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Viktor Malyshev,
Yurii Lipskyi,
Viktoria Kovalenko,
Angelina Gab,
Dmytro Shakhnin,
Olha Orel

ASSESSMENT OF THE GLOBAL ARTIFICIAL INTELLIGENCE MARKET IN HEALTHCARE

Recently, there has been a significant increase in the use of artificial intelligence in healthcare, an increased trust of healthcare providers in artificial intelligence, and the interest of investors in the development of healthcare solutions based on artificial intelligence. The vast majority of providers of medical services and technologies, as well as of biomedical companies, are using artificial intelligence which confirms the great demand in the field of health care. The increased adoption of artificial intelligence techniques in medical applications has led to the focus of key market participants on new products and technical connections to expand commercial production.

The object of research is the world market of artificial intelligence in healthcare. Factors influencing the market positively and negatively have been identified. The general characteristics are given, as well as key points of the state and development of the market. The market is segmented by geographic regions, applications, therapeutic area support, market components, technologies, and usage. According to the segmentation of the world artificial intelligence market in health care by geographical regions, the largest market share belonged to the segment of the North American region (45 %); by application – to clinical trials segment (22.7 %); by the support of therapeutic areas – to radiology segment (75 %); by artificial intelligence components – to software segment (41 %); by technologies – to machine learning segment (33.1 %); by use – to medical imaging and diagnostics segment (27.1 %).

The main strategic trends and directions of further development of the market of artificial intelligence in health care are provided. The dynamics of the market in terms of growth factors, market opportunities, limitations, and challenges are considered. Important factors inhibiting the development of the artificial intelligence market in the field of health care are the lack of qualified specialists and ineffective cooperation between the public and private sectors.

Data on competitive tech giants and artificial intelligence healthcare powerhouses are provided.

Keywords: *artificial intelligence, health care, market characteristics, market segmentation, market dynamics.*

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1. Introduction

Artificial intelligence (AI) is defined as "the study of "intelligent agents", that is, any agent or tool that can understand and comprehend its environment and, therefore, take appropriate actions to increase its chances of achieving its goal" [1]. AI also refers to the conditions under which machines can imitate human intelligence in learning and analysis, thus working towards solving problems. This type of intelligence is also known as machine learning. AI usually encompasses a method that supports both software and hardware. From a software perspective, AI is directly related to algorithms. An artificial neural network is a theoretical framework for executing artificial intelligence algorithms that simulate the human brain [2]. From the very beginning, medicine has been identified as one of the most promising areas of application for AI. Since the mid-20th century, researchers have proposed and developed numerous systems to assist in clinical decision-making. Furthermore, it is difficult to encode higher-order interactions between different pieces of knowledge created by different experts, and the integrity of prior healthcare knowledge limits the use of the network. It has also been challenging to implement a system that combines deterministic and probabilistic reasoning to reduce relevant clinical context, prioritize diagnostic assumptions, and recommend therapy. The COVID-19 outbreak has certainly impacted the need for and revealed the potential of AI technologies. Medical practices are successfully using these technologies to rapidly detect and diagnose different strains of viruses, using personalized patient data to improve treatment. AI algorithms can learn to learn details about patients' health, which further enables healthcare providers to quickly identify a patient's condition and devise the right therapy regimen. Government initiatives, the increase in the number of market "players" and their "merger", the growth of procurement and the establishment of technical cooperation, as well as the ongoing COVID-19 pandemic have played a significant role in expanding the market and accelerating

the further use of AI in medicine. The increased implementation of AI methods in medical programs has led to the fact that key market participants have focused on new products and technical connections to expand their product portfolio and meet the needs during the COVID-19 outbreak. At a meeting of the Government, the relevant order approved the Concept for the Development of Artificial Intelligence in Ukraine [3]. This document defines the goal, principles and objectives of the development of AI technologies. One of the important tasks of the concept is the research and application of these technologies in the field of healthcare, in particular to combat epidemics and pandemics, as well as to predict and prevent potential epidemic outbreaks in the future. In accordance with the Action Plan for the Implementation of the Concept of Artificial Intelligence Development in Ukraine for 2021–2024, approved by the Order of the Cabinet of Ministers of Ukraine dated May 12, 2021 No. 438-r [4], the directions and mechanisms for implementing the main tasks of developing AI technologies in Ukraine have been determined. In particular, it is important to ensure the use of these technologies in defense systems, healthcare, justice, as well as for analyzing the effectiveness of the public administration system. One of the problems is the human resources that must ensure the functioning of the healthcare sector and use AI technologies for the needs of the medical industry in the future.

