

DOI: [10.26565/2786-4995-2024-4-02](https://doi.org/10.26565/2786-4995-2024-4-02)

UDC 36.71

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## **Conceptual changes in banking sector architecture in modern conditions**

**Abstract. Introduction.** Modern trends in globalisation and digitalisation have a significant impact on the architecture of the banking sector, requiring the adaptation and transformation of traditional banking models. The rapid development of financial technologies, the growing popularity of cryptocurrencies, changing regulatory requirements, and changes in consumer behaviour require a review of the conceptual framework of banking institutions.

**Purpose, objectives and research methods.** The purpose of this study is to determine the conceptual changes that are taking place in the architecture of the banking sector under the influence of modern technological, economic and social changes.

The object of the study is the banking sector as part of the financial system, which is undergoing changes under the influence of global economic processes, innovative technologies and regulatory reforms.

The study used such methods as comparative analysis and system analysis. To obtain qualitative results, an analytical review of financial and economic literature and the regulatory framework on the architecture of the banking sector was conducted.

**Research results.** The study showed that the modern architecture of the banking sector is undergoing significant changes under the influence of digital technologies and innovations. One of the key trends is the integration of financial technologies, which allows banks to optimise their operational processes, increase the efficiency of risk management and improve the quality of customer service. Banks are actively implementing artificial intelligence to automate processes, blockchain to increase transparency and security of transactions, and big data to analyse customer behaviour and make decisions. At the same time, new challenges arise from cybersecurity, regulatory changes, and competition from non-bank financial institutions.

The **practical value of the results** is that the analysis allows banking institutions and regulators to adapt to new conditions more effectively. The findings can be used to optimise banking activities, improve internal processes, develop new financial products and strengthen resilience to risks arising from constant changes in the market.

Conceptual changes in the banking sector's architecture are defining new approaches to management, development strategy and service delivery. Digitalisation has become an integral part of banking activities, forcing banks to review their business models and actively invest in technological innovations.

**Keywords:** banking sector architecture, digitalisation, financial technology, blockchain, artificial intelligence, big data, cybersecurity.

**JEL Classification:** E 50, G 21

Formulae: 0, fig. 1, table: 5, references: 34.

**For citation:** Tkachenko O. Conceptual changes in banking sector architecture in modern conditions. Financial and Credit Systems: Prospects for Development. №4(15) 2024. P. 20-31. DOI: <https://doi.org/10.26565/2786-4995-2024-4-02>

**Introduction.** Some financial technologies have become so ingrained in the functioning of the banking sector that they often become commonly used and the only possible way of performing technological operations and processes. In contrast, further technological development and the digital era have fostered the emergence of new technologies and innovative ways of financing that are spreading to all areas and parts of the banking system. The banking services market cannot be imagined without the use of information technology, mobile applications, electronic means of making payments, online transfers, online account management, etc. The current development of the banking sector is characterised by the increasing digitalisation of banking services and the technologicalisation of operational processes.

**Literature review.** The theoretical and methodological foundations of the study of financial technologies and their role in the banking sector are laid down in the scientific works of such foreign scholars as: L. K. Osei, Y. Cherkasova, K. M. Ovare [23]; I. K. Panetta, S. Leo, Fogley A. Delle [24]; S. Ustenko, T. Ostapovych [28].

Ukrainian economists also make a significant contribution to solving this problem, in particular: R. V. Bezpalý [1]; M. M. Berdar, K. V. Nechyporenko [2]; Y. Vladyka, L. Turova [3]; O. V. Yermoshkina, O. I. Goryacha [4]; T. A. Lechachenko [7]; Y. O. Mazurkevych [8]; V. V. Matei, A. O. Buz [9]; L. Y. Melnyk [10]; G. M. Pochenchuk [11]; V. V. Rysin, I. R. Borik [12]; A. Y. Semenog [13]. The emergence of the concept of “financial technology” is most often associated with the abbreviation of the name of a project launched in the early 1990s by Citigroup [34]. The Financial Services Technology Consortium project was one of the corporation's initiatives aimed at creating an image of openness to cooperation with third-party technology companies [33].

