INFORMATION AND INNOVATIVE TECHNOLOGIES IN THE TURBULENCE ERA

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INFORMATION AND INNOVATIVE TECHNOLOGIES IN THE TURBULENCE ERA

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2.5. INNOVATIVE TECHNOLOGIES IN BANKING ACTIVITIES AS THE DRIVING FORCE OF THE EFFICIENT FUNCTIONING OF THE BANKING MARKET

In the conditions of a market economy, commercial banks, as institutions that carry out effective redistribution of financial resources, occupy one of the key places in the state's activities. Thanks to them, temporarily free funds are mobilized in the most profitable areas of the enterprise, which ultimately leads to economic growth and improvement of the standard of living in the country as a whole.

In the conditions of serious technological innovations, commercial banks face new challenges, both in terms of improving the level of service quality and creating qualitatively new products in general. Although commercial banks are quite conservative institutions, fierce competition in the market forces them to take active actions in this direction.

Today, information technologies are an integral part of the activity of commercial banks, and create a new basis for the provision of banking services. Already now, hundreds of companies are emerging on the financial and banking markets of Ukraine that combine financial and banking activities with information technologies, which has become the key to acquiring new customers and effective communication with them. The study of this topic will make it possible to better understand the impact of information technologies on the activities of commercial banks, and to determine the main directions of such activities.

The issue of research on the development of innovations in banking Kyiv sphere dedicated work such scientifictsiv, as S. Egorycheva, I. Balobanov, I. Kryvych, V.Tkachuk, V. Vykulov, O. Merenkova, O. Hlushchenko.

Successful banking requires constant changes and innovations. First, banks constantly interact with clients and must preserve and increase the capital of their clients, offer them new ways to expand their business activities and increase profitability.

Secondly, there is a lot of competition between banking institutions, which forces banking organizations to constantly change and modernize their policies, to adapt to rapidly changing economic conditions. The introduction of innovations is a necessary condition for the stability and competitiveness of domestic banks.

Possible to single out a number of reasons that make it necessary to introduce innovations in banking activity:

1) ensuring the profitable operation of the bank in the long term;

2) increasing operational efficiency, which in modern conditions requires the introduction of process innovations, which helps to reduce the costs of performing certain operations while simultaneously improving the quality of service;

3) the ability of the banking institution to generate new streams of income as a result of the introduction of innovative products, high quality customer service, which is ensured by the implementation of innovative solutions, which qualitatively distinguishes the bank from competitors;

4) compliance with the requirements of state regulation of banking activity, which is aimed at ensuring the stable and reliable functioning of the banking system by controlling the risks assumed by commercial banks as financial and credit intermediaries;

5) the desire of financial and credit institutions to create and maintain the image of a modern, dynamic institution that is sensitive to changes in the needs of clients, is interested in solving their financial problems, provides affordable and comfortable service;

6) significant changes in the structure and nature of the needs of consumers of financial services that have occurred in recent decades.

Innovation literally means "investment in innovation".

Innovations operating in the financial sphere are financial innovations. Banking innovation is part of financial innovation.

Banking innovation is the final result of the bank's innovative activity implemented in the form of a new banking product or transaction.

Regarding the definition of the concept of "banking innovation", it should be noted that it does not have a clear single definition in the modern literature, therefore it is appropriate in the Table. 1 consider the most well-known approaches[554].

Table 1. Approaches to defining the concept of "banking innovation"

Author	Treatment concept "banking innovation"
I. Balabanov, A. T. Honcharuk, V. Borovkov	It realized in form new banking product or services terminal resultinnovative activity the bank
O. Lavrushin	A synthetic concept of the bank's activity, which is aimed at obtaining additional revenues in the process of creating favorable conditions for the formation and placement of resources potential through the implementation of innovations that contribute to customers in Manny profits
S. Yakovenko, I. Timchenko	Methods of institutional organization of banking processes and models of their behavior in modernnome financial the world what find own expression in appearance new ones banking technical nology, services, products, targeted on growth efficiency activity commerce- foot the bank and her social component
V. Tkachuk	The final result of the process of modernization of all aspects of the bank's activities, which consists in improved banking services, business processes, service, organization, management and marketing with purpose achievement competitive advantages on market.
S. Egorycheva	In a narrow sense, banking innovation is the introduction of new or significantly improved completed banking products and services, which answer available or potential financial needs of clients, the bank's own interests and banking requirements legislation, provide interested parties additional benefits and is by the resultsbanking engineering In a broad sense, banking innovation is a process of creating additional value for customers, employees and owners the bank by introduction quality changes in everyone spheresits activities, namely products, services, processes, business models and strategies that became as a result practical implementation new ones ideas of knowledge and outsider experience
I. Kryvych	The final result of the innovative activity of the bank, which was implemented in the form of new or improved banking product or services, which implemented in practicetic activity.
V. Vykulov	Creation banking product, what owns more attractive consumer ownactivities comparatively from proposed before, or qualitatively new product, capablesatisfy the previously unmet needs of its potential buyer, or use cheap more perfect technologies creation that same banking product
O. Merenkova	Innovation in banking activities, which are characterized higher technologicallevel and new ones consumer qualities
N. M. Matviychuk	defines banking innovation as "a synthetic concept of the bank's activity in the field of innovative technologies, aimed at obtaining additional income in the process of creating favorable conditions for the formation and placement of resource potential with the help of innovations that help customers in obtaining profit"

Summarizing all of the above, we can conclude that banking innovation is the result of the bank's activity aimed at creating new products and technologies, as well as innovative methods of managing a banking institution in order to obtain additional income and competitive advantages.

Therefore, the concept of banking innovation can be applied to any innovations in all spheres of the bank's functioning, which makes it possible to achieve – a certain positive economic or strategic effect (increase in the client base, increase in market share, reduction of costs for conducting certain types of operations, etc.).