In [5], it is proven that AI technologies will become the basis for reforming the healthcare sector in Ukraine. It is established that an important issue of socialization of the implementation of these technologies is the protection of human autonomy. It is noted that the development of AI algorithms should lead to their access and widespread use in the medical field. It is substantiated that one of the advantages of AI is its ability to self-learn based on practical experience. The authors identify problems that hinder the active development and implementation of AI technologies in the healthcare sector in Ukraine. In [6], the prerequisites and scientific principles of creating a strategy for the development of artificial intelligence in Ukraine, as well as the means and ways of its effective implementation, are considered. In [7], it is emphasized that the most important thing in working with artificial intelligence is understanding the capabilities and limitations of the technology. It is determined that AI is not a logical solution to solve all problems, but rather a tool for improving human decision-making and improving results in certain areas and industries. In [8], it is noted that despite the large amount of investment in the development of AI for use in medicine, at the moment the effectiveness of all existing solutions is not high enough.

The study [9] noted a significant increase in recent years in the interest in the use of AI in the field of healthcare, which is changing the paradigm due to the increasing availability of medical data and the rapid progress of analytical methods. It is noted that AI can be applied to different types of medical data – structured (machine learning methods, such as classical support vector machines and neural networks, modern deep learning) and unstructured (processing of unstructured data). The main areas of medicine where AI tools are used include oncology, neurology, cardiology, endocrinology, dentistry, etc. The world's largest IT companies, including Microsoft, IBM, Intel, and Google, have their own AI-based developments that help solve such problems.

The study [10] provides a narrative review of healthcare services based on an interdisciplinary approach, in which AI-based services are used as part of operations, and analyzes the key elements for creating successful AI-based healthcare services. The benefits of AI in this area include improving healthcare outcomes, helping caregivers with their work, and reducing healthcare costs. It is noted that the AI market in the healthcare sector has high market potential with a compound annual growth rate (CAGR) of 28 %.

AI applications are fundamentally changing healthcare. The review [11] reveals the role of AI in this area and highlights key aspects of implementation:

– medical imaging and diagnostics;
– virtual patient care;
– medical research and drug discovery;
– patient engagement and adherence;
– rehabilitation;
– other administrative applications.

The review [1] lists medical AI applications used in healthcare:

– drug discovery and discovery;
– clinical practices (smart clinical practices; collaboration and model sharing in clinical practice);
– patient care (maternal care; healthcare robotics; AI genetics – data-driven medicine; AI-based stethoscope).

Previous studies in the review [12] have shown that AI can improve the quality of healthcare services, and AI-based technologies improve the quality of human life by making life easier, safer, and more productive. The rapid development of AI has the potential to revolutionize healthcare by integrating it into clinical practice. Communication about the role of AI in clinical practice is critical to successful implementation, as healthcare providers are equipped with the necessary knowledge and tools [13].

The study [14] noted that legal and political barriers, uncertain funding, and changing revenue models make digital transformation difficult for healthcare organizations. Given these complexities and competing priorities, the main trends for innovators and decision-makers in the field in the near future will be:

– remote and virtual care;
– Internet of Things and wearables;
– artificial intelligence and machine learning;
– medical robotics and embedded devices.

The results of the study [15] show that the expansion of AI technologies in healthcare has encountered several challenges related to technological capabilities, regulations and policies, data management and the ethical landscape surrounding the use of AI.

The review [16] highlights the current state of AI applications in healthcare. It highlights three most popular areas of AI-driven healthcare: intelligence simulation, which has driven drug discovery, preclinical research and patient screening. The study suggests that pharmaceutical companies have benefited from AI in healthcare by accelerating the drug discovery process and computerizing objective recognition. Human-generated thinking (AI) can further help eliminate tedious information verification strategies.

A detailed study of the latest developments in the AI application in healthcare, an assessment of their effectiveness, and an explanation of the advantages and problems associated with these innovations is devoted to a review [17]. Thanks to a comprehensive assessment of twenty recent studies, the review notes the noticeable progress and transformative impact of AI in clinical settings.

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A summary of reviews and scientific works on the topic of artificial intelligence in healthcare [1, 2, 5–17] allows to point out the insufficient amount of information on the assessment of the global AI market in this area and the concentration of individual data in various publications. Therefore, the problem of:

– systematization of data on the study of the global AI market in healthcare;
– identification of factors influencing the market, key points of its status and development, main strategic trends and directions of further market development;
– implementation of segmental market analysis and assessment of its dynamics.

Thus, *the aim of research* is to assess the global AI market in healthcare. The identified main strategic trends in the development of the global market of artificial intelligence in healthcare will allow to determine the growth trends of the Ukrainian market. Taking into account the factors that influence the state and dynamics of the global market will contribute to the integration of the Ukrainian market into the global one.

2. Materials and Methods

The following scientific methods were used in the study:
– method of searching for literary data on the topic under study;
– method of analyzing literary sources;
– comparative analysis of different methodological approaches;
– content analysis of documents;
– method of systematization and classification when conducting research on the achievements of modern science and practice in the use of AI in the field of healthcare.

3. Results and Discussion

3.1. General characteristics of the global market for artificial intelligence in healthcare

The global market for AI in healthcare in 2023 was 19.27 billion USD and is projected to reach 26.69 billion USD in 2024. It is expected to reach approximately 613.81 billion USD by 2034, growing at a CAGR of 36.83 % from 2024 to 2034 (Fig. 1). The AI market in North America reached 8.67 billion USD in 2023.

