ANALYSIS OF THE USE OF ARTIFICIAL INTELLIGENCE IN THE DIGITAL FINANCIAL ENVIRONMENT IN UKRAINE

АНАЛІЗ ВИКОРИСТАННЯ ШТУЧНОГО ІНТЕЛЕКТУ В ЦИФРОВОМУ ФІНАНСОВОМУ СЕРЕДОВИЩІ В УКРАЇНІ

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The significance of the research is determined by the fact that the use of AI in the digital financial environment of Ukraine opens numerous opportunities for improving its efficiency, security, accessibility, and innovation. Therefore, this article is devoted to the analysis of the specifics of using artificial intelligence in the digital financial environment in Ukraine. Within the research, it has been proven that artificial intelligence is actively being implemented and adapted to the needs of various areas of the digital financial environment through specific transformations. It has been concluded that among the transformations driven by the use of artificial intelligence in the digital financial environment in Ukraine, we can distinguish the growing popularity of remote payments, the expansion of open banking usage, the development of digital identification, the advancement in financial data analysis, fraud detection, process automation, and the provision of personalized financial advice, the increase in the number of fintech companies working with AI, the heightened focus on cybersecurity, and the active regulation of the digital financial environment.

Keywords: fintech companies, digital payment instruments, online banking, electronic wallets, payment cards, financial solutions regulation of the digital financial environment.

Значущість дослідження обумовлена тим, що використання штучного інтелекту в цифровому фінансовому середовищі України відкриває перед його користувачами численні можливості. Отже, стаття присвячена аналізу специфіки використання штучного інтелекту в цифровому фінансовому середовищі України. У межах дослідження було доведено, що штучний інтелект активно впроваджується та адаптується до потреб різних сфер цифрового фінансового середовища через специфічні трансформації. Висновок дозволяє виокремити кілька ключових трансформацій, які відбуваються у цифровому фінансовому середовищі України завдяки використанню штучного інтелекту. Серед них зростання популярності віддалених платежів, розширення використання відкритого банкінгу, розвиток цифрової ідентифікації, аналіз фінансових даних, виявлення шахрайства, автоматизація процесів та надання персоналізованих фінансових порад, зростання кількості фінтех-компаній, підвищення уваги до кібербезпеки та активне регулювання цифрового фінансового середовища. Зазначений висновок підтверджує, що використання штучного інтелекту є ключовим фактором у трансформації фінансового сектору України, забезпечуючи його ефективність, безпеку, доступність та інноваційність. Щодо ефективності фінансового сектору України, застосування штучного інтелекту дозволяє автоматизувати рутинні процеси, аналізувати великі обсяги даних та оптимізувати операції, що призводить до зниження витрат та підвищення продуктивності фінансових установ. Щодо безпеки фінансового сектору України, алгоритми штучного інтелекту можуть ефективно виявляти шахрайські дії, відмивання грошей та інші фінансові злочини, що забезпечує безпеку транзакцій та захист активів клієнтів. Щодо доступності фінансового сектору України, завдяки штучному інтелекту фінансові послуги стають доступнішими для широкого кола населення, включаючи жителів віддалених регіонів та людей з обмеженими можливостями. Щодо інновацій у фінансовому секторі України, штучний інтелект стимулює розробку нових фінансових продуктів та послуг, таких як персоналізовані інвестиційні рекомендації, інтелектуальне управління ризиками та інноваційні платіжні рішення.

Ключові слова: фінтех-компанії, цифрові платіжні інструменти, онлайн-банкінг, електронні гаманці, платіжні картки, фінансові рішення.

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Target setting. The digital financial environment in Ukraine is an ecosystem that combines financial services, technologies, and infrastructure for conducting financial transactions and interactions between market participants in electronic format. It began to form at the end of the 20th century with the emergence and spread of information technologies and the Internet. At the same time, with the transition to the stage of rapid development of technologies and globalization, the digital financial environment of Ukraine is undergoing continuous transformations that change the way people and businesses interact with financial services. It should be noted that one of the most transformative technologies influencing this process is artificial intelligence (AI). The use of AI in the digital financial environment of Ukraine opens numerous opportunities for improving its efficiency, security, accessibility, and innovation.

