders soon began to lend their deposits, rather than just the deposits of others, using note issuance to extend their lending capability further. Banking then spread to France, England, and the Low Countries. During the Middle Ages, commerce and transportation grew, leading to increased demand for credit and the establishment of banks as we know them today. Branch banking also found a foothold in Britain. The British bank set up branches in foreign capitals. Over time, the barriers to entry into banking collapsed. Bank failures because of nonperforming loans forced other nations to enact laws or covenants allowing foreign banks to enter. Banks have gotten so big that antitrust action should be brought against them.

1.2.1. Early Banking Practices

The concept of banking in its most elementary form emerged approximately five thousand years ago, coinciding with the advent of commerce in ancient civilizations, where merchants commenced the practice of investing their surplus of commodities they had collected as a result of their dealings in areas where commodities were scarce, thereby, operating as lenders during lean years. The ancient temples and palaces, where the bulk of commodities were stored, soon became the initial banks, lending to both businessmen and rulers, borrowing from the former during harvest times, and receiving interest and rent for the services of holding commodities for safekeeping. Since commodities of varied kinds, with greater or lesser demand replacement values, acted as money, the lenders were affected both by the risk of loss or damage by thieves and rodents and by the critical need for liquidating the loans when maturity arrived, which coerced them to charge lower interest rates than were available for loans in cash.

The ancient Greeks established loan banks and money changers who handled deposits and issued notes, reducing the need for businessmen to travel with cash. The Chinese output silk currency for international transactions. Just a few years before Christ the Romans introduced notes by depositing coins at a bank and having a 3rd party issue the notes with which the depositors could redeem their coins. During the Middle Ages in Europe, trade began to flourish and banks emerged to support and stimulate that growth, with loans to kings and nobles establishing their credit at repayment. The banking system developed in response to that demand. The merchant bank emerged at first, handling deposits and transferring exchange currency. Formerly exchange rate transactions were handled by the moneychangers who had already established an exchange system linking various European currencies with a fee charged for the service. Later banks emerged to handle loans.

1.2.2. The Rise of Modern Banking

The founding of the Bank of England and the creation of several other central banks noted the importance of a Bank as essential to the monetary system and assigned it a privileged status. These institutions soon became the monopoly issuer of paper currency, banks with branches were mainly commercial banks, which competed with local currency issuers, who catered to the commercial districts. Eventually, the joint-stock bank began to emerge as the most important type of business and to establish branches. In these early specialized commercial institutions, the capital stock was provided mainly by merchants and domestic traders. The propitious and essential aspect of extended specialization was the growing number and variety of goods that businessmen and traders engaged in processing and exchanging and increasing remittances of money across space and time.

In the original take-off location of cities, mercantile banks for receiving and exchanging deposits of money began well in advance of other banking activities for lending money to merchants. Finding profitable use for deposit reserves, to be transmitted over space and scraped for special periods, required prolonged specialized experience. The corporation which evolved from this earlier form of the banking business was essential for the unified accumulation of deposit funds, and also necessary for handling a wide diversity of accounts and transmittal services. Its features were specialization; the incorporation of commercial banks, thus securing limited liability; and its monopoly position chartered, the privileges and protections needed to attract liquidity, including secured loans to co-ordinate long- and short-term needs; exchanging and transferring funds and services and their ability to obtain a return for lenders with different time preferences; prudence as the banker of last-granting secure loans and reserves management; and short-term banking specialization and overall management were essential to economic industrialization.

1.3. Technological Innovations in Banking

While banking existed for several centuries, it was roughly in the middle of the twentieth century that technological innovations were introduced into the industry. The introduction of ATMs allowed banks to expand their services considerably without physically adding additional expenses linked to employing more bank tellers. The move to online banking, and subsequently mobile banking through smartphones, allowed banks to offer services to the client 24-7. Banking clients no longer had to worry about banking within the hours that banks were physically open. They could now deposit checks, view their account information, transfer funds, pay credit card bills, and pay utility bills online. This increased the speed at which banking clients could do business with their bank. It also allowed banks to increase their revenues due to lower operating costs and increased customer loyalty. While online banking is pervasive in developed economies, those areas of the world that still have little access to computers and online banking services have begun utilizing mobile phones as a way to gain easier access to banking services.

The latest important advancements in banking technology involve blockchain technology and cryptocurrencies. Peer-to-peer, decentralized financial systems that utilize cryptocurrencies have arisen as an alternative to traditional banking and financial institutions. These digital currencies have begun to challenge the existence of central banks. Cryptocurrencies have started to exist as a new form of money that is used to facilitate payments and act as a store of value. Stablecoins, another type of cryptocurrency that is pegged to a tangible asset, have arisen to tackle the problem of

price volatility associated with cryptocurrencies. NFTs, or non-fungible tokens, have started to change ownership of digital assets by utilizing blockchain technologies.

