OPEN BANKING AS A NEW APPROACH:
A MODEL PROPOSAL FOR TURKEY

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PLAGIARISM

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

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ABSTRACT

Open banking involves banks sharing customer information with third-party service providers with the customer's permission, allowing these companies to offer new products and services. Banks provide the necessary infrastructure using Application Programming Interface (API) for approved transactions and transmit the permitted information to service providers. This comprehensive approach allows customer financial data to be processed and processed in one place. Financial technology organizations, also known as service providers, also participate in the service process between banks and consumers.

Open banking applications have begun to emerge in the field of payment systems and the importance of the need for security and uniformity has become evident. Legal codes and standards have been established in countries such as the United Kingdom, the European Union and Australia to promote competition in the banking sector and provide beneficial goods and services to customers. The number of applications submitted since the entry into force of the Payment Systems Directive (PSD) 1 and 2 has increased significantly, especially among EU member states.

In the study, first of all, the historical development of the open banking concept within the banking sector is explained and its development in the world and in Turkey is compared. Finally, a bank model that will serve in Turkey has been proposed based on services abroad. The bank model is designed to target credits, treasury, banking operations and payment systems and accounting department.

Keywords: API, banking history, fintech, PSD, open banking.

ÖZET

Açık bankacılık, bankaların müşterinin izniyle üçüncü taraf hizmet sağlayıcılarla müşteri bilgilerini paylaşmasını ve bu şirketlerin yeni ürün ve hizmetler sunmasına olanak sağlamasını içerir. Bankalar, Onaylanan işlemler için Uygulama Programlama Arayüzü (API) kullanarak gerekli altyapıyı sağlar ve izin verilen bilgileri hizmet sağlayıcılara iletir. Bu kapsamlı yaklaşım, müşteri finansal verilerinin tek bir yerde işlenmesine ve işlenmesine olanak tanır. Hizmet sağlayıcı olarak da bilinen finansal teknoloji kuruluşları da bankalar ile tüketiciler arasındaki hizmet sürecine katılmaktadır.

Ödeme sistemleri alanında açık bankacılık uygulamaları ortaya çıkmaya başlamış ve güvenlik ve tekdüzelik ihtiyacının önemi belirgin hale gelmiştir. Bankacılık sektöründe rekabeti teşvik etmek ve müşterilere faydalı mal ve hizmetler sunmak amacıyla İngiltere, Avrupa Birliği ve Avustralya gibi ülkelerde yasal kanunlar ve standartlar oluşturulmuştur. Ödeme Sistemleri Direktifi (PSD) 1 ve 2'nin yürürlüğe girmesinden bu yana yapılan başvuruların sayısı, özellikle AB üye ülkeleri arasında önemli ölçüde artmıştır.

Çalışmada öncelikle açık bankacılık kavramının bankacılık sektörü içerisindeki tarihsel gelişimi anlatılmış ve dünyadaki ve Türkiye'deki gelişimi karşılaştırılmıştır. Son olarak yurt dışındaki hizmetler esas alınarak Türkiye'de hizmet verecek bir banka modeli önerilmiştir. Banka modeli krediler, hazine, bankacılık operasyonları ile ödeme sistemleri ve muhasebe birimlerini hedef alacak şekilde dizayn edilmiştir.

Anahtar Kelimeler: Açık bankacılık, API, bankacılık tarihi, fintech, PSD.

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LIST OF ABBREVIATONS

ADC: Alternative distribution channel

AI: artificial intelligence

AIS: Account Information Service

AISP: Account Information Service Provider

AML: Anti-Money Laundering

API: Application Programming Interface

ATM: Automated Teller Machine

B2B: Business-to-Business

B2C: Business to Consumer

BaaP: Banking-as-a-Platform

BaaS: Banking-as-a-Service

BAT: Banks Associations of Turkey

BSRA: Banking Supervision and Regulation Authority

C2B: Consumer to Business

CBRT: Central Bank of the Republic of Turkey

CDR: Consumer Data Right

CFPB: Consumer Financial Protection Bureau

CMA: Competition and Markets Authority

CRM: Customer Relationship Management

EBA: European Banking Authority

EFT: electronic funds transfer

ERP: Enterprise Resource Planning

EU: European Union

Fintech: Financial Technology

GDPR: General Data Protection Regulation

HR: Human Resources

IBAN: International Bank Account Number

IT: Information technology

KYC: Know Your Customer

OBIE: Open Banking Enforcement Authority

P2P: Domestic Peer-to-Peer

PFM: Personal Finance Management

PIN: Personal Identification Number

PIS: Payment Service Initiation Service

PISP: Payment Initiation Service Provider

POS: Point of Sale

PSD: Payment Services Directive

PSD2: Payment Services Directive 2

SME: Small and Medium-Sized Enterprise

TPP: Third-Party Provider

1. INTRODUCTION

A digital and interconnected universe that has become more intertwined with economic activities over the last decade. The renowned ‘marketplace' is no longer a physical location, but rather an activity that permeates digital lives. People's ability to comprehend the nature of their online economic transactions is undermining the foundations of a free market economy as technology becomes more pervasive. The combination of digital technology and business presents new information asymmetries. The global economy is enduring a profound digital transformation, and the rate of change is accelerating.

Numerous new internet-based businesses rely on consumers' 'consent' to share personal data (including online behavioral profiles and demographic information) as part of the purchasing process. This type of ‘surveillance capitalism' is gaining more and more attention. Professor Shoshana Zuboff stated, "In the early years of the twenty-first century, Google became ground zero for an entirely new subspecies of capitalism in which profits were derived from the unilateral surveillance and modification of human behavior." He also stated, "Without internet access and knowledge, it is nearly impossible to conceive of effective social participation in employment, education, and health care."

1.1. Developments in the Banking Industry and the Concept of Open Banking

The banking industry is not immune to the effects of information digitization and the social data dynamics that result from it. But acceptance and spread of technology don't happen at the similar rate in all businesses (Milne, 2006). The banking sector is highly regulated by the government, and a license is required to provide financial services. This makes it more difficult for new firms to enter the sector and protects banks from outside competition (Gozman and Currie, 2014). In the past, banks were less likely to experiment with novel concepts because they posed less of a danger to the market. In addition, consumers frequently have limited swapping options and must pay a premium for them. (Beerli et al., 2004) Therefore, banks prioritize customer relationship management (CRM) over novel product and service concepts.

The 2008 financial crisis led a lot of people to lose trust in traditional banks, so people started looking for alternatives (Vives, 2019). Companies that focus on financial technology (fintech) have started to offer new services, such as mobile payments and

deals with cryptocurrencies (Constine, 2017). After Industry 4.0, the usually slow-moving banking sector sped up a lot and gradually caught on to the digital trend. "Challenging banks" are a new type of bank that has grown out of changes in technology and changes in what people want from their banks. As the name suggests, they have used new digital technologies to compete with established institutions and offer more value to their customers (Bataev and Rodaenov, 2020).

Open banking is a technology-enabled approach to financial services makes use of aggregated, authenticated data that is accessible via APIs to provide customers more ways to access their financial data and increase transaction security (Hoppes & Duffy, n.d.). In the context of banking, "open banking" refers to the practice of making customer banking, transaction, and other financial data available to third-party financial service providers via application programming interface (API) access from banks and non-bank financial organizations. Through open banking, customers, banks, and ancillary service providers can share information about their banking relationships with one another. It is widely agreed that open banking will revolutionize the financial services sector (Chappelow, 2020). Customers gain from open banking because it encourages innovation, increases competition among financial institutions, and creates new markets in which consumers may shop for financial services. However, it also raises concerns about regulation and data privacy, which helps to explain why different global markets adopt different approaches to governance and make different amounts of development (McKinsey, 2020). The banking sector has strict standards governing the importance of trust. Because customers have faith in banks and give those institutions their hard-earned cash. This is why financial institutions have opened up their services through exclusive channels. But the rise of digitization, the development of security technology, and the increased demands of bank clients have compelled the use of other platforms to gain access to banking services. There are times when customers would rather use a mobile device or loyalty app to do banking transactions. These customers could have more than one bank account and like to monitor and manage everything from a centralized location. With customer permission and a robust security perimeter, banks can share customer data and basic banking apps with other platforms (Okay, 2019).

1.2. Open Banking in Europe

In light of all this technological development and change, the EU is actively pushing for more digitalization by putting in place policies that both make technological change possible and keep it under control. The EU says that the European Digital Economy is the future of the European economy (EC, 2015). It says this in its complete EU Single Digital Market plan. The whole economy is becoming more financialized at the same time that it is becoming more computerized. This is called "the increasing role of financial incentives, financial markets, financial actors, and financial institutions in the functioning of national and international economies" (Epstein, 2005). As the financial sector becomes more important to the economy, people are more likely to use digital versions of the services it offers in their daily lives. So, the way the two processes are made and how they work are linked and closely related. Application programming interfaces (APIs), block chain, data analytics, and smart devices will drive the next generation of banking services. In light of the increasing interconnectedness of the global community, financial institutions are actively seeking novel avenues to capitalize on these developments. Concurrently, emerging technological advancements are fundamentally transforming the manner in which engage with financial transactions. This is especially clear in the highly digitalized Scandinavian countries, where people are buying digital services quickly and using them more. For example, more than 80% of people in Sweden, Norway, and Denmark use mobile payments, even though the first mobile payment apps were launched more than a decade years ago by institutions (Deloitte, 2018). These developments are not limited to payment services; they impact the entire financial services value chain, transforming employment, skills, and organizations (Mühleisen, 2018). The connections between financialization and digitalization have not escaped the notice of EU regulators, whose latest Payment Services Directive II (PSD2) aims to promote competition and innovation in the financial services industry. This directive is central to the most recent chapter of the EU's digitalization of financial services: Open Banking. As a concept, Open Banking has been utilized primarily by practitioners and "...represents a shift from an old regime of corporate transparency to greater openness and transparency" (Gozman et al., 2018). Open banking enables retail customers and small businesses to share their data securely with other banks and third parties, compare products based on their requirements, and administer their accounts without ownership using institutions" (Deloitte, 2017).

Therefore, open banking can be understood both as a structural shift in the institutions of the financial services sector and as the mechanisms that bring about this shift.

In addition, the outlook for the European banking sector has changed with the implementation of the revised PSD2 in 2018 (Noctor, 2018). By enacting PSD2, banks were required to share consumer data with independent fintech firms. The availability of data has spurred financial innovation and allowed fintech companies to provide integrated financial services to their customers (Brodsky and Oakes, 2017). Before PSD2, banks were hesitant to exchange customer data for fear of security breaches and because no one bank stood to gain from the introduction of this service (He et al., 2020). This deal sped up the development of open banking. Open banking as a cooperative approach in which financial data is exchanged through APIs. APIs are widely used in software technologies to facilitate data flow both inside and outside of their governing organization. APIs allow third-party providers (TPPs) to access a bank's data, which might lead to the creation of innovative service models. Because of their improved digital agility and data-intensive usage, fintech organizations may create new value propositions. Many challenges have arisen for the banking sector as a direct result of open banking. A bank's main concern may be intermediation as TPPs gain more customers and develop their own platforms, and as a result, customers may soon no longer need to use online banking services provided by banks (Gozman et al., 2018). It is anticipated that the banking business will evolve as a result of external forces including cybersecurity threats (Mansfield, 2016) and intense rivalry (He et al., 2020). Because of fintech's rapid growth, the conventional banking system is under increasing pressure to change. Existing and potential competitors in the banking industry might benefit from exploring new avenues of growth.

Even though the foundations and guiding developments of open banking have emerged in the European Union, the world's financial services are undergoing significant transformations. In many nations, open banking research is ongoing or open banking regulations are planned for the near future. There are differences in the emergence and implementation of open banking regulations across nations. These differences are the result of country-specific decisions regarding issues such as which actors are governed by the open banking regime, how standards are determined and which institutions are responsible for governance, which sectors are covered by open banking regulations, who is responsible for funding and timeliness, and what security mechanisms are in

place. Open banking regulations and practices may emerge in response to market demands, or they may be initiated by national regulatory bodies in an effort to foster a culture of innovation and boost competition. Regulatory agencies can be mobilized by the process triggered by the demands and market requirements of financial technology companies. From this perspective, competition institutions, central monetary authorities, or industry associations may be in charge of open banking's orientation and management processes. The scope of open banking regimes may also vary.

1.3. Open Banking in Turkey

Regulations pertaining to open banking in Turkey consist primarily of regulations within the scope of harmonization to be carried out over the course of the next few years in tandem with studies conducted in the European Union. The Law No. 6493 on Payment and Securities Settlement Systems, Payment Services, and Electronic Money Institutions went into effect in 2013 to comply with the PSD1 regulation published in 2007. Numerous mechanisms related to payment systems services were defined and included in the law for the first time. By amending the Law No. 6493 with the 2019 Law No. 7192 on the Amendment of the Law on Payment and Securities Settlement Systems, Payment Services, and Electronic Money Institutions, the responsibilities of the The Banking Supervision and Regulation Agency (BSRA) in the field of payments were transferred to the CBRT. Consequently, the CBRT was designated as the solitary regulatory body.

The Open banking movement in the financial services industry is profoundly altering how industry organizations store, process, and monetizes consumer data, and is accompanied by the larger digitalization trend. As financial services become more and more digital in nature, customer data becomes more crucial. According to studies, the financial services industry is the second most analytical industry, after the technology sector (Davenport and Harris, 2017). Given the intrinsic significance of data in the finance industry, a radical change in the way data is handled, such as open banking, could have a significant effect on organizations in the sector. This is especially true for incumbent banks that can monetize consumer data without the traditional obligation to share the data with third-party competitors. This is currently changing, but the effect of open banking on the organizational models of established institutions is a fascinating and timely topic.

The importance of the open data economy in modern life has grown along with the development of digital technologies. However, this type of exposure is usually seen as risky from the standpoint of a bank, thus more attention should be paid to supervision, regulation, and risk management (Brodsky and Oakes, 2017). In the past (He et al., 2020), only authorized bank personnel had access to customers' financial records. In light of “privacy as a fundamental human right" (Goddar, 2017) and the General Data Protection Regulation's (GDPR) 2016 release, customers are now the exclusive owners of their data. Because of the GDPR, companies have revised their privacy policies. Another major regulatory force is the amended Payment Services Directive (PSD2). It standardized the nuances of data ownership, especially in the financial sector, and made it possible for customers to willingly exchange their banking information with other TTPs using APIs (Brodsky and Oakes, 2017).

1.4. Possible Effects of Open Banking

The use of digital technology is also fundamental to open banking. The financial sector has long been a veteran of the digital age. To better serve their clients, banks have begun offering digital versions of previously in-person services, such as account verification online (Zachariadis and Ozcan, 2017). A change in service or business model may be necessary due to the complexity introduced by digitization, which is the process of turning analog information into a digital format that a computer can store, read, and send (Bloomberg, 2018). The technology that aids digitization has several facets, but APIs are often regarded as having the largest influence on open banking (McKinsey, 2014). To avoid learning the provider's complete system, an API can serve as a "link" between two computers (Jacobson and Woods, 2012).

Bodle (2011) argues for API systems to be both interoperable and modular. These two characteristics can reduce technology costs and accelerate innovation by averting duplication of effort. Instead, APIs allow users to build "on top of" existing systems. The degree to which the API publisher exerts control over the API differentiates private APIs from partner APIs and from open APIs. Banks have been using private APIs for a very long time. Banks use proprietary APIs to lower the cost of building internal IT systems by facilitating communication across departments. The use of standard APIs is very prevalent. Public application programming interfaces (APIs) allow banks to provide these services without building their own systems (International Banker, 2020),

despite the fact that they must associate with other financial institutions such as clearinghouses and brokerages. Given security dangers including malicious third-party providers (TPPs) and other consumer privacy issues, the degree to which open APIs should be available is still controversial (Gozman et al., 2018).

When it comes to luring in new customers, the banking sector continues to benefit greatly from the implementation of PSD2 and APIs. New services like account information service providers' (AISPs) that help customers manage their money across many accounts are becoming increasingly popular. People used to go to each individual bank to handle their finances, but now, with the help of account information sharing providers (AISPs), they can do it all from one place. Consequently, open banking may be characterized as the movement from data obscurity to data transparency (Currie et al., 2017) and the exchange of banking data between two or more parties to improve financial goods and services (Brodsky and Oakes, 2017). It's a fresh start for the banking industry that might spur more breakthroughs by making massive amounts of transaction data accessible for analysis. It is widely agreed that fintech companies are both more innovative and more agile than traditional businesses (Zachariadis and Ozcan, 2017). Customers, especially millennials, want traditional banks to match the quality and ease of fintech businesses (Srinivas et al., 2019).

The advent of Open Banking has had a profound impact on the banking industry, resulting in significant disruptions to traditional banking practices and business models. Prior to CRM, banks could concentrate on sustaining their business model, but now they also possess customer information. The reduction in information asymmetry has also reduced the 'lock-in' effect or ‘switching cost' (Zachariadis and Ozcan, 2017). Consequently, a bank's agenda included numerous adjustments, such as new competitors and customer expectations. Depending on perceived characteristics, changes can be perceived as threats or opportunities (Jackson and Dutton, 1988).

2. OVERVIEW AND BASIC CONCEPTS OF BANKING

2.1. Banking Concept

Banking is a concept that defines a financial sector that uses funds for consumption or investment, primarily as the name given to institutions that raise capital. Accordingly, the concept of banking refers to the sector that collects the savings of individuals and

institutions in the economy as funds, uses these funds by converting them into value, serves as the foundation for economic investments, and is one of the most essential components of financial systems with these functions (Ustaomer, 2019).

In other words, banks are defined as those who conduct, prepare, or mediate all types of transactions involving capital and money, as well as financial institutions that meet all types of state and business needs in this field. Despite the fact that banks are financial institutions where individuals or institutions in need of funds can meet, they are one of the most effective pillars of financial and financial integrity for nations and the world. Examining the definitions of banks in the literature reveals that they are primarily a structure that resembles a matching function between fund suppliers and fund demanders. Based on these definitions, banks are institutions whose primary function is to buy and sell money and operate as an intermediary between these two activities. Although banks have distinct structures on a global scale, the following definitions organize them according to their shared characteristics:

Banks are financial institutions obligated to accept cash or precious metals from the community for use in financial transactions or the acquisition of goods (Ayaz, 2011). According to their domains of activity, banks can buy, sell, transmit, and exchange money markets, capital markets, and other assets on both national and international markets. Accordingly, the following are the functions of institutions (Afşar and Afşar, 2010):

a) Accepting individual and corporate deposits and preserving them

b) Ensuring the acquisition, disposition, transfer, and exchange of assets

c) c)Intermediating Payment Services

d) Providing financial market services

e) Forwarding Deposits

f) Addressing Economic Needs

g) Offering advisory services for financial matters

Considering the general operating principles of banks and their position in the economic order, it is evident that banks contain all the conditions required by the service sector. Therefore, all rules and objectives that are obligatory for a business should be fundamental bank responsibilities. Banks can be conceptualized as businesses with a predetermined minimum amount of capital, goals and a vision, senior management and stakeholders, and profit-driven functions. (Ayaz, 2011) The bank is also defined by its official institutions and laws. The definition and categories of banks have been established by the banking law applicable in Turkey. According to the 2005 Banking Law No. 5411, the Bank is defined as "deposit banks, participation banks, and development and investment banks" and the scope of this law is as follows: Deposit bank: Institutions operating on the basis of accepting deposits and extending loans in their own name and on their own account in accordance with the provisions of this Law, as well as branches of such foreign institutions operating in Turkey. Deposit banks, or commercial banks in other words, collect deposits, disburse loans, aid in the implementation of monetary and credit policies, serve as a middleman, support industrial organizations, take part in subsidiaries, safeguards investors' securities, actively participate in stock exchange activities, supports and directs development, and extends short-term business loans to industrial and commercial enterprises. They are organizations engaged in money market operations. Deposit banks play crucial roles in the growth of the country's commercial life and industry as well as in the conversion of modest deposits into capital on the money, credit, and capital markets. According to several parameters, including loans issued globally and in Turkey, the number of branches, and asset size, deposit banks hold the majority of the banking market and actively engage in business.

Participation bank: Organizations operating on the basis of collecting funds and making loans available through special current and participation accounts in accordance with the provisions of this Law, as well as branches of such organizations established abroad and operating in Turkey. With the exception of the fact that participation banks operate without charging interest and do not offer cash loans without commercial transactions, they are more similar to deposit banks than they are different, despite minor distinctions in their funding sources and methods. Within each maturity category, these institutions assemble money in the form of participation accounts or current accounts for autonomous operation. A unit value is produced by dividing the amounts placed into

this maturity group and the group's profit amount by the account values. Each time money is deposited or withdrawn to a maturity group, a separate account value is assigned to each transaction through a changing coefficient. The bank and the saver split the profit associated with this unit value. This is known as profit share, and at the conclusion of the term, the profit share that was gained from the transactions is given to the depositor accounts. The purchases and investments intended with this money are undertaken through participation banks (formerly known as private finance institutions), and no direct money transfer is made to people or organizations requesting funding from these institutions. In other words, the institution sells the good at a profit and then pays the price of the good while transferring it by debiting the consumer who utilizes the money. As a result of the purchase and sale of goods, money is paid not to the customer who received the loan but to the person or institution from which he purchased the goods, and the goods are purchased on behalf of that person. This avoids being included in the scope of interest.

Development and investment bank: Except for accepting deposits or participation funds in accordance with this Law; the establishments whose primary function is to extend credit and/or to carry out the duties assigned to them by special laws, as well as the branches of such banks established abroad that operate in Turkey. Development and investment banks may only distribute credit; they cannot acquire deposits or participation money. Development and investment banks are prohibited from doing tasks including carrying out personal banking transactions and arranging foreign currency deals. They finance the loans they offer using their own resources as well as money they raise domestically and overseas. These banks play crucial roles in the growth of nations. These banks offer medium- and long-term financing, assess projects, structure, rehab, combine, sell, and liquidate businesses. They also build, run, and oversee asset management firms, offer genuine consulting to domestic and international investors, and finance investment vehicles through leasing. They are at least as necessary as commercial banks for the actual sector that needs these services due to their structure and features that allow them to offer security services and issue securities on their own behalf or for the benefit of their customers. It's also important to note that they have adopted all of these as primary rather than secondary functions.

Banks are trust-based institutions, which form the basis of economic systems. Consumers, investors, and individual depositors' assets are deemed "safe" by banks, on the premise of their operations. The majority of market participants' deposits, loans, and assets are currently secured by banks. In this context, banks are required to adhere to certain operating principles. These principles include numerous factors founded on the trust principle, which is the economic engine. Some of these include the principle of transparency, the principle of social utility, the principle of social honesty, the principle of impartiality between consumers, and the principle of opposition to the laundering of crime-related assets. Within the framework of these principles, banks are institutions that maintain the confidence of their customers and comply with legal regulations in a transparent manner when directing investments (Kapinus and Skrygun, 2014). The fundamental reasons why banks adhere to the aforementioned principles are the pursuit of profitability, the need to establish trust, and the requirement to maintain liquidity. Banks perform their financial intermediation functions based on these three fundamental principles (Goodhart, 1995).

Banks acquire the funds that individuals and businesses do not spend over a specified time period and ensure that they are used through loans and investments. However, this definition does not adequately characterize the modern banking system, which was created on the premise that the primary function of banks is credit transactions. The globalization of the banking industry, the expansion of the financial system's banking system, and the international crises have increased the significance of marketing activities in banking activities. While the world is globalizing, cultures and economies have also influenced one another. Therefore, banks have also entered the process of international competition. The first studies to develop numerous marketing innovations and distinctions have begun. Marketing began and expanded on a microscale. Marketing activities for profit have adopted a customer-centric approach and taken on the form of marketing based on people's requirements.

In the modern banking system, banking activities have evolved and become more diverse over time. Due to this, it is difficult to define banking in a manner that encompasses all of its activities. As the domains of activity of banks expanded, the historical development of banking accelerated. Today, it is evident that banking is in a constant state of flux in tandem with technological and financial market advancements.

The widespread use of technology in all fields and the accompanying financial innovations have accelerated the banking industry's transformation and created the need to access banking services from anywhere. Visiting the bank for banking transactions has become a situation that many individuals dislike. With the proliferation of the internet, digital channels such as internet banking and mobile banking have become primarily used for banking transactions such as money transfers, bill payments, and account monitoring (PWC, 2020).

