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IMPACT OF ARTIFICIAL INTELLIGENCE ON THE ACTIVITIES OF FINANCIAL INSTITUTIONS AND STATE SECURITY

The article examines peculiarities of the development of artificial intelligence technologies in various fields of application. The field of application of the artificial intelligence technologies in Ukraine has been studied. Based on the analysis of the road map of the artificial intelligence development, the key areas of the implementation of such technologies were formed. Areas of use of artificial intelligence in the activities of financial institutions are highlighted. Based on the analysis of strengths and weaknesses, positive and negative aspects of the use of the artificial intelligence technologies were formed. Based on the experience of using the artificial intelligence technologies in the activities of financial institutions of the EU countries, software products that allow detecting threats, dangers and financial crimes have been identified. The peculiarities of the use of artificial intelligence in ensuring the security of the state have been studied. It is substantiated that when ensuring the security of the state, an important aspect when using the artificial intelligence technologies is the ability to analyze large volumes of data, which include open sources of information, social networks, which allows predicting possible threats and dangers.

Keywords: *artificial intelligence, information technologies, financial institutions, state security, experience of EU countries, European norms in domestic legislation.*

Fig.: 4. References: 15.

Formulation of the problem. The modern development of society is characterized by the formation of a new type of information technologies, which are actively introduced into all spheres of life. In Ukraine, despite the existing problems, there is a significant development of information technologies, which allow the country to actively integrate into the processes of global informatization. It is the development of information technologies that allows the state to actively participate in international exchange and consumption processes. Prompt access to information and its effective use play an important role. The widespread use of new information collection and processing systems contributes to increasing the informatization of society.

One of the areas of the development of digital technologies is the use of the artificial intelligence technologies, which are developed in most countries of the world. The artificial intelligence technologies are widely used in all spheres of social life. Ukraine should pay due attention to the development and implementation of the technologies based on artificial intelligence, as it risks losing the opportunity to compete with other countries in many strategic sectors of the economy, which will negatively affect its overall development.

Today, most authors define artificial intelligence as a complex of technological solutions based on which the cognitive function of a person is imitated, which allows when performing certain tasks to obtain results that are equal to the results of the human intellectual activity. The rapid development of technologies leads not only to positive changes, which are expressed in the automation and acceleration of the performance of many functions, but also requires significant attention in the matters of security and information protection. Therefore, in addition to the development of the artificial intelligence technologies, it is necessary to develop methods and approaches to the protection of information that affects the security of the activities of institutions and the state at all levels of management.

Analysis of recent research and publications. Today, the issue of the development of the artificial intelligence technologies is relevant and is considered from different positions by many foreign and domestic scientists. Features of the impact of the artificial intelligence technologies on security at different levels are studied in the works of O. Adamchuk, O. Baranova, T. Katkov, K. Khernes, S. Petryaeva, Yu. Sydorchuk, O. Yastreb O. and others. Features of the use of the artificial intelligence technologies in the activities of financial institutions are studied in the works of A. Bahramirze, L. Klob, N. Panteleeva, F. Pasiura, M. Feti, and others. However, despite the significant amount of thorough research in this topic, the issue of the influence of artificial intelligence on the activities of financial institutions and the security of the state remains relevant today.

The goal of the article is to determine the specifics of the influence of artificial intelligence on the activities of financial institutions and the security of the state.

Presenting main material. The modern world is characterized by a significant development of digital technologies, in this context, information is a strategic resource that affects the economic and security development of the state. Important in this case is the state of information security, which is influenced by factors of the external and internal environment. The main factors include the socio-economic state of the state, the political situation in the country, the state of digitization and innovative development. The implementation of the artificial intelligence technologies is an urgent issue not only for business structures, but also for the state as a whole. In the conditions of the expansion of the information space, the issues of ensuring the security of the state are becoming relevant, which affects the state's ability to counter threats and dangers in various areas of the country's development. The sphere of defense and security is a priority area of the

development for every state, and this is especially relevant for Ukraine in the current conditions of military aggression. The introduction of the artificial intelligence technologies makes it possible to significantly expand the capabilities of this field and change the balance of power between the world's states.

