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INNOVATIVE TECHNOLOGIES IN BANKING ACTIVITIES

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Abstract. *The article examines the application of financial technologies in commercial banks, the classification and principles of financial technologies according to their fields of activity. An analysis of the main financial technologies used by commercial banks is presented, their content, as well as their application in banking practice, is described.*

Keywords: *digitization, digital technologies, financial technologies, banking activities.*

БАНК ФАОЛИЯТИДА ИННОВАЦИОН ТЕХНОЛОГИЯЛАР

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Аннотация. *Мақолада тижорат банкларида молиявий технологияларни қўллаш, уларнинг фаолият соҳаларига кўра молиявий технологияларнинг таснифи ва тамойиллари кўриб чиқилган. Тижорат банклари томонидан қўлланиладиган асосий молиявий технологиялар таҳлили келтирилган, уларнинг мазмуни, шунингдек, банк амалиётида қўлланилиши тавсифланган.*

Калит сўзлар: *рақамлаштириш, рақамли технологиялар, молиявий технологиялар, банк фаолияти.*

ИННОВАЦИОННЫЕ ТЕХНОЛОГИИ В БАНКОВСКОЙ ДЕЯТЕЛЬНОСТИ

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Аннотация. *В статье рассматривается применение финансовых технологий в коммерческих банках, классификация и принципы финансовых технологий по сферам их деятельности. Представлен анализ основных финансовых технологий, используемых коммерческими банками, описано их содержание, а также применение в банковской практике.*

Ключевые слова: *цифровизация, цифровые технологии, финансовые технологии, банковское дело.*

Introduction.

The transition to a new technological paradigm has established digitalization as one of the key trends in the development of both the modern national and global economy. An increasing number of areas of economic relations are being influenced by rapid technological advancements. The financial market, as a vital component of the economy, is undergoing an active process of digital transformation in the provision of financial services. The penetration of digital technologies has affected all types of financial services, with their application in banking activities being particularly pronounced. One of the reasons for the large-scale digital transformation is that financial services are a key segment for consumers, and a new technological method of competition for them. The use of digital technologies helps to increase the competitiveness of financial market participants both at the national and international levels, due to higher client orientation and cost reduction.

The main characteristics of the application of financial technologies, such as the accessibility of banking operations for clients, the availability of interfaces, the ability to transfer financial information, significant time savings, account control, the possibility for account holders not to participate in transactions personally, the absence of delays in payments, etc., require constant attention regarding issues that concern the further development of technologies in the banking sector.

Literature Review.

The significance of digital technologies in the modern world is growing day by day. Their recent development has led to significant changes. For example, digital technologies have simplified and shortened production cycles; they have also enabled the expansion of analytics, making its processing more accessible. In the modern world, the dynamic development of markets is hard to imagine without the existence of advanced technologies. Therefore, by penetrating almost all spheres of human life-from purchasing various goods to education and banking services-digitalization is changing the entire economic activity of the country and society (Bikoeva, 2019).

According to researchers David Lee and Kuo Chuen (2015), the concept of FinTech (Financial Technology) has emerged relatively recently. Professor Patrick Schuffel considers FinTech to be an entirely new financial sector, whose activity involves improving financial operations, particularly banking, through the application of new technologies and developments. According to Skan Ju and Ryan (2019), the modern FinTech market is divided into segments represented by electronic platforms, banking applications, digital security, and others.

According to an analysis by McKinsey & Company (2023), financial technologies help increase the efficiency of insurance companies and create opportunities for the implementation of new service delivery methods. Furthermore, there are wide opportunities for data collection and fraud detection, which can lead to better risk identification and mitigation measures.

Modern information technologies have a radical impact on business processes in commercial banks, bringing them to a qualitatively new level. It should be noted that banking technologies are inseparably linked with information technologies, which contribute to the comprehensive automation of business operations (Berdyshev, 2019).

Financial innovations, according to Vikulova (2001), are the creation of a banking product with more attractive consumer properties compared to those previously offered, or a qualitatively new product capable of satisfying the unmet needs of potential buyers, or the use of more advanced technology to create the same banking product.

Tools for digitalization in banking activities include: big data in proactive communication with clients; marketplace; robotics; blockchain technology; video integration; use of chatbots and virtual assistants; creation of virtual reality (VR); use of biometrics in the banking sector. The foundation of these banking technologies lies in protecting against fraudulent schemes,

increasing the accessibility of services and improving service quality, promoting competition, borrower analysis, and enhancing financial accessibility (Ivanova et al., 2020).

Today, four main reasons are identified that stimulate significant changes in the market where financial institutions operate. These include: the development of new financial technologies, actively applied in the financial market in recent years, such as blockchain, big data, and smart contracts; the emergence of new products in the areas of online lending and online investing; the development of robotic versions of artificial intelligence; the evolution of payment systems, becoming more convenient and secure for potential clients; the use of advanced technical solutions; and the rise of "virtual currencies" (Borisova, 2018).