At the same time, as a new product or service, banking innovation manifests itself only in the process of its implementation on the financial market or within the bank, and the demand for an innovative banking product or service determines its degree of novelty[555].

The following are the main areas of innovation in the banking sector.

1) breakthrough innovations – improvement of existing banking services and products, development of new types of products, services, processes or technologies;

2) strategic innovations – development and implementation of innovative marketing strategies;

[554] Ryabokin M. V. (2018) Banking innovations as a necessary condition for increasing the bank's competitiveness on the financial market

[555] Hlushchenko O., Tkachenko M. (2012) Modern trends in the development of banking innovations.

3) technological innovations – innovations related to changes in internal banking processes, provision of services to clients;

4) structural innovations – the transformation of the bank's structure or the change of its individual elements to increase the efficiency of operation.

The main external factors that determine the directions of innovations in banks are the globalization of financial markets, which causes the transition to a more homogeneous financial market; the liberalization of national financial markets, which causes the emergence of new competitors that are not banks; information and communication globalization.

Under the influence of these factors, such innovations as the creation of new banking products based on the development of information technologies are taking place in the banking system of foreign countries; active development of virtual banking services (electronic signatures and accounts, banks and exchanges); use of information technologies for new marketing activities; new methods of internal control and audit; creation of new and improved functional machines for self-service Classifications of banking innovations are given in Table 2[556].

Table 2. Kinds banking innovations

Sign	View	Explanation / example
By degree implementation innovativepotential	Innovations efficiency	"Electronic turn", "Credit factory" (occuroptimization and automation available services and processes).
	Technological innovations	Mobile online bank, internet banking (are created new ones products and services).
For the reasons of emergence	Spontaneous	Deposit programs.
	Strategic	Introduction banks to Master Card.
	On perspective	Privat Assistance (informational support, technical help, consulting).
	Operative	Programs lending
By by type novelties	First level innovations	Brand new banking products and services that don't have analogues on the world or national bank market.
	Second level innovations	New banking products and services that appeared on the national nal market, which already have analog on market others countries
	Third level innovations	New ones banking products and services in within the framework individual the bank
By characterneeds	Demand innovations	Reply on requests customers
	Innovations offers	They arise with initiatives banks
In their place application	Innovations for back-office	Unit, which provides work department, managers act- you and liabilities companies
	Innovations for middle-office	They answer by interaction back-office and front-office.
	Innovations for front-office	Units in organization, what answer by work with customers
By functionalcontent	For management	Interactive video systems
	Production	Virtual around the clock banks (Chase Manhattan Bank).
	Structural	Substitute structures the bank
	Intellectual	Using network marketing
	Financial	SWOP operations.
By content	Product	Introduction new product
	Process	Improvement technologies.
For quality characteristics	Radical	Creation plastic cards
	Modified	Improvement programs lending
	Combined	Terminal.
Depending from pace implementation	Fast	Internet banking.
	Slow down	Automation services
	Leap-like	Deposit programs.
	Uniform	Plastic cards
By level costs	Low cost	New ones services
	High cost	New ones technologies.
Depending onobject	Internal banking	Own banking products
	Non-banking	ATM, plastic cards

[556] Ryabokin M. V. (2018) Banking innovations as a necessary condition for increasing bank competitiveness in the financial market .

Considering banking innovations, it is worth highlighting the following areas of their introduction:

- product innovations – consist in the development of new or modification of existing banking products;
- process innovations, reflecting the improvement of banking business processes within the framework of integrated quality management programs – TQM (Total Quality Management);
- marketing innovations – innovations in sales channels and marketing communications of a commercial bank;
- technological innovations related to the development of the technical capabilities of the bank's functioning;
- management innovations related to changes in the organizational structure of the bank, mechanisms of planning, control, stimulation, etc.

Product innovations can be considered:

- as a process of creating fundamentally new banking products (creating a new banking product that has more attractive consumer properties, compared to those offered earlier);
- as a process of improving individual characteristics of existing products (improvement of the existing banking product, with the aim of satisfying previously unconsidered customer needs).

In global practice, the following types of banking innovations are usually distinguished:

– banking product in new market segments;

– innovations as development of activities in new areas of the financial market;

– new methods of cash management and use of new information technologies;

– modified financial intermediation services aimed at reducing operating costs and more effective management of assets and liabilities;

– new products in traditional debt capital segments.

Today, banking innovation in Ukraine is expressed most often in the appearance of new banking products.

A banking product is a set of modified banking and financial operations to solve any client's need, which can be positioned as a new banking service or a combination of traditional bank services, built into a technological chain, which allows solving a specific client's problem and satisfying his demand for comprehensive services .

For example, the bank product "salary project" can consist of three operations:

− issuance of plastic cards by the bank for employees of the enterprise;

− setting a credit limit from plastic cards in the amount of one or two salaries of an employee;

− installation of an ATM at the enterprise.

As a rule, a banking product is aimed at a specific group of customers. Customer groups can be built in the following combinations:

− natural persons and legal entities;

− residents and non-residents;

− large, medium, small depositors, etc.

By type of activity, clients can be divided as follows: insurance companies, pension funds, correspondent banks, investment companies, shops, tour operators, etc.

New banking products are created based on the analysis of the client's needs and the banks' ability to satisfy them.

A new banking product can be individual or mass.

Single banking product is an individual product. As a matter of fact, it has characteristic, unique features that distinguish it from other banking products. For example, a specific coin made of a specific precious metal of a specific weight, specific real estate, a bond of a specific issuing bank, etc. A single banking product has a clearly defined range of customers. Therefore, it is produced for specific consumers.

A mass banking product is a product without a sharply expressed individuality. He has no special characteristic features. A mass banking product is distinguished only by the types

of product or financial asset, for example, a bank deposit, a bank account, state domestic or municipal loan bonds of all types, etc. A mass financial product is produced for a wide range of consumers and investors.

