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Application of financial technologies in the banking system of Ukraine

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Abstract. The financial sector contributes to the growth of the population's well-being, stimulates business development, and helps to expand the markets for goods and services. With the passage of time, financial technologies are becoming more and more important, because after the global financial crisis, banking institutions were forced to adapt to new challenges. With the advent of the latest technologies, banks had to focus on the efficient provision of financial services, taking into account financial inclusion. In order to help consumers of financial services manage the financial aspects of business, while using new programs, financial technologies are used. They are a necessary mechanism for the formation of competitiveness of any company and any state. However, there is a problem of low involvement of the population in the financial sector, as not every individual has access to quality financial services and the necessary experience to use them in everyday life. Thus, the purpose of the article is research and analysis of the application of financial technologies in the banking system of Ukraine. The article examines the essence of financial technologies and their role in the development of the financial sphere of Ukraine. The question of the emergence of financial technologies is highlighted. It was considered how and with the help of which financial technologies the work of banking institutions is carried out during the COVID-19 pandemic. In order to determine the strengths and weaknesses, opportunities and threats, a SWOT analysis of the use of online technologies by banking institutions of Ukraine during the COVID-19 pandemic was conducted. It was found that there was an increase in demand among the fintech population, especially during the COVID-19 pandemic

Keywords: financial technologies, banking system, pandemic, startup, banking institutions, financial inclusion

INTRODUCTION

The financial sector stimulates the growth of the population's well-being, promotes business development, and helps expand the markets for goods and services. The role of financial technologies is becoming increasingly important, because after the global financial crisis (2008), banking institutions were forced to adapt to new challenges. With the advent of new technologies, banks had to refocus on the efficiency of providing financial services, taking into account financial inclusion. The above led to the emergence of the concept of "financial inclusiveness" or "inclusion", that is, the availability of financial services for retail consumers. Fintech is being used to help financial services consumers manage the financial aspects of business using new applications. They are an important tool for shaping the competitiveness of any company and any country. However, it is worth noting that there is a problem of low involvement of the population in the financial sector – not everyone has access to quality financial services and sufficient knowledge and experience to use them in everyday life. In order to activate the population's interest in using financial services, it is necessary, in our

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opinion, to create the following opportunities: accessibility, quality, safety, comprehensibility, simplicity. Such scientists as: S. Volosovich [1], L. Dudynets [2], T. Kalashnikova [3], G. Pochenchuk [4] A. Semenog [5], M. Tarasyuk [6], D Filipov, etc.

P. Shufel understands financial technology as a new financial industry that uses technology to improve financial activity [7]. Group of authors, A.Yu. Semenog, Y.M. Kryvych, S.V. Cirulyk [5], financial technologies are considered as services provided by technology companies with the help of special software and focused on the financial needs of customers. M.V. Tarasyuk, O.O. Koscheev [6] and L.A. Dudynets [2] understand the technologies used in the financial industry by financial technologies.

Noting the significant results of the scientific achievements of both foreign and Ukrainian authors, it is worth noting that the application of financial technologies specifically in the banking system of Ukraine requires further study and analysis, because the financial services market is actively developing, creating new innovative services and products. *The purpose of the article* is research and analysis of the application of financial technologies in the banking system of Ukraine.

THE ESSENCE OF FINANCIAL TECHNOLOGIES AND THEIR ROLE IN THE DEVELOPMENT OF THE FINANCIAL SPHERE OF UKRAINE

The industrial age of monopolies has already been replaced by the digital one. And this implies the flourishing of platform companies, which, having a relatively small number of full-time employees, generate no less capitalization compared to monopolies [8]. Thus, the market capitalization of one of the world's largest financial companies, Ant Financial, which was founded in China in 2015 and has 101,958 thousand employees, was (in 2019) $60 billion. USA, and the most expensive bank in the world, JPMorgan Chase (founded in 1799, where 235 thousand people work) – 245 billion dollars. USA [2]. Indicators of added value per employee in these companies differ significantly (12 million US dollars and 1 million US dollars, respectively) [8]. As of August 1, 2018, there were already 33 fintech companies with a billion-dollar capitalization (so-called unicorns) in the world [9].