Competition in the banking sector is intensifying, and without the adoption of the latest technologies in the service mechanism, even the strongest banks with a conservative strategy will lose a significant portion of their clients (Eskindarov et al., 2018).

Research Methodology.

The research method used was logical-structural analysis of theoretical and empirical data available in the public domain. Additionally, analysis and synthesis were applied, which allowed, on the one hand, to identify specific areas of development of financial technologies in the banking sector, and on the other hand, to generalize and link together the main trends in their development within the industry. As a result of the study, the particular significance of financial technologies in the banking sector was determined.

Analysis and Results.

Today, the creation of advanced banking technologies as a tool for the development and support of banking business is based mainly on the following principles:

– Openness of technologies, capable of interacting with various external systems, aiding in the selection of software and hardware platforms, and ensuring portability across different hardware devices;

– Modular design, which allows easy configuration of systems for specific needs with the potential for future expansion;

– Scalability, which involves the complexity and expansion of banking system modules as business processes evolve;

– Flexibility in configuring functional modules, as well as their adaptation to the specific conditions and needs of individual financial institutions;

– Continuous improvement and development of the system, based on the reengineering of all business processes;

– Modeling of the financial institution and its business processes;

– Multi-user access to information in real-time and the execution of functions within a unified information space (Zhilyaeva, 2016).

Currently, the financial technologies used in banking activities can be classified according to the following parameters:

– Financial technologies related to financing (crowdfunding, lending, factoring);

– Financial technologies related to asset management (social trading, automated advisory systems, personal finance management);

– Financial technologies related to payments (alternative payment methods, cryptocurrencies, and blockchain in general);

– Financial technologies in the insurance sector.

Currently, there are many types of financial technologies used in the banking sector. Below are the most commonly used financial technologies by commercial banks:

1. Cloud Technologies. The use of cloud technologies allows banks to access computational power and resources as an internet service. Banks often use cloud technologies for important aspects of business operations, such as accounting and operational activities, risk

management, and information security. There are also cases of virtual banks being created using cloud technologies. For example, DBS Bank from Singapore created DigiBank in India, which exists solely as a mobile bank using the operational structure of the parent bank.

2. Artificial Intelligence (AI) and Machine Learning. These technologies are based on the use of neural networks to build decision-making algorithms. Banks use AI and machine learning for a wide range of tasks, which can be divided into two main directions.

– First, in customer interaction. Unlike traditional models of customer interaction, where banks offer standardized products and services, a more advanced, client-oriented system for assessing needs allows for offering more suitable services and products tailored to the specific client. This is possible due to the use of AI in analyzing large amounts of data. AI helps to identify key moments in a vast amount of data about a customer's actions, in order to detect their needs.

– Another area to mention here is robo-advising. This service helps a bank client create an investment portfolio based on user-defined parameters such as acceptable risk level, desired returns, and investment planning horizon. Asset management then occurs automatically through AI. Additionally, new services are emerging that help clients better manage their personal finances based on their current situation and future goals. In these services, AI is also responsible for decision-making.

– Furthermore, AI is used in chatbots and voice assistants, where it processes inquiries and generates responses or solutions. Without AI, customer support services would not be as efficient, as it would be physically impossible to process requests and provide responses quickly enough.

– Second, in decision-making. The use of AI significantly reduces the time needed to generate personalized solutions and messages for clients. Furthermore, AI can quickly retrieve information about clients and provide it to bank staff even before a request is made, thus speeding up banking processes or, for example, predicting a potential risk of default in advance, which helps prepare and reduce the overall level of risk.

3. Big Data. This category includes vast amounts of information that are large in size, heterogeneous, and unstructured, such as data from social media or the press. Previously, such data was not used for analysis because its complexity made it difficult to extract any value. Processing these datasets required significant computing power, considerable time, and substantial financial investments. A significant number of methods for working with such data are based on statistical techniques and the use of artificial intelligence.

4. Biometrics. Biometric technology allows the identification of a person based on unique biometric data, such as fingerprints, retina scans, etc. This technology is used by banks to provide remote services (e.g., transaction verification in mobile banking apps, user identification), enabling the delivery of a wide range of services without the need for a personal visit to the bank or the submission of identity verification documents.

Through this technology, banks can attract new clients in regions where they do not have a physical presence, while users can become customers without leaving their homes. This is especially useful for people in remote areas or individuals with limited mobility. Another use of biometrics is in enhancing security. Biometrics can also replace cards for payments, with bio-payment systems allowing customers to make purchases through facial recognition.

5. Blockchain. Blockchain is a distributed ledger technology that consists of a linked list of code blocks containing recorded information (Bakulina, Popova, 2018). Each new transaction is written into a new code block, which stores the history of the previous one, synchronized by time. Once recorded, the information is synchronized across all copies in the ledger. This property ensures the immutability of the data. Banks can use blockchain technology in real-time lending (for managing borrower risks using smart contracts), verification, asset appraisal, liquidity management, cash flow, and portfolio management.