In Ukraine, for the development of the artificial intelligence technologies, an expert advisory committee for the development of the field of artificial intelligence was formed under the Ministry of Digital Transformation of Ukraine, which was created in 2019. The main purpose of creating the committee is to increase the competitiveness of Ukraine in the artificial intelligence field. The main areas of work were divided into four groups: public administration, education, security and regulation. It is in these areas that the areas of development of the artificial intelligence technologies are being implemented. In Ukraine, the expert advisory committee for the development of the artificial intelligence field developed a road map for the regulation of artificial intelligence in Ukraine.

The proposed road map includes the following areas of development:

- service training, which includes the formation of business tools for preparing for the new conditions of the regulatory framework of the domestic and European legislation for the functioning of enterprises;

- prudence, which is built on the use of the experience of European countries in the implementation of the artificial intelligence technologies to take into account risks and threats;

- partnership and self-regulation, which forms the directions of cooperation between the state and business in various spheres of social life, since close cooperation will make it possible to take into account the needs of each party more effectively and reduce the level of conflict of interests;

- global perspectives, which include orientation to the world trends (extraterritorial effect of the EU AI Act and "Brussels Effect"), taking into account the interests of the state in the foreign market;

- product approach, which is based on such business development, which is able to independently enter international markets and maintain its competitiveness.

The importance of the development of the artificial intelligence field for Ukraine lies in the support and implementation of such technologies in the specified priority areas to ensure economic freedom and security of the state at all levels.

In matters of the national security, the development of the artificial intelligence systems is a priority task, military aggression by Russia has shown that today's weapon control systems are outdated compared to the technologies of developed countries. In the future, it is the systems based on artificial intelligence that will be involved in the security of states.

In the education sphere, there is a significant deficit in the fields of Computer vision, Machine learning, Big data, Natural language processing, which negatively affects the state's competitiveness on the international market.

In the economy, the development of artificial intelligence contributes to the capitalization of modern corporations, the use of such technologies contributes to the innovative integration of the country into the global space.

There are many approaches to defining the essence of artificial intelligence, but in general it can be presented as the result of human activity, which is capable of logical thinking, justification and management of its actions, but the lack of their correction in case of changing conditions. Artificial intelligence should be considered as a result of the innovative development of technologies, which is a system of interconnections and the basis for the formation of the information system formations. In the future, the use of artificial intelligence will allow to change social relations.

Today, the artificial intelligence programs consist of various modular components that are activated as needed depending on the structure of a specific task. If we consider the implementation of the artificial intelligence technologies in the activities of financial institutions, it was first used by the US bank Citibank to automate decision-making processes. However, at that time, the introduction of innovative technologies required significant financial resources, which only individual financial institutions could afford. Since 2017, the leading Japanese companies have declared their readiness to finance such projects for the automation of workplaces [1].