The study [19] also confirms that the AI healthcare market is experiencing a significant and significant growth spurt. Its size was estimated at 16.3 billion USD in 2022 and is expected to reach 73.55 billion USD by 2029 with a CAGR of 40.2 %.

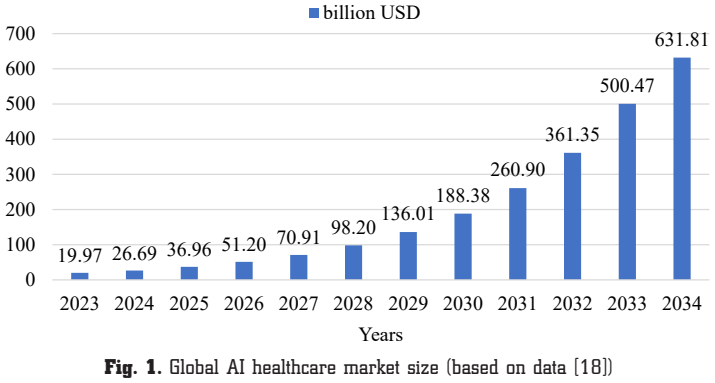

Fig. 1. Global AI healthcare market size (based on data [18])

Key market status and development highlights are as follows:

– North America accounted for the highest revenue share of over 45 % in 2023 and has a significant presence of key market players;
– Asia-Pacific is expected to grow at the fastest CAGR from 2024 to 2034;
– by market component, the software segment accounted for the largest revenue share of 41 % in 2023 and is expected to grow at the fastest CAGR in the market during the forecast period;
– the use of AI-based medical imaging technologies is a leading trend among healthcare companies;
– the healthcare business continues to grow and expand, accompanied by mergers and acquisitions;
– the integration of AI with complementary technologies, such as robotics or blockchain, is driving the development of precision medicine and transforming healthcare delivery;
– the need for 24/7 patient support is driving the demand for AI-based generative virtual assistants and chatbots.

AI is in high demand in the healthcare industry. Today, 86 % of healthcare service providers and technology providers, life-science companies are using AI [19]. This figure is a decisive proof of the potential of AI in healthcare and its importance to the industry.

The USA healthcare AI market size was 6.07 billion USD in 2023 and is expected to reach 195.01 billion USD by 2034, growing at a CAGR of 37 % from 2024 to 2034 (Fig. 2).

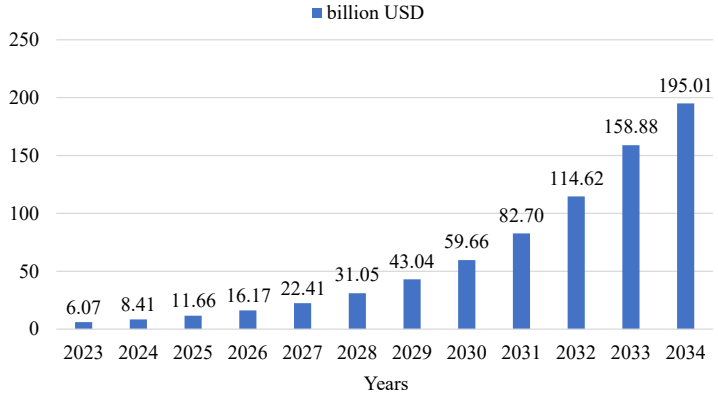

Fig. 2. Global AI healthcare market size in the USA (based on data from [18])

The increasing adoption of digital technologies in the healthcare sector due to the significant need to reduce costs in this industry and the need to improve the quality of patient care services are the determining factors that stimulate the AI growth in the healthcare market. The rapid increase in the prevalence of various chronic diseases and the elderly population leads to an increase in the number of patients in hospitals. A large amount of patient health data is generated every day, which needs to be stored and managed effectively. The increased demand for personalized medicine and the need for digital medical records are significantly stimulating the AI development in the healthcare market. AI and machine learning technologies, when integrated into healthcare systems, enable healthcare professionals to detect diseases at an early stage and offer improved patient care services. Additionally, data analytics, deep learning

technology, natural language processing (NLP), predictive analytics, and content analytics support healthcare professionals in early diagnosis and treatment.

3.2. Segmentation of the global market for artificial intelligence in healthcare

The market is segmented by geographical region, application, therapeutic area support, market components, technologies, usage.

3.2.1. Segmentation of the global market for artificial intelligence in healthcare by geographical region. In 2023, the North America region had the largest market share of 45 % (Fig. 3). The reasons for the region's dominance are:

– implementation of advanced and new digital technologies;

– strong and developed healthcare, IT and telecommunications infrastructure;

– favorable government policies that encourage the introduction of digital and new technologies in the healthcare sector;

– a huge reserve of patients (it is estimated that more than half of the USA population suffers from one or more chronic diseases), which leads to an increase in their number in hospitals and the need to store and manage their health data.

