

# FINANCIAL TECHNOLOGIES: EVOLUTION, ESSENCE, STATUS AND DEVELOPMENT PROSPECTS

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### INTRODUCTION

At the current stage of development of the financial services market, the so-called financial technologies, or fintech, are attracting special attention. This segment is characterized by rapid growth and the introduction of new technologies that radically change the interaction between market participants. Financial technologies can be viewed as innovative solutions that, in addition to technological changes, often lead to significant organizational and product transformations. Such innovations are being actively integrated not only by large market players such as banks, investment and insurance companies, but also by new specialized structures created specifically for the implementation and use of the latest financial technologies.

Despite the significant growth of the fintech sector, research on its specifics and functioning is still limited. The purpose of this study is to comprehensively analyze the stages of development of financial technologies, define the essence of the concept of “financial technologies”, and study the current state and prospects of the fintech industry. To achieve this goal, the study sets the following objectives:

- to determine the nature and reasons for the emergence of financial technologies as an important element of the modern financial services market;
- to study the main stages of fintech development, from its inception to the current state;
- to consider different approaches to the definition of “financial technologies” for a deeper understanding of their role in the financial ecosystem;
- to analyze the current state of the fintech industry, outlining the main trends and challenges facing this industry;

– to assess the prospects for further development of fintech, taking into account its integration into traditional financial structures.

In the course of the study of the development of financial technologies, a number of methods were used to ensure a comprehensive approach to the study of this complex and multifaceted topic. In particular, the author used a logical and structural analysis of theoretical and empirical data presented in the public domain, which allowed systematizing information on the stages of fintech formation, its current state and development prospects. For quantitative and qualitative analysis of the status, structure and development of fintech within the global and national financial markets, specific scientific methods were used, in particular statistical analysis and graphical methods. The methods of analysis and synthesis made it possible, on the one hand, to identify certain areas of development of financial technologies, and on the other hand, to summarize and link together the main trends and problems faced by this industry. The study identified the importance of financial technologies in the modern financial sector and their impact on the digitalization of financial services.

### **1. Stages of financial technology development**

Fintech as an independent element of the financial market has a rather complicated and controversial history, which is the subject of discussion among both foreign and Ukrainian scholars. Most scholars distinguish three stages of fintech development. The first stage of financial technology development (Fintech 1.0) can be attributed to the period since 1866, when the telegraph appeared and the globalization of financial processes began. For example, British researchers A. Lagna and M. Ravishnankar<sup>1</sup> note that the history of financial technologies begins with the emergence of mass communication, such as radio, telephone and telegraph, in the eighteenth century. In their opinion, these innovations have dramatically changed the process of information transfer, which has had a huge impact on decision-making in the field of financial asset management. Reducing the time for information exchange – from weeks to hours and even minutes – has become an important catalyst for improving the efficiency of financial transactions and the development of global markets.

The laying of telegraphic cables between Europe and the United States significantly accelerated information exchange, which created the preconditions for more efficient management of financial resources. The Western Union payment system, based on telegraph lines, was the first example of the use of high technology to provide financial services. The

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<sup>1</sup> Lagna A., Ravishankar M. Making the world a better place with fintech research. *Information Systems Journal*. 2021. Vol. 32, No. 1. P. 61–102. DOI: 10.1111/isj.12333

telegraph significantly accelerated the transfer of financial data between countries, which allowed for prompt control over the implementation of financial decisions. However, this period was accompanied by problems with privacy and security of information due to the public nature of telegraph channels.

At that time, financial transactions were quite limited in their functionality, and technologies remained within the banking sector. The main task was to increase the efficiency of traditional banking services.

At the beginning of the 20th century, financial communications underwent another change with the introduction of the telephone. The telephone allowed for continuous contact between financial institutions and their customers, which improved the speed of information exchange and ensured greater privacy compared to the telegraph. However, the availability of telephone services remained limited, making communication difficult in some regions.

Radio communication, introduced in the 1920s, was the next step in the development of financial technology. It made it possible to scale up the process of managing financial assets and conduct simultaneous operations in different financial markets. However, the widespread use of radio communications led to an increase in the risk of commercially valuable information leakage.

In the 1950s, television began to play an important role in the financial sector. The transmission of visual and audio information through television channels allowed financial institutions to quickly access news and analyze it to make management decisions. This gave a competitive advantage to those with access to television, but the limited availability of this technology limited its impact.

Since the mid-1960s, video communications and video conferencing have been widely used in the financial sector. This allowed financial managers and capital owners to organize both individual and collective meetings in real time, which significantly improved decision-making efficiency. Video communication provided the ability to transmit audio and visual information while maintaining the privacy of the communication channel.

In 1973, the international interbank information transfer and payment system SWIFT was founded in Brussels on the initiative of Carl Reuterskiold, co-founded by 239 banks from 19 countries. The original intention of SWIFT was to create a way for banks to communicate with each

other faster and more securely to process international payments<sup>2</sup>. At the same time, a global interbank system was introduced, which was an important step towards the automation of international financial transactions. This system greatly facilitated the process of making non-cash payments, and this gave rise to a massive shift to the use of plastic cards, even among individuals. In addition, national information networks began to appear in different countries, such as the French Minitel system, which was one of the first attempts to provide access to financial services through home terminals.

Despite the innovations, there were certain limitations. The convenience of using such networks was not at the highest level, which, combined with the high costs of accessing the servers of financial service providers, significantly hindered the spread of these technologies. Customers were often forced to pay additional fees to connect to servers, making these services less accessible to the general population. Therefore, despite technological progress, financial technologies remained quite limited and not widely adopted.

“The first stage (Fintech 1.0) lasted until 1987, when the financial industry used information technology based mostly on analog data transmission”<sup>3</sup>.

The second stage (Fintech 2.0) begins with the introduction of computer technology into the financial sector, marking the beginning of the digitalization era. It was at this stage that the banking system began to transform, acquiring features that are characteristic of the modern financial environment. The development of bank cards, ATMs, and electronic payment systems has significantly changed the landscape of financial services. Massive use of the Internet is emerging, which has created new channels of interaction between banks and customers. Electronic money and payment systems, such as PayPal, emerged and became the first harbingers of modern fintech.

O. Shevchenko and L. Rudykh note that “the term ‘financial technology’ itself emerged in the early 1990s, when the Internet began to develop”<sup>4</sup>.

By the mid-1990s, financial services began to gradually move beyond physical bank branches, allowing customers to conduct certain transactions from a distance. In particular, it became possible to receive financial services

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<sup>2</sup> Scott S. V., Zachariadis M. The Society for Worldwide Interbank Financial Telecommunication (SWIFT): cooperative governance for network innovation, standards, and community. London : Routledge, 2014. 192 с.

