

PhD in Economics Yaroslav Chaikovskiy, Associate Professor

Department of Banking Business, Ternopil National Economic University, Ternopil,
Ukraine

Yaroslava Kovalchuk, Student

Ternopil National Economic University, Ternopil, Ukraine

Modern fintech directions in the banking sector

Summary

The article defines the essence of the concept of «financial technology». Modern fintech trends in Ukraine and in the world are analyzed. Also, presents the most successful examples of the use of financial technologies in the banking sector in recent years. In addition, a number of areas for future research in the field of financial technology, which are currently very promising in the banking sector and could be launched in Ukraine and worldwide are offered.

Keywords

banks, financial technology, fintech, artificial intelligence, open banking, blockchain, mobile banking, Internet banking, banking services

Introduction

One of the factors behind structural changes in Ukraine's financial market is the increasing use of the Internet and mobile devices to provide financial services. There have been radical changes in technology that have affected not only the information sphere but also the economic sphere. The current technological revolution has also had a significant impact, including on the banking sector's infrastructure, which is associated with increased automation in bank operations and greater customer focus. For the most part, such transformations in the industry are associated with the need to reduce costs, improve the security of financial transactions, and ensure that the service industry is responsive to an ever-evolving society.

The purpose of the article is to determine trends directions of research of new financial technologies in the banking industry.

Radical changes in technology have affected not only the information sphere but also the economic sphere now. The current technological revolution has a significant impact, including on the banking sector's infrastructure, which is associated with increased automation in bank operations and greater customer focus. For the most part, such transformations in the industry are associated with the need to reduce costs, improve the security of financial transactions, and ensure that the service sector is consistent with an ever-evolving society.

That is why the research into the problems associated with the development of new financial technologies is extremely relevant.

Fintech development in the world

The latest technological revolution has affected not only the information sphere but also the economic one. Significant changes in the financial sector are associated with the need to reduce costs, improve the security of financial transactions, and ensure that the services sector is in line with the ever-evolving society. In the banking industry, financial technologies play an important role, enabling them to establish

new types of agreements and procedures in the classic banking business, such as lending, capital management, transfers, and payments.

Financial Technologies, often shortened to fintech, are generally financial services used in the creation and utilization of modern digital technologies. The Oxford Dictionary defines that fintech is “computer software and other technologies used to activate or support both banking and financial services”¹.

Fintech has spread to almost all markets in the world, but emerging markets are leading positions in their adoption by fintech. According to Ernst & Young’s research, China and India are leading, with an acceptance rate of 87 %. Russia and South Africa are slightly lower in the ranking, with an acceptance rate of 82%. Among developed countries, Ernst & Young stands out for the Netherlands, the United Kingdom, and Ireland; these countries are leading in adoption, which partly reflects the development of open banking in Europe².

Based on Ernst & Young’s statistics on the Global FinTech Adoption Index, the trend is increasing. Acceptance of fintech services has increased from 16 % in 2015 to 33 % in 2017 and reached 64% in 2019, meaning that recent data shows that 64% of consumers have used two or more financially technological services or platforms. This indicator turned out to be higher than expected and consumer awareness is even higher, with only 4% of global consumers unaware of at least one way to transfer money or pay for services³. With state-of-the-art hardware, software, and networks, fintech drives consumers to use more and more new developments.

Changes in the relationship of fintech companies with traditional financial institutions

Now we can observe changes in the relationship of fintech companies with traditional financial institutions. Previously, fintech companies were considered as their competitors and could pose a real threat in the future. However, the World FinTech Report 2018 noted that more than 75 % of fintech companies identify cooperation with traditional financial institutions as their primary goal⁴. Such cooperation will promote innovation and retain customer confidence on both sides; otherwise, scientists give disappointing forecasts to such firms.

It is safe to say that for the last 10 years have been the real golden breakthrough in fintech. Venture Scanner data shows that from 2008 to 2018, more than 2.8 thousand fintech startups had been launched in the industry (Fig. 1). As of 2019, most new fintech companies are in the banking and capital markets, while insurance is the second most favorable for fintech.

