

Financial Technologies: Digital Payment Systems and Digital Banking. Today's Dynamics

Adalet HAZAR 

Department of International Finance and Banking
Faculty of Commercial Sciences, Baskent University, Turkey

Şenol BABUŞCU 

Department of International Finance and Banking
Faculty of Commercial Sciences, Baskent University, Turkey

Abstract

Financial technologies (FinTechs) have been rapidly advancing in recent years, enabling transactions in financial markets to become faster, more efficient, and more secure. The use of advanced technologies such as artificial intelligence (AI) and machine learning (ML) provides significant advantages to the financial services sector. The complexity of financial markets and the need for swift action increase the demand for financial technologies.

FinTech plays an important role in offering more services at lower costs, helping traditional financial institutions remain competitive, and creating new market opportunities. Additionally, it supports financial inclusion by increasing access to financial services and plays a vital role in achieving sustainable development goals. In this section, we discuss the importance of FinTech, the conveniences and advantages it brings to transactions in financial markets, and the opportunities it provides to market participants.

Keywords: fintech; open banking; digital payment system.

JEL Classification: O16; O31; O32.

Introduction

Financial technology (FinTech) is a term that includes software, mobile applications and other technologies designed to develop and automate traditional forms of finance for companies and individuals. Since FinTech covers all applications that change the financial sector, FinTech includes any technology-blended version of the services traditionally performed by a bank, payment company or other financial service provider.

FinTech start-ups also offer corporate customer solutions such as corporate banking and POS devices, and extend to areas such as accounting, taxation, product inventory that have not been handled by the financial sector in the past. In addition, examples such as technology companies, interface and payment providers that do not directly serve consumer or corporate customers and improve the services of financial sector players are also accepted as FinTech.

1. FinTech Development

The concept of FinTech was first used in the 1990s with an initiative of Citi Group under the name of "Financial Technology Consortium" (Arner et al., 2016). On the other hand, there are some researchers who consider the year 1960, when ATMs started to be used, as the beginning of FinTechs.

According to the data prepared by Visual Capitalist, in 2020, 400 thousand hours of Netflix videos were watched over the Internet in just 1 second, 42 million Whatsapp messages were transmitted, and 6,500 packages were sold by Amazon (Jenic, 2020). This intense Internet-connected life has been an important development that has increased the development of FinTech companies.

Another innovation that is as effective as the Internet is smartphones. Especially since 2007, as a result of the increasing use of smart phones, mobile solutions have started to become a part of our lives, and this has contributed to the development of FinTech companies as much as Internet-connected life. With the increasing processing power and Internet-connected lives, smartphones have become a tool on which FinTechs can easily produce and offer solutions. This situation has increased the level of use of the products that FinTech companies put on the market.

As can be seen, Internet-connected life, together with mobile banking, removes the need for bank branches, which are the most important places for traditional banking. The introduction of banking services, especially money transfer, through mobile solutions increases the functionality of mobile banking more and more.

Apart from the main factors mentioned above, competition among banks contributes to the development of FinTech companies. With the increase in competition, banks desire to be in the natural flow of life, and Fintech ecosystems are established in order to adapt to this. Fintech ecosystem consists of five elements: FinTech start-ups, The government, financial customers, technology developers and traditional financial institutions (Inn, 2016). These elements, which used to operate differently from each other, have started to be used by banks in time to develop their own business models.

FinTech companies can gain customers by addressing this non-banking niche. On the other hand, the changing demands of bank customers also contribute to the development of FinTech companies. The changing demand of bank customers is undoubtedly due to generational change. The Y and younger generations, which are the predominant segment of bank customers, demand flexible, customized solutions, and the existing products of banks do not always appeal to these groups. Due to this situation, these customers may prefer to use third party applications instead of mobile banking applications developed by banks.

The most important reason why the Bank's customers started to prefer FinTech solutions is that FinTech companies produce solutions quickly as a result of flexible product development processes. Undoubtedly, the introduction of legal regulations also has a catalytic effect on bank customers' preference for third-party solutions. Because legally secured processes can eliminate the uneasiness that occurs when using the product. To give an example, with the "Law on Payment and Securities Settlement Systems, Payment Services and Electronic Money Institutions", which came into force in 2013, it has become possible to establish electronic money institutions and payment institutions.

Thus, some services that were previously available only with a banking license have become available to non-bank companies as well. This has led customers to prefer FinTech solutions.

The concept of FinTech, which was initially used as an abbreviation of financial technology words, is now defined as a new business model that develops according to the changing world conditions of the banking sector. As a matter of fact, in the study done by Schueffel in which more than 200 studies were examined, FinTech was defined as "a new financial sector that applies technology to improve financial activities" (Schueffel, 2016). In most of the studies, FinTech is defined as a new sector serving with a new approach.

In order to understand the FinTech sector, it is necessary to first define the size of this sector. It is stated that FinTechs spend approximately 450 billion US dollars annually (Kavuri and Milne, 2019). When we look at the fields of activity of FinTech companies, it is seen that the companies mainly focus on areas such as payment

systems, insurance management, asset management, regulation management, blockchain, cyber security, e-commerce, artificial intelligence, robotics (KPMG, 2020).

Similar to the trend in the world, it is seen that FinTech companies are developing in Turkey as well. After the “Law on Payment and Securities Settlement Systems, Payment Services and Electronic Money Institutions”, which entered into force in 2013, FinTech companies in Turkey started to grow more.

2. FinTech Solutions

Connected tools are among the applications found in fintech solutions. According to Digital Auto Report, while an average of 25% of the vehicles in the European Union, USA and China were connected to the Internet in 2020, this rate is predicted to reach 87% in 2035 (PWC, 2020). This development creates a solution area that will cause FinTech companies to grow further in the future. The payment systems to be established over the Internet between the fuel station, parking area, service point and the vehicle should be considered as a development that will change the traditional payment systems of FinTechs.