In addition, the new banking product can be limited or unlimited.

A limited bank product is a product whose volume or number of issuance is strictly quota-based. This volume is set when the product is released. The size of the volume is determined by many factors: the size of the authorized capital of the joint-stock bank, customer demand, etc. Limited banking products include shares, bonds, types of credit agreements, etc. This product is produced for a specific buyer.

An unlimited banking product is a product, the volume (quantity) of which is not limited by any quotas. This product is produced on the basis of a possible potential buyer. The number of buyers is an undetermined value. Therefore, the volume of issue of the delimited banking product is not limited by any norms and conditions, except for the factor of purchase demand. Unlimited banking products include: plastic settlement and credit cards, bank accounts, etc

A new banking product can be presented in the form of property or property rights.

Property is a material object of ownership, for example, money, measured gold bars, coins, foam papers, etc.

Property right means the right to own, manage and use certain property. The banking product in the form of property rights includes such documents as a bank account agreement, credit agreements, etc.

As a new product, banking innovation manifests itself only in the process of its implementation on the financial market or within the bank.

The demand offered by the buyer for a banking product or operation determines the degree of novelty of these types of innovations. When a new product that has appeared on the market is sold, it means that it is in demand and has its buyer. The level of demand for a new product determines the level of its usefulness, which means the degree of its novelty.

Any new phenomenon is related to time. When it lasts over time, it becomes a mass, traditional phenomenon. A banking innovation operates only within the time frame established by the initial and final points of the life cycle of this innovation. And this means that banking products or operations that are new only for this bank, but have long been implemented in other credit institutions, cannot be considered banking innovations.

Banking innovations cannot also include minor changes that are of a private nature and do not change the content and essence of the banking product or operation, for example, changes in interest rates on bank accounts and deposits, terms of deposit deposits, etc.

According to the economic content , banking innovations can be divided into technological and product innovations.

Technological innovations include: electronic money transfers, bank cards, virtual cards, prepaid gift cards.

Virtual cards – special bank cards, as a rule, do not have a physical embodiment. At the client's request, the issuing bank can produce a plastic virtual card that lacks the main attributes of a regular bank card: a chip or magnetic strip, a hologram and the owner's signature. The main idea behind the creation of this banking product is to protect information about the client's account number during transactions with untrustworthy online stores.

Prepaid gift cards are bank cards of the international payment system with a certain limit, which is paid when the card is purchased. The peculiarity of this card is that the information about the holder and owner of the card is not reflected in the client base of the issuing bank.

Product innovations include new banking products that may be related to both new operations and services and traditional banking operations during their development or changes in regulatory conditions.

Innovative banking products, changes in service and the latest technologies in domestic banks make it possible to facilitate the process of expanding the customer base, primarily by attracting the younger generation or by luring customers from competing banks. In the future, the development

of the banking services market of Ukraine depends on a more active readiness of banks to quickly adapt to the needs of a widerrange of customers.

In order to find out how modern foreign innovative banking products are, it is necessary to refer to the experience of the world's leading banks. For example, the Royal Bank of Canada is currently testing an innovative bracelet that allows you to measure a person's heart rate and identify a person when making contactless payments. The Canadian bank CIBC Bank created and offered its customers a new credit card – "Cobrand" in cooperation with the famous Tim Hortons restaurant chain. This innovative card has buttons, so when making a purchase or paying a bill in a restaurant, the customer selects the button he needs and makes the payment. For paying for purchases, the customer earns bonus points, which can then be used in the restaurant. And the Westpac bank from New Zealand introduced identification when entering the mobile application using a finger scan, which increased the protection of the client's accounts.

Innovative activity in the banking sector should be based on certain principles:

- the principle of perspective, which is related to the compliance of innovative activity with the bank's strategic tasks;
- the principle of customer-oriented banking innovations, which is related to their basic needs;
- the principle of anticipation, that is, banking innovations must be innovative and predictable;
- the principle of provision of resources, i.e. innovative activity requires the availability of certain financial, technical and personnel resources;
- the principle of efficiency, i.e. innovations should lead to increased profits and increased competitiveness of the bank;
- the principle of time limitation, i.e. limiting the terms of implementation of the innovation process.

It is quite difficult to trace the exact chronology of the appearance of all banking innovations in the world.

The chronology of the development of the most significant banking innovations is given in Table 3.

The magazine "Global Finance" published the world's top banks in the direction of innovation for 2016. There are no Ukrainian banks in this rating yet.

It should be noted that the banks of Ukraine began to actively introduce the possibilities of Internet banking into their practice of providing banking services recently. Only at the end of 2011, the launch of Erste Web was announced by Ernst Bank, in January 2012 the Raiffeisen Online system of Raiffeisen Bank Aval was implemented, in March VTB Bank presented the VTB-online system, in August the Internet banking "Platinum Click" "Platinum Bank". Later, other banks of Ukraine gradually joined this process. According to the data of analytical studies, the conditions of service of individuals in the Internet banking system are available to 50 leading banks of Ukraine, conducted twice a year by the information portal "Just Banker"[557].

It is impossible not to note that both Ukrainian and global banking is being transformed, new technologies are changing not only the way money is managed, but also the method of conducting banking business. Currently, there is a partial transition from traditional banking to digital banking. The Ukrainian banking business, like the global banking business, is transforming and moving to a digital format.

Studies of banking practice point to three main factors in the growth of this trend. First, mobile banking is more convenient and helps save the user's time. Secondly, it is quite accessible thanks to the fact that 65% of the world's population has a smartphone. Thirdly, mobile applications simplify and reduce the cost of the transaction process, thereby reducing the bank's costs[558]. Forecast data indicate that by the end of 2022, customer visits to retail bank branches will decrease by 36%, while mobile transactions will increase by 121% and account for 88% of all banking transactions[559].