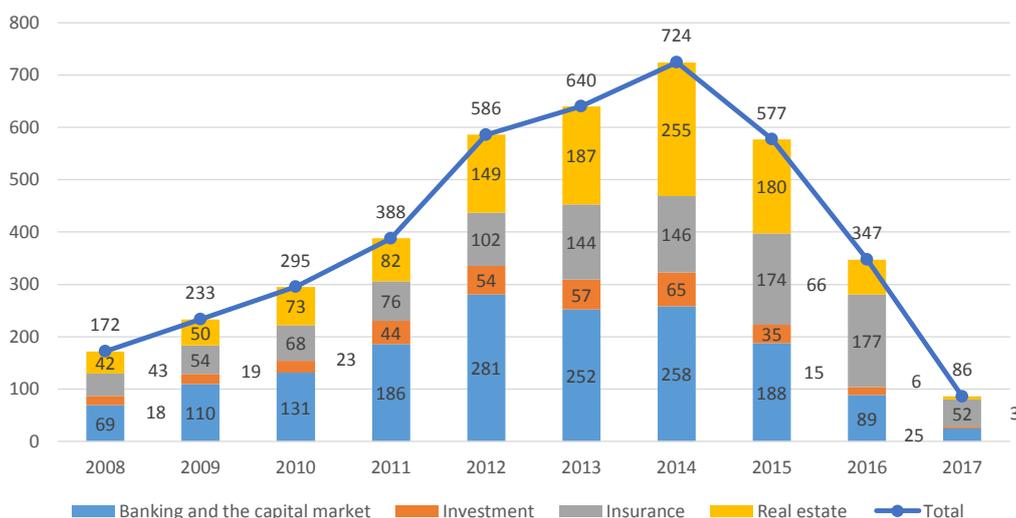


Fig 1. Number of fintech companies established during 2008-2017

¹ Oxford dictionary. FinTech.

² Ernst & Young. Global FinTech Adoption Index (2019).

³ Ernst & Young. Global FinTech Adoption Index (2019).

⁴ World FinTech Report 2018 (2019).

Source: own study based on statistical data from the official site of the Deloitte. Closing the gap in Fintech collaboration: Overcoming obstacles to a symbiotic relationship. Deloitte Center for Financial Services (2018).

We can note in Fig. 1 that 2014 was the peak in a number of established fintech companies, namely 724 companies were opened. Among the total number of new fintech companies, 258 companies were mostly founded in the banking and capital markets, and 255 companies in the real estate sector. Subsequently, starting in 2014, certain changes were gradually made related to the development of technologies, which enabled more rapid development of the insurance industry.

World Bank statistics for 2017 report that 68.5% of all adults in the world have their own bank account; it is not surprising that in developed countries this figure reaches 94 %. Among all adult bank account holders, every second (52 %) made or received at least one digital payment in 2016, and in developed countries, the user rate was 90.5 %⁵. Thus, it can now be argued that banking institutions, one of the most important and influential financial institutions in the world, are the major intermediaries in making digital payments.

Main fintech segments

In general, digital payments are currently ranked first in transaction value among all fintech segments (Fig. 2). Lending and management of personal finance are considerable, but the most rapid growth is observed in the latter. In 2018, the value of transactions in this segment increased by more than 108% compared to the previous year⁶. In the future, it is predicted that a similar trend will continue in the future.

