FEATURES OF USE OF MODERN FINANCIAL TECHNOLOGIES IN THE ACTIVITIES OF CREDIT ORGANIZATIONS

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Abstract: *This article describes the characteristics of the FinTech industry and presents the cycle, geography, key elements and stages of development of FinTech 1.0, FinTech 2.0, and FinTech 3.0. The impact of improving the quality and quantity of information technology, changing consumer habits, as well as the need to improve the efficiency of financial and non-financial institutions in the development of FinTech is revealed. An analysis of the main advantages and disadvantages of the development of the FinTech industry in the world shows that FinTech is a sector of the economy that includes companies that use technology to provide financial services more efficiently. Opportunities and disadvantages of financial technologies are also grouped into cloud technologies, artificial intelligence, blockchain, machine learning, the Internet of Things, big data, intelligent communications, application programming interface, cryptography, biometrics, etc.*

The description and types of regulation and control technologies are given, in which RegTech is divided into specific technologies: transaction monitoring technology; risk management technology; reporting technology; and control technology (SupTech). The latter is a technology with automated processing of reports and other received data from financial market entities related to monitoring and analysis of market and operational risks of digitalization, regulatory requirements, etc. The authors grouped FinTech classifications by industry, subject of management and types.

The structure of the banking system of Tajikistan was analyzed and it was concluded that the main reason for the reduction in the number of credit organizations in Tajikistan in recent years is unpreparedness for the radical changes taking place in the world and the ongoing economic crisis – the COVID-19 pandemic – which had a significant impact on the activities of domestic credit organizations. Due to the fact that clients of credit organizations did not receive loans during this period, the financial condition of many organizations deteriorated, as a result of which they were declared bankrupt.

The main indicators of the balance of credit organizations, the financial stability of the banking system of Tajikistan, and the number of means of payment used are analyzed, and it is concluded that the banking system, like any economic system, is constantly evolving, and its structural elements must work together. Currently, the banking system is undergoing changes under the influence of new financial technologies. To determine the level of digitalization of the banking system, the indices of digital financial services for 2018–2021 were calculated and analyzed, which confirmed its low level.

The influence of factors on the share of payment orders received by credit institutions via the Internet and the share of payment orders received by credit institutions via messages using mobile subscriber devices was determined by the regression method.

The study also identified the prospects for the impact of blockchain technology on GDP and, in conclusion, recommendations are provided for the introduction of financial technologies in the activities of organizations in Tajikistan.

Keywords: *financial technologies, financial institutions, digital transformation, banking system, credit organizations, financial infrastructure.*

Introduction

The financial sector as a basis of any economic system provides the movement of currency between participants in financial and economic relations. Financial institutions act as intermediaries in operations for the placement and attraction of financial resources, collecting funds from some business entities and providing them to others.

The current stage of development of the financial sector is characterized by the introduction of new technologies (Karpova, 2018) that allow new ways to manage cash flows without resorting to the help of intermediaries. These type of high-tech services are called FinTech.

The main body of the paper

FinTech is an ever-evolving segment at the intersection of financial and technology services. Technology start-ups and new market entrants are introducing it in innovative approaches to products and services that are now used in the traditional financial services sector. FinTech can be described as a process that involves the use of technology to offer a financial solution. FinTech has emerged as a lucrative business opportunity (Filippov, 2018), filling untapped markets that have become more attractive to financial institutions, especially in a post-crisis period. On the other hand, such competitive strength leads to new financial innovations. Moreover, FinTech is a symbiosis of finance and new technologies using mobile applications and algorithms, and with the rise of a younger generation interested in finance and investment, FinTech makes it easier to collaborate using mobile devices.

FinTech usually involves a startup (Finstorm, 2015) that uses advanced and new technologies in the field of mobile payments, money transfer, lending, capital raising, etc. Some experts note that an essential feature of all FinTech startups is increasing the efficiency of the financial system. The FinTech industry has gone through three stages in its development (Table 1).

Table 1. The main stages of development of the FinTech sphere

Source: composed by the authors

Stage	**1866–1967**	**1967–2008**	**2008–present**
Period	FinTech 1.0	FinTech 2.0	FinTech 3.0
Geography	Global/Developed	Global/Developed	Global/Developed
The main elements	Infrastructure/Computing	Traditional/Internet	Mobile/startups/new participants
Jumping momentum	Network	Digitization	Financial crisis 2008/smartphone

In the first phase (FinTech 1.0), the financial services sector, which was closely related to technology, remained an analog sector. Since 1967, the development of digital technologies associated with communication and transaction processes has contributed to the transformation of finance from analogue to digital. In 1987, financial services in developed countries became significantly more mainstream and digitalized on the global stage.

In the second phase (FinTech 2.0), products and financial services were provided by the traditionally regulated banking industry using technology.

The last decade can be described as a milestone in the evolution of financial technology (FinTech 3.0), with new technology start-ups and companies offering financial products and services to organizations and people.

Over the past 10 years, we have seen the explosive growth of financial technology. The rise in FinTech firms and banking startups was fueled by the 2008 global financial crisis, which forced banks to cut costs and pull out from some markets, creating a FinTech vacuum. In the entire history of observations, the highest volume of financing in FinTech companies was observed in 2018. According to Mazitova and Prihodko (2020), the total investment in FinTech at the beginning 2018 was over $41.8 billion, total financing at the end of 2019 was $37.6 billion, and the 5-year growth rate of FinTech investor activity from 2013 to 2018 was 13%. Taking into account all of these data, we can observe that the interest of investors in making deals with FinTech technology in recent years has remained unchanged – even increasing from year to year.

Currently, the global market for technology solutions for the financial sector is one of the fastest-growing markets in the world. This means that projects that yesterday seemed fictional are today already at the final stage of testing or even being put into operation.

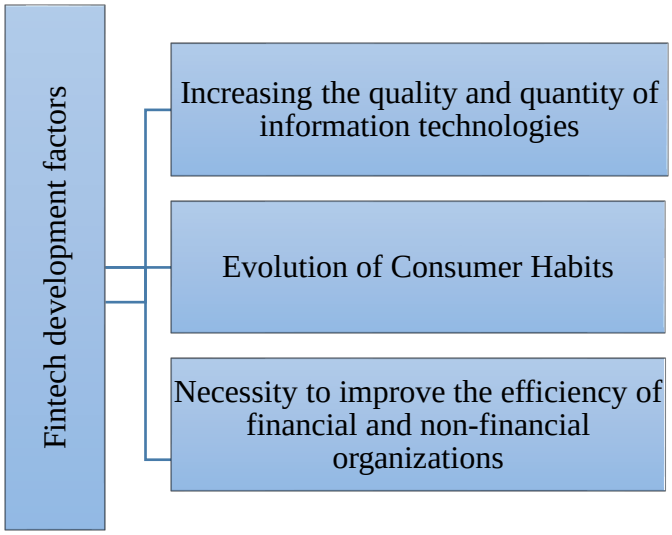

Figure 1. Factors of FinTech development
Source: Laura & Kukhnin (2018)

The factors determining the emergence, development and widespread use of financial technologies are:

1. Increasing the quality and quantity of information technology. Qualitative growth is reflected in the fact that the capacity of ICT has increased to such an extent that it can perform the most complex financial transactions more quickly and safely. Consumers can operate and perform transactions with their accounts 24 hours a day, anywhere and in real time. Quantitative growth is conditioned to the almost complete availability of technologies, their coverage of most of the population of the planet and the possibility of their use around the world. Access provides both financial and technological benefits.
2. Evolution\changes in consumer habits. An increasing number of consumers consider it normal and acceptable to purchase a wide range of goods and services via the Internet, including financial ones.
3. Necessity for financial and non-financial organizations to improve their efficiency. Financial institutions are seeking to reduce their costs by introducing distance and automated services, improving the quality of services and adapting the service delivery model to changing consumer

needs. With the help of FinTech, non-profit organizations hope to achieve a higher level of monetization of their target audience by offering a growing number of services.

In their research, Haddad & Hornuf (2019) noted that the dynamics of the number of created FinTech startups in the country is influenced by factors such as: the level of development of the capital market in the country; the availability of technology; the stability of the financial system; the number of mobile subscribers; the size of the labor market; the unemployment rate in the country; the business environment, etc.

