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# THEORETICAL FOUNDATIONS OF IMPLEMENTING DIGITAL TECHNOLOGIES IN THE TRANSFORMATION OF BANKS

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**Abstract:** Maqolada banklarni transformatsiyalash jarayonida zamonaviy texnologiyalarni joriy etishning nazariy jihatlari xorijiy iqtisodchi olimlarning ilmiy qarashlari asosida tahlil qilinadi. Shuningdek, bank tizimining rivojlanishi klassik va raqamli rivojlanish nazariyalari kesimida o'rganilib, har bir yondashuvning o'ziga xos afzalliklari yoritib beriladi. Tadqiqot natijasida bank transformatsiyasiga doir mualliflik ta'riflari ishlab chiqildi va ilmiy asoslangan xulosalar shakllantirildi.

**Key words:** transformatsiya, klassik yondashuv, raqamli yondashuv, raqamli texnologiyalar, internet-banking.

**Annotatsiya:** The article analyzes the theoretical aspects of implementing modern technologies in the process of bank transformation based on the scientific views of foreign economists. In addition, the development of the banking system is examined at the intersection of classical and digital development theories, highlighting the specific advantages of each approach. As a result of the study, original definitions of bank transformation were developed, and scientifically grounded conclusions were formulated.

**Kalit so'zlar:** transformation, classical approach, digital approach, digital technologies, internet banking.

**Аннотация:** В статье на основе научных взглядов зарубежных экономистов проанализированы теоретические аспекты внедрения современных технологий в процессе трансформации банков. Также развитие банковской системы изучено на стыке классических и цифровых теорий развития, при этом освещены характерные преимущества каждого подхода. В результате исследования разработаны авторские определения банковской трансформации и сформулированы научно обоснованные выводы.

**Ключевые слова:** трансформация, классический подход, цифровой подход, цифровые технологии, интернет-банкинг.

## INTRODUCTION

The development of Uzbekistan's economy and the processes of globalization necessitate the implementation of new strategies and transformation approaches in the banking sector. Transformation processes play a crucial role in improving banks' operations, enhancing their competitiveness, and ensuring the provision of efficient services to customers.

Today, banks are actively pursuing the modernization of their activities, the adoption of digital technologies, and the application of innovative approaches to customer service. These processes require a comprehensive reconsideration of banks' internal structures, service delivery mechanisms, and business models.

## LITERATURE REVIEW

Over the past decade, the role of digitalization in transforming the banking system aimed at increasing technological capacity has become the subject of extensive academic debate. Researchers have assessed the necessity and significance of introducing innovations into the banking sector, as well as their positive impact on national economic development.

In particular, issues related to the digitalization of financial processes have been addressed in the scientific works of T.Yu. Popova, B. Graham, L.V. Koch, L.A. Zubchenko, R. Zingales, Z. Bodie, R. Merton, and H. Minsky. In Russian economic science, however, a unified and generally accepted definition of the term “banking innovations” under the conditions of the digital economy has not yet been fully formed, while scholarly research in this direction continues to develop.

This concept encompasses a set of measures implemented in practice, characterized by advanced technological features intended for specific groups of users of innovative technologies. Economists interpret the introduction of innovations in the banking sector within the framework of four main approaches, according to which these approaches include the following.

Within the first approach, banking innovations introduced in the context of the digital economy are considered a key source for the development and implementation of modern banking products. According to E.F. Zhukov, “banks and financial institutions analyze innovations with the single objective of forming additional financial funds and resources that contribute to the growth of final profits by subsequently applying them to existing financial instruments, operating product lines, and permitted financial operations” [1].

In the Financial and Credit Encyclopedic Dictionary edited by A.G. Gryaznova, financial innovation is defined as a newly developed financial product or financial instrument. This conceptual approach applies to all segments of the global financial market and, since the last quarter of the twentieth century, has identified products and technologies directly introduced, particularly in the secondary mortgage financial market, aimed at securitizing assets for future use [2].

According to L.V. Koch, “a banking innovation is an innovation developed directly for end users, applied by customers themselves, and transformed into a modern form based on previous technological advancements” [3].