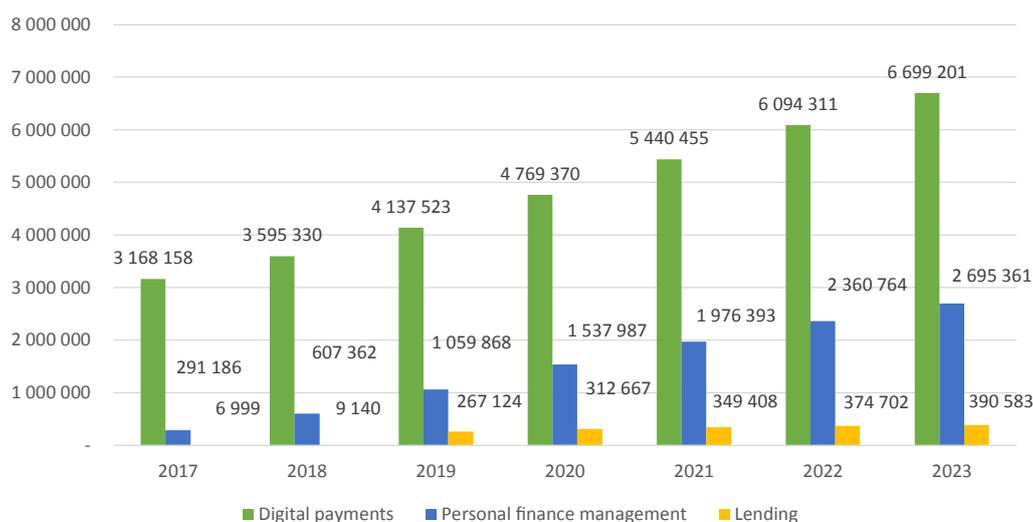


Fig 2. Major fintech transaction value segments (2017-2018 and forecast for 2019-2023), US \$ million

Source: own study based on statistical data from the official site of the Statista.

We are still in the very early stages of true fintech, with technology companies improving their financial services every year, as well as creating new market structures in countries with underdeveloped banking infrastructure. Increasing the role of fintech in the financial market forces traditional financial institutions to collaborate with fintech companies, on the other hand, fintech participants are also interested in sharing the latest technology with banks for financial gain. Unambiguous leaders in the market are companies, including banks, which provide new, digital banking services and integrate services of digital payments (Digital Payments), Robo-consulting (Robo-Advising) and other fintech-solutions.

⁵ World Bank Group. Account ownership at a financial institution or with a mobile-money-service provider, richest 60% (% of population ages 15+).

⁶ Statista.

Areas of development and implementation of FinTech in the banking sector

From banking practice, it should be noted that in 2017, 91.3% of banks planned to cooperate with fintech companies⁷. This indicator is quite high, which indicates that the vast majority of banks are aware of the importance of fintech companies in the financial services market.

Having analyzed the various fintech studies, we can now identify quite a few areas of development and implementation of fintech in the banking sector, but the most successful examples of the use of financial technologies in recent years were:

- artificial intelligence;
- open banking;
- blockchain;
- mobile banking.

Artificial Intelligence (AI) is one of the promising directions for further development of information systems and financial technologies. One of the most important emerging technologies is machine learning (ML), natural language processing (NLP), and natural language generation (NLG). These technologies are based on learning algorithms that improve themselves by collecting and analyzing huge amounts of data.

The banking industry is a leading industry that is currently focused on the development and integration of artificial intelligence for a multitude of tasks. Autonomous Research, as an independent research organization in the financial sector, reported that by 2030, the banking industry expects to save about \$ 1 trillion through artificial intelligence⁸.

The introduction of artificial intelligence will allow institutions to reduce costs, increase efficiency and revenue, improve productivity and quality of services provided. In addition, artificial intelligence allows you to move to a more personalized service delivery, that is, based on the information received about the client, you can more successfully offer him certain services. One of the most sought after areas of artificial intelligence is robotics consulting because besides the fact that it can be used for a variety of purposes, such as fraud prevention or risk management, this type of service is much cheaper than traditional financial consulting.

An example of the successful use of robotics consulting is Bank of America, which offers voice and text messaging services provided by Eric's Chabot to its clients. Back in 2016, Bank of America introduced Eric as a virtual assistant who uses predictive analytics and cognitive messaging to provide round-the-clock assistance to more than 45 million bank customers. Bank of America has reported that as of March 2019, Eric has over 6 million active users and is growing⁹.

An open banking system has a similar purpose to customer orientation. The essence of this direction is to use the Application Programming Interface (API) to allow third party (developers) to access the banking data of clients (with their consent). The main purpose of open banking is to improve customer service and to create new programs and services based on customer data.

According to the World Retail Banking Report 2017, over 78 % of banks and about as many fintech companies were planning to use the API to improve the quality of their services. Most of them were also convinced that APIs would greatly help them channel new revenue streams¹⁰.

In addition, the European Parliament initiated the adoption of APIs in the banking sector back in 2015 with the introduction of new banking rules known as the European Union Payment Services Directive 2, or PSD2. In order to comply with the law, European banks need to move from legacy software to an API-based interface that include robust security features. As of September 14, 2019, PSD2 has become operational.

⁷ Statista.

⁸ Autonomous Research.

⁹ The official site of the Bank of America.

¹⁰ World Retail Banking Report 2017 (2018). URL: <https://www.efma.com/assets/content/study/2017/World%20Retail%20Banking%20Report%202017%20summary.pdf>. [20/4/2020].