<sup>3</sup> Поченчук Г. М. Фінансові технології: розвиток і регулювання. *Економіка і суспільство*. 2017. № 13. С. 1193–1200.

<sup>4</sup> Шевченко О. М., Рудич Л. В. Розвиток фінансових технологій в умовах цифровізації економіки України. *Ефективна економіка*. 2020. № 7. DOI: 10.32702/2307-2105-2020.7.61. URL: <http://www.economy.nayka.com.ua/?op=1&z=8053> (дата звернення: 12.08.2024).

through phone calls or by using automated teller machines. However, the range of available services was rather limited, and clients were not able to use information technology to manage their finances on their own.

All transactions using information technology were carried out exclusively through banks, which provided customers with the necessary tools, such as ATMs, to conduct financial transactions. At that time, customers did not have their own hardware or software to access financial data on their own. This meant that technological innovations remained mostly within the banking sector and were not available to the general public for offline use.

The subsequent rapid development of financial technology in the world was driven by several factors. First, the global economic crisis of 2008 led to a significant loss of confidence in traditional banking products and financial instruments, prompting people to look for new, more reliable alternatives.

Secondly, the rapid process of digitalization has covered almost all areas of human activity, including the financial sector. Digital technologies have provided greater consumer satisfaction, expanded financial management capabilities, reduced costs for market participants, accelerated financial transactions, increased the availability of services, and made market relations more transparent. Innovations in data processing have also spurred the development of new fintech areas, such as blockchain, P2P lending, online scoring, and algorithmic trading.

The third factor is the expansion of Internet access, which continues to cover more and more areas and provide higher data transfer speeds. This allows users to stay online around the clock, which is reinforced by the rapid development of the mobile market.

The fourth factor is the growing popularity of social networks and messengers, which have created the conditions for the emergence of new types of financial services, such as crowdfunding, P2P transfers, social trading, etc. Social platforms allow users to exchange information directly, which stimulates the development of new financial solutions.

The fifth significant factor is the desire for innovation among the millennial generation, which is characterized by high demands for convenience, quality and speed of service. This generation, born between 1980 and the early 2000s, is already accustomed to automated, fast, and efficient technologies, which contributes to the growing demand for digital payment systems.

The sixth factor is the success of technology companies in other sectors of the economy, such as retail and entertainment. Successful companies that have

been able to change their markets and offer competitive products have drawn the attention of entrepreneurs to the opportunities in the financial sector.

In addition, the growth of e-commerce has stimulated the development of financial services in the areas of payments and transfers, as well as financing. In turn, the expansion of online commerce has contributed to the growth of payment services, including e-wallets, in-app payments, and instant payments, as well as customer lending services<sup>5, 6, 7</sup>.

We agree with the opinion of D. Arner, J. Barberis and R. Buckley that since 2008, both developed and developing countries have entered a new stage of financial technology development, FinTech-3.0, which is defined not by financial products or services, but by those who provide them. “This latest startup-led evolution of financial technology poses challenges for both regulators and market participants, particularly in balancing the potential benefits of innovation with the potential risks of new approaches”<sup>8</sup>. Thus, the third, mature stage of financial technology development was marked by dramatic changes in the way people interact with financial services. One of the determining factors of this stage was the massive spread of the Internet, which became available almost everywhere due to the widespread use of mobile devices and gadgets. This provided continuous access to the network regardless of the users' location, which significantly changed their daily lives.

The virtual space that emerged from this process became a place where people began to spend a significant part of their time, both socially and professionally. There has been a significant rethinking of consumer habits: receiving services, including financial ones, in a virtual environment has become commonplace. Although not all services have fully moved to the online format, the use of the Internet to interact with financial products has become so widespread that most consumers have lost their doubts about the safety and reliability of such interactions.

During this period, new forms of financial assets emerged, including cryptocurrencies, which have become an important element of the modern

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<sup>5</sup> Шевченко О. М., Рудич Л. В. Розвиток фінансових технологій в умовах цифровізації економіки України. *Ефективна економіка*. 2020. № 7. DOI: 10.32702/2307-2105-2020.7.61. URL: <http://www.economy.nayka.com.ua/?op=1&z=8053> (дата звернення: 12.08.2024).

<sup>6</sup> Мазаракі А., Волосович С. Fintech у системі суспільних трансформацій. *Вісник КНТЕУ*. 2018. № 2. С. 5–16.

<sup>7</sup> Калашнікова Т. В., Самохіна С. А. Розвиток ринку фінансових технологій в Україні як фактор сприяння фінансовій інклюзивності. *Вісник ХНАУ ім. В. В. Докучаєва. Серія Економічні науки*. 2018. № 3. С. 201–210.

<sup>8</sup> Arner D. W., Barberis J. N., Buckley R. P. The Evolution of Fintech: A New Post-Crisis Paradigm? *The University of Hong Kong*, 2015. С. 1–45. URL: <http://hub.hku.hk/handle/10722/221450>

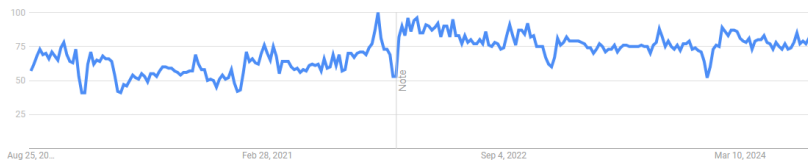
financial landscape. In addition, the development of digital technologies has led to the emergence of new financial and investment products, such as ICOs (Initial Coin Offerings), which have opened up new business opportunities, including cryptocurrency mining.

Technologies for accessing financial services have also undergone a transformation. People can now identify themselves without having to use plastic cards or paper documents, thanks to biometric authentication. This has led to the emergence of virtual banks that provide financial services without the physical presence of customers in branches, which is another step towards full digitalization of the financial sector.

The above chronology of the stages of financial technology development is to some extent conditional. Different scholars may have slightly different time frames for these stages. However, there is a consensus among scientists that the evolution of financial technologies has been driven by the gradual introduction of new means of communication and automation of financial processes, which has led to the current state of fintech, which continues to change and improve the financial sector.

## **2. Approaches to defining the essence of the concept of “financial technologies”**

According to Google data, the popularity of the term “financial technology” has been high lately (Fig. 1).



**Fig. 1. Popularity of the term “financial technology” in Google over the past 5 years**

The numbers on the graph are not absolute measures of search volume, as the data is normalized and presented on a scale from 0 to 100, where each point on the graph is divided by the highest point, or 100. The numbers next to the search terms at the top of the graph are totals, or overall numbers.