Directions and features of the development of financial technologies:

– development of the global Internet network;

– development and popularity of smartphones and various applications;

– rapid growth and spread of social networks;

– creation of new innovative products and services of the "Big Five" technology companies, which contributes to the formation of new standards of quality, speed and convenience for consumers (Amazon, Facebook, Google, Apple, Microsoft,

– significant increase in migration processes, which led to money transfers;

– search for sources of financing for small and medium-sized businesses;

– alternative types of payments;

– marketplaces;

– artificial intelligence;

– digital identification and biometrics, etc.

Table 1. Prerequisites for the development of financial technologies in different countries of the world

Directions	Characteristics
Infrastructure	Technological readiness of the market: – mobile coverage and Internet access; – fintech solutions (active use of payment terminals, electronic money, expanding access to finance)
Favorable legal and regulatory environment	Simple and transparent rules for setting up a business, proper taxation rules, licensing requirements and protecting the rights of investors and businesses is key
Access to capital and investment	Countries – Singapore, Great Britain, China and India actively support investments in financial technology initiatives, which allows for rapid scale-up of projects
Expertise	Availability of qualified employees in various consulting areas, which helps to create appropriate incubators and initiatives with accelerators

Source: *built by the authors based on data [10-12]*

The development of financial technologies in European countries deserves attention. In particular, in Great Britain thanks to the creation of such initiatives as the FinTech Delivery Panel and the FinTech Steering Group, which bring together banks, fintech companies and government institutions to discuss and develop development programs financial technology market [10]. The cooperation of various institutions of the financial services market is implemented thanks to the functioning of the so-called Fintech Bridges, which allow the effective exchange of information about innovations and new trends in the financial services market both within Great Britain and with other countries [10].

Unlike Great Britain, there are no special conditions for fintech business regulation in France [11]. Fintech companies that carry out banking operations undergo standard procedures for registration and obtaining a license [11]. However, the approach of French regulators consists of personalized assistance to fintech companies in providing comprehensive support [11]. In general, for the development of the financial technology market in the EU countries, an action plan was presented back in 2018 regarding the introduction of special rules of regulation, supervision and control that are more flexible than for other companies [11]. This plan is to be implemented by the European FinTech Lab (EU FinTech Lab) [11].The experience of India, whose fintech sphere is regulated by such institutions as the Reserve Bank of India (RBI), the Securities and Exchange Board of India (SEBI), the Telecom Regulatory Authority of India (TRAI), the Insurance Regulatory and Development Authority (IRDA), is also undoubtedly interesting, National Payment Corporation [12]. Also in India, a fintech sandbox mechanism has been introduced for financial startups, which for a certain period of time benefit from preferential regulatory requirements and state support for financial experiments [13].

In Ukraine, as in other countries of the world, there is a practice of subordinating fintech companies to general laws and regulations that regulate activities on the financial services market. Since most fintech solutions are aimed at providing payment services and money transfers (Table 2).

Table 2. Main legislative acts on the provision of payment services and money transfers in Ukraine

Name of the Law of Ukraine	Characteristics of the main provisions
About banks and banking activities from July 3, 2020.	regulates the structure of the banking system, economic, organizational and legal principles of creation, activity, reorganization and liquidation of banks
About payment systems and money transfers in Ukraine from July 3, 2020.	regulates the general principles of the functioning of payment systems and settlement systems in Ukraine, the concept and general procedure for transferring funds within Ukraine, establishes the responsibility of transfer subjects, and also determines the general procedure for supervision (oversite) of payment systems
About currency and currency transactions from April 28, 2020.	regulates the legal basis of currency transactions, currency regulation and currency supervision, the rights and obligations of subjects of currency transactions and authorized institutions and establishes responsibility for their violation of currency legislation
About electronic trust services from February 13, 2020.	regulates the legal and organizational principles of providing electronic trust services, including cross-border ones, the rights and obligations of subjects of legal relations in the field of electronic trust services, the procedure for state supervision (control) of compliance with the requirements of legislation in the field of electronic trust services, as well as legal and organizational principles of electronic identification
On financial services and state regulation of financial services markets dated October 4, 2020.	regulates the general legal principles in the field of providing financial services, the implementation of regulatory and supervisory functions for the provision of financial services

Source: *built by the authors based on data [14-18]*

It is worth noting that the legal and regulatory environment has been improving in recent years to support fintech and other startups. Among the important changes that took place in Ukrainian legislation:

1. permission to sign invoices and agreements with an electronic signature;
2. intensive use of documents in English;
3. simplified taxation system for IT companies (5% per year);
4. gradual lifting of restrictions on repatriation of dividends;
5. gradual adoption of European Union directives (PSD2);
6. introduction of identification and trust services for electronic transactions in the domestic market of Ukraine.