Ukraine, as an associated member of the European Union, will not be able to circumvent these changes in the banking sector¹¹.

Blockchain is still considered as one of the most important innovative technologies in various industries, the financial services industry is no exception. In general, in the banking sector, blockchain will allow you to track every transaction and allow you to retrieve accurate information from anywhere in the network. Adoption by the banking institutions of this technology will allow them to make payments faster and more accurately, in addition, significantly reduce their cost.

At present, banking institutions are in the early stages of adopting a blockchain, focusing either on developing their own blockchain strategy or working on the evidence of blockchain performance as a whole.

Blockchain technology was first tested at Bank of Ayudhya PCL in Thailand. There, in 2017, they conducted a successful pilot test of real-time international transfer from Thailand to Singapore using advanced Krungsri Blockchain Interledger technology. This test was conducted jointly with MUFG Bank, Mitsubishi Corporation and Standard Chartered Bank in Singapore. The innovation has helped Mitsubishi significantly improve its liquidity management efficiency and reduce cost management¹².

It is impossible to notice that world banking is changing. New technologies, including the aforementioned ones, are changing not only the way money is managed but also the banking business itself. Now, there is a partial transition from traditional banking to digital.

Three main factors explain the growth of this trend. Firstly, mobile banking is more convenient and helps to save time, because all the necessary services are always at hand. Secondly, it is quite affordable because 65% of the world's population has a smartphone. Third, mobile applications simplify and reduce the cost of completing a transaction, thereby reducing bank costs¹³.

Currently, it is expected that by 2022 customer visits to retail banking will decrease by 36%, while mobile transactions will increase by 121 % and account for 88 % of all banking operations¹⁴.

There are already dozens of alternatives to traditional banking institutions. For example, fully digital banks are completely innovative, banks that do not have physical branches are called neobanks. The first twists were Simple and Moven, both American banks. In Europe, leaders are Monzo and N26 from the UK and Germany respectively¹⁵. This trend is only gaining momentum in the world; however, according to Finder in the UK, 9 % of adults have already opened an account in neobanks¹⁶.

Fintech development in Ukraine

In Ukraine, despite the small banking market, there is now only one partially non-bank called Monobank. Although Monobank was developed as a stand-alone product concept, it was eventually launched based on the classic commercial bank Universal Bank. The success of this project is indicated by the fact that at the beginning of 2019, in just over 2 years, the number of clients of their mobile bank reached 1 million¹⁷.

Ukraine has not shied away from the significant development of financial technology. This has been especially noticeable over the last four years when more than 100 companies have been active in the market as of 2019. These include startups and more mature service providers.

Payments and money transfers are the largest market segment among Ukrainian fintech companies, as more than 30% of all start-ups work in this field (Fig. 3). However, since the beginning of 2018, they have not

¹¹ European Parliament.

¹² Krungsri becomes the first bank in Thailand offering real-time international funds transfer based on Blockchain's Interledger for corporate customers.

¹³ Fintech Trends that will Transform Banking and Financial Services in 2019.

¹⁴ Branches In Decline: Last One Out, Turn Off The Lights.

¹⁵ Top 5 Innovations in Banking Application Development: From Challenges to Opportunities.

¹⁶ Digital banking adoption.

¹⁷ The official site of the Monobank.

shown much interest in this area. The situation is similar with regard to blockchain technology; in 2017 and 2018, only two companies were established in this field in Ukraine¹⁸.