FinTech companies are constantly improving their financial services to make them more accessible to businesses and consumers. By making financial services easier to use and more accessible, businesses and consumers will also improve their business. Various studies and special reports have looked at the opportunities and challenges offered by FinTech for the financial sector from a variety of perspectives, including those related to consumer and investor protection, market orientation, competition, and access to financial services (see Table 2).

Table 2. The main advantages and disadvantages of the development of the FinTech industry in the world

Source: composed by the authors, based on Sedykh (2019)

Advantages:	Disadvantages:
- availability of a developed digital and traditional financial infrastructure, which gives opportunities for the easy implementation of innovative projects; - availability of qualified and creative staff capable of introducing new technologies; - user loyalty to non-traditional financial services, including banking and non-banking segments; - high interest of investors in innovative FinTech projects in developed markets; - effective government regulation for the development of FinTech projects.	- underdeveloped or unevenly developed digital and financial infrastructure; - lack of qualified personnel; - low level of technological and financial literacy of the population; - low level of public confidence in financial technologies and the trend towards traditional financial service formats; - the growth of cyber threats and the active fight against cybercriminals; - lack of market transparency, which creates significant risks for local and foreign investors; - insufficient development and monitoring of the legal and regulatory framework in the field of financial technologies.

Thus, FinTech is a sector of the economy that includes companies that use technology to provide financial services more efficiently.

Currently, the FinTech sector is actively developing all over the world in terms of employment, investment, and the number of FinTech companies. All-new types of financial technologies will help optimize economic costs, reduce cybercrime, minimize paperwork and create a reliable financial market environment (Komilova & Yusupova, 2021).

The following table lists the opportunities and shortcomings of financial technologies:

Table 3. Opportunities and disadvantages of financial technologies

Source: composed by the authors

List of financial technologies	Advantages:	Disadvantages:
Cloud technologies	- availability of all data from any device; - reduction of costs for the purchase of powerful computers and servers and the absence of the need to use the services of IT specialists;	- cloud-based work requires Internet connection; - the user cannot always configure the software to be used for personal needs;

List of financial technologies	Advantages:	Disadvantages:
	- the necessary tools for working through the web service are provided automatically; - services are paid for only when they are needed, while payment is made only for the necessary package of services; - provide maximum reliability.	- it takes a lot of money to build a personal cloud, which is not appropriate for new ventures; - the cloud is a data store that attackers can access by exploiting a system's vulnerability.
Artificial intelligence	- no human error; - zero risk; - 24/7 access; - machines with AI can quickly make decisions; - AI machines have no emotions.	- AI machines are expensive; - machines with artificial intelligence are not creative; - machines with AI reduce jobs; - machines with AI do not understand morality.
Blockchain	- decentralized; - reliable; - transparent; - universal.	- scale of complexity; - the possibility of fraudulent activities.
Machine learning	- identification of trends and patterns; - no human intervention is required; - continuous improvement; - for processing multidisciplinary data and large volumes of data; - widespread usage.	- receiving information; - time and resources; - interpretation; - high sensitivity to mistakes.
Internet of Things	- efficiency and safety; - assistance in making social and economic decisions; - reduce time costs and increase income.	- the need for preliminary preparation; - from the very beginning there are problems of compatibility and data integration; - confidentiality; - the possibility of failure or error.
Big data	- business improvement processes; - detection of fraud; - improve customer service.	- privacy and security; - the need for technical expertise.
Smart contracts	- independence; - safety and reliability; - saving time and money; - accuracy.	- technological risks; - it is impossible to take into account subjective conditions; - absence of a regulatory system.
Application programming interface	- can be anywhere; - works fast; - takes into account nuances.	- difficult change process; - not standardized; - may be poorly designed.
Cryptography	- confidentiality; - authentication; - unity of information; - reliability.	- unavailability of complex encrypted information; - selective access control; - does not protect against vulnerabilities and threats arising from improper system design; - the security of cryptographic methods is based on the complexity of computational mathematical problems.
Biometrics	- identification can be provided to access accounts without visiting the bank by using a mobile phone camera and talking to a voice recognition program;	- availability of biometric identifiers for copying and carrying out attacks on most specific biometric systems; - the need for certain conditions for biometric identification;

List of financial technologies	Advantages:	Disadvantages:
	- facilitating access to banking services for people with limited mobility and citizens living in remote areas; - the cost of accepting one client for the bank reduces by 60%; - many transactions will eventually be transferred to an online format.	- the situation may be related to the violation of biometric identifiers or unreadability; - for many specific biometric systems, biometric scanners are very expensive; - compliance with regulatory requirements for the protection of personal biometric data.
RPA	- provides connectivity to older systems; - projects are clearly structured; - conflict resolution; - modeling of business processes.	- does not improve the process; - is very sensitive to changes; - is without integration.

Moreover, it is proposed to distinguish among financial technologies, regulatory technologies (RegTech) and management technologies (SupTech) (see Table 4).

Table 4. Types of regulatory and control technologies

Source: composed by the authors

No.	Technologies	Description	Type
1	Regulatory technologies (RegTech)	Used by organizations operating in the financial market to optimize processes related to the implementation of regulatory and supervisory requirements. In particular, among the regulatory technologies, banks distinguish:	– specific technologies aimed at investigating clients and other persons involved in monetary transactions, including the initial acceptance of services, as well as disclosing proceeds of crime, terrorist financing and financing the proliferation of weapons of mass destruction.
			– circulation monitoring technology aimed at identifying deviations and violations in the processes associated with the transfer of funds, foreign exchange operations, as well as operations with financial instruments.
			– risk management technologies focused on the automation of risk management. From the point of view of market risks, such technologies include automation of the evaluation of financial instruments, cash transactions, control of the established limit, and so on. In terms of operational risks, they can improve the efficiency of internal procedures, protect against fraudulent activities, and so on.
			– related reporting technologies, where calculations are carried out automatically, which reduces the cost of operating information systems.
2	Control technologies (SupTech)	Implemented in the practice of regulatory and supervisory bodies in financial markets to improve their efficiency. Such technologies are associated with automated processing of reports and other information received from financial market entities, monitoring and analysis of market and operational risks, digitization of regulatory requirements, and so on.	

Thus, economic entities are primarily interested in the elaboration, implementation and development of RegTech, since these technologies allow companies, on the one hand, to reduce costs, and, on the other hand, to ensure compliance with government requirements. The development of SupTech depends entirely on the interest of regulators in updating approaches in

the field of regulation and control. Based on all of the above, the classification of FinTech is presented in Table 5.

Table 5. FinTech classification

Source: compiled by the authors on the basis of Sitnik (2019)

Classification	FinTech
By field	1. Payments and remittances 2. Lending and personal financing 3. Capital management and operations in financial markets 4. Insurance
According to the subject of management	1. Regulatory Technology (RegTech) 2. Control Technologies (SupTech)
By type	1. Cloud technologies 2. Artificial intelligence 3. Blockchain 4. Machine learning 5. Internet of Things 6. Smart contracts 7. Application Programming Interface (API) 8. Big data technologies 9. Biometrics 10. Cryptography etc.

Thus, it can be concluded that there are various types of financial technologies that help organizations operate more efficiently. Today, for the effective operation of modern financial instruments, it is necessary to have an electronic infrastructure for both the state and individual market participants – therefore, all types of financial technologies are used in all areas.

In the modern world, banks continue to play an important role in the development of the economy. By accumulating capital, concentrating its direction and reducing risks, banks create an important basis for expanding and accelerating production. In the context of the globalization of world markets, the efficient operation of commercial banks in Tajikistan remains the most important condition for the successful economic development of the country and largely determines the pace of economic development in Tajikistan.

With the strengthening of economic ties, the improvement of the economic situation, and the drive to attract of foreign experience, it becomes necessary to introduce and use innovative financial technologies and modern methods and models of financial management aimed at increasing efficiency and competitiveness and expanding the scope of activities. However, in order to proceed directly to the description of the internal processes of commercial banks today, it is first necessary to analyze the overall picture of the banking system. The banking system is an institutional body that unites all elements of the banking sector that are interconnected, as well as their activities in relation to each other, the state and society as a whole.