Analysis of research and publications. The digital financial environment in Ukraine has not yet received due attention from scientists. Currently, there is no comprehensive approach to understanding the content and features of using artificial intelligence (AI) in the digital financial environment in Ukraine. It should be noted that some aspects of the outlined problem are being researched by Zianko V. and Nechyporenko T., who indicate that our country is actively developing a digital financial environment, implementing innovative solutions, and promoting the development of the fintech sector. According to these scientists, security is another area where AI brings significant benefits. Koziy N. S. and Synytsya O. O. draw attention to the multifaceted effect of artificial intelligence, which manifests itself through its ability to significantly increase the efficiency of financial operations (through the automation of routine processes, such as transaction processing, account management, financial data analysis, and auditing). Moșteanu N. R. indicates that AI can analyze large volumes of data in real time, allowing financial institutions to make quick and informed decisions. Thus, research on the digital financial environment and the use of artificial intelligence in the financial sector of Ukraine is necessary and relevant. It will allow for a deeper understanding of current processes, identify key challenges, and develop strategies for further development of financial technologies in the country.

The wording of the purposes of article (problem). The purpose of the article is to analyze the specifics of using artificial intelligence in the digital financial environment in Ukraine.

The paper's main body with full reasoning of academic results. According to recent research [2; 4; 5–6], the range of key components of the digital financial environment in Ukraine is quite broad. These components are represented by: digital payment instruments (mobile applications, online banking, electronic wallets, payment cards, contactless payments); fintech companies, startups, and innovative enterprises (entities that offer new technological solutions for the financial sector, such as online lending, investment platforms, personalized financial advisors, etc.); open banking (a system that implements the secure exchange of financial data between banks and third-party service providers with the client's consent); e-identification: (electronic signatures, BankID, MobileID, which allow identifying users online and providing them with access to financial services); regulatory technologies (RegTech) (ensuring compliance with regulatory requirements in the financial sector); infrastructural components (payment systems, electronic document management systems, cloud technologies, etc.). Thus, the key components of the digital financial environment in Ukraine are shown in Figure 1.

The content of these components clearly shows that the financial environment has a service, technological, and infrastructural basis, which connects its components and forms the basic principles of its digitalization.

So, the service basis of the financial environment includes all services provided by financial institutions to their clients [5]. The technological basis includes all technologies and technical solutions that are used to support and develop financial services [4–5]. The infrastructural basis includes all physical and organizational elements that ensure the functioning of the financial system [5].
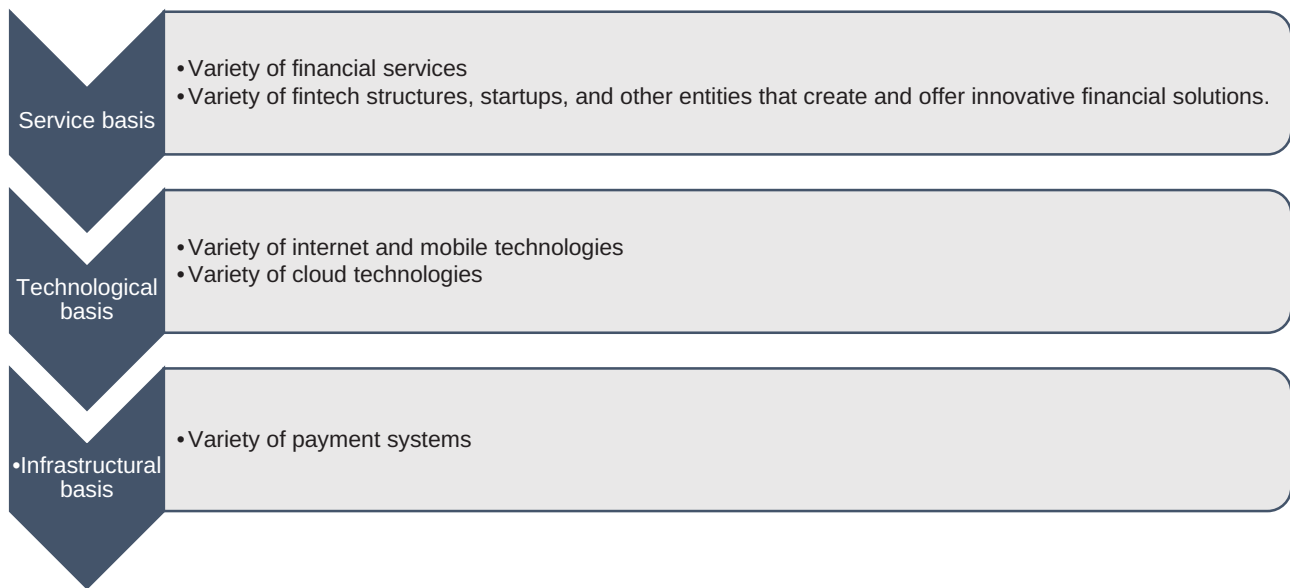
Given the continuous expansion of the service, technological, and infrastructural foundations of the digital financial environment through artificial intelligence (AI) (Figure 2), it is expected that the use of the latter will gradually expand its potential. This statement confirms that artificial intelligence is actively being implemented and adapted to the needs of various areas of the digital financial environment through specific transformations [4].

