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## **DIGITAL TRANSFORMATION OF THE BANKING SYSTEM OF UKRAINE: INNOVATIVE MODELS, TECHNOLOGIES AND ECONOMIC EFFICIENCY**

## **ЦИФРОВА ТРАНСФОРМАЦІЯ БАНКІВСЬКОЇ СИСТЕМИ УКРАЇНИ: ІННОВАЦІЙНІ МОДЕЛІ, ТЕХНОЛОГІЇ ТА ЕКОНОМІЧНА ЕФЕКТИВНІСТЬ**

*This article examines the impact of digital transformation on Ukraine's banking sector, particularly the role of information technology in enhancing the efficiency and competitiveness of financial institutions. The author analyses the key technological trends that will determine the future of banking, such as artificial intelligence, blockchain, 5G, cloud computing and the Internet of Things. Particular attention is paid to the prospects for the development of digital banking in the context of the growing influence of neo-banks, fintech companies, and new business models, such as BaaS. A comprehensive digital modernisation strategy focused on the small and medium-sized enterprise (SME) segment is proposed using JSC CB 'PrivatBank' as an example. The necessity of implementing specialised software solutions that integrate with online banking – including electronic document management, business intelligence and business idea evaluation tools – is substantiated. A financial and economic assessment of the proposed project was carried out, confirming its high investment attractiveness: the net discounted cash flow over six years exceeds UAH 230 million, with annual profits in excess of UAH 66 million. These results demonstrate that digitalising banking services meets modern customer needs and strengthens the bank's market position, promotes financial inclusion and creates an effective financial ecosystem.*

**Keywords:** digital transformation, digital economy, financial sector, financial instruments, information technology, digital banking, blockchain.

*У статті розглядається роль цифрових технологій як ключового чинника трансформації банківської системи в умовах сучасної економіки. Особлива увага приділяється впливу інновацій на ефективність функціонування банківських установ, їх адаптацію до викликів цифрової економіки та зростаючих запитів клієнтів щодо якості та швидкості фінансового обслуговування. Встановлено, що впровадження технологій штучного інтелекту, блокчейну, мобільного та інтернет-банкінгу, безконтактних платежів, хмарних рішень та 5G забезпечує не лише операційну оптимізацію, а й формування персоналізованих підходів до клієнтів. Метою дослідження є обґрунтування ефективності використання цифрових інновацій у банківській сфері України та аналіз потенціалу їх впровадження для розвитку онлайн-банкінгу, особливо в контексті підтримки мікро-, малого та середнього бізнесу. У межах дослідження проаналізовано новітні бізнес-моделі цифрового банкінгу, зокрема розвиток необанків, банківських маркетплейсів та концепції BaaS. Доведено, що ці формати стають основою для створення гнучких фінансових екосистем, які забезпечують взаємодію між класичними банками, фінтех-компаніями та кінцевими користувачами. На прикладі АТ КБ*

*«ПриватБанк» представлено проєкт з розробки програмних рішень для підтримки малих і середніх підприємств (МСП), що включає сервіси електронного документообігу, бізнес-аналітики, інтегрованих платіжних систем та інструментів оцінки бізнес-ідей. Встановлено, що цифрова трансформація є визначальним чинником адаптації банківських установ до нових ринкових реалій, особливо в умовах актуальних загроз і нестабільності, зумовлених, зокрема, воєнними подіями в Україні. Зазначено, що інтеграція цифрових технологій суттєво трансформувала традиційні підходи до ведення банківського бізнесу, сприяючи підвищенню його результативності та розширенню переліку послуг, орієнтованих на потреби споживачів. Запропонована стратегія орієнтована на підвищення конкурентоспроможності банку, розширення клієнтської бази та зростання обсягів кредитного портфеля. Економічні розрахунки засвідчують інвестиційну привабливість ініціативи: чистий дисконтований грошовий потік перевищує 230 млн грн, а річний прибуток стабільно перевищує 66 млн грн. Результати дослідження свідчать про доцільність глибокої цифровізації банківської діяльності в Україні та необхідність подальшого наукового супроводу таких трансформацій.*

**Ключові слова:** цифрова трансформація, цифрова економіка, фінансовий сектор, фінансові інструменти, інформаційні технології, цифровий банкінг, блокчейн.