Thus, it should be noted that one of the conditions for the effective functioning of the modern economy is the presence of a clear and structured banking system. This is one of the most important elements of the economic system of the state. The banking system of Tajikistan is an integral part of the financial sector and plays an important role in the implementation of the country's monetary and economic policy. In this regard, one of the main tasks of the banking system is to promote financial intermediation by attracting free funds from the population and other legal entities and directing them through lending to business entities.

The banking system of Tajikistan is two-tier, consisting of the upper level – the National Bank of Tajikistan – and the lower level – financial and credit organizations, including banks, non-bank

credit organizations, as well as microfinance organizations operating in the country under the license of the National Bank of Tajikistan (see Figure 2).

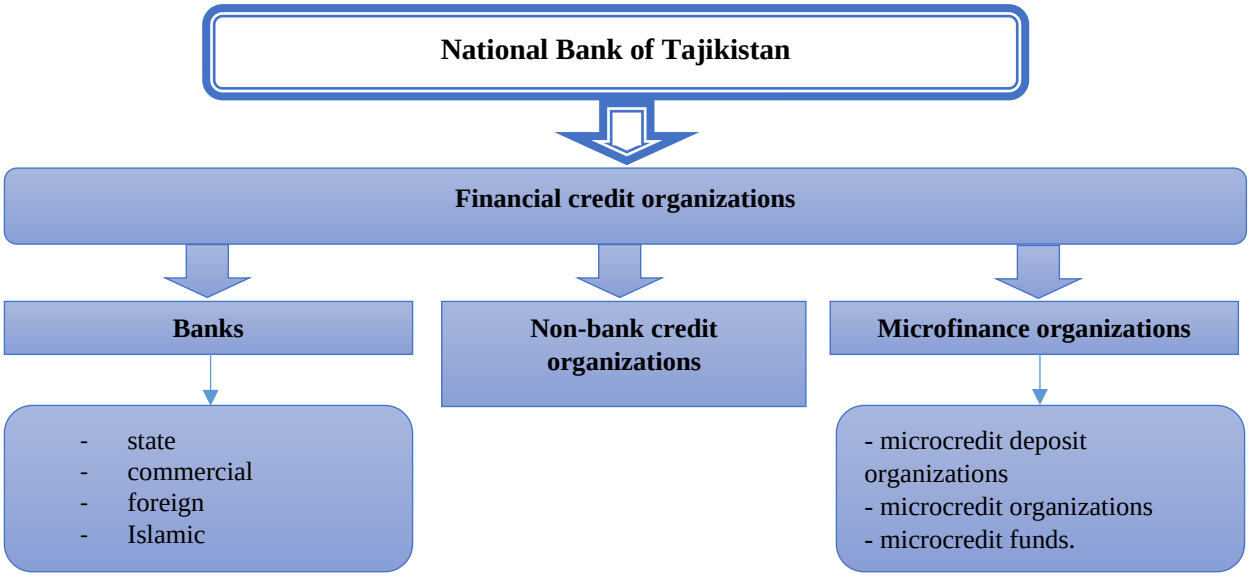

Figure 2. Structure of the banking system of Tajikistan
Source: compiled by the authors

In accordance with the Law of the Republic of Tajikistan "On Banking Activities," credit institutions are legal entities that perform all or some banking operations stipulated by the law and other legislative acts of the Republic of Tajikistan on the basis of a license from the National Bank of Tajikistan.

A bank is a credit institution whose main purpose is to make a profit, which has authorized capital established for it by the National Bank of Tajikistan and the right to carry out at least three operations: attracting deposits and savings, lending, and opening and maintaining bank accounts.

Non-bank credit organizations are credit organizations that have the right to perform certain banking operations. The list of banking operations for non-bank credit organizations is established by the legislation of the Republic of Tajikistan and the National Bank of Tajikistan.

One of the main differences between credit institutions is their authorized capital. In accordance with instruction 176 "On procedures for regulating the activities of credit organizations," the authorized capital of a commercial bank should be more than 50 million somoni, non-bank credit organizations 30 million somoni, and microcredit financial organizations 6 million somoni.

In accordance with the Law of the Republic of Tajikistan "On the National Bank of Tajikistan," one of the goals of the National Bank of Tajikistan is to ensure the stability of the state banking system. Therefore, the National Bank of Tajikistan has the exclusive right to regulate and supervise financial credit institutions in accordance with the laws of the Republic of Tajikistan "On the National Bank of Tajikistan," "On Banking," "On Islamic Banking," "On Microfinance Organizations" and other sectoral laws in order to maintain the stability of the banking system and payment system, protect the interests of depositors and creditors, and regulate and supervise financial and credit institutions.

Financial and credit institutions are one of the links between industry and trade, agriculture and the population. In addition, financial institutions provide cash management services, farm lending, and

mediation in the redistribution of capital, increase the efficiency and productivity of production, and provide banking services and products through their wide networks, including branches and banking service centers in various regions of the country. All of this contributes to the financial coverage of the country.

Table 6 analyzes the structure of the banking system of Tajikistan for the 2016 to 2020 period.

Table 6. Structure of the banking system of Tajikistan

Source: composed by the authors

Structure	**2016**	**2017**	**2018**	**2019**	**2020**	**2016–2017**	**2017–2018**	**2018–2019**	**2019–2020**
1. Financial credit institutions (total)	104	84	79	75	69	−20	−5	−4	−6
1.1 Banks	18	17	17	17	19	−1	0	0	2
1.1.1 Traditional banks	18	17	17	16	18	0	17	−1	2
1.1.2 Islamic banks	–	–	0	1	1	–	–	1	0
1.2 Microfinance organizations	86	67	62	58	50	−19	−5	−4	−8
1.2.1 Microcredit deposit organizations	38	27	25	22	18	−11	−2	−3	−4
1.2.2 Microfinance institutions	14	7	6	6	5	−7	−1	0	−1
1.2.3 Microcredit funds	34	33	31	30	27	−1	−2	−1	−3
2. Structural subdivisions of MO (total) *	1,857	1,670	1,668	1,828	1,935	−187	−2	160	107
2.1 Branches	437	343	332	328	356	−94	−11	−4	28
2.1.1 Islamic Banking Window	–	–	–	–	2	0	0	–	2
2.2 Banking service centers	1,420	1,327	1,336	1,420	1,579	−93	9	84	159
2.3 Cashier service points	4	0	9	0	0	−4	9	−9	0

According to the Table 6 data and analysis, as of December 31, 2020, a total of 69 financial institutions operated in the territory of Tajikistan, including 18 traditional banks, 1 Islamic bank and 50 microfinance institutions. Compared to 2016, this indicator decreased by 35 financial institutions. In particular, a decrease was observed in 2017, which led to a sharp reduction in the number of credit institutions by 20 units. The main reason for the decline of credit organizations in the territory of Tajikistan is unpreparedness for the radical changes taking place in the world and the low competitiveness of domestic banks.

One of the reasons for this is the current economic crisis and the COVID-19 pandemic, which have had a significant impact on the activities of domestic credit institutions. The consequences of the pandemic showed that not all credit institutions were able to provide remote services during the isolation period, since the main income of credit institutions comes from providing loans to various industries, enterprises and the public. Due to the fact that clients of credit organizations did not receive loans during this period, the financial condition of many organizations deteriorated, as a result of which they were declared bankrupt.

During the reporting period, the number of microfinance organizations decreased to 36, and in 2017, 11 microcredit deposit organizations and 7 microcredit organizations ceased their activities. The main reason for this was that these organizations did not provide a wide range of modern services, which indicates their low competitiveness. In modern conditions, credit organizations in developed countries widely use advanced financial technologies in their activities. In the market of domestic credit institutions, individual elements of these technologies are provided only by commercial banks such as OJSK Bank Alif, OJSC Bank Eskhata, CJSC Spitamen Bank, CJSC Bank Arvand, and CJS MDO Imon International.

Therefore, it is difficult for microfinance organizations to compete with such banks in modern conditions, which leads to their bankruptcy. Over the past 5 years, the number of MCO branches has decreased by 81 units, while the number of banking service centers has increased by 159 units. Since 2020, two Islamic Bank windows have been operating in the country. An increase in the number of branches and other structural subdivisions helps to increase the population's access to credit resources. Table 7 shows the main indicators of the credit institutions of Tajikistan for a 5-year period.