Among the transformations driven by the use of artificial intelligence in the digital financial environment in Ukraine are [1; 4–5]: increased popularity of remote payments, expansion of open banking usage, development of digital
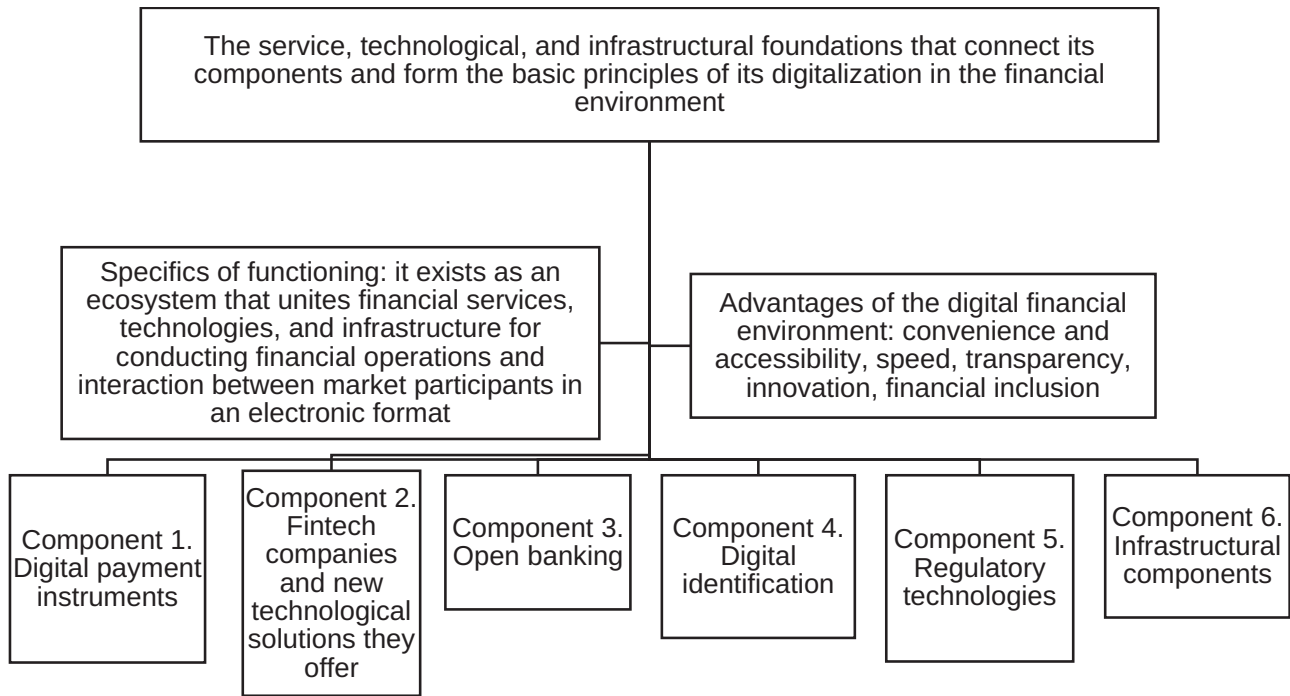
Figure 1. Key components of the digital financial environment in Ukraine