[557] It was decided V. (2016) Innovations in banking sphere Ukraineeat

[558] Fintech Trends that will Transform Banking and Financial Services in 2019, Perfect.

[559] Branches in decline: last one out, turn off the lights.

Table 3. Chronology development the most essential banking innovations

Year	Essence innovations
1661	Generated first state central bank in the world and exactly Bank Sweden.
1824	In the USA, for the first time in the world, a bank clearing system was created, that is, a system of non-cash payments Hunks by goods, precious papers and provided services, founded on accounting mutual financial requirementsand obligations
1937	Created the first credit bureau.
1939	Invented prototype the first ATM
1949	released prototype modern credit cards
1950	Banks create the network transfers financial information by help telex connection
1961	Entered reversible deposit certificates
1970	Conducted the first agreement securitization mortgage assets
1972	Created centralized electronic chain accounting banking checks
1973	Created system SWIFT.
1974	Invented smart card.
1984	French bankers start communicate with customers on electronic mail
1993	Implemented digital money (Digi Cash).
1996	International payment system Visa International.
1997	IN USA openly first in the world virtual bank.
2000	Association, what consists of with 12 the largest manufacturers microprocessor maps, announced about entitythe first one in the world universal electronic wallet
2008	Terminals fast ones calculations ibox.
2009	the first application technologies blockchain by translation bitcoins
2012	Japanese bank company The Ogaki Kyoritsu Bank, Ltd entered in exploitation new ones ATMs, which allow to the client get access to account having applied palm tospecial scanner
2013	Generated first public bitcoin fund Bitcoin Investment Trust, and bank Barclays started accept deposits for bitcoin exchange
2015	American neobank Atom Bank (Great Britain) got full bank license
2015	Indian startup Ultracush launches mobile pay service, which will allow carry out payments on basis ultrasound
2016	Two the biggest banks Southern Korea – KEB Hannah Bank and Woori Bank enter system identification users mobile banking on retina eye
2017	Discovery the first in the world bitcoin bank, what belongs to Austrian startup Bit Trust
2019	Breeding on market digital cards Apple Card, – titanium map created MasterCard andGoldman Sachs. The main ones characteristics - map without room, term actions and CVV code, has only Full name the owner

In a study by Juniper Research called Retail Banking: Digital Transformation & Disruptor Opportunities 2020-2024, it is noted that by 2024 the number of digital banking users in the world will reach 3.6 billion, which is 50% more than in 2020[560].

According to the European Retail Banking Radar report, the number of bank customers will reach 85 million by 2023, compared to 15.6 million in 2019. The increase in the number of digital banks will primarily be provided by representatives of Y – (millennials) and generations who prefer use digital products.

Today, there are six digital banks operating in Ukraine, created according to the principle of "bank within a bank", which are independent structures that develop digital products under a separate brand. These banks include: O. Bank ("Idea Bank"), "Monobank" (Universal Bank), "Todobank" ("Megabank"), Izibank (Universal Bank), Sport bank ("Oxy Bank" and "Taskombank"), Neobank ("Concord" battery).

At the current stage of development of innovations in Ukrainian banks, the following types of products are the most popular:

1) mobile banking is a service through which a client of the bank, i.e. own card account, has the opportunity to manage his own non-cash funds using a mobile phone: transfer funds from one account to another, top up a mobile account, transfer funds on credit, pay for the Internet, communal services, etc.;

[560] Digital Banking Users to Reach 3.6 Billion by 2024, an Increase of 50%.

2) Internet banking (web banking) is one of the types of remote banking services, which enables the client to manage his accounts without leaving home using the Internet, even in remote corners of the country;

3) QR-banking is an invention that allows you to easily and quickly pay bills for goods, services and Internet purchases without taking a plastic card with you, using a QR code using a contactless banking system. A QR code (quick response code) is a two-dimensional image in which certain text or numbers are inserted, and information can be read from it with any mobile phone with a camera and software. You just need to take a picture of the code, which is quickly recognized via the mobile Internet, the payment page will open, where you need to enter your password;

4) Send money is the latest service that allows you to transfer money to the recipient's account using a mobile phone number. The idea is that you don't need to enter a 14-digit number like before, but just the phone number of the recipient of the money. Next, the system already works with the recipient, who must enter his card data and confirm the transfer. To do this, you need to go to the application, enter the mobile phone number, the amount and choose which card to debit funds from. What is important, the recipient can be a client of any other bank of the Visa or Master Card system;

5) photo cash register is a novelty for smartphones. Based on photos of bills and utility bills, bank employees themselves create all the necessary documents, which are then sent to e-mail as a scanned photo. All you need to do is take a photo of the receipt you want to pay for, send it to the bank via SMS and confirm the transaction.

6) Privat24 for Google glass glasses is an application of the future, with which you can pay bills for a photo, transfer funds through voice functions, refuel at gas stations, pay for goods and services in stores and on the Internet, pay for restaurant orders, withdraw cash without a card at an ATM, etc.

Blockchain technology and cloud banking can be considered the most promising directions for the development of the banking sector.