Table 7. Main indicators of the balance sheet of credit institutions (million somoni)
Source: composed by the authors based on data from the National Bank of Tajikistan (2021)

No.	Name	2016	2017	2018	2019	2020
1	GDP	54,471.1	61,093.6	68,844	77,354	82,543
2	Assets of financial institutions	21,187	20,932	21,201	21,976	26,307.4
3	As percent to GDP	39%	34%	31%	28,4%	32%
4	Loans issued, total	8,000.6	7,896.1	8,179.1	9,555	1603.3
5	Investments	1,604	2,172	2,427	2,232	2,672.06
6	Liabilities of financial credit institutions	15,690	15,207	15,287	15,749	19,131.7
7	Deposits of financial institutions:	9,244	9,283	9,724	9,682	11,414.2
7.1	- demand deposits	3,313	4,274	4,885	4,699	5,931.44
7.2	- other deposits	5,931	5,009	4,838	4,964	5,482.79
8	Balance equity of credit institutions	5,497	5,725	5,591	6,226	7,175.74

GDP is one of the main indicators that determine the condition of economic development of the country. In Tajikistan, GDP is growing from year to year, which indicates the sustainable development of the state economy.

Over the past 5 years, this figure has grown by 28,072 million somoni, and in 2020 it amounted to 82,543 million somoni. More than 30% of GDP was accounted for by the assets of credit institutions. This indicates that credit institutions play a significant role in the formation of GDP, which contributes to the economic development of the country.

Table 8 analyzes the dynamics and structure of the main indicators of credit institutions of Tajikistan. As a result of the analysis, it was revealed that the assets of credit institutions for the period from 2016 to 2020 tended to increase, growing by 24.2%, but due to a decrease in the number of credit institutions by 20 units, assets diminished by 255 million somoni.

Investments accounted for more than 10% of assets and over the past 5 years, and increased by 1,068.06 million somoni, or 66.6%. This indicates that credit institutions have free resources to make real and portfolio investments in order to develop their activities. Banks such as OJSC Bank Eskhata, CJSC Bank Arvand and CJS MDO Imon International provided preferential loans for business development.

One of the main elements of the active part of the balance sheet of credit institutions is the provision of loans, which account for more than 70% of the income of credit institutions. In the territory of Tajikistan, the bulk of interest income falls on the issuance of loans. Therefore, the provision of as many loans as possible will contribute to the development and stimulation of the activities of enterprises and individuals, the state, and credit organizations themselves. Over the past five years, lending has decreased by 6,397.3 million somoni, or 80%. The supply of loans declined mainly during the COVID-19 pandemic. Credit institutions were not ready for such changes and were unable to provide their services remotely during the lockdown. If domestic credit organizations, like in other developed countries, used modern financial technologies to provide online services,

the deterioration of their financial situation would not have been so significant. In response to the problems of recent years, which affected the activities of almost all domestic organizations, credit organizations have actively started to implement modern financial technologies in their activities. The use of the elements of the digital economy leads to a decrease in costs and an increase in profits.

Table 8. Analysis of key balance sheet indicators of credit institutions

Source: calculated by the authors

No.	Indicator	2016–2017			2017–2018			2018–2019			2019–2020		
		Abs. (mln. som)	Rel. (%)	Ver. (%)	Abs. (mln. som)	Rel. (%)	Ver (%)	Abs. (mln. som)	Rel. (%)	Ver. (%)	Abs. (mln. som)	Rel. (%)	Ver. (%)
1	Assets of credit institutions	−255	−1.2	100	269	1.3	100	775	3.7	100	4,331.4	19.7	100
1.2	Loans issued, total	−104 .5	−1.3	37.7	283	3.6	38.6	1,375.9	14.4	43.5	−7,951.7	−83	6.1
1.3	Investments, total	568	35.4	10.4	255	12	11.4	−195	−8	10.2	440.06	19.7	10.2
2	Liabilities of credit institutions	−483	−3.08	100	80	0.5	100	462	3	100	3,382.7	21.5	100
2.1	Deposits of credit institutions	39	0.42	61	441	4.8	63.6	−42	−0	61.5	1,732.2	17.9	61.5
2.1.1	- demand deposits	961	29	50.2	611	14	50.2	−186	−4	48.5	1,232.4	26.2	48.5
2.1.2	- other deposits	−922	−15.5	49.8	−171	−3	49.8	126	2.6	51.3	518.79	10.5	51.5
3	Balance equity of credit institutions	228	4.15	100	−134	−2	100	635	11	100	949.74	15.3	100

The obligations of credit institutions amounted to 3,171.7 million somoni in this period, an increase of 20.2%. The main element of the liabilities of domestic credit institutions is attracted deposits. Therefore, the more deposits attracted or demanded for a period, the more opportunities for credit institutions to provide loans to the population. Figure 3 shows the dynamics of the main indicators of the financial statements of credit institutions:

Deposits of credit organizations increased by 2,170.2 million somoni in this period, i.e., by 23.5%, and accounted for more than 61% of the liabilities of credit institutions. The analysis showed that attracting deposits in credit institutions is widespread, and domestic credit institutions provide loans to the population not at the expense of their own capital, but at the expense of attracted deposits, which is beneficial for their operations. Also, according to the Table 8 data, we can see that the capital of credit institutions during the 5-year period increased to 4,721.28 million somoni, i.e., by 86%.

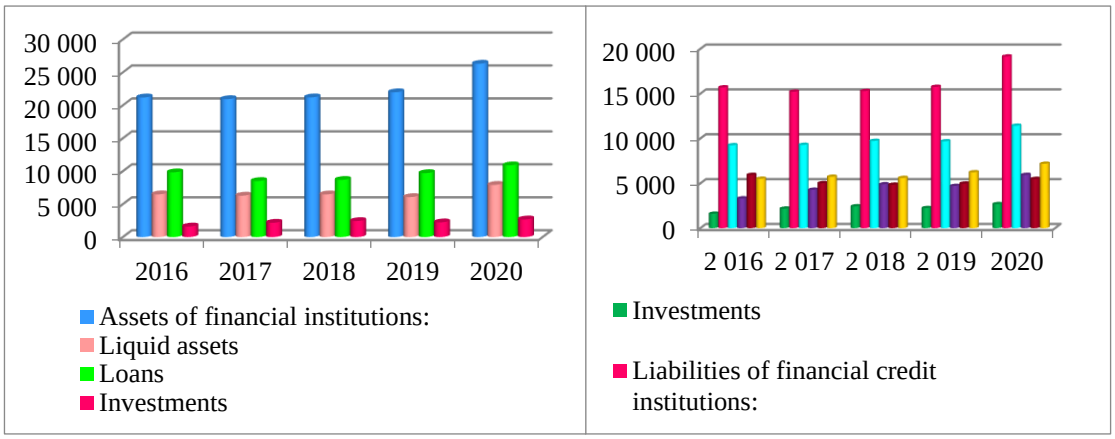

Figure 3. Dynamics of key balance sheet indicators of credit institutions
Source: composed by the authors based on data from the National Bank of Tajikistan (2021)

Based on the abovementioned data, indicators of the financial stability of the banking system of Tajikistan were calculated, the results of which are shown in Table 9.

Table 9. Analysis of indicators of financial stability of the banking system of Tajikistan
Source: calculated by the authors based on data from the National Bank of Tajikistan (2021)

	List of indicators	**2016**	**2017**	**2018**	**2019**	**2020**
1	Capital adequacy	17%	22.9%	22.1%	19.9%	18.2%
2	Return on assets (ROA)	–2.8%	0.5%	1.9%	2.1%	2.5%
3	Return on equity (ROE)	–21.0%	1.7%	7.0%	7.6%	9.1%
4	Net interest income relative to gross income	63.7%	65.2%	65.3%	66.3%	73.5%
5	Non-interest expenses relative to gross income	131.4%	61.7%	56.0%	60.2%	61.9%
6	Liquidity	30.9%	30.1%	30.8%	27.7%	30.0%
7	Liquid assets in relation to current liabilities	83.9%	73.8%	72.3%	67.4%	70.5%

According to the indicators given in Table 9, it is possible to find information on the efficiency of credit institutions' activity. In accordance with Instruction No. 176 "On procedures for regulating the activities of credit organizations," all organizations operating in Tajikistan must meet the acceptable standards set out in this instruction, i.e., comply with the prudential measures of the National Bank of Tajikistan. For example, the capital adequacy ratio for credit institutions is set at a minimum of 12%. As can be seen from the figures given in Table 9, credit institutions are meeting this indicator, but in recent years there has been a downward trend. Due to the COVID-19 pandemic, organizations have not been able to operate at full capacity, causing difficulties and having a significant impact on their financial conditions.