Another solution that can be mentioned is virtual assistants. Virtual assistants are an important development that will enable FinTechs to take up more space in the future. Virtual assistants, which are mostly used in organizations that solve people's problems such as call centers, have begun to find more use, especially with the development of word processing / comprehension technologies. As a matter of fact, virtual assistants that can give almost human reactions when supported by artificial intelligence have been created. An example of this is Google CEO Sundar Pichai's presentation in 2018, when the Google virtual assistant relayed a conversation with live people. The virtual assistant talked to a human on the phone, but the human continued to chat without realizing that the person he was talking to was a machine (Mashable Deals, 2018). In our country, banks and telecom companies use virtual assistants in call centers.

Blockchain technology is also among the solutions developed by FinTech companies. While investments in blockchain technology, which is used primarily in the fields of crypto money, notary, promissory notes, transaction and user security, are growing every year, banks are currently implementing R&D projects for blockchain. However, it is possible to say that the number of applications using blockchain technology will increase in the near future, and accordingly FinTechs will develop more (Hazar and Özen, 2021). Also, Raifu and Ogbonna (2022) examined the concept of cryptocurrency as a safe haven during times of economic uncertainty or market turbulence, offering valuable insights into the evolving role of cryptocurrencies in the global financial landscape.

FinTech companies specializing in customer experience meet the needs of enriching banking systems in terms of experience. The concept of customer experience, known as user experience, has been divided into two subheadings in recent years. These are customer and employee experience. Competitive banks naturally concentrate on customer experience first. However, in recent years, studies have been carried out on employee experience as well as customer experience. Institutions have started to continuously improve the systems they use in order to enable their employees to make sales more easily. The main value proposition of FinTech companies that offer such solutions is to ensure efficiency in processes and increase the number of customers as a result. For example, some banks can save a lot of time in their processes by using the solutions of FinTech companies specializing in document processing.

Cloud computing has emerged with computer resources shared among users in recent years and has become an increasingly preferred structure as it reduces IT costs. For example, Google's document / spreadsheet processing services are a good example of cloud computing. With this service, it is no longer necessary to install a program to process documents / tables on each computer. In general, it is possible to say that cloud computing has developed with e-mail. Services offered primarily for e-mail, today document writing, processing, etc. many

services have been added and therefore it has become possible for complex systems in banking to work over the cloud.

Statistics, a concept as important as mathematics, has increased its popularity even more today under the name data analytics. The underlying reason why data analytics has become important is the growth of data and the technology that develops with machine learning. Automation solutions have also become smarter with the proliferation of machine learning algorithms as a result of machines interpreting the data obtained by data analytics. This situation has created new solution areas for FinTech companies.

3. Future of FinTech Concept

Although technological changes and customer needs will make the concept of FinTech even more popular in the future, the most important issue to overcome is trust. As a matter of fact, although Covid-19 is an important opportunity for FinTechs, it is said that the problem of trust still creates a barrier and it is stated that data security, obscurity, limited regulations and some data leak scandals create barriers for FinTechs. According to a study, 64% of people trust banks, while 47-49% trust in FinTech formations (Wilde, 2020). While the most important reason for the formation of this trust gap is the fact that institutionalization has not yet been fully formed in FinTech companies, another factor is the rapid change in technology, which makes it difficult to adapt.

However, as the legal regulations around the world come into effect, products and services that were previously monopolized by banks will be started to be made by FinTechs. On the other hand, with the spread of cross-border digital payment systems, we see that many companies that were born as local FinTechs can turn into important corporate structures and global companies with operations in all countries are beginning to form.

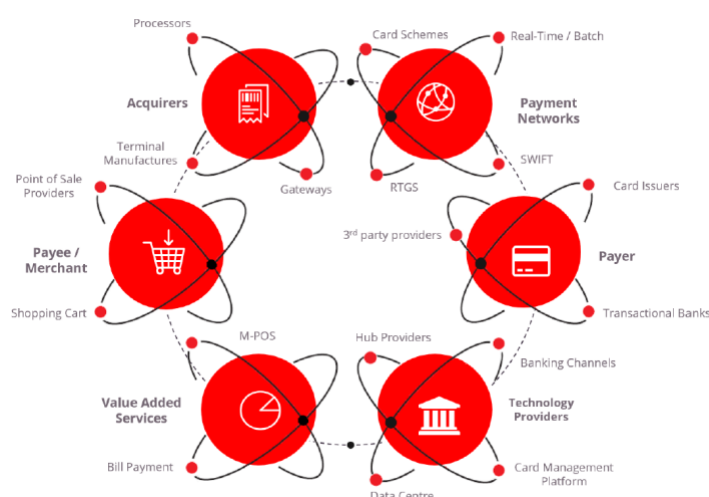
Although the general opinion is that there will be no need for banks in the medium and long term, it would be more accurate to think that all FinTech companies will actually become banks. For this reason, the regulations that the authorities will make by foreseeing the future will become more critical than ever. In addition, it has become very important for the new era to strengthen the competencies of the employees and the young population, especially in machine learning and analytics.

4. Digital Payment Systems

Finding a safer, faster, cheaper and more convenient way to make and accept payments is an important component of financial inclusion. Compared to more traditional methods such as cash and checks, electronic payments can offer a superior option for both consumers and businesses (Saxena, 2016). Payments take the form of money in the e-commerce environment and are called "electronic (digital) payments" with an electronic exchange. Digital payments are the most important and integral part of e-commerce. A significant part of the popularity that e-commerce has gained today is due to the perspective of doing business over the system, and this method enables the purchase and sale of goods and services over the Internet. In this framework, commercial payments made using e-commerce turn into money transfers in electronic environment, and digital payments are activated.

The digital payment ecosystem includes a number of different players, including the acceptor, payment service providers, payment aggregators, networks (e.g., Visa, MasterCard), payment issuers, and loyalty programs (Equinix Forum, 2018).

Figure 1. Digital payment ecosystem



Source: Equinix Forum (2018, 4).

Digital systems make it possible to make many payments quickly, safely and cost-effectively (Global Partnership for Financial Inclusion, 2015). Based on the fact that digital payments allow for more efficient and cost-effective financial transactions, companies also increase their profits (Klapper, 2017).