Dynamic technological development and increased opportunities for the use of information technology in the banking services market have contributed to the development of the relevant categorical apparatus. One of the most commonly used in this context is the concept of “fintech”, which is used by various scholars [23] to refer to fintech innovations, fintech services, and fintech companies. The multifaceted nature and different meaning of the term “fintech” has led to significant differences in the definition of this concept in the financial and economic literature.

One of the most common approaches is to interpret fintech in terms of a type of innovation, and in this aspect, the concept of fintech is closest to the concept of financial innovation. It is worth noting that, unlike fintech, financial innovations are not always associated with the adaptation of certain information technologies to the financial services market. Fintech innovations are always technological innovations. Technological innovations that have enabled the development of fintech include: distributed access technologies (blockchain), artificial intelligence, big data analytics, application programming interfaces, cloud technologies, biometrics [28].

The definitions of fintech presented in these sources of financial and economic literature demonstrate different aspects and approaches to this concept.

P. V. Bezpalý [1] focuses on the distinction between fintech as an industry and as specific companies, which can be useful for understanding the structure of the financial sector and the role of companies in it.

M. M. Berdar, K. V. Nechyporenko [2] emphasise the innovation and business model aspect of fintech, which is important for understanding how new technologies can change business practices and create new opportunities in the financial services market. This definition emphasises the impact of technological innovations on the financial services market and their role in creating new business models.

V. V. Matei, A. O. Buz [9] and L. K. Osei, Y. Cherkasova, K. M. Ovare [23] focus on the combination of traditional banking technologies with new models, which makes it clear how fintech integrates the latest developments into established banking practices, creating hybrid models.

O. V. Yermoshkina, O. I. Goryacha [4], K. Panetta, S. Leo, Fogli A. Delle [24] focus on fintech as a service provided through user-oriented technologies. This emphasises the practical

aspect of fintech and its role in increasing the convenience and accessibility of financial services for customers.

V. V. Rysin, I. R. Borik [12], A. Y. Semenog [13] and S. Ustenko, T. Ostapovych [28] focus on the technological aspect of fintech and its use in various sectors of the economy. This is important for understanding how financial institutions and other organisations use technology to improve their services and processes.

These definitions demonstrate different perspectives on fintech, which together provide a comprehensive view of its nature and impact on the modern banking sector.

Despite the significant existing scientific heritage, a number of theoretical and applied issues remain unresolved, including the impact of financial technologies on the development of the banking sector, the dynamics of economic growth and financial instability.

The logical incompleteness of forming a holistic view of financial technologies as a determinant of the banking sector development determines the relevance of the study, its purpose and content.

**Purpose, objectives and research methods.** The purpose of the study is to identify the conceptual changes that are taking place in the architecture of the banking sector under the influence of modern technological, economic and social changes.

The object of the study is the banking sector as part of the financial system, which is undergoing changes under the influence of global economic processes, innovative technologies and regulatory reforms.

The subject of the study is conceptual changes in the architecture of the banking sector in the context of modern economic challenges and transformations.

The research is aimed at analysing the main trends and challenges facing banking institutions, as well as at studying how these changes affect the structure, functions and processes in the banking sector. Special attention is paid to the role of financial technologies in shaping the new architecture of banks.

The article analyses how new financial instruments, technological innovations and regulatory changes affect the structural and functional aspects of the banking system, as well as its interaction with other financial market participants.

The study used such methods as comparative analysis and system analysis. To obtain qualitative results, an analytical review of financial and economic literature and the regulatory framework on the architecture of the banking sector was conducted.

The information base of the study is based on scientific works of Ukrainian and foreign scholars, statistical data of the National Bank of Ukraine on the banking sector [30], financial reports of international organisations such as the International Monetary Fund [31] and the World Bank [Ошибка! Источник ссылки не найден.]. The information base also includes analytical reviews of financial markets and data on the introduction of the latest financial technologies in the banking sector.

**Research results.** The development of financial technologies is a direct manifestation of rapid digital transformation. Currently, banks are in the process of adapting to fintech, which can be generally divided into 5 stages [5;25;27] (table 1).