Despite the tense situation in the world, the profitability of domestic credit institutions showed good results. In 2020, the return on assets, which is one of the main indicators in the banking sector, amounted to 2.5%. This indicator should be at least 5%, according to the recommendations of the Basel Committee, which regulates the activities of credit institutions. Although this indicator does not correspond to the norm, positive changes are observed – i.e., in dynamics, the indicator tends to increase.

According to Table 9, it can be seen that in 2016 all indicators did not meet the requirements or showed very low values. One of the main reasons for the decline in performance is the bankruptcy of the most powerful bank in the country, Agroinvestbank, which ceased operations in 2014, the impact of which manifested itself in subsequent years. The services of this bank were used by both

legal entities and individuals of the country, who suffered significant losses as a result of the termination of its activities. In this regard, people's confidence in the country's banking system has been undermined, and they are wary of banking services.

According to the analysis of the number and volume of funds used, in the period from 2016 to 2020 the number of payments increased from year to year by 109,579 units in total during this period, or 180%, which increased the total amount of payments by 813,239 million somoni. Part of these payments were ordered, and over the past 5 years their number has increased by 4,587 units, amounting to 306,114 million somoni. In 2019, there was a decrease in payments via the Internet, from 494,000 units in 2018 to 44,000 units in 2019. The main reason was the increase in the cost of Internet services. However, in 2020 electronic payments were made via the Internet and increased by 700 units in the amount of 26,438 million somoni. This increase was due to the fact that customers did not have the opportunity to visit credit institutions and did not use active remote services.

According to the analysis, the dynamics of the number of payments used is shown in Figure 4.

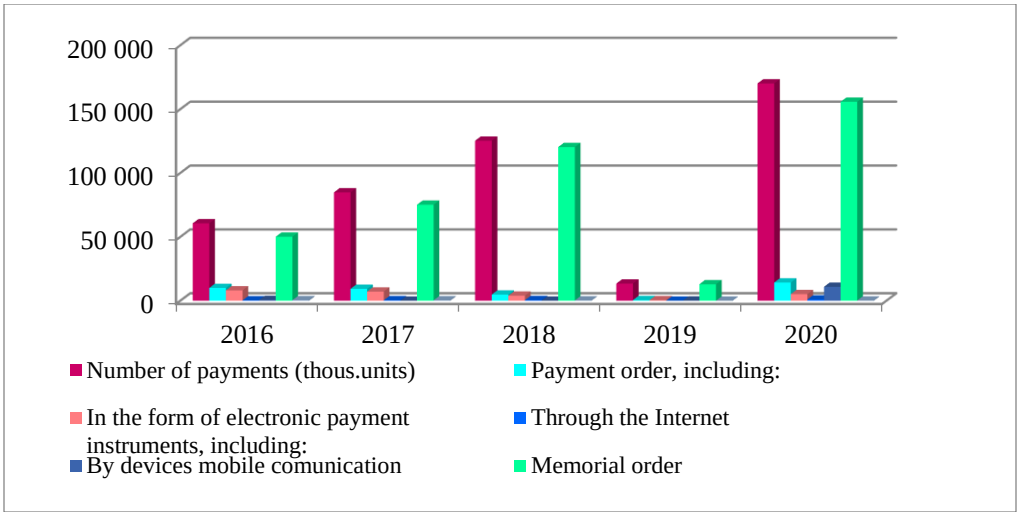

Figure 4. Diagram of the number of payment instruments used

Source: composed by the authors based on data from the National Bank of Tajikistan (2021)

Due to the fact that in the territory of Tajikistan a certain limit was set for the population to receive SIM cards in the amount of no more than 2 units per citizen. In 2017, the number of payments made by phone decreased. Despite this, in 2020, telephone payments increased by 10,260 units and amounted to 1,569 million somoni. Credit institutions actively use the Internet and mobile banking in their activities, through which they can use remote banking services. The main increase occurred in 2020, when a number of leading banks, such as OJSK Bank Alif, OJSC Bank Eskhata, and CJS MDO Imon International provided their services to customers remotely, which was actively supported by customers, during the COVID-19 pandemic. This was convenient for both credit institutions and their customers. This indicates that the population is increasingly switching to electronic forms of payment, and credit organizations of Tajikistan, like in leading countries, are making efforts to introduce modern financial technologies.

Thus, in conclusion, we can say that the banking system, like any economic system, is constantly evolving. Its structural elements should work together and be more efficient. Currently, the banking system is undergoing changes under the influence of new financial technologies. New branches

and venture funds will be created, which will be actively introduced into the activities of modern banks.

In this study, the authors also identified an assessment of the use of new financial technologies in the activities of credit institutions.

Currently, the financial sector of all countries is undergoing transformational changes that occur for a number of interrelated and interdependent reasons. Among them are: the introduction of digital technologies and their increasing role for consumers, financial intermediaries, and financial regulators themselves; increased competitive pressure on banks from financial technologies and large technology companies; as well as the COVID-19 pandemic, which accelerated the impact of these changes.

The digitalization of financial intermediation in Tajikistan is also proceeding at a pace that will make a significant contribution to the digital transformation of the Tajik economy and is one of the main priorities for the development of the country. Digitalization can accelerate the transition of the Tajik economy to a technological way of life, thereby increasing the potential for economic development and improving the wellbeing of citizens. At the same time, the high cost of new technologies, as well as the risks associated with the unpreparedness of many business entities for a complete digital transformation, require a comprehensive vision and a deep understanding of the digitalization process when making managerial decisions, including in the financial sector.

Effective management of the process of digital transformation of the financial sector, aimed at minimizing potential risks while maximizing profits, is based on:

- the comprehensive and integrated assessment of the level of digitalization of the financial sector;
- the identification of possible resources for identifying competitive advantages and improving the efficiency of the digital transformation process in the financial sector.

The financial sector is an important element of the economy and determines the speed and quality of change. Currently, electronic payments and e-commerce are an integral part of the financial sector. The financial sector is a leader in the implementation and use of innovative technologies and digital services for working with clients. One can be certain that the development of innovative technologies will contribute to the transformation of the financial sector in its current state and will affect its modernization in the future.

With the advent of new technologies, business models are also changing, and new entrants are emerging. FinTech companies are challenging existing banks and offering innovative solutions to streamline many financial services by making them simpler, more accessible and cheaper. Digital transformation helps financial companies attract and retain customers and generate profits.

The introduction of digital technologies into the banking platform has a significant impact on the workforce and the personnel management system, thereby reducing human resources through process automation. In this regard, there is a need to develop a new digital transformation management system in banking. Thus, the following areas should be developed:

- establishing communication with the audience;
- selecting and training of personnel;
- creating a database to store large amounts of information;
- inventing and implementing special mobile and computer applications.

The level of development of the digital economy and the rating of the country are measured on the basis of various structural indicators that combine individual sub-indices responsible for the digital transformation of individual sectors of the economy and society. The difference between different ratings in the choice of primary indicators lies in the characteristics of the level of use of the achievements of the digital economy in the country and their classification by sub-indices.

Existing methods do not allow for a comprehensive assessment of the level of development of the digital economy in the country. These methods mainly assess the technical aspect and thus determine the development of the digital economy, the level of ICT infrastructure and the readiness of people for transformations. In this regard, it is necessary to analyze the digital economy based on a number of indicators that assess the level of application of modern technologies in the economy at different levels.

The development and implementation of a comprehensive digital economy development index is an important task, the solution of which will identify problem areas for the development of the digital economy in Tajikistan.