Digital payment, also called electronic payment, is the transfer of value from one payment account to another via a digital device such as a computer, mobile wireless data or a digital communication channel communication such as SWIFT. In another definition, digital payments; are positioned as financial services that are accessed and offered through digital channels, including mobile devices (Agur et al., 2020). While exchanges between different business partners continue to be offered on e-commerce platforms, the cash-based payment system has gradually been replaced by digital payment systems. In this framework, the digital payment system can be defined as a kind of inter-organizational information system that connects a large number of corporate and individual customers for money-related transactions (METU-OCW, EPS).

Another definition of digital payment systems is “the arrangement of monetary exchange between buyers and sellers in online conditions with a digital financial instrument (for example, electronic checks, credit card or cash in digital form) supported by a bank, mediator or legal partner”. Digital payment systems include the following:

- Transactions made via payment cards (e.g., credit, debit or prepaid cards)
- Transactions made through other devices (e.g., mobile phones or smart devices) that enable digital payment
- Transactions made through devices that leverage application programming interfaces (APIs) and open banking models.

Below are the primary advantages of digital payment systems:

- It provides cost savings thanks to higher efficiency and speed.
- It provides transparency and security by reducing corruption and theft due to increasing traceability and accountability.
- It contributes to the prevalence of the financial base by increasing access to a range of financial services.
- The system contributes to promoting consumption, reducing corruption, increasing productivity and creating welfare by improving income collection.
- The increased use of electronic payments helps prevent the informal economy by ensuring that transactions are recorded.

- Digital payment systems technology provides cheaper and safer access to financial services, especially for those with low incomes and those living in remote parts of the society.
- Digital payment systems also enable SMEs to sell on the global market and thus expand their customer base (ICC Brief 4).
- It creates opportunities for local FinTechs to operate globally.
- Despite these important advantages of digital payment systems, there are also some difficulties. The identified challenges are related to infrastructure, regulatory, legal and socio-cultural issues (Khan et al., 2017).
- Infrastructure: In order for digital payments to be carried out effectively and efficiently, it must have a reliable infrastructure that the majority of the public can benefit from. For example, in some developing countries, large parts of the country lack banks and do not have access to basic infrastructure such as electricity and telecommunications that drive digital payments.
- Regulatory and legal issues: The establishment of necessary legal regulations and international standards is essential for the effectiveness of the digital payment system. The nature of digital payments (for example, which laws will apply in the disputed cases and the legality of digital signatures and electronic contracts) brings with it legal issues.
- Socio-cultural challenges: Social and cultural differences and the use of various forms of payment make it difficult to establish a digital payment system on a global level.

While customers can purchase goods and services, pay with cash, check or credit cards in traditional businesses, digital buyers can use one of the following digital payment systems for digitally purchased products and services (METU-OCW, EPS): electronic fund transfer (EFT), payment by card: bank cards (debit cards), credit cards, smart cards, electronic money (e-money/e-cash), online payment, electronic checks (e-check), electronic wallets (e-wallet), micro payment systems, electronic gifts, peer-to-peer (P2P) payments, business to business (B2B), business to consumer (B2C) and consumer to consumer (C2C) transactions, mobile payments, other payment systems.

Electronic funds transfer includes electronic money transfer between parties through financial institutions. EFT is used to transfer money directly from one bank account to another without any paper money changing hands.

Payment by card: carrying out the payment stage of a transaction by means of physical and virtual cards issued by an issuer, instead of cash, valuable papers, etc., constitutes a card payment transaction.

Bank cards (debit card): Debit cards refer to the structure associated with the card with certain features, which enable the financial value in the customer's account to be transferred to the other party via the digital payment system. Debit cards are similar to credit cards except they have no overdraft limits. It is a card prepared by a financial institution such as a bank as a means of payment and given to the customer. A debit card is a card used for cashless payments at retailers, online stores or cash withdrawals at ATMs that allows access to funds in the owner's bank account (METU-OCW, EPS).

Payments made with debit cards are drawn directly from the consumer's personal account instead of the intermediary account.

Credit cards are still the most used method in digital payment systems. It refers to the structure that allows the spending party to make transactions within the limit defined without any financial value in their account, and enables the transaction to be carried out through a digital payment system connected to a card with certain features. Initially, security concerns hindered the adoption of credit cards. However, later, with the introduction of more security features, the use of customers' credit cards has increased rapidly (Bezhovski, 2016). One of the most important advantages of credit cards is their functionality that allows instant online transactions from anywhere.

Credit cards are the most common form of digital payment. Cardholder authentication is achieved using the credit card number, name, expiration date and security number. Complementary systems such as Verified by Visa and MasterCard Secure Code have been developed by credit card companies to keep users' personal information safe. In addition, this payment method offers users the opportunity to create a password they use for online shopping with a credit card (Khan et al., 2017).

Smart cards contain financial value and other necessary personal information used for digital payments. Cards with an embedded microchip in the size of a credit card with a processor, RAM and ROM memory are defined as smart cards. To be able to pay with a smart card, the card must be introduced to a hardware terminal.

Electronic cash (e-cash): Electronic cash is standard money converted into electronic form to pay for digital purchases. E-cash usually runs on a smart card with a built-in microprocessor chip. E-cash transactions, which work as a direct transfer from the customer's desktop to the merchant's site, generally do not require remote authorization or Personal Identification Number (PIN) codes at the point of sale. E-cash can be transferred over a telephone line or the Internet.

Online payment can be used for monthly payment transactions such as Internet and telephone bills. Online payment system is a payment method called collection via Internet, virtual p.o.s. etc. and realized by means of various cards in a virtual (Internet) environment.

Electronic checks (e-check): In the e-check system, legal and commercial protocols are used, which are related and identical to traditional paper checks. Electronic checks have the speed and processing efficiencies of electronic payments as they are a new payment tool for online transactions that combine high security, speed, convenience and transaction efficiency. E-checks have advantages such as secure and fast payment of liabilities, fast check processing capability and low transaction costs (METU-OCW, EPS).