A line pointing downward means that the relative popularity of a search term is decreasing—not necessarily that the total number of searches for that term is decreasing, but that its popularity relative to other searches is decreasing.

The term “financial technology” is often used with different meanings, which can lead to inconsistency and ambiguity in its interpretation.

For a long time, no serious attempts have been made to formulate a generally accepted definition of this concept. Instead, there is a large number of studies that analyze various aspects of financial technology, but the authors usually limit themselves to general definitions that facilitate understanding of the topic without a deep analysis of the term. At both theoretical and practical levels, the issue of developing a clear conceptual framework remains open and requires further research. Therefore, in order to better understand the essence of the concept of “financial technologies”, it is advisable to consider the existing theoretical approaches to its definition.

Financial technology, also known as fintech (short for financial technology), is a relatively young and rapidly growing industry that is gaining popularity both in Ukraine and around the world. It encompasses the use of various technological solutions to improve and automate financial services. The definition offered by Oxford Languages states that fintech includes “computer programs and other technologies that are designed to support the operation or provision of banking and financial services”<sup>9</sup>. In other words, fintech combines innovative approaches and digital tools to optimize financial transactions, making them more accessible, convenient and efficient for users.

According to the Strategy for the Development of the Financial Sector of Ukraine until 2025, financial technologies are defined as the process of providing financial services and services using innovative technologies<sup>10</sup>.

A. Bettinger was the first to use the term FinTech as “a merger that combines banking expertise and competencies with information technology”<sup>11</sup>.

As noted by A. Bharadwaj, O. El Sawy, P. Pavlou, and N. Venkatraman, fintech can be characterized as a digital business, since, unlike traditional commercial banks, its operating platform operates exclusively in the online environment<sup>12</sup>.

According to B. Zhang, R. Wardrop, P. R. Rau and M. Gray, fintech can be defined as a set of technological innovations in the field of financial

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<sup>9</sup> Oxford Languages. Fintech. URL: <http://www.oxforddictionaries.com/definition/english/fintech> (last accessed: 12.08.2024).

<sup>10</sup> Стратегія розвитку фінансового сектору України до 2025 року. *Національний банк України* : веб-сайт. URL: [https://bank.gov.ua/admin\\_uploads/article/Strategy\\_FS\\_2025.pdf?v=4](https://bank.gov.ua/admin_uploads/article/Strategy_FS_2025.pdf?v=4) (дата звернення: 16.08.2024).

<sup>11</sup> Bettinger A. Fintech: A series of 40 time shared models used at Manufacturers Hanover Trust Company. *Interfaces*. 1972. P. 62–63.

<sup>12</sup> Bharadwaj A., El Sawy O., Pavlou P., Venkatraman N. Digital business strategy: toward a next generation of insights. *MIS Quarterly*. 2013. Vol. 37, No. 2. P. 471–482.



services that challenge the traditional banking approach and radically change the way these services are provided and consumed<sup>13</sup>.

P. Schuffel in the article “Taming the Beast: A Scientific Definition of Fintech” explores the complexity of Fintech and provides a definition formed in the process of reviewing more than 200 scientific articles over a period of more than 40 years that refer to the term Fintech. In this scientific work, the professor characterizes Fintech as a new financial industry that uses technology to improve financial performance and defines financial technology as an independent actor in the financial market that focuses on the introduction of advanced digital technologies in the field of financial asset management<sup>14</sup>.

A. Fitri notes that fintech is a set of digital technologies that are used in financial transactions to increase their efficiency in the market<sup>15</sup>.

P. Gelis considers fintechs to be businesses of the new, fourth industrial revolution, which emerged as a response to the widespread digitalization of the economy. These companies represent an independent alternative to traditional financial institutions such as banks<sup>16</sup>.

I. Dyakonova and A. Pedich in their article “The Essence of the Concept of “FinTech”: Development of the Categorical Apparatus and Research of the Role in the Global Financial Market” analyze approaches to the interpretation of the concept of “financial technologies” (Table 1) and provide their own definition of financial technologies “as a multi-vector, unique and comprehensive form of interaction between the latest technologies and the financial industry, characterized by its quantitative and qualitative development through startups and increased efficiency of service delivery”<sup>17</sup>.

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<sup>13</sup> Zhang B., Wardrop R., Rau P. R., Gray M. Moving mainstream: Benchmarking the European alternative finance market. *Journal of Financial Perspectives*. 2015. Vol. 3, No. 3. P. 1–40.

<sup>14</sup> Schueffel P. Taming the Beast: A Scientific Definition of Fintech. *Journal of Innovation Management*. 2016. Vol. 4, No. 4. P. 32–54. URL: <http://www.open-jim.org/article/view/322/221> (Last accessed: 08.08.2024).

<sup>15</sup> Fitri A. Book Review: The Fintech Book: The Financial Technology Investors, Entrepreneurs and Visionaries. *Journal of Indonesian Economy and Business*. 2016. № 31 (3). P. 345–348. DOI: 10.22146/jieb.23554.

<sup>16</sup> Gelis P. Why FinTech Banks Will Rule the World. In *The FinTech Book*. John Wiley & Sons, Ltd., 2016. P. 235–237. DOI: 10.1002/9781119218906.ch61.

<sup>17</sup> Д’яконова І., Педич А. Сутність поняття «фінтех»: розвиток категоріального апарату та дослідження ролі на світовому фінансовому ринку. *Економічний дискурс*. 2017. № 3. С. 7–16. URL: <http://ed.pdatu.edu.ua/article/view/123564> (дата звернення: 06.08.2024).

Table 1

**Analysis of approaches to the interpretation of the concept  
of “financial technologies”<sup>18</sup>**

Criteria	Author	Definition
Technology	Abraham Bettinger, 1972	An acronym that stands for financial technologies that combine banking experience with modern management methods of science and computer.
	Loncharski, 2016	The evolution and application of technology in finance, replacing traditional business models in the market and opening up new risky horizons.
Sector, industry, industry	Miku, 2016	A new sector of the financial industry that includes the full range of technologies used to organize trade, corporate business, and retail services to the end consumer.
	Wharton, 2014	A sector of the economy consisting of companies that use technology to improve the efficiency of financial systems.
Finance	Hossi, Zo, 2013	A third way of conducting financial activities besides direct financing through securities markets and indirect financing through commercial banks.

According to L. Dudynets, financial technologies are tools used in the financial industry to increase cost efficiency, create added value in products, accelerate processes and ensure their safety<sup>19</sup>.