The need to implement such innovations is explained by the need to support the competitiveness of institutions at the international level, development of technologies and systems of automation of production processes. Thus, the main areas of use of the artificial intelligence technologies in the activities of financial institutions can be attributed (Fig. 1).
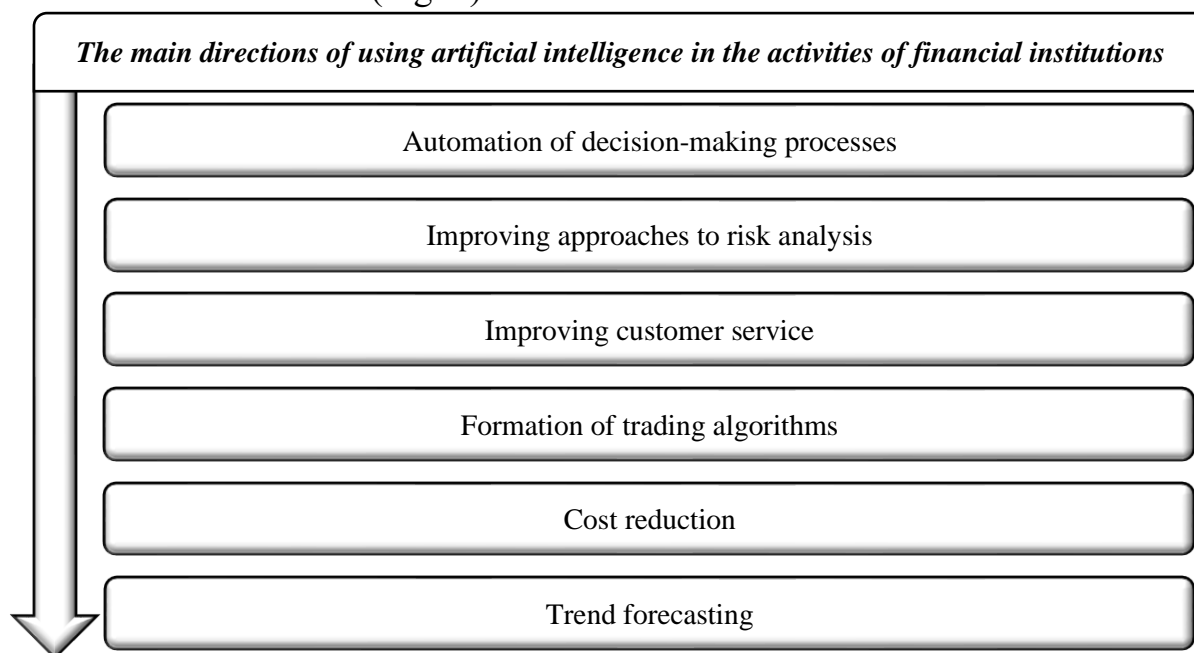

Fig. 1. The main directions of using artificial intelligence in the activities of financial institutions

Source: summarized by the authors based on [3; 7].

The use of automation of decision-making processes allows financial institutions to reduce the use of human labor in areas that require the analysis of large data sets, which significantly simplifies the processes of making informed decisions about risk determination, credit scoring, and others. The use of the artificial intelligence technologies allows financial institutions to analyze risks in real time.

Chatbots, personalized recommendations, and analysis of customer behavior are currently being actively used to improve interaction with customers, which allows us to treat customers more loyally and satisfy their needs.

Large investment funds use artificial intelligence algorithms to make decisions on buying and selling financial instruments on various stock markets.

The use of artificial intelligence technologies allows large institutions to automate routine tasks, which significantly reduces the use of labor and allows to optimize business processes.