Table 4. Promising directions of development of the banking sector

Name	Essence	Possibilities of implementation in the banking business
Blockchain	the mechanism of forming a common database for carrying out transactions based on the formation of line ties in the banking sector and openness of information for line subjects	formation of a new digitized banking product with an increased level of security and an asset storage product with joint ownership - bank - enterprises, natural persons, which will lead to a reduction of intermediaries between the bank and the client, reduction of costs, risks of information loss, acceleration of settlements through the formation of "smart contracts"
Banking in the clouds	a mechanism for storing banking information on the Internet	formation of individual projects for the client (B-Cloud), which involves placing the infrastructure in the cloud and organizing remote communication channels with the bank, the possibility of obtaining additional services, the possibility of forming an individual "hybrid" cloud for a specific client; 2) the formation of a new bank in the "cloud", which allows you to obtain additional information storage capabilities and reduce costs for this storage, obtain additional data protection, expand the range of financial and non-financial services

Blockchain is considered one of the most important innovative technologies in various industries. In Ukraine, banking institutions are in the early stages of blockchain adoption. They either focus on developing their own blockchain strategy or work on proving the effectiveness of blockchain as a whole. An example of the application of blockchain technology in Ukraine was the release by the National Bank of Ukraine in 2018 of a limited volume of its own digital currency based on blockchain technology – the electronic hryvnia.

Blockchain technology was first used in the creation of cryptocurrency. For a long time, she was associated only with this sphere. Bitcoin is still the best and brightest example of the application of this technology. However, blockchain has recently started to spread in other areas of business. Many corporations are implementing blockchain and launching projects based on this technology,

and the most popular niche for blockchain application after cryptocurrency remains the financial sector.

The introduction of blockchain will open up new opportunities for banks. This technology has a number of advantages and disadvantages

Blockchain technologies allow you to get a number of significant advantages:

a) safety. Blockchain is a secure digital register, a network of equal nodes, where transactions for the transfer of ownership rights to objects are stored, rather than a database of property objects (for example, customer accounts with their deposited funds);

b) saving money. Implementation of infrastructure based on blockchain technology allows to significantly reduce the costs of its maintenance and eliminate numerous risks related to security. The absence of intermediaries allows all interacting parties to save money;

c) acceleration of processes. Blockchain allows you to replace numerous models of data reconciliation and thus significantly speed up any processes. A clear example is the international letter of credit between S7 Airlines and Alfa Bank in the form of a transaction through the Ethereum blockchain in 23 seconds instead of the usual 14 days.

d) universality. With the help of blockchain technology, it is possible to create public databases: land registers, open resources for registration of property rights, in particular intellectual property rights, management of energy flows, voting via the Internet. Smart contracts are becoming increasingly common – transactions that are automatically executed under a pre-programmed set of conditions.

The appearance of blockchain technology, which supports the functioning of cryptocurrency, countries consider as a possible payment system with digital currency. Yes, blockchain is a technology of decentralized, i.e. distributed, private and securely encrypted information storage. However, both the technology itself and the digital currency that functions on it have a number of shortcomings that prevent modern countries from introducing it into the payment system.

One of the main disadvantages of blockchain technology is the inability to process a sufficient number of tasks in a certain period of time. Scalability, that is, the technology's ability to process larger and larger volumes of blockchain information cannot be compared to the processing speed of Visa or Mastercard. In addition, the use of such technologies involves large costs for maintaining such technology. The development of blockchain technology itself requires large financial resources. In addition, maintenance itself involves high costs, even taking into account the amount of energy consumed by this technology. Even if this technology is introduced into the country's payment system, it must be understood that the consequences may not always be positive. So, for example, the already existing payment and financial system, which was built for years for efficient and well-established functioning, may suffer a disruption.

Thus, the use of cryptocurrency, the emission of which is carried out by miners, can lead to uncontrolled emission and growth of the money supply, which will lead to huge inflation, which cannot be overcome by classical methods of state control. It should also be noted that the reduction of costs due to the absence of intermediaries is positive only for individuals. Because with less use of financial institutions, their income will decrease and the functioning of these institutions will be under attack. Thus, the system can weaken state control, which will lead to an increase in fraudulent activities. In addition, the presence of new digital technologies in any case predicts the growth of cybercrime. In addition to possible losses from cyber attacks themselves, the state must spend heavily on the development of new control technologies to ensure a secure system.

Cloud technologies are a model of providing convenient network access to resources that are configured and can be quickly provisioned, scaled and released with minimal operating costs and requests to the provider. Cloud services are divided into several models of service provision – from basic infrastructure services to a complex of ready-made business functions, for example, services of accounting and operational activities of banks.

Law "On cloud services" (will enter into force on September 16, 2022) lays the foundations for the development of information and communication technology platforms based on cloud computing and the implementation of the cloud first principle and defines the following:

- the concepts of "cloud computing", "cloud services", "cloud services provider", "cloud services user", "cloud resources", "data processing center", a list of cloud services, methods of providing them, establishes requirements for a cloud service provider for public customers;

- legal basis for the provision of cloud services, essential terms of the agreement on the provision of cloud services;

- features of provision and consumption of cloud services, processing of personal data and protection of information in the provision of cloud services[561].

According to the Law, a cloud service is a service for providing cloud resources using cloud computing technology, which provides for the possibility of remote user access to the cloud infrastructure through electronic communication networks. All services are provided using cloud computing technology and include:

- infrastructure as a service, which consists in providing the user with storage resources or electronic communication systems;
- the platform as a service, which consists in providing the user with access to the infrastructure and sets of computer programs;
- software as a service, which consists in providing the user with access to applied computer programs;
- security as a cyber protection service provided to the user using cloud resources;
- other services that meet the definition of cloud services.

The effectiveness of the above-mentioned measures was also noted in the practice of activity of one of the largest banking institutions of Ukraine – "PrivatBank". During threats to the functioning of the banking system, the bank used cloud first technology to protect its customers' data and the smooth operation of the banking structure and transferred all its servers from the physical data storage center to the "cloud", which made it possible to reduce dependence on computer equipment in those regions of Ukraine , where it was destroyed during the war. It is worth noting that the National Bank of Ukraine allowed banks to store and process data "in the cloud" from March 8, 2022.