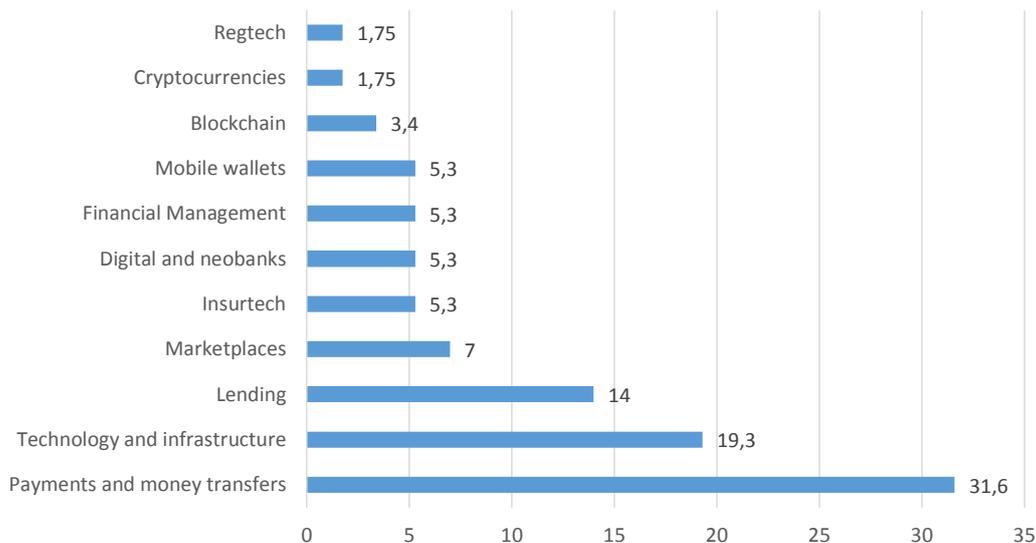


Fig 3. Distribution of fintech companies in Ukraine in 2018, %

Source: own study based on statistical data from the Fintech in Ukraine: trends, market overview and catalog.

Instead, technological areas such as consulting and analytical systems have been quite popular over the last three years. It is more likely that this trend will continue in the future, as analytics services become increasingly popular with big data and artificial intelligence¹⁹.

Areas for future research in the field of financial technology, which are now quite promising for the banking industry

It is worth highlighting a number of areas for future research in the field of financial technologies, which are currently quite promising for the banking industry (Tab. 1).

Tab 1. The proposed directions of financial technologies for future research

Fintech categories	Suggested directions in the appropriate category
Payments	Data transfer technologies, cyber security, and analytical methods of payment.
Consulting services	Internet of Things, Artificial Intelligence, Machine Learning, Augmented Reality (AR), Virtual Reality (VR), Mixed Reality (MR), Big Data, Advanced Algorithms, and Automation.
Financing	Mobile-related technologies, CSCW (computer sharing), AI, machine learning, big data, advanced algorithms, and automation.

Source: own study based on statistical data from Leong, K., Sung, A., FinTech (Financial Technology): What is It and How to Use Technologies to Create Business Value in Fintech Way? Int. J. Innov. Manag. Technol. 2018, 9(2), 74-78.

In terms of payment aspects, non-cash payment is a key trend in this direction, especially for the banking sector. It is suggested that research be conducted on how to improve the process in terms of user-friendli-

¹⁸ Ukrainian Fintech Catalog 2019.

¹⁹ Ukrainian Fintech Catalog 2019.

ness, efficiency, and safety²⁰. For example, an empirical study²¹ compared the functionality of Quick Pay and Union Pay. The conclusion suggests that Quick Pay is more popular than Union Pay since Quick Pay has better performance in terms of ease of access, ease of use, reputation and reliable protection.

When it comes to transferring security, it is worth mentioning about blockchain technology, this topic is not new, but it is quite actively studied, and there is a lot of research on various techniques and possibilities of using this technology. For example, a decentralized smart contract system called Hawk, based on blockchain technology is used to protect the personal data of users²².

With regard to consulting services, they provide suggestions to users according to a set of rules and criteria. In the financial field, financial consulting covers services such as investment advice, asset management consulting, insurance services, customer support for management decisions, and banking consulting.

Financial technology has made a significant leap in the consulting services sector. Developing the Internet of Things, Artificial Intelligence, Machine Learning, Big Data, Advanced Algorithms, Automation, and more are new directions for future research in this area. In addition, future research should be linked to improved personalization of service delivery, cost reduction, flexibility, and process automation, improved user experience, etc.²³.

Financing means any act of obtaining funds from various sources for financial activities. There are various traditional sources of financing, such as family and bank loans, venture capital, franchising, government funds, stock markets, bonds, and more. Fintech developments now offer many new alternative ways of financing that is, funding channels that go beyond traditional systems.

When it comes to FinTech banking finance developments, mobile-related technologies, such as online banking and non-banking, are of particular importance. In addition, future developments in financial technology should generally or indirectly relate to improving the information exchange process, reducing transaction costs and providing new financing alternatives²⁴.

The rapid growth rate of fintech has conflicting effects on the financial services market. On the one hand, fintech is modernizing the financial system and providing new opportunities for consumers and employers in the market. On the other hand, there is a breach of the current traditional system of finance, as well as customer service models, which forces traditional players to adapt to new market conditions.