The artificial intelligence technologies allow financial institutions to forecast economic and financial trends by using analytical models that take into account many factors of the external and internal environment. Such trends allow institutions to adapt more quickly to the changes in the economic and financial environment, which makes it possible to significantly reduce the risk of economic losses. The activities of large financial institutions in the state contribute to ensuring the security of the state in both the economic and social aspects. Therefore, it is also advisable to use artificial intelligence technologies to ensure the security of the state (Fig. 2).
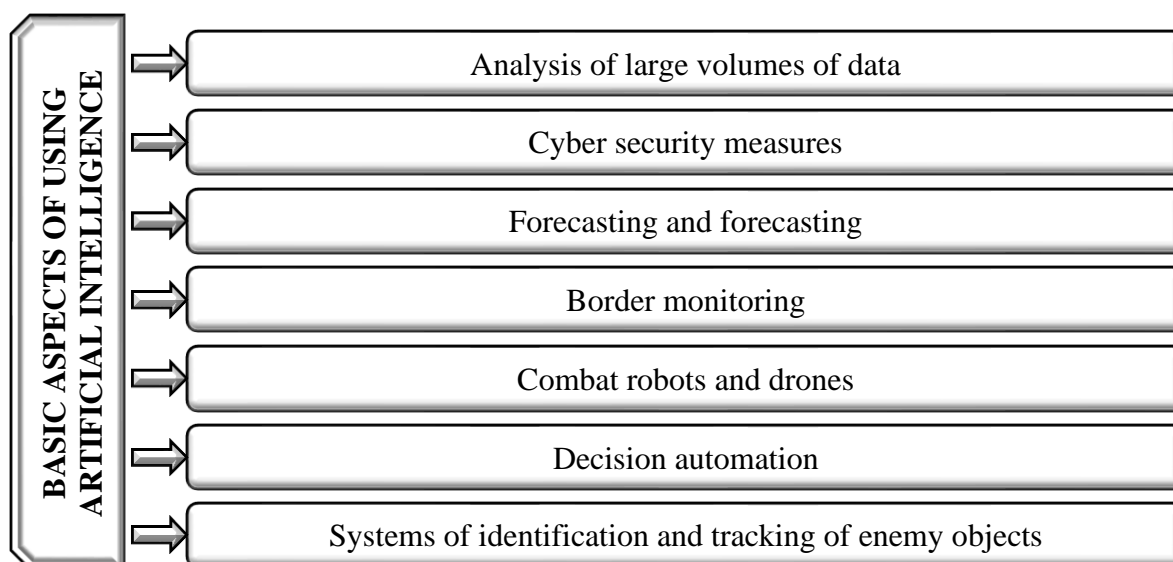

Fig. 2. Basic aspects of the use of artificial intelligence in ensuring the security of the state

Source: summarized by the author based on [2].

When ensuring the security of the state, an important aspect when using the artificial intelligence technologies is the ability to analyze large volumes of data, which include open sources of information, social networks, which allows

predicting possible threats and dangers. Based on the use of modern technologies, technologies are used for the security of the state, which, based on the analysis of network traffic, make it possible to determine the abnormal activity and identify potentially dangerous software. Based on the data analysis carried out with the help of artificial intelligence, it is possible to predict possible crises and conflicts that may affect the security of the state.

The use of modern technologies based on video surveillance, the use of images to effectively monitor borders and detect illegal activities. In matters of defense security, with the help of control of combat drones and robots, it is very effective to carry out operations to ensure the security of the state. As in the activities of financial institutions, automation of decision-making plays an important role in ensuring the security of the state, which contributes to the selection of the optimal possible set of alternatives. For the defense industry, artificial intelligence technologies make it possible to recognize and track enemy military objects, aircraft, ships, etc., which significantly contributes to ensuring the defense security of the state.