The desire of consumers to experiment with digital services has become the reason for the emergence and growth of new fintech companies. In Ukraine, this direction is actively developing, more than 100 companies operate on the market of financial services.

It is worth noting that in Ukraine the BankID system has been implemented and supported by the National Bank of Ukraine, which provides access to a number of banking and administrative services on the Internet through the identification of the client through his password and login from online banking. In general, this contributes to the emergence of various digital financial products, online platforms for the provision of financial and administrative services, trading on the securities market. The specified system will allow a consumer who has passed the KYC procedure of one bank and received a national BankID to use it to open accounts in any other bank. Financial technologies involve attracting to the financial sector those people who have not yet used online services and were outside the banking system, as well as providing quality services to their regular users who receive an insufficient amount of financial services.

The incomplete filling of the niche of the financial sector in Ukraine, in our opinion, is also explained by the presence of certain obstacles to the banks' service to residents of remote settlements and small businesses (due to low financial literacy or public conviction).

At the beginning of 2017, fintech as one of the priority areas in the world was formed in the Comprehensive Program for the Development of the Financial Sector of Ukraine until 2020 [19].

While researching the fintech market in Ukraine, more than a hundred of its participants were interviewed and the following priority areas of application were identified:

– payments (69% of respondents);

– non-banks (63%);

– P2P lending (56%) [19].

– It should be noted that the most significant technological trends today include:

– machine learning (can provide assistance in optimizing production and business processes);

– artificial intelligence (understands questions formulated in natural language and finds answers to them in the database, recognizes faces in photographs);

– digital assistants; context trading [8].

Fintech aims to protect the rights of consumers of financial services regarding the disclosure of information about them (in transactions, advertising, etc.) (Fig. 1).

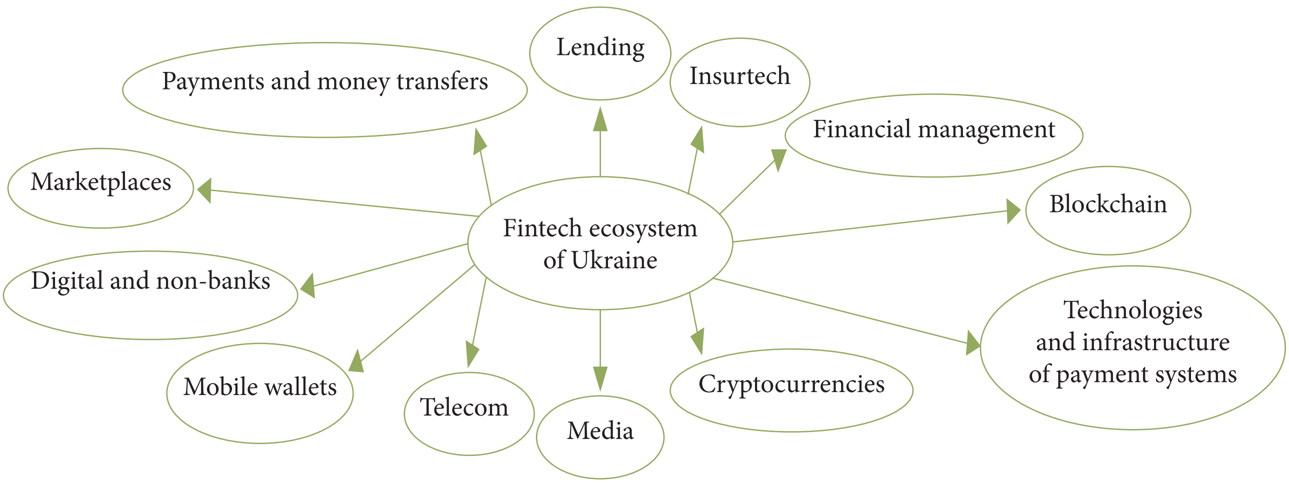

***Figure 1**. Components of fintech ecosystem of Ukraine*
***Source**: generated by the authors based on data [8]*

Thanks to financial technologies, global financial services in the field of micro-credit, micro-savings and micro-insurance will become useful for the population and help overcome poverty in all countries of the world [8].

In addition, we believe that fintech is capable of increasing the country's GDP and the standard of living of its population. It should be noted that even in 2017, specialized startups attracted 16.6 billion dollars in financial technologies. USA, while 1128 agreements were concluded [20].