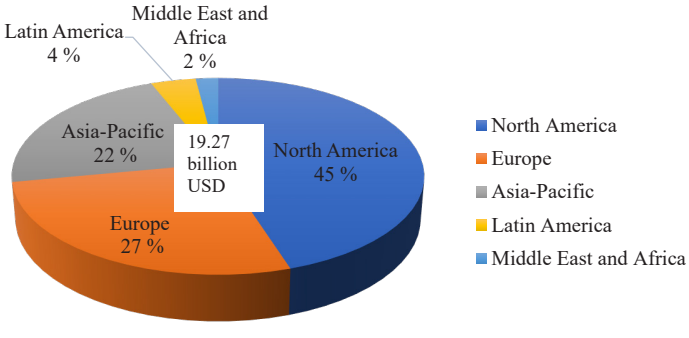

Fig. 3. Segmentation of the global AI healthcare market by geographic region (2023), % (based on data from [18])

Europe and Asia-Pacific regions had almost the same market revenue shares of 27 % and 22 %, respectively. The shares of Latin America and the Middle East and Africa regions were in the range of 2–4.4 %. The Asia-Pacific market is estimated to have the fastest growth during the forecast period, due to:

– increasing government investment in the development of "smart" hospitals and healthcare, IT infrastructure;

– increasing popularity of smartphones and increasing internet penetration;

– the need to ensure data security and privacy needs in the healthcare sector;

– the presence of a huge population in the region and a growing proportion of elderly people;

– increasing prevalence of lifestyle-related diseases.

The study [19] also notes that North America dominates the AI healthcare market (Fig. 4). It emphasizes the strong support of healthcare companies in the USA from the government and the earlier period of establishing coordinated public-private cooperation and technology adoption. The AI healthcare market in South America focuses on the development of remote patient monitoring and telemedicine.

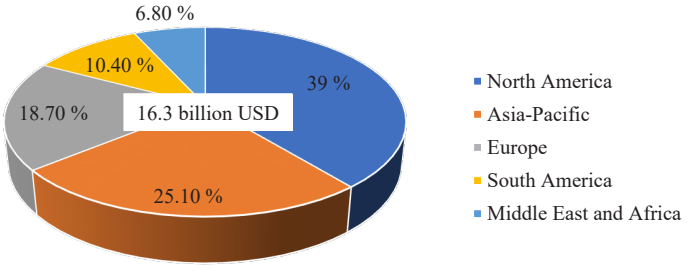

Fig. 4. Segmentation of the global market for artificial intelligence in healthcare by geographical region (2023), % (based on data [19])

But the second largest AI healthcare market, in contrast to the study [18], is the Asia-Pacific region. It is developing rapidly, and its GAGR is expected to be 8.5 % by 2028. Due to the growth of the elderly population, medical tourism and increased research and development activities, Asian countries have accelerated the implementation of medical AI.

In the European market, the key "players" are Germany, the United Kingdom, France, Spain, Ireland, Switzerland and Belgium. The main directions of market development in these countries are research and development activities and the discovery of biotech drugs.

The Middle East and Africa will develop more slowly than other regions. They focus on AI-based telemedicine services and increased collaboration between healthcare institutions.

3.2.2. Segmentation of the global market for artificial intelligence in healthcare by application. By application of AI in healthcare, the segments can be divided into three groups.

The first with high growth rates and the largest revenue shares includes two segments: clinical trials (22.7 %) and robotic surgery (22.5 %).

The second, with slow growth rates, segments with shares in the range of 6.4–13.3 %: fraud detection (13.3 %), connected cars (13.1 %), diagnostics (7.7 %), virtual assistants (7.1 %), administrative process assistants (6.4 %).

The dosage error correction and cybersecurity segments (the third group) corresponded to revenue shares of 4.1 % and 3.1 %, respectively (Fig. 5).

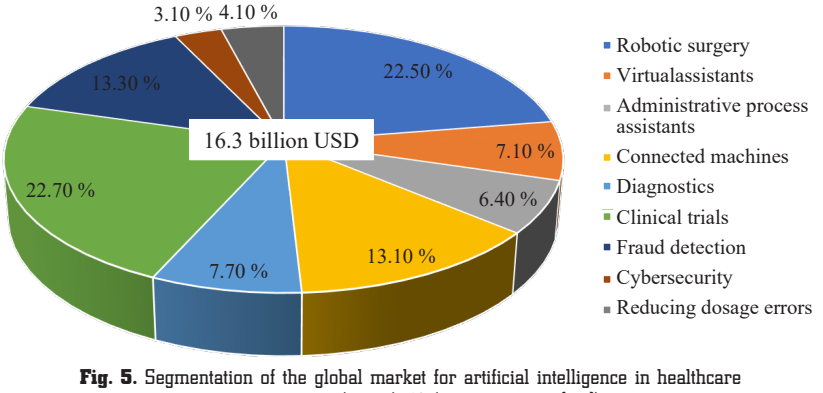

Fig. 5. Segmentation of the global market for artificial intelligence in healthcare by application (2023), % (based on data [19])

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The use of AI leads to greater accuracy of surgical procedures. For complex surgical operations in the cardiovascular system or neurology, absolute accuracy is required, and AI robotics can provide this. AI algorithms are also changing the processes of clinical trials. The power of rapid data analysis at each stage of clinical trials increases their accuracy, cost-effectiveness and patient-centeredness. In addition, AI plays a crucial role in the use of connected machines in healthcare. It combines data from devices and sensors into a single system. This makes it possible to collect, share and analyze huge amounts of data.