**Formulation of the problem.** In the context of the modern banking sector, information technology has become a strategic resource that ensures the efficiency and competitiveness of financial institutions. Global digitalisation trends are creating a need for the intensive implementation of innovative solutions, driven by growing customer demand for efficient, high-quality, convenient financial services. Consequently, banks must abandon traditional business models in favour of technology-oriented approaches.

Digital transformation in banking is proceeding rapidly, driven by high competition, favourable regulatory policies, rising costs of maintaining traditional infrastructure and growing consumer confidence in digital services [1]. Integrating modern technologies such as mobile and internet banking, contactless payment systems, blockchain and artificial intelligence allows for significant operational process optimisation, cost reduction and increased personalisation of banking services.

Digital banking is a dynamic and innovative field that requires constant academic reflection and the development of new methodological approaches and practical solutions. Developing scientifically based mechanisms for digital transformation will strengthen the banking system's resilience and its ability to adapt to the requirements of the digital economy [3].

The digital transformation of the banking sector is relevant because it requires a significant revision of the models of interaction between financial institutions and customers, an increase in market stability, the modernisation of service tools and an expansion of the range of banking products and services offered. An innovation-oriented bank must build a customer-centred service system that is highly convenient and efficient, and introduce effective indicators for assessing the quality of banking operations.

One of the priority areas for development is the active use of modern digital technologies, particularly the expansion of electronic financial services. Changes in the global economic

environment, domestic economic fluctuations and the growing importance of digital markets are transforming the banking sector. In this context, the digital environment is becoming a critical factor in all key areas of banking institutions' activities, including strategic planning, operational processes, and customer relations.

**Analysis of recent research and publications.** An analysis of current research papers and publications shows a growing interest in the processes of digital transformation of the Ukrainian banking system on the part of both the academic community and financial sector practitioners. In particular, Ukrainian scientists V. Baranova and co-authors [2] study current trends in financial engineering, focusing on the introduction of innovative mechanisms for managing financial flows. They emphasise the role of machine learning algorithms in predicting financial risks and optimising banking portfolios, which contributes to the efficiency of banking institutions.

The study by N. Danik and A. Torlopov emphasises the significant changes taking place in traditional business models of banks under the influence of digital transformation, which requires financial institutions to adapt to new market conditions. The author emphasises the growing importance of fintech companies that actively cooperate with banks to implement innovative solutions and expand the range of banking services [4].

L. Bondarenko and A. Podaryn [5] analyse the dynamics of digital change in Ukraine's banking sector, noting positive trends in the adoption of digital tools, as confirmed by international ratings. Ukraine in particular demonstrates a steady increase in digital competitiveness and in the spread of contactless payment technologies, indicating its active participation in global digitalisation processes.

The study by I. Kochuma looks at the main ways in which banks are using digital technology to transform their businesses. It also analyses the structural components of this transformation and identifies the different stages that are being implemented [7]. The

author identifies the following key stages: the introduction of digital communication channels with customers; the creation of digital banking products; the transition to comprehensive digital services; the formation of the 'digital brain' of the bank; and the development of digital DNA to ensure the adaptability and integrity of banking activities in the context of digital transformation.

Innovative business models are given special attention, including an intelligent omnichannel bank, a highly socially integrated bank, and financial and non-financial banks operating within digital ecosystems. The author emphasises that introducing such models is essential for banks to maintain their competitive position in a rapidly changing digital environment [8]. Despite the rapid development of digital financial services, a number of challenges still hinder the Ukrainian banking sector's full digital transformation [9].

In our opinion, there is no established mechanism for integrating banks with fintech companies, particularly in terms of developing joint digital products for business. There is a lack of practical models of cooperation that would ensure the efficiency and security of such solutions.

To ensure the sustainable development of digital banking, it is necessary to overcome technological, organisational and methodological barriers, focusing on the creation of adaptive and cost-effective solutions, which makes this study timely and relevant.

**The purpose of the article.** The purpose of this article is to investigate and substantiate the effectiveness of information technologies for the development of the banking sector in Ukraine.