The second approach defines the segment toward which banking innovations are directed under the conditions of economic digitalization. It characterizes the transformation of traditional technological processes through the introduction of more advanced methodologies and methods that, based on existing financial and technological solutions and software platforms, ensure the formation of final data in carrying out financial operations. These operations include one or several aggregated procedures such as analysis, accounting, control, planning, budgeting, and other related activities. The reformatting of banking innovations applied within financial and technological processes has significantly enhanced the essence of the operational infrastructure and the role of the processes occurring within it in banking practice. This can be clearly interpreted as a manifestation of the digital era in the context of global financial markets.

According to D.A. Nazipov, a high level of integration between information and banking innovations aimed at expanding the customer base, as well as the openness of digital processing, ensures an increase in the economic efficiency and profitability of financial institutions through the adoption of digital technologies. This confirms the relevance of research focused on studying and addressing the scientific and methodological issues of introducing digital processes and digitally transforming existing banking technologies in the environment of digital and telecommunication technologies [4].

The third approach considers banking innovations in the digital economy directly through the established business processes of financial and credit institutions. The globalization of the world economy and financial markets is driven by the decisive role of the global Internet network and by the formation of an electronic communication environment characterized by a substantial increase in the volume of data being processed and transmitted. This, in turn, enables the creation of a financial ecosystem for banks that facilitates solving emerging banking processing tasks and transitioning to innovative ways of organizing business processes.

Popova T.Yu. describes the process of developing and pilot implementation of digital innovations in the banking sector as complex, multi-stage, multi-level, and highly cost-intensive [5]. Therefore, the introduction of digital innovations initially began in the largest banks of Russia, as well as within the framework of state support for digitalization projects.

The fourth approach encompasses the introduction and improvement of organizational and managerial forms of interaction. It is driven by the need to distribute functional responsibilities through outsourcing, innovatively update banking products, diversify services, and develop administrative and financial management instruments within credit institutions. All of these processes are grounded in competition emerging in specific directions, including:

- the formation of customer-oriented products and services;
- achieving universality across the spectrum of financial activities;
- ensuring integration into global globalization processes;
- implementing possible organizational consolidation in various areas;
- expanding opportunities to transform banking processing and the technological forms of business.

The diversity of interpretations regarding the essence of banking innovations is explained by the absence of a single unified criterion-based approach. Within the first approach, banking innovations are viewed as a source for developing and introducing additional banking products, whereas the second and third approaches emphasize the specific features of their development and subsequent application. The fourth approach implies a direct transformation of the functions performed by commercial banks in the global financial market and, in essence, represents an innovative process manifested under the conditions of further development of institutional and organizational forms characterized by banking technologies.

The digitalization of the banking sector enables banks to implement a differentiated approach to customers, taking into account the characteristics of various customer groups, and to tailor banking product offerings as closely as possible to individual consumer needs. The introduction of innovative technologies is aimed at creating the most convenient and transparent banking services regardless of time and location, as well as at increasing service efficiency through improvements in the quality of established banking services. Such development of the banking sector indicates that competition in the banking environment will ultimately intensify in the context of forming the most convenient and customer-oriented banking products.

A.I. Serebrennikova and N.E. Sokolinskaya, who have conducted research on the problems of transforming and digitalizing banking activities in modern conditions, note the complexity of the transformation period and emphasize the necessity of modernization and innovation in banking practice. They argue that such transformation is accompanied by increased attention to the risks inherent in the banking sector [6].

Foreign authors X. Ma, Q. Meng, D. Yang, and H. Wang examine the impact of digital technologies on various sectors of the economy (industry, the financial sector, and public services) and identify the country-specific features of digital transformation in China [7]. The issue of transforming business models in the context of digital transformation has been studied in the works of P. Weill and S. Woerner [8]. The studies of foreign scholars devoted to modern aspects of transforming banking activities make it possible to identify a number of common features in the digitalization processes of financial institutions in the Republic of Uzbekistan and to reveal challenges common to many countries, particularly from the perspective of information security. In the works of M.S. Leighton, J.S. Hurwitz, A.F. Nugent, F. Halper, and M.A. Kaufman, it is emphasized that “technological changes are inevitably interconnected with changes in the regulatory environment for the activities of credit institutions” [9].

The Uzbek economist N.Kh. Jumaev notes that in the digital economy, the use of IT makes it possible to reduce costs, thereby achieving optimization and increased efficiency. He emphasizes that modern scientific approaches and innovations acquire particular importance and priority in the digital economy, and that high-technology, knowledge-intensive sectors tend to develop most dynamically under such conditions [10].