Depending on technological advancements, many new services are offered daily in a sector that is in constant development. Consequently, it becomes increasingly difficult to define a comprehensive banking system.

2.2. Historical Development of Banking

2.1.1. Ancient Banking

In order to satisfy their requirements, people have devised various techniques from antiquity to the present. In the formulation of these methods, the effects of a person's living environment, their traditions, the events they experience, and the data they acquire are evident. The lengthy and intricate history of finance dates back thousands of years to the primordial civilizations. The earliest banks were likely temples or other religious institutions that served as vaults for valuables. However, over time, these institutions evolved into more complex financial institutions that provided loans, made investments, and acted as intermediaries between borrowers and lenders. Ancient banking refers to early forms of banking that existed in various areas of the globe prior to the emergence of the modern banking system (Mwelwa,2023). Compared to modern banking, these early banking systems were archaic, but they met the requirements of ancient societies. Temple banking existed in ancient Babylon, Egypt, and Greece and was one of the earliest forms of banking. In this system, temples functioned as the primary financial institutions and managed the community's wealth. The temple was the primary financial institution in ancient Babylon. The temple was responsible for tax collection, irrigation system management, and infrastructure maintenance. As a consequence, he amassed considerable wealth, which he used to provide financial services to the community.

The temple also operated as a financial institution in ancient Egypt. Individuals and enterprises could bring grain, livestock, and other products to the temple. He would

safeguard these items in the granaries and provide depositors with receipts. Additionally, the temple would offer loans to individuals and enterprises. It would levy varying annual interest rates on these loans. The amount borrowed, the length of the loan, and the associated risk all influenced the interest rate. In ancient Greece, the temple also served as a financial institution. The temple of Apollo at Delphi was both a depository and a place of divination. Individuals and companies could make deposits of gold, silver, and other valuable items. It would also offer loans to individuals and businesses, for which interest would be charged. The temple accepted gold, silver, and other valuables from individuals and businesses, stored them securely in its vaults, and issued receipts to depositors. These receipts could also be utilized as payment or as collateral for loans (Beattie, 2023). Temples and churches were the most significant banking locations due to ancient society's reliance on banking's foundation and the role of religion in society. The use of these locations for banking led to the clergy being regarded as the first bank employees.

2.1.2. Middle Age Banking

During the Middle Ages, the number of bankers and the number of bankers who offer opportunities such as lending money, accepting deposits, granting loans, and conducting high-interest transactions increased as the rate of money use accelerated. Italy is one of the nations where these financiers are swiftly proliferating. The name of these financiers, who became prominent in Italy in the 12th century, is derived from the Italian word for "bench, table," "bank" (Perry and Ryder, 1965). These individuals, who conducted the banking transactions of the era by transacting through these banks in the trade-centered districts or markets, were also known as "bankers." Due to the fact that the bankers were unofficial and unrestricted in their business ethics, however, loans were made under severe conditions, and conflicts arose. Beginning in the Middle Ages, the development of social law, the increase in trade, the diversification of economic relations, and the need for banks to support and mediate this economic structure led to the rapid development of the banking system and banking. During the same time period, political events such as significant wars and the beginning of the Crusades contributed to the banking system's ability to secure and transport large deposits. With the foundation of banks in Italy and other European nations during the Middle Ages, the banking industry as known it today began to take shape. The first modern banks were

established in the Italian city-states of Venice, Genoa, and Florence, which became significant financial and commercial hubs (Vaia, n.d.).

The services offered by these banks included deposits, loans, and currency exchange. The Bank of Venice established the first modern bank in 1157. The bank issued currency and loans to the Venetian government. Banco di San Giorgio was one of the earliest banks, having been founded in Genoa in 1407. The bank served as a repository for public funds and made interest-bearing loans to individuals and businesses. Other banks, such as the Banco di Rialto in Venice and the Medici Bank in Florence, shortly followed. Renaissance and the Age of Discovery: The Renaissance is a cultural, artistic, scientific, and philosophical movement that began in late 14th century Italy and lasted until the middle of the 16th century. During this time, Europe's economy revived and significant advances were made in industry and commerce. As trade expanded during the Renaissance, the banking industry grew and diversified during this time period. Although banks such as the Fugger Bank in Germany and the Rothschild Bank in Austria arose as significant players in the financial world, Italian cities introduced numerous innovations to the banking system, making Italy a leader in banking during the Renaissance. At that time, only monarchs, nobles, and merchants were permitted to conduct banking transactions. By providing credit, foreign exchange, and international trade services, Italian banks, in particular the Medici Bank, contributed to the growth of Renaissance Florence (Mwelwa,2023). The money exchange service provided by banks has facilitated transactions between currencies from various countries.

In addition to providing financing to their consumers, banks contributed to the expansion of international trade. In the late 15th and early 16th centuries, during the Age of Discovery, Europe expanded its commerce as a consequence of overseas discoveries. During this time, banks also began to offer loans for maritime commerce, attracting a large clientele. The exploration of new continents afforded countries such as Portugal and Spain tremendous economic opportunity. Consequently, banks began to offer financial services for discoveries and commercial transactions, attracting a large clientele. The prevalence of international institutions in the banking sector fostered a competitive environment among banks. By cooperating with one another, this competition facilitated the establishment of financial networks for international trade transactions. By exchanging financial information and resources, these networks have

helped establish a larger customer base. Utilizing financial instruments such as the issuance of bonds and bills, banks contributed to the development of financial markets.

2.1.2. Banking in the Industrialized Era

The industrial revolution began in England at the end of the 18th century and lasted until the beginning of the 19th century. During this time, production methods and technologies underwent a significant transformation, and industrial production spread around the globe. Change and development in production techniques have also resulted in significant changes in the financial industry. Due to the fact that changes in production methods have increased merchants' investment requirements, the search for resources to finance these investments has begun. In such an environment, banks' lending functions gained prominence. Banks, particularly in the United Kingdom, played a significant role in the financing of industry and commerce, making an undeniable contribution to the development of industry and commerce and economic expansion. In addition to providing funds for investments through direct loans, banks during this time period also issued bonds and equities. The industrial revolution resulted in the emergence of new industries and companies, which were financed through the issuance of bonds and stocks (Beattie, n.d). By purchasing these bonds and equities, banks provided companies with financing. Thus, the establishment of new industries was encouraged.

Moreover, banks' stock trading enhanced the liquidity of investors and contributed to the growth of the stock market. In addition to financing investments, banks have facilitated the transmission of funds through checks and money orders. The pace of commerce has also accelerated as a result of the advent of swift transfer methods.

During the 18th and 19th centuries, the Industrial Revolution brought about significant alterations to the banking industry. As industrialization and urbanization grew, so did the need for capital, and banks begin to lend to businesses and entrepreneurs. During this time, banks also began issuing banknotes guaranteed by gold and silver reserves held by the state or the bank. These banknotes served as a convenient form of currency and contributed to economic expansion. The expansion of global commerce over time necessitated the internationalization of banking services. With the expansion of international commerce, the significance of foreign exchange transactions has also

grown. By actively engaging in foreign exchange transactions, banks supported international trade and contributed to the globalization of financial markets.

The establishment of private banks was one of the final developments that banks experienced during the industrial revolution. The establishment of private banks during this period increased competition in the banking industry. As competition has increased, banks have been provided with a variety of products and services to better serve their consumers. Thanks to technological innovations and globalization, the banking sector underwent a significant transformation in the 20th century. This transformation has enabled banks to improve customer service, become more efficient, and expand their global customer base.

Numerous new products and services have emerged in the banking sector as a result of technological advances. Initially, the development of computer systems and electronic payment systems enabled banks to conduct transactions more efficiently and provide customers with a broader selection of financial services. Later, innovative technologies such as ATMs, online banking, and mobile banking enabled banks to have easier access to their consumers, to conduct transactions more quickly and securely, and to do so more efficiently. These technologies have also automated and made more efficient the business processes of institutions (Feyen et al, 2021). Today, banks are increasingly focusing on digital transformation, employing artificial intelligence, block chain technology, and other innovations to better understand customer behavior and improve customer service. These technologies have enabled banks to respond to the requirements of their consumers more effectively and to offer more personalized services. In addition to technological advancements, globalization has had a significant impact on the banking industry. During this time period, the opening of banks to international markets enabled banks to reach more customers and provide a broader selection of investments. In addition, international financial institutions have assisted banks in becoming more active on global markets.

However, in addition to technological advancements, the financial industry also faces certain challenges. In the second half of the twentieth century, however, many nations began to deregulate their banking sectors, allowing for increased competition and innovation. This has resulted in the emergence of new categories of banks, including investment banks, commercial banks, and online banks, which provide a variety of

specialized financial services. However, inadequacies in the regulation of the banking sector led to the emergence of financial crises. After the financial crisis, governments tightened their control and regulation of banks. Generally speaking, the regulations were intended to make institutions less hazardous and more transparent. Alternatively, the pervasive use of technology has begun to pose new risks to banks and their customers. Emerging issues included compromised customer accounts, identity and data theft, and exposure to other malicious activities. For this reason, increasing cyber security measures has become an additional concern for institutions.

In conclusion, banking has a long and complicated history that has seen numerous changes and advancements over the years. From its initial beginnings in ancient civilizations to the contemporary era of digital banking, banking has played a crucial role in the growth and development of the world's economies. As technology and globalization continue to reshape the financial industry, the coming years are likely to witness even more changes and innovations.

2.3. Digitization of Banking

History's technological advancements have influenced the evolution of information and communication technologies. This circumstance led to the evolution of conventional banking practices. As a result of the comprehension of technological advancements over time, banking products and services began to be utilized via ATMs, telephones, and computers. With the expansion of Internet usage possibilities, there have been advancements in electronic finance. In this context, banks made the transition to electronic banking after 1980 (Erol et al., 2015) As the scope of the financial services industry grew, so did the rate of change and transformation in the banking industry. As a result of advancements in communication technology and financial markets, it can be observed that banking service processes are continually updated. The incorporation of technology into nearly every aspect of people lives and the continuous renewal of financial services have accelerated the process of change in the banking industry, resulting in the need for access to banking services from any location.

Çelik and Mangr (2020) define digital banking as the digitization of all traditional banking activities and physical program services within a bank branch is an unfavorable circumstance. With people's easy access to the internet, money transfers, payments,

account monitoring, etc. have been facilitated by internet banking and mobile banking (PWC, 2020).

The evolution of digital banking in history began in the late 1800s and has continued to the present day. Below is a summary of the historical chronological order of the digital transformation that banks underwent during this process.

Table 1: Digital Transformation of Banking

Year	Development
1871	EFT transaction was made by Western Union for the first time in the world.
1894	The US-owned Credit Letter Company has launched the world's first payment card that can be used by certain people in certain places.
1914	Western Union Bank launched the first credit card in the world.
1950	The Diners Club card, which is the first example of today's credit cards, was introduced by F. Mc Namara.
1953	Bank of America had the Stanfor Research Institute build the first bank mainframe to process customers' checks.
1967	Barclays Bank opened the first ATM in England.
1989	The first call center for direct banking was put into service at Midlan Bank.
1994	Founded by Stanford Federal Credit Union, the first financial institution in the USA to offer internet banking services.
1996	Netbank, the first internet banking application, was established in the USA under the name of Atlanta Internet Bank.
2000	Discover Financial Services in the USA and France and ING direct Banking started operations in Skandiabanken Nordic countries.
2001	Yodlee, the first bank account using server technology, increased the number of internet banking users.
2005	Rabobank launches branchless banking with Rabo-direct in the Netherlands
2008	With the partnership of wireless operator KODI and Mitsubishi in Japan, Jibun Bank and in Australia NAB started to serve as new actors in digital banking.

2009	Fidor, which provides only online service in Germany, is Simple and Ally in the USA, and Bitcoin, which is accepted as the first digital currency, was launched.
2010	Rakuten Bank opened in Japan.
2011	First Direct launched the first mobile app in the UK.
2012	Alior Bank (Poland) and Knab (Netherlands) started to serve.
2013	N26 has obtained the bank license. Hello Bank (France), Intsabank (Russia) and mBank (Poland) started their activities.
2014	They established Tencent WEbank and Ant Financial MY bank.
2016	Innovative Mobile Banks Monzo and Revolut launched in the UK.
2017	The digital banks 'Atom Bank' and 'Starling' started to give loans to their bank users.
2018	In 1 minute and 36 seconds, £1 million has been accumulated in Monzo, the digital bank, which has been given an official status in the UK.
2019	With the increase in banks using API, open banking has started to take an active role in the USA, China, Canada and most European countries.
2020	By launching the "Facebook Bank", Facebook has started to offer its own cryptocurrency-backed spending comparison services.
2021	Amazon has launched a checking account for individuals with spending advice, POS financing options, and access to Amazon Go branches.

Source: https://www.retailbankerinternational.com/comments/history-digital-banking/

Internet banking has taken the place of telephone banking applications due to the internet's global expansion since 1995. In 1997, İşbank was the first bank in Turkey to implement internet banking software. As customers rapidly adapted to this system, Garanti Bank released the application on the same day. In 2007, with the advent of smart phones, İşbank introduced the first mobile banking application. With the advancement of technology and the increase in the use of smart phones, the banking industry has continued to develop mobile banking services (Tuna, 2023). Mobile banking applications are currently replacing internet banking. After credit cards, telephone banking, internet banking, mobile banking, fintech, open banking, digital banking, block chain, etc., the final stage of the digitalization process in the banking sector has reached a point where concepts are now being discussed.

In conventional banking, face-to-face transactions slow down and increase the cost of transactions. All banks direct the majority of their consumers to non-branch channels. Through mobile applications, banks can provide remote account opening, digital credit, insurance, etc. It offers numerous services remotely. Performing these transactions through applications incurs expenses for the bank. Digital applications that supplant human labor and alternative distribution channels are the most crucial cost-saving factors for institutions. The benefits of digitalization for banks include efficiency, cost advantage, presence, competitiveness, and agility. Banks are renewing their digital platforms and investing continuously in this area in order to simplify their customers' transactions and service them across all channels. They analyze consumer requirements and create applications that provide intelligent solutions for them. Applications such as artificial intelligence technologies and voice assistants enable consumers to respond and conduct transactions in a very timely manner. Every day, the evolution of these systems gives the concept of customer representation in banking a new dimension (Akdemir, 2020). Through digitalization, multiple banking services can be accessed via a single application. In order to compete with large technology firms and fintech ventures that offer innovative products and services, banks should strive to produce products and services with the same level of quality and flexibility. Through technological applications such as artificial intelligence, cloud computing, and the internet of things, banks are continuously modernizing their processes. Thus, they enhance the customer experience, accelerate processes, and provide a cost advantage.

Digital banking enables consumers to conduct banking transactions via bank distribution channels (Bulut and Cizgü, 2020). It accelerates the growth of digital banking in this environment. In this context, digital banking provides consumers with all types of banking services via phone, computer, tablet, or television without requiring them to visit a bank branch (Noyan and Gavcar, 2020). Alternative distribution channel (ADC) refers to a variety of banking channels besides bank branches. The primary ADC channels include automated teller machines, telephone banking, Internet branch, mobile branch, and point-of-sale machines.

1. Banking Services at ATMs

Self-service technologies are designed to provide consumers with the ability to receive services at any time. The use of these technologies in banking is intended to simplify

operational matters. Additionally, it reduces the burden on employees who are assigned to perform these tasks. In this manner, the extension of the workday is prevented. Self-service technologies are commonly regarded as a means to reduce banking transaction costs. The earliest form of self-service banking services was the automated teller machine (Oua et al., 2009). For the first time in the world and in Turkey, ATMs were used to relocate banking operations out of branches (Tüzün, 2020). In this context, ATM is an electronic device that enables clients to conduct financial transactions without visiting a bank branch or interacting with bank personnel, and transmits these transactions to the relevant financial institution (Ceylan, 2010).

2. Telephone Financial Services

Shortly after the invention of the first telephone in the United States, telephone banking was introduced for the first time. In this regard, call centers serve an important function. With the adaptation of call centers to banking, telephone banking has become more prevalent (Akolu, 2003). The growth of direct marketing opportunities in telephone banking has been significant (Akçetin and Çelik, 2015). In this manner, banks attempt to increase revenue through information transformation, customer acquisition, and profit margin. Particularly as a result of telephone banking, speed and convenience in banking services are offered, and significant operational cost reductions are realized (Isin, 2006).

3. Internet Financial Services

The banking sector, which plays a significant role in the global economy, benefits significantly from advancements in communication and computing technology, and as a result, banks create new distribution channels (Çabuk and İnan, 2005). The use of advancing technology in the banking industry prompts banks to diversify the services they provide to customers and to take steps to improve service quality (Uzun and Berberolu, 2017). Banks enabled internet-based banking transactions through this procedure. In this context, internet banking has become an integral part of commercial and economic life due to the innovations it has made in the service sector as a result of the advancement of technology (Bayraktarolu, 2012). Although there are numerous benefits for banks and consumers, there are also a number of disadvantages (Savaş, 2011). Internet banking provides consumers with a variety of services, including inter-

account money transfers, electronic fund transfers, automatic payment orders, foreign exchange trading, stock trading, credit card payments, and fund trading (Diker, 2011).

Internet banking has acquired significant momentum in the sphere of digital banking over the past decade. In addition to all of these, internet banking has recently begun to diversify. With internet-capable mobile devices, content has become more comprehensible, and transactions can be conducted from anywhere with internet access. Cell phones are currently an integral element of people's existence. Consequently, they are no longer merely communication tools, but also mobile terminals with commercial and entertainment functions. Mobile banking entails conducting banking-related transactions via mobile devices. In other words, a mobile terminal is utilized when conducting monetary transactions (Krassie, 2002). Mobile banking is an extension of internet banking that combines digital finance and mobile communication. The most essential aspect of the concept of mobile banking is that customers connect to the data system of the bank from which they request services via mobile communication channels and conduct certain financial transactions.

The growing popularity of smartphones has increased consumers' interest in mobile banking. Both banks and consumers can benefit from mobile banking (Ozcan et al., 2019). Customers interact with the bank via mobile phones and personal digital assistants (PDA) in mobile banking. Initially, there were applications such as SMS banking and WAP banking, but with the proliferation of smartphones, a new technology emerged that enabled the provision of more advanced services. Banks have been able to promptly adapt to mobile banking due to its potential benefits (Seyrek and Akşahin, 2016). With mobile banking applications, however, customers have immediate access to their bank accounts and can conduct banking transactions from anywhere. Using these channels, banks use advanced technologies to generate new revenue, reduce operational expenses, and increase market share, while simultaneously developing new products and services to satisfy customer needs (Korkulu, Oktay, & Akan, 2018).

4. Point-of-Sale (POS) Services

In today's society, the majority of monetary expenditures are made via POS devices. In this manner, point-of-sale devices have acquired a prominent position within the monetary system. In numerous ways, POS terminals facilitate monetary transactions

between consumers and merchants. The most significant benefit is the ability to conduct financial transactions with a bank card without using an ATM (Varc, 2015). In this context, banks compete to process credit card purchase and sale transactions over the POS network (Demirel, Keskin, Ülgen, Yozgat, and Baş, 2011). Thus, the ability to transmit funds and make payments via an electronic system became feasible.

2.4 Open Banking Definition

The rapid advancement of technology has revealed the need for an innovation in order to provide quality service, digitalization, and keep up with the times in the finance industry and many other disciplines. Banks have approached cautiously, as creating such technological advancements within their own bodies would incur significant costs. From this perspective, fintechs strive to provide technologies that offer quicker and more efficient solutions by eliminating the complex, procedural, and time-consuming structure of traditional finance and banking transactions (Aksey and Bilgel, 2019). Fintech activity spread quickly to several fintech verticals. They are present in 22 out of the 36 financial service domains, with payments and money transmission having the highest concentration (Hanafizadeh & Amin, 2022). Banks have been successful in protecting their revenue in large part and facilitating the introduction of fintech despite the growing threat posed by these potential competitors. Due to their frequent reliance on banking infrastructure, licenses, clientele, products, and data, fintechs are compelled to collaborate with established players (Enriques & Ringe, 2020).

Open banking is an innovative banking strategy that has emerged in the last decade. The key to its emergence is expanding access to financial services for customers. Understanding that banks collaborate with other financial institutions, third-party service providers, and even consumers has shaped this strategy. Open banking is based on API technology, a standard for data sharing that enables consumers to share their financial data, account information, payment histories, and other financial information. API is a collection of programming tools that enable software applications to communicate with other software applications or computer systems. An API;

a) contains a set of identifiers that perform a specific function; using these identifiers allows other applications to perform a specific action or receive a specific service.

b) is used to facilitate the sharing of data or processes within an application or system.
c) specifies the set of commands required to invoke a specific application function.
d) defines a set of commands used to perform a specific application function and makes those functions accessible to other applications.
e) denotes any interface that connects the database of a service to an external application.

In general, APIs facilitate the safe transfer of data from point A to point B. In other words, it permits independent platforms to communicate with one another. In open banking, APIs serve as the link between financial institutions, third-party providers, enterprises, and consumers.

The use of APIs enables banks and fintechs to jointly provide banking services. This interface facilitates communication and synchronization between a bank's database or services and applications or programs from other companies (Chakray, 2022). According to Gozman, Hedman, and Sylvester (2018), open banking allows outside developers to create products and services based on the infrastructure of financial institutions. In other words, APIs decouple the financial value chain, allowing third-party providers to design and deliver services. Collaborations between banks and fintech firms result from banks' need for quicker access to innovation. Internal innovation is hampered by bureaucratic, complex governance frameworks, and cumbersome legacy systems. The element that unifies all definitions of open finance is "change." On the basis of this widely held belief, it is presumed that this transformation is possible in all dimensions. This new structure, which is intended to recreate, alter, or eliminate the extant morphological components of the financial system, can be viewed as a new business ecosystem based on a variety of principles. Essentially, these principles are as follows:

a) A high level of customization and personalization of the product and service offering, accomplished through an in-depth and immediate understanding of the client's financial circumstance and meeting any need with a broad product offering;

b) A broad product offering that meets any need; and customer focus, customer experience, simplicity of use, and use of processes and tools based around convenience, which may include a redesigned process (such as a streamlined sales application) or the introduction of a previously unavailable offer.

c) Data wealth refers to the pervasive accumulation and application of information to facilitate business processes.

d) API-connected ecosystem in which new product configurations are offered by connecting partners (or competitors) via APIs.

Given the prevalence of digitalization and fintech in the banking industry, the first three explanations are fairly standard and offer little insight into the essence of open banking. However, the final point is within the ecosystem and between ecosystems. The connection relies on the pervasive use of APIs, which conveys an innovative message.

Open banking will provide a solid bridge to the next set of technologically based online banking definitions with the following tenets.

a) New technology platforms that create the environment/infrastructure to connect market participants by increasing the level of multi-channel access to products/services; new technology platforms that create the environment/infrastructure to connect market participants;

b) Technological third-party services from outside the banking world but integrated into the financial ecosystem; here in the narrow sense, open banking is also attributed to account collection (scanning information of customer products distributed across many financial institutions);

c) Finance liberation through PSD2: regulatory forced technological collaboration layer allowing for more open interactions, diluting the ever-present issue of captive banking. Open banking, which introduces a new perspective to the industry, has the potential to offer numerous advantages to consumers, financial institutions, and the economy. Open banking promotes greater competition in the financial sector by allowing new entrants to offer innovative financial products and services that compete with those of

established institutions. However, banks and other financial institutions can create new financial products and services in partnership with third-party service providers. These innovations can help increase the competitiveness of financial markets and improve customer service. Open banking can improve customer experience and increase customer loyalty by enabling financial institutions to analyze data, provide services that are more tailored to their customers' needs, give customers greater control over their financial data, and facilitate access to a broader array of financial services. Thus, financial institutions can increase customer contentment by providing services that are more in line with their expectations.

d) Improved financial management: Open banking makes it simpler for customers to manage their finances by granting them access to a broader selection of financial products and services and allowing them to view all their financial information in a single location. By utilizing the services of multiple financial institutions, clients can meet their own financial requirements more effectively. A consumer may combine a bank account with an investment account, or link a credit card account to the payment system of a distinct financial institution.

e) Enhanced financial inclusion Open banking can aid in enhancing financial inclusion by providing access to financial services to marginalized individuals and enterprises. Due to limited access to financial services, many people remain financially excluded, particularly in developing nations. Their access to financial services and level of financial inclusion can be increased through open banking.

f) Enhanced security: Open banking requires banks and other financial institutions to take robust security measures to protect customer data, which can reduce the risk of fraud and cybercrime.

g) Cost reduction: There may be a reduction in the number of intermediaries used by financial institutions as a result of APIs. This, in turn, can reduce transaction costs, allowing financial institutions to provide services at reduced rates.

h) Innovation: Through open banking, financial institutions can serve various customer segments or develop new business models. Additionally, open banking permits financial institutions to utilize new technologies.

i) New actors: The availability of APIs enables financial institutions to offer additional products and services to their customers, while also permitting third-party providers to serve customers. This can result in the emergence of new enterprises in the financial sector and the expansion of access to financial services.