Wang, J. Christina, in turn, notes that fintech is the result of cooperation between purely financial businesses and the IT sector. This cooperation combines financial services with advanced digital technologies, creating new effective solutions for the market<sup>20</sup>.

A. Semenog, J. Kryvyeh and S. Tsyrulyk, financial technologies are considered as services provided by technology companies using specialized software that is focused on meeting the financial needs of customers<sup>21</sup>.

<sup>18</sup> Д’яконова І., Педич А. Сутність поняття «фінтех»: розвиток категоріального апарату та дослідження ролі на світовому фінансовому ринку. *Економічний дискурс*. 2017. № 3. С. 7–16. URL: <http://ed.pdatu.edu.ua/article/view/123564> (дата звернення: 06.08.2024).

<sup>19</sup> Дудинець Л. А. Розвиток фінансових технологій як фактор модернізації фінансової системи. 2018. URL: <http://global-national.in.ua/archive/22-2018/149.pdf> (дата звернення: 14.08.2024).

<sup>20</sup> Wang J. Christina. Technology, the Nature of Information, and Fintech Marketplace Lending. *Federal Reserve Bank of Boston Research Paper Series Current Policy Perspectives Paper*. No. 18-3. 2018. URL: <https://ssrn.com/abstract=3310767> (Last accessed: 12.08.2024).

<sup>21</sup> Семенов А. Ю., Кривич Я. М., Цирулик С. В. FinTech технології: суть, роль і значення для економіки країни. *Вісник Одеського національного університету імені І. І. Мечникова. Серія : Економіка*. 2018. Вип. 2(67). Т. 23. С. 100–105.

At the same time, according to O. Shevchenko and L. Rudych, financial technologies are a combination of digital technologies and innovations in the financial sector, which is used by technology companies to provide, expand and disseminate financial services<sup>22</sup>.

H. Bukharin notes that the concept of “financial technologies” covers innovative methods of providing financial services used by both FinTech companies and traditional financial institutions, as well as other participants in economic relations. These services are aimed at meeting the needs of financial market participants, individuals, and public authorities using the latest technological platforms. In addition, financial technologies, in his opinion, include software and technological innovations aimed at the qualitative transformation of economic and social processes and the effective provision of social and economic human rights<sup>23</sup>.

As defined by A. Munawar, A. Rosyadi and D. Rahmani, fintech is an innovative business model that changes conventional business models to modern ones<sup>24</sup>.

According to the definition of R. Benziane, S. Roqiya, and M. Houcine, “fintech encompasses the use of digital technologies, such as the Internet, mobile computing, and data analytics, that facilitate, develop, or change the operation of financial services”<sup>25</sup>.

According to Lerong Lu, “fintech refers to the close interaction between the financial services industry and the latest information technologies, such as big data, cloud computing, blockchain, and artificial intelligence”<sup>26</sup>.

M. Agrawal, M. Irfan and A. Goyal believe that fintech is a combination of financial services and the latest technologies that aims to introduce innovations into the financial industry. We share their opinion that it is a fast-growing industry that covers a wide range of solutions – from digital

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<sup>22</sup> Шевченко О. М., Рудич Л. В. Розвиток фінансових технологій в умовах цифровізації економіки України. *Ефективна економіка*. 2020. № 7. DOI: 10.32702/2307-2105-2020.7.61. URL: <http://www.economy.nayka.com.ua/?op=1&z=8053> (дата звернення: 12.08.2024).

<sup>23</sup> Бухарін Г. О. Фінтех як об'єкт нормативно-правового регулювання: теоретико-методологічний аспект: автореф. дис. на здобуття наук. Ступеня канд. юрид. наук: 12.00.07. Запоріжжя, 2020. 24 с. URL: [http://phd.znu.edu.ua/page/aref/07\\_2020/Bukharin\\_aref.pdf](http://phd.znu.edu.ua/page/aref/07_2020/Bukharin_aref.pdf) (дата звернення: 15.08.2024).

<sup>24</sup> Munawar A., Rosyadi A., Rahmani D. Financial technology (fintech) dalam inklusi keuangan umkm kota Banjar di masa pandemi COVID-19. *INOVASI*. 2022. Vol. 18. P. 39–49. DOI: 10.30872/jinv.v18i1.10454.

<sup>25</sup> Benziane R., Roqiya S., Houcine M. Fintech Startup: A Bibliometric Analysis and Network Visualization. *International Journal of Accounting & Finance Review*. 2022. Vol. 11, No. 1. P. 8–23. DOI: 10.46281/ijaf.v11i1.1715.

<sup>26</sup> Lu L. Understanding Fintech. *Global Fintech Revolution: Practice, Policy, and Regulation*. Oxford, 2024. Online edition, Oxford Academic. URL: <https://doi.org/10.1093/9780191884597.003.0002> (Last accessed: 13.08.2024).

payments and lending to mobile banking, cryptocurrencies, insurance technologies (InsurTech) and asset management (WealthTech). Fintech is revolutionizing the way financial services are delivered, making them more accessible, faster and more efficient for users, as well as contributing to changes in the regulatory environment and enhancing security and risk management<sup>27</sup>.

Thus, based on the analysis of the definition of “financial technology” in scientific publications of foreign and Ukrainian scholars, we can see a wide range of approaches to its interpretation and formulate our own definition of the term “financial technology”. In our opinion, financial technology, or fintech, is a set of innovative digital solutions that integrate with financial industry products and services to improve their efficiency, speed, and accessibility. Fintech covers a wide range of technologies used to automate financial transactions, manage risks, and provide a secure environment for consumers and businesses. From mobile banking and cryptocurrencies to digital lending and insurance, financial technologies are significantly changing traditional approaches to financial services, creating new opportunities in the context of digitalization and globalization of economic relations.

### **3. Current state and prospects of fintech industry development**

Financial technologies have been playing a leading role in the global financial system for a considerable period of time, being one of the most dynamic and important industries. M. Balytska and K. Brovenko emphasize that the growing popularity of financial technologies is associated with the constant introduction of innovations aimed at meeting the needs of customers for modern technological solutions, increasing usability, improving efficiency and reducing transaction costs. These factors have contributed to the emergence of new entities in the global financial market, such as FinTech companies and digital ecosystems<sup>28</sup>.