**Summary of the main material.** The proliferation of digital technologies has led to the development of new online banking services that prioritise convenience and personalisation. These include [6]:

- digital banks that operate exclusively online and allow users to open accounts, make payments and apply for loans without visiting branches;

- financial marketplaces combine various banking services on one platform to provide centralised financial management for users;

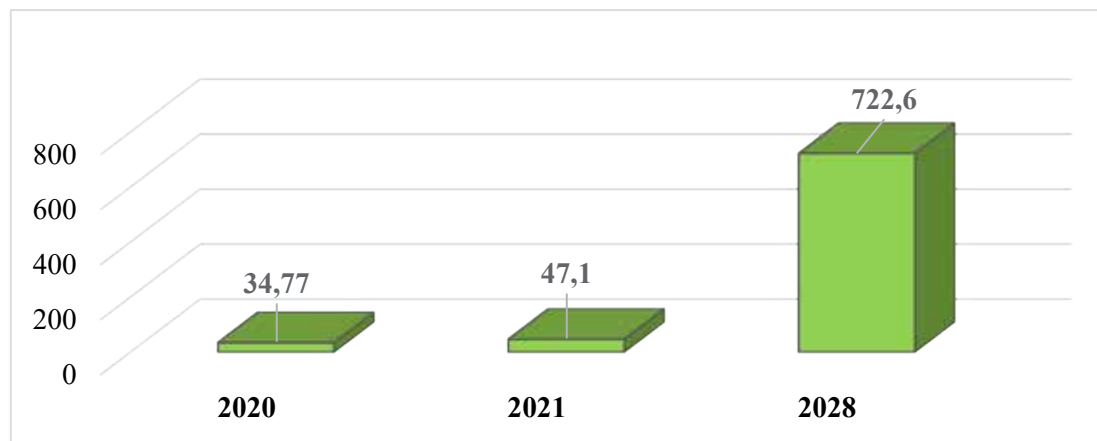
- the Banking-as-a-Service (BaaS) model provides third parties with access to banking infrastructure, facilitating the rapid introduction of new financial products and services.

The evolution of online banking is shaping new financial ecosystems where different business models coexist and interact. An example of this transformation is neobanks, hybrid structures that combine the key features of digital banks, marketplaces and BaaS platforms, providing flexible and customer-focused services.

According to experts' forecasts, the market size where neobanks will be present in 2028 will increase approximately 21 times compared to 2020. This means that while in 2020 the market for non-banks was valued at USD 34.77 billion, in 2028 it could reach USD 722.6 billion (Figure 1).

The COVID-19 pandemic and the full-scale invasion of Ukraine have been powerful catalysts for the digitalisation of the banking sector, leading to the rapid introduction of modern technologies. The need for remote customer service and ensuring the stability of financial transactions in crisis conditions has significantly accelerated the processes of digital transformation in banks.

In the context of digital banking, technology and data play a decisive role, forming the basis for innovative development in this area. It is expected that by 2030, leading financial institutions will implement personalised approaches to customer service, actively using big data analytics and artificial intelligence to create individualised financial products and predict consumer needs.



**Fig. 1. Experts' forecasts of the size of the global non-bank market (USD billion)**

Source: compiled by the authors based on [10]

The rapid development of technologies such as artificial intelligence, blockchain and fifth-generation (5G) mobile communications is causing fundamental changes in the financial sector. These changes are transforming service delivery mechanisms, making them more secure, accessible and user-centric. A large-scale transformation of traditional financial infrastructure is expected within the next 10–15 years [11].

An important area of digital development for banks is deepening partnerships with fintech companies, particularly in PoS financing – a short-term lending model directly at points of sale. This segment, which has a market value of over \$391 billion, is experiencing dynamic growth, particularly among online shoppers. By cooperating with fintech platforms, banks can quickly implement advanced technologies, such as artificial intelligence and machine learning, to automate lending processes and improve the assessment of customer creditworthiness. This contributes to wider access to financial services and increased customer satisfaction.

We examine the prospects for the further development of internet banking, taking into account current technological trends, using the example of PrivatBank, one of the leaders in the Ukrainian banking market. In order to strengthen its market position, the bank could offer small businesses an innovative service in the form of free software integrated with online banking.

This approach will help optimise business costs and increase efficiency (see Table 1).