3.2.3. Segmentation of the global market for artificial intelligence in healthcare by supporting therapeutic areas. The list of AI-enabled applications approved by the USA Food and Drug Administration allows to determine the degree of support for various therapeutic areas by artificial intelligence. According to the latest update, the administration has approved 521 devices using AI. Radiology has a significant advantage over other disciplines (75 % or 391 devices approved by the administration). The second position belongs to the discipline of cardiology with a share of 10.9 %. The remaining segments are characterized by insignificant shares: hematology – 2.9 %, neurology – 2.7 %, clinical chemistry – 1.2 %, microbiology – 1.0 % (Fig. 6).

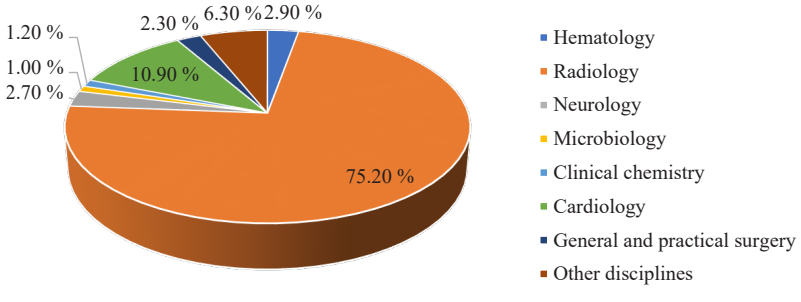

Fig. 6. Segmentation of the global AI healthcare market by therapeutic areas (2023), % (based on data [19])

3.2.4. Segmentation of the global AI healthcare market by its components. Based on the components (software, hardware, services), the software segment had the highest revenue in 2023 at 41 %. The hardware and services segments had revenue shares of 35 % and 24 %, respectively (Fig. 7). The widespread implementation of AI-based software solutions in healthcare institutions has led to the rapid growth of this segment. Increased investments in AI-based software technologies in the healthcare sector contribute to an increase in the market share of this segment. Leading medical companies are collaborating with software developers to design and implement AI-powered applications for use in the healthcare sector.

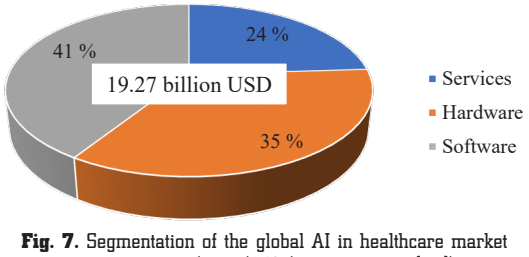

Fig. 7. Segmentation of the global AI in healthcare market by component (2023), % (based on data [18])

The software segment is expected to grow the fastest during the forecast period, due to the increased penetration of AI and machine learning-based software in various healthcare applications worldwide. The rapid emergence and increasing adoption of telehealth and telemedicine technologies in the healthcare sector due to the COVID-19 pandemic in 2020 significantly contributed to the growth of AI software solutions in this sector, with this trend continuing in the future.

The global AI in healthcare market segmentation by its component can also be done based on data [19]. The software segment accounted for the largest revenue share (40.5 %) and is expected to grow the fastest (Fig. 8).

The software segment includes machine learning platforms, natural language processing (NLP) and text analysis tools, deep learning platforms, computer vision, speech and audio recognition, integrated development environments (IDEs), and AI frameworks. The global trend of digital transformation and the capabilities of AI software solutions have made it a leading component in healthcare.

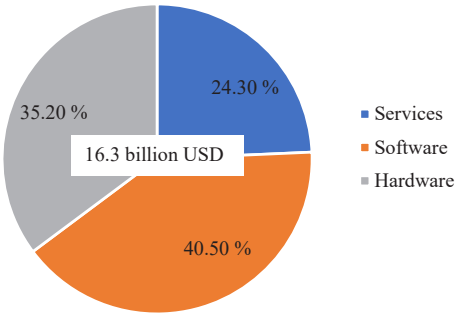

Fig. 8. Global AI healthcare market segmentation by AI components (2022), % (based on data [19])

3.2.5. Global AI healthcare market segmentation by technology. According to the segmentation by components (machine learning, natural language processing, computer vision, robotics, expert systems), the machine learning segment had the highest revenue in 2023 at 33.1 %.

The remaining segments are arranged in the following sequence: natural language processing (23.9 %), computer vision (18.0 %), robotics (17.7 %), expert systems (7.3 %), Fig. 9.