Table 10. Indicators for calculating indices of the digital economy

Source: composed by the authors

					Absolute		Relative	
No.	**List of indicators**	**2018**	**2020**	**2021**	**2020–2018**	**2021–2020**	**2020–2018**	**2021–2020**
1	Number of working age population	5,473,900	5,664,300	5,870,304	190,400	206,004	3.48	3.64
2	Number of active agents	10	19	20	9	1	90	5.26
3	Number of payment points	5,177	6,991	6,290	1,814	−701	35	−10
4	Number of registered accounts	2,132,426	3,204,712	4,231,492	1,072,286	1,026,780	50.3	32
5	Number of transactions (thousand units)	125,331	170,202	204,612	44,871	34,410	35.8	20.2
6	Cost of transactions (million somoni)	706,415	1,225,511	1,229,767	519,096	4,256	73.5	0.35
7	Number of complaints	36,000	35,500	34,990	−500	−510	−1.4	−1.4

Based on the analysis of the indicators (Table 10) needed to calculate the indices, it becomes clear that the use of digital financial services is growing significantly in Tajikistan. In turn, credit institutions strive to introduce more accessible and convenient financial technologies and provide their customers with quality services. The analysis showed that the number of active agents provided by digital financial services is increasing year on year – from 10 to 20 in 3 years. The number of registered accounts also increased by 32% compared to 2020. The number of payment points increased to 1,814 in 2020, and decreased by 10% the following year. The main reason for this is the closure of some credit institutions. The number of transactions is also growing from year to year, including in 2021, and their number will increase by 20%.

Thus, it can be concluded that digitalization in Tajikistan is at a moderate level, while the use of digital financial technologies is increasing at a slight pace.

A comprehensive assessment of access should use both supply and demand information to measure a specific set of digital financial services, i.e.: access to digital financial services; the use of digital financial services; and the quality of digital financial services provided to users (Table 11).

According to these indicators, it becomes clear that Tajikistan has just started providing digital financial services and is at a lower level than other developed countries. Tajikistan ranks 139th in the UN e-government ranking (UN DESA, 2020). The e-growth index is 0.3366, indicating an average growth rate. This figure is much higher in Kazakhstan at 0.725, reflecting a high level of growth. High-speed Internet access is still limited and expensive compared to in other regions of

Central Asia. According to the World Bank, in Tajikistan in 2018 only 33% of people used the Internet on any device, while in Kazakhstan (Turdibekov, 2018) this indicator was 50%.

Table 11. Digital financial services indices

Source: composed by the authors

Indicators for measuring access				
No.	**Indicator**	**2018**	**2020**	**2021**
1	Internet users (%)	17	25	33.3
2	Percentage of administrative units with agent outlet			
3	Number of DFS agents per 10,000 adults	0.144	0.12	0.11
4	Number of active DFS agents per 10,000 adults	0.018	0.033	0.034
5	Number of merchant payment points per 10,000 adults	9.45	12.3	11
6	Percentage of adult population with registered DFS accounts	38.9	56.5	74.7
Indicators for measuring usage				
7	Percentage of active DFS accounts	46	50	66.6
8	DFS transactions (by volume) per registered account	35	64	81.1
9	Value of DFS transactions	8,480	12,134	6,598
Indicators for measuring quality				
10	Number of complaints per 10,000 active DFS accounts	169	111	83
11	Percentage of complaints resolved	33.3	38.4	45.6
12	Transaction failure (%)	17.1	6	4
13	Financial literacy	Low	Low	Low

Permanent Internet access in Tajikistan is maintained only in large cities, where residents pay the highest prices in the world for Internet services. The cost of the main subscription package is 16% of average monthly income. However, despite this, the number of Internet users in the country has grown to 33.3%. According to the calculation of the accessibility index for the population, it was found that the number of digital financial service providers is 0.11, i.e., 0.11 credit institutions per 10,000 people of working age. The number of credit institutions in the country is decreasing, and only the strongest and most competitive organizations are engaged in the process of digitalization, the introduction of financial technologies, and the promotion of their activities. Of the digital financial service providers, 20 were active, meaning 0.034 per 10,000 able-bodied people, which is a very low rate. The number of payment points is 11 units per 10,000 population across the country against 450 units in Kazakhstan. Only 74.7% of the working population have a registered account for digital financial services. This indicator should be increased, and the working-age population should use digital financial services more. Despite this, this indicator is growing from year to year, and in 2018 grew by 38.9%.

Based on the calculation of accessibility indicators, it was found that only 66.66% of registered digital financial services accounts are active. The average of this indicator in Kazakhstan is 92%. Approximately 81.1% of transactions are active accounts of registered digital financial services. For each registered digital financial services account, transactions amount to around 6,598 somoni per month.

Using an indicator to measure quality, we determined the quality of digital financial services, which showed an average level. Financial services to clients are provided in simple, understandable language, without any hidden conditions. They are also adapted to: the local context and language requirements; the established template/disclosure format, including design, font size, eligibility for compensation and related processes: and the visibility of the total cost of the service including fees, taxes, commissions and etc.

There are 83 complaints per 10,000 active accounts on the quality of financial services, of which only 45.6% are resolved. Failed transactions amount to 37.6% of monthly transactions, which is a high indicator, and financial institutions should try to reduce this. This indicator is associated with the financial literacy of the population, and, as noted above, the level of financial literacy of the country's population is very low. According to the International Finance Corporation (IFC), two-thirds of the population do not use the Internet, and 90% of the population do not use financial services. Only 10% of the population is financially literate, which is why unsuccessful transactions are more common. To overcome all of these shortcomings, it is necessary to increase the level of financial literacy of the population and attract more people to using financial services, which, in turn, should increase the number of active agents providing financial services. In the territory of the republic, the most active subjects are credit institutions, which should provide customers with convenient financial services through the introduction of financial technologies, which also contributes to the economic development of the country.

Due to globalization and fierce competition, major banks around the world are moving to a new business model – a digital banking model that allows customers to conduct transactions through remote channels. Each bank uses digital technologies to expand the product line to meet the specific needs of the buyer.

The National Bank of Tajikistan has identified four system-forming banks of the country: OJSC Eskhata bank, OJSC Orienbank, SSB of RT Amonatbank, and CJS MDO Imon International (see Table 12).

Table 12. List of systemically important credit institutions of Tajikistan for 2021

Source: composed by the authors

No.	Systemic credit institutions	The final rate, %
Commercial banks		
1	SSB of RT Amonatbank	30.53
2	OJSC Orienbank	21.43
3	OJSC Eskhata bank	11.98
Microfinance organization		
4	CJS MDO Imon International	6.42

At the next stage of the study, the authors determined the impact of financial technologies on the structure of the banking system.

In modern conditions, there are a number of trends in the financial market of Tajikistan that are the basis for the development of financial technologies, including:

- the decrease in the marginal income of banking operations;
- the transformation of business models of financial market participants and their desire to create an ecosystem;
- the increase in the inflow of financial services based on their digitalization;
- the loss of monopoly by banks in the provision of traditional banking services, as well as the significant strengthening of the role of non-financial organizations in the financial market;
- the willingness of banks to cooperate in various forms with technology start-ups.

The value of information technology in the financial sector is generally high. In the near future, the banking sector will be dominated by trends to improve the quality and reliability of the offered banking products and services, organize electronic access to customers and increase the speed of payment transactions.

This is due to the desire of commercial banks to gain a competitive advantage in financial markets. In modern conditions, banks are looking for development opportunities based on the use of new financial technologies, the most promising of which are: big data analysis, artificial intelligence, machine learning, robotics, biometrics, cloud technologies, blockchain and mobile technologies. Every year, more and more people in Tajikistan use smartphones and tablets to access the Internet and meet their business and personal needs with the help of digital technologies. This provides additional opportunities for the development of the mobile economy: the more mobile devices are used every day, the more companies are interested in creating mobile Internet services.

Every year, the mobile economy in Tajikistan shows an average growth of 3%. The development of mobile technologies allows entrepreneurs to focus on this task without being distracted by administrative issues. Mobile business services are actively developing and will continue to grow. Modern information technologies have a fundamental impact on the business processes of commercial banks, bringing them to a qualitatively new level. It should be noted that banking technologies are closely related to information technologies, which contributes to the complex automation of business. In modern banking practice, mobile technologies can be divided into the following main areas of development: mobile banking, Internet banking and the client-bank system. On the basis of the client-bank system, customers of commercial banks have the opportunity to remotely perform various operations, allowing them to receive information about their account status and other banking information, account management, card payments and services, as well as other current operations.