However, the development of fintech is not homogeneous – there are many different trends and directions in this area that are developing in response to changes in the global economy and society. These trends often reflect global events, economic issues, and social shifts, forming a kind of map of financial technology development that is constantly evolving along with changes in the global agenda. Thus, fintech not only adapts to global

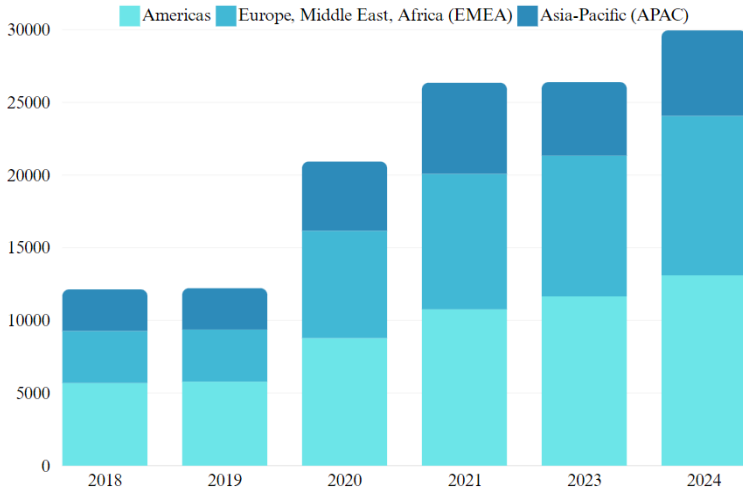
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<sup>27</sup> Agrawal M., Irfan M., Goyal A. The Importance of Fintech in Promoting Regulatory Compliance in Major Fintech Subsectors. *Integrating RegTech Solutions for Industry 4.0* / edited by Swati Gupta, et al., IGI Global, 2024, P. 35–48. DOI: 10.4018/979-8-3693-3322-8.ch003.

<sup>28</sup> Балицька М. В., Бровенко К. С. Фінансові технології як драйвер розвитку фінансових ринків. *Інвестиції: практика та досвід*. 2021. № 9. С. 59–65.

changes, but also becomes a reflection of them, reflecting the main processes and problems of the modern world<sup>29</sup>.

This variety of trends in the development of financial technologies is manifested not only in the global context, but also in regional differences (Fig. 2).



**Fig. 2. Number of fintech companies in the world from 2018 to 2024 by region<sup>30</sup>**

Each region of the world has its own peculiarities in fintech implementation, which depend on the level of economic development, access to technology, regulatory conditions, and local market needs. For example, in some countries, fintech is developing rapidly due to a high level of digitalization and an innovative environment, while in others; it is in its nascent stage and is just beginning to gain momentum. Different regions respond differently to the realities of growth, which determines their unique path in the development of financial technologies. In this context, it becomes evident that fintech not only reflects global trends but also shapes them, influencing economies and societies in various parts of the world.

<sup>29</sup> Бурцев Я. І. Розвиток фінансових технологій та сучасні тренди в банківській сфері. *Економіка, управління та адміністрування*. 2024. № 2(108). С. 152–159. DOI: 10.26642/ema-2024-2(108)-152-159.

<sup>30</sup> Number of Fintech startups worldwide in 2018, by region. *Statista*: website. URL: <https://www.statista.com/statistics/893954/number-fintech-startups-by-region/> (Last accessed: 26.08.2024).

As of early 2024, the Americas, including North, South, and Central America, as well as the Caribbean, became the region with the largest number of fintech companies in the world. There were about 13,100 fintech companies in this region, which is 1,500 more than a year earlier. By comparison, there were 10,969 fintech companies in the EMEA (Europe, Middle East, and Africa) region, and 5,886 in the Asia-Pacific region.

In 2023, the United States ranked first in the number of fintech unicorns, with roughly five times more fintech companies than the UK, which came in second place.

Investments in the fintech sector have grown significantly over the past decade, reaching an all-time peak in 2021. However, investment activity slowed considerably in 2022, particularly in the Americas, where there was a substantial drop in investment value. This reduction in investment was likely caused by the economic downturn associated with the COVID-19 pandemic.

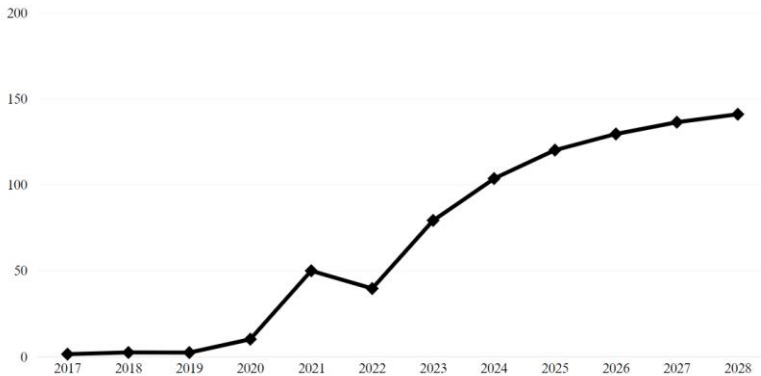
In recent years, fintech companies have become an integral part of everyday life, with their numbers continuing to grow annually. Most of these companies originate from the United States and China, with these two countries accounting for 8 of the top 10 fintech companies globally as of early 2024. Despite the dominance of the US and China, the Irish payment processing platform Stripe became the world's most valuable fintech unicorn in 2022.

It is noteworthy that fintech companies headquartered in the USA and China hold leading positions among the world's largest fintech firms by market capitalization. As of early 2024, U.S.-based payment giants Visa and Mastercard topped the rankings, with market capitalizations of approximately \$520 billion and \$396 billion, respectively. Third place was occupied by Intuit, a company specializing in software for finance, accounting, and tax preparation, while fourth place went to China's Tencent, with a market capitalization of \$146 billion. European companies such as Stripe, Adyen, and Revolut were also among the leaders by market capitalization<sup>31</sup>.

It should be noted that the global fintech industry experienced a significant increase in revenues in the period from 2017 to 2023 (Fig. 3). In 2023, the total revenue of the industry will reach USD 79.38 billion. According to Statista Market Insights, the revenues of the global fintech sector are expected to continue to grow in the coming years and exceed USD 141.18 billion by 2028.

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<sup>31</sup> Ринкова капіталізація найбільших фінтех-компаній у всьому світі у 2024 році. *Statista* : веб-сайт. URL: <https://www.statista.com/statistics/1262288/largest-fintech-companies-by-market-cap/> (дата звернення: 26.08.2024).