Thus, fintech has evolved from the initial stage of introducing technology exclusively in traditional sectors of the economy to the point where it has become a unique mechanism capable of determining user expectations.

The acceleration of the digital transformation of the banking sector has become particularly noticeable in recent years, driven by a number of factors:

- the loss of customer confidence in the traditional banking sector during the 2020 global financial crisis and the need to move to remote service channels;

*Table 1. Stages of development of financial technologies in the banking sector*

Stage name	Essence	Duration
Fintech 1.0	The era of the beginning of financial globalisation. The key events of this period include the first transatlantic cable that allowed any information to be transmitted to the other side of the world (1866), the first electronic money transfer system Fedwire in the United States (1918), and the first American Express credit card (1958).	1865-1966
Fintech 2.0	It begins with the world's first ATM installed by Barclays in 1967, setting off financial trends that would change the world: NASDAQ created the first digital stock exchange, which laid the foundation for the modern functioning of stock markets; in 1973, SWIFT was founded, which is the first and most widely used protocol for communication between financial institutions, facilitating large volumes of cross-border payments; in the 1980s, the first attempts at online banking appeared. It was during this period that banks began to use computers to improve electronic and automated operations and expanded customer channels through online platforms	1967-2008
Fintech 3.0	A turning point in the development of financial technology was 2008, when the global financial crisis began, causing a large part of the population to distrust the traditional banking system. This, along with the fact that many financiers lost their jobs, led to a change in mindset and paved the way for a new industry, fintech 3.0, which is marked by the emergence of new players in the market, including fintech start-ups. Another important factor is the penetration of the mass market by smartphones, which have provided access to the Internet to millions of people around the world. Google Wallet was introduced in 2011 and Apple Pay in 2014. An important event of this period was the release of Bitcoin in 2009, which would be followed by a boom in various cryptocurrencies	2008- 2014
Fintech 3.5	Globalisation, which involves the expansion of digital banking services around the world with the improvement of financial technologies. The era is marked by an increase in the number of new entrants (BigTech, neobanks) and the rapid development of new technologies in developing countries	2014- 2017
Fintech 4.0	The period of disruptive technologies. Banks increase the efficiency of traditional services and introduce new ones using IT technologies such as artificial intelligence, Big Data, cloud computing and blockchain. At this stage, commercial banks begin to optimise their business by fully deploying digital transformation, which is essentially a change in traditional financial channels and business integration	from 2018 to the present day

*Source: developed by the author on the basis of scientific publications [5; 25; 27]*

- rising expectations from the services provided, including financial services. Consumers are becoming increasingly focused on continuous updating and acceleration of processes, greater availability of technology and convenience of services in the face of the obsolescence and limitations of traditional products, both in form and substance;

- the spread of the mobile Internet, which has led to a shift in the focus of the bank's customer acquisition strategy from opening another branch to creating online services and supporting the mobile version of the website;

- the success of technology companies in other sectors of the economy (retail, healthcare).

The National Bank of Ukraine has approved the Strategy for the Development of Fintech in Ukraine [16], i.e. a step-by-step plan for creating a full-fledged fintech ecosystem in Ukraine with innovative financial services and accessible digital services [6].

The strategy was based on the key areas set out in the Strategy for the Development of the Financial Sector of Ukraine [16]. This document structured and detailed the trends and directions of financial innovation development. The key effective elements of the Fintech Development Strategy in Ukraine were:

- developing and implementing the concept of a full-fledged regulatory sandbox for rapid testing of innovative projects;

– raising the level of financial awareness and involvement (inclusion) of the population and businesses;

– launching an academic base with a focus on open banking.

The implementation of the Fintech Development Strategy in Ukraine is also linked to the implementation of digital projects that the NBU is working on. In particular, these include the introduction of remote identification and verification, the implementation of the PSD2 European Directive, the possibility of making instant payments from account to account in the EPS 24/7; strengthening the regulatory perimeter in the field of cybersecurity, and all other innovative projects of the central bank.

The emergence of successful fintech companies that have significantly changed their markets and offered more competitive products and services has attracted significant interest from banking institutions.