Open banking, despite its many potential benefits, presents a number of challenges and hazards.

a) Open banking involves the sharing of sensitive financial data, which raises concerns about data privacy and the potential misuse of consumer data. Opening APIs, exchanging data, and integrating financial institutions can result in security vulnerabilities. Therefore, stringent regulatory requirements and standards are necessary to ensure the security of open banking applications. To ensure security, financial institutions should utilize APIs with specialized designs and implement user authentication and authorization methods.

b) Cybersecurity: The increased sharing of consumer data and use of application programming interfaces (APIs) create new cybersecurity risks, such as data breaches and the possibility of cyberattacks. To ensure security, financial institutions must utilize APIs with specialized designs and implement user authentication and authorization methods. Additionally, regulatory standards and customer confidence must be addressed. Financial institutions should implement an open and transparent disclosure policy and establish a secure infrastructure for storing and sharing consumer information.

c) Regulatory compliance: It also provides various solutions for addressing challenges such as open banking practices, regulatory standards, and consumer confidence. With the PSD2 (Payment Services Directive 2) regulation, the European Union added numerous new open banking requirements. These regulations require financial institutions to comply with certain open banking practices standards. Similar regulations have also been enacted in other nations. To participate in open banking, banks and other financial institutions must comply with a number of regulatory requirements, which can be complex and time-consuming.

d) Technological obstacles Open banking necessitates the use of complex technology platforms and application programming interfaces (APIs) that can be costly to implement and maintain.

e) Customer confidence: The success of open banking is contingent on customers' confidence in the security and privacy of their financial data. Customers will want assurances that their personal and financial information will not be misused and will be shared securely. Consequently, financial institutions should implement a policy of open and transparent disclosure for open banking practices. In addition, a secure infrastructure for storing and exchanging consumer data should be established. If customers lack confidence in open banking, they may hesitate to partake.

2.5. Development of Open Banking

The concept of banking services is evolving swiftly on a national and international scale. The rapid technological movement and development is the reason for the diversification and pervasive use of banking services in the digital environment on a global scale. This process will increase the variety of banking services, resulting in development, change, and transformation. This cycle will continue as long as technological advancements remain consistent. This circumstance will necessitate the continuous evolution of understanding of service. In this regard, the classical concept of banking services has evolved in the modern era. In this process, technological advancements benefited banks by facilitating consumer access, reducing their workforce, and increasing their profitability ratio. The advent of fintech is fundamentally the foundation for the entrance of open banking into the financial sector. Knowing the present trends in market entrance for fintechs would be helpful in understanding their disruptive potential in the banking sector and how they affect the spread of open banking regulations.

Fintechs have brought about a multitude of innovations that can be broadly categorized into two types. The first type pertains to the provision of core banking services, while the second type utilizes advancements in general-purpose technology to enhance existing banking products and procedures. These advancements include artificial intelligence (AI), cloud computing, and distributed ledger technology, among others (Feyen et al., 2018). In the realm of financial technology, there are certain companies

that fall into a specific category. These companies provide software that allows for digital authentication and onboarding of clients, as well as programs that utilize algorithmic credit scoring. Additionally, there are companies that specialize in easing regulatory compliance, which is commonly referred to as RegTech. The companies, in general, lend their support to the provision of financial services. The advantages of banks incorporating their services are evident. By doing so, they can simplify their operations, reduce expenses associated with hiring personnel, and provide more reliable and affordable services. It is a rarity to come across fintech companies that provide fundamental financial services and directly compete with traditional banks. Typically, banks undertake a variety of interrelated tasks by engaging in a wide range of operations (Boot, 2016). Because of this, banks have increasingly learnt how to work with outside parties.

The use of APIs enables banks and fintechs to jointly provide banking services. This interface enables synchronization and connectivity between a bank's database or services and third-party applications or programs (Chakray, 2022). In banking (or, more generally, open banking), APIs "enable third parties to build applications and services around the platforms of financial institutions" (Gozman et al., 2018). In other words, APIs decouple the banking value chain, allowing third-party providers to develop and deploy services. Open banking is a comparatively novel concept that has gained popularity in the financial industry. It includes the use of open APIs (application programming interfaces) that enable financial institutions to share consumer information and facilitate financial transactions.

Open banking can be attributed to the 2008 financial crisis, which caused widespread loss of confidence in the financial sector. In response to this crisis, regulators around the globe initiated the implementation of new regulations designed to increase financial sector transparency and competition. The European Union’s PSD, which went into effect in 2007 and took effect in 2009, was one of the most significant regulations to emerge during this time period. PSD is defined as developing innovative payment services and establishing a single market for payments within the EU. PSD paved the way for open banking by mandating that banks grant third-party providers (TPPs) access to their customers' account information and authorization to initiate payments on their behalf.

The second version of PSD, known as PSD2, was released in 2015 and became effective in 2018. PSD2 mandates that banks make their APIs accessible to third-party providers, granting them access to consumer data and the ability to initiate payments on their behalf. This paved the way for open banking to develop in Europe and beyond. With the introduction of the Open Banking initiative in the United Kingdom in 2016, the concept of open banking acquired further momentum. The UK government, the Competition and Markets Authority (CMA), and the financial services industry collaborated to increase competition. Under open banking, the nine largest UK banks were required to develop APIs that enable TPPs to access account information and initiate payments on behalf of their customers. This has given rise to a number of new fintech companies offering innovative new services such as account consolidation, budgeting tools, and automated investment advice. Since then, open banking has continued to garner global attention, with similar initiatives launched in Australia, Canada, and Singapore, among others. The concept has also expanded beyond traditional banking services, with initiatives such as open insurance and open finance aiming to increase competition and transparency in the insurance and broader financial services sectors. Although open banking began in payment systems, it has since transformed into a new ecosystem by reshaping the relationship between parties in the payment world.

Open banking is redefining the nature of the relationship between customers and banks, and all actors in the financial services industry are swiftly moving towards a new era in which they establish multilateral relations among themselves. Open banking has the potential to change the delivery of financial services, making it easier for customers to manage their own personal money and providing them with access to a wider variety of financial goods and services. The open banking system, which has been characterized as the banking system of the future, provides numerous opportunities for fintech entrepreneurs. If customers give their permission, open banking enables banks to offer a wider range of services by sharing their customers' information with fintech entrepreneurs. Open banking can be defined as a banking system endowed with advanced technology that enables third-party service providers to access their financial information and conduct transactions, as long as they have the permission of bank customers (PWC, 2020). Open banking is a technique in the banking industry that gives API-based access to customer banking, transaction, and other financial data from banks

and non-bank financial institutions to third-party financial service providers. Consumers, financial institutions, and outside service providers can use inter-institutional accounts and data networking thanks to open banking. With the potential to completely change the financial sector, open banking is a huge source of innovation (Chappelow, 2020). Open banking is creating brand-new financial services ecosystem in which banks' responsibilities can shift significantly, encouraging innovation and opening up new markets for rivalry between banks and other financial organizations, all to the advantage of end users. Nevertheless, it also poses issues of regulation and data privacy, which helps to explain why global markets take various approaches to governance and contribute to varying degrees of progress (McKinsey, 2020).

3. OPEN BANKING

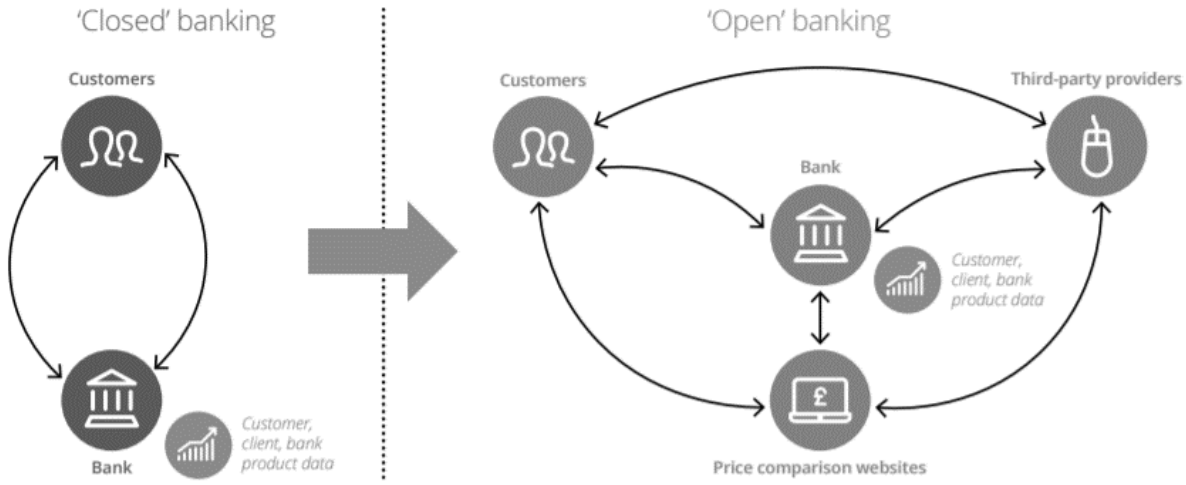
3.1. Open Banking Concept

One of the most important parts of financial trading services has consistently been customer information. Damme (1994) says that banks exist for a particular reason - to eliminate or reduce significant information asymmetries that cause difficulties in direct interactions between creditors and lenders. In the realm of financial services, the significance of data is on the rise, much like it is in various other sectors of the economy. The data is frequently referred to as the "new oil" in everyday speech (The Economist, 2017). This is so that more value may be extracted from the data by lowering the costs of data collection, storage, and processing (such machine learning, AI, and forecast algorithms) thanks to technological advancements. The trend towards open banking has caught the attention of policymakers in various nations. In response, they have either implemented or are contemplating implementing regulations that facilitate the acquisition and utilization of financial data. The objective is to promote innovation and competition in the market. According to various studies, open banking practices are on the brink of being adopted by over 80 nations (Babina et al., 2022).

The open banking approach that has emerged as a result of these developments differs from the traditional banking perspective in numerous ways, particularly in its structure and processes. Open banking is facilitated by APIs that enable financial institutions to share data. These APIs enable consumers to utilize their financial information by providing access to their accounts at various financial institutions. Customers' financial information is communicated in a more secure manner, and financial transactions are

conducted more quickly and easily. Open banking enables various financial institutions to offer more products and services using their customers' financial data, whereas traditional banking uses only its own products and services to meet customers' financial needs. Therefore, open banking increases competition and provides consumers with additional options. Open banking also provides consumers with more tools and resources to better comprehend and manage their financial data. For instance, financial management applications can assist consumers in better tracking their financial data and budgeting. Thus, the customers' financial situation can improve, and they can more easily reach their financial objectives. Customers' access to financial services is typically more restricted in conventional banking. Frequently, a customer's access to financial products is restricted to those provided by their bank. In addition, customer service at traditional banks is frequently limited, and response times to customer inquiries can be lengthy.

Table 2: Comparison of Open Banking and Traditional Banking Open Banking vs. Traditional Banking



Source: Deloitte, How to flourish in an uncertain future open banking

Open data means that customers are allowed to share the information their banks have on file with other service providers. Access to data is controlled by strict rules, and customer information is often returned in a standard file to make it easier to compare and analyze. Open banking, which is required by law, is made up of three parts that work together. Customers are the only ones who own the information about them, and they have the right to decide who can see it and why. When customers give their express

consent to share their data, it is a clear indication that they believe the benefits of the services they receive are greater than the potential risks to their privacy. This willingness to share personal information is a crucial aspect of modern business practices, as companies rely on this data to provide tailored services and personalized experiences to their customers. While there are certainly risks associated with sharing personal data, the fact that customers are willing to do so suggests that they trust the companies they are working with and believe that the benefits of these services are worth the potential trade-offs. The term "data portability" alludes to this idea as a subset of the larger concept of "active data rights."

Second, it implies that individuals have control over details about themselves in addition to being protected against others abusing or stealing their data (Asrow, 2022). According to the second idea, financial institutions have a motivation to keep their clients' information confidential and away from competitors. The way banks use client information on their own is insufficient economically. Society would gain more if economic middlemen who may profit from its usage shared data, as data is unique and the same information can be utilized by numerous economic intermediaries (Carrière-Swallow and Haksar, 2022). Customer data can make it hard for banks to compete (Dell'Ariccia, 2001). Existing customers gain from relationship banking because the bank can get a better idea of how creditworthy they are by using the private information they get from talking to their customers all the time. This lets them gain market power over their users and hurt their rivals in the process.

Letting customers share transaction information with any third-party companies they want should make it easier for people to get into the banking business and put more pressure on customers to shop around. This means that the cost of providing financial services goes down and that more new ideas are used. The fact that data is so important to fintech businesses is another reason why open banking policy are good (Wolberg-Stok 2022). In comparison to banks, technology businesses make better use of client data since they tailor their services to each individual. As a result, businesses may capitalize on the fact that their clientele varies and effect transformation in three crucial ways (Babina et al., 2022). First, fintechs may produce individualized services and products (such as financial planning and asset management). Second, using sophisticated data analytics tools, purchasers may better anticipate whether or not

customers would pay for specific products and services. This facilitates pricing differentiation. Service providers can increase their consumer surplus (mostly from willing-to-pay clients) and expand their customer base by catering to low-paying customers thanks to price discrimination. Fintechs commonly combine data from new sources with traditional banking data to make risk pricing and credit decisions faster and more accurate (Babina et al.,2022). Individually tailored projections that are more accurate. Risk is required to mitigate adverse selection, which arises from the scenario of "pooling equilibrium," in which both "good" and "bad" borrowers receive loans on identical terms because of the inability to distinguish between them.

People are optimistic about open data rules because they think the amount of data made by the financial business won't change. But the fact that open banking rules will make consumer data a public asset may change the motivation of customers and banks who are involved in making it. Customers can stop giving out data if they don't know how it will be used (Babina et al., 2022) or if they are afraid of having to pay because of it, like if the data shows that they're high-risk customers. One important question is when and if they will agree to share their banking information with third-party companies. As a result of their normal business, banks don't usually have to pay much to collect information about their customers. Relationship banking charges may no longer be applicable if businesses do not have exclusive access to client data, which might lead to a decrease in overall data volume (Carrière and Haksar, 2022).

Open banking policies necessitate alterations to banks' IT architecture to permit API access to client data by third-party suppliers. It is impossible to have open banking without open or public APIs, which anybody can use provided they adhere to the rules set out by the API provider or the law (Zachariadis and Ozcan, 2017). However, private APIs are employed when banks and fintechs collaborate on their own volition. These APIs are extremely specialized, not readily available to the general public, and bound by contractual obligations. It has been argued that "openness" does not have to imply "fidelity-free" API access (Zachariadis and Ozcan, 2017). A safe and secure system that makes it easy to share a lot of consumer data is not possible simply by mandating that banks build up open APIs. The first set of requirements is that data rights can be used in a variety of contexts. This encompasses both "passive data rights" (such as standards for data safety, hacking, and the proper use of data) and "active data rights" (including

the ability to transfer data, the aforementioned criteria for customer permission, and the right to remove or amend data). APIs provide some data rights protections into their underlying technical architecture and solution sets.

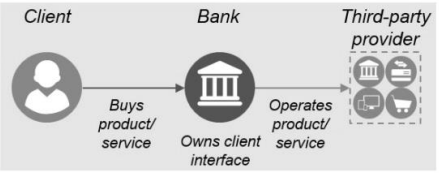
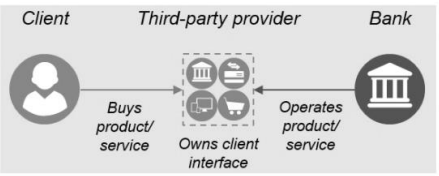
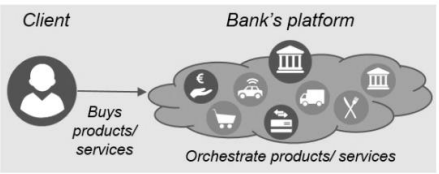
APIs are a collection of procedures for managing data functions and payloads, as well as connections and authentication (Cardinal and Thomas, 2022). In order to ensure that two systems may exchange information securely, they must follow certain criteria for communication. Present authentication standards allow trusted third-party sources to access client data without needing or gaining access to the customer's credentials by impersonating another entity in order to access their accounts. The data functions and loads determine the sorts of data (scope) that other sources can access. It is common practice to restrict access to data to "read-only," but granting "write" permission to third parties allows them to act on behalf of consumers. APIs may exhibit inconsistencies in their architecture and technical security standards. These inconsistencies may arise due to varying sources of guidance, including regulatory agencies, associations of industries, self-regulatory entities, and established best practices (World Bank, 2022).

Banks can make their own APIs in-house or buy a "ready-made" service from API companies. In addition to the data rights that come from banks' technical standards, all market players (banks, fintechs, and data brokers) who use APIs, handle data, or store data must follow an extra set of rules that make sure their systems work well. These rules may be incorporated into the open banking structure or may be established as a consequence of operational risk management protocols for licensing financial intermediaries/third-party providers or personal data security regulations. Data breaches, abuse, illegal logins, transactions, etc., are all connected problems. Determining accountability for system failures, such as fraudulent losses, between banks and third-party providers necessitates the implementation of open banking practices, modernization of regulatory rules, and unambiguous guidance. Market participants often encounter difficulty in establishing appropriate contractual arrangements to allocate responsibilities (Boms and Taussig, 2022). The second thing that needs to happen for an open banking policy to work is for API standards to be interoperable across the industry. This is in addition to setting up a complete and secure data exchange system that takes into account any customer protection problems that may come up. Interoperability refers to the capacity of external systems and

applications to connect with a source system's API without requiring knowledge of its features. This is achieved through the use of accepted data methods and a standard interface (Zachariadis, Ozcan, 2017). Standardization of data recording formats is also needed for interoperability. By ensuring that data maintained by one market player (incumbent corporations and fintechs) may be used easily by other market participants, unnecessary expenses associated with changing to a bespoke format can be avoided (Carrière-Swallow and Haksar, 2022). Adherence to common API standards is necessary for external sources to take advantage of economies of scale in data collecting, aggregation, and analysis.

As the open banking ecosystem expands, the central question is no longer whether to "play together" but how to maximize the new game. The three fundamental Open Banking models for institutions are "collectors", "distributors", and "managers. Each can be included in the bank's overall strategy depending on the business use case. In the aggregator model, banks sell on behalf of or in concert with a service provider, acting as agents. A clear use of aggregation is the supply of account information from many bank accounts. Under contrast, under a distributor model, banks handle what is eventually sold by a third-party supplier, acting as a pure service or product provider, akin to a point-of-sale consumer loan for home appliances. In this case, a third party (a retailer of home appliances, for example) owns the user interface. The most challenging choice for a bank is the third one—becoming an orchestrator. In this strategy, banks develop their own platform or standalone application with extra products or services, such as in-app purchases for parking, tickets, and the purchase of discounted items, among other things, that go beyond standard banking. Banks can offer this type of service by integrating ecosystems and third-party suppliers into their platforms. This puts the bank at the heart of the clients' everyday activities and makes it possible for them to handle their basic needs.

Table 3: Methods of Open Banking

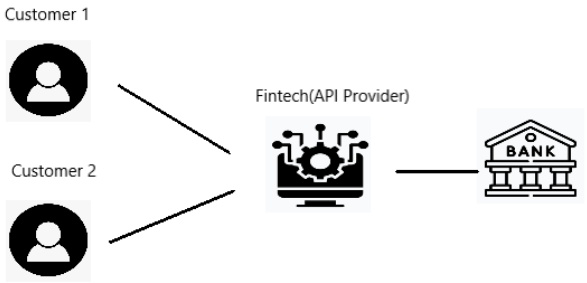
ARCHETYPES	DESCRIPTION	VISUALIZATION
AGGREGATOR	The bank aggregates products/services from third-party providers to enhance the bank's offerings and customer experience	
DISTRIBUTOR	The bank acts as a service provider for a third-party provider which owns the client interface	
ORCHESTRATOR	The bank provides a platform (marketplace) which integrates the bank's own and third-party products offering these to all clients in the market	

Source: https://www.bankinghub.eu/innovation-digital/open-banking-stays

3.2. Actors of Open Banking

Open banking is a process in which numerous financial sector actors collaborate to grant customers access to their financial data and the ability to readily transfer it between financial institutions. Customers, financial institutions, fintech firms, technology providers, and regulators are examples of these actors. Actors in this ecosystem collaborate for a variety of reasons, including providing access to customers' financial data, facilitating data exchange between financial institutions, innovating, enhancing the customer experience, and safeguarding the financial system's integrity. The open banking ecosystem is dependent on the cooperation of numerous actors. Interactions between financial institutions, fintech companies, technology providers, and regulatory entities contribute to the development and expansion of the open banking ecosystem.

Table 4: Open Banking Service Process



3.2.1.Customers

Customers, or beneficiaries, are one of the most important components of the open financial ecosystem. They are the central players in the open banking ecosystem and have access to their financial information. Due to the sharing permissions they have granted their banks, they have access to their financial information and can easily transfer between financial institutions. Open banking provides customers with an improved consumer experience and greater access to financial products.

3.2.2.Banks

It is a significant player in the open finance ecosystem. The primary responsibility of these institutions is to share the data they acquire from consumers who consent to having their information shared with other financial institutions. By providing access to customers' financial data as a result of the integration established to provide such a data flow, they help customers better comprehend their financial health and risk profiles. In contrast, with these integrations, financial institutions can attract more consumers and improve the customer experience.

3.2.3.Fintech Companies and APIs

Consumers today look for banks as well as mobile and internet solutions that offer simple, quick, and accessible payments. The advent of financial technologies (Fintechs), which are pushing the established financial entities to the brink of disruption, has been made possible by the rapidly evolving technical breakthroughs (Brodsky & Oakes, 2017). Fintechs are developing innovative methods for providing financial services and shaping the direction of the banking sector. In the open banking ecosystem, key players are often fintech companies that offer novel financial products and services. By allowing fintech businesses access to banking data, open banking promotes the development of more beneficial financial services for consumers. There is a huge market for fintech startups to go into as more and more financial apps go open source. The open banking ecosystem relies on the services of technology companies that were created within these institutions. These businesses offer APIs to financial institutions, allowing them to access customer data and connect with one another. Technology vendors contribute to the development of the open banking ecosystem. Within the open banking ecosystem, several apps created by IT service providers may

be utilized to get access to customers' financial information. These API programs allow for confidential information sharing between banks.

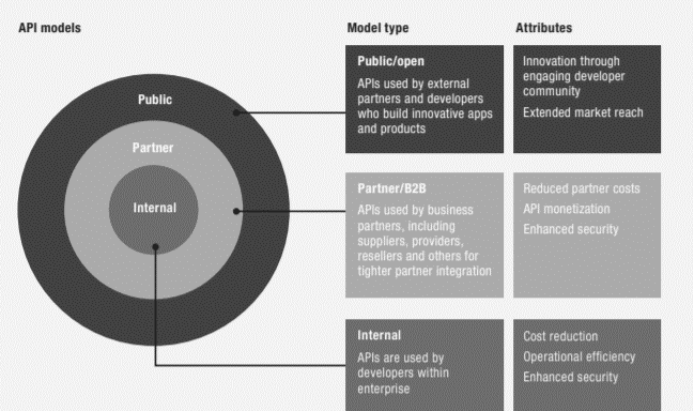
There are three distinct API categories that power open finance.

a) Internal APIs: These are internal to each bank or financial institution and are only used for information exchange within the same private system. They are not listed in public API directories, are unknown to the outside world, and cannot be accessed by outside parties or systems. They are administered internally through an API developer portal that safeguards API access and usage through authentication and authorization mechanisms.

b) Partner APIs: These APIs are designed for the business partners of the bank or financial institution. Partner APIs are not accessible to the general public, but are only accessible to a predefined group of users via authentication and authorization mechanisms. However, unlike internal APIs, partner APIs operate outside of the company's boundaries, necessitating additional security measures.

c) Public/Open APIs: These APIs are accessible to third parties, who do not need to be bank partners to utilize them. This form of API enables merchants to implement an innovative payment structure. They are listed in public API directories, where API developers can integrate them into their systems in order to further develop them.