1.3.1. The Introduction of ATMs

The world saw a much-awaited and anticipated automation wave around the 1960s, which was propagated by technological innovations. As a by-product of this unforeseen automation wave, the banking sector was revolutionized with the invention of automated teller machines, or ATMs, on a global scale. The first technologically hailed invention of ATM was set in motion in the year 1939 in Brooklyn, New York by an inventor, a combined engineer, and mechanic, under the name of Banks of the Manhattan Company, and was followed by trials and obvious changes in the basic model.

An ATM served the customer after providing the service and was hired by storing some cash and handing it over to the machine using a special token. The functioning of ATM sparked the invention of other similar machines in Europe calling for drastic changes in the manual way of banking. Starting from a simple transaction of depositing and withdrawing cash, which were simple and majorly possessed longer waiting queues, the customer now enjoyed the feasibility of performing multiple transactions at any time of the day, without relying on the bank staff. He was experienced in using ATM to check account balances, transfer funds from one account to another, as led by the invention of the credit-debit card and the magnetic identification strip that formed a major part of the card, and print account statements. The ATM technology was welcomed finely and eventually endorsed globalization, by way of currency exchange, which lent the outlook of the bank and benefited various sectors including the travel, tourism, and commerce industries. The working and movement of these ATMs were smoothened and lubricated by the chip identifiers used in the ATM cards for genuine identification.

1.3.2. Online Banking Revolution

Through the digital channels created by technological innovation, banks began to offer more services via their Websites. This process, called "interactive," "Web-based," or simply "online" banking, began for checking balances and transferring funds between accounts. As services were gradually extended to areas such as bill payments, order inquiries, forwarding notices to banks, loan applications, and new customer applications, accounts were extended beyond the bricks-and-mortar of branch networks and new customers became "online" or "virtual." Their consequences for banking are now profound. The online banking revolution has not only accelerated the shrinking of bank branch networks but also led to the emergence of "virtual banks" which, using the efficiencies of technology and the Internet, have no branches.

The product being sold is still a bank account, guaranteeing elements of the banking business—maturities that do not restrict the conversion of deposits into currency. Its distribution to customers with surpluses is, however, a far cry from where it started a century ago. That was through brick-and-mortar bank branches and an extensive sales force. Physical distribution via banks' offices remains important. However many depositors are willing to accept a higher interest rate for having their funds deposited in a bank that saves the costs of physically servicing them with special branch networks or with bank tellers. Indeed, customers may not mind going to a local office of a different bank to make the transaction that converts deposits into currency for which the account at the virtual bank was opened. Just about all the costs of running a bank account for which the services are being bought have disappeared. The virtual banks allow this because they do not bear the costs of maintaining branch networks nor can they share that burden with commercial customers.

1.3.3. Mobile Banking Applications

Mobile banking applications are the most recent and widely recognized development for banking operations on mobile devices. These applications allow a wide range of banking transactions, such as checking balances and transaction history, transferring money, depositing checks via telephone camera, paying bills, using a mobile wallet, and finding bank branches and ATMs. Moreover, more sophisticated mobile banking applications are opening up the possibility of multimedia services. Comprehensive mobile banking solutions by third-party vendors are also available and widely used. These vendor applications empower consumers to pay or receive money irrespective of the location of either party. These applications make a deeper relationship between bank accounts and customers, facilitate increased consumer engagement, and secure a higher share of consumer wallets.

Banks around the globe encourage consumers to adopt mobile banking applications for several reasons. These include improving accessibility and convenience for customers; lowering transaction costs for customers and banks alike; lowering end-to-end processing time; promoting the adoption of basic banking services to unbanked sections; and preventing fraud, thefts, or collusion through instant disbursements and confirmations. To achieve these advantages, banks work with digital device manufacturers; data service providers; application providers; and payment clearinghouses. These alliances are associated with considerable investments and risks at the onset. Banks are exposed to cyber threats, breaches, and behavioral risks through the use of mobile banking applications, which is why consumer acceptance is particularly sensitive to security concerns. Several processes have been attempted to

boost the security of operations. Various guidelines for safeguarding transactions using mobile devices have also been issued by regulators.

1.3.4. Blockchain Technology and Cryptocurrencies

Blockchain technology has been around since 2008 when it was first introduced as a peer-to-peer decentralized system for recording and managing public transactions using Bitcoin. But only recently, the interest in this technology has become widespread, because it enables the transfer of value and ownership without the need for an intermediary. It also has the potential to change banking and many other businesses forever, freeing them from the need for third-party authority that all customers have had to rely on in the paper and electronic accounting systems of the past. Bitcoin paved the way for the creation of a global cryptocurrency ecosystem aimed at enabling new financial services and wealth applications while bypassing the banks entirely.

Today there are thousands of cryptocurrencies with various specifications, characteristics, and intended use on the market. Since cryptocurrencies often rely on pseudo-anonymity and are ultimately free from government control, banks and governments regard these digital currencies as a menace to the traditional banking system, but early blockchain adopters believe that they will ultimately shake up the banking system in a positive way. For example, transfer costs can be virtually zero, and transaction times significantly shorter in the case of cryptocurrencies because there is no third-party clearing and settlement process and very limited risk of fraud due to built-in blockchain verification.