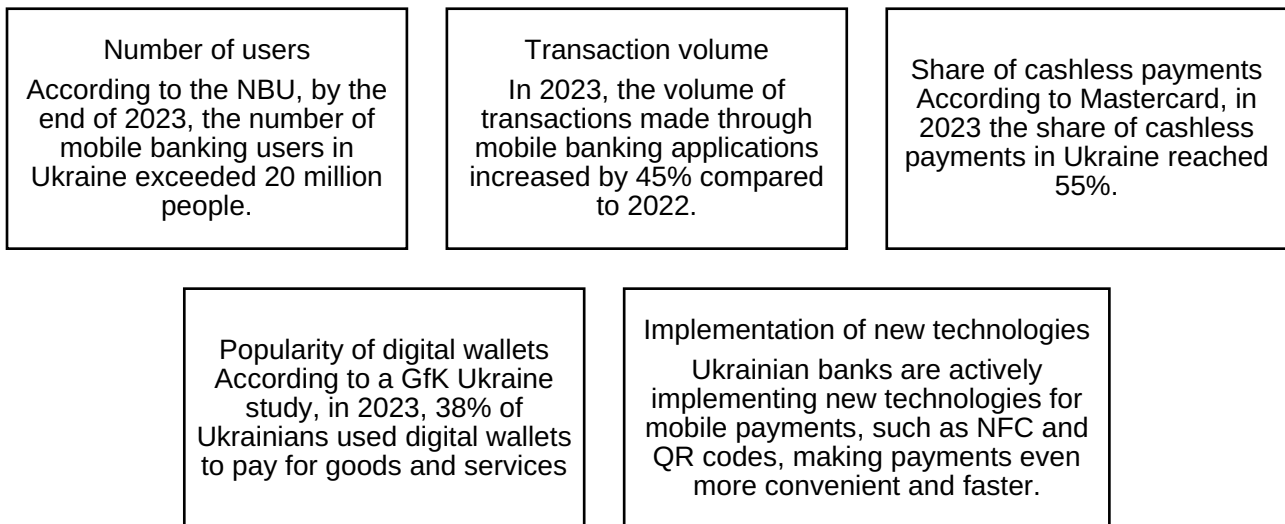*Source: formed based on [1; 5–6]*

Figure 2. Directions for expanding the service, technological, and infrastructural foundations of the digital financial environment through artificial intelligence

Source: formed based on [4–5]

identification, advancement in financial data analysis, fraud detection, process automation, provision of personalized financial advice, growth in the number of fintech companies utilizing AI, heightened attention to cybersecurity, and active regulation of the digital financial environment.

Thus, the growth in popularity of remote payments is a result of a significant number of mobile banking and digital wallet users, an increase in the volume and share of cashless transactions, and an increase in the number of new technologies for mobile payments implemented by banks (Figure 3).

Number of users
According to the NBU, by the end of 2023, the number of mobile banking users in Ukraine exceeded 20 million people.

Transaction volume
In 2023, the volume of transactions made through mobile banking applications increased by 45% compared to 2022.

Share of cashless payments
According to Mastercard, in 2023 the share of cashless payments in Ukraine reached 55%.

Popularity of digital wallets
According to a GfK Ukraine study, in 2023, 38% of Ukrainians used digital wallets to pay for goods and services

Implementation of new technologies
Ukrainian banks are actively implementing new technologies for mobile payments, such as NFC and QR codes, making payments even more convenient and faster.

Figure 3. Trends characterizing the growth in popularity of mobile payments and digital wallets

Source: formed based on EY data

These data indicate transformations in the digital financial environment, which are defined by the decrease in the use of cash in favor of cashless financial transactions that are carried out instantly, remotely, securely, and as a result of integration with other services.

The expansion of open banking is a result of the implementation of open banking, which allows third parties (fintech companies) to access the financial data of bank customers with their consent through API (Application Programming Interface). The outlined changes stimulate competition in the market and lead to the emergence of new innovative products and services [4]. Thus, the directions and content of transformations in the digital financial environment of Ukraine arising from the use of open banking are outlined in Table 1.

The development of digital identification is a result of the implementation of BankID (which allows using the data already available in the bank to identify the client in other online services) and MobileID (which uses your mobile phone number and a special SIM card to confirm your identity), which change the process of customer identification and provide them with the opportunity to receive financial services remotely. It contributes to increased financial inclusion and accessibility of financial services for all population segments. So, the directions and content of transformations in the digital financial environment of Ukraine from the development of digital identification are shown in Table 2.

Regarding the development of financial data analysis, fraud detection, process automation,

and personalized financial advice, they contribute to faster and more accurate data processing, reduced fraud risks, increased competitiveness of financial institutions, improved financial literacy of the population, and increased trust in financial institutions. Thus, the directions and content of transformations in the digital financial environment of Ukraine from the outlined processes are shown in Table 3.

Regarding the growth of fintech companies working with AI, the outlined trends have led to increased competition in the financial market, the emergence of new and innovative financial products and services, and a decrease in the cost of financial services according to the specifics shown in Table 4.