When using the artificial intelligence technologies, it is important to observe ethical and legal norms that affect the privacy of citizens, the sphere of abuse of powers, and insufficient regulation of measures. The implementation of artificial intelligence requires maintaining a balance between innovative development and ensuring people's rights and freedoms. The use of artificial intelligence in various fields has both positive and negative aspects (Fig. 3).
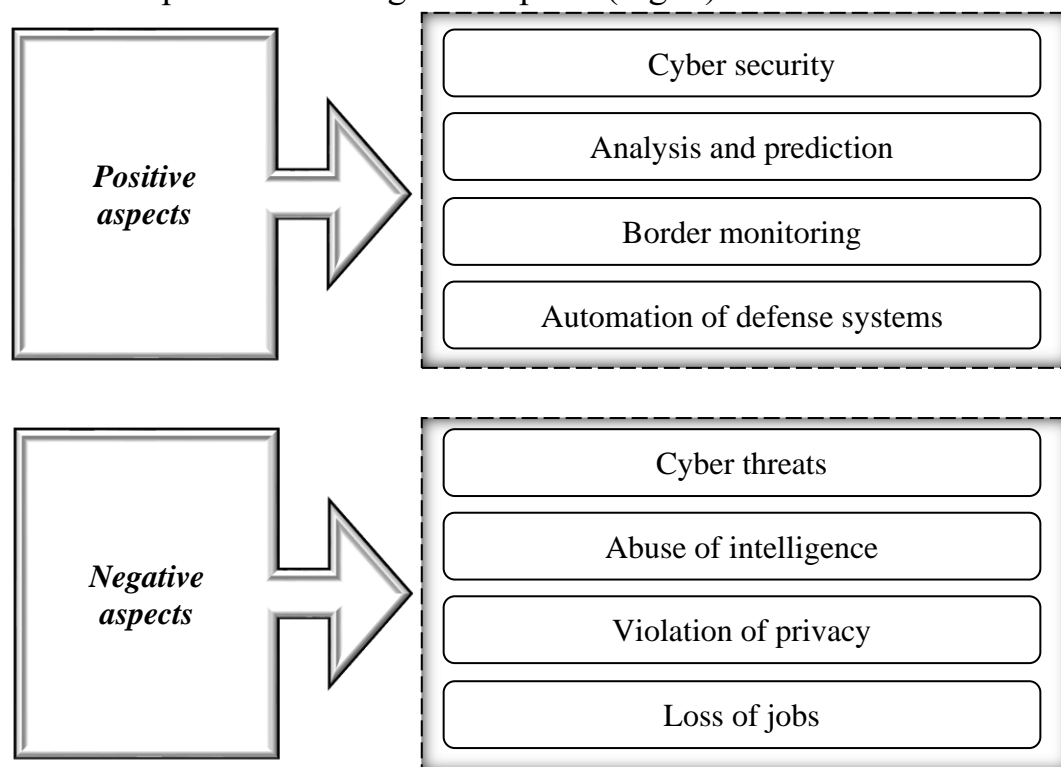

Fig. 3. Positive and negative aspects of using artificial intelligence in the context of ensuring state security

Source: summarized by the authors based on [2; 5-7].

The positive aspects include protection against cyber-attacks, analysis of large data sets and the construction of forecasts based on these data, border monitoring and automation of defense systems, which are currently an important direction in the defense capability of the developed countries. The negative aspects of the use of the artificial intelligence technologies include the creation of more complex and intelligent cyber threats, which significantly complicates the task of cyber protection.

Improper use of the received information can violate the privacy of citizens and contribute to mass surveillance. Innovative development in technologies leads to a decrease in the level of use of human capital in many production processes, which negatively affects the level of personnel involvement, as the need for it decreases. Such trends lead to an increase in the unemployment rate of the population, which negatively affects the socio-economic development of the regions and the state as a whole. Therefore, the wide use of the artificial intelligence technologies should be based on the development of appropriate programs and measures that would facilitate the involvement of released workers in other areas of activity.

If we consider the impact of artificial intelligence on the development of financial institutions, according to IHS Markit in 2018, due to the implementation of the artificial intelligence technologies on Wall Street, $41.1 billion will be saved by 2030. The decrease in the expenses level occurred mainly due to the reduction of employees of banking institutions by 1.3 million people [4]. Under such trends, the introduction of technology will lead to the dismissal of tens of millions of workers in the field of financial services all over the world. The most vulnerable in this case are employees of call centers, credit departments, operators, that is, professions that mostly have a narrow range of operations. Due to the introduction of chatbots, collector robots, scoring systems and other technologies that automate these processes. Quite successful implementation of the artificial intelligence technologies took place in interaction with blockchain, crowdfunding platforms, Internet acquiring, electronic wallets, big data and others.

These technologies are also popular in Ukraine. The most common financial institutions in Ukraine that use the artificial intelligence technologies are banking institutions and insurance companies, and banking institutions use such technologies more actively. Insurance companies use artificial intelligence technologies most often for the development and implementation of new services, justification of tariffs taking into account the needs of customers and the general dynamics of prices in the industry [9].