Models of cooperation between banks and fintech companies are shown in figure 1.

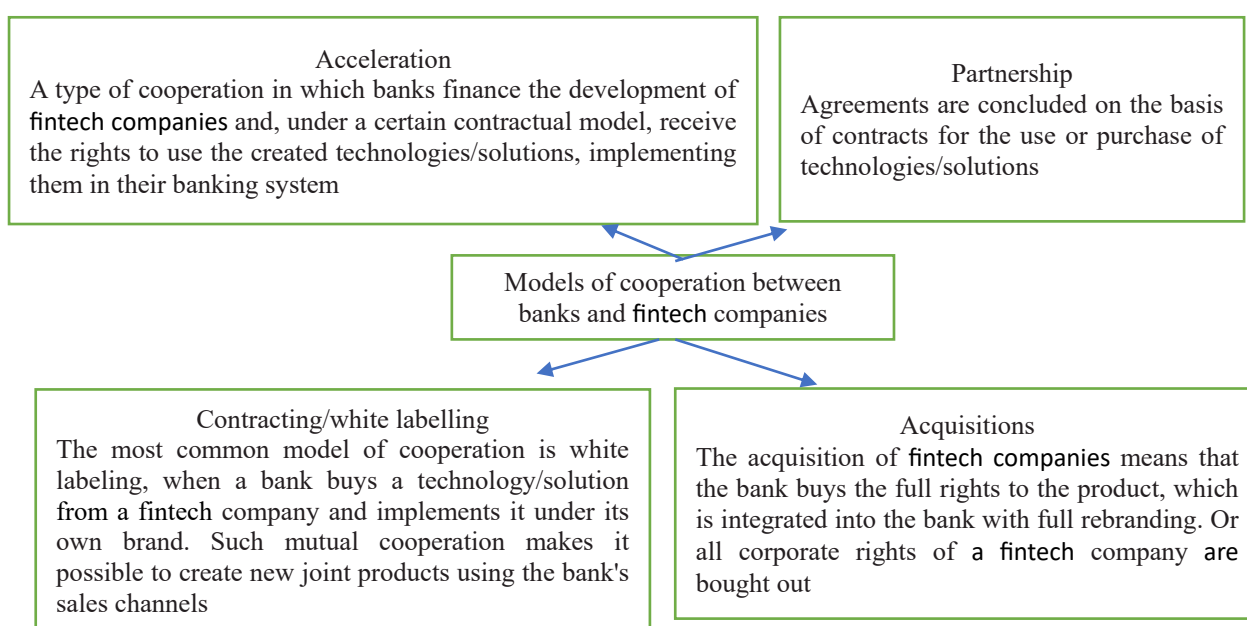


Figure 1. Models of cooperation between banks and fintech companies

Source: developed by the author on the basis of scientific publications [14; 17; 19; 22; 26]

Each of the models of cooperation between banks and fintech companies has its own characteristics and disadvantages. The risks of partnerships include the complexity of interaction, as exclusive partnerships (when all rights to an innovative technology/solution are transferred) significantly limit the ability of fintech companies to scale and develop an innovative financial technology or development in parallel. In a non-exclusive partnership, it is difficult for banks to secure competitive advantages in the financial market.

Acceleration is considered to be the most common form of cooperation between banks and fintech companies in the world today. However, this form of cooperation also has its drawbacks: significant monetary costs do not always lead to the desired result. Banks in Ukraine rarely invest in such developments, given the high time and financial costs involved. The disadvantage of such a form of cooperation as contracting is that under similar conditions, a fintech company can work with many other banks, which results in the loss of a unique competitive advantage. For banks, such a form of cooperation as an acquisition is an advantage. However, acquisitions often face problems with combining two businesses that have different corporate cultures and business models. Usually, such innovative technologies require constant improvement, which is difficult to do in this form of cooperation.

In Ukraine, cooperation between banks and fintech companies is hampered by contradictory and imperfect legislation and regulation. In addition, venture capital business is not typical for Ukrainian banks. Nevertheless, cooperation between banks and fintech companies offers the following benefits:

- the opportunity to receive banking services without being tied to branches and working hours;
- speed of operations, security of transactions and data in the digital environment;
- banks gaining unique competitive advantages;
- Increasing sales and attracting new customers;
- creating synergies by reducing costs.