But of course, cryptocurrencies like Bitcoin right now are very unstable in value, and thus, not very useful as a means of exchange and stable store of value just yet. Perhaps the greatest advantage blockchain technology has over its predecessor database technologies is that it creates a very secure way to transfer ownership and value thanks to the validation process at the heart of all blockchain transactions. Because of the distributed ownership of the public ledger and the validation process by participants in the network, hackers and fraudsters can't do anything nefarious with blockchain transactions.

1.4. Impact of Digital Transformation

In general, digitalization focuses on providing a better customer experience, optimizing internal processes to increase cost efficiency, and improving risk management systems to minimize losses and maintain monetary stability. These three aspects are closely interconnected and complement one another, creating a complex evolution structure. In

other words, improving customer service diminishes handling requirements but increases transaction amounts, which in turn could result in higher losses from financial crime, lower cybersecurity resilience, and greater reputational risks.

Customer Experience Enhancement

Digitization increases the pace of dealing with banking services for clients and results in lower transaction costs. It creates easier access to banking services and new communication channels for customers. The majority of banking services can be available 24/7 anywhere across the globe. Faster handling time for payments and low-cost delivery motivate businesses and individuals to transfer a wider array of transactions to banks. More business volume accumulated in banks contributes to banking profitability and enhances their capacity to realize economies of scale. A wider product array creates cross-sell opportunities, attracting consumers with lower pricing improving the margins of other business lines, and offering customized financial products.

These opportunities motivate large tech companies to expand their services into the fintech area and challenge banks with lower price tags. Enhanced competition leads to banks being more efficient. New players, which foster innovative and attractive alternative products, are not encumbered with large fixed assets and legacy systems, leading to a high pace of innovations and quicker time-to-market. These innovations are related to offering lower mortgage rates, taking a smaller percentage from transactions, providing better rewards for credit cards; more personalized credit scoring with lower interest rates, and offering fully digital monitoring and advice systems to manage client assets. All these stimulate banks to invest in the development of contemporary technological capabilities to update their operating systems, keep up with the speed of technological processes, improve customer experience, and remain market players.

1.4.1. Customer Experience Enhancement

The banking services sector is constantly subjected to the demands of an increasingly competent clientele that is familiar with the operation of technology, bound by a plethora of options, and taken to seek the best experiences they can get through the services provided. The evolution of banking in the digital age is directly related to the added value provided to the customer and defined by the relationship established between them and the banking entities they serve. In this sense, the evolutionary path of the banking industry is not fundamentally related to the products and services provided, but to the different experiences generated, in a more dedicated environment reminiscent of servitization. Consequently, technology and innovation have supported the improvement of customer engagement and relationship strategies in a consistent manner.

In the digital age, we are witnessing a drastic shift from physical banking interactions to digital banking interactions. In light of the digital transformation process being followed by the banking industry, characterized by a heavy investment in the development and implementation of digital channels, customer experience enhancement has been the foremost focus of many banks. Banks are attempting to provide customers with a single, consistent, personalized experience across multiple channels, including physical branch, telephone, or online/electronic via smartphone/mobile application or through the Internet. Banks are investing greatly in systems, trying to establish an organizational digital mindset to complement existing banking systems in an omnichannel approach to banking. They are adapting their operations and behavior to support the significant changes in customers' attitudes and preferences. Banks now know that consumers are demanding more information, better and faster service, more responsive bank personnel, a greater variety of products and services tailored to specific needs, the capability for greater transaction and account management privacy, and a far more personalized experience than in the past.

1.4.2. Operational Efficiency

There are a few retail banks based on their regional structure that have been blessed with benefits. However, an average geography-based retail bank has not prospered or been particularly favored. For the past three to five decades, the licensing and the business model have been explicitly or tacitly modeled on a pretty strong principle of deliberate inefficiency. The business framework has inescapably led to fact-based managerial problems. The various activities of a bank are understandably disjointed, independent, and non-automated—some of them are wholly human-enabled and driven. These circumstances have created a huge, very large, and unidentifiable need for a variety and incalculable virtual transactions, leading to huge waiting queues. Unlike other service industries, whose fortunes are buttressed by the locking in of customers by high switching costs, banks have inside customers whose value-added processing services are inescapably delayed.

These problems have been greatly aggravated by the adoption of various outsourcing strategies. There is a huge operational difference between banks in which the principal continually determines, cloisters, and optimizes each process or subprocess and banks that are merely back-office processors of other institutional activities. We might also add here that though various ancillaries and satellite activities are outside the core area, the internal customer still has access to the retail nook and cranny. The viruses of the partial impossibility of cost-cutting, easily accessible substitute goods, high sensitivity to both quality and cost of delivery, excessive waiting, and non-existent switching costs are operative here. The prospects of the lucky few are understandable. The luckless have a

virtual tiger by the tail. They must reinvent and create an entirely different bottom line from scratch and, perhaps additionally, redesign the market. Lastly, cash flow must deal with other market-linked developmental problems.