As a result, all the main applications of this bank were successfully transferred to the cloud storage, at the same time, access to financial services was ensured for customers at any time. In total, "PrivatBank" moved 3,500 servers to the cloud environment, uploading more than 4 petabytes of client data and transactions, as well as more than 270 applications. This is the largest project in this field, on which more than 470 IT specialists and contractors worked[562]. In addition, the fact that the bank needed to adapt to the new conditions of operation as quickly as possible is important, because the work of the entire institution depended on the promptness of making appropriate decisions, and this is the possibility of receiving financial services for hundreds of thousands of customers. Hacker attacks on the bank's servers took place just before the Russian invasion of Ukraine, so the relevance and timeliness of making adequate decisions actually saved the banking system from unauthorized access. Under normal circumstances, the implementation of such a project would take 1.5 years or more; in crisis situations, with regular work and speed of decisions, the bank managed in 45 days[563].

Traditionally, every commercial bank implemented an information security policy on its own infrastructure. The transition from private solutions to cloud-based solutions allows for the implementation of high-quality and modern information security systems in the event of a total reduction in the cost of ownership for the organization due to the rejection of installation and maintenance of software and hardware, as well as a reduction in costs for personnel servicing the specified equipment. The most common cloud security solutions: antivirus services; spam

[561] Law of Ukraine "On Cloud Services" 2022

[562] "PrivatBank" completed the migration of IT systems to the "cloud" – it took 1.5 months." Internet portal "Mezha.media".

[563] Harmatiy Serhii Relevance of economic and financial information storage through "cloud technologies" during martial law

protection services; information storage protection services; services for protection against fraud and DDoS attacks, services for storing and using private keys of electronic signatures[564].

The payment protection function is present in advanced versions of paid antiviruses and is aimed at preventing money theft during online payments. Cloud providers do not provide payment services, but can only provide resources for rent to an organization that processes payment cards. Therefore, providers do not process or store Cardholder Data (CHD) or Sensitive Authentication Data (SAD) during transactions. However, many clients of a large cloud provider (banks or payment systems) provide payment services to the public or businesses. In this case, payment protection responsibilities are shared between the provider and the client, but both the provider and the client in this case must comply with PCI DSS requirements to the extent defined by the contract between these parties. Therefore, the joint efforts of both the provider and the client achieve compliance with all PCI DSS requirements, and this burden does not fall on just one client.

New challenges in the modern economy of Ukraine require the implementation of innovative solutions as soon as possible, since the military threat does not allow time for prolongation.

The banking system of Ukraine faced serious challenges regarding the preservation of the confidentiality of customer information, operations and financial activities in general, which was caused by the start of a full-scale Russian-Ukrainian war.

The practice of carrying out innovative activities indicates that the basis of effective functioning of innovative banking business is solving the problems of optimizing business processes, guaranteeing security, virtualization, forecasting and modeling, stress testing, and managing systemic risks. The study What's Going On in Banking 2021 recognized the best technologies for 2021: artificial intelligence; application programming interfaces; internet of things; P2P payments; NFC technologies[565].

Now you can highlight the following top 5 trends development market banking services.

1. Contactless payment – one with key trends among everyone financial innovations Appearance in cards chip for contactless payment gives possibility to the useron cash register, not releasing map with hands, to attach her to terminal and make payment But, hereby opportunities technologies not are limited Gradually acquire popularity contactless payments using smartphones and other gadgets equipped with a chip NFC wireless communication. But that's not all, because in addition to smartphones, as a tool for implementation payments already available smart watch Alpha Watch with technologycontactless payment MasterCard.

Contactless payments are rapidly penetrating people's lives. In July 2021, Visa confirmed that it had processed 1 billion contactless transactions in Europe in 12 months[566]. The study also found that two-thirds of global consumers plan to expand their use of contactless payments in the future. Mastercard recently confirmed that it will phase out magnetic stripe cards from 2024[567].

2. Biometric identification is a new trend in the payment market worldwide. The following customer identification technologies are currently available: fingerprints, selfie photo, scanning iridescent retina eyes rhythm palpitation, and even timbre voice Suchidentification more safe and, the main thing more convenient for customer, than existing ways, but requires greater security from banks and payment vendors. About increased interest to biometric solutions testifies all bigger accessibility corresponding functionality on tablets and smartphones, support for similar solutions by consumers and new regulatory requirements of the EU regarding reliable identification. Preferable majority consumers (93%), chooses biometrics instead passwords[568].

3. Digital wallets and QR codes. Today 97% online orders are left incomplete due to the reluctance of users to enter their payment data in the browser for each purchase. This problem is solved by digital wallets, after entering once in it, the user can make payments to his payment card

[564] Nikishyn D., Fedyushin O. Risks of information security in cloud services.
[565] What's Going On In Banking 2021 Rebounding From the Pandemic.
[566] One Billion Additional Touch-free Visa Payments Made as Consumers Embrace Contactless Commerce.
[567] Swiping left on magnetic stripes.
[568] Overcoming Mobile Biometrics Challenges: MasterCard and University of Oxford Collaborate he New Research Initiative

in the future one click Experts Davosky forum allocate four directions payment innovations on the closest years: mobile payments (wallets and payment system), integrated payment systems (apps for mobile orders and payment, applications forshopping), streaming payments (in ago number of with geographic binding and between devices(m2m)) and development systems security payments (biometric identification, tokens and t. d.).

Along with the development of digital wallets, the trend of QR payments is gaining popularity. This trend is especially pronounced in countries with high penetration of smartphones, there is an extremely low level of coverage of POS terminals and access to financial services (India, Nigeria, Kenya).

4. Internet things (English "internet of things", IoT) – it system, what unites realthings in virtual the network Content of technology consists of in because almost any the device in your home, in the car, on you, provided it is connected to the Internet, able to perform various actions depending on this information, thereby facilitating life. Example, to pay by gasoline on without leaving the gas station from the car

Gadget maybe to connect to global network Internet or same "cooperate" with other devices nearby. This is how "smart" systems arise at home or same the whole "smart" cities.