Currently, fintech offers innovative solutions for the main areas of bank operations that institutions can use to modernise their traditional services (table 2).

*Table 2. Areas of application of financial technologies in the banking sector*

Sector of application	Financial technology	Application
Payment services	<ul style="list-style-type: none"> <li>– Electronic wallets</li> <li>– Mobile banking</li> <li>– Peer-to-peer payments (P2P)</li> <li>– Online transfer services</li> <li>– Cloud cash registers</li> <li>– B2B transfers</li> <li>– P2P currency exchange</li> </ul>	All payments that are initiated, processed and received are electronic, ensuring fast and secure transfers. Unlike traditional transactions, the new payment services discourage theft and other crimes involving cash.
Lending	<ul style="list-style-type: none"> <li>– Crowdfunding</li> <li>– Crowdlending</li> <li>– P2P lending</li> <li>– BNPL (Buy Now Pay Later)</li> </ul>	The technology allows banks to streamline the loan process: customers can apply online and get approved in minutes.
Insurance services	<ul style="list-style-type: none"> <li>– Blockchain</li> <li>– Smart contracts</li> <li>– Insurtech</li> <li>– P2P insurance</li> </ul>	Improving existing insurance products and services with the help of financial technologies that can reduce costs while improving the quality and transparency of the company's operations.
Investment management	<ul style="list-style-type: none"> <li>– High-frequency trading (HFT)</li> <li>– Mobile trading</li> <li>– Online brokerage</li> <li>– Robo-consulting</li> <li>– Social trading</li> </ul>	This technology helps banks offer customers more personalised solutions tailored to their needs. It includes services for asset allocation and portfolio optimisation using technological devices.

*Source: developed by the author on the basis of scientific publications [15; 18; 20; 21; 26]*

To determine the impact of financial technologies on the modern banking sector, we propose to define this concept as the industry that includes financial technologies for the provision of banking services in the financial market. The Basel Committee on Banking Supervision under the Bank for International Settlements classifies financial technologies into four sectors as shown in table 3.

*Table 3. Classification of financial technologies by the Basel Committee on Banking Supervision*

Sector			
Loans, deposits and capital growth services	Payment, clearing and settlement services		Asset management services
	Retail	Wholesale trade	
Crowdfunding	Mobile wallet	Money transfer network	High-frequency trading
Lending market	P2P payments	Wholesale foreign exchange trading	Social trade
NeoBank	Cryptocurrency	Digital currency exchange platforms	E-commerce
Alternative credit scoring			Robot consultants
Service to support the market	Portal and data aggregators		
	Ecosystem (infrastructure, open source, APIs)		

	Using data (big data analysis, machine learning)
	Security (consumer identification and authentication)
	Cloud programming
	Internet of things/mobile technologies
	Artificial intelligence (bots, automation in finance, algorithms)

Source: developed by the author on the basis of scientific publications [17; 23; 27]

According to the Basel Committee on Banking Supervision, the main areas of fintech products and services include:

- loans, deposits and capital raising: crowdfunding (a way of raising funds for the growth and development of a project, initiative, enterprise or programme through contributions from a large number of third parties who may be unrelated to the project itself or to professional business investment) [8];
- lending market; mobile banking, customer creditworthiness assessment (scoring);
- cash and settlement operations, clearing, mobile wallet, P2P lending, cryptocurrency, cashless payments;
- investment process management: high-frequency trading, copy-driving, e-trading, automated consulting [14].

In our view, the classification of financial technologies developed by the Basel Committee on Banking Supervision is the most appropriate, as it divides financial technologies into sectors that are directly related to core banking services.

**Discussion.** Theoretically, financial technologies in the banking sector are positive for economic growth and contribute to the transformation of the banking sector. Table 4 shows the potential benefits of financial technology in the banking sector.