The results of the analysis of queries in the Google search engine indicate significant interest among the target audience in Ukraine in the software products we offer. With a coverage of about 75% of potential users, it is projected that an annual volume of 2.8 million ad impressions and about 197,000 clicks on the relevant web resources will be achieved [12].

Marketing research has revealed that among representatives of the target segment, the most popular services are electronic signatures, business plan preparation, and the implementation of electronic document management systems. The cost per click in online advertising varies depending on the type of service, with the highest rates being typical for business analytics and electronic reporting. The total annual budget for marketing activities is 10,958,000 hryvnia.

Based on the analysis and forecasts, it is expected that the implementation of the proposed digital solutions will attract approximately 1,970 new small and medium-sized businesses. Given the average loan size in this segment, the total loan portfolio is expected to increase by approximately 8.2 billion hryvnias. This forecast indicates the high effectiveness of the chosen strategy for the digital transformation of banking services and the development of online banking (Table 2).

Table 1

**Expanding the range of services, including free services, for small and medium-sized enterprises (SMEs) in order to increase the attractiveness of PrivatBank JSC's online banking for this category of customers**

Solution to the problem: insufficient competitiveness in the field of lending to small and medium-sized enterprises.	Development of a set of useful software tools for SMEs, such as business analysis, integration of online payments on websites, assessment of business project potential, creation of web business cards using artificial intelligence, and other features that will increase the bank's value for customers.	Impact on competition and efficiency: the net present value (NPV) of this measure will be 231 million hryvnia. This will strengthen the bank's market position, which is an important element of its competitiveness.
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Source: constructed by authors

Table 2

**Estimated economic effect for the bank from developing online programmes for SMEs (in the first year of operation)**

№	Indicator	unit of measuring	Value
1	Number of transitions	units	197000
2	Average conversion rate on the Internet	%	1
3	Expected number of new SME customers	units	1970
4	Average loan size for SMEs at the bank	thousand UAH	56,307
5	Expected growth in SME loan portfolio	million UAH	110,93
6	Share of net interest income in gross interest income	%	90,01
7	Economic effect in the form of increased net interest income from additional SME loans	million UAH	99,85

Source: constructed by authors

The analysis shows that the implementation of the project to attract new customers from the SME segment will lead to a significant increase in net interest income. Thanks to the high interest margin of 90.01%, revenues are expected to grow by 99.85 million hryvnia, confirming the effectiveness of the chosen online banking development strategy.

Despite its significant potential, the development of internet banking in Ukraine is hampered by a number of factors. These include high cybersecurity costs, competition from international financial institutions, and the need to adapt services to the needs of different population groups, especially those affected by the war.

Overall, the digitalisation of the banking sector is transforming traditional financial institutions, making them more customer-focused, innovative and efficient.

Developing online programmes for SMEs is a profitable investment project for PrivatBank. The business analytics tools, online payments and business idea assessment included in the service package meet the current needs of small businesses and contribute to the bank's revenue growth and customer base expansion.

**Conclusions.** The digital transformation of Ukraine's banking system is an objective necessity driven by changing consumer expectations, the development of financial technologies, high levels of competition and the growing role of online service channels. The introduction of

innovative technologies – in particular artificial intelligence, blockchain, cloud computing and mobile banking – is shaping a new architecture for financial services. Innovative banking models, such as neobanks, financial services marketplaces, and the BaaS concept, are becoming the basis for new ecosystems in which digital services provide a high level of personalisation, integration, and accessibility for customers. This opens up prospects for closer cooperation between banks and fintech companies.

JSC CB PrivatBank's example demonstrated the feasibility of focusing digital solutions on small and medium-sized enterprises (SMEs). Developing and implementing comprehensive software integrated with online banking helps optimise SME costs and increases this segment's engagement with digital banking products. However, the digitalisation of the banking sector requires the overcoming of several barriers, including insufficient integration with fintech structures, the high cost of cyber security, a shortage of IT specialists and the need to adapt services to wartime conditions. These challenges can be overcome with strategic planning and state support for innovative solutions.

Digital transformation strengthens the market position of Ukrainian banks, improves the quality of customer service, expands financial inclusion and develops an effective digital environment capable of ensuring the stability of the banking system in the post-crisis period.

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