**Fig. 3. Revenue dynamics of the fintech industry in the world for 2017-2023 with forecasts for 2024-2028 (in billions of US dollars)<sup>32</sup>**

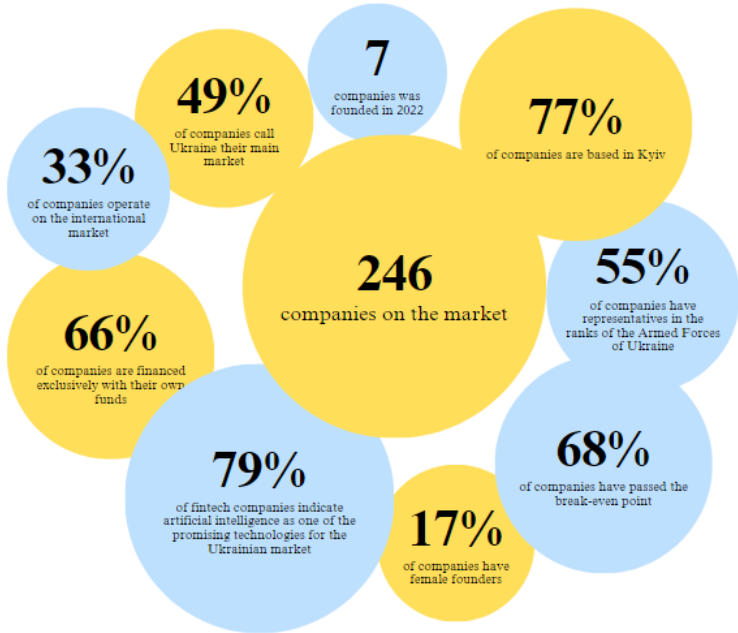
Discussing the development of technologies in the Ukrainian financial market, it is evident that the country is currently in the early stages of fintech adoption. However, each year, technology companies are increasingly improving financial services, gradually shaping new market structures in Ukraine<sup>33</sup>.

As of 2023, 246 companies were actively operating in the Ukrainian fintech sector (Fig. 4). Among them, seven new firms were established in 2022, highlighting the remarkable resilience and entrepreneurial spirit of Ukrainians. Despite the ongoing war in the country, they continue to find opportunities for business creation and development.

This achievement is even more impressive given the fact that 55% of these companies have employees who are defending the country in the Armed Forces of Ukraine. In total, the Ukrainian fintech market employs approximately 14,400 people, which demonstrates the significant role of this sector in the national economy.

<sup>32</sup> Estimated revenue of global fintech in 2023 and 2030. *Statista*: website URL: <https://www.statista.com/statistics/1384016/estimated-revenue-of-global-fintech/> (Last accessed: 26.08.2024).

<sup>33</sup> Григораш О., Волошин І. Тенденції розвитку фінансових технологій під впливом пандемії та війни. *Економіка та суспільство*. 2023. № 47. DOI: 10.32782/2524-0072/2023-47-72.



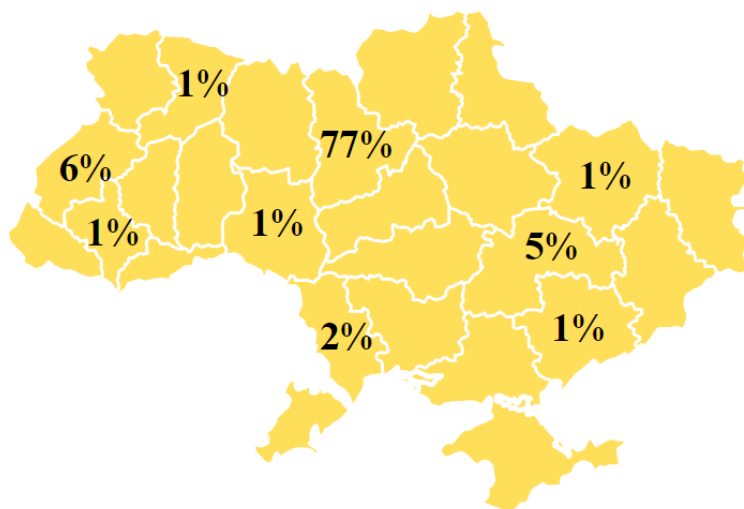
**Fig. 4. State of the fintech market in Ukraine in 2023<sup>34</sup>**

Estimates of the total volume of the Ukrainian financial technology market indicate that it reaches \$1 billion. It is worth noting that the majority namely 66% of fintech companies are financed exclusively from their own resources. Additionally, 10% of companies plan to attract investments of at least \$1 million during 2024, indicating ambitions for further growth and expansion of their capabilities. These figures emphasize the potential for future development of the Ukrainian fintech sector, even under extremely challenging conditions.

Most fintech companies are located in the city of Kyiv, with Lviv and Dnipro occupying the second and third places, respectively (Fig. 5).

<sup>34</sup> Український фінтех-каталог 2023: дослідження ринку фінансових технологій : веб-сайт. URL: <https://business.diaa.gov.ua/cases/iniciativi/ukrainskij-finteh-katalog-2023-doslidzenna-rinku-finansovih-tehnologij> (дата звернення: 26.08.2024).





**Fig. 5. Location of fintech companies by region of Ukraine<sup>35</sup>**

Technological infrastructure remains the leading sector for Ukrainian fintech startups for the third year in a row (Fig. 6). Its influence continues to grow: in 2023, 24% of companies chose this direction, compared to 22% in 2021 and 20% in 2020. The increasing popularity of innovation in this field can be partly attributed to the favorable trend of conducting business in the online environment, which boosts demand for companies providing IT solutions for financial institutions and banks, helping them implement or expand their digital presence.

The second place is occupied by payment services and transfers, which account for 14% of companies. This figure has significantly decreased compared to previous years (19% in 2021), primarily due to the full-scale invasion, which not only significantly worsened working conditions for payment companies but also caused serious disruptions for many market participants. In particular, during the first months of the war, economic activity sharply decreased, and numerous restrictions and limits were imposed on most financial transactions, significantly impacting the payment sector<sup>36</sup>.

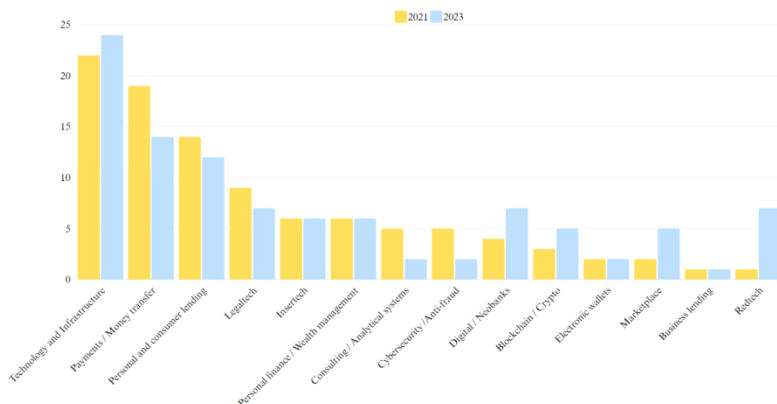
<sup>35</sup> Український фінтех-каталог 2023: дослідження ринку фінансових технологій: веб-сайт. URL: <https://business.dii.gov.ua/cases/initiativi/ukrainskij-finteh-katalog-2023-doslidzenna-rinku-finansovih-tehnologij> (дата звернення: 26.08.2024).