Table 5: Types of APIs



Source: https://www.mckinsey.com/~/media/mckinsey/industries/financial%20services/our%20insights/data%20sharing%20and%20open%20banking/data-sharing-and-open-banking.pdf

Financial institutions are implementing a wide range of API strategies, including a mix of open APIs (interfaces based on public standards), partner APIs (interfaces based on standards created by key partners), and closed APIs (based on the bank's internal standard). Banks have implemented partner APIs and open APIs in several regions. It is reasonable to predict that more EU banks will embrace open APIs as a result of PSD2, as several have already begun adopting various API strategies. In addition, financial services are expected to have a more significant effect than other types of services. It is hoped that non-banking services would be made easier by the sharing of consumer data with third parties. Business services (accounting, expenditure management, tax, and budgeting services) and lifestyle applications (car-hauling apps, concierge apps, real estate apps, and entertainment apps) are expected to benefit the most from open banking and APIs.

The extent to which API banking affects banks' business models will likely be determined by factors such as the volume and kind of data shared, the number and type of new financial service providers, the volatility of market share, and the speed of change. Regulators, as a third-party entity, are crucial to the oversight and management of the free-flowing financial system. These bodies guarantee secure and ethical implementation of open banking practices by banks, while laying out the legal groundwork for them. They guarantee the proper implementation of open banking

practices and safeguard the financial system's integrity. In addition, regulators seek to make the financial sector more transparent through open banking. Consequently, the open banking ecosystem is a structure that enables multiple actors to collaborate in order to innovate within the financial sector and enhance the consumer experience. All of these entities comprise a structure known as the open finance ecosystem. This ecosystem enables financial institutions to access the financial information of their consumers, gain access to financial services more swiftly and easily, and make more prudent financial decisions. Simultaneously, the open banking ecosystem fosters financial innovation and enables more cost-effective delivery of financial services. Cooperation and coordination between these parties guarantee the implementation of open banking practices in a secure and ethical manner. In addition, the development and expansion of the open banking ecosystem generate a significant tide of innovation and change within the financial sector.

3.3. Legal Regulations

The "Payment Services Directive (PSD)", which was published by the European Union in 2007 and has begun to be implemented in all countries, is regarded as a cornerstone in the field of financial technology. With the "European Union Payment Services Directive (PSD1) No. 2007/64 regarding payment services in the European Union and Norway, Iceland, and Liechtenstein in 2009, the legal basis for payment service providers that can compete with the banking sector in the payment field was established. In January 2016, PSD2, which was devised in addition to this regulation, went into effect, and two new regulations were introduced to lay the groundwork for an open banking system. These are (PWC, 2019);

a) "Payment Initiation Services (PISP): The user-requested initiation of a payment order pertaining to the user's account at another payment institution.
b) Account Information Services (AISP): Arrangements for online delivery of consolidated information regarding one or more of the user's accounts at other payment institutions.

The member states of the European Union (EU) have until January 2018 to implement the PSD2 regulation in their national laws. The "European Banking Authority" (EBA) is an institution entrusted with ensuring the implementation of regulations regarding financial institutions in the EU. All service providers providing services within the

scope of PSD2 must be registered by the EBA once they have been authorized by the governing bodies in their home countries, in accordance with the conditions outlined in the regulation. By removing data sharing from the initiatives of banks within the scope of the open banking system, one of the most significant issues brought to light by these regulations is making data sharing a requirement.

In addition, even if they are not required to comply with the capital adequacy requirements determined by the EBA, they are expected to purchase a liability insurance policy, the minimum amount of which is based on the size of the activity, in order to ensure that they can carry out their activities without interruption. Customers using open banking applications in the European Union are required to have previously obtained eligibility, but they have the right to revoke this eligibility at any time upon request.

The United Kingdom is among the most industrialized nations in the financial sector. According to research conducted by the UK Competition and Markets Authority (CMA), which administers the "Open Banking Initiative," "older and larger banks do not have to compete hard enough for client business, and smaller and newer banks find it difficult to expand. This means that many people overpay for their banking activities and cannot take advantage of new services." (Deloitte, 2017.) As a result of these issues, CMA has focused on increasing competition between and among new entrants and residents through innovations centered on the quality of service and product received by consumers of banking services. Large retail banks will be required to establish standards for APIs (Zachariadis and Ozcan, 2016). These APIs will have both read and write capabilities and will make transaction data from personal and business accounts accessible to third parties. In addition to enabling third parties to initiate payments without the use of credit or debit cards, a related benefit is that financial institutions become more transparent regarding their product offerings, customer satisfaction ratings, and other service level indicators. In addition, with the implementation of PSD1 and PSD2 when the United Kingdom was a member of the European Union, nine major institutions converted to open API applications. The UK Competition and Markets Authority (CMA), which mandated the establishment of the Open Banking Enforcement Authority (OBIE) in 2018, issued the first open banking standard. In the same year, the second standard was also published. According to "OBIE" data in the United Kingdom, 118 companies have obtained open banking licenses as of 2019, with

200 companies' applications still pending (https://www.paymentsforum.uk).Taking into account the applications in the United States, "US The "Consumer Financial Protection Bureau (CFPB)" provides instructions for utilizing API applications, a secure data access method. The American organization "The Electronic Payments Association" is striving to ensure that all financial institutions have a standardized API system. In addition, American banks have established their own API systems and made them available to customers (Fintech Istanbul, 2019). Open banking is still being looked at in Canada, which will enable people share their financial information with third parties.

The United States (US) took a different method than the UK, which was built on standards. Section 1033 of the Dodd-Frank Wall Street Reform and Consumer Protection Act, which was passed in July 2010 as a reaction to the financial crisis of 2007–2010, says that customers have the opportunity to see their bank records. Section 1033 also says that banks have to give people all of this data in a way that they can use if they ask for it. But nothing is said about the right to send the data to a third-party service via an API. In 2017, the US Consumer Financial Protection Bureau released a set of non-binding rules that let people give informed permission for third parties to access their data without giving out their login information. So, these principles put into action the same idea that led to the creation of open banking. Even though some US banks have added APIs that allow customers to give third-party providers safe access to their banking data, many US customers still give FinTech companies access to their data by scraping their screens. US President Joe Biden issued the following Executive Order in July 2021 (White House, 2021): The Director of the Consumer Financial Protection Bureau is encouraged to consider, consistent with the procompetition objectives stated in Section 1021 of the Dodd-Frank Act, beginning or continuing a rulemaking under Section 1033 of the Dodd-Frank Act to facilitate the portability of consumer financial transaction data so consumers can more easily switch financial institutions.

With the 2018 passage of a law, data exchange through API applications is now legal in Mexico. The National Banking and Securities Commission will oversee these initiatives, which are legal, and the Bank of Mexico will provide additional information. In Switzerland, the development of API standards to encompass the entire banking system is not yet complete, and work on this issue is ongoing. This topic is handled by

the "Open Finance API (Swiss Open Finance APISOFA)" institution. The institution's objective is to develop a standard API for the complete finance system. Several African nations adopted data protection legislation modeled after the EU's GDPR, including South Africa's Protection of Personal Information Act of 2013. Open Technology Foundation advocates open banking in Nigeria and develops standard APIs for Nigerian banks. However, open banking is not extensively implemented in Africa. Developing nations with limited access to financial services would stand to gain the most from open banking (White et al., 2020). Because it is less expensive than opening physical bank branches, open banking has the potential to expand financial inclusion in developing nations with huge populations that lack access to traditional banking services. Therefore, open banking will not only benefit current banking clients but also make financial services available to the underbanked.

In Asia, open banking progress fluctuates depending on the jurisdiction. As a consequence of their early market entry and bold adoption of an open banking system, Asian nations have begun to achieve success. Hong Kong has made significant progress toward open banking in recent years. The Hong Kong Monetary Authority implemented open banking in four phases (Hong Kong Monetary Authority, 2022). Beginning in December 2021, gradually disclose account information.4. Beginning gradually in December 2021, transaction details will be provided. During the second quarter of 2022, the majority of the 28 participating institutions in Hong Kong introduced phases 3 and 4 for retail and corporate customers. Unlike the United Kingdom, where open banking is mandated by law, in Hong Kong, open banking is pushed by the financial institutions themselves. Actually, there are more banks involved in open banking in Hong Kong and fewer rules imposed on banks to execute open banking. FinTech firms find it harder to use open banking solutions because of the lack of standards in the industry. Several Hong Kong FinTech startups (such as GoBear, Planto.io, and MoneyHero) are making headway in providing their services through open banking despite the challenging climate for third-party providers. However, India has taken a more nuanced approach to open banking by encouraging partnerships between FinTech firms and conventional banks.

As part of a bigger effort to promote digitization and financial inclusion via open APIs, the India Stack provides the infrastructure underpinning India's open banking. A universal digital ID and a payment mechanism are only two of the features of the India

Stack. Instead of giving FinTech businesses free access to banking data via API and user consent, as is done in the EU and UK, the India Stack brings together FinTech companies and banks. India Stack's popularity and ability to serve financially excluded people in India and abroad have skyrocketed since the platform's debut. It's vital to remember that India Stack's goals and origins were different from those of the open banking initiatives of the EU and the UK. To facilitate further digitization and the maintenance of a single database, India developed India Stack. By contrast, the open banking policies adopted by the United Kingdom and the European Union aimed to empower customers with access to their financial information and boost competition in the banking sector. Growth in India Stack suggests it encourages new ideas and might be a model for use in fields and countries beyond India's own financial services industry. In contrast, open banking may learn from the EU's GDPR. The India Stack, on the other hand, is based on user permission rather than compliance, which may create privacy issues and reduce consumer uptake if a similar framework were deployed abroad.

In addition, Singapore is well recognized as an early adopter of open banking and is often cited as an example for the rest of Asia to follow. Singapore's open banking framework has the Monetary Authority of Singapore to thank for its introduction of API (Exchange), which promotes open API and financial innovation. The Monetary Authority of Singapore uses a staged approach to collaboration with the financial sector, much like its Hong Kong counterpart. Many Singaporean banks forge relationships or participate in API development with FinTech firms even if doing so is entirely optional for the banks. In 2018, the Monetary Authority of Singapore created API Exchange (Monetary Authority of Singapore, 2018) as a platform for cooperation between financial institutions and FinTech businesses.

Banks in Japan are not mandated to use open banking like their Singaporean counterparts. Many large banks and FinTech firms in Japan are making the switch to open banking. The Japanese government's financial regulator, the Financial Services Agency, approves of this move. Although the large volume of cash transactions in the Japanese economy is often cited as a reason for the country's comparatively late adoption of open banking in comparison to other parts of the world, this fact also highlights the enormous efficiency gains that can be achieved through digitalization and open banking in particular. Many banks in Japan are working together to build

payment infrastructure in preparation for open banking. These institutions include Mitsubishi UFJ Financial Group, Sumitomo Mitsui Financial Group, and Mizuho Financial Group, as well as Resona Bank, the Bank of Fukuoka, and the Bank of Yokohama (Lashuk, 2021). The pace of China's advancement towards the implementation of open banking can be characterized as comparatively lethargic. The current state of regulatory measures pertaining to open banking is notably lacking in substantial regards. The present study highlights the ongoing efforts of several Chinese banks to establish the requisite infrastructure for leveraging API technology and engaging in collaborative partnerships with fintech firms, with the ultimate aim of delivering cutting-edge financial services. The vast number of unbanked adults in China, estimated at approximately 225 million individuals (Demirgüc, Kunt et al., 2017), presents a significant opportunity for the implementation of open banking. However, the realization of this potential is contingent upon the establishment of a suitable framework for open banking. The success of open banking has been demonstrated in various frameworks, as evidenced by the UK and India. The suitability of open banking for a given country is contingent upon its economic, social, and regulatory milieu.

In 2016, the Republic of South Korea underwent a significant transformation in its banking system, transitioning to an open banking model. However, it is noteworthy that only a select few fintech enterprises were granted access to the coveted API application systems. The issue of consumer complaints arising from the exorbitant transaction fees has become a significant concern in the current economic landscape. In response to the imperative need to mitigate customer complaints, the South Korea Financial Services Commission (FSC) embarked on a strategic initiative in 2019 aimed at reducing the transaction fees associated with APIs by a factor of ten (Fintech Istanbul, 2019).

Considering Turkey, the concept of open banking has been on the country's financial agenda since 2013. With the 2013 implementation of the "Law No. 6493 on Payment and Securities Settlement Systems, Payment Services, and Electronic Money Institutions," the legal framework for fintech companies in Turkey has been established. The legal infrastructure of the digital world in banking and payment systems has been established in Turkey with the implementation of the second regulation. The revised statute went into effect on January 1, 2020. It substantially enhances the current open banking law in the Republic of Turkey. Moreover, the law unexpectedly stipulates that

the Central Bank of the Republic of Turkey, and not the Banking Regulation and Supervision Agency, will regulate payment services and open banking service providers. By January 1, 2021, the law will require all open banks and PSPs to apply for authorization from the Central Bank. Despite an amendment in the law that gives the Central Bank authority over open banking, Turkey has no plans to create its own open banking system. In contrast, Turkey is one of the first countries outside the European Union to implement the revised PSD2 due to its close ties with the European Union and the presence of numerous foreign institutions from the European Union. The "Banks and Electronic Banking Services Information Systems Regulation" was published in the Official Gazette on March 15, 2020 by the Banking Regulation and Supervision Agency. This regulation went into effect on 1 July 2020 and has a significant impact on banks, audit firms, technology firms that outsource to banks, and all businesses that offer "open banking" solutions. This directive includes topics on;

a) Installation and administration of bank information systems,
b) Bank information security,
c) Electronic finance services.

Beginning on July 1, 2020, financial institutions will be required by law to use two-factor authentication for customer account access and financial transactions. The rule exemplifies the use of an electronic signature, as well as the use of the Personal Identification Number (PIN) or biometric data found on the Turkish Identity Card. The safety of mobile apps is addressed under According to Rule 34, this is the case. This guideline states that "any software or mobile application offered by the bank to its customers for use in electronic banking services must be verifiable as the appropriate bank." All software and mobile apps used by a financial institution must be scanned for malware, and the appropriate upgrades must be made available to customers. Remote identification via a third party is addressed under Article 43 of the Ordinance. Permits the bank to use remote identification methods to identify a customer or person acting on the customer's behalf from another bank that has already performed the authentication event, either under the existing "Anti-Money Laundering Proceeds Act" or through open banking services. With this regulation, significant progress has been made in providing consumers with existing bank accounts with remote access to financial services. Thus, remote contract signature was made easier for financial institutions seeking to acquire new customers, and the scope of transactions that could

be conducted within the open banking system was expanded. It is not specified in the law under what circumstances banks in Turkey are required to share data with fintech companies. With the existing regulations, however, some technical standards have been established, albeit to a limited extent, in parallel with PSD2, and the technological framework for institutions that can conduct future transactions within the scope of open banking has been defined.

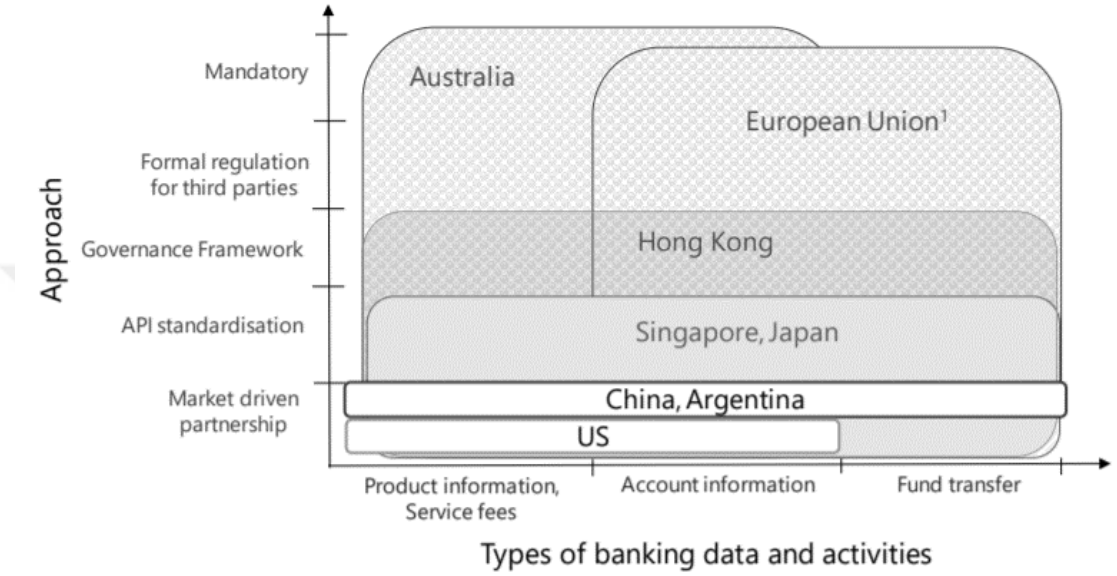
The regulation delegates to the Central Bank of the Republic of Turkey the authority to regulate the procedures and principles governing data exchange in open banking. However, it is anticipated that the forthcoming regulations will clarify the conditions under which banks must share their data with other fintech companies as part of the open banking system. In the secondary regulations planned for the open banking system, it is therefore necessary to explicitly define the limits of standardization of data sharing in accordance with the expectations of the banking industry and to take steps to assure data security. From the perspective of fintech initiatives, it is of the utmost importance that the obligations do not make logging into the system difficult, and that there are provisions supporting data privacy and straightforward usage applications for consumers who will use these applications. Collaborations with financial technology companies play a crucial role in the success of Turkey's open banking system. With PSD2 the structures and operations of third-party service providers that operate between institutions and customers have already been determined. While the banking sector focuses on core competencies, they will connect financial technology companies that will develop new business models based on these API applications. As a result, they will achieve significant savings in transaction costs and maximize revenue growth while ensuring customer satisfaction. With this win-win logic, both fintech ventures and banks will be successful, and consumers will have access to more convenient and high-quality services.

3.4. Open Banking Developments in the World

Regarding open banking, it is evident that there is no global "one size fits all" solution. Others have less developed open finance ecosystems than others. Others require one-to-one contracts and connections between institutions and third-party providers and offer standard APIs.

This intricate environment is not likely to alter in the immediate future. There are a number of reasons why countries conduct business differently, including regulatory pressure, market dynamics, local competition, and even cultural perceptions of data security and confidentiality.

Table 6: Comparison of Countries Comparison of Open Banking Frameworks



Source: https://www.bis.org/bcbs/publ/d486.pdf

3.4.1. Open Banking in the EU

PSD1 or Payments Services Directive was created by the European Commission at the end of 2007 in an effort to increase competition and non-bank participation in the payments industry. It emphasized consumer protection and payment providers' and users' rights and responsibilities.

In 2015, the European Parliament approved a proposal from the European Commission to protect online and mobile payments with new regulations. In 2018, this new proposal, PSD2, would become effective. PSD2 made banks accessible to third-party providers, necessitating that banks provide an interface, which they typically did by developing APIs that allow third-party providers to directly initiate payments or request account information. In addition, PSD2 introduced Strong Customer Authentication (SCA), which entails the use of two authentication factors to satisfy new security requirements.

PDS2 had a profound effect on open banking, as it made electronic payments more secure, boosted innovation, and encouraged a tremendous increase in API development.

PSD2 went into effect on January 13, 2016, and member states had two years to implement it into national law. PSD2's primary objectives, according to the European Commission, are to:

a) contribute to a more integrated and efficient European payments market,
b) level the playing field for payment service providers (including new players),
c) make payments safer and more secure;
d) protect consumers;
e) encourage lower payment prices.

PSD2 encompasses third-party providers (TPPs), which was not the case with its antecedent from 2007. Revised Payment Services Directive (PSD2) is the foundation of open finance in Europe. PSD2 was implemented by the EU in order to bring an integrated and efficient payment system to Europe and to guarantee an equitable and streamlined transaction process on the European market. Without the implementation of this legislation, open banking in Europe would not be conceivable. While PSD2 addressed a number of concerns regarding payment security and transparency, its greatest benefit was that it stripped banks of proprietorship over consumer data. This has returned a great deal of control to the end user in terms of how they can interact with their account, allowing for much more efficient access to third-party companies to manage financial conditions.

This directive encourages alternatives to banks to enter the payment systems industry. Examining the number of open banking products offered on the European market over the past four years reveals a nearly eightfold increase. Legislation and achieved milestones demonstrate that all EU actors are keen to become acquainted with this new concept.

	Mar-19	Sep-19	Mar-20	Sep-20	Mar-21	Sep-21	Mar-22	Dec-22
Consumer	8	21	36	45	49	48	52	48
Small business	6	11	18	25	29	31	34	35
Both	7	20	37	48	68	75	76	76
Total	**21**	**52**	**91**	**118**	**145**	**153**	**161**	**159**

Figure 1: Number of Open Banking Products Released to the Market by Customer Type Over Time

Source: https://openbanking.foleon.com/live-publications/the-open-banking-impact-report-march-2023/intermediate-outcomes-adoption?_x_en_hist=true

Account Information Service Provider (AISP) and Payment Initiation Service Provider (PISP) are two new categories of companies that are emerging in current practice (KPMG, 2017). This directive grants AISP access to the account information of bank customers. These businesses have the ability to access consumer account information, collect and analyze data on the consumption patterns of one or more users, and draw meaningful conclusions from these data. By accessing a customer's bank account information, for instance, an AISP is able to observe the customer's savings in any bank and in any currency and provide investment advice based on the customer's savings. In terms of marketing, the ability to suggest services that a consumer may require based on fundamental customer information is of utmost importance. PISP, on the other hand, is the party that pays on behalf of the customer using the customer API supplied by the bank, with the customer's consent. This feature is revolutionary and will bring innovation to the industry in terms of inter-account money transfers. Currently, only the account holder possesses bank-issued cards, but this innovation has enabled the development of payment systems that do not require the use of a wallet. These two new players are truly companies that intervene between the bank and the consumer to produce more individualized and innovative software solutions. Due to the services they have developed, these two competitors are in a position to significantly impact the Fintech market's competition. AISP provides the service of administering all of a client's accounts on a single platform/interface. A user will be able to report instantaneously on the balance and transactions of all currencies in all of their institutions, based on the desired date and criteria.

3.4.2. Open Banking approaches outside the EU

The world of Open Banking is vast and diverse, with numerous efforts underway. The range of products and services offered, the timelines for implementation, the types of institutions involved, and the third parties involved all vary greatly. It would be impossible to list them all. All of them can be classified into two categories - market-driven or regulation-driven.

a)Market-driven: Several countries, such as India, Japan, Singapore, and South Korea, presently lack official or enforceable Open Banking regulations. However, their respective governments are taking steps to promote and expedite the implementation of data-sharing frameworks within the banking sector. The Monetary Authority of Singapore and the Association of Banks have released an API Playbook. This playbook is designed to facilitate data sharing and communication between banks and Fintechs. In Japan, the Financial Services Agency has taken steps to ensure that financial institutions are transparent about their Open APIs by requiring disclosure of the standards governing them. Additionally, the FSA has created a certification process for TPP and is encouraging financial institutions to participate in at least one TPP agreement by 2020. The majority of Japanese banks is making significant progress towards meeting the 2020 deadline and is giving serious consideration to this regulatory encouragement.