Despite the ongoing development of information and communication technologies, a number of factors may hinder the growth of the internet banking sector within the banking system. These include a lack of trust among individuals in internet services, security concerns, inconvenience of network access, customers' reluctance to conduct large transactions, and the complexity of the interfaces of many internet banking systems. Internet banking is a general term for remote banking service technologies, whereby access to accounts and operations can be carried out at any time of the day from any computer connected to the Internet. To perform transactions, customers are not required to download special software components of the system; the use of a web browser alone is sufficient.

According to economist V. Spilnichenko, “remote banking services represent a set of services that allow customers, at their own discretion, to carry out account operations and obtain information services without visiting a bank branch. A remote banking service system is the interaction between the customer and the bank's information database through telecommunication systems” [11]. N.I. Kulikov and Yu.V. Kudryavtseva, in their research conclusions, emphasize that in the Russian banking services market, online services continue to develop even under conditions of economic stagnation, and although a full transition to this system may still be premature, it is inevitable within the next three to five years [12]. According to the approach of L.A. Samsonova, in the conditions of intense competition in the banking sector, especially amid the growth of consumer culture among individuals, banks are compelled to adapt to increasingly demanding conditions. In such circumstances, banks that provide remote services to their customers gain a clear competitive advantage. In the competitive struggle, only those banks that completely restructure their activities in line with the new requirements of banking business and modern information technologies will ultimately succeed [13].

## RESEARCH METHODOLOGY

In the course of the study, the methods of scientific abstraction, the principle of objectivity, observation, comparative analysis, and logical generalization were extensively applied.

## ANALYSIS AND RESULTS

In recent years, the use of “digital banking” instruments in the banking and financial sector has been expanding steadily. The term digital banking refers to the transition to an online banking system in which banking services are provided via the Internet.

Online or Internet banking, in turn, is understood as an electronic payment system that enables customers of a bank or other financial institution to perform a range of financial transactions through the institution’s website. This system creates opportunities for both banks and customers to carry out banking services in a more convenient, faster, and more transparent manner (Table 1).

Table 1. Digital Banking Service Model<sup>1</sup>

Evaluation parameters of banking service models	Evaluation criteria	Description of digital banking services	Key directions of banking service transformation
Structure of money supply	Dominant form of money circulation	Cashless	Maximizing electronic interaction with customers
Security	Applied authentication methods	Physical electronic, password-based biometric, combined	Modernization of methods for ensuring banking service security
Technologies	Methods of customer data storage	Centralized data center (data center), 2000s technologies	Optimization of digital IT architecture and data management
	Accessibility of data	Within the country	
	Form of computer network	Internet	
	Approach to customer data processing	Using <i>big data</i> tools	
	Speed of data processing	At the level of seconds	
Organizational structure	Number of departments	9	Increasing the role of automation in banking activities
	Emergence of a new department	Banking automation department (IT)	
	Degree of departmental reorganization	Establishment and expansion of the automation department, reduction of workload in other departments	
	Ratio of front/back offices	20/80	
Customer interaction	Emergence of new service channels	Not available	Optimization of banking service channels
	Forms of service channels	Branch, telephone banking, terminal banking, internet banking, TV banking, mobile banking	
	Sales organization approach	Omnichannel	
	Degree of interaction between channels	High level	Increasing customer orientation of banking services
	Dominant form of customer contact	Remote	
	New means of customer communication	Wireless networks	
	Modern methods of customer interaction	Social media, web applications, video communication	

<sup>1</sup> Compiled by the author.

The “digital bank” system is based on a high degree of process automation, the provision of services through web platforms, the use of application programming interfaces (APIs) that ensure the delivery of inter-institutional banking products, as well as the availability of opportunities for customers to access financial information via computers, mobile phones, and ATMs.

Digital banking services possess a number of distinctive features (Table 1):

- the dominant form of money circulation is cashless, which implies maximizing electronic interaction with customers;
- the use of physical electronic, password-based biometric, and combined authentication methods aimed at modernizing approaches to ensuring the security of banking services;
- optimization of digital IT architecture and data management within the country through centralized data centers and big data tools via the Internet;
- enhancement of the role of automation in banking services as a result of the emergence and expansion of automation departments and the reduction of workloads in other departments;
- extensive use of social media, web applications, and video communication in customer interaction.