According to the forecast of the analytical company SMA in 2032-2035 IoT-infrastructure will spread on 1 trillion devices and 100 million applications[569].

5. Cryptocurrencies are a special type of electronic (or digital) money that have own decentralized payment system and are functioning usually on basis blockchain technologies (blockchain). In other words, it is an artificial payment system that equates to to real ones money and has official course.

The development of the cryptocurrency market is of particular importance for traditional financial institutions systems, and together with by them for banking systems countries of the world this worth to notein the world of work there are both supporters and opponents of crypto currencies. So in countries the third the world cryptocurrency forbid miners chased AND in of Japan bitcoin recognized as legal tender on par with the yen. In Canada, it's not just official payments in bitcoins are allowed, but the state company Royal Canadian has also been created Mint, which is engaged in the development of the MintChip cryptocurrency, which is different from Bitcoin is pegged to the Canadian dollar. A bitcoin bank owned by an Austrian startup has been operating in Austria since 2017 BitTrust. You can at a bank branch to exchange bitcoins in euro and vice versa. Of Ukraine, then status cryptocurrency still not legally defined.

6. Fintech (fintech) movement. Under fintech understand software or technological innovation in financial services[570]. About active development fintech evidence of movementthe fact that there are more than 10,000 fintech startups in the world today. Among FinTech companies already have their own "Unicorns" – companies worth more than 1 billion dollars USA[571]. The total number of fintech companies in Ukraine is also growing, yes according to the "Ukrainian fintech catalog 2019", there are currently more than 100 companies, withthem 58% appeared for the last ones 3 times years[572]. By forecasts experts so calledThe global FinTech revolution may over time "destroy" about half of banking institutions in the world. And according to the estimates of, for example, the largest American bank Citi, further growth FinTech startups will lead to that what to 2025 year 30% banking employees (1.7 million) world bank systems will lose your workersplaces.

The term fintech comes from two English words: finance (finance) and technology (technology). The translation would have something like financial technology. In other words, offering financial services using new technologies.

Although this word may seem relatively recent, the truth is that it appeared more than 25 years ago. According to Mark Hochstein, in an article written on the American Banker website. The term

[569] What such "Internet things".
[570] Everything will be fintech: will banks lose the war to new services.
[571] Nikishyn D., Fedyushin O. Risks of information security in cloud services.
[572] Catalog of fintech companies of Ukraine.

appeared in the early 1990s thanks to a project led by Citicorp. That is, the financial company known today as Citigroup.

It would be at the annual Smart Card Forum conference, where Citicorp, trying to overcome its bad reputation for resisting technology collaboration with other companies, will make its case. They refused to cooperate with new technologies and argued: "Citicorp cooperates because times have changed," Catherine Allen, the head of Citicorp at the time, would say.

The project that the company would manage from now on would bear the original name of fintech (consortium of technological financial services). It was at this very moment, and no other, that a term was born, the use of which has been exponential in our society and in the financial industry.

Types of fintech companies

Next, we will see a number of services that apply technological innovations to provide financial services:

− loans and credits: Through the Internet, some companies offer financing services, such as crowdfunding and crowding. This type of service also includes providing online loans. The latter grant loans or not according to the decision of automatic algorithms.

− payments and transfers: You no longer need to contact a bank branch to carry out such procedures. You can make payments and transfers from your computer. What's more, you can even withdraw money from an ATM without a card. All you need is a mobile application from the bank. Many fintech transfer companies make money payments faster and cheaper.

− investments: From new and improved trading platforms, through wealth management robots, to personalized financial advisors. Some services of this type attract significant capital, and traditional investment funds already see them as a threat to the sector.

− personal finance: New services are offered through mobile applications that try to make personal finance smarter, more transparent and easier. These types of services help users plan, control their spending, and save.

− currency: Especially when we travel to countries with a different currency, we need to change the payment currency. This process was traditionally carried out through banks. Today, thanks to the development of technology, we can exchange currencies with other users over the Internet.

− blockchain: The technology that powers Bitcoin could be the future of global financial transactions. Currently, an intermediary is needed to make the transfer. For example, a bank. Blockchain technology creates a decentralized digital public registry. This record is secure, anonymous and tamper proof.

Such companies develop unique innovative offers and offer more flexible and often more favorable conditions for using their products. For example, the development of savings programs for phones, where the program itself calculates your income and accordingly determines the level of savings that should be set, as well as the direction and options for depositing these savings. Visiting a bank branch and even independently searching for the most profitable options for investing your savings are no longer necessary, as a virtual financial advisor can provide such services instantly and even independently withdraw the required amount of funds for savings from your account every month. Some analysts even believe that FinTech companies represent the future of banking services and can almost completely oust banks themselves from the market. In 2015, a "FinTech Cluster" was created in Ukraine, which provides for the unification of banks, financial startups, and investment funds.

Active participants in the Ukrainian FinTech market are PrivatBank, Alfa-Bank, Raiffeisen Bank Aval, and OTP Bank.

In general, today it can be stated that the content of innovative activity of banks covers three segments of fintech innovations, namely:

- formation and implementation of new methods and organizational forms of providing banking services (and this is the rejection of the network of branches, electronic banking, postal banking services, remote lending, etc.);

- formation and implementation of new financial and organizational tools, their innovative combination;

- selection in motion of the development stages of the life cycle of innovations in the field of banking (from the birth of the idea to use the appropriate tool to its innovative transformation during implementation).

Depending on the degree of integration of banks and the FinTech segment, four levels of interaction between these subjects of the financial services market can be distinguished: traditional banking, digital banking, open banking and Open-X banking. Currently, three models actually coexist – traditional, digital and open banking, but the most viable and working are digital and open banking. Analytical studies confirm that the availability of a full range of digital bank services for consumers is much more important than the physical presence of bank branches. Figure 6 presents a generalized adaptation scheme for the development of fintech innovations in banking.