The outlined changes are due to the rapid development of the fintech sector in Ukraine, which produces an increase in companies and startups offering innovative solutions in the field of payments, lending, investments, and other financial services (among them Monobank, Portmone, Finmap, LeoGaming). Thus, over the past 2021–2023, the number of fintech startups in Ukraine has grown exponentially. According to the Ukrainian Association of Fintech and Innovative Companies (UAFIC), in 2023, more than 200 fintech companies were operating in Ukraine. These trends synthesized the phenomenon of continuous modernization of its financial sector. Thus, according to a study by Adventures Capital, in 2022, Ukrainian fintech startups attracted more than $100 million in investments, and in 2023, $110 million in products and services such as personalized

Table 1

Directions and content of transformations in the digital financial environment of Ukraine from the use of open banking

Transformations	Content of transformations	The direction of AI action in the defined area
Stimulation of competition	Fintech companies get the opportunity to compete with traditional banks by offering innovative and more convenient financial services. It forces banks to improve their products and services to remain competitive.	Open banking through AI enables third parties to access the financial data of bank customers with their consent, facilitating the emergence of new players in the market who can use this data to create innovative products and services. AI can be used to analyze this data and develop new solutions.
Emergence of new innovative products and services	Open banking creates a favorable environment for the development of the fintech industry. New companies can use customer data to develop personalized financial solutions, such as budget management tools, investment platforms, financial product comparison services, etc.	
Convenience and accessibility of financial services	Customers get the opportunity to use the services of different financial institutions through a single interface, which simplifies financial management and makes them more accessible.	
Reduction of the cost of financial services	Competition between banks and fintech companies contributes to lower prices for financial services, making them more affordable for a wider range of consumers.	

Source: formed based on [3; 5; 7]

Table 2

Directions and content of transformations in the digital financial environment of Ukraine from the development of digital identification

Transformations	Content of transformations	The direction of AI action in the defined area
Increased financial inclusion	Digital identification allows people who previously did not have access to banking services (for example, due to remoteness from branches or lack of documents) to receive financial services remotely.	Digital identification through AI is an important element of the digital economy, contributing to the development of e-commerce, online payments, and other digital services
Reduced bureaucracy	There is no need to personally visit banks and provide copies of documents, which reduces the bureaucratic burden on customers and financial institutions.	
Enhanced security	Digital identification uses modern security technologies, making it more secure than traditional identification methods.	

Source: formed based on [1; 5–6]

investment recommendations, intelligent risk management, and innovative payment solutions.

The outlined changes stimulate competition in the market and lead to the emergence of new innovative products and services. Thus, the directions and content of transformations in the digital financial environment of Ukraine arising from the use of open banking are outlined in Table 1. So, according to CERT-UA, the number of cyberattacks in the domestic financial sector in 2023 increased by 25% (compared to the previous year).

According to the Kaspersky Lab report, Ukrainian banks and fintech companies are frequently targeted by phishing, malware, and DDoS attacks. Therefore, financial institutions and fintech companies are actively implementing new data protection technologies and increasing customer awareness about the safe use of digital financial tools.

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Table 3

Directions and content of transformations in the digital financial environment of Ukraine from data analysis, fraud detection, process automation, and personalization of financial advice

Transformations	Content of transformations	The direction of AI action in the defined area
Efficiency of financial operations	The speed and accuracy of data processing increase, which accelerates the execution of transactions and reduces the number of errors	AI can process large amounts of information much faster and more accurately than humans. AI algorithms can analyze transactions and customer behavior in real-time, detecting suspicious activity and preventing fraud. AI automates many routine operations, such as processing loan applications, making payments, reviewing insurance claims, etc
Security of financial operations	Thanks to data analysis and fraud detection, the risk of losing money due to fraudulent activities is reduced	
Accessibility of financial services	Automation of processes and personalized advice make financial services more accessible and understandable for a wider range of users	
Competitiveness of the financial market	New technologies and innovative solutions stimulate competition between financial institutions, which leads to improved service quality and lower costs	
Financial literacy of the population	Personalized advice and tools help users better understand their finances and make more informed decisions	
Trust in financial institutions	Transparency and security of financial operations increase user trust in financial institutions and contribute to the development of the digital financial environment	

Source: formed based on [1; 3; 5–6]

Table 4

Directions and content of transformations in the digital financial environment of Ukraine from the growth of fintech companies working with AI

Transformations	Content of transformations	The direction of AI action in the defined area
Increased competition in the financial market	A greater number of players forces companies to offer better terms and innovative products, which ultimately benefits consumers	The growth of fintech companies working with AI in Ukraine has a positive impact on the country's economy, contributing to its modernization, increased competitiveness, and improved quality of life for citizens. Fintech companies introduce new technologies and approaches that stimulate traditional banks to modernize their systems and processes.
Emergence of new and innovative financial products and services	Fintech companies often offer more convenient, fast, and affordable financial solutions that meet the needs of modern consumers	
Reduction in the cost of financial services	Competition between fintech companies and traditional banks leads to lower prices for financial services, making them more affordable for consumers.	