With no significant government initiatives promoting the development of open banking goods and services, the United States has also chosen a market-driven strategy. The creation of regulatory strategies to support the secure sharing of data in financial services was advised in a report from the US Treasury. There is currently little interest in pushing this project and releasing a single federal policy on Open banking due to the highly fragmented and state-based nature of banking and financial regulation in the United States, as well as a cultural aversion to "red tape." In an effort to gain an advantage over their competitors, the major banks in the United States have begun forming contractual partnerships with third-party companies to develop API-based solutions. These solutions serve as a means of both acquiring new customers and enhancing their existing customer base. The individuals in question possess a keen understanding of the strategic significance of open banking. Despite the absence of an industry-wide API strategy, TPPs often rely on screen scraping as a means of providing

customers with innovative services without having to establish contractual agreements with each individual bank. The situation poses a challenge for banks, which bear complete responsibility for their customers, even when TPPs engage in screen skimming without the bank's awareness. This occurs when TPPs obtain access to a customer's bank account using the customer's bank login information.

b) Regulations- driven: Hong Kong and Australia, have chosen to pursue a strategy that is driven by regulations. In the month of July in the year 2018, the Hong Kong Monetary Authority made public the Open API Framework. This framework lays out a four-phase plan for banks to utilize Open APIs. The first phase involves the sharing of information on products and services, while the final phase involves the sharing of information on transactions and payment initiation services. In the near future, banks will be mandated to furnish APIs to third-party providers (TPPs). However, it will be at their discretion to restrict access to only those TPPs with whom they have established a working relationship. Australia's approach and extensive scope make it a standout among other countries. As with other Open Banking initiatives, the Consumer Data Right Act (CDR) is currently in the final stages of development. Once implemented, this legislation will enable consumers to share their data with any third-party providers that have been approved by the relevant authorities. This will give consumers greater control over their data and allow them to choose who they share it with. On the other hand, the CDR places its emphasis on data policy as opposed to financial services. At first, the CDR (Consumer Data Right) will solely pertain to the banking industry. However, as time progresses, it will encompass all types of businesses. This expansion will involve the inclusion of the energy and telecommunications sectors.

Moreover, the Consumer Data Right (CDR) represents the initial component of Open Banking legislation that introduces the notion of "reciprocity." Further elaboration on this concept is provided below. The concept of open banking in the European Union and United Kingdom was initially introduced to encourage competition within the banking and payments industries. As time passed, it became evident that the subject matter extended beyond its initial scope. Open Banking holds the potential to revolutionize the financial services industry and beyond by serving as the basis for a diverse array of services and products. Its most significant contribution, however, may be in the creation of innovative structures for sharing data. It is expected that the

landscape of financial services will undergo significant changes due to data legislation, especially in terms of data sharing and portability. With the advent of Open Banking and data sharing, the boundaries between financial services and other industries have become increasingly indistinct. However, it remains uncertain whether the collaboration between financial services regulators and DPAs is adequate to address the challenges that arise as a result.

The European Union's General Data Protection Regulation, commonly known as the EU GDPR, has gained widespread recognition as the new standard for safeguarding personal data across the world. In the year 2018, two significant regulations, namely GDPR and PSD2, were implemented. Upon reflection, it is evident that while both rules aim to achieve similar objectives concerning safeguarding and transferring data, their individual designs make it difficult to integrate them in reality. The anticipated surge in data sharing due to Open Banking has prompted some countries, notably the US, to remain ambiguous about their intentions to reassess their data protection regulations. The widespread practice of screen skimming, which often goes unnoticed, is a cause for concern. Furthermore, the United States' reluctance to establish a definitive legal framework to address instances of fraud or data breaches is particularly troubling. With data breaches, customers find themselves with no significant control over the data they share, while a clear responsibility framework remains absent. According to PSD2 regulations in the EU, screen scraping is allowed by law. However, due to the GDPR guidelines, banks are being encouraged to develop API communication alternatives.

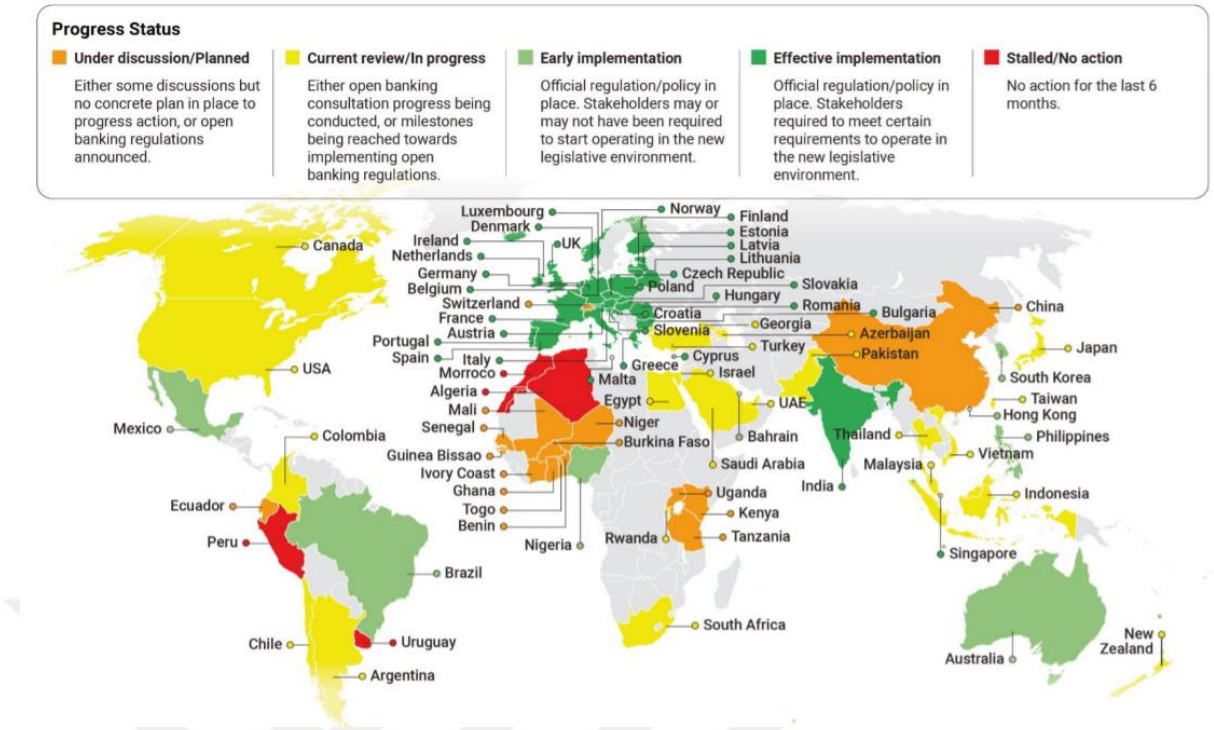


Figure 2: Open Banking Progresses over the World

Source: https://thepaypers.com/expert-opinion/open-finance-coming-into-focus--1259825

The adoption of open banking initiatives is a relatively new concept that is still in its early stages. In countries such as the United Kingdom, where Open Banking regulations have been fully implemented, there is still a need for businesses and authorities to enhance customer comprehension and expand scalability. Creating a secure and efficient environment for exchanging data across various industries is a task that will require a significant amount of time. The future seems to be centered on Open Banking and a larger cross-industry data exchange ecosystem, as believed by the markets. With the blurring of borders between financial services and other sectors, a significant shift is underway in the relationship between firms and their clients. This shift is also affecting how risk and liability are distributed among organizations and industries. In order to effectively respond to the challenges at hand, regulators must take a critical step and break down the silos that exist within their own regional and sectoral domains. This is crucial to ensure that the security and fair use of consumer data is given highest priority. In this new environment, any financial services company that desires success must conduct a comprehensive evaluation of its long-term strategy, technology, and

operational skills. In the future, it will be crucial for businesses to comprehend that granting customers full authority over their "data lives" will be essential from both a commercial and regulatory standpoint.

3.5. Open Banking in the Turkey

3.5.1. Historical Development

In order to remain competitive and develop, banks implement new technologies and services. They are all attempting to advance to the next stage of banking services by adopting open banking technology. It enables banking consumers to take advantage of the banking system by granting them authority over their data. Open banking can offer consumers access to multiple accounts from a single location, as well as product and service options that are unavailable through other banking applications. The open banking system is already in place in developed nations, and consumers embrace it. In Turkey, however, it has been implemented in a peaceful space over the past few years. The Turkish government has taken steps toward the development of an open banking system and issued corresponding regulatory guidelines. Parallel to the PSD regulation in the European Union, it was published in Turkey in 2013 under the title "Law on Payment and Securities Settlement Systems, Payment Services, and Electronic Money Institutions" with the number 6493, and payment-related concepts were added for the first time. The law defines payment systems, payment institutions, institutions for electronic currency, and payment service providers. The 11th Development Plan, drafted for the years 2019 to 2023, is a document in which Turkey's inventive financial concepts within the context of financial market policies are articulated.15 250.1. The statement "A road map will be created for the development of the Fintech ecosystem in Turkey, and a single public institution will coordinate its implementation" is included. In this context, it has been indicated that coordination will be the responsibility of the Finance Office of the Presidency. Article 250.5 of the Development Plan states, "Legislation alignment with EU Payment Services Directive 2 will be ensured in order to strengthen the open banking legal infrastructure." The concept of open banking was first incorporated into a development plan.

In the 2020 Presidential Annual Program, the following three items outline the activities and initiatives to be carried out in the context of compliance with PSD2 and the law.

The CBRT will be connected to the supervision of payment systems, and the essential arrangements will be made to enhance the efficiency of these systems. Regulation on Banks' Information Systems and Electronic Banking Services will be implemented. Work on the necessary legislative change for Turkey will be conducted in conjunction with the institutions with who must cooperate in accordance with the aforementioned directive. While the activities outlined in the first article were carried out in accordance with Law No. 7192, effective 01.01.2020, "The Law on the Amendment of the Law on Payment and Securities Settlement Systems and Electronic Money Institutions and Certain Laws," the legislation outlined in the second article was implemented by the BRSA on 01.07.2020. Due to the fact that the legislative provisions for Open Banking were implemented in 2020 as part of the 11th Development Plan, it was not included in the Presidential Annual Program for 2021, and significant legislative modifications are not anticipated until 2024. With the law number 7192, parallel modifications were made to the PSD2 regulation in law number 6493.

The most significant of these modifications are by Law No. 6493, the BRSA and the CBRT were granted separate responsibilities and powers; however, Law No. 7192 eliminated this duality and gave all responsibilities and powers to the CBRT. In accordance with the new regulation, in addition to regulating and supervising payment institutions, payment systems, and e-money institutions, the CBRT will evaluate operating permits and applications. In addition to the payment services outlined in the Law No. 6493, the Law No. 7192 defines three new payment services. These;

a) The payment order initiation service offered regarding the payment account in another payment service provider upon the request of the payment service user,
b) The service of providing consolidated information regarding one or more payment accounts of the payment service user on online platforms, provided that the user's approval is obtained,
c) It is expressed as "Other transactions and services reaching the level to be determined." The first two paragraphs of the PSD2 regulation in Turkish law pertain to account information service (AIS) and payment service initiation service (PIS). The law declares that the approach to open banking

will be consistent with that of the European Union as it establishes the framework for payment systems.

The CBRT and the BRSA drafted and promulgated secondary regulations to regulate the issues addressed in Law No. 6493, which have now entered into force. These regulations outline the framework for the responsibilities of the two institutions in the regulation of the operation. The purpose of the "Regulation on Payment Services and Electronic Money Issuance, Payment Institutions and Electronic Money Institutions" published by the BRSA in the Official Gazette on 27.06.2014 is "authorization and activities of payment institutions and electronic money institutions operating in Turkey, as well as payment services, and to regulate the procedures and principles regarding the issuance of electronic money." The purpose of the "Regulation on the Operations of Payment and Securities Settlement Systems" published in the Official Gazette on 28.06.2014 is "to regulate the procedures and principles regarding the operating license and activities of the system operators of the payment and securities settlement systems."

In accordance with Law No. 6493, payment institutions, electronic money institutions, issuance and payment services are regulated by the BRSA, whereas payment and securities settlement system administrators are regulated by the CBRT. This dual structure became a single structure in November 2019 as a result of law no. 7192. The duties and authorities were gathered before the CBRT in accordance with the second paragraph of Article 16 of Law No. 7192. The BRSA defined open banking for the first time with the "Regulation on Information Systems and Electronic Banking Services of Banks" (information systems regulation), which goes into effect on July 1, 2020. In addition to regulating banks' electronic banking services, this regulation defines open banking services. The Association of Payment and Electronic Money Institutions of Turkey was established, as mandated by Law No. 7192, to serve as an umbrella organization that unites the sector's actors.

Article 76 of the Banking Law No. 5411 was amended by the Omnibus Law No. 7247, which went into effect on June 26, 2020, to allow the establishment of a relationship between institutions and customers via remote access tools. The aforementioned BRSA regulation on information systems, which goes into effect on 01 July 2020, includes regulations on remote customer acquisition (digital onboarding). The "Regulation on Remote Identification Methods to be Used by Banks and Establishment of Contract

Relationship in Electronic Environment", which details the method of remote customer recognition and contract relationship establishment, was published in the Official Gazette on April 1, 2021, and the date of implementation was set for May 1, 2021.With the first paragraph of article 12 of Law No. 6493 on Payment and Securities Settlement Systems, Payment Services, and Electronic Money Institutions ("Law"), Payment Order Initiation Service and Account Information Service have been added to the CBRT-governed payments area. These two services are referred to collectively as "Payment Services Data Sharing Services" (PSDSS).

Guide prepared by the CBRT, "Regulation on Payment Services and Electronic Money Issuance and Payment Service Providers" ("Regulation") and "Communiqué on Information Systems of Payment and Electronic Money Institutions and Data Sharing Services in the Field of Payment Service Providers" ("Communiqué"), as well as the payment services outlined with the CBRT and the business models used in this field, and regulates the activity permits to be granted by the CBRT. AISP and PISP are the two classes of Payment Service Providers included in the scope of payment services data sharing services, according to the Guidance. Payment Service Providers that provide one or both of these services, assuming they have the requisite authorizations, are referred to as Authorized Payment Service Providers, and Payment Service Providers that have a payment account with them are referred to as ASP. Banks, electronic money institutions, payment institutions, and Posta and Telegraf Teşkilat A.Ş. are accepted as ASP per the regulations. PISP, on the other hand, initiates a payment transaction from the user's payment account at his Account Service Provider upon request, while PISP compiles the information of the payment service user's accounts at different APSs and presents it to the payment service user on online platforms from a single application. Certain criteria have been established for a service to be considered an "Account Information Service" in this context.

According to the third paragraph of Article 3 of the Provisional Law, institutions that provide Account Information Services are required to obtain an operating license from the CBRT. Contacting ASP directly and being technically, administratively, and legally liable to these parties; This service is deemed to be the Account Information Service if a contract is made with HHS to receive responses to inquiries made at specific frequencies over its own company's infrastructure. According to the Guide, an

operating permit is required for this service. However, if the customer himself signs a web services protocol and shares account activities with the account service provider where his accounts are located, and the account service provider does not enter into legal relations with the ASPs where the customer's accounts are located, the service provided by the account service provider is not considered an Account Information Service; rather, it is considered a Payment Order Initiation Service and is one of the activities associated with this service. Within the scope of the Guide, it has been determined that there are no objections if service providers who currently provide services to these two categories but have not applied for an operating permit from the CBRT act in accordance with the Regulation, the Communiqué, and the CBRT Instruction on "Contracts" dated 13 December 2021.

All of the mentioned regulations demonstrate that the digital transformation in Turkey is closely monitored and acted upon by the government. Although there are no mandatory provisions requiring banks to share data with third-party providers in Turkey, the laws and secondary regulations in place in Turkey, similar to the European PSD2 regulation, pave the way for open banking. It can be said that the development of financial markets in Turkey tends to take place within the confines of the law, as opposed to being influenced by market functioning. For this reason, it is crucial that the legislation is determined in a clear and understandable manner for the actors in the sector and those considering entering the sector. With the entry of a sufficient number of market participants, it is anticipated that banks will be required to share data, and that the terms of this obligation will be governed by new regulations.

3.5.2. The Potential of Open Banking in Turkey

Turkey provides services in the banking sector in a highly technological and innovative manner. Innovations emerging in the international arena are closely followed, and from time to time, it is at the forefront of innovations. Many statistics show the digital banking trend also confirm this idea.

According to The Banks Associations of Turkey (BAT) Banking Statistics, the total number of active digital banking customers (individual and corporate) reached 103 million 634 thousand as of June 2023. (While the data of the banks were aggregated,

the number of customers among the banks was not deduplicated). While 2 million 9 thousand people of this number made "only internet banking" transactions, 91 million 351 thousand people made "only mobile banking" transactions. The number of users performing both internet and mobile banking transactions is 10 million 274 thousand. And the increase in the tendency of customers to use digital banking in the graphic that started as of 2017 is an indication that they value the features found in financial technology services. It is possible to say that it will not be difficult for customers to adapt to the innovations in the banking field.

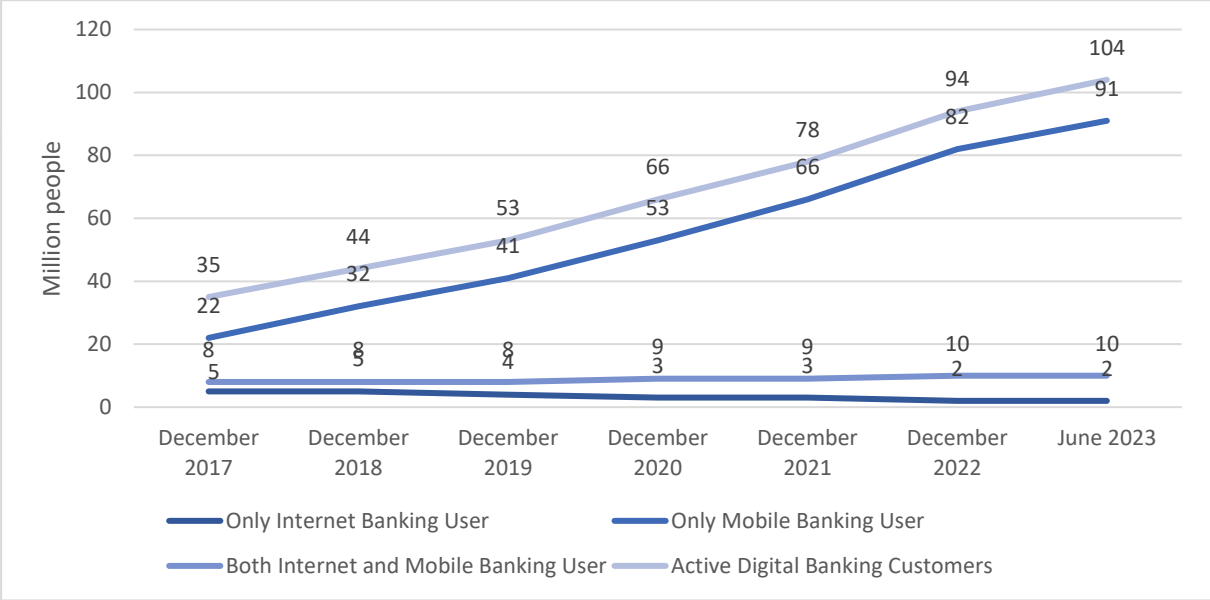


Figure 3: Number of Active Digital Banking Customers

Source: TBB

Additionally, the high number of fintech startups established in Turkey in the last 5 years is another indicator. 90 fintechs were established in 2018, but there was no regular and continuous increase in this regard. It can be said that the reason for this is that the sector reached its saturation point in a short time with a rapid start. So much so that it is possible to say that there is currently no area that has not developed within the limits permitted under legal regulations.

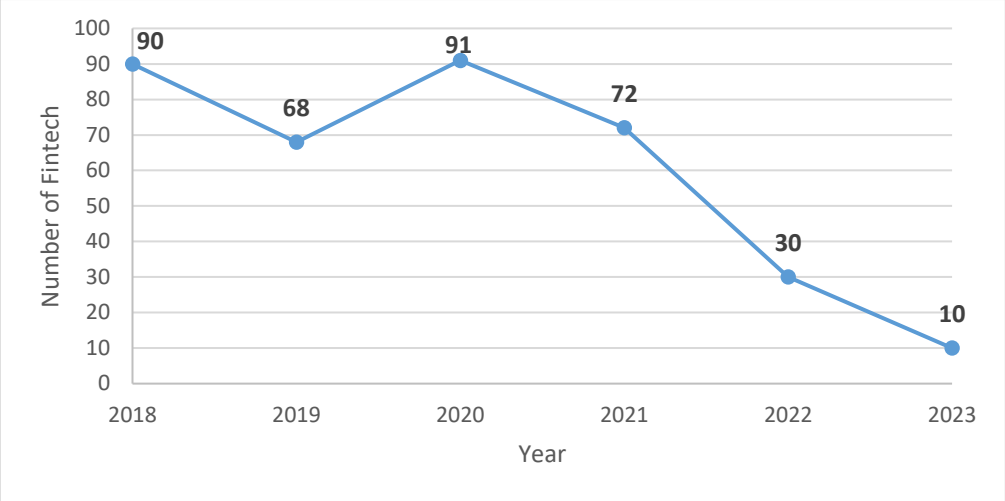


Figure 4: Number of Startups Established

Source: https://startups.watch

When the areas served by fintechs established in the last 5 years are examined, it is possible to say that they have replaced the necessary actors for banking in each of them. Apart from the areas shown in the chart below, there is no area that is needed but cannot be serviced due to lack of developers. However, looking at the graph again, it is possible to say that fintechs are concentrated in the payment field and remain distant from asset management. 260 of the 650 live fintechs operate in the field of payment systems. And only 8 of them are making advances in the field of asset management.

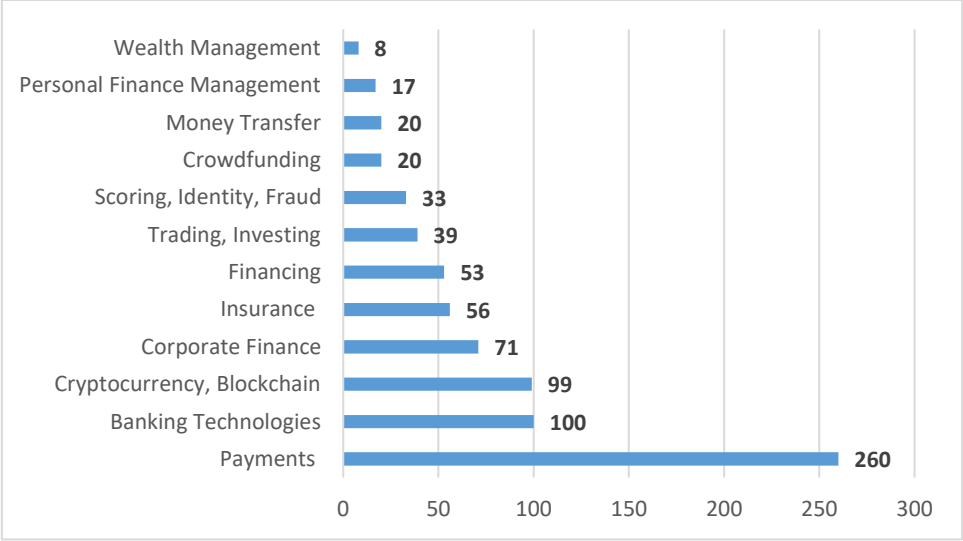


Figure 5: Service Areas of Fintech Companies

Source: https://startups.watch

3.5.3. Comparison with Multinational Banks Serve in Turkey

As PSD 2 brings more third parties into the European financial world, there is also a shift in how banks relate to their customers. To survive this change, banks need to push their creativity and make it easier for their customers to access third-party products and services. In this context, open banking activities abroad of multinational banks serving in Turkey are at an advanced level. Currently, Akbank, Albaraka Katılım Bankası, DenizBank, Garanti BBVA, Halkbank, ING, Kuveyt Türk, QNB Finansbank, TEB, Türkiye İş Bankası, Vakıfbank, Yapı Kredi Bankası, Ziraat Bankası and Ziraat Katılım Bankası provide open banking services in Turkey. Among these banks, those providing international services with their headquarters abroad are Albaraka Katılım Bankası, DenizBank, Garanti BBVA, ING, Kuveyt Türk, QNB Finansbank and TEB. However, open banking applications have not been developed in the areas where Albaraka Katılım Bankası, DenizBank, Kuveyt Türk and QNB Finansbank are headquartered. For this reason, the services provided by ING, Garanti BBVA, TEB (BNP) banks abroad within the scope of open banking were examined.