Electronic wallets (e-wallets): They are digital wallets that enable all credit cards, debit cards or prepaid cards to be safely stored on the digital platform and to make quick payments through these cards for online shopping (www.iyzico.com). Near Field Communication technology in the e-wallet can store all kinds of digital information such as credit cards, electronic tickets, etc. In addition, it can transfer information to private readers and perform transactions such as payment, ticket purchase or reservation confirmation in a very short time (Baydur, 2011). Electronic wallets, which are useful for those who shop through digital systems, are a safe and useful tool for other money transfer transactions as well as shopping. E-wallets can store credit cards, passwords, PINs and more personal and financial information.

Mobile wallets, an application of e-Wallets, allow users to install an application on their smartphones from online stores and pay for their online / offline purchases (Bezhovski, 2016).

Micro payment systems are similar to e-wallets in that they contain the financial value stored for online payments, and the difference is that they are used for small payments. The process is similar to e-wallet technology, where the customer transfers some money to the desktop wallet and then pays for digital goods using that wallet (Hazar and Özen, 2021). Using micropayment, the customer can pay for a chapter from a scientific book or a song from an application on the Internet.

Peer-to-peer (P2P) payments is a system that allows at least two users in a network to share data directly between each other. Within this framework, P2P payment service allows digital cash (e-Cash) transfer via e-mail between two people who have an account in banks using e-Cash. An example of a P2P payment service is PayPal. Transactions made via PayPal are instant. This service is free for people sending money to each other and the payee does not need to enter any credit card information. PayPal allows money to be sent to anyone with an email address, regardless of which bank the person uses or whether the recipient is already registered with the service. People who want to send money to others can open an account by logging into PayPal from the relevant Internet

address and save the amount to be sent. This amount is written on the person's credit card, a payment notification is sent to the buyer and an account is created in the name of the buyer. When the person to whom the payment was sent receives the email notification, they sign up for PayPal and can access the account containing the payment. The money in this account can be sent by direct deposit to the recipient's bank account or by postal check from PayPal (METU-OCW, EPS).

Business to business (B2B), business to consumer (B2C) and consumer to consumer (C2C) transactions. The fastest form of e-commerce payment is business-to-business (B2B) transactions. Transactions between the manufacturer and the wholesale business or from the supply marketing of the businesses to the organization of advertising activities are within this scope (Ertaş, 2017). Virtual marketplaces are examples of this business model. B2C market transactions are less complex than B2B transactions. In the B2C system, retail products and services are sold directly to the final consumer (Ertaş, 2017). Payments are usually electronic transfers from consumer accounts.

Consumer-to-consumer (C2C) e-commerce is a business model in which a consumer sells their goods or services online to other consumers. The transaction between two customers is managed by a third party who has created an e-commerce website to deal with transaction status, payments and other matters. This third party helps sellers and buyers find each other for a small fee. In the model, consumers offer their products for sale to other consumers through certain marketplace applications at a price they determine. In this business model, there is no obligation such as invoicing the sales made (iyzico.com).

Mobile payments appear to be suitable for both online purchases and offline micropayments. The use of mobile payment services reduces overall transaction costs and ensures safer transactions. This payment method has made it easier for businesses to collect important information about their customers and the products they buy.

Other payment systems. In addition to the digital payment systems described in the previous section, new applications emerge as technology develops. Some of these innovations are as follows;

- Contactless Payments,
- Open Application Programming Interfaces,
- Distributed Ledger Technology,
- QR Codes,
- Central Bank Digital Currencies.

Digital payment methods have made great progress in recent years, and the developments are signals that they will change even more in the coming period. In this context, the trends in digital payment systems that are likely to be experienced in the coming years can be summarized as follows (Digipay, 2020).

Biometric authentication is a verification method that includes the biological and structural characteristics of a person and will become widespread in the coming period. These verification methods include fingerprint scanners, facial recognition, iris recognition, heartbeat analysis and vessel mapping. Biometric authentication will become a safe option to prevent illegal transactions in digital payments. Biometric authentication is an adequate payment method as it combines accuracy, efficiency and security in one package. In this respect, it is quite safe as it contains the unique features of an individual and will help build customer loyalty and trust accordingly (Digipay, 2020).

Gen Z: As it is known, the term "Generation Z" is mostly used for people born in 2000 and later. This generation is Gen Z, which is also the generation of the digital world. This generation is gradually gaining weight in the population. This change in population is of great importance in terms of digitalization. Generation Z is the generation that will be more dependent on the latest, more automated and faster technology-based services (Digipay, 2020).

Transition from Cards to Codes: EMV technology (Europay, Mastercard, Visa) introduced customers to computer-based and secure payment mechanisms. EMV technology is known for using codes that change every time a transaction occurs. This use of temporary codes increases the security of bank accounts.

Increasing Demand for Mobile Point of Sale: The mobile point of sale (mPOS) has been an important step in freeing merchants from their physical environment and dependence on in-store payments. Firms will be able to act more comfortably in many activities with mobility as they can accept payments from customers without any problems.

Smart Speaker Payments allow their users to give voice commands to a speaker and receive a voice response in return. The user can give voice commands for various operations such as ordering or reservation making. In recent years, many giant companies have invested in the production of smart speakers. Amazon became the first company to produce its smart speaker in 2014. Google Home and Apple joined Amazon in 2016 and 2017, respectively. Users use smart speakers to purchase goods such as food and clothes, send money or pay directly. However, many people still have security concerns about making payments through voice assistants. With the elimination of these concerns, the future of smart speakers, in which big companies such as Amazon, Google and Apple have invested, looks promising (Digipay, 2020).

High Security Powered by Artificial Intelligence and Machine Learning: High-level security enhancements of payment technologies are a prerequisite for them to go further, as people will always prefer to use a highly secure payment method. Banks obtain a large amount of customer information and payment data every day. In order to detect all possible threats in these transactions in a short time, banks now use machine learning. The first step to achieve artificial intelligence is machine learning.