<sup>36</sup> Кравчук Н. Я., Луцишин О. О. Фінансовий ринок України під час війни: реалії функціонування. *Світ фінансів*. 2022. № 4(73). С. 112–128.

Third place in the Ukrainian fintech sector is occupied by consumer and personal lending, chosen by 12% of companies. Notably, this area of activity, despite facing numerous challenges, has not experienced a significant decline over the past three years. In 2023, this segment saw a 2% decrease compared to 2021. Although the war impacted the operations of companies in the consumer credit sector, they continue to remain active in the market.

Additionally, there has been significant growth in fintech companies within the regulatory sphere, with an increase from 1% in 2021 to 7% in 2023. The share of neobanks also grew, from 4% to 7%. This trend reflects the real situation in the country: many Ukrainians actively utilize fintech tools for transferring funds, particularly through non-banks. This has become especially relevant with the substantial rise in transfers from abroad due to the large number of refugees. Moreover, the population continues to rely on credit services, and the country's digitalization process, including in the public services sector, is rapidly gaining momentum.

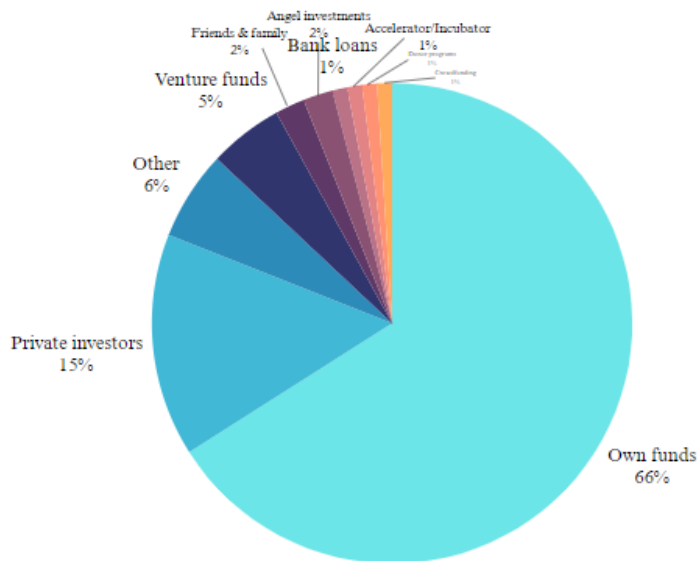
These trends underscore the significant role financial technologies play in the market. On one hand, they enhance the level of service for participants in financial relations, and on the other hand, they contribute to qualitative changes in the financial sector overall. At the same time, the issue of financial support for the fintech market remains relevant, as continued growth and development will require sustained investment and resources.



**Fig. 6. Distribution of fintech companies by spheres of activity<sup>37</sup>**

<sup>37</sup> Український фінтех у 2023 році: стан, виклики і перспективи : веб-сайт. URL: <https://speka.media/ukrayinskii-fintex-u-2023-roci-stan-vikliki-i-perspektivi-plr1dv> (дата звернення: 26.08.2024).

According to information<sup>38</sup>, among the sources of financing of fintech companies in 2023, 66% consisted of own funds (Fig. 7), and 33% had already attracted investments earlier; half of them used funds for operating expenses. The second most important source of financing was investments from private investors, which provided 15% of the total volume of financing in 2023.



**Fig. 7. Sources of funding for fintech companies in 2023<sup>39</sup>**

We agree with the opinion of T. Solodzhuk, R. Shchur and V. Dryslyuk,<sup>40</sup> regarding the fact that the active participation of the National Bank of Ukraine, which not only acts as a regulator, but also plays a significant role in the development of fintech and initiates and supports the development of fintech projects. With his assistance, the “Strategy for the Development of the Financial Sector of Ukraine until 2025” was approved<sup>41</sup>,

<sup>38</sup> Український фінтех 2023 : веб-сайт. URL: <https://ain.ua/2023/06/21/ukrayinskyy-finteh-2023/> (дата звернення: 26.08.2024).

<sup>39</sup> Український фінтех 2023 : веб-сайт. URL: <https://ain.ua/2023/06/21/ukrayinskyy-finteh-2023/> (дата звернення: 26.08.2024).

<sup>40</sup> Солоджук Т., Щур Р., Дрислюк В. Ринок фінансових технологій (фінтеху) в Україні: стан та перспективи розвитку. *Економіка та суспільство*. 2023. № 56. DOI: 10.32782/2524-0072/2023-56-160.

<sup>41</sup> Стратегія розвитку фінансового сектору України до 2025 року. *Національний банк України* : веб-сайт. URL: [https://bank.gov.ua/admin\\_uploads/article/Strategy\\_FS\\_2025.pdf?v=4](https://bank.gov.ua/admin_uploads/article/Strategy_FS_2025.pdf?v=4) (дата звернення: 16.08.2024).

which provides for the development of the market of financial and digital technologies as one of the strategic directions. As part of this strategy, the National Bank of Ukraine and the financial community have identified several main tasks, in particular:

- transition of most market participants to open banking standards and implementation of remote identification and verification tools;
- increasing the share of non-cash payments using payment cards to 85% of the total number of transactions;
- launching a regulatory "sandbox" and testing 16-20 innovative products per year;
- balanced development of all areas of fintech;
- expanding the use of innovative technologies in the processes of supervision and regulation;
- joining the National Bank of Ukraine to the Global Financial Innovation Network (GFIN) through participation in the “global sandbox”<sup>42</sup>.