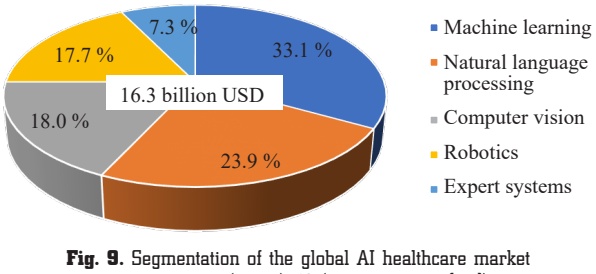

Fig. 9. Segmentation of the global AI healthcare market by technology (2023), % (based on data [19])

3.2.6. Segmentation of the global AI healthcare market by application. According to the market segmentation by application (clinical trials, diagnostics, robotic surgery, virtual assistants, wearables) based on data [18], in 2023 the clinical trials segment dominated the global AI healthcare market with the highest market share. Increased investment in research, drug discovery and development, clinical trials of newly developed drugs led to an increase in the profits of the clinical trials segment in the AI healthcare market. Patent expirations, increased demand for rapid

clinical trial results, and development of new drugs have fueled the growth of this market segment worldwide. Furthermore, increasing use of AI is expected to reduce the time and cost per patient, further driving the demand for AI in the healthcare market. Also, the use of AI in clinical trials will help in obtaining accurate results and saving time. Favorable government policies and various startups in this field are promoting the use of AI, which is also influencing the growth of this segment.

The virtual assistant segment is expected to grow at the fastest rate during the forecast period. The integration of AI in this segment is driven by the shortage of skilled professionals, improving internet access, and increasing adoption of smart devices. Increasing investments in the implementation of automated technologies in the healthcare sector is also expected to fuel the growth of the virtual assistant segment.

The results of the study [19] allow to segment the global market for artificial intelligence in healthcare by use, taking into account other segments. By the use of AI in this field, the segments can be divided into three groups. The first group with high growth rates and the largest revenue shares includes two segments: medical imaging and diagnostics (27.1 %) and personalized medicine (20.8 %). The second group with slow growth rates includes segments: predictive analytics and early detection (17.4 %) and virtual assistants and chatbots (15.8 %). The segments of drug discovery and development, administrative automation, and remote patient monitoring accounted for 4.1 % and 3.1 % of revenue, respectively (Fig. 10).

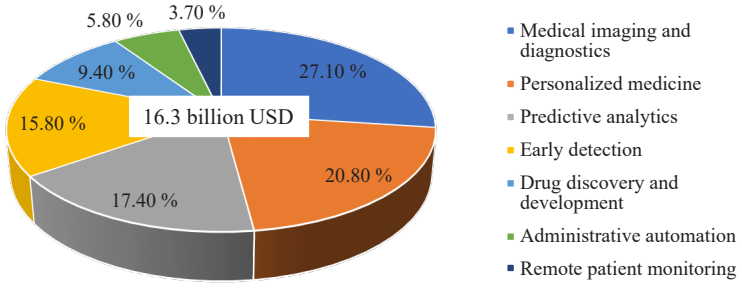

Fig. 10. Segmentation of the global market for artificial intelligence in healthcare by use (2022), % (based on data [19])

3.3. Dynamics of the global market for artificial intelligence in healthcare

Market growth factors. These factors include:

– significant assistance of AI-based tools and hardware to healthcare organizations to simplify and improve patient care, which also leads to lower costs and increased overall treatment efficiency;

– rapid growth in the elderly population and chronic diseases, as well as technological progress in the healthcare sector;

– increased need for operational efficiency among healthcare organizations;

– expansion of hybrid healthcare;

– the emergence of huge amounts of information and the ability of AI algorithms to manage and provide information from the increased volume of medical data (according to the DATCON index, by 2025 the volume of data in the healthcare sector will exceed 10 trillion gigabytes);

– greater attention to predicting possible diseases using AI in the healthcare sector;

– the possibility of automating routine tasks and opening up new prospects for treatment using AI;

– shortage of medical personnel, which leads to increased responsibilities and burden on existing employees and possible errors, negatively affecting productivity and patient care.

Important factors for market growth are also the increased need for remote patient monitoring systems and improved diagnostic processes. Remote patient monitoring combined with AI allows for continuous monitoring of patients with real-time information about their health status. This personalized approach ensures the guarantee, adaptation of medical interventions to the needs of each patient with optimization of treatment effectiveness. AI algorithms can remotely and accurately analyze medical images such as X-rays, CT scans, and MRIs. This capability is especially valuable in regions with limited or no access to modern medical facilities. The COVID-19 pandemic has increased the need for remote patient monitoring, especially for the elderly. This monitoring is particularly useful for treating chronic diseases. AI systems can also track a patient's overall health. Healthcare providers' focus on remote patient monitoring is leading to an increase in the use of AI.

AI algorithms can analyze vast amounts of medical data, including patient histories and genetic information, which can improve and speed up the diagnostic process. The ability of AI-based diagnostic tools to discern subtle patterns and signs of diseases enables early detection and subsequent effective prevention. All these factors are driving the market growth.