1.4.3. Risk Management Improvements

The technological development observed in the banking sector also accelerates the capture and analysis of internal and external information, therefore allowing more accurate risk modeling and estimation. Technologies such as big data analytical and machine learning also contribute to the banking ability to efficiently carry out risk controls, making the investment necessary to build such capabilities, i.e., investing in financial technologies specialized in artificial intelligence applied to the risk

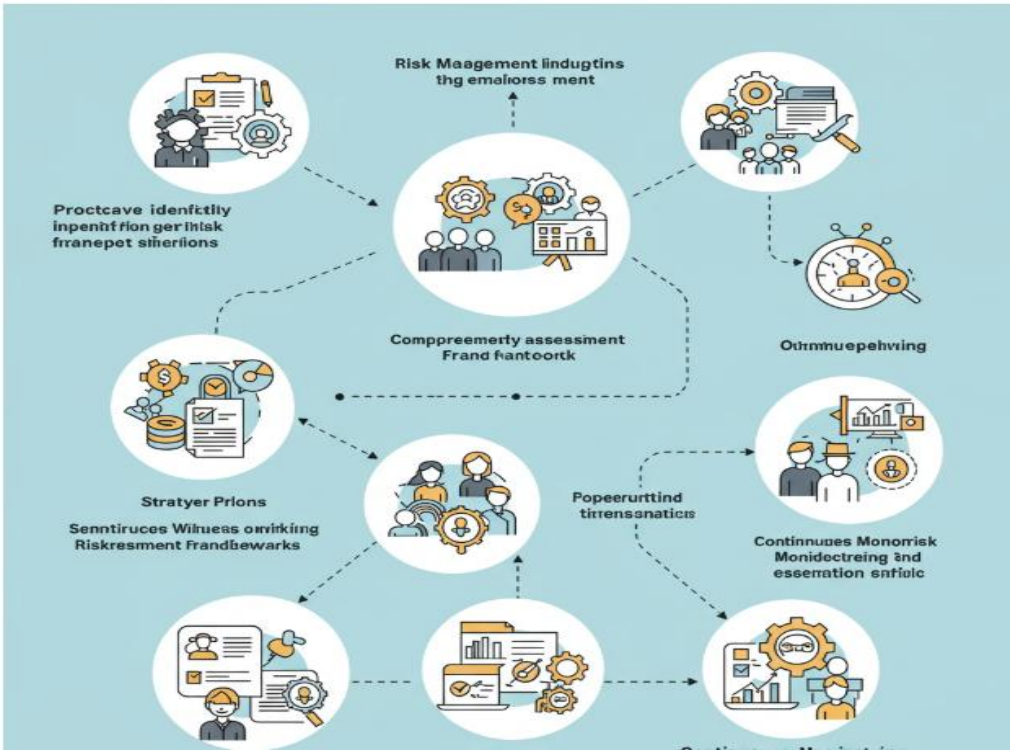

Fig 1 . 2 : Risk Management Improvements

management and underwriting process. In the monitoring of liquidity risk, for instance, banks can benefit from machine learning models able to feed supervisory authorities and internal decision-makers with more reliable predictions. If there is already a broad consensus regarding the widespread use of algorithms in the operation and management of large funds, the faster adaptation made possible by artificial intelligence could also be applied to traditional banking institutions. They would thus become more capable of

managing investor expectations during crisis episodes, an essential characteristic to ensure the liquidity of their shares in the market and, consequently, the stability of such institutions. Mobilizing retail clients to finance their activities through the banking market is a challenge for banks and for the central banks, which regulate the banking industry and are aware that the stability of traditional banking institutions is fundamental to the stability of the financial system as a whole. Transparency and good corporate governance are central to ensuring that the market capitalizes banks in conditions that facilitate their operation on the interbank market. In addition, corporate governance focuses also on long-term value generation for investors and not only on short-term profitability is necessary.

1.5. Regulatory Challenges in the Digital Era

The rapid growth of the Digital Economy has resulted in the establishment of the FinTech sector, capable of offering services that are comparable to financial institutions and realizing the necessary regulatory challenges that the financial authority must face in the short term to allow the coexistence and long-term development of services that compete with traditional finance services. FinTech can be understood as the innovative technological companies that have emerged for the provision of financial services and that have not started from scratch but have evolved from software created for the industry, especially in accounting and payment systems. FinTech solutions can become substitutes or complements to traditional regulatory financial services, but there is the risk that they will be used for actions outside the law to favor the hidden economy or operations of suspicious origin.