Source: formed based on [2; 5]

Regarding active regulation of the digital financial environment, AI helps government agencies and financial institutions perform their functions more effectively (increasing the efficiency and speed of regulatory processes, increasing transparency and accountability, and creating regulatory sandboxes). The directions and content of transformations in the digital financial environment of Ukraine from the use of AI in its regulation are shown in Table 5.

In fact, the transformations we have outlined indicate that the use of artificial intelligence (AI) in the digital financial environment is a key factor in the transformation of the Ukrainian

Table 5

Directions and content of transformations in the digital financial environment of Ukraine from the Use of AI in its regulation

Transformations	Content of transformations	The direction of AI action in the defined area
Efficiency and speed of regulatory processes	AI can process vast amounts of financial data, helping regulators detect fraud, money laundering, and other financial crimes, as well as assess the effectiveness of regulatory policies. Automation of financial institution reporting verification, transaction monitoring, and customer identification	Fraud detection, risk analysis, and forecasting of financial trends. Automation of compliance procedures, transaction monitoring, and reporting verification. Scenario modeling, policy consequence forecasting, regulatory measure optimization. Detection and prevention of cyber threats/
Improvement of the quality of regulatory decisions	AI can help regulators develop more effective and adaptive regulatory policies, taking into account various scenarios and predicting potential consequences. AI can identify potential risks to financial stability, such as systemic risks, cybersecurity risks, and fraud risks, allowing regulators to take preventive measures.	
Increased transparency and accountability	AI can provide continuous monitoring of financial markets and the activities of financial institutions, increasing transparency and accountability. AI can help detect violations of regulatory norms and conduct investigations, contributing to ensuring fairness and adherence to market rules.	
Creation of regulatory sandboxes	AI can be used to create virtual environments where fintech companies can test their innovative products and services under the supervision of regulators. It allows for stimulating innovation and ensuring compliance with regulatory requirements.	

Source: formed based on [1; 3; 7]

financial sector, ensuring its efficiency, security, accessibility, and innovation.

Conclusions from this study and prospects for further exploration in this area. Within the research, it has been proven that artificial intelligence is actively being implemented and adapted to the needs of various areas of the digital financial environment through specific transformations. The following conclusions have been drawn:

1. Transformations driven by the use of artificial intelligence in the digital financial environment in Ukraine include the following: increased popularity of remote payments, expansion of open banking usage, development of digital identification, advancement in financial data analysis, fraud detection, process automation, provision of personalized financial advice, growth in the number of fintech companies utilizing AI, heightened attention to cybersecurity, and active regulation of the digital financial environment.

2. The utilization of artificial intelligence (AI) is a key factor in the transformation of the financial sector in Ukraine, ensuring its efficiency, security, accessibility, and innovativeness.

3. Regarding the efficiency of Ukraine's financial sector, AI enables the automation of routine processes, analysis of large volumes of data, and optimization of operations, leading to cost reduction and increased productivity of financial institutions. Regarding the security of Ukraine's financial sector, AI algorithms can effectively detect fraudulent activities, money laundering, and other financial crimes, ensuring transaction security and protecting clients' assets. Regarding the accessibility of Ukraine's financial sector, thanks to AI, financial services become more accessible to a wider population, including residents of remote regions and individuals with disabilities. Regarding the innovation in Ukraine's financial sector, AI stimulates the development of new financial products and services, such as personalized investment recommendations, intelligent risk management, and innovative payment solutions.

Further research in the field of using artificial intelligence in the digital financial environment

of Ukraine has significant potential. The main directions that require deeper exploration include studying the use of AI for forecasting and managing various types of financial risks, including credit, market, and operational risks; researching the impact of automation on the efficiency and productivity of financial institutions, as well as on the quality of customer service; investigating the potential of open banking to create innovative financial products and services, as well as its influence on competition in the financial sector, and so on. These research directions can not only deepen our understanding of the opportunities and challenges associated with the use of AI in the financial sector of Ukraine but also contribute to the development of innovative solutions to enhance the efficiency, security, and accessibility of financial services.

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