Market restrictions. The significant complexity and cost of implementing AI-based processes and tools raises concerns about the security of patient data and, coupled with regulatory hurdles, may hinder the market growth in the future.

Building or deploying an AI system for a healthcare firm can be expensive. Due to this issue, many healthcare providers may limit the provision of such services. Resistance to change is another major factor hindering the market. Healthcare professionals may resist changing their existing system to an AI-driven system that requires less human intervention.

Furthermore, the lack of standardization of AI models is another major constraint for the market. Healthcare data is often unstructured and varies across institutions, making it difficult to create reliable and generalized AI solutions. All these factors limit the adoption of AI in this industry, creating serious constraints for the market.

The development and deployment of AI applications for healthcare typically requires approval from various authorities, including the Food and Drug Administration (FDA) or the European Union. The approval process can be lengthy and expensive. The lengthy process can delay the adoption of AI in healthcare and deter small companies with limited resources from entering the market. This factor is a major deterrent for the market. In addition, regulations important for data privacy and security, and changing guidelines can limit the development of AI systems for the said industry.

There is a problem that is also slowing down the adoption of AI in healthcare. It is related to the lack of experienced specialists, which leads to delayed development,

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errors, and increased healthcare costs. Healthcare providers are turning to technology companies for expertise in implementing AI, and, naturally, the demand for such expertise makes competition between the latter very intense.

Market opportunities. Recent demonstrations of AI for medical diagnostics have increased the confidence of the medical community and have given impetus to the further implementation of AI in the healthcare sector. The expansion of the set of digital information related to patient health, increased demand for personalized medicine and decreasing treatment costs are some of the important driving forces for the market development. The increase in the global geriatric population, changing lifestyles and the increasing prevalence of chronic diseases have contributed to the increase in the demand for diagnostics and improved detection of diseases at early stages.

Technological advancements in the field of AI for healthcare will also contribute to the market opportunities. It is noted that numerous technological advancements open up numerous opportunities for market growth. Cloud computing, which is being deployed in the healthcare sector with AI systems, aims to offer scalable and cost-effective storage and processing capabilities for AI applications. This will enable healthcare organizations to securely store and analyze huge data sets. The penetration of Internet of Things devices is also seen as a technological advancement in AI solutions. Internet of Things devices, such as wearable health trackers and monitors, can be integrated with AI. The latter can analyze this continuous stream of data to detect anomalies, predict potential health problems, and improve patient outcomes.

Market challenges. One of the challenges of using AI in healthcare is the requirement to access large amounts of data to work effectively. Another is the risk of bias if the data used to form algorithms is not representative of the whole. Finally, there is a need for more standardization of different AI systems, which will make it easier to compare results and combine data from multiple sources.

One of the biggest challenges for AI in healthcare is how to implement it in daily clinical practice. Over time, clinicians may move to tasks that require unique human skills and the highest level of cognitive function.

Another market challenge is the slower adoption of AI services in underdeveloped regions. The development, use, and maintenance of AI systems require significant capital investment. As a result, underdeveloped regions often face financial constraints to deploy such services. In these regions, the healthcare sector or infrastructure may be limited with limited access to medical facilities, medical equipment, and skilled healthcare professionals. Integrating AI into such an environment can be significantly challenging.

3.4. Tech giants in competition and powerful AI healthcare companies

The big tech giants have accelerated their exploration of the AI healthcare market over the past few years. They are collaborating, developing AI-based solutions, and investing heavily in AI startups:

– *Google* is building its life science brand and is actively using AI for its own purposes. DeepMind, the AI company owned by Google, is a key player in this market. Google focuses on pharmaceutical research and development of AI, radiology, and imaging; it is also interested in healthcare search and unstructured data analysis;

– *Microsoft* is a leader in healthcare IT services. Azure Cloud is becoming the leading environment for enterprise software focused on providers and competing for the collection and sale of health data;

– *Amazon* has a HIPAA-compliant cloud service for processing health data; it also focuses on precision medicine with AI, medical supply chain, insurance and care delivery;

– *Apple* has the largest share of the wearables market. The iPhone and Apple Watch are mainly used to collect patient data for further processing with AI. Also, the Apple Health App offers a patient-doctor environment with several features through the iPhone.

Powerful companies in the healthcare field with AI are:

– *DeepMind* (USA) is a subsidiary of Google, known for its breast cancer detection tool, radiology solutions for detecting eye diseases, etc.;

– *Augmedix* (USA) is a medical documentation expert, developing an AI-based solution to extract data from doctor-patient conversations, convert them into text notes and enter them into the EHR system;

– *CloudMedX Health* (USA) uses natural language processing and deep learning to analyze large-scale platform and clinical case data to provide clinicians with insights into patient health and new approaches to disease treatment;

– *Babylon Health* (UK) provides remote consultation services by collecting patient complaints and arranging voice or video calls with appropriate doctors 24/7;

– *Corti* (Denmark) is an AI-based assistant that can detect a heart attack by analyzing the patient's voice, comparing it with their medical history, and informing medical staff;

– *Butterfly Network* (USA) is a developer of a portable ultrasound imaging system using Ultrasound-on-Chip technology that combines semiconductors, AI, and cloud technologies in a pocket-sized form factor;

– *Enlitic* (USA) is a healthcare company that uses deep learning to analyze vast amounts of medical images and other data to generate new insights;

– *Arterys* (USA) has invented an AI-based solution for studying radiological images using cloud services and has received FDA approval;

– *Caption Health* (USA) focuses on early detection of diseases with its ultrasound interpretation device. This AI-powered diagnostic tool allows any doctor to examine any part of the body;

– *Behold.ai* (UK) helps radiologists' study radiological images using AI; by training an algorithm that can detect abnormalities in various types of medical images and scans with 90 % accuracy.