1-ING

ING is a global bank with a strong European base and serve around 37 million customers, corporate clients and financial institutions in over 40 countries. ING is one of the leading banks in digitalization and benefits from technology while trying to achieve its goals. The prevalence of digital channel use and service diversity in the European region proves this assumption once again. When viewed from the perspective of open banking, it can be seen that this bank stands out among its competitors. First of all, with the InsideBusiness Connect service it offers to its customers, it offers various secure connection channels to help its customers automate their treasury processes.

Customers using this service can record and track their payment files, control their assets, enter orders, cancel orders, etc. can do many operations. Moreover, direct access is provided not only within ING accounts but also to the entire ING network, including access to third-party bank accounts. ING InsideBusiness consists of 2 types of channels. Interactive channels provide a user interface for all daily banking activities such as

payments, cash management, trade finance, lending and financial markets. Connection channels enable automatic, secure and direct transfer of the payment and reporting files solution from the customers' ERP (Enterprise Resource Planning) to the bank. All of these channels can be self-managed centrally by corporate administrators authorized by the customer.

Also, financial institutions have a legal and ethical obligation to screen all cross-border payments to prevent money laundering, terrorist financing and doing business with individuals, companies and countries that are subject to sanctions. ING Transaction Screening Service will enable consumers to pre-screen their transactions against sanction lists. The service allows secure access to ING's screening system and can be integrated into consumer payment flows. ING entities and PSPs' (Payment Service Providers) can use this service to screen their transactions and continue based on the response. By pre-screening transactions against applicable screening lists, ING provide a global solution to help mitigate this risk. Payment Service Providers that use a split payment model for cross-border payments, they create 2 separate (domestic) payments from an international payment order and use an ING account for one of these payments, and they can utilize these control mechanisms.

Another service is Confirmation Availability of Funds. To make the payment process smoother, as a Licensed PISP, customers submit a funds availability confirmation request to ING, with a simple “yes” or “no” return as to whether funds are available in the relevant account.

In addition to these innovative open banking services, ING also provides integration of all bank accounts and payment initiation and request services to its customers.

2-BBVA

BBVA is a global group that continue its activities for more than 160 years, serves 89.3 million customers in more than 25 countries. BBVA is continuously investing in robust and reliable technology, leveraging advanced data analytics and artificial intelligence. With 14,1 million digital and 13,8 million mobile customers, the share of digital sales in total sales has reached 89% (BBVA,2023). The bank's open banking investments are also increasing in this direction. BBVA provides an interface that allows two computer systems to interact, such as a company's ERP system and BBVA systems. But as a result of this interaction, they also create a collaborative ecosystem that allows

customers and customers to anticipate their needs and to create more efficient services and deploy them on the platforms they already use. In short, it allows banking services to be placed exactly where they are needed.

Checkout Financing API is a service aimed at businesses. When businesses whose customers make recurring payments are integrated with this service of BBVA, they will be enabled to provide their clients a set limit, which will allow them to pay for their purchases in installments and shop until they hit the limit. The limit will be automatically renewed when each payment is paid. With a quick and straightforward online approach, it makes it simple for customers of businesses to receive funding while making payments, regardless of their bank. It provides a credit facility that they may now reuse with only a click, whether they are physical businesses or internet retailers.

The Fund Confirmation service allows payment service providers (PSD) and debit issuers of credit cards to validate in an instant the availability of money in their customer's direct debit account before performing their card payment, provided the account is available online. Businesses may be more confident in their collections this way, avoiding unexpected circumstances for their clients. Every day cash departments carry out manual repetitive tasks that are not only time-consuming but often lead to errors, therefore increasing exposure to operational risks. With this in mind, BBVA has developed a series of APIs to reduce these risks. Treasury Management APIs allow real-time access to BBVA services directly from customers internal systems, ERPs or other management platforms, improving efficiency and freeing up time for more valuable strategic processes.

With each customer's primary checking account, a number is connected to the Immediate Business Concentration (CIE) service. They can utilize this number to automatically and with a reference collect payments from their clients. Using deposits with a CIE reference and this API, businesses may increase the value of their CIE agreement. They can identify payments received at the request of their own clients in addition to having access to their funds from payment, regulating payments made or pending collections, removing the dangers of handling cash, and cutting operational expenses. It is an ideal solution to increase the efficiency of company's payments. They can save reconciliation costs, automate processes. Payments will be made from the account they choose and they will always know who, when, and how.

3-BNP Paribas

In France, Germany and Italy, BNP Paribas has adopted Worldline's technology, which integrates the electronic signing of SEPA mandates with account verification based on Open Banking. SEPA Direct Debit (SDD) is an automatic payment system that uses a signed mandate to pay one-time or ongoing payments in the Single Euro Payments Area. To lessen fraud in SEPA Direct Debit transactions, Worldline, a pioneer in international payment services, and BNP Paribas Cash Management have begun to collaborate. France, Germany and Italy are the first three nations where BNP Paribas has deployed Worldline's technology, which combines the electronic signing of SEPA mandates with account validation based on Open Banking. The remaining nations will follow in the future.

SEPA Direct Debit (SDD) is an automatic payment system that uses a signed mandate to pay one-time or ongoing payments in the Single Euro Payments Area. BNP Paribas Cash Management is the first to integrate an Account Validation solution into its current white-label product, EasyCollect, in order to reduce the risk of fraudulent use of another person's IBAN during the mandate signature process, a pattern that has been implicated in more than 60% of fraudulent direct debits. It improves SEPA Payment Suite and proposes an innovative extension, using Strong Customer Authentication and providing advanced security to eliminate the risk of IBAN misuse during the mandate signature process. This is done by combining the e-signature of SEPA mandates with account validation using Open Banking.

BNP also receives services for personal finance management (PFM) application from Axway company, which provides services for digital integration to companies. In this way, it allows users to collect financial information from multiple banks and financial institutions on a user-friendly platform. These app help users track spending, set budgets, monitor account balances, and analyze financial habits. PFM apps provide users with a comprehensive and unified view of their finances by securely accessing the necessary data from various financial institutions.

The way the mentioned multinational banks, which are also in Turkey, provide services abroad has changed day by day. In this context, it is impossible for developments, even basic concepts such as account merging and payment initiation, not to start in Turkey. ING Bank provides open banking services, including viewing all current bank accounts

on a single screen via ING Mobile and tracking fast and easy money transfer processes between accounts belonging to different banks. In this context, ING Bank has started these services as of 2022 (ING Bank, 2022). Garanti BBVA provides open banking service as an API provider. In this context, Garanti BBVA API Store is used as an open source application programming interface of Garanti BBVA.

While open banking makes progress in Turkey, it encounters some obstacles. First of all, legal regulations in Turkey are not compelling banks, unlike PSD2. In other words, banks are not obliged to share the data they collect from their customers with 3rd parties. For this reason, banks do not currently offer an inclusive open banking service. As a result, some banks do not yet offer open banking services at all.

On the other hand, in Turkey, the protection of sensitive data is strictly protected by law, and the customer profile does not show a voluntary tendency because they attach importance to privacy and security. Customers show a conservative approach to sharing their data with 3rd parties. Because data breaches are frequently on the agenda in Turkey.

In addition, there are conflicting and compelling issues among legal regulations. The main rule in the banking system for now is two-component authentication. It may also be possible with a single component authentication service for Open Banking service.

The fact that digital onboarding is a new concept in Turkey is an obstacle to development, but it is the starting point of open banking. Until recently, banks could only include people over the age of 18 in the process of becoming a customer remotely. It is legally a new process for legal entities to become customers with digital onboarding.

3.6. Effects on Banking

Open banking is expected to be more than just an interesting way to gather financial information; it will definitely have real and important effects. Multiple profit pools are at risk for a number of core banking products, which makes acquisition and franchise models impossible and makes the main account relationship less effective as an anchor. By making data more accessible, more hyper-targeted offers will be available, making it easier for customers to compare opportunities across providers. At the same time, improvements in payment and identity systems will make it easier for customers to take advantage of these offers. As a result, cross-selling high-margin credit cards,

collateralized lending, and spending up to a certain amount to get a new primary deposit relationship in the hopes of making money in the future will be less successful as services and retention rates go down and customers mix and match their banking. In the long run, these changes will speed up the platforming of financial services by separating product production from marketing. This is the trend toward platform banking as a new business model, and it shows how important it is to use customer interfaces that are entertaining. With access to large third-party product stocks through BaaS, these connections can make competition between products stronger. As a result, profitability per client and per product is likely to go down.

Also, because open banking has made financial data a commodity, those who compete for customer interfaces can get an unfair advantage by having access to proprietary data from financial activities and behaviors that are related to finances (for example, data generated by major life events and interactions caused by certain personality traits). This greater access can make it possible for interfaces to offer more customized products, services, and counseling than their standard competition. It can also help interfaces get closer to their clients, as has happened in the retail and media industries. In a world with many platforms, though, not everyone can succeed. Since it's a zero-sum game, more time spent on one platform means less time spent on others. So, in a platform economy, competition is likely to get tougher. To create a good open banking environment, banks are expected to use the following service ideas.

a) Constantly updating data-driven lifetime value estimates to keep costs in line with each client's needs.
b) Optimizing for high client-productivity interaction in order to keep close, deep relationships, especially since technology is expected to grow.
c) Putting together sets of data that are unique and can be defended in order to give financial help and services that are hard for rivals to copy.

Open banking is a novel concept for a financial system that enables customers to move their bank accounts from multiple platforms, not just the financial institution's app or website, and to share their account registration and transaction data with other regulated institutions. The customer serves as the starting point. They are the sole administrators of the information that was once kept in banks under their control. Users may pick and choose what data to reveal and to whom. The model has the ability to reshape society

since it is presently being applied and operationalized on a global scale, in contrast to a payment method, which only alters the user experience. Because third parties may create more effective, targeted, and specialized apps and solutions for a wide range of social niches and segments with access to an individual's data, this is where open banking's genuine promise rests. With open banking, a customer with numerous bank accounts may use account aggregator apps to see all of their transactions in a unified display; some apps can even move money between accounts if one has a negative balance. The same software, enhanced with AI, may help the user save money and get his financial house in order by suggesting better interest rate financial products.

Small and medium-sized enterprises (SMEs) will benefit from open banking since their accounting service provider will have access to all of their transactional data, allowing for improved cash flow management, payment reconciliation, and inventory management. It eliminates the need to export data from several sources before merging it into a single, cohesive whole. If the entrepreneur has better data, getting a loan at a reduced interest rate will be much easier. Before the advent of open banking, financial institutions followed a vertical model of production and distribution. Thus, the bank created, disseminated, and marketed its wares using its own distribution mechanisms (such as brick-and-mortar locations, ATMs, the internet, mobile devices, and direct relationships with other banks). However, open banking will drastically alter the current method of distribution. Distribution of financial goods will be possible within an ecosystem of providers with individual interfaces and identities. As a result, the traditional business model will evolve into a data-driven platform where several financial service providers fiercely compete to give clients with individualized offerings at rock-bottom pricing. Interface and user experience will be at the heart of the disagreement. The keys to success in today's data-driven, fast evolving world of Industry 4.0 are new ideas, ready availability of the right product, and low prices for customers. This applies to banking and financial services as well.

Open banking is a notion that challenges the conventional understanding of what a bank is and how its services are delivered. This shift has given rise to the ideas of "banking as a service" (BaaS) and "banking as a platform" (BaaP). The main difference between now and then is that customers have higher hopes for a different approach to service. Banking as a Service (BaaS) is a business model in which banks and other financial

institutions offer their products and services via digital channels to other businesses and individuals. Through application programming interfaces (APIs), BaaS essentially grants third-party providers access to banking infrastructure, such as account opening, transaction processing, and risk management. One of the primary benefits of BaaS is that it allows businesses to offer financial services without needing to become licensed financial institutions. This is especially advantageous for entrepreneurs and other businesses that lack the resources or knowledge to establish their own banking infrastructure. By forming a partnership with a bank or other financial institution, these businesses can offer their customers a vast array of financial products and services, including payments, lending, and investments, while leaving regulatory and compliance responsibilities to the bank. Typically, BaaS providers offer a variety of APIs that grant third-party developers access to banking infrastructure and enable them to create customized financial products and services. For instance, an online retailer could use BaaS to provide its consumers with a debit card that can be used in both online and offline stores. Using BaaS, a mobile app developer could integrate banking services such as account establishment and payment processing into their app. BaaS providers may also offer value-added services, such as fraud detection, compliance monitoring, and customer support, in addition to essential banking services. These services can assist third-party providers in ensuring that their financial products and services are compliant with regulatory requirements and provide an exceptional consumer experience.

In addition, Banking as a Platform (BaaP) is a business model in which banks provide a set of fundamental banking infrastructure, including payment processing, account management, and risk management, as a platform for third-party developers to create and offer their own financial products and services. Essentially, BaaP enables developers to build custom financial applications and services on top of a bank's existing infrastructure, utilizing the bank's open APIs and other tools. One of the primary benefits of BaaP is that it enables developers to create and offer financial products and services that are tailored to the specific requirements and preferences of individual customers. Using the bank's payment processing and risk management infrastructure, for instance, a developer could construct a mobile app that provides budgeting tools and personalized investment advice. This can allow financial institutions to expand their customer base and offer a broader range of services, while

also enabling developers to create innovative solutions that can attract new customers and generate revenue.

Additionally, BaaP can facilitate collaboration and innovation in the financial sector. By providing open APIs and other tools, banks can encourage the creation of new applications and services that leverage the bank's existing infrastructure. This can contribute to the development of new business models and revenue streams, as well as promote competition and customer-centric innovation in the financial sector. BaaP providers may offer value-added services such as fraud detection, compliance monitoring, and customer support in addition to fundamental banking infrastructure and APIs. These services can aid in ensuring that third-party developers are able to comply with regulatory requirements and deliver an exceptional consumer experience.

Table 7: Comparison of Banking as a Service and Banking as a Platform (BaaP)

Types/ Characteristics	Banking as a Service (BaaS)	Banking as a Platform (BaaP)
Customer Experience	Owned by a 3rd party and managed in its channel	Owned by the bank as the primary channel owner
Chanel	Developer portal	Mobile or web
Product Ownership	Owned by the bank in most cases	Owned by the bank or a 3rd party depending on the use cases
Banking License	Managed by the owner of the financial product, in most cases the bank	Managed by the owner of the financial product
Onboarding	Shared between a 3rd party and the bank depending on the use case	Shared between the bank and a 3rd party and the bank depending on the use case
Customer Service	Provided by the channel owner or a 3rd party and supported by the bank	Provided by the channel owner or the bank and supported by a 3rd party
Risk/Liability	Predominant risk or liability is with the owner of the financial product in most cases the bank	Predominant risk or liability is with the owner of the financial product

Five primary use cases for open banking via BaaS or BaaP offer diverse avenues to financial inclusion: Individual privacy, security, and protection should be at the core of all five, as brand-new entry points make financial services more accessible and valuable for everyone.

a) Financial management

   a. Assistance with budgeting and enhanced financial literacy for individuals

   b. Businesses' liquidity management and accounting capabilities

b) Expanded payment options

   a.Alternative payment methods via payment initiation services, such as account-to-account payments via QR codes — preferably in real time

c) Credit provisioning

   a. Soft credit assessment based on data from routine incoming and outgoing funds, including income and utility payments, and behavioral data from mobile devices.

   b. More precise credit determinations Permitting immediate microloan approval, including installment payments at the point of sale, can establish credit histories.

d) Product comparisons

   a. Competitive marketplaces for product comparisons such as loans, term deposits, and credit cards

   b. Increased competition that facilitates account switching

e) Account issues

   a. Remote enrollment and customer identification (KYC) verifications

Open banking's effects on the sector can be analyzed under three categories: customers, enterprises, and institutions.

3.6.1. Open banking benefits for consumers

Open banking enables consumers to gain access to a greater selection of products and services by sharing their financial information with third-party providers. Customers have previously agreed to share their financial data with third-party vendors so that they can develop more convenient and user-friendly goods and services.

Customers now have full access to their banking information because to new open banking laws. Using modern APIs, they can be certain that only you will be able to access their authentication information and credentials. The customer also has the freedom to choose who gets access to their financial details and to what extent. This ensures that the third party will only have access to the information they need. Since open banking promotes new forms of payment for goods and services, companies can't take payments from customers without their permission.

It is common for people to have multiple bank accounts today, which can make it difficult to get a comprehensive view of each account. Tracking each account separately is not optimal because it can hinder a person's financial comprehension, leading to unanticipated expenses, credit denial, and maintenance fees. Account aggregation enables users to observe information from multiple bank accounts in a single modern interface or application. With the customer's express assent, third parties may use the data collected from this combined view to recommend better financial products and practices. This includes recommendations for improved credit card or loan options that account for expenses. It can be used to offer advice on how to save money without abandoning common practices. If the objective is to maximize returns – whether through investments or interest – it can recommend where to invest the savings in order to achieve this.

The present-day society is characterized by a marked differentiation from the society of antiquity. The heterogeneity of individuals' financial needs necessitates a customized approach, as a uniform strategy may not be the most effective. Through the utilization of diverse and reliable data sources, the implementation of open banking has the potential to facilitate enhanced comprehension of consumer behavior and preferences, thereby enabling businesses to identify and offer customized products and services that

cater to their unique needs. The implementation of open banking technology possesses the capacity to enhance the user experience and overall outcomes through the provision of a wider range of options to customers.

Customers are acclimated to using credit and debit cards for payment. With such payment mechanisms, serious issues arise. Moreover, neglected, lost, expired, and stolen cards do not meet the requirements of modern consumers. Compared to conventional money transfer methods, the failure rate of remittance/EFT and FAST transactions, immediate payment problems, and transaction fees will be unavoidable for consumers if open banking and high security standards are implemented. In addition, the security level can be increased through the development of strong customer authentication protocols, which reduces fraud by introducing a crucial additional step to the payment's authentication process.

3.6.2. Open banking benefits for businesses

The implementation of open banking has the potential to confer significant advantages upon small businesses by affording them access to financial services and data that may have been hitherto unavailable. The provision of payment processing, financial analysis, and other services that are conventionally reserved for larger businesses may be encompassed in this context. The present discourse aims to explicate the principal benefits that commercial entities, particularly SMEs and those that facilitate electronic transactions, can attain through the integration of open banking solutions.

a) Efficiency: The contemporary economic landscape is characterized by an intricate web of challenges that impede the growth of SMEs. The task of expanding a business within this milieu is a formidable one that requires a multifaceted approach. The realm of financial micromanagement, encompassing a wide range of activities from accounting to payroll, has emerged as a critical area of focus for businesses. In this context, open banking has emerged as a promising solution that can facilitate access to pertinent financial data. By leveraging open banking, businesses can potentially streamline their financial micromanagement processes and enhance their overall financial performance. Through the delegation of duties to external service providers, proprietors can effectively reallocate their resources to other critical domains, such as marketing and enhancing the customer experience. The

maximization of available information is directly proportional to the level of detail achievable in planning, as well as the identification of inefficiencies and opportunities. With the implementation of open banking solutions, the consolidation and examination of all existing commercial financial information has become possible. This is achieved through the use of a diverse range of analytical instruments.

b) Automation: Today's crucial digital automation may be achieved with easy data access via open financial systems. Automation is not only crucial in today's data-driven society, but also extremely economical in the long run.

c) Innovative solutions: Open banking providers can think outside the box and deliver novel solutions, in contrast to more conventional banks. They can react considerably faster to digital developments now that they have access to new sources of financial data. Businesses may use digital wallets to quickly adapt to customer preferences, such as the growing popularity of alternative payment methods.

d) Accessibility to loans: Open banking technology facilitates the creation of accurate credit risk assessments by enterprises. The more accurate credit reports are, the simpler it is to gain access to the necessary credit to maintain cash flow or increase investment. The technology of open banking serves to unify an individual's financial data into a singular, centralized location, thereby facilitating ease of access to lending institutions and the ability to petition for financial resources. In addition, it expedites the determination of creditworthiness by eliminating the need for manual submission of financial statements and other documents. Everyone involved has easy access to the most important information, saving time and resources.

It takes time for any payment method, even the most common ones like debit and credit card transactions, to be processed and posted to the account. This makes it hard to monitor cash flow and solicit new capital. With the use of open banking technologies, one-time payments may be received quickly, easily, and safely. By avoiding middlemen and facilitating instantaneous transactions, direct bank-to-bank transfers maximize efficiency.

Moreover, these expenditures are frequently less expensive than online card transactions. The absence of time-consuming stages makes this process ideal for one-

time payments and eliminates the complications that cause customers to abandon their shopping carts.

By removing the exclusivity of card payments, open banking enables businesses to lower service prices. Payment application programming interfaces for open banking do away with transaction fees and the bulk of operating expenditures.

A well-designed transaction flow, such as that seen in open banking payment systems that provide many alternatives, may undeniably raise conversion rates, customer happiness, and retention, all of which lead to less shopping cart abandonment and more sales and income.

Many businesses fail to adequately address this problem, which has a detrimental effect on their brand's image in the eyes of their target audience. By using biometric authentication for mobile banking payments instead of usernames and passwords, businesses may improve the customer experience with open banking.

3.6.3. Open banking for banks advantages

Banking institutions were not the sole players in the financial markets once the European Union developed a legislative framework that boosted their development. Thanks to the explosion of the financial technology industry and the availability of previously unavailable data, these upstarts may now compete with more established businesses by providing game-changing technology and paving the way for the introduction of a wide range of novel goods and services.

Even before open banking was a "thing", banking has always been a highly competitive ecosystem. Despite some resistance to change, traditional banks have always had to experiment with new technologies in order to avoid falling behind and remain relevant. Open banking is a matter of making greater use of the same tools that have been used for a long time, and spicing them up with modern APIs that enable a client's financial service providers to securely communicate with one another. Traditional institutions can benefit from open banking in the following ways:

a) Collaboration is critical: The world of finance is in constant flux, and a global pandemic continues to alter how individuals view banking, money, and life. If there was some competition between incumbent financial institutions and Fintechs in the past, partnerships are now viewed as a means of retaining

consumers. Traditional institutions that do so have a competitive advantage and a greater chance of keeping up with emergent solutions that are significantly more appealing to the average user.

b) Customer-centric experience: Numerous conventional banks have developed engaging mobile applications and enhanced their online banking services as a result of financial innovations. Digital transformation and a customer-centric approach are required to increase consumer engagement and meet the requirements of existing and prospective users.
c) New technologies result in enhanced goods and services: Open banking has leveled the playing field for new competitors in a market formerly dominated by legacy institutions. Consequently, traditional banks never felt the need to innovate; this has changed with the advent of Fintechs, which are swiftly developing and implementing innovative financial solutions.
d) More data, smarter decisions, more revenue: Opening financial data to third parties enhances everyone's ability to make timely, informed decisions, including banks. This is true for fintechs and traditional institutions alike.

The good news for the major banks is that they are already dependable guardians of client data with strong brands that they can leverage to position themselves for success in an open banking environment, even though open banking presents the possibility of increasing competition. The chance will be to establish a distinct vision of the part they wish to play so they can keep up with shifting client expectations.

Open banking gives a big potential for smaller and mid-sized banks to gain new clients as they use the data made public by their larger competitors to expand into new areas. On the contrary, including them in a data-sharing system might come at a major cost to them. For this reason, the early focus of open banking in other countries has tended to be on larger banks. Successful banks will possess a variety of traits, such as a customer-centered approach that aims to provide individualized solutions to win its clients' hearts and minds. A key component of that will be mastering their analytics skills so they can utilize the available insights to provide clients with the appropriate range of products and services at the appropriate time.

Banks will also need to set themselves apart through clever data utilization. The difficulty will be organizing their data sets so that they can provide information upon request. In order to react to customer requests and needs for access to, changes to, and

deletion of their own data in light of privacy regulations, open banking organizations must first do a data-mapping exercise to determine where client data is stored across systems. Although the thought of sharing data may make the banks uneasy, it's crucial to keep in mind that open banking presents a number of chances and advantages for them.

The efficiencies produced by open banking can assist the banks cut expenses in addition to allowing them to take advantage of new technology. Due to the greater access to and exchange of data among institutions, open banking has the potential to lower additional dangers that major banks are exposed to, including fraud and money laundering.

Profitability in the banking sector depends on the complex relationship between many parameters. Banks' profitability is based on leverage ratio, loan/deposit ratio, market capitalization, net interest margin, amount of debt and gross domestic product etc. Therefore, simply comparing profit before and after open banking will not yield meaningful results.