The application of regulation to FinTech is based on the principles of proportionality, thanks to which regulations are not applied uniformly to all entities, but take into consideration the size and risk of the entities. However, unlike the proportionality principle that allows small players not to be subject to the same regulations as larger players, some regulations are common to all players to allow the correct development of the industry and to avoid the players offering services without following the same regulations can generate a competitive advantage to the detriment of the correct development of the industry. This set of regulations allows for the proper supervision of the entities catering to this industry and the correct conduct of these entities, in terms of consumer protection, avoiding the commission of money laundering, insider trading, or illicit funding acts, among others, creating a level playing field in which traditional and digital entities compete on equal terms.

1.5.1. Compliance with Financial Regulations

Regulatory Challenges in the Digital Era

Rapid technological developments have influenced not only how we communicate and do business, but also how we regulate these activities. Banks, which traditionally relied on an in-person model, are now able to dispense funds, receive deposits, sell products, and offer investment advice through mobile apps and other technological solutions, often without human intervention. Regulatory and supervisory challenges are as complex and evolving as the underlying technology. Certain hardships for banks, especially the need to invest more heavily in compliance, require a careful analysis of whether these burdens should fall exclusively or even at all on bank resources. Institutions not subject to the same regulatory requirements may have advantages that place banks at a competitive disadvantage in the marketplace for consumers and small businesses. This paper identifies some of the regulatory hurdles facing banks amidst rapid developments in processing technology.

Compliance with Financial Regulations

All banking institutions are subject to comprehensive financial regulations, imposed at both the federal and the state level. Regulators impose these requirements to safeguard the safety and soundness of the depository institution, ensure financial protection for the customer, and serve to provide the federal government and its states the information and power to uphold the laws of the land. Compliance ensures a bank's legitimacy and lack thereof may lead to license revocation and imprisonment of the board of directors. Banks recognize that their share of costs for meeting these important national objectives is high relative to other industries, especially upwardly mobile community banks. Banks are subject to the requirements and permissive securities laws and regulatory guidance and examination, and special procedures may be required in convenience and needs of local customers.

1.5.2. Data Protection and Privacy Laws

Data protection and privacy are crucially important because, by the services they provide, banks – and financial institutions generally – possess an enormous reservoir of highly sensitive data and information on the private lives of customers, both individuals and organizations. Everything from private spending habits to health expenses is recorded by banks. Even the most intimate details about a person’s life, such as divorce or bankruptcy, can be inferred from the flow of funds through bank accounts. In particular, KYC rules compel financial institutions to obtain and retain very sensitive information from customers, which makes banks prime targets for harm should this data be left vulnerable, whether through malice or neglect.

With the gathering and processing of such sensitive, personal information on a massive scale, banks must tread carefully when it comes to following the various mandates and rules concerning the privacy of customer information. The unfortunate fact is that, as a result of the digital transformation, the sensitive nature of financial information of key stakeholders, including customers, employees, and organizations, has become even more vulnerable to compromise by hackers, leaving regulators with no option but to formulate stringent laws governing how collected information is treated, both online and off. Regulators and banks share the view that breaches cannot be tolerated as they can have disastrous repercussions, not least in terms of lost business, given customers' near-instinctive distrust of financial institutions.

1.6. The Role of Fintech Companies

The rise of fintech companies in recent years has significantly impacted the balance of power among stakeholders in the financial services industry. Fintech companies were primarily innovators who overcame obstacles presented by regulatory entities and established their business models. They successfully targeted market segments that were underserved or unserved by traditional banks, like consumers with poor credit histories. They created new products that linked consumers to businesses through e-commerce sites. They provided low-cost payment solutions. They made it easier for foreigners to transfer money to their countries of origin. They found ways to regroup many low-value transactions into blockchain and cryptocurrency networks. More recently, fintech companies have expanded their repertoire of products and services to include student loans, auto loans, mortgages, insurance policies, and investment products. Some fintech companies have expanded their target audience to include high-income consumers dissatisfied with their traditional banks.

The emergence of fintech companies and their expansion into many areas that were traditionally under the purview of banks is having both disruptive and collaborative effects on traditional banking institutions. In response to the potential disruption, traditional banks are partnering with fintech companies to broaden their product portfolios, reach new customer segments, explore new technologies, and reduce costs. Other banks are acquiring fintech companies to gain talent and specialized capabilities. Some banks operate fintech startups as specialized divisions to compete more effectively in specific areas. However, traditional banks continue to represent the bulk of the financial services that companies and consumers use. Banks have deeper resources than any fintech company, and their physical presence and reputation in their respective markets lead most consumers to prefer opening bank accounts and executing transactions through banks.

1.6.1. Collaboration with Traditional Banks

The financial industry is undergoing major changes due to the presence of Fintech businesses. These firms concentrate on the development and implementation of technologies that have the potential to fundamentally change the financial services market. The services offered by Fintech companies include payment processing, currency exchange, peer-to-peer lending, and online banking. These businesses are targeting consumers and companies that still utilize conventional banking services. They are taking advantage of the growing number of people using mobile devices for their purchasing experiences and the discontent of consumers with traditional banks. Technology and competition are motivating consumers to embrace new financial solutions provided by Fintech companies.