Along with numerous advantages, the digitalization of the banking sector also entails certain significant challenges. In particular, further development of digital banking requires substantial investment. Large banks, unlike smaller ones, have greater financial capacity to attract highly qualified personnel, acquire new technologies, and introduce artificial intelligence and biometric solutions into their operations. Therefore, large banks find it easier to compete in the field of digitalization with smaller financial institutions. This situation, in turn, may create the risk of market pressure on small and emerging banks, highlighting the importance of policies aimed at supporting balanced competition and inclusive sectoral development.

Another challenge is that elderly bank customers are not yet fully prepared to abandon personal communication with bank staff. They tend to use digital products only when there is no urgent need and prefer visiting bank offices in person rather than interacting with automated systems. Moreover, many of them lack sufficient financial and digital literacy skills required to use digital services effectively. At the same time, raising awareness of the importance of digital transformation, improving digital competencies, and strengthening cybersecurity measures can significantly mitigate these challenges.

The digitalization of banks is implemented mainly in two directions: the introduction of product innovations and process innovations. The first direction of development is based on the creation of innovative banking products, such as credit brokerage services that allow customers to apply online for consumer loans or mortgages without the involvement of specialists; biometric identification enabling remote confirmation of banking operations; cashback services; and bonus programs for loyal customers, among others.

The second direction of digitalization — process innovations — is primarily aimed at minimizing the costs associated with supporting banking operations. The use of artificial intelligence implies the optimization of banking services by reducing intermediary interactions with customers and by providing a wide range of services designed to meet the needs of all segments of the population.

In customer service, banks seek to reduce direct contacts with front-office representatives typical of the traditional banking system and to shift toward remote modes of interaction, optimize human resources, and integrate such processes as customer data storage and access into a digital ecosystem. For consumers, the openness of financial services implies the availability of multiple sales and service channels, including offline, online, mobile applications, and others.

In particular, under the conditions of the COVID-19 pandemic in 2020, special attention was paid to the use of innovations and the continuous modernization of customer service, which accelerated the digitalization of the banking sector and the development of digital technologies. With the onset of the pandemic, opportunities for personal interaction were sharply limited, many services were initially unavailable online, and this required banks to make rapid and adaptive decisions. As a result, the demand model changed, followed by a transformation in approaches to maintaining customer loyalty. Isolation also increased the relevance of applications that allow customers to access multiple services remotely in a single digital environment.

Users have responded positively to new convenient non-financial solutions offered by banks and have increasingly adapted to using ecosystems built around a single brand. Therefore, in the near future, accelerated and sustainable development of the banking sector can be expected through the deployment of large-scale ecosystems based on modern digital technologies.

## CONCLUSIONS AND RECOMMENDATIONS

In conclusion, it can be stated that the introduction of innovative services and technologies in commercial banks requires a comprehensive approach and clearly defined mechanisms to ensure the successful transformation of banking activities. This implies the development of a well-grounded transformation strategy,

the formulation of goals and priorities for innovation, and the establishment of concrete action plans. In this process, particular importance should be attached to effective cooperation with fintech companies and startups for the implementation of new technologies and services; the organization of training programs and professional development courses for employees in modern technologies and working methods; the use of data analytics to study customer needs and the systematic collection of feedback in order to continuously improve product innovations; and the adoption of biometric technologies (fingerprints, facial recognition, and other biometric data) to enhance the security and convenience of customer authentication. The implementation of these measures will enable banks to successfully introduce innovative services and technologies, improve customer experience, optimize business processes, and further strengthen their competitiveness in the financial market. At the same time, the active development of digitalization in the banking sector increases the demand for highly qualified specialists possessing the necessary knowledge and skills in digital technologies, and may also require existing staff to adapt to new conditions through continuous training and organizational change. Nevertheless, these challenges can be effectively addressed through systematic capacity building, motivation, and efficient management. Overall, the transition to digital services necessitates consideration of several key factors, including the rapid development of digital and innovative technologies in the external environment; the qualitative transformation of customers' needs, particularly the growing demand for remote access to services, high-quality information support, and security; the intensification of competition in the banking sector and the strengthening of competition for consumers of banking services; and the consistent improvement of service quality through the active development and application of digital technologies.

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