The use of chatbot technologies allows the companies to be in constant contact with the client while the insurance contract is in effect, which greatly simplifies the procedure for providing services and assessing risks. The advantages of introducing artificial intelligence into the activities of financial institutions include a reduction in the level of corruption due to the transparency of service

provision, forecasting and personalization of the receipt and provision of services, the development of online marketing taking into account the needs of customers, and fast processing of payment documents.

The threats of using such technologies in the financial sector include the possibility of choosing the wrong algorithm for selecting financial indicators, the likelihood of cyber-attacks, and reducing the number of personnel due to the automation of most processes [4].

Current trends and potential opportunities for the use of artificial intelligence in software development are presented in Fig. 4.
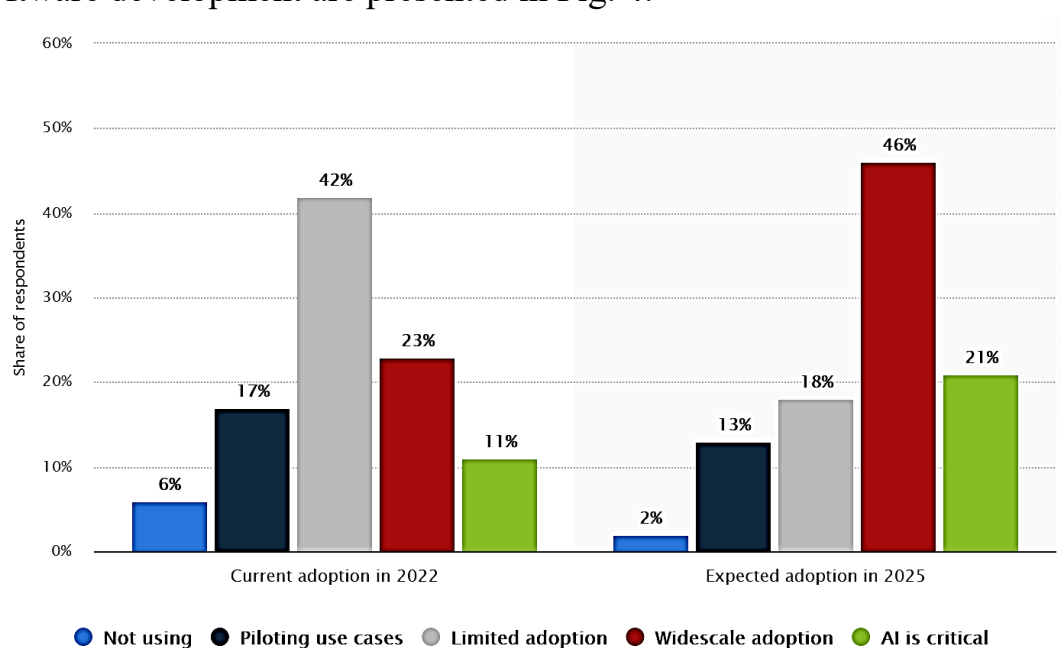

*Fig. 4. Current trends and potential opportunities
for using artificial intelligence in the software development*
Source: [8].

In the field of activity of financial institutions, the use of artificial the intelligence technologies is connected with the use of Internet products, therefore threats most often accompany users precisely through Internet traffic. Taking into account the experience of the EU countries in this area [10-15], it is advisable to single out the following software products that allow detecting threats and dangers, detecting financial crimes:

NDR (Network Detection and Response) is a software product that allows you to detect attacks at the network level, which allows you to quickly react to them and neutralize their negative impact. Based on existing databases, these technologies based on artificial intelligence can identify them and eliminate their negative impact by changing the configuration of network devices.

EDR (Endpoint Detection and Response) – platforms capable of detecting threats on servers and computer devices with a system of rapid response to them and elimination of negative consequences. These platforms are able to detect

malicious programs and automatically respond to them by transmitting data to control centers. As in the first option, the artificial intelligence system, based on existing databases, collects information about enemy objects and detects internal threats.