Fintech companies are forcing banks to reconsider their business strategies to improve customer experience and engagement while controlling costs. For some product areas, banks and Fintech firms are no longer in competition with one another but rather collaboration partners. It is no longer a matter of banks versus Fintech, but a question of building symbiotic relationships that will allow financial institutions to maintain their competitive advantages. The ease of integration with legacy systems is one of the key attractions of many Fintech products. Traditional banking systems frequently experience significant difficulties in providing a customer experience comparable to online retailers and other e-commerce organizations. Fintech companies are offering valuable additional services that can provide enhanced operating and capital efficiency as well as customer experience while enabling banks to remain within their core competency of regulation and trust.

1.6.2. Disruption of Banking Models

Despite the challenges posed by the recent global banking crisis, which has eroded confidence in the fintech sector during 2022 and early 2023, the ongoing digitalization of many services has resulted in important segments remaining permanently disintermediated by fintech. In addition, traditional banks and fintech companies both continue to evolve and change their respective offerings to satisfy increasingly demanding customer expectations. On the one hand, fintech increasingly become the delivery channel for so-called "embedded finance," allowing small companies to satisfy financial service demand needs without relying on banks. On the other hand, in several vertical niche markets, traditional banks, and major tech companies have decided to adopt a "hub bank" role, where they concentrate on creating a specialized offering that can be seamlessly integrated with their customers' business activities. In turn, fintech in the niche has decided to focus on a specialized function. These developments have

pushed both players to hybridization and specialization, making the lines demarcating what makes a bank or fintech increasingly fuzzy.

However, there are also challenges from other companies, often called BigTech, which have also entered the finance space, creating even larger risks for banks, tech companies, and the economy as a whole, particularly regarding systemic risk. BigTech has several advantages that allow them to develop finance vertically without actually becoming banks, including size, brand, trust, low marginal costs and ability to subsidize losses, a large existing customer relationship for non-financial services, competitive advantages in data analysis, bundled service offerings, and finally the possibility of greater regulation arbitrage. Unlike fintech, which is educated enough to offer completely new services, usually based on new collaborative platforms for seamless customer journey generation, and has a profound incentive to be disruptive and to offer new finance business models, the entry of non-financial players into finance tends to be only complementary.

1.7. Customer Behavior in the Digital Banking Landscape

In response to a growing number of varied digital banking solutions, as well as increasing customer expectations towards these solutions, banks have increased interest in understanding changing customer behavior issues in the digital banking landscape. With the growing desire to be provided the same level of customer service and convenience offered by tech giants without the extra fees, banks have invested heavily in digital banking technology to leverage their long-standing position and trust as a financial institution, including the use of advanced technology. However, not only are the banks struggling with issues in changing behaviors of bank customers in the digital space, including how to influence such behaviors and use of non-bank competition surrogates, but banks are also facing a level of distrust by the customers towards investments in the digital banking space.

Beyond simply providing a myriad of traditional banking services via a digital platform without additional fees, banks are realizing that financial institutions need to provide personalized and engaging customer experiences through several additional channels. Failure to do so has on occasion led to consumers discontinuing banking relationships altogether, resulting in an entire loss of contact with an institution that has for years, if not generations, protected their interests. New digital banks have launched with the primary goal of utilizing the latest technologies, as well as innovative customer experience design, to attract and retain customers. These players have focused on naively filtering products, as well as incentivized excess deposits to create a lower cost and not expensive lending, primarily appealing to younger consumers with higher balances and lower relative risk. Because of innovations in technology, regulation, and willingness of

the publicly traded financial institutions to accept greater amounts of risk, new players have arrived who use novel ways to break the barrier to entry and cater their digital experiences designed specifically to those underserved by traditional banking practices.

1.7.1. Changing Expectations of Consumers

Consumer expectations about banks have changed over the years. Consumers now want a seamless experience across many digital channels and are rapidly moving towards any service provider who can offer them better value for their money. As a result, they are willing to switch service providers and even products when they encounter cheaper or more convenient options. Banks are no longer competing in only the banking space. Companies falling within their ecosystem now provide competitive offerings at lower prices.

Today's consumers expect banks to understand their unique needs and offer them inexpensive solutions. Banks have access to a wealth of customer transactional data and can utilize this to implement targeted marketing. However, questions regarding the ethics of using personal information for product recommendations that may ultimately be out of the consumer's reach are being raised. Consumers are also growing increasingly aware of data vulnerabilities. Consequently, they are now more hesitant when interacting with any online service or e-commerce platform. It raises significant hurdles for financial institutions, especially as a lender's push for online loan applications is strongly supported by the lack of documentation. At the same time, there are opportunities available in different consumer product segments for banks to offer services. This has become essential as they work towards recovering profits lost during economic slowdowns.