However, more meaningful results can be obtained when the results of the survey made to bank employees are added to the apparent increase in profitability. According to a study (Köseoğlu, 2023), bank employees;

a) Increasing the number of APIs will positively affect bank's activity volume.
b) Open Banking application will cause significant changes in income items.
c) Open Banking application will positively affect the (capital and asset) profitability of Bank.
d) Open Banking application will increase bank's market share.
e) Open Banking application will accelerate the increase in bank's asset size.

4. LITERATURE REVIEW

The term "open banking" refers to the practice of creating new banking products and services by comparing and analyzing the account information and banking behaviors of different bank clients. Fintech is an industry term that refers to companies that mix traditional financial services with technological development in order to provide new goods and services. Due to the nature of open banking, it is said in this context that the idea of fintech is referenced combined with the concept of open banking in the literature study that was previously described. A financial innovation has emerged as a consequence of the popular reaction that the novel technologies provided by fintechs to

the market in financial services have received. The ideas of fintechs and open banking are usually used side by side in the explanations on this topic.

In his study, Birch (2016) presented his forecasts that there would be shifts in the roles traditionally played by banks as a result of the rise of innovative technology. Up this light, there are claims that the space that will continue to exist apart from the conventional services provided by banks can only be filled up through the collaboration of fintech companies. It is underlined that the laws that are set in the banking sector will evolve into a shape that is more creative in terms of payment services with each passing day, and that they may effectively make improvements in satisfying the expectations of their customers.

In their study, Christi and Barberis (2016) underlined that the world of finance is able to grow creative through ideas such as open banking, where new financing resources are generated and competing products are developed, and by incorporating a current definition of the concept of fintech. In other words, the financial world can only become innovative through concepts such as open banking if an up-to-date definition of fintech is included. It has also been said that in order for the banking industry to flourish properly, there must first be certain uniform laws established. As a direct result of this, there have been assertions made that vertical banking will play an essential role in the foreseeable future. It has been asserted that the modifications in the legislation and the behaviors of the consumers have led to certain adjustments that will almost certainly make the notion of open banking obligatory. Therefore, rather of constructing all technologies from the ground up, it is suggested that mixed technological advancements would be conceivable, in which the banking industry saves time and money by focusing on API technologies. This advancement will be achievable. In his study, Vives (2017) found that the reason why fintechs have a good impact on wellbeing is because they allow bank customers to make unique decisions on their own data, in addition to increasing receptivity to new services. It has been asserted that cutting-edge technologies such as big data, machine learning, and artificial intelligence would not be able to make substantial headway until they are widely used in the sector of financial services. It was suggested that traditional financial institutions should form partnerships with financial technology companies in order to deliver more cutting-edge financial services. It has been said that the current market circumstances are likely to shift significantly as the significance of fintech companies continues to grow within this

framework. In a separate piece of research, authored by Li, Spigt, and Swinkels (2017), the authors studied how the value of companies is impacted by the interactions that exist between fintech firms and the traditional banking system. In this context, the changes that occurred in the stock pricing of US-based banks between 2010 and 2016 as a result of their investments in fintech companies are explored. According to the findings of the research, financial technology companies provide an important function that is complimentary to the growth of banks. Mainly due to the fact that panel statistics are supplied demonstrating that the return on all of these investments has a beneficial influence on the stocks. There have been assertions made that this complementary nature is one of the primary manifestations of open banking practices.

The authors Aksoy and Bilgel (2019) investigated the idea of open banking, which is a relatively development in the banking and financial industries. It is mentioned in this context that an innovative method has been able to use these technological innovations for some profit-oriented harmonizations. This has resulted in an important breakthrough for the banking and finance sector, as well as the effects that technological advancements have on every sector in the modern world. The relevance of open banking is stressed in terms of the utilization of innovative methods in the banking and finance sector. This is because open banking serves as an indicator of the degree to which a country has developed its technical and financial infrastructures. Accordingly, open banking application is mentioned in the study as having the potential to be an important method of profitability and efficiency for businesses. This is as a result of the integration of some functional data analysis processes and artificial intelligence, which will improve the overall fulfillment of consumers by combining different software interfaces. In addition, open banking application is mentioned as having the potential to be an important method of profitability and efficiency for businesses. In keeping with what has been discussed, the research evaluates, on the basis of interpretation, the potential strategic aims of the banking industry and enterprises manufacturing financial technology in Turkey, as well as their perspectives on future creative processes.

In their research, Şahin and Canturk (2020) investigate the idea of open banking, which is regarded as one of the most significant technical advancements that the banking industry is now experiencing. When seen in this light, open banking apps are considered to be a novel banking idea that is currently being created by fintech companies. These companies came into being as a result of the convergence of financial and technical

advancements. On the other hand, the idea of open banking is viewed not just as something that came about as a consequence of the digitization of banking applications but also as something that is itself an application that promotes digitalization. Accordingly, the legal infrastructures of open banking apps were investigated during the course of the study. It is said that the idea of open banking, which is associated with both possibilities and threats, places financial institutions in a more favorable position with regard to the execution of four fundamental strategic goals, namely compliance, transformative, competitiveness, and imperialism.

The authors Demirez et al. (2021) investigate the open banking sector, which represents a new facet in the use of technical infrastructures and chances. In this context, the term "open banking applications" refers to the process of establishing various applications and services for the benefit of customers by sharing consumer data with third parties with the agreement of the consumer through a variety of interfaces. These applications and services are designed to make consumers' lives easier and more convenient. Accordingly, Demirez et al. (2021) produced a study in favor of open banking activities as a financial services chain that may be employed more widely in the next years. This research was published. As a result, it has been said that open banking apps will develop into a market that is still open-ended and inclined to grow.

In her study, Köseoğlu (2023) examined the historical development of open banking and revealed the long-term future plans of different countries. He evaluated the situation in Turkey within the framework of legal legislation. In addition, a survey was conducted on the employees of 5 banks serving in Turkey and complying with open banking regulations to determine the areas that they expect the banks to be affected by.

In his study, Yallı (2023) examined fintechs, as in other studies, and introduced the concepts of open banking, BaaS and BaaP in this context. He evaluated the situation in the world and in Turkey within the framework of legal legislation. In addition, the audit models prepared for open banking are examined and an audit model proposal for Turkey is presented.

With the help of this research, it is intended to provide a model bank that is particularly illustrative, taking into consideration the impacts that the open banking strategy has had on the industry in the majority of the researches that can be found in the literature. Nevertheless, advancements in both Turkey and the rest of the globe are explored,

beginning with the fact that the idea of open banking emerged in the banking industry throughout the course of history.

5. A MODEL PROPOSAL FOR TURKEY

Although it is claimed that the definition and scope of banking has changed, some basic duties that have not changed since the first banks are still valid. The process begins with adding the customer to the portfolio and converting people into customers, and continues with the collection of deposits and the use of funds. In addition, some reporting activities are carried out in units established due to legal requirements. However, over time, it became possible to establish new units in order to adapt to developing technology. Even though the way services are provided has changed, it has served the same purpose since day one: meeting the demands of those with excess funds and those in need of funds. On the other hand, as a result of technological developments, new playing fields have been opened for banks. The method or channel of service provision or new activities that can be carried out has also emerged. An example bank organizational chart is given below.

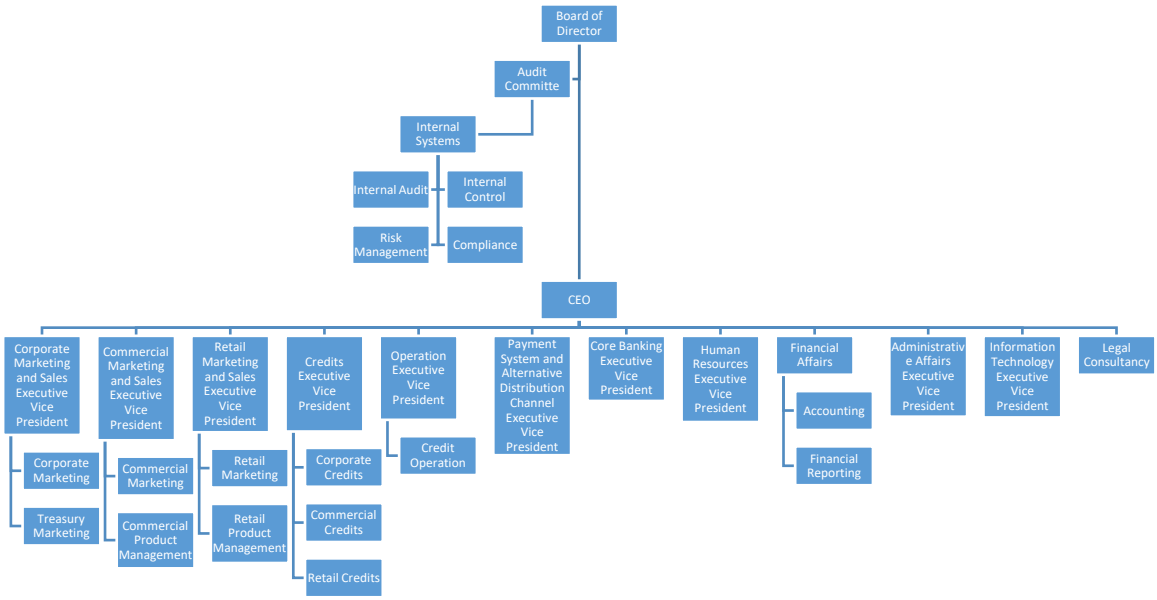


Figure 6: Organization Chart of a Bank

When proceeding through this organizational chart, open banking affects;

a) Marketing teams to develop and introduce the new products that will emerge
b) Credits teams in terms of loan allocation, operations and follow-up

c) Operations teams because of changing the way do their jobs
d) HR department in terms of changing of the personnel profile to be recruited by the
e) Change of business processes for accounting department
f) The developments requested from IT teams should be in a new area
g) For digital banking teams, creating a new serving field.

The concept of open banking, which can cause a significant change in the way a bank provides services, will of course affect all units, albeit at different levels. However, while presenting this model proposal, changes in operational processes were taken into focus. For this reason, a model recommendation will be presented based on the units given below. This thesis aims to create a bank model on business families that are expected to be affected by open banking developments, taking into account all these service areas and the organizational chart of banks that are key players operating in Turkey. In this context, loans, banking operations, treasury, payment systems and accounting units will be designed for the model bank.

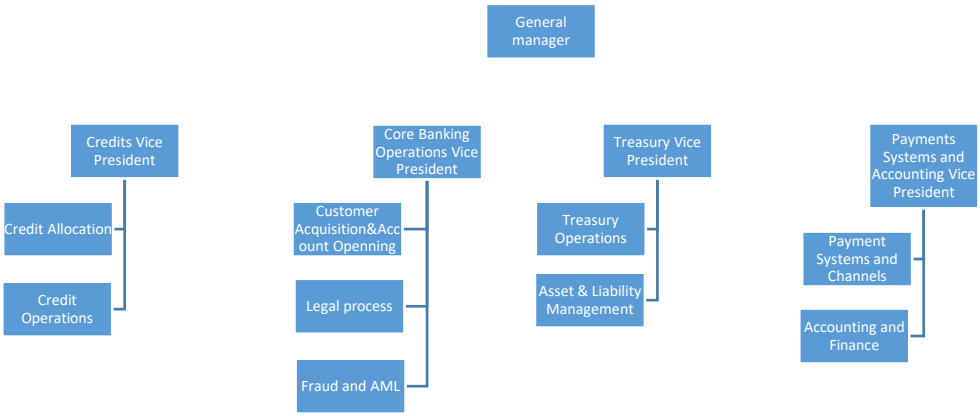


Figure 7: Organization Chart of Model Bank

5.1. Credits

5.1.1. Credit Administration

In this era of advanced technology, the application process for loans is also quite archaic. It is necessary to acquire all the necessary documents from consumers to demonstrate their eligibility for the loan. It requires a significant amount of time to compile the recent financial history, salary information, documents demonstrating the

securities and real estate possessed, and many other details. Nonetheless, a summary of monthly quantities of income and expenses, as well as their categories (rent, loan, wage, allowance, etc.), residual income, debt-to-income ratio, whether there is a seizure of funds in direct bank accounts, availability of wage advances, and total amount of debt should be provided. Open banking enables the collection of a variety of data, including the number and total amount of payment events such as debt refusal, the number and total amount of last credit limit withdrawals, indicators related to overdraft such as the maximum overdraft account, and documents displaying the securities and real estate owned. By eradicating the need for applicants and lenders to manually compile, submit, and verify this information and documentation, applications and lending decisions can be made more quickly and efficiently. In addition, it permits the cross-comparison of information received from various institutions. Thus, it will not be provided with deceptive information.

5.1.2. Credit Assignments

A bank has only one requirement when extending a loan: repayment of the loan. The answer to the query of who can repay the loan is therefore extremely valuable to banks. The development of statistical decision-making models to assess the creditworthiness of institutions and reduce the risk of default dates back to the 1950s. It was determined that statistical scoring models were significantly more effective at distinguishing good risk profiles from poor ones than a model based solely on the opinions of credit institution employees. This increased the proportion of "good loans." Over time, models have become more complex, but the underlying principle has remained largely unchanged. They continue to rely on a combination of demographic, socio-professional, and financial data, and the default risk and resultant non-performing loan ratio have yet to converge on zero. This is due in part to the fact that the relevant models are not fed entirely precise data. It is extremely challenging to obtain live or at least daily updated data in abundance. Today, the only method to accomplish this is to acquire the necessary data from those who directly or indirectly influence the financial market. Even if the relevant data can be collected separately, the consolidation of these inputs is a time-consuming task. With open banking, it is possible to eradicate this fragmentation. The risk of loan default will be significantly decreased by incorporating fragmented data from a variety of information sources, such as a customer's payment

performance at another bank, bill payment habits, public loans, and joined services, into decision-making modules in a clear and usable manner.

Additionally, with the speeding up of digital enrollment procedures, there are now more customers in the portfolio who have access to alternative distribution channels. These customers anticipate being able to retrieve their money right away without going to a bank. However, banks frequently contend with legacy infrastructure and inadequate data management across silos, which lengthen the lead time for data-driven decisions. This can be costly for both consumers and banks as approval processes may be impeded by potential delays, affecting credit risk assessment.

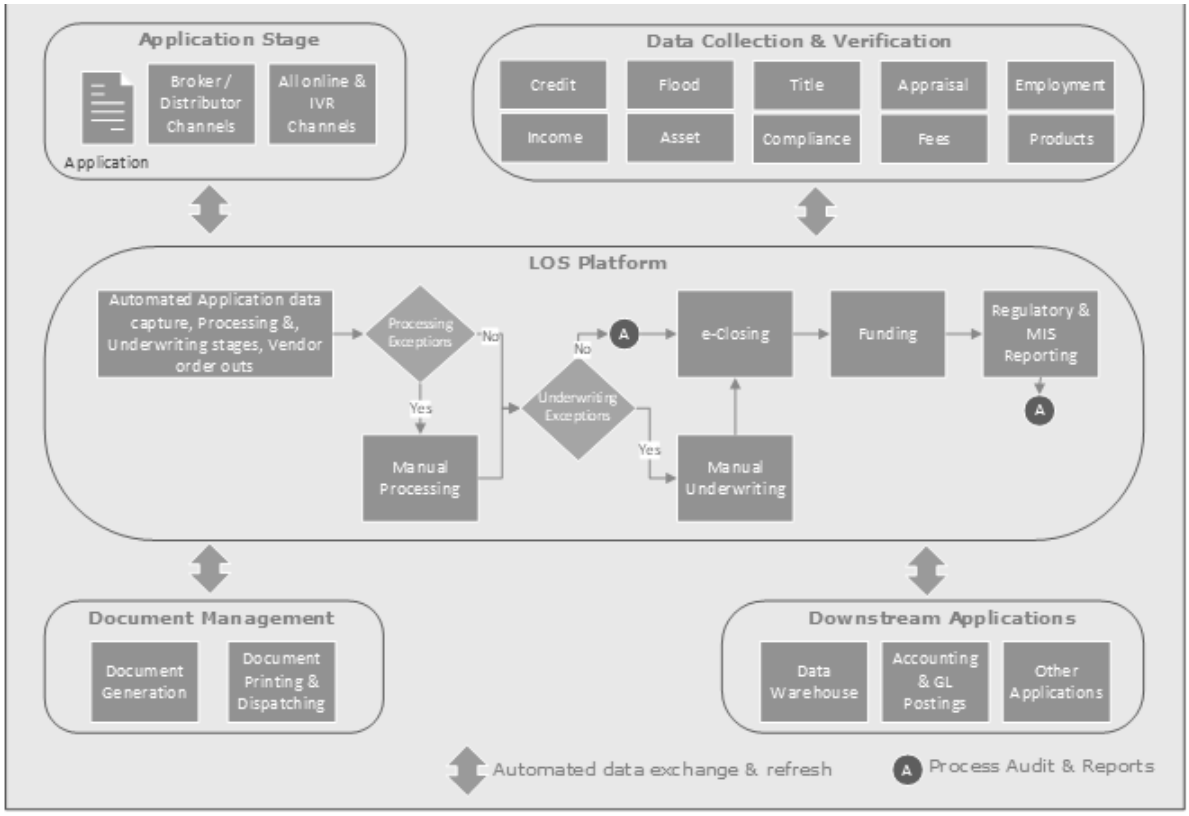


Figure 8: Process of Loan

https://www.wipro.com/banking/gallagher/resources/blogs/sridhar-sathyanarayan/how-lenders-can-reduce-loan-processing-time-from-weeks-to-days/

Alternatively, both non-cash and cash loans are prevalent in the finance industry. Checks, a form of non-cash loan, are utilized by millions of business owners across the globe, regardless of industry or company size. However, significant advancements have not been made since their inception, and today only a small number of providers,

including enterprise platforms, offer an alternative to burdensome and risky paper transactions. Over 92% of businesses still prefer to pay their vendors and suppliers by check, despite the fact that over 70% of businesses are victims of check fraud (Snap Check, 2022). With open banking, checks transferred to the digital environment are initially more cost-effective. By eliminating the need for printing, paper, and postage, the clearance process costs for both customers and institutions will be significantly reduced.

The delay in processing and delivering paper checks also disrupts the market's workflow. It provides transparency for all customer check payment processes in digital checks. Digital checks will ultimately increase consumer satisfaction with checks by combining the familiarity of conventional commercial checks with the safety, speed, and security of modern payment technology.

Additionally, monitoring traditional checks is cumbersome. It will be necessary to allocate time for a continuous control mechanism and to maintain a constant supply of unanticipated circumstances. The utilization of digital checks has facilitated the ability of customers to engage in commercial transactions without temporal or spatial constraints.

5.2. Treasury

Treasury can be broken down into two categories: customers' treasury transactions and the bank's own cash position management.

First, the successful completion of International Payments has always necessitated a large number of customer-facing documents. However, despite claims that the world has become globalized and that international borders have blurred, countries that impose sanctions against one another will continue to do so in the future. As a result, the use of cryptocurrencies based on block chain technology for both investment and transfer purposes is increasing daily. This new concept in the financial sector, decentralized finance, has issues that the more regulated banking sector must address.

By constructing the necessary infrastructures, banks can incorporate their customers' cryptocurrency purses into the banking system. At this point, the security issues associated with crypto currency applications will be resolved, and the bank will offer a comprehensive service to its clients. By integrating Block chain-based applications and

banking infrastructure, money transfers will be more efficient and require fewer documents.

Banks that integrate with multiple crypto-based applications will have access to a vital data source for analyzing market sentiment for each crypto asset. These insights will always be useful for the administration of these foreign actors, whose assets are in some way contributed by their clients.

It enables them to monitor their investment performance and financial transactions in real time, giving them a clear picture of their financial health. Without API connectivity, companies may only be able to access up-to-date information about their cash status once or twice per day, meaning that decisions regarding the company's cash are frequently made based on outdated information. However, APIs can facilitate the transition from intraday statements to real-time cash balance data. This could be a method for businesses to gain access to a real-time view of their global cash balances – not just for their primary accounts, but for all of their banks and subsidiaries as well. This real-time cash position can then be used as the foundation for real-time cash planning.

Second, it facilitates the transmission of funds between investors' bank accounts and investment accounts. This makes it simpler for investors to make expeditious investment decisions, since they no longer have to consider the time required for funds to clear. APIs provide the real-time connectivity required for businesses to take advantage of real-time payments. It is essential to note, however, that APIs do not inherently guarantee immediate payments, which are instead determined by the applicable scheme and clearance agreement. For instance, a bank may expose its API for payments but continue to process them as BACS or SEPA Credit Transfer payments instead of their immediate payment equivalents (i.e. Faster Payments and SEPA immediate Credit Transfer). Host-to-host connectivity, on the other hand, may not support instant payments per se, but can frequently provide near-real-time payment processing and, thus, make payments rapidly enough to satisfy the requirements of many businesses.

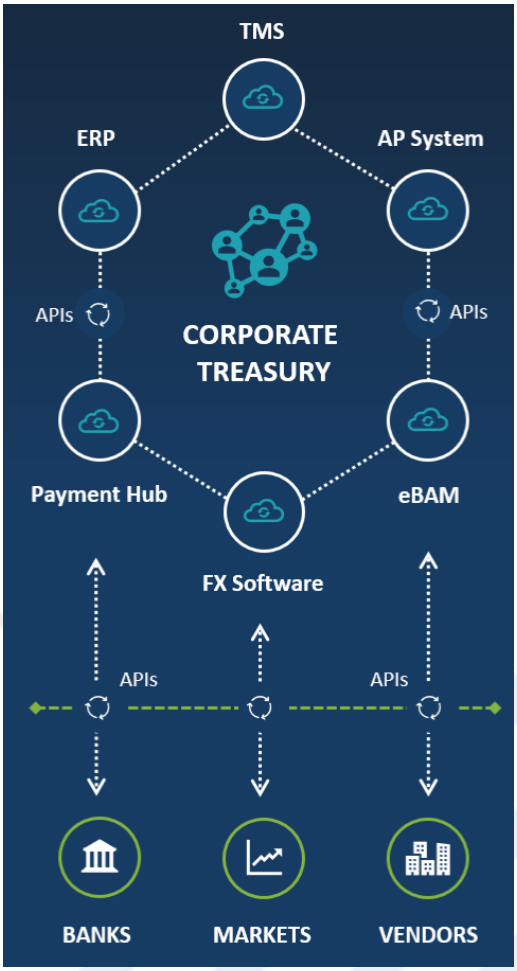
Lastly, there is the issue of increased security. By utilizing secure APIs to access the financial data of users, investment platforms can ensure that user data is protected and kept private. This can provide consumers with the peace of mind that their financial

information is secure. Additionally, Open banking can increase the transparency of investment platforms. By displaying all of a user's financial accounts in a single location, they can gain a better understanding of their overall financial health. This can assist users in making more informed investment decisions based on their entire financial picture, as opposed to a single account or asset. Lastly, open banking offers investors more investment opportunities. Using consumer financial data, investment platforms can offer customized investment products based on the investor's risk profile, investment objectives, and financial situation.

From the bank's perspective, API-integrated Systems are cross-border currency pooling. Some banks are already investigating the possibility of using APIs to enhance cross-border cash aggregation by leveraging real-time visibility over a company's cash in various countries.

In areas such as forex, where a more dynamic exchange of information between a hedging platform and a company's house banking could provide significant benefits, there could also be some intriguing use cases. For instance, the company could choose to securely communicate information about upcoming positions with its banks so that the banks can proactively propose methods to hedge future exposures. Open APIs enable the retrieval of historical transaction data, which can then be used to inform underwriting teams about a company's creditworthiness, outstanding balances, and financial health, resulting in more precise credit decisions and efficient risk management.

Treasury transactions are traditionally settled at the end of the day via the SWIFT system. The instantaneous flow of information provided to the bank's consumers can also be utilized by the bank's treasurers to make speedier decisions regarding liquidity management and investments. Thus, the instantaneous visibility of the company's financial position ensures that its account balances are minimized. Moreover, balance and transaction reporting in real time enables the treasurer to effectively monitor the movement of cash. Daily account reconciliation helps to reduce the possibility of fraud. Real-time reporting will also facilitate the treasury team's month-end reconciliations.