UEBA (User and Entity Behavior Analytics) – this software product is a system that analyzes the behavior of users and information entities, and uses a nontypical algorithm to determine the presence of unwanted programs. Based on the detection of atypical behavior, this product detects and identifies threats. It also identifies atypical behavior as an abnormal phenomenon, singles out various threats and risks for the enterprise and the state as a whole. Such deviations in behavior can be used to detect fraud, protect conference data, comply with regulations, and more.

TIP (Threat Intelligence Platform) - platforms that, based on data, identify threats and dangers at the early stages and are aimed at establishing threats from the external environment.

SIEM (Security Information and Event Management) is a technology that evaluates and monitors information flows in real time, which come from various means of information protection, which allows establishing security threats. These technologies are also based on a large amount of information support, based on which information is checked for compliance and its identification within the framework of threats.

SOAR (Security Orchestration and Automated Response) – this system is aimed at identifying threats and dangers with the help of existing accumulated databases, but unlike the existing ones, artificial intelligence technology allows not only to evaluate threats, but also to automatically respond to them.

Application Security – additional data protection systems that, based on the use of artificial intelligence, can identify threats, respond to them independently, identify weaknesses in information security, which allows changing data protection rules.

Antifraud – systems based on artificial intelligence that allow real-time detection of threats in business processes and establishment of appropriate deviations. The use of such technologies allows a quick response to established financial crimes, which significantly reduces the level of possible losses [2].

Thus, it can be concluded that today the field of artificial intelligence is at a stage of rapid development. The most common directions of its use are data protection, processing of large amounts of information, customer orientation.

In Ukraine, the development of areas of artificial intelligence is regulated by the Concept of the Development of Artificial Intelligence in Ukraine ("On the Approval of the Concept of the Development of Artificial Intelligence in Ukraine"). According to this concept, the development of artificial intelligence covers nine areas, including [7]:

- the field of education and science, in which it is planned to train and retrain highly qualified employees to acquire skills for performing works based on the use of artificial intelligence, development of digital literacy (use of digital

technologies, searching for data on the Internet). Stimulation of scientific research in the field of the use of the artificial intelligence technologies, promotion of international cooperation within such research, involvement of foreign specialists and scientists in projects based on the use of innovative technologies.

In the field of economic development, stimulation is carried out within the framework of supporting enterprises that introduce artificial intelligence technologies. Stimulation is carried out based on the formation of a suitable business climate, investment attractiveness of the industry, development of information infrastructure, formation of the favorable tax policy for enterprises of this industry.

In the field of cyber security, the artificial intelligence technology is implemented in national information systems, programs and products that include not only data processing, but also data protection.

The field of information security based on the use of the artificial intelligence technologies is designed to ensure national interests through the prevention of threats and their effective neutralization.

In the defense field, the use of the artificial intelligence technologies has been implemented in weapons systems, military equipment, data collection and analysis in the process of combat missions, analysis of the capabilities of the troops, protection of personal data, tracking of enemy maneuvers, etc.

In the field of public administration, the use of the artificial intelligence technologies allows identification of individuals, which greatly simplifies obtaining services in the medical field and the field of obtaining public services of various levels.

In the field of legal regulation, these technologies contribute to the integration of European norms into the domestic legislation, which greatly simplifies the procedure of international cooperation.

The artificial intelligence technology is also being introduced into the sphere of justice, which will contribute to the simplification and expansion of already existing technologies of the Unified Register of Pretrial Investigations, the electronic court, and others.

It can be concluded that in Ukraine the development of the artificial intelligence technologies is gradually being introduced into all spheres of social life. As the experience of EU countries proves, these technologies make it possible to significantly simplify the analysis of data systems, identify weaknesses and threats, and quickly respond to negative actions. In financial institutions, the use of artificial intelligence technologies allows to significantly increase the level of customer orientation, which simplifies and speeds up the receipt of services and improves their quality.