Contactless Payments: Another payment method that can be seen to grow rapidly in the coming period is contactless payments. Contactless payment is based on customers showing their smartphones to the reader. This method is much faster and more convenient than inserting a card. Contactless payments are faster and more secure than PIN technology, as they instantly transfer encrypted data to the point-of-sale device. To be able to pay, all you have to do is download the application, add a card by entering the necessary information and show the phone to any reader.

Mobile Wallets Gain Weight: According to a report by RetailDive, approximately 2.1 billion customers used mobile wallets in 2019 and this number is increasing. A mobile wallet is a mobile application that tries to imitate a real physical wallet. With the help of the mobile wallet, money can be sent to other users, received from other users and stored in the wallet. Also with the mobile wallet, a user can pay electricity bills, buy tickets and more (Digipay, 2020). Major companies such as Apple, Google and Samsung have mobile wallets.

The expected developments in the market structure after the changing trends in the technological structure and product types can be summarized as follows:

- It is inevitable that there will be an increase in competition among the existing closed and open payment platform providers in order to get a bigger share of the market. Strategies for this may include developing custom payment products or an expanded financial infrastructure to facilitate trade.
- As the distance to be taken in terms of transaction speed, convenience and access decreases, competition will shift to the financial side and may reduce payment processing fees. This will lead companies to create alternative income areas. As a result, new markets can be entered for differentiated or improved customer service and new products can be developed to meet the changing needs and expectations of customers (Deloitte, 2020).
- The increasing globalization of payment processing reveals the need for new standards for managing money flow and protecting customer data. As a continued increase in the cross-border transaction

volume in new digital payments is expected in the coming period, it is expected that the relevant organizations will standardize their data platforms and begin to unite around global industry standards such as ISO 20022 to ensure payments integration (Deloitte, 2020).

- Some strategies that have been implemented by non-commercial organizations indicate that the importance of the payment ecosystem will increase in the future (Deloitte, 2020). First, the Fed announced that it would develop a 24/7 real-time gross payment service called the FedNow Service to increase the speed of payment systems in the United States. Second, the People's Bank of China has announced plans to launch a state-backed cryptocurrency.

5. Digital Banking and Digital Transformation

Today, the banking sector designs and implements business models based on digital systems. Digital transformation encompasses the widespread delivery of banking services in new contemporary ways. Today, digitalization has become a strategic priority for the banking sector in the world. The number of bank branches is decreasing and many services are offered through technology (Hazar and Özen, 2021). Professionals think that the development in financial technology started with the distrust of banks and the complexity of access to credit after the 2008 global financial crisis. However, greater attention from regulators, industry participants and consumers to the FinTech sector emerged mainly after 2014 (Galazova and Magomaeva, 2019).

The increasing use of digital financial innovations in banking has a positive effect on the one hand, but on the other hand it increases the risks. The use of new technologies increases the number of banking services and the speed of delivery. Accordingly, the demand for them increases and the profitability of the institutions increases by decreasing the transaction costs. In contrast, the transfer of transactions to the digital area and threats related to cyber security diversify the risks associated with activities.

However, banks' refusal to develop financial technologies in their operations due to the risks to arise may lead to more negative consequences for institutions. With the greater use of technology in developing new services and business models, the banking sector is undergoing a transformation from being based on physical branches to using information technology.

The emergence of digital banking dates back to the introduction of ATMs and cards in the 1960s. An important step was taken with the use of the Internet in the 1980s. With the widespread availability of the Internet in the 1990s, online banking has become indispensable in the sector. With the development of the e-commerce system in the 2000s, an important step has been taken in today's modern digital banking world. Later, the widespread use of smart phones paved the way for digital banking.

The historical development of the banking sector has gone through three different stages of digital transformation that started in the 1990s (IBS, 2019). The first transformation is the transition to electronic operations, which makes banking more transactional and technology-centric, and creates a model based on efficiency and automation. In this period, banks started to focus on applications that increase customer comfort by using ATMs, call centers and telephone banking.

The next phase is the implementation of a range of SMAC technologies (Social, Mobile, Analytics and Cloud) that have a visible impact on today's banking services and products. These technologies have created the opportunity to transition from being an efficient supporter of financial institutions to the provision of personalized banking services.

The current digital transformation process, which is the last stage, is driven by new technologies such as artificial intelligence, robotic process automation, blockchain, API banking and Internet of things (IoT) that have the potential to significantly change the banking environment. Such technologies have started to be used and when

used together, they can provide a much deeper level of personalization and customer loyalty and fundamentally change the way banking transactions are implemented.

Considering the upcoming period in the banking sector, from a different perspective, it can be stated that digital transformation takes place in five main stages. These stages are (Galazova and Magomaeva, 2019):

- **Emergence of Digital Channels:** In this process, which can be defined as the first stage, ATM networks, Internet banking, mobile banking are accepted as the beginning of a digital change in the business world.
- **Emergence of Digital Products:** This step, which is the second stage, includes big data, contactless payments, virtual cards, artificial intelligence, machines. Services to meet the financial needs of customers uninterruptedly throughout the day with advanced software were created in this process.
- **Creating a Complete Digital Service Cycle:** In this third stage, besides digitizing their traditional services, banks are changing their business models and expanding their business areas by creating new digital business. The use of digital tools naturally allows for their globalization. At this stage,
- **Formation of the Digital Brain:** In this step, which is the fourth stage, the "Digital Brain" continuously analyses data automatically in all business segments, departments, product groups and services. This gives the institution more information about its capabilities.
- **Creation of Digital DNA:** In the fifth stage, a new coordinate system that enables the bank to make strategic decisions throughout its life cycle, namely "digital DNA", takes place.