Consumers are changing, and so too are their preferences. This presents a unique and prime opportunity for banks to achieve organic growth. Banks must focus on the millennial consumer segment. They have a deeper understanding of technology use and are now building wealth. As a newer group of consumers consider mortgages or other longer-term products, understanding the behavior of this diverse group is integral for banks looking to be competitive.

1.7.2. Adoption of Digital Banking Solutions

The digital bank market is dynamic, increasingly competitive, and undergoing significant innovation and transformation. The pandemic has accelerated the digitization of the retail banking value chain, and consumers are increasingly migrating online. However, banks that fail to tailor their offerings to new customer preferences risk losing

market share and ultimately becoming obsolete. Bank transformation requires a comprehensive roadmap of action areas and industry best practices to guide their investment decisions. Delivering a superior customer experience will be critical for banks looking to differentiate themselves from new entrants and each other. As bank customers become ever more digitally empowered, it is increasingly vital that banks invest in understanding how their customers want to interact with them and how those interactions can integrate with their lives and relationships outside banking.

The pandemic quickly and dramatically accelerated the digitization of retail banking. New legislation aided the evolution of digital banking. Crucially, increasing numbers of people — not just young, tech-savvy consumers — realized that remote, app-centered banking works and has embraced its convenience. Some banks have adopted new means of working. Digital bank and fintech models that replace human engagement with digital interactions, including chatbots, digital apps, open-source software, and cloud-enabled big data systems, are quickly generating significant amounts of customer deposits as ambitious retail banking players expand into new countries through the support of digital banking infrastructure. Banks can choose from one of three strategizing pathways: invest in developing their digital banking acumen, partner with digital banking providers to take services to market more quickly, and become customers of the rapidly expanding digital banks.

1.8. Future Trends in Banking Technology

After having described, in the previous Chapter, the current trends in banking technology, in this Chapter we try and contextualize and forecast what the future has in store for banking technology and banks — and which role banks will play in society — in the next few years. Work on banking is becoming increasingly digital, thanks to the sympathetic pressure from customers, who now expect from banks the same level of attention, data handling power, experience, cost structure, and immediacy as they find in online shopping. This leads banks to adopt, sometimes almost blindly, the most popular of technological trends, especially in the field of information technology. They seem to follow the noisier screaming in the market and the louder proponents of "revolutionary" technological changes. One can just think about cloud computing, machine learning, real-time processing and storage of huge amounts of data, convenience-oriented products, or crypto-assets. Without denying the positive contribution to banking of the industrial and scientific research behind such major technological trends, one must conduct with caution and prudence. Simply because some technological trend seems to have generated an exploitable window, and most vendors are pushing their proposals, it does not follow that a bank must quickly design a product to be developed and exposed in the market. In this concluding section, we briefly

describe three main trends we see shaping the future development of bank works: the implementation of, and the development of, artificial intelligence; the future of payments and the potential 'de-banking' of the financial system; and finally, the bridge role that technology can play to enhance as much as possible the sustainability of the banking industry.

1.8.1. Artificial Intelligence in Banking

It can be said that the banking and financial services markets are adopting artificial intelligence at a faster rate than any other verticals. Just as shopping and entertainment used to lead the way in both online activity and technology investment, so are banks and financial institutions quickly becoming market leaders in the development and adoption of sophisticated, computer-powered functions to enhance customers' experience and security, reduce costs, deliver efficiencies, and provide the basis for deeper and more useful relationships. Artificial intelligence technologies, already widely deployed to assist marketing decision-making and search engine optimization, have now matured into a broad-based capability that works to create content rather than to curate it; makes autonomous decisions rather than benefit from enhanced human decision-making; and increasingly contributes to or is responsible for business unit and corporate strategy. The AI innovation cycle is now feeding the entire economy as these new capabilities are applied not only in finance but also in every industry, in both B2B and B2C. For BFSI, deployment of these technologies is complex, but successful institutions are increasingly using them for more than operational efficiency. They are developing programs that encompass all channels and that seek to create high-value relationships with individual customers, not just as groups but as unique individuals with distinct needs and changing attitudes. Incorporating customer centricity into marketing through healthy data collection and analysis efforts has been an industry goal for decades. Understanding the dynamics of risk is also key, especially in a world where both consumers and businesses experience changing financial capabilities and stimuli.

1.8.2. The Future of Payments

Technological innovation is reshaping both our financial activities and payment systems, manifesting through the digitalization of payment methods and the emergence of new technological solutions. Among these innovations are the mobile phone, social networks, big data, Cloud Computing, Blockchain, Artificial Intelligence, and the Internet of Things. These are enhancing payment systems by facilitating interaction, eliminating friction, and providing a unique experience characterized by immediacy, efficiency, and transparency. These developments allow the adoption of wholesale Central Bank Digital

Currency solutions, such as the digital Euro, or for settlement of digital assets, such as newly established tokenized deposits, which both complete or compete with traditional payment systems.