Table 4. Potential benefits of the application financial technologies in the banking sector

Potential benefits	Impact on the economy
Decentralisation and diversification (observed as a result of increased competition and improved quality of services)	In lending, fintech innovations such as big data analytics and loan origination automation are reducing barriers to entry. Robo-advisory services introduce new players into the asset management sector and could therefore increase diversification depending on the variety of models used. In other words, the use of distributed ledger financial technologies could reduce concentration in the regulatory process.
Efficiency (achieved through modern technology platforms)	Robo-advisory services and financial technology that simplify back-office functions can strengthen the business models of incumbent financial institutions. Machine learning and artificial intelligence can help improve decision-making processes by enhancing the models used by financial institutions and investors. The use of algorithms for assessing creditworthiness and investment opportunities allows platforms to operate at relatively low costs. Fintech lending platforms can reduce customer acquisition and transaction costs and lead to better capital allocation. Distributed ledger financial technologies can reduce risks by reducing settlement times.
Transparency	More and better use of data can reduce the asymmetry of information in the financial services market. Improved data can enable the creation of smart contracts that more accurately target the specific risks that users want to manage. Fintech lending and crowdfunding can connect household and business markets (facilitating the emergence of small and medium-sized enterprises without the involvement of banks).
Access to and convenience of financial services	Neobank enables consumers to obtain credit services and make purchases quickly and efficiently. Robo-advisory services expand access to wealth management for households. There is potential to develop the payments ecosystem to expand access to wholesale payment systems.

Source: developed by the author on the basis of scientific publications [15; 18; 20; 21; 26; 29]

At the same time, the use of financial technologies in the banking sector is a source of potential risks for the economy at both the micro and macroeconomic levels (table 5).

Table 5. Potential risks from use financial technologies in the banking sector

Potential risk	Impact on the economy
Micro level	
Mismatch of loan maturities	Maturity mismatches may arise as a result of securitisation or if credit platforms start using their own balance sheet to form sinking funds
Liquidity risk	Fintechs usually do not involve the storage of customer money. As a result, most fintech loans are not sufficiently collateralised
Cyber risk	Increased use of financial technology and digital solutions expands the range and number of entries points that cyber hackers can attack
Dependence on third parties	Robo-advice and financial technology lending rely on third-party data providers that can be concentrated in one place
Legal / regulatory risk	There are legal uncertainties related to fintech innovations, such as smart contracts or robo-advisors. The regulatory framework is fragmented and varies significantly from country to country
Business risk of critical financial market infrastructure	If innovative payment and settlement services evolve into critical services, overall business disruption could affect the delivery of critical services and prevent their recovery
Systemic risk	Significant and unpredictable losses incurred by one fintech platform may affect others. Increased automation of trading strategies (more sophisticated algorithmic trading, social trading) may lead to new and unpredictable shocks in financial markets
Procyclicality	Interactions between investors and borrowers on fintech lending platforms have the potential to be more volatile than traditional intermediation, as a sudden, unexpected increase in NPLs could trigger a crisis of confidence. Increased access to low-cost financing may increase competition between market participants and, as a result, reduce prices, which could lead to overcrediting of the economy
Excessive volatility	Algorithmic trading platforms may be more active during periods of low volatility, but quickly exit the market during periods of market stress when liquidity requirements are high, thereby increasing asset price volatility. Fintech aggregators are designed to facilitate the rapid movement of cash around the banking system depending on price and relative performance, which can increase the volatility of bank deposits and, as a result, affect bank liquidity
Systemic importance	Digital currencies and wallets may themselves displace traditional bank payment systems. Fintech aggregators may become the default means of accessing banks and applying for new bank accounts and loans

Source: developed by the author on the basis of scientific publications [14; 17; 19; 22;26]

Along with the above-mentioned benefits, financial technology in the banking sector has the potential to adversely affect the banking system and the provision of critical banking services. A serious disruption of these services or the disintermediation of the regulated entities that provide them could have potentially serious negative consequences for the economy.