We believe that the transformation of the financial sector of Ukraine into a transparent, fair and diversified system that supports enterprises of all sizes and serves the needs of citizens will lead to:

– increasing confidence in the banking system;

– expansion of access to finance in the non-banking financial sector;

– expansion of the use of electronic finance, activation of information and educational work with vulnerable population groups, etc. [20].

At the end of 2019, there were more than 100 active fintech companies in Ukraine, and most of them were founded within the last three years. 63% of fintech companies operate with their own funds, and the same number have broken even. The activation and strengthening of the development of the fintech sector is observed, so about 20 new companies will appear on the market in the near future. The rapid growth of the number of startups and the parallel development of the ecosystem will contribute to the increase of interest on the part of investors, as well as to the growth of the number of incubators and accelerators [20]. A vivid example of a domestic fintech company is JSC CB "PrivatBank".

The directions of Ukrainian fintech providers are shown in fig. 2.

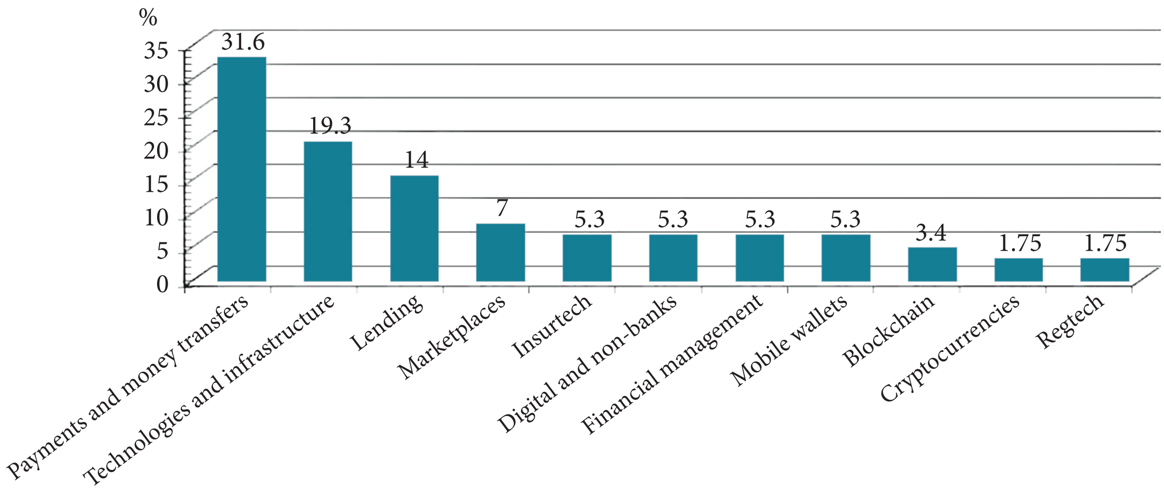

Figure 2*. Main types of services of Ukrainian fintech providers*
Source*: generated by the authors based on data [20]*

Payments and remittances occupy about a third of the areas of Ukrainian fintech providers (31.6%), technology and infrastructure occupy the second place (19.3%), lending takes the third place, and marketplaces take the fourth place. Among other directions, it should be noted: other tech, digital and neobanks, financial management, mobile wallets – 5.3% each, respectively. Blockchain (3.45%), cryptocurrencies and regtech (1.75%, respectively) occupy a small specific weight.

A large number of Ukrainian financial companies are targeting the common European market. Recently, there has been an active export of intellectual resources to other countries. This, in turn, forms the infrastructure necessary for the development of a startup environment with the use of accelerators and incubators.

As for the geographical location, more than 80% of Ukrainian fintech companies are located in Kyiv. Other base cities are Dnipro, Odesa, Kharkiv, Rivne and Lviv. This concentration is explained by the fact that the headquarters of large banks are located in the capital, and in general, Kyiv is the center of business life. But the presence of advanced IT infrastructure in the regions will enable fintech to develop more actively in regional centers, especially in those where the main offices of banks are located. It is worth noting that the geographical location and distribution of Ukrainian fintech companies differs significantly from data on the IT market in general. According to the report on the development of the Ukrainian IT industry, only slightly more than 50% of IT companies are registered in Kyiv. About 25% of startups have up to 10 employees, another 25% – from 11 to 25. Only 27% of companies have more than 50 employees. This distribution by the number of employees in Ukraine coincides with the global one, because according to Venture Scanner, 35% of fintech companies in the world have up to 10 employees, and 73% – up to 50. In total, fintech companies in Ukraine employ more than 4,000 people [20].