Using mobile banking, the subscriber receives banking services directly through a laptop, smartphone or tablet using wireless access technology. Based on this technology, it is possible to transfer data from websites to the mobile devices of bank customers with Internet access. Internet banking is a promising direction in the development of banking information technologies. In connection with the development of distance banking systems, systems of various forms and volumes of banking services were created: Internet client, Internet banking, telebanking, WAP service or mobile banking.

To further study the impact of promising financial technologies on the institutional structure of the banking sector in Tajikistan, it is necessary to assess the impact of the development of mobile technologies on the number of internal structural units of credit organizations in Tajikistan. First of all, it should be noted that the number of credit institutions in Tajikistan has significantly decreased in recent years. An analysis of the features of the supervisory policy pursued by the Bank of Tajikistan in recent years has revealed that in the near future no more than 30–40 credit organizations will operate in the banking system of Tajikistan.

As of January 1, 2022, there are 64 credit organizations operating in Tajikistan. In 2016, there was a decrease in the number of credit institutions, and since then their number has been steadily declining. At the same time, the decrease in the number of credit institutions was significant, as evidenced by statistical data: in 2016, the total number of credit institutions was 104, and in 2022 there are 64 – a decrease of 40 credit institutions.

The main reason for the decrease in the number of credit institutions is the revocation of banking licenses because of a lack of capital, as well as violations of banking legislation. The reduction in the number of banks, on the one hand, can be seen as a process of improving the banking system, which will generally increase confidence in the banking sector. On the other hand, a clear result is a decrease in competition in the banking services market.

Following the above objectives, indicators of the share of payment orders received by credit institutions in Tajikistan via the Internet, as well as the share of payment orders received by credit institutions through messages using mobile devices, will be considered.

A regression dependence model was built using the Excel spreadsheet editor. The initial data for building the regression are given in Table 13. To determine the indicators, the following coefficients are established:
Y – the number of operating internal structural divisions of credit institutions (branches);
X_1 – the share of payment orders received by credit institutions via the Internet, %;
X_2 – the share of payment orders received by credit institutions in the form of text messages using mobile subscriber devices, %.

Table 13. Indicators for constructing regression
Source: calculated by the authors

Date	Number of internal operating structural divisions of credit institutions (branches), divisions	Share of payment orders received by credit institutions via the Internet, %	Share of payment orders received by credit institutions via text messages using mobile subscriber devices, %
31.03.2019	244	4.7	0.04
30.06.2019	240	4.63	0.044
30.09.2019	247	5.46	0.0451
31.12.2019	247	5.188	0.05
31.03.2020	250	5.56	0.12
30.06.2020	252	5.5	0.26
30.09.2020	250	5.303	0.54
30.12.2020	252	5.32	0.71
31.03.2021	252	5.3	1
30.06.2021	196	6.1	1.4
30.09.2021	195	6.7	1.6
30.12.2021	194	11	2.028

Based on the quarterly data provided, regression statistics (correlation coefficient and coefficient of determination) were constructed.
A regression equation is given for the dependence of the number of internal structural divisions of credit institutions (branches) on the share of payment orders received by credit institutions via the Internet and the share of payment orders received by credit institutions via messages using mobile devices. The following regression equation was obtained:

$$Y = 264.5 - 1.96X_1 - 26X_2$$

The proximity of the correlation coefficient (R) is equal to 0.84, indicating a close linear relationship between the variables under consideration. The determination factor, $R^2 = 0.71$, shows that this regression equation explains 70% of the variable variances of the result, while the other factors make up only 30%. The actual value of the F-test (Fisher test) was 9.72. The value of the table was set at 4.96. Since the real value of F (9.72) > F_{Table} (4.96), the statistical significance of the equation is generally recognized, which allows it to be used in practical forecasting and analytical calculations.

Table 14. Regression equation indicators

Source: calculated by the authors

Correlation analysis					
R-package	*R*-square	*R*-square normal	Standard error	Observation	
0.841683	0.70843	0.635537	15.3	11	
Regression analysis					
Indicators	*Df*	*SS*	*MS*	*F*	*F* Significance
Regression	2	4550.181	2275.09	9.718828	0.007227
Residual	8	1872.728	234.091		
Total	10	6422.909			
Regression card					
	Coefficients	Standard error	*t*-statistics	*P*	
Y	264.5209	21.50222	12.30202	1.77	
Variable X_1	−1.96157	4.386957	−0.44714	0.66	
Variable X_2	−26.3106	10.79386	−2.43755	0.0407	

Thus, it can be said that with an increase in the share of payment orders received by credit institutions via the Internet by 1%, the number of operating internal structural units of credit institutions will decrease by approximately 2 units. With an increase by 1% in the share of payment orders received by credit institutions through messages via mobile devices, the number of internal structural units of existing credit institutions will be reduced to 26.

Thereby, with the increase in the use of the Internet and mobile technologies for various payments, the number of internal structural divisions (branches) of existing credit institutions will decrease. The more mobile and Internet technologies will be used by clients of credit institutions, the more banks will reduce their structural units, and, accordingly, the cost of maintaining them.

In this research, the authors also reveal the impact of blockchain technology on GDP.

The stage of digitization of economic processes is significantly changing the traditional direction of economic activity. Consolidation of evidence on the role of blockchain technologies in the developing world and their impact on macroeconomic indicators has led to their rapid growth in developed countries in recent years. At the same time, the use of blockchain technology makes it possible to highlight many of the biggest changes in the economic environment that have taken place as a result of "blockchainization":

- a decrease in transaction costs as a result of the transition to a digital payment system;
- a reduction of the operational and loan risk of credit institutions;
- an increase in the volume of transactions in the stock markets.

It should be noted that the financial sector of our country is already in the process of transitioning to a revolution in business processes, and blockchain technology can also have a significant impact as one of the types of modern financial technologies.

In this regard, the main task is to find solutions to problems, and ensure the transition from a general idea of the impact of this technology on the economy and its individual industries to a high degree of formal assessment. The calculations in this paper are aimed at determining the effectiveness and feasibility of the transition to the infrastructure of financial transactions and business processes.

At the same time, it should be noted that fundamental factors certainly cover a wide range and require a separate analysis of these factors in order to correct the results obtained.

Based on algorithms and approaches, a mathematical model will be built that allows integrating blockchain technology into the economic environment to determine the degree of impact on GDP. The construction of such a model will make it possible to determine the sensitivity of the country's

economic dynamics when introducing this technology into certain functional areas of the national economy.

In the field of blockchain technology, its main approaches in banking can be distinguished: reliable verification and processing of data, accounting and protection of information resources in a decentralized way with a small number of intermediaries facilitating transactions and a low level of control from regulators. These approaches indicate the prospects for their implementation in the financial sector of the economy, where a large number of different operations are carried out, which reflects the effective accounting and reliability of both the financial system itself and the economy as a whole.