One of the main factors of adaptation in the future is the cooperation of all market participants. For banks, this is primarily an increase in competitiveness and for fintech companies, it is a way to integrate their own fintech solutions into an already working sphere and properly target them to customers²⁵. It is also a well-known fact that financial services are one of the most regulated industries in the world, so regulatory issues for fintech companies have a serious impact. Instead, cooperation with banking institutions has significantly simplified technological integration and become more widespread.

In addition, financial technologies can also be useful for regulators themselves. As most technologies are more consumer-oriented, they are in close contact with the banking community and its needs. Such exchange of information between regulators and financial institutions that use fintech, including between banking institutions, may increase the regulator's awareness of consumers' habits, behavior, and desires²⁶.

²⁰ McWaters, R., The future of financial services: How disruptive innovations are reshaping the way financial services are structured, provisioned and consumed, World Economic Forum 2015.

²¹ S. Wang, J. Fan, M. Zhang, An empirical study on the impact of perceived benefit, risk and trust on e-payment adoption: Comparing quick pay and union pay in China, Proc. 2015 7th International Conference on Intelligent Human-Machine Systems and Cybernetics, 2015.

²² A. Kosba, A. Miller, E. Shi, Z. Wen, C. Papamanthou, Hawk: The Blockchain Model of Cryptography and Privacy-Preserving Smart Contracts. Proceedings of the Symposium on Security and Privacy; SP'16; 2016, May 22-26; San Jose, CA, USA. URL: <https://eprint.iacr.org/2015/675.pdf>. [20/4/2020]

²³ K. Leong, A. Sung, FinTech (Financial Technology): What is It and How to Use Technologies to Create Business Value in Fintech Way? Int. J. Innov. Manag. Technol. 2018, 9(2), 74-78.

²⁴ Ibidem.

²⁵ A. Strange, A. Rampell, Using "infection points" to overcome fintech startup distribution challenges. Andreessen Horowitz, 2016, May.

²⁶ D. Lockton, D. Harrison, N.A. Stanton, The design with intent method: A design tool for influencing user behaviour. Applied Ergonomics. 2010, 41(3), p. 382.

Also important in the field of fintech is security, especially for banking institutions, they need to combat the widespread misconceptions about the security and reliability of user data on which their products are based. They need to build trust with consumers and partners and create innovative intervention mechanisms to achieve the desired outcome²⁷.

Conclusions

Based on the analysis of the development and current state of banking innovations in Ukraine in the current conditions, we can draw the following conclusions:

1. Financial technologies, in the general sense - financial services in the course of creation and use of which modern digital technologies are used; Often targeted at mobile devices to improve the efficiency of the financial system as a whole.

2. Changes in the relationship between fintech companies and traditional financial institutions are now underway. Most fintech companies identify cooperation with traditional financial institutions as their primary goal. Such cooperation will promote innovation and retain customer trust in both parties.

3. Analyzing the diverse research areas of fintech development and implementation in the banking sector, we can consider artificial intelligence, open banking, blockchain, and mobile banking as the most appropriate and widespread areas of application of financial technologies in recent years in the world.

4. In Ukraine, over the last four years, the largest market segments among Ukrainian fintech companies have been occupied with technological areas, as well as payments and money transfers.

5. Financing, various consulting services, and payments - these can now be considered as one of the most promising areas for future research in financial technology.