Although there are many advantages of digitalization for the banking sector, the most basic ones are:

- **Ensuring Business Efficiency:** Digital systems not only increase the quality of service offered to customers, but also enable banks to make their internal work more efficient. It also makes corporate communication more efficient.
- **Saving Costs:** Traditional banking transactions are slow, prone to human error, and costly because they require large workspaces. Digital platforms reduce these costs and enable faster responses to market changes.
- **Increased Accuracy in Transactions:** It is known that the error rate is high due to manual transactions in the periods when technology is used very little or not at all in banking. With digitalization, the verification process is simplified and more accurate accounting is provided by applying information technology solutions with software.
- **Increasing Competitiveness:** Digital solutions help banks manage their marketing efforts, allowing them to reach wider markets and establish closer relationships with technologically savvy consumers.
- **Providing More Agility:** The use of automation increases customer satisfaction as it accelerates both external and internal processes. On the other hand, rapid detection can be achieved in risk management activities, which are gaining more and more importance for banks, and the necessary measures can be taken more rapidly.
- **Enhanced Security:** All banks face an increasing number of cyber threats that can damage their reputations. Banks can take advantage of the extra layers of security provided by technology to protect their data.

Until recently, the main task of the IT departments of banks was to support business objectives by using digital technologies determined by senior management. Today, with the digital transformation, digital technology has become the main idea in all bank applications beyond support. Thus, with digitalization, the banking sector is changing irreversibly. Reaching customers is cheaper and easier than the old methods. The number of bank branches is decreasing and banking services are offered to customers through online systems.

It is accepted that mobile banking is formed by the combination of electronic banking and mobile communication technology and is an extension of Internet banking (Coşkun, 2018). Internet and mobile banking are considered one of the biggest technological advances affecting the banking industry as they enable customers to do the majority of their banking transactions themselves. Through Internet banking, customers can pay their bills, manage their accounts, and perform many transactions over the Internet that they could have done by visiting the bank before.

With the development of mobile phone technology, banks have started to use mobile applications to facilitate payment methods. This digital trend is not only limited to banks, but big technological companies such as Apple and Google have also started to deal with this issue (Piirainen, 2016).

Artificial intelligence is changing the habits of customers in banking and making their interaction with a bank's digital channels simple, efficient and smart. Artificial intelligence can be used for the following purposes in banking (Moneythor, 2020). The ability of artificial intelligence to analyse and categorize data enables early detection of financial fraud or theft and enables rapid identification of unusual customer behaviour patterns. Exploration of the potential integration of intelligent agents into an online betting strategy to enhance profitability is introduced by Popîrlan, Gavrilă, Popîrlan, 2017) within a betting management system to assess its effectiveness in the online betting market. Additionally, is conducted a comparative analysis to determine advantages of artificial intelligence is the automation of workflow. AI can be used to create documents, reports, and audit reports, as well as to save employees time and provide high-quality results. Artificial intelligence and machine learning enable banks to provide personalized recommendations, making it easier for them to analyse and understand customer preferences.

Chatbots, in the simplest terms, are computer programs that can chat with people. These robots listen to questions and comments and respond appropriately. With faster response times and 24-hour support, it is a driving force in gaining customer loyalty and increasing customer satisfaction. These robots become smarter over time by increasing their level of knowledge through interactions with customers. Their ability to analyse and categorize transactional data enables them to provide smart and personalized insights to the right person at the right time. In addition, since chatbots keep their previous interactions in their memory, they remember the preferences of the customers, so they can offer the right suggestions to the customers.

Natural language processing means that the spoken language is understood, processed, interpreted and sentenced by computers, which are formed by the combination of linguistics and artificial intelligence. In this context, natural language processing combined with artificial intelligence can be used to create chatbots that help banks automate their processes and provide real-time intelligent customer service.

Technological advances such as machine learning allow banks to analyse and categorize more data about their customers. The ability to have data and use it by processing it with technology is becoming one of the biggest competitive areas for banks. As explained earlier, cloud computing is the provision of information processing services such as database, network, software, analysis and machine intelligence over the Internet. In banking, the cloud is the preferred server system for banks and contributes positively to market penetration speeds, improving customer habits, reducing costs, increasing security and many other areas.

Biometrics, the automated method of verifying a customer's identity with their biological characteristics, helps banks to offer their banking services securely and with low fraud risk. Fingerprint authentication it is about face and voice recognition are becoming new security elements for accessing bank accounts, confirming transactions and accessing personal information (Moneythor, 2020).

Application Programming Interfaces or APIs are an attachment used to create and share banking products and services, as well as a set of crafted classes, procedures, functions, or constructs provided by the service or

operating system. APIs allow third parties to connect to a bank or financial service provider and access information such as services, financial information, customer accounts, product catalogues.

In open banking, third-party providers are allowed to access banks' customer account data, and advanced services can be created for customers by banks and FinTechs. Open Banking is the secure sharing of bank financial data and services with third parties via open APIs. Open Banking allows these companies to develop financial products. Open banking initiatives and regulations, which were first introduced in the UK and Europe, later spread around the world. Today, many countries have also implemented legal regulations on this issue. Open banking increases competition in the sector and facilitates new entry into the market (Moneythor, 2020).

6. Future in Digital Banking

Business and Transactions to be Affected in the Future

Digital banking will affect the banking sector in many ways, and its main areas of influence are listed below.

Products and solutions offered to customers: In particular, products that cross traditional banking boundaries are likely to be seen. For example, real estate brokerage, valuation, financing and insurance under new products for home buyers are likely to be combined in one offer. New product combinations can be much more than simply putting together existing products.

The development and rapid deployment of new customer solutions could potentially create new types of acquisitions between banks and other financial institutions doing similar work. Therefore, there will be more collaborative work between banks and non-bank institutions.

There will be much less dependence on physical distribution channels, especially as cash needs decrease and new vehicles are made available to customers. Customers increasingly prefer mobile devices as prefer to branches. It seems likely that there will be a significant decrease in physical branches as different and more attractive channels are offered to customers as a result of digitalization.

Digital technologies, solutions and thinking will have a significant impact on all banking activities. For example, in banking, process digitization will automate most back-office processes. It will contribute to the development of policies and processes in risk management (Kelly, 2014). Digital technologies may also lead to the realization of some negative initiatives. Some participants may show intention to operate outside of regulations. These developments will lead to the emergence of non-banks who try to operate as banks but do not want to comply with banking rules (Kelly, 2014). Regulating banking activities in this environment will also require regulating the activities of institutions operating as non-bank digital financial institutions.