As a basic tenet of economics, it is assumed that, like any other product, payment services are subject to the processes of supply and demand. However, traditional payment models only partially fit reality, as they are supported by mainly public institutions that regulate the market while monopolizing the issuance of banknotes and coins as well as the creation and management of the payment infrastructures through which these payment instruments circulate. Technological progress has radically changed the way services are offered, but not the traditional banking model whereby payments act as an input in a wider banking business. The question then arises as to whether payment services will follow in the celebrative footsteps of other traditional services, such as tourism or the restaurant industry, undergoing a radical transformation due to economic decoupling, digitalization, and remote work. In payment services, the acceleration has taken on the form of accelerated digitization, involving less costly models based on the digitalization of solutions that previously seemed insurmountable, such as payment processes linked to the execution or management of traditional business without a supporting technological backbone.

Fig 1 . 3 : Payment Technology Adoption & Growth

1.8.3. Sustainability in Banking Technology

Despite technological advancements driving the banking sector forward, they have also significantly contributed to the industry's substantial energy consumption and carbon footprint. Technology is driving tremendous social changes at the same time as it is damaging the environment. The financial sector has made great direct and indirect contributions to global greenhouse gas emissions. Climate change is real and is shifting customers' expectations towards a more socially responsible approach. People are acknowledging the powerful influence that organizations have and are pushing the financial sector to make more efforts toward carbon reduction. Financial organizations are increasingly becoming aware that technological progress must not come at the expense of the environment.

Still, how can banking technology contribute to society while at the same time being mindful of its consequences? First of all, banks must redesign their products and services more sustainably: "People, Planet, Profit." Banks can be at the forefront of positive social change only if they eliminate unnecessary features of their products and services and reduce the energy demand. But banks cannot do this alone. The banking sector needs to share these values with the entire ecosystem. When selling through a bank other companies provide the financial domain to a product or service helping court additional customers. The challenge for banks is to make sure that their products do not change parameters in a manner that could directly or indirectly lead to a negative impact on the customers, their business, and the ecosystem.

Technology can help banks become more sustainable through a wide range of solutions. Banks can optimize the energy landscape around them by introducing new predictive and prescriptive models for climate management and climate physical risk management. Another way is to introduce more energy-efficient systems. The selection of the computing infrastructure can help reduce major sources of emissions in a bank. Banks can also implement tools enabling carbon tracking through banking processes.

1.9. Conclusion

Closing Thoughts on the Evolution and Future of Banking

The evolution of banking is a unique and enlightening science: it possesses the basic characteristics that allow us to call it a science. It has its object: the banking phenomenon. It makes use of a method, an analytical method, the same method used to perceive social realities throughout the ages through their evolution. It possesses provenance laws, also called divine laws in the sense that they are the rules that turn the historical process into a true process, whose characteristics lead us to believe that history follows specifiable paths; paths that are validated day by day through scientific predictions. It allows us to

enlighten or foresee what the space of the later stage of its evolution will be like. It therefore boils down to teaching us to delineate the map of banking.

The future of banking is the future of banks, and that future will be linked, also in this case, to the future of the industrial revolution. At its focal point, there will be the demolition of the perimeter of economic activities. It will be followed by the multiplication of new forms of business models thanks to the more and more pushing technological revolution. It will be followed by the globalization of economies. It will be followed by the continuous search for vertical integration corridors needed to shorten the time taken for companies, created to meet the needs of the market and invest money, and banks, built to collect that money and distribute it. It will lead economic and financial intermediaries to invade the last bastion of banks: business relationships with customers. Banks will be ready to face that evolutionary process because they will be protagonists, and perhaps not inactive, alongside the technological revolution: acting, no longer performing, as interfaces alongside digital platforms.

1.9.1. Closing Thoughts on the Evolution and Future of Banking

The present state of Banking appears to be the result of an ongoing process of evolution since its beginning, where three forces are found combined to contribute to this general state. The first has to do with regulation, which has dictated the way Banks manage their resources, from their capital requirements to their allowed ability to abandon prudential rules. The second force is the trustworthy nature of Banks that has sustained their success and has forcefully evident the controversial aspect of financial activity. The third force has been technological evolution whose impact has been growing in importance, fueled by the self-reinforcing interaction of banks and progress in technology. Banks have been experimenting with a path of continuous re-evaluation that makes them more able every day to make profitable the information they have had along their history about the relation between risk and return of everyone from the customers coming to their doors to ask for a loan. The specialization Banks have followed will not allow the same common sense concept to be applied when referring to future changes. The future is unknown, and the belief is that it is outside the evolution curve where the real changes will take place; evolution will occur only if there is no disruptive change.

The truth is that in the whole economy, including Banking, the balance regarding the three forces mentioned up to now will present the same uncertainty, determined by the incapacity of foreseeing the course of change of the whole economy. Technology that affects so deeply other industries will continue doing the same with Banking. It is possible to try to offer a truly personalized product even at a distance to any Bank.

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