TMS: Treasury Management System

eBAM: Bank Account Management through software

ERP: Enterprise resource planning

AP System: accounts payable system

Figure 9: Process of Treasury API

Source: https://tispayments.com/wp-content/uploads/APIs-Blog-Graphic-2.png

5.3. Payments Systems and Accounting

The present study aims to investigate the capacity and resources required for effectively managing all payment flows utilizing the most cost-efficient technology. By doing so, individuals can enhance their budgeting skills, identify the most suitable deals, and explore the best products and services for accessing their accounts. The study posits that a regulated price comparison website can offer valuable insights into actual spending patterns, thereby facilitating the development of frugal habits.

A payment to a merchant or corporation will be initiated through their mobile banking software or online banking web portal. The transaction will function similarly to a bank transfer. The funds will then be transferred promptly to the merchant using real-time banking channels. Receiving funds in real-time enables the user to promptly credit funds to their customer's account, thereby enhancing the customer experience. If a refund is necessary, it can be issued in real-time, thereby enhancing the consumer

experience. Using APIs can also reduce reconciliation costs compared to bank transfers. Checkout without data entry decreases shopping cart abandonment Increase conversion rates by facilitating mobile payments for customers.

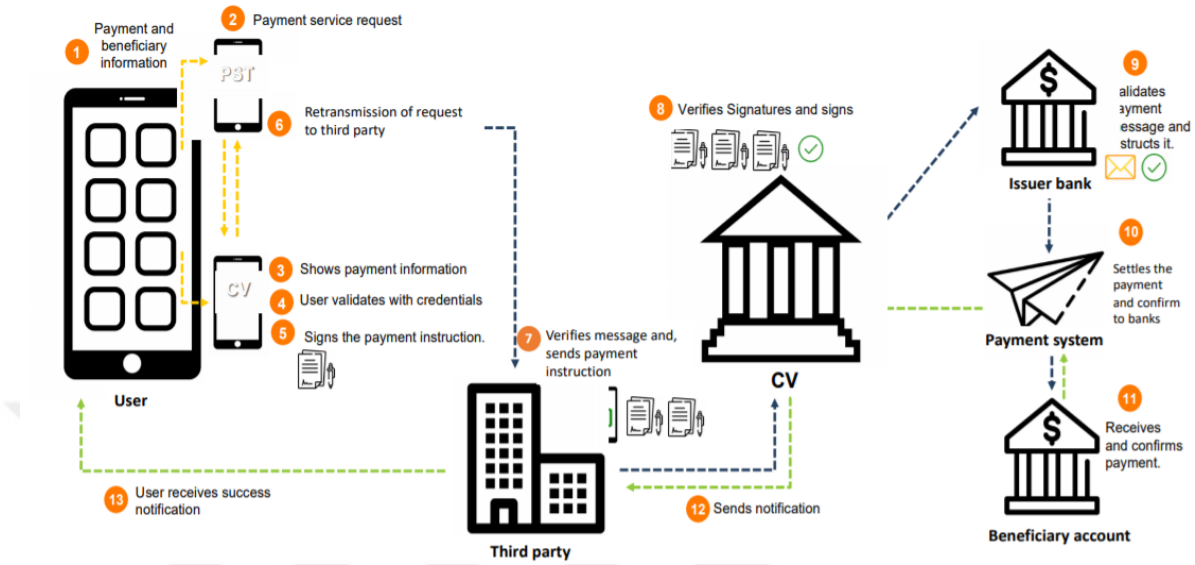


Figure 10: Process of Payment System API

Source: https://www.bcn.cl/laborparlamentaria/documento?id=697591a

There are four API-based payment categories. These:

a) Business-to-Business (B2B) - B2B payments consist of businesses paying their suppliers or vendors. They are typically denominated in crores, indicating their high value.

b) Business to Consumer (B2C) - B2C payments are business-to-consumer transactions. Included are reimbursements, legal payments, insurance claims, and contingent employee earnings. These are remittances of moderate to high value.

c) Consumer to Business (C2B) - C2B payments consist of consumer payments to businesses. C2B payments include bill payments, hospital co-payments, and payments made at the point of sale (POS). These payments are typically regarded as having a medium to low value.

d) Domestic Peer-to-Peer (P2P) - Domestic P2P transactions involve two parties. Local P2P payments include transactions between acquaintances and relatives. These are remittances of medium to low value.

Customers' accounting software can also be incorporated into the banking application. In this manner, they will initiate collections from their creditors by submitting a request to the bank, and it will be possible to advance all previous processes from the bank application, via open banking and APIs. Customers can create a mutual collection record and payment assignment by transmitting, via their own bank, the follow-up of their receivables and payables and, if necessary, the invoice forwarding transactions to the bank of the party to whom they are credited. Thus, mutual payments will be made in a secure and convenient environment.

Through APIs, it is also possible to add products subject to customers' commercial invoicing to their inventories. By perusing the product/service information engraved on the invoice issued to the customer by the vendor and adding it to the required inventory records, a further operational procedure can be performed through the banking application.

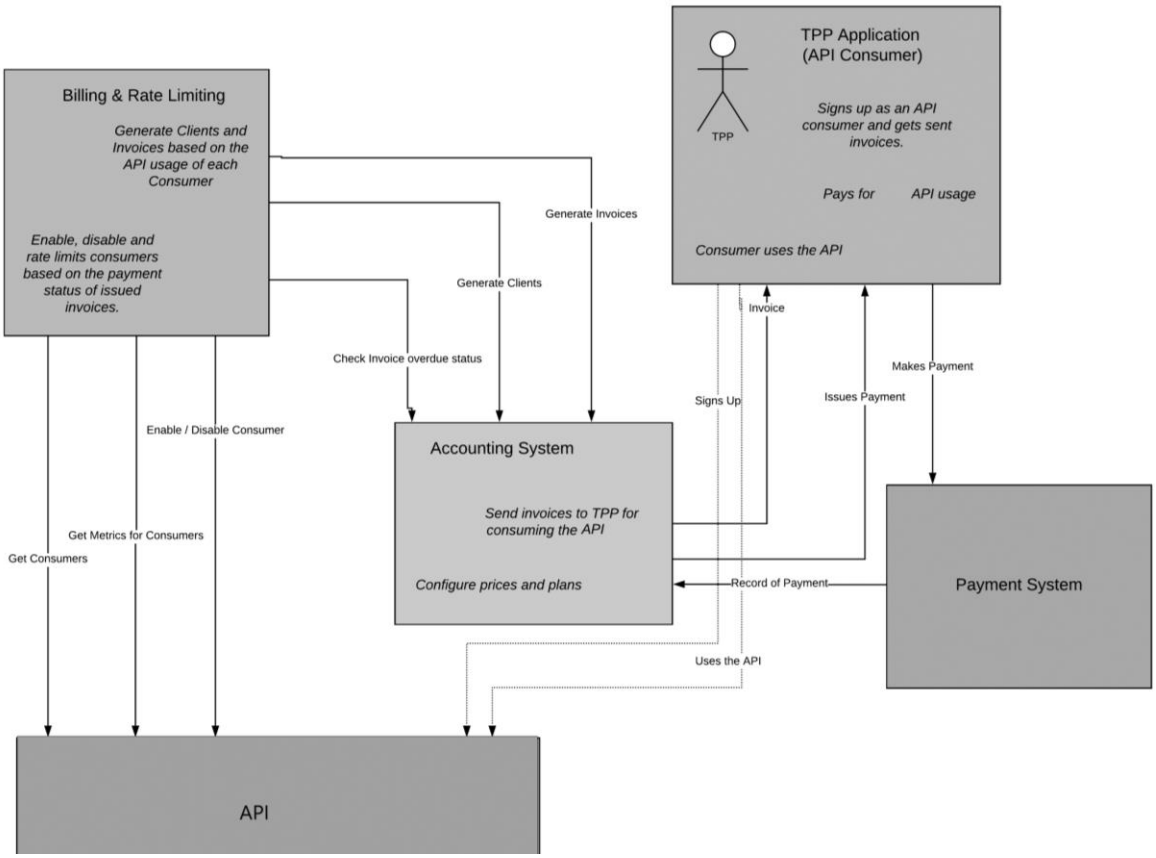


Figure 11: Process of Accounting API

Source: https://github.com/OpenBankProject/OBP-Billing

5.4. Banking Operations

5.4.1. Fraud and AML:

Financial crime, specifically anti-money laundering (AML) and counter-terrorist financing measures, remain at the top of the agenda for regulators. In an increasingly digital world, global tensions and instability, anti-money laundering, and counter-terrorist financing measures have become central to the risk management of financial institutions, and firms must prepare and defend themselves against these risks. Know Your Customer (KYC) is a legal requirement designed to protect institutions from fraud and money laundering. Simply stated, the KYC process is the verification of consumers' identities before or during their use of financial services. The objective is to exclude "bad players" and hazardous individuals from financial markets.

The prior, conventional procedure consisted of numerous sequential stages that an individual or group must complete. The collection of data, compilation of client profiles, and creation of audit traces have been manual processes. Each stage would require countless hours of manual labor, and a client could be off-boarded for any number of risk-related reasons. This procedure is obligatory, and labor costs can impact the bottom line, reducing returns on investment. Historically, these time-consuming processes have been costly, including the loss of many consumers during the initial phases of the application procedure.

The open banking system, on the other hand, is predicated on the notion that a person has the right to use their financial data to their own advantage. Simultaneously, financial institutions capture and analyze raw consumer data using their own algorithms and analytics. Today, financial institutions develop derived data to provide additional value or insight to the consumer, and fintech firms have made it simpler for businesses and banks to conduct KYC without human intervention. Many of them provide trustworthy KYC solutions via sophisticated APIs. Through KYC APIs, a few fundamental details such as name, date of birth, address, gender, mobile number, and photo identification are instantaneously accessible and dependable.

Advanced APIs that communicate with one another are excellent time savers and offer KYC at a low cost. The integration of these APIs can facilitate and expedite the background screening process. With no time squandered on manual data entry,

documentation, or attestation, operations can be streamlined and customer/user onboarding can be accomplished immediately.

There are numerous advantages for institutions and enterprises that utilize KYC APIs.

a) No human intervention: KYC APIs eliminate the need for human intervention at every stage. This API integration decreases the possibility of errors at every stage.
b) KYC APIs provide real-time insights, such as customer risk analysis, credit score, and numerous other parameters, so that businesses can make the best decisions for each customer.
c) Zero risks of manual errors: KYC APIs deliver the correct data at the right time and location, eradicating the possibility of clerical errors. The integration of KYC APIs into the operational workflow of an enterprise is poised to yield significant benefits in terms of temporal and financial efficiencies. Instead of enduring a time-consuming and laborious verification process, businesses can streamline and automate the KYC flow to create a frictionless onboarding process. This frictionless experience leads to a seamless induction procedure and, as a result, increased retention.
d) KYC APIs expedites the process of businesses' expansion into novel markets.

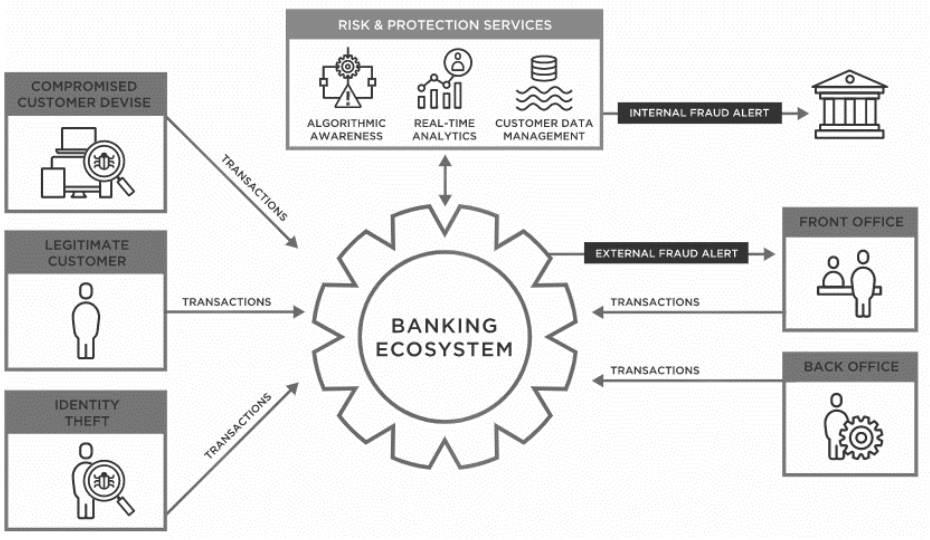


Figure 12: Process of KYC API

Source: https://www.tibco.com/reference-center/how-to-detect-banking-fraud-in-a-constantly-evolving-cyberspace

5.4.2. Onboarding and Account Management

Numerous businesses in regulated industries have protracted and difficult onboarding procedures for new customers. According to new research commissioned by TrueLayer and conducted by YouGov and released, four out of ten individuals begin the process of creating an online account for a service but do not complete registration. When requested to submit information in response to a verification request, 46% of individuals abandon the signup process, and 75% of consumers are only willing to spend 10 minutes or less before giving up. To prevent this churn, onboarding APIs offer a secure, dependable, and fast method for onboarding new customers.

In the past, the onboarding procedure frequently entailed manual, time-consuming duties such as collecting and verifying personal information, conducting identity checks, and establishing proof of address. By obtaining customer data from their bank APIs, banks and their consumers will save time and resources during the enrollment process. This will enhance the overall user experience and increase the conversion rate of new customers by eliminating the need for them to enter their personal information manually.

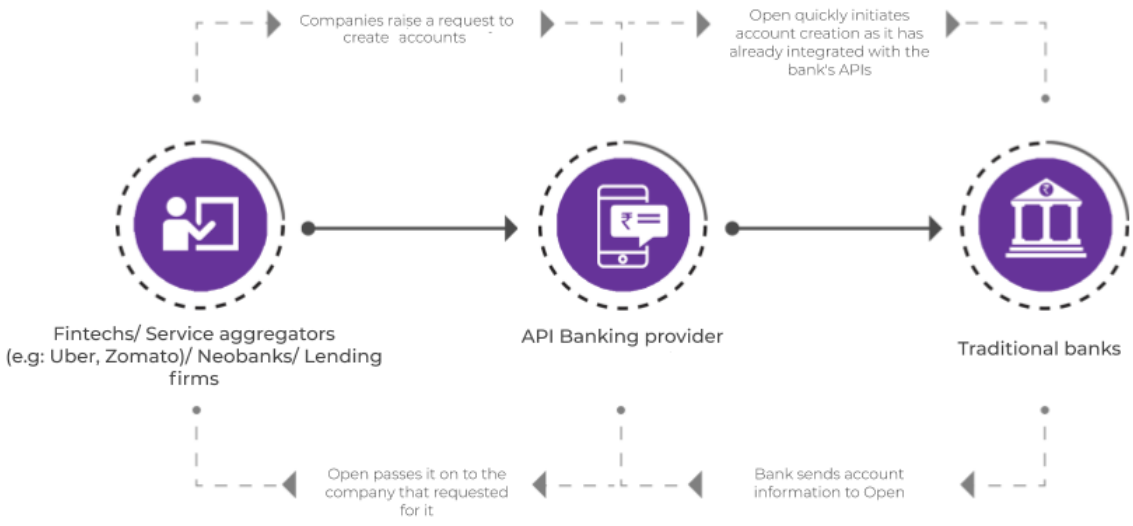


Figure 13: Process of Onboarding API

Source: https://open.money/banking/core-banking-api

With the advent of open banking, consumers will now have the convenience of being able to access and view all of their bank accounts through a single interface. Open banking relies heavily on the use of APIs to enable the safe and efficient exchange of

data between different entities. These APIs play a crucial role in ensuring that information is shared securely and seamlessly between parties involved in open banking transactions. Data sharing is defined as the act of a data bearer or data provider providing data to a third party or data consumer with the consent of the data proprietor. The exchange of digital information between individuals and organizations is a crucial aspect of open banking initiatives. This process is supported by a range of practices, technologies, architecture, cultural elements, and legal frameworks that work together to form one of the primary pillars of open banking. The introduction of explicit data sharing models offers several advantages. The promotion of transparency, competition, and market entry can be a significant contributor to the reciprocity and cooperation within the financial ecosystem. The act of combining data from different sources has the potential to increase the effectiveness and worth of services.

In conclusion, this technology has the potential to enhance decision-making processes, elevate the quality of products, and grant individuals' greater control over their own data. In the world of technology, there exists a powerful tool known as account aggregators. These infrastructures are designed to efficiently manage and transfer data transactions between two key players: data providers and data consumers. As we delve into the world of data exchange, we come to understand the significance of Account aggregators. They serve as a crucial mechanism for the implementation of this process. One of the responsibilities of the participants is to ensure interoperability among themselves. Although Account aggregators play a crucial role in data management, they are merely intermediaries and lack the ability to store or redirect information to unauthorized individuals or entities. One notable aspect of account aggregators is their approach to devising mechanisms for obtaining consent from end-users regarding data flows.

In the realm of open banking, the presence of account aggregators is of utmost importance for effective execution of data-sharing. In the world of information management, an account centralizer or aggregator serves as a focal point for the collection and organization of data that has been properly standardized and regulated. Data sharing is advantageous in many ways. It facilitates the sharing of information in the digital sphere, fosters collaboration and mutual benefit in the financial system, and enables the integration of data from several sources to improve service quality. It also allows people to make more informed choices, speeds up innovation, and gives them

more control over their personal information.

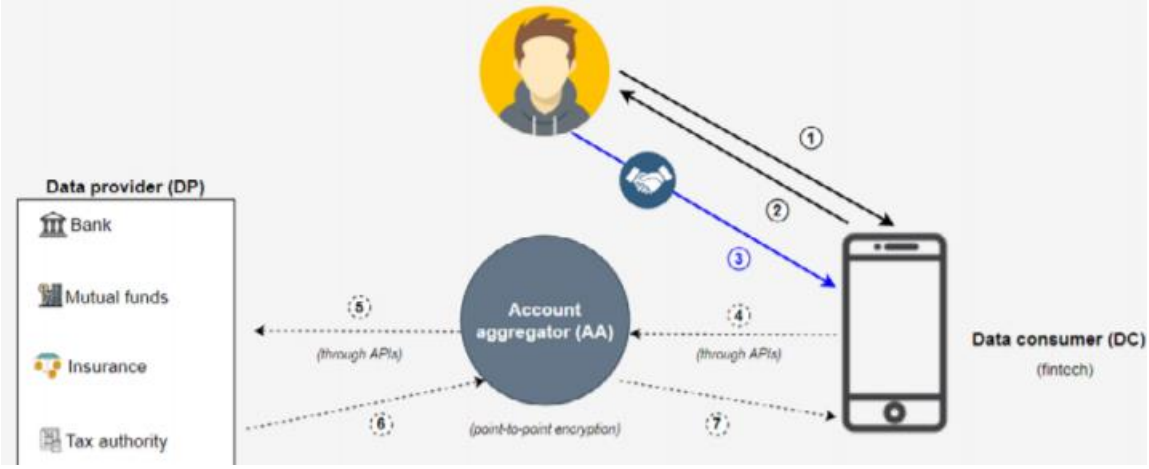


Figure 14: Process of Account Aggregation

Source: https://www.bis.org/publ/othp56.pdf

5.4.3. Official transactions

After the financial crisis, banks have become one of the industries with the strictest legal requirements worldwide. However, it maintains contact with numerous official institutions.

When their consumers are parties to a public receivable, the relevant legal authorities send information to the institutions. What is referred to as information in this context is essentially a data payload. The relevant data bundle is transmitted to all institutions, and the customer's account balance up to the specified amount is blocked. However, since this data package is simultaneously sent to all institutions and their systems are not integrated, quantities in excess of the debt amount may be blocked. With the incorporation of APIs into the collection of public receivables, individuals will be able to be blocked only to the extent of their debt. When the amount in a bank account and the amount that has been blocked are shared with other banks, other banks will not block.

In conclusion, banks are subject to rigorous regulations. In addition, it is difficult and labor-intensive to manage the auditors' requests in these audits. Businesses rely on their banks to respond quickly and accurately to requests for audit affirmation, but legacy processes and high volumes of requests hinder banks' ability to execute effectively. APIs can help banks eradicate these processes and provide customer support teams with a superior user experience and cutting-edge technology.

With the assistance of a centralized API request list, a bank can eradicate the time spent chasing and tracing requests across multiple channels. Multiple communication channels have a detrimental effect on productivity and efficiency. API allows institutions to reduce costs and increase efficiencies. They eliminate the overwhelming number of dispersed queries.

Additionally, API can decrease duties by eliminating manual follow-ups. Error rates and duplicate requests caused by manual processes decreased as a result of the reduction in manual workload. It streamlines workflows to eliminate redundancy, processing errors, and rework.

6. CONCLUSION

The effects of communication technologies changing at a rapid rate around the world have caused changes in society and culture and made a new generation very different from the ones before it. Organizations that can keep up with today's rapid change, in which technology is at the center of people's lives, have a chance to stay in business. As in every other area, changes in the banking world have led to new rules. The main parts of the players who are already there get lost when new ones come along. When fintechs and big platforms work together on a global scale, they create a synergy that makes it hard for countries to ignore these changes. They are now taking steps to help with the digital finance shift. One important part of all this change is open banking, which will change the rules of the standard banking sector over the next few years.

In 2008, there was a global financial crisis that touched all financial markets and the system as a whole. People lost faith in the banking system and banks because of the crisis. Due to the effects of the crisis, there are now more laws that affect the financial sector, and as a result, technology in this sector is changing quickly.

With the growth of technology, customers can now do many tasks without going to the branch. In traditional banking, face-to-face activities are done in real bank branches. Block chain and digitalization have brought up many new problems, like digital banking and open banking. Changes in the market and competition are pushing banks to work with fintechs, which are companies that use technology to make financial services. This will help banks do more than just offer services through their own digital outlets. As a result of this change and transformation caused by technology, the banking industry moves away from the old banking system and turns into a digital platform.

There is a change toward a time when banking isn't just about money anymore and data banking becomes more important.

Even though there are sometimes concerns about open banking in the banking world, it has become widely accepted in a short time all over the world. Open banking will be the key to an important lock in the process of changing the way money works. Those who don't keep up with this expected change will likely lose in different ways. Even though Turkey is still in the early steps of open banking, it is expected that the system will get better as fintech startups gain more business development experience and as customers become more aware of the environment.

It is possible to say that open banking will radically change the organization of banks from end to end. However, since this thesis aims to create a new structure for operational areas, suggestions have been made for loans, basic banking operations, treasury, payment systems and accounting units.

In the field of loans; open banking's ability to collect information from many sources will be an important breakthrough in the processes of finding good customers and allocating receivable loans. In addition, considering that collecting information and documents and processing them takes a lot of time, it can be said that operational processes will also become easier.

In basic banking activities; Banks are utilizing from APIs to streamline the onboarding process, reducing manual tasks like identity checks and address verification, thereby improving user experience and boosting conversion rates. In addition, financial crime, particularly anti-money laundering and counter-terrorist financing measures, is a top priority for regulators. Know Your Customer (KYC) is a legal requirement to protect institutions from fraud and money laundering. Traditional manual processes are costly and time-consuming. Fintech firms offer sophisticated APIs for KYC, simplifying the process and reducing costs. This integration streamlines operations and allows for immediate onboarding.

As the world becomes more globalized, the use of cryptocurrencies for investment and transfer is increasing. Banks can integrate their customers' cryptocurrency purses into the banking system to address security issues and provide efficient money transfers. APIs can help banks monitor investment performance, facilitate real-time cash balance data, and facilitate fund transmission between investors' bank accounts and investment

accounts. Open banking offers increased security, transparency, and investment opportunities. Banks are exploring API integration for cross-border currency pooling, hedging platforms, and forex. Real-time visibility of a company's financial position can help make faster decisions regarding liquidity management and investments. Real-time reporting also facilitates treasury team reconciliations and reduces fraud.

Mobile banking software or online portals enable merchants to initiate payments, similar to bank transfers. Real-time transfers allow users to credit funds to customers' accounts and issue refunds in real-time. APIs can reduce reconciliation costs, decrease shopping cart abandonment, and increase conversion rates by facilitating mobile payments for customers, thereby enhancing the customer experience.

In conclusion, banks shouldn't see the digitalization process as a threat if they change and work with financial technology businesses. They should see this change and cooperation as a way to improve the customer experience, offer new products and services, lower operational costs, give customers access to the financial system, reach more customers, make financial life easier, and get more people involved in the financial system.

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