According to the specified scheme, the cooperation of banks with fintech startups ultimately ends with the development and implementation of a modern innovative product, the profitability of which can have a certain range of variability, since there are certain features of the procedure for developing innovative banking products and services.

At the same time, the banking institution has certain alternatives: to improve the existing product; to develop a new product for the bank, but already known to the market, to create a completely new (unknown to the market) product.

However, it is necessary to take into account that a fundamentally new product may not immediately bring income to the bank, but it will contribute to the development of banking technology and industry, increase the positive image of the bank

The Ukrainian FinTech market is developing at a fast pace, which is undoubtedly also related to the COVID-19 pandemic and the need to rebuild the banking system and develop online payments.

For 2020, the NBU highlights the following "figures and facts regarding the FinTech sector in Ukraine in its reporting:

− 53% of companies are self-financed;

− 72% of FinTech enterprises are located in the capital of Ukraine;

− 55% of transactions with debit cards are non-cash;

− 28% of companies in the FinTech sector have female managers or top managers;

− 71% of firms in this industry have broken even;

− 52% of companies provide services on the international market;

− 47% of firms were created in the last three years;

− 89% of payment terminals support contactless payments;

− the number of enterprises engaged in payment services and money transfers increased by 14%.

The analysis of the trends of the Ukrainian fintech market showed that Ukraine is developing in line with global trends and during 2019-2020 the greatest growth was observed among companies operating in the field of payment services and money transfer platforms, private and business online lending, as well as technologies and IT infrastructure

The number of fintech companies in the fields of payments and mobile wallets, personal and consumer lending is growing due to the increase in financial literacy of the population and the expansion of understanding of their needs. At the same time, according to experts, in the near future more than half of the financial technology market will develop artificial intelligence and big data technologies, and about 40% of the market will develop blockchain technology. However, currently only 10% of companies have sufficiently structured data for use in big data technology.

The main advantages of fintech firms (or fintech startups), which they use to increase the client base, increase market share and reduce costs, are orientation to the client's values and his needs, the flexibility of the business structure, and the wide use of modern and state-of-the-art technologies. At the same time, a number of fintech companies cooperate with banks and international payment systems in the context of individual projects, such as the development of platforms for P2P card

transactions, the issuance of payment cards with the logos of several companies and other payment services[573].

In addition to domestic fintech companies, foreign fintech companies are successfully introducing their products in the banking sector of Ukraine[574], such as Middleware. The Corezoid operational cloud system developed by the company, which is capable of generating solutions and algorithms for the digitization of company management processes, namely managing equipment and software of any complexity, communications, people, etc., is used by PrivatBank, FUIB. For A-bank, the Middleware company developed a service for shared access to credit cards, which allows the cardholder to send funds from a list in the bank's mobile application, manage limits in terms of amounts and time periods, and grant access to his Mastercard card to specific users. Bank "Piraeus" concluded an agreement with Middleware for the development of a new fully functional remote banking platform that will work for all client segments.

Another accelerator of the implementation of financial technologies in Ukrainian banks is the Visa payment system. Thus, together with Oschadbank, a system was developed and implemented that allows you to pay for fares in public transport using contactless plastic cards (implemented in Zhytomyr, Ternopil, Chernihiv, Ivano-Frankivsk, Kramatorsk). Another joint product is the development of Tap to Phone technology – contactless payment via smartphone. Together with PrivatBank and Kasta, a biometric system for paying for purchases using Face ID was implemented. Also, together with PrivatBank, a chatbot was introduced, which allows you to place an order in restaurants and immediately pay directly in the chatbot. Also, together with partner banks, Visa implements Scan to pay technology for contactless payment using a QR code.

Cooperation between banks and fintech companies is a win-win for both parties. The advantage of banks is the developed client base, reputation and financial resources. However, the traditional structure of banks leaves little room for developing innovative projects. At the same time, financial companies have high innovation potential, regular market monitoring, but lack of funding and client base. Therefore, joint projects allow minimizing the disadvantages and multiplying the advantages of both partners. According to the forecasts of the Association of fintech and innovative companies, in the near future the main areas of joint work will be: payment services, artificial intelligence systems, Big Data, automation of business processes and cyber security.

Currently, the National Bank is at the beginning of its own path of joining the international fintech community and interacting with other regulators of this innovative market. As an example, the National Bank of Ukraine joined the Global financial innovation network (GFIN). This will enable the Ukrainian Central Bank to increase the level of penetration of innovations into the financial sector and will contribute to the implementation of the objectives of the Fintech Development Strategy in Ukraine until 2025. Membership in the network will provide the National Bank with the following advantages:

- involvement in the exchange of experience, information and analytical reports between regulators of different countries of the world;
- expert assistance in building a regulatory "sandbox" in accordance with the best global practices;
- study of innovative solutions for a full understanding of probable risks, modern approaches and methodology of fintech market regulation;
- the main mission of the Global Network of Financial Innovations is to: promote cooperation and exchange of experience on innovation issues between financial regulators;
- improvement of fintech cooperation between regulators and business.

Also, it is advisable to highlight the main types of innovations that have been developed and implemented in the banking sphere in recent years: product innovations: real-time payments, mobile, cardless, contactless payments; distance lending, payment mini-terminal, online products); process

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[574] Hlushchenko O., Tkachenko M. (2012) Modern trends in the development of banking innovations. Financial credit. activity: probl. theory and practice. Vol. 1. Vol. 2. P. 5-14.

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(technological) innovations: cloud data storage, cloud computing – Big Data processing, open banking – API, intelligent data analysis, BaaS – banking as a service, blockchain technology; market innovations: everyday banking, 24/7 digital banking, banking security, marketing innovations.

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