There is confidence in the society that banks can protect the money they receive and return it when the payment is due, make the transactions correctly and on time, and protect customer information. To ensure that trust in the financial system is maintained, authorities will need to keep a close eye on new payment systems and the institutions that offer them. Also, the requirement to protect a customer's personal information is a banking principle. Unless required by law, banks may not give customer data to a third party or use it for other than specified purposes. In contrast, many digital business models rely on the use of private data. Privacy on the Internet is declining. While some customers welcome the sharing of data, there may be a situation where the trust in the system decreases for the rest of the customers. In this context, determining data protection and usage standards is an important issue that regulators should work on. In general, cyber security in banks is based on the creation of strong external defences such as firewalls and the encryption of data while moving outside the walls. Recently, system traffic and activity monitoring have also been introduced to identify abnormal events that may indicate fraud or attack.

In general, the emergence of digital financial services will change the profile of risks in the financial system. As new risks emerge, it will be also making it easier to manage some existing ones. For example, credit risk will have the potential to be managed more accurately as the amount and timeliness of data available to lenders has increased significantly. Also, some operational risks will decrease as more automation is used. However, system reliability will likely become a more important risk factor as the ability to revert to manual systems in the event of failure becomes increasingly difficult. Additionally, cybersecurity risks will increase (Kelly, 2014).

Trends in Digital Banking

Since digital banking covers all banking activities, it is an issue that should be considered in the strategies and practices in every field of banking. In this context, the emerging trends in the sector are detailed below:

- **Use of New Age Technologies:** New technologies such as robotic process automation, artificial intelligence, Internet of Things (IOT), blockchain and shared infrastructure are forces that will reshape the way financial institutions operate in the future. These technologies are prepared for widespread use in all areas of banking.
- **Improving (Developing) Customer Habits:** One of the most critical areas that banks try to improve through digital banking is customer habits. Customers' expectations for digital services are shaped by the habits provided by technology companies such as Google, Apple, Facebook, Amazon, and similar practices are expected from financial service providers.

For example, some banks in the world have started to allow voice-based commands for iPhone users. This app allowed them to perform basic operations such as checking bank accounts, credit card information and making e-payments via Apple's virtual assistant Siri.

Digital banking means that banks now have large amounts of data for each of their customers. By using elements such as predictive analytics and artificial intelligence, it enables them to further personalize their service offerings for their customers.

Financial institutions have realized that customers are happy to have different options and therefore started to offer them a wide variety of channels. As customers now use multiple devices at the same time, banks are investing in technologies that allow seamless transitions between different channels to improve their communication with customers (IBS, 2019).

In the future, back offices will have multiple functions, contributing to the growth of the bank's transaction volume. The back office will leverage technologies such as robotic process automation to reduce reliance on manual processes. With the developing technology, significant cost savings are expected for banks in back-office processes. Another function that a bank's back office will impact is enhanced customer information. The back office handles almost all customer data. Banks will increasingly use this data, using enhanced analytics to generate insights about customer behaviour and transactions (IBS, 2019).

Fintechs have had a significant impact on the delivery of financial services. Existing financial institutions have also approached the work of these new businesses positively and collaborated with them to offer fintech products to their customers. This cooperation is likely to continue in the future.

The convenience provided by financial institutions to allow customers to access services from multiple devices makes the data network more vulnerable. Increasing risks mean that data security is one of the top priority areas for financial institutions. In this context, financial institutions will increase their investments in digital security systems while trying to combat fraud, data breaches, system weaknesses, and at the same time maintain enhanced customer loyalty (IBS, 2019).

Developments in digital banking ensure that the products offered by financial institutions are constantly renewed. In this context, it should be expected that new products based on technology will emerge continuously in the sector. As digital transformation continues, financial institutions will need to change their organizational structures and adapt to this transformation.

Discussion and Conclusion

The rapid integration of financial technology into various aspects of life, as well as its easy integration into many areas, creates opportunities for more effective use of all kinds of resources. In this context, financial technology, which will enable human intelligence to be used in more creative areas in the future, has opened the door to a new era for all worldwide.

This section emphasizes the transformative impact of FinTech in various sectors, illustrating how these innovations streamline transactions, enhance accessibility, foster financial inclusion, improve security measures, and propel overall efficiency within financial operations. The conclusion underscores the significant potential and the continuous evolution of fintech, emphasizing the need for further exploration and integration to exploit on their benefits while addressing potential challenges in their implementation.

Credit Authorship Contribution Statement:

The authors of the study performed all tasks related to the preparation, research and writing of the study.

Acknowledgments

The authors are very grateful for the feedback and guidance of the journal editors regarding the study.

Conflict of Interest Statement

The authors declare that there is no conflict of interest regarding the study.

References

- [1] Agur, I. P., Soledad, M., and Rochon, C. (2020). Digital financial services and the pandemic: Opportunities and risks for emerging and developing economies. *IMF Research*. <http://www.imf.org/en-special-series-on-covid-19-digital-financial-services-and-the-pandemic.pdf>
- [2] Arner D, Barberis J, and Buckley R. (2016). The evolution of fintech a new post-crisis paradigm? *University of New South Wales Law Research Series*, 62. <http://dx.doi.org/10.2139/ssrn.2676553>
- [3] Baydur, S. (2011). Alternatif bir ödeme aracı olarak elektronik cüzdan (Thesis), Marmara Üniversitesi Sosyal Bilimler Enstitüsü. İstanbul. https://tez.yok.gov.tr/UlusalTezMerkezi/tezDetay.jsp?id=J89pYV5IEXe-FfL9sYNlrQ&no=V9bymrf_yydX-Y2klW550Q
- [4] Bezhovski, Z. (2016). The future of the mobile payment as electronic payment system. *European Journal of Business and Management*, 8(8), 127-132.
- [5] Coşkun, A. (2018). Türkiye ve İngiltere'de mobil bankacılık kullanımının mukayeseli olarak incelenmesi. *İstanbul Ticaret Üniversitesi Dış Ticaret Enstitüsü Tartışma Metinleri*. WPS No/151/2018 – 01. <https://ticaret.edu.tr/dis-ticaret-enstitusu-working-paper-series/>
- [6] Ertaş, B.L. (2017) Dijital ekonomide yurt dışından alınan hizmetler bakımından KDV mevzuatındaki sorunlar. *Vergi Raporu Mevzuat Dergisi*, 12, 131-140.