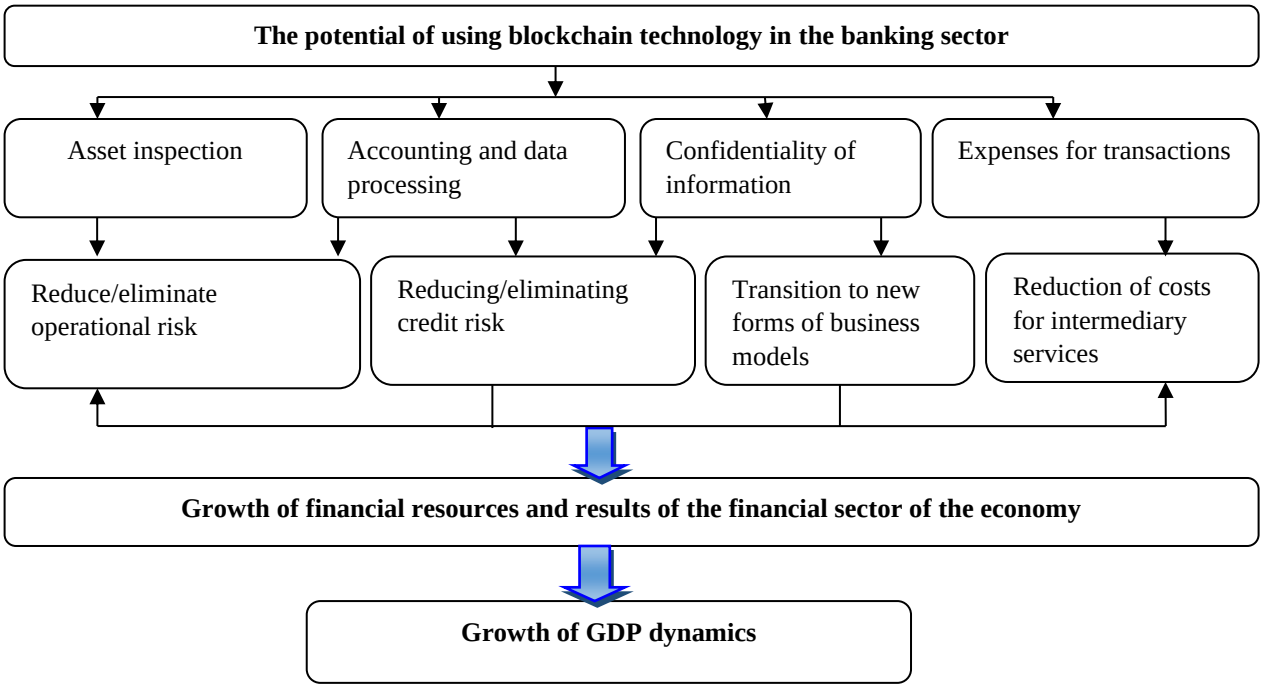

Figure 5. The use of blockchain technology in the banking sector and its impact on GDP
Source: composed by the authors

At the same time, it should be noted that the methodological analysis is based on the analysis of increasing the efficiency of the banking sector of the economy under the influence of blockchain technology through the prism of accounting, assessing priorities, and optimizing its operational processes. This aspect reflects the study of the impact of blockchain technology on the financial sector and the national economy based on four key factors. The first factor for the regression equation is the total amount of payments received by the bank, which contributes to the new commission income.

Another influencing factor is the profit of credit institutions. That is, it is a fact that with the introduction of blockchain technology, credit institutions receive more profit. The third factor is the total volume of loans issued by credit institutions, which leads to cost reduction and the optimization of operational processes, as well as the reduction of operational risks. The fourth factor is the total volume of attracted deposits, which is the main source for credit institutions.

Table 15. Description of the variables according to the model

Source: Compiled by the authors

Variables	**Indicators**
Dependent	
Gross domestic product, million somoni	GDP
Independent	
Total amount of payments, million somoni	V_{payments}
Total amount of profit/loss received, million somoni	$V_{\text{financial results}}$
The total volume of issued loans, million somoni	V_{loans}
The total volume of attracted deposits, million somoni	V_{deposits}

Now, on the basis of these indicators, we develop a mathematical-regression model, which expresses the effect of the above factors on GDP.

Table 16. Coefficients of regression equations

Source: calculated by the authors

Variables	**Parameter**
GDP	8,850.942
V_{payments}	−0.0018
$V_{\text{financial results}}$	23,487
V_{loans}	0.208
V_{deposits}	0.147
R-complex	0.75
R^2	0.6
R^2-standard	0.4
F-standard	3.5

As a result of the introduction of variables, the following regression equation was obtained:

$$Y = 8850.942 - 0.0018X_1 + 23.48738X_2 + 0.208079X_3 + 0.147063X_4$$

Now we can look at the resulting model and the impact of each of the factors affecting the volume of GDP when implementing blockchain technology. The complex correlation coefficient (*R*-complex) shows the density of the relationship between the volume of GDP and the factors influencing it. The overall correlation coefficient was 0.75, which means that there is a strong correlation between the four factors that affect GDP. The coefficient R^2 represents the change in GDP under the influence of factor indicators and evaluates the quality of the constructed model. Based on the constructed model, it was found that the coefficient R^2 is equal to 0.6, i.e., the selected factors have a significant impact on GDP.

The significance of the complex correlation coefficient is checked using the Fisher *F*-scale. To do this, we first determine the *F*-value of the observational and tabular indicators. To do this, we use the Fisher distribution table, which in the case of ($\alpha = 0.05$; 4; 11) is equal to 3.36. It was observed that the *F*-speed on the model is 3.5, which is higher than the F-factor in the table. This suggests that the regression equation is significant and reflects the validity of the resulting model.

As a result, it should be noted that the developed regression equation indicates the presence of a positive impact on GDP, which quantifies the degree and potential impact of blockchain processes on economic processes.

According to the dynamics of changes in GDP (Figure 5) before and after the introduction of blockchain technology, it can be seen that GDP is growing. In other words, the volume of factors affecting GDP will increase with the introduction of blockchain technology, which will not only

increase the macroeconomic indicators of the country, but also increase the level of stability and efficiency of its participants and ensure the competitiveness of the economy in decades to come.

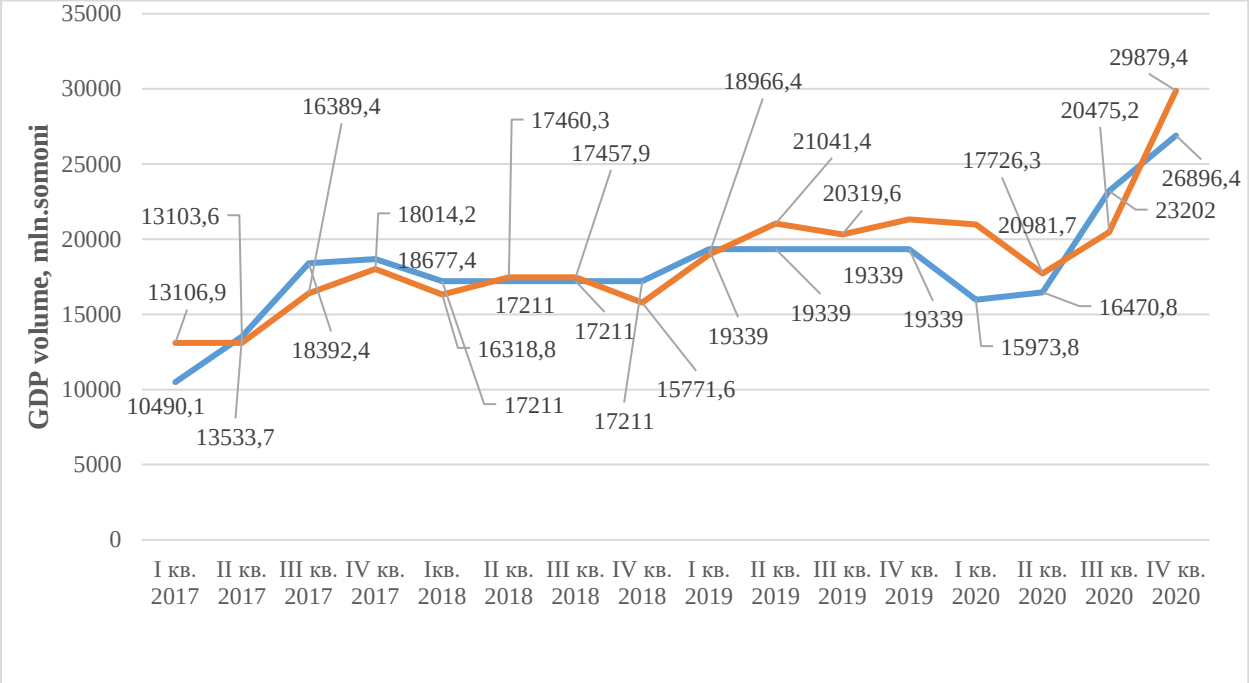

Figure 5. Dynamics of GDP change

Source: composed by the authors based on data from the National Bank of Tajikistan (2021)

Conclusions

This study allows us to conclude that the use and further development of financial technologies can ensure the creation of new organizational models of the banking market and improve the quality and availability of banking technologies in servicing, both for individuals and corporate clients in the digital economy. As a result of cooperation with FinTech startups, banks receive a more comfortable environment for implementing their own innovative direction as the main advantage, as well as the associated reduction in operating costs, the improvement of a personalized approach to the sale of products and services, and an overall improvement in the quality of customer service. During this study, we also found that the process of modernization of financial technologies is able to change the existing paradigm of the development of the financial market.

In conclusion, we can say that the technological foundation is now beginning to form in Tajikistan, which is necessary for the development of new technological industries, including FinTech directly.

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