Conclusions. Based on the analysis of the experience of EU countries, it can be stated that the artificial intelligence technology is actively used in various sectors of the national economy. The most common are technologies for analyzing large amounts of information, its evaluation, and based on the comparison of input information with existing algorithms, the level of threats and dangers is

determined. The European experience proves that the use of artificial intelligence in the activities of financial institutions allows to improve interaction with clients, significantly shorten the terms of receiving services, and more effectively analyze the external environment and internal client base.

However, with the development of the artificial intelligence technology, the products need to be improved not only in the field of service and analytics, but also in the field of data security. Cyberattacks on financial institutions can lead to a collapse in the country's banking system, which will negatively affect not only the domestic market, but also foreign operations. Therefore, ensuring security is a priority direction for the use of the artificial intelligence technologies.

Since Ukraine is a full member of the global financial system, the provision of services in virtual space significantly increases the level of risk, for the elimination and prevention of which it is necessary to attract significant funds for the development of security systems. Due to the influence of global financial systems in terms of the use of the artificial intelligence technologies, the transformation of the domestic financial sector will take place. The implementation of such programs will significantly increase the competitiveness of financial institutions, contribute to the development of financial cooperation, and increase trust in consumers of financial services. Features of the development and implementation of the artificial intelligence technology should be reflected in the development strategies not only of the economic and defense sectors, but also in the national programs.

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ФІНАНСОВІ РЕСУРСИ: ПРОБЛЕМИ ФОРМУВАННЯ ТА ВИКОРИСТАННЯ

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ВПЛИВ ШТУЧНОГО ІНТЕЛЕКТУ НА ДІЯЛЬНІСТЬ ФІНАНСОВИХ УСТАНОВ ТА БЕЗПЕКУ ДЕРЖАВИ

У статті розглянуто особливості розвитку технологій штучного інтелекту у різних сферах застосування. На основі аналізу дорожньої карти розвитку штучного інтелекту було сформовано ключові аспекти впровадження таких технологій. Окреслено напрями використання штучного інтелекту в діяльності фінансових установ. За результатами аналізу сильних та слабких сторін сформовано позитивні та негативні аспекти використання технологій штучного інтелекту. Враховуючи досвід використання технології штучного інтелекту у діяльності фінансових установ країн ЄС, виокремлено програмні продукти, що дозволяють виявити загрози, небезпеки та фінансові злочини. Досліджено особливості використання штучного інтелекту при забезпеченні безпеки держави. Обґрунтовано, що важливим аспектом при використанні технологій штучного інтелекту є спроможність до аналізу великих обсягів даних, які включають відкриті джерела інформації, соціальні мережі, що дозволяє передбачити можливі загрози та небезпеки.

На основі аналізу досвіду країн ЄС, стверджується, що технологію штучного інтелекту активно використовують у різних галузях народного господарства. Визначено, що використання штучного інтелекту у діяльності фінансових установ дозволяє покращити взаємодію з клієнтами, значно скоротити строки отримання послуг, більш ефективно проводити аналіз зовнішнього середовища та внутрішньої клієнтської бази. Аргументовано, що з розвитком технології штучного інтелекту потребує удосконалення продуктів не тільки сфера обслуговування та аналітики, але й сфера забезпечення безпеки даних. Акцентовано на тому, що кібератаки на фінансові установи можуть привести до колапсу в банківській системі держави, що негативно вплине не тільки на внутрішній ринок, але й на зовнішні операції, тому забезпечення безпеки є пріоритетним напрямом використання технологій штучного інтелекту.

Ключові слова: штучний інтелект; інформаційні технології; фінансові установи; безпека держави; досвід країн ЄС; європейські норми у вітчизняному законодавстві.

Рис.: 4. Бібл.: 15.