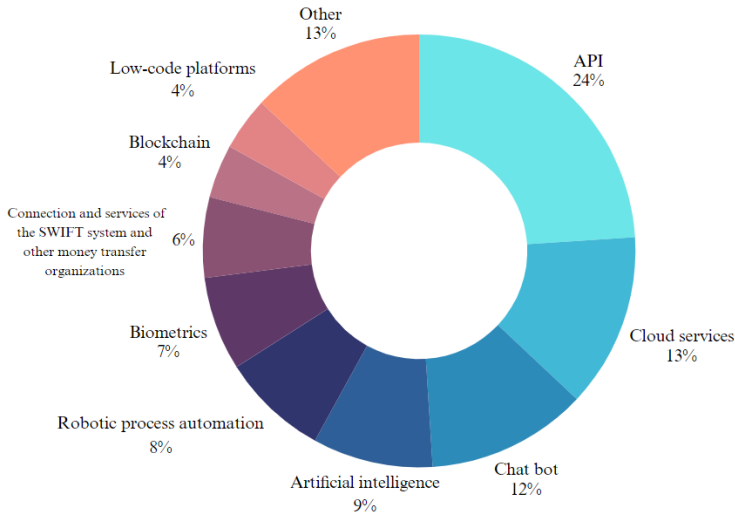
Currently, the most widely used technology among Ukrainian fintech companies is ARI (24% of the total), which indicates its importance for integration and interaction with various financial systems (Fig. 8). The second and third places are respectively occupied by cloud services (13%) and chatbots (12%), and artificial intelligence with a value of 9% occupies the fourth place. However, as can be seen from Figure 4.79% of companies see great potential in the use of artificial intelligence. They believe that artificial intelligence will become one of the main technologies for the future development of the financial sector in Ukraine, as it opens up new opportunities for automation, data analysis and increasing the efficiency of financial operations.

The development of financial technologies in Ukraine brings numerous advantages to the financial market but also introduces significant challenges and risks that can impact the stability and security of its functioning. The main concerns, in our view, are as follows:

– *Dependence on Personal Data*. The effectiveness of fintech services relies heavily on access to vast amounts of customer personal data and information about their financial transactions. This data is collected and processed using Big Data technologies and open banking APIs, which poses risks to customer privacy and security. Potential leaks or misuse of this data could lead to serious consequences for both individual customers and the entire financial market.

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<sup>42</sup> Стратегія розвитку фінтеху в Україні до 2025 року : веб-сайт. URL: <https://bank.gov.ua/ua/files/DDWIAwXTdqdClp> (дата звернення: 26.08.2024).



**Fig. 8. Main Technologies of Fintech Companies in Ukraine**

– *Necessity of Inter-branch Connections.* Fintech companies often collaborate with other products and services to meet customer needs. This collaboration requires the transfer of personal data and financial assets between different systems, increasing the risk of losing control over this data and assets. The lack of proper regulation and standards in this area can lead to security breaches.

– *Lack of a Unified Security Standard.* Currently, there is no universally accepted standard for data exchange security in the fintech sector. Each company establishes its own protocols and security measures, creating heterogeneity and potential vulnerabilities in the overall fintech infrastructure. This complicates cooperation between different market players and increases risks for customers.

– *High Level of Cyber Threats.* Financial technology is one of the most attractive targets for cybercriminals. Hackers actively attack fintech services to obtain personal data, steal financial assets, or carry out fraudulent transactions. Each cybersecurity incident can have serious consequences for customer confidence in the fintech market and result in significant financial losses.

– *Regulatory Complications.* The rapid development of financial technology often outpaces legislative and regulatory initiatives. This leads to gaps in legal regulation, creating uncertainty for fintech companies and increasing risks for their activities.

Thus, while fintech development is an important driver of economic progress, it also carries certain risks that require attention and solutions from both the financial sector and regulatory authorities. Ensuring the security, confidentiality, and stability of financial technologies is essential for their continued successful development.

In addition, the ongoing war remains the primary threat to the development of the financial technology industry in Ukraine. Due to the full-scale invasion, 26% of fintech companies were forced to curtail their operations. However, thanks to the heroism of the Armed Forces of Ukraine, which halted the enemy's advance on Kyiv, where the vast majority of fintech companies are based, the stability of their operations was maintained, even amid regular power outages. An important indicator is that 96% of companies continued their activities after the war began, demonstrating the resilience of the Ukrainian fintech sector.

## **CONCLUSIONS**

The emergence of fintech was due to the qualitative and quantitative growth of information technologies, the desire of companies to increase the efficiency of their activities, as well as the change in consumer habits.

Currently, financial technologies are showing rapid development, which is the result of the introduction of innovative approaches in the provision of financial services. Fintech is a modern manifestation of the process of informatization of the financial sector and the economy in general, and it is increasingly integrated into traditional financial models.

The modern development of fintech is associated with the entry of non-financial companies into the market of financial services, which allows it to be interpreted as one of the directions of financialization of the economy. One of the main factors contributing to the growing influence of fintech on the market is its ability to quickly adapt to changes in the market environment and provide high quality customer service.

Today, fintech companies not only become an integral part of the global and national economy, but also significantly transform the financial services sector, offering innovative products that change traditional approaches to work in financial markets. At the same time, fintech faces a number of challenges, including the need to improve the regulatory framework and protect economic competition. In addition, ensuring cyber security is an important challenge, as the growing reliance on digital technologies increases the risks of cyber threats and fraud. Fintech companies must also adapt to today's conditions and the growing demands of customers who expect reliability, transparency and innovation from them.

The further development of fintech involves the gradual convergence of traditional and innovative financial institutions, which will lead to the fact that the tools and models inherent in fintech will become standard practice for the financial sector in general. This will mean the transition of fintech to a new stage of development, which can be called integral, when fintech innovations are fully integrated with traditional financial models.

Fintech in Ukraine shows a high potential for development, which is expressed in the growth of the number of companies and the scope of their activities. The main directions of further development of financial technologies in the country are the improvement of state regulation, improvement of fintech products, attraction of investments, as well as establishment of strategic partnerships with traditional participants of the financial market. These measures will promote financial inclusion, expand access to financial services and increase the overall efficiency of the financial system of Ukraine.

With this in mind, it can be argued that fintech will play an increasingly significant role in the financial sector, contributing to its evolution and the formation of a new, integrated financial ecosystem.

## **SUMMARY**

The chapter examines the stages of development of financial technologies, approaches to defining the essence of the concept of “financial technologies”, as well as the current state and prospects for the development of the fintech industry. Special attention is paid to the analysis of the main stages of fintech formation, from its birth to the modern period of integration with traditional financial institutions. Various approaches to the definition of the term “financial technologies” are considered, which allows for a deeper understanding of the essence and meaning of fintech in the modern financial environment, and the author's definition of this economic category is provided. The research focuses on issues arising in the field of fintech, in particular regarding regulatory, cyber security and economic competition in the field of fintech. The results of the study testify to the significant role of fintech in the transformation of the financial sector and its prospects for further development. The importance of improving the regulatory environment, developing new products, attracting investments and strengthening partnerships with traditional financial institutions is emphasized. The study proves that financial technologies will continue to play a decisive role in the formation of the new financial ecosystem, contributing to its innovative development.

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