References

- Oxford dictionary. FinTech. Retrieved from: <https://en.oxforddictionaries.com/definition/fintech>.
- Ernst & Young. Global FinTech Adoption Index (2019). Retrieved from: <https://fintechausensus.ey.com/2019/Documents/ey-global-fintech-adoption-index-2019.pdf>.
- World FinTech Report 2018 (2019). Retrieved from: <https://www.capgemini.com/wp-content/uploads/2018/02/world-fintech-report-wftr-2018.pdf>.
- Deloitte. Closing the gap in Fintech collaboration: Overcoming obstacles to a symbiotic relationship. Deloitte Center for Financial Services (2018). Retrieved from: <https://www2.deloitte.com/content/dam/Deloitte/pl/Documents/Reports/pl-fsi-fintech-collaboration.pdf>.
- World Bank Group. Account ownership at a financial institution or with a mobile-money-service provider, richest 60% (% of population ages 15+). Retrieved from: <https://data.worldbank.org/indicator/FX.OWN.TOTL.60.ZS?end=2017&start=2011&view=chart>.
- Statista. Retrieved from: <https://www.statista.com/>.
- Autonomous Research. Retrieved from: <https://www.autonomous.com/>.
- The official site of the Bank of America. Retrieved from: <https://www.bankofamerica.com/>.
- World Retail Banking Report 2017 (2018). Retrieved from: <https://www.efma.com/assets/content/study/2017/World%20Retail%20Banking%20Report%202017%20summary.pdf>.
- European Parliament. Retrieved from: <https://www.europarl.europa.eu/portal/en>.
- Krungsri becomes the first bank in Thailand offering real-time international funds transfer based on Blockchain's Interledger for corporate customers. Retrieved from: <https://www.krungsri.com/bank/en/NewsandActivities/Krungsri-Banking-News/blockchains-interledger.html>.
- Fintech Trends that will Transform Banking and Financial Services in 2019. Retrieved from: <https://perfectial.com/blog/fintech-trends-2019/>.

²⁷ M. Bofondi, G. Gobbi, The big promise of fintech. *European Economy* 2017, 2:107–119.

- Branches In Decline: Last One Out, Turn Off The Lights. Retrieved from: <https://thefinancialbrand.com/66228/bank-credit-union-branch-traffic/>.
- Top 5 Innovations in Banking Application Development: From Challenges to Opportunities. Retrieved from: <https://djangostars.com/blog/banking-application-development/>.
- Digital banking adoption. Retrieved from: <https://www.finder.com/uk/digital-banking-adoption>.
- The official site of the Monobank. Retrieved from: <https://www.monobank.com.ua/>.
- Fintech in Ukraine: trends, market overview and catalog. Retrieved from: https://data.unit.city/fintech/fgt34ko67mok/fintech_in_Ukraine_2018_ua.pdf
- Ukrainian Fintech Catalog 2019. Retrieved from: <http://drive.fintechua.org/FintechCatalog19Ukr.pdf>.
- Leong, K., Sung, A. (2018) FinTech (Financial Technology): What is It and How to Use Technologies to Create Business Value in Fintech Way? Int. J. Innov. Manag. Technol. 9(2), 74-78. Retrieved from: <http://www.ijimt.org/vol9/791-M775.pdf>.
- McWaters, R. (2015). The future of financial services: How disruptive innovations are reshaping the way financial services are structured, provisioned and consumed, World Economic Forum. Retrieved from: http://www3.weforum.org/docs/WEF_The_future_of_financial_services.pdf
- Wang, S., Fan, J., Zhang, M. (2015) An empirical study on the impact of perceived benefit, risk and trust on e-payment adoption: Comparing quick pay and union pay in China, Proc. 2015 7th International Conference on Intelligent Human-Machine Systems and Cybernetics.
- Strange, A., and Rampell, A. (2016). Using "infection points" to overcome fintech startup distribution challenges. Andreessen Horowitz, May. Retrieved from: <https://a16z.com/2016/05/06/infection-points-fintech-distribution/>.
- Lockton, D., Harrison, D., Stanton, N. A. (2010). The design with intent method: A design tool for influencing user behaviour. Applied Ergonomics. 41(3), 382–392.
- Bofondi, M., Gobbi, G. 2017. The big promise of fintech. European Economy 2:107–119. Retrieved from: http://european-economy.eu/wp-content/uploads/2018/01/EE_2.2017-2.pdf#page=109.

Nowoczesne kierunki technologii finansowej w sektorze bankowym

Streszczenie

W artykule przedstawiono koncepcję technologii finansowych. Przeanalizowano współczesne trendy tych technologii zarówno na Ukrainie, jak i na świecie. Zaprezentowano również najlepsze praktyki wykorzystania technologii finansowych w sektorze bankowym w ostatnich latach. Ponadto zwrócono uwagę na możliwości uruchomienia wielu obszarów przyszłych badań na Ukrainie i na świecie w dziedzinie technologii finansowej, które są obecnie bardzo obiecujące w branży bankowej.

Słowa kluczowe

banki, technologia finansowa, fintech, sztuczna inteligencja, otwarta bankowość, blockchain, bankowość mobilna, bankowość internetowa, usługi bankowe