Funding problems and income - one of the main issues for startups is to find financing in the early stages of development. Up to 80% of startups in the world are financed with their own funds, as well as with the funds of friends and relatives (the so-called friends & family category). In Ukraine, about 70% of fintech companies work without attracting money from third-party investors, of which 61% rely exclusively on their own funds, another 9% – attract money from friends and relatives. 30% use external investments, mainly private investors and angel investments (Fig. 3) [20].

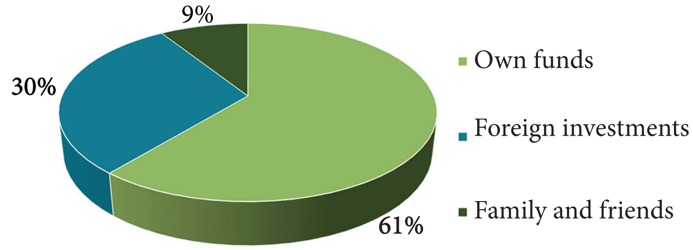

Figure 3*. Specific weight of funding sources in the structure of fintech companies of Ukraine*
Source*: generated by the authors based on data [20]*

The spread of COVID-19 has forced fintech companies to innovate more intensively. The COVID-19 pandemic has forced most banking institutions to start their work online, which has become more convenient for many service users. A massive improvement and update of websites and mobile applications has begun (Table 3).

Table 3. Online services of banking institutions of Ukraine

Name of banking institutions	Online services
JSC CB "PrivatBank"	Deposit operations without visiting bank branches. The ability to add the necessary services to the «basket» of the site, and then make payment.
JSC "OTP-Bank"	Monitoring of operations and sent documents for legal entities. In order to provide individuals with information about the functionality of the Internet banking system in an interactive mode on the Internet, a system user guide was developed.
JSC "Alfa-Bank"	The possibility of confirming operations using one-time passwords via SMS. Conducting transactions without entering details. Analytics of operations with your partners.
PJSC "PUMB"	The opportunity for its depositors to use the deposit constructor, with which you can independently choose the amount of the deposit, the term, the method of paying interest, the possibility of withdrawing and replenishing funds.

Source: *built by the authors based on data [10-12]*

For example, JSC "OschadBank" has created an additional application u-Take, which is designed for quick purchases in stores and restaurants without queues. Internet banking is used by over 200,000 clients of OTP Bank. Other banking institutions expanded the functionality of their online service in 2019 and are still improving it. JSC CB "PrivatBank" is the leader in providing online customer service. It won the 2019 PSM Awards with 47.7 percent of the vote [23]. It was found out that during the quarantine JSC KB "PrivatBank", like most banking institutions, started working online. A significant contribution in this regard was made by the mobile application Privat24, which can be used by institutions during the COVID-19 pandemic, has both strengths and threats, corresponding to maximum amounts of 4.3 and 4.2. a large package of bank services without leaving home. The application's capabilities include: payment by details, making a payment, paying for utilities, transfers from card to card, paying credit payments, changing the credit limit, issuing insurance, receiving receipts, currency exchange, paying for parking spaces, etc. Currently, it has more than 11 million users.

To determine the strengths and weaknesses, opportunities and threats, we conducted a SWOT analysis of the use of online technologies by banking institutions of Ukraine during the COVID-19 pandemic (Table 4).

Table 4. SWOT analysis of the use of online technologies by banking institutions of Ukraine during the COVID-19 pandemic

S (Strengths)	Wf (weight factor)	S (score)	Wf*S (multiplication)
1. Increasing the number of non-cash transactions in banking institutions of Ukraine	0.3	5	1.5
2. Increasing the volume of the electronic money market in the country	0.1	4	0.4
3. Convenience in carrying out operations for the population of the country.	0.3	4	1.2
4. Reduction of physical contacts among people during quarantine	0.3	4	1.2
Total:	**1**		**4.3**
O (opportunities)	Wf (weight factor)	S (score)	Wf*S (multiplication)
1. Digitization of the banking system	0.5	4	2.0
2. Speed of bank transactions	0.2	5	1.0
3. Development of joint projects with central banks of other countries	0.1	2	0.2
4. Expanding the scope of online operations	0.2	4	0.8
Total:	**1**		**4**