6. Smart Contracts. A smart contract is an electronic algorithm embedded with specific conditions. It operates within a distributed ledger system, meaning it is stored in a

decentralized manner, providing access to all participants of a transaction and protecting against unilateral changes to the contract's terms. This algorithm is connected to the banking system and integrated with external systems for data retrieval. Using external data, the algorithm checks whether the specified conditions are met, and if so, the contract is executed, triggering the corresponding actions. Banks often use smart contracts in trade finance, letter of credit transactions, and lending.

7. Cryptography. Cryptography is a technology used for data protection. It involves encrypting data using a specific set of methods to ensure the security of information. In banking, cryptography is widely used for transmitting confidential information, electronic signatures, and user authentication.

8. Robotics. Robotic Process Automation (RPA) refers to the automation of business processes using software robots and artificial intelligence. A robot mimics human actions when interacting with a graphical interface. In traditional automated systems, developers create a list of actions to automate a task. RPA, however, builds the list of actions by observing the user's actions during manual task completion. RPA system scenarios can vary from simple tasks, like replying to emails, to activating multiple programs responsible for actions in an ERP system.

Table 1

Examples of Innovative Banking Products

Innovative Product	Technology Opportunities
Biometric Payment	Speeds up the payment process.
Fast Payment System	QR code payment functionality (C2B: individual to legal entity), easing the work of small retailers and their clients.
Consumer Loans via Remote Biometric Identification	Optimizes the process and allows remote application for consumer loans.
Cash Withdrawal at the Checkout	Enables cash withdrawal at the checkout, simplifying access to funds.
Virtual Vision	Allows faster responses to customer requests.
Virtual Mortgage (VR-Mortgage)	Provides virtual viewing of the property and surrounding area, reducing time for property selection.
Cardless ATM	Doubles the speed of operations without the need for a physical card and paper receipts.
Augmented Reality Cards	Increases customer loyalty to the bank.
Payment Rings	Allows payments at any terminal without using a card; convenient for always having it with you.
Digital Mortgage	Enables online document processing and loan issuance, eliminating the need to visit a bank office, and includes e-signing.
User Identification via Photo	Allows users to make transfers faster.
Cashback Services	Enhances the attractiveness of the bank among potential clients by allowing them to receive a refund of part of their expenses.

Source: *Prepared by the author based on empirical research (Chuvalskaya, Belyaeva, 2022).*

From all of the above, it is clear that financial technologies have found wide application in the banking sector. Both the modernization of business processes and the financial products and services depend on the implementation and development of digital infrastructure. While this incurs additional costs, with the right approach, these investments can not only quickly pay off but also provide a significant boost to the overall improvement of the company's operations.

In the banking sector, new products or services automatically incorporate the use of innovative technologies, which enable banks to analyze vast amounts of data, apply machine learning technologies, utilize artificial intelligence, and leverage blockchain technologies.

Innovations in banking products allow for the personalization of customer service, which leads to increased customer loyalty and helps financial institutions enhance their competitiveness. Table 1 provides examples of innovative banking products and their competitive advantages.

Process innovations include changes in the technologies used to review consumer loan applications, the adoption of contactless payment technologies, as well as enabling customers to access products or services without visiting bank branches. Process innovations also involve the use of various outsourcing platforms.

The implementation of innovative products and services increases the speed of interaction between the bank and the customer, as well as the delivery of services. A gradual transition to the use of new technologies will enhance customer convenience, reduce costs, and make the bank more attractive, thereby boosting its competitiveness.

Conclusion.

In conclusion, it is important to note that, in the current environment, domestic commercial banks are continuing their shift from traditional methods of working with clients through tellers to new digital formats. This is primarily happening due to the widespread development of digital banking tools. This trend is most prominent among major players (banks with state-owned capital) in the banking sector. It is evident that they will continue their technological growth in the near future. On the other hand, smaller banks, due to budgetary constraints, will focus on specific customer segments, prioritizing survival and maintaining their existing customer base. At the same time, the ongoing consolidation of banking assets will continue, meaning the most successful banks will be those that can quickly integrate new and diverse financial structures into their organizational and technological ecosystems.

The current transition of banks to digitalization will drive the development of mobile applications and chatbots, aimed at improving customer interactions and maximizing personalization. The flexibility and convenience of online interactions with a banking partner will become a decisive factor in customers' choice of banking services.

The implementation of innovative transformations in the banking sector aims to achieve the following key goals:

– Increasing the competitiveness of the domestic banking system;
– Creating a knowledge-based development model for the sector;
– Reducing the human factor in customer interactions;
– Optimizing the timing of banking operations;
– Improving the quality of banking services in terms of profitability and efficiency.

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