**Conclusions.** Summarising the above, the following conclusions can be drawn:

1. Financial technologies are a key lever for the digital transformation of the banking sector. They provide new tools to improve the efficiency, accessibility and convenience of financial services.
2. The evolution of fintech includes several stages, starting with the introduction of electronic systems and ending with disruptive technologies such as artificial intelligence, blockchain and big data.
3. Cooperation between banks and fintech companies can be based on several models, each of which has its own advantages and risks. Acceleration and acquisition are the most common. However, they also have their drawbacks.

Despite significant progress in the development of fintech, there are obstacles in Ukraine in the form of imperfect legal regulation and underdeveloped venture capital business in the banking sector.



**Prospects for further research** in this area include an in-depth analysis of the impact of digitalisation and financial technologies on the banking sector, a study of new banking business models, such as neobanks and fintech companies, and an assessment of the risks and opportunities associated with the introduction of artificial intelligence and blockchain in banking. Thus, another important area is the study of regulatory challenges and new approaches to regulating financial innovations, in particular in the context of ensuring the stability of the financial system and protecting financial services consumers.

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- The article was received by the editors 07.11.2024*  
*The article is recommended for printing 12.12.2024*

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### Концептуальні зміни архітектури банківського сектору в сучасних умовах

**Актуальність.** Сучасні тенденції глобалізації та цифровізації значно впливають на архітектуру банківського сектору, вимагаючи адаптації та трансформації традиційних моделей банківських операцій. Стрімкий розвиток фінансових технологій, зростання популярності криптовалют, зміна регуляторних вимог, а також зміни в поведінці споживачів вимагають перегляду концептуальних основ діяльності банківських установ.

**Мета й об'єкт дослідження.** Метою даного дослідження є визначення концептуальних змін, які відбуваються в архітектурі банківського сектору під впливом сучасних технологічних, економічних та соціальних змін.

Об'єктом дослідження є банківський сектор як частина фінансової системи, що зазнає змін під впливом глобальних економічних процесів, інноваційних технологій та регуляторних реформ.

**Методи дослідження.** У процесі дослідження використовувалися такі методи, як порівняльний аналіз, системний аналіз. Для отримання якісних результатів було проведено аналітичний огляд фінансово-економічної літератури та нормативно-правової бази щодо архітектури банківського сектору.

**Результати дослідження.** Дослідження показало, що сучасна архітектура банківського сектору зазнає значних змін під впливом цифрових технологій та інновацій. Однією з ключових тенденцій є інтеграція фінансових технологій, що дозволяє банкам оптимізувати свої операційні процеси, підвищити ефективність управління ризиками та покращити якість обслуговування клієнтів. Банки активно впроваджують штучний інтелект для автоматизації процесів, блокчейн для підвищення прозорості та безпеки транзакцій, а також великі дані для аналізу поведінки клієнтів і прийняття рішень. Водночас виникають нові виклики, пов'язані з кібербезпекою, регуляторними змінами та конкуренцією з боку небанківських фінансових установ.

**Практична цінність отриманих результатів** полягає в тому, що проведений аналіз дозволяє банківським установам і регуляторам більш ефективно адаптуватися до нових умов.

Отримані висновки можуть бути використані для оптимізації банківської діяльності, вдосконалення внутрішніх процесів, розробки нових фінансових продуктів і зміцнення стійкості до фінансових ризиків, що виникають у зв'язку з постійними змінами на фінансовому ринку.

Концептуальні зміни архітектури банківського сектору визначають нові підходи до управління, стратегії розвитку та надання послуг. Цифровізація стала невід'ємною частиною банківської діяльності, що змушує банки переглядати свої бізнес-моделі та активно інвестувати в технологічні інновації.

**Ключові слова:** архітектура банківського сектору, цифровізація, фінансові технології, блокчейн, штучний інтелект, великі дані, кібербезпека.

Формули: 0, рис.: 1, табл.: 5, бібл.: 34.

**Для цитування:** Tkachenko O. Conceptual changes in banking sector architecture in modern conditions.. Фінансово-кредитні системи: перспективи розвитку. №4(15) 2024. С. 20-31. DOI: <https://doi.org/10.26565/2786-4995-2024-4-02>

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- Стаття надійшла до редакції 07.11.2024  
Статтю рекомендовано до друку 12.12.2024