Table 4, Continued

S (Strengths)	Wf (weight factor)	S (score)	Wf*S (multiplication)
W (weaknesses)	Wf (weight factor)	S (score)	Wf*S (multiplication)
1. A decrease in the profitability of banking institutions due to a decrease in the interest rate	0.3	4	1.2
2. Fall in demand for loans due to a decrease in the solvency of the population	0.3	4	1.2
3. Decreasing the quality of conducting inspection checks in a remote format	0.2	3	0.6
4. Low quality or lack of internet connection in remote areas for banking operations	0.2	5	1.0
Total:	**1**		**4.0**
T (threats)	Wf (weight factor)	S (score)	Wf*S (multiplication)
1. An increase in cyber-attacks on the online accounts of clients, which increases the risk of loss of money by clients of banking institutions	0.3	5	.5
2. The presence of errors during operations due to insufficient financial literacy of the population	0.3	3	0.9
3. Reduction of cyber security of the banking system	0.3	5	1.5
4. Inability to solve some issues online	0.1	3	0.3
Total:	**1**		**4.2**

The strengths of the use of online technologies are: an increase in the number of non-cash transactions in banking institutions of Ukraine, an increase in the volume of the electronic money market in the country, convenience in carrying out transactions for the population, a decrease in physical contacts among people during quarantine.

With the development of innovative processes, the need to protect banking institutions from possible cyber attacks also increases. Threats also include: errors in transactions due to insufficient financial literacy of the population and the inability to resolve some issues online.

Digitization of the banking system makes it possible to provide financial services in simpler and more accessible formats. When using online technologies by domestic banking institutions during the epidemic, the impact of the weaknesses identified by us should be eliminated: a decrease in the profitability of banking institutions due to a decrease in the interest rate; a drop in demand for loans due to a decrease in the solvency of the population; decrease in the quality of conducting inspection checks in a remote format; low quality or lack of internet connection in remote areas for banking transactions.

CONCLUSIONS

One of the determining factors in the development of the modern financial system is the purposeful introduction of financial technologies. Fintech is technology used in financial services to help companies manage the financial aspects of their business using new applications. It is worth noting that there was an increase in demand among the population of financial technologies, especially during the period of the COVID-19 pandemic, because due to the spread of quarantine measures, almost all institutions stopped their activities and as a result there was a decrease in the level of profitability. To get out of such a difficult situation, mobile applications began to be created and used, which made it much easier to use the services of banking institutions during the pandemic. But financial companies should focus their attention on making the use of new financial technologies convenient, high-quality, accessible, understandable and safe for every consumer of financial services.

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Застосування фінансових технологій у банківській системі України

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Анотація. Фінансовий сектор сприяє зростанню добробуту населення, стимулює розвиток бізнесу, допомагає розширювати ринки товарів і послуг. З плином часу фінансові технології набувають все вагомішого значення, оскільки після світової фінансової кризи банківські установи були вимушені прилаштуватись до нових викликів. З появою новітніх технологій банки повинні були спрямовуватись на ефективне надання фінансових послуг із врахуванням фінансової інклюзивності. З метою допомоги споживачам фінансових послуг керувати фінансовими аспектами бізнесу, при цьому використовувати нові програми, застосовуються фінансові технології. Вони є необхідним механізмом утворення конкурентоспроможності будь-якої компанії і будь-якої держави. Однак існує проблема низького залучення населення до фінансового сектору, так як не кожен індивід має доступ до якісних фінансових послуг і необхідний досвід для їх використання в щоденному житті. Таким чином, метою статті є дослідження та аналіз застосування фінансових технологій у банківській системі України. У статті досліджено сутність фінансових технологій та їх роль у розвитку фінансової сфери України. Висвітлено питання виникнення фінансових технологій. Розглянуто, яким чином та за допомогою яких саме фінансових технологій здійснюється робота банківських установ у період пандемії COVID-19. Для визначення сильних і слабких сторін, можливостей і загроз проведено SWOT-аналіз застосування онлайн- технологій банківськими установами України під час пандемії COVID-19. З'ясовано, що відбулося збільшення попиту серед населення фінтех-технологій, особливо в період пандемії COVID-19

Ключові слова: фінансові технології, банківська система, пандемія, стартап, банківські установи, фінансова інклюзивність