3.5. Discussion of the research results

Practical significance. The results obtained in the course of the research can be used for a comparative assessment of the state of the Ukrainian market of artificial intelligence in healthcare, determining its strengths and weaknesses. Taking into account the factors that influence the state and dynamics of the development of the world market will contribute to the integration of the Ukrainian market into the world market. The identified main strategic trends in

the development of the world market of artificial intelligence in healthcare will allow to determine the growth trends of the Ukrainian market. It was also established that the inhibiting factors for the development of the artificial intelligence market in healthcare are the lack of qualified specialists and ineffective cooperation between the public and private sectors.

Research limitations. There is practically no systematic information in the literature on the world market of artificial intelligence in healthcare and its segment analysis. There is only some information in individual foreign analytical reports and publications that require further systematization and generalization.

The influence of martial law conditions. Under martial law, there is insufficient funding for the latest developments in the field of artificial intelligence and their implementation in healthcare. Insufficient funding is one of the important restraining factors for the growth of the relevant market in Ukraine.

Prospects for further research. Using approaches and methods to assess the global market for artificial intelligence in healthcare can be useful for determining ways for further development of the Ukrainian market.

4. Conclusions

The literature review and research results indicate the growing use of AI in healthcare, the increased trust of healthcare providers in AI, and the interest of investors in developing AI-based healthcare solutions. The lack of qualified specialists and ineffective cooperation between the public and private sectors hinder the development of the AI market in healthcare. Most AI innovations are useful in healthcare, but the strategies they help can be quite different.

Today, 86 % of healthcare providers and technology, life-science companies use AI, which confirms the high demand in the healthcare industry.

According to the segmentation of the global AI market in healthcare:

– by geographical regions, the largest market share belonged to the North America region with a share of 45 %;
– by application – the clinical trials segment (22.7 %);
– by therapeutic areas support – radiology segment (75 %);
– by artificial intelligence components – software segment (41 %);
– by technology – machine learning segment (33.1 %);
– by use – medical imaging and diagnostics segment (27.1 %).

The main strategic trends and directions of further development of the artificial intelligence market in healthcare are presented. The market dynamics are considered in terms of growth factors, market opportunities and constraints, and challenges. Data are provided on technological giants in terms of competition and the best companies in the healthcare industry with artificial intelligence.

The dynamics of the global market of artificial intelligence in healthcare are considered in terms of growth factors; market constraints, opportunities, and challenges. Data are provided on technological giants in terms of competition and powerful companies in the healthcare industry with artificial intelligence.

Conflict of interest

The authors declare that they have no conflict of interest regarding this study, including financial, personal, authorship or other, that could influence the study and its results presented in this article.

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Data availability

The manuscript has no related data.

Use of artificial intelligence

The authors confirm that they did not use artificial intelligence technologies when creating the presented work.

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✉ ***Viktor Malyshev,*** *Doctor of Technical Science, Professor, Department of Fundamental and Medical and Preventive Disciplines, PrHEI "International European University", Kyiv, Ukraine, ORCID: https://orcid.org/0000-0003-2756-3236, e-mail: viktor.malyshev.igic@gmail.com*

Yurii Lipskyi, *PhD, Associate Professor, Department of Marketing, Management and Public Administration, National Academy of Statistics, Accounting and Audit, Kyiv, Ukraine, ORCID: https://orcid.org/0009-0009-8483-5833*

Viktoria Kovalenko, *PhD, Associate Professor, Department of Fundamental and Medical and Preventive Disciplines, PrHEI "International European University", Kyiv, Ukraine, ORCID: https://orcid.org/0000-0001-8778-014X*

Angelina Gab, *PhD, Associate Professor, Department of Fundamental and Medical and Preventive Disciplines, PrHEI "International European University", Kyiv, Ukraine, ORCID: https://orcid.org/0000-0003-3162-7159*

Dmytro Shakhnin, *PhD, Associate Professor, Department of Fundamental and Medical and Preventive Disciplines, PrHEI "International European University", Kyiv, Ukraine, ORCID: https://orcid.org/0000-0001-9657-8621*

Olha Orel, *PhD, Lecturer, Department of Fundamental and Medical and Preventive Disciplines, PrHEI "International European University", Kyiv, Ukraine, ORCID: https://orcid.org/0000-0001-5187-7580*

✉ *Corresponding author*