- [7] Galazova, S. S., and Magomaeva, L. R. (2019). The transformation of traditional banking activity in digital. *International Journal of Economics and Business Administration*, Volume VII, 2, 41-51. <https://doi.org/10.35808/ijeba/369>
- [8] Hazar, A., and Özen, Ü. (2021). *Dijital Dönüşüm ve Finans*. Akademi Consulting & Training Publications, Ankara.
- [9] Inn, L. (2016). Fintech: ecosystem and business models. *Advanced Science and Technology Letters*, 142, 57-62.
- [10] Jenic, C. A. (2020). A minute on the Internet in 2020. Statista. <https://www.statista.com/chart/17518/data-created-in-an-internet-minute/>
- [11] Kavuri, A., and Milne, A. (2019). Fintech and the future of financial services: what are the research gaps? *SSRN Electronic Journal*, 84. <http://dx.doi.org/10.2139/ssrn.3215849>
- [12] Kelly, G. (2014). The digital revolution in banking. *Occasional Paper Group of Thirty Washington*, D.C. 89. <https://centerforfinancialstability.org/research/OP89.pdf>
- [13] Khan, B., Olanrewaju, R. F., and Baba. A. M. (2017). A compendious study of online payment systems: past developments, present impact, and future considerations. (*IJACSA*) *International Journal of Advanced Computer Science and Applications*, 8(5), 256-271. <https://doi.org/10.14569/IJACSA.2017.080532>
- [14] Klapper, L. (2017). How digital payments can benefit entrepreneurs. <https://wol.iza.org/uploads/articles/396/pdfs/how-digital-payments-can-benefit-entrepreneurs.pdf?v=1>. <https://doi.org/10.15185/izawol.396>
- [15] Piirainen, L. (2016). Digitalization of the financial sector and change management (Bachelor's Thesis). Degree in International Business Oulu University of Applied Sciences. Oulu.
- [16] Popîrlan, C. I., Gavrilă, L., and Popîrlan, C. (2017). Using Intelligent Agents in Online Betting Management Systems. *Journal of Advanced Research in Management*, Volume VIII, 2(16), 126-131. [https://doi.org/10.14505/jarm.v8.2\(16\).04](https://doi.org/10.14505/jarm.v8.2(16).04)
- [17] Raifu, I. A. and Ogbonna, A. E. (2022). Safe-Haven Effectiveness of Cryptocurrency: Evidence from Stock Markets of COVID-19 Worst-Hit African Countries. *Journal of Research, Innovation and Technologies*, Volume I, 2(2), 107 - 120. [https://doi.org/10.57017/jorit.v1.2\(2\).02](https://doi.org/10.57017/jorit.v1.2(2).02)
- [18] Schueffel, P. (2016). Taming the beast: a scientific definition of fintech. *Journal of Innovation Management*, 4, 32-54. https://doi.org/10.24840/2183-0606_004.004_0004
- [19] Wilde, A. (2020). Why consumers just don't trust fintechs? <https://sifted.eu/articles/fintech-trust-gap/>
- *** Deloitte (2020). Payment trends 2020 report. <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/financial-services/us-fsi-infocus-payments-2020.pdf>
- *** Digipay (2020). Top 8 digital payment trends for 2020. (Blog). <https://www.digipay.guru/blog/top-digital-payment-trends/#>
- *** Dijital Cüzdan Nedir? <https://www.iyzico.com/blog/dijital-cuzdan-nedir-ve-nasil-kullanilir/>
- *** Equinix Forum (2018). Key trends in digital payments markets and strategic infrastructure. <https://www.equinix.com/resources/whitepapers/key-trends-digital-payments/>

- *** Global Partnership for Financial Inclusion (2015). Innovative digital payment mechanisms supporting financial inclusion- stocktaking report. [https://www.gpfi.org/sites/gpfi/files/documents/12-Stocktaking%20of%](https://www.gpfi.org/sites/gpfi/files/documents/12-Stocktaking%20of%20)
- *** IBS Intelligence (2019). Emerging trends in digital banking. <https://ibsintelligence.com/white-paperrepository/>
- *** ICC Issues Brief 4. Electronic payment services and e-commerce. <https://iccwbo.org/content/uploads/sites/>
- *** KPMG (2020). Pulse of fintech H1 2020. <https://home.kpmg/xx/en/home/campaigns/2021/02/pulse-of-fintech-h1-2020.html>
- *** Mashable Deals (2018). Google's AI assistant can now make real phone calls. https://www.youtube.com/watch?v=JvbHu_bVa_g
- *** METU. Açık Ders Malzemeleri, Electronic payment systems (EPS). https://ocw.metu.edu.tr/pluginfile.php/354/mod_resource/content/0/Lecture_4.pdf
- *** Moneythor (2020). Digital banking 101. <https://www.moneythor.com/2020/07/30/digital-banking-101/>
- *** PWC (2020). Digital auto report. <https://www.pwc.com/gx/en/strategyand/assets/digital-auto-report-2020.pdf>
- *** Saxena, A. (2016). Electronic payment systems 101. https://www.marketlinks.org/sites/default/files/resource/files/Electronic_Payment_Systems_101.pdf

Cite this article

Hazar, A. and Babuşçu, Ş. (2023). Financial Technologies: Digital Payment Systems and Digital Banking. Today's Dynamics, *Journal of Research, Innovation and Technologies*, Volume II, 2(4), 162-178. [https://doi.org/10.57017/jorit.v2.2\(4\).04](https://doi.org/10.57017/jorit.v2.2(4).04)

Article's history:

Received 7th of August, 2023; Revised 25th of August, 2023;

Accepted for publication 29th of August, 2023; Available online: 30th of September, 2023.

Published 30th of December, 2023 as article in Volume II, Issue 2(4)

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