The future of warfare. Anticipated changes in military trends

Майбутнє війни. Передбачувані зміни у військових трендах

Arif Hasanov [A]
PhD in National Security and Military Sciences, Assoc. Prof., e-mail: arif.h.hasanov@gmail.com, ORCID: 0000-0002-8814-1590

Rashad Tahirov [A]
PhD in national security and military sciences, e-mail: rashad_tahirov1975@yahoo.com, ORCID: 0000-0003-1936-152X

Khayal Iskandarov [A]
PhD in National Security and Military Sciences, e-mail: xayal1333@gmail.com, ORCID: 0000-0001-8975-6530

[A] National Defence University, Republic of Azerbaijan

Аріф Гасанов [A]
Кандидат наук з національної безпеки та військових наук, доцент, e-mail: arif.h.hasanov@gmail.com, ORCID: 0000-0002-8814-1590

Рашад Тахіров [A]
Кандидат наук з національної безпеки та військових наук, e-mail: rashad_tahirov1975@yahoo.com, ORCID: 0000-0003-1936-152X

Хаял Іскандаров [A]
Кандидат наук з національної безпеки та військових наук, e-mail: xayal1333@gmail.com, ORCID: 0000-0001-8975-6530

[A] Національний університет оборони, Азербайджан

Received: September 6, 2024 | Revised: October 20, 2024 | Accepted: October 31, 2024

DOI: 10.33445/sds.2024.14.5.1

Purpose: to discuss the changes in the scientific and technical field, and examine their impact on military art.

Method: comparative analysis, and synthesis.

Findings: Today's military and political realities require the Armed Forces to be ready for wars that may occur at any time, including in the future, in order to ensure the country's national security. Because, as in the past, the struggle for natural resources, competition between states, aspirations for hegemony, as well as ideological differences and security concerns, which lead to military conflicts, will continue in the future. At the same time, the great progress achieved and expected in the field of technology will significantly change the traditional forms and methods of fighting. The study and skillful application of these forms and methods in the Armed Forces will be one of the main conditions for success in future wars. Scientific and technical progress affects all areas of human activity without exception, and has a noticeable effect on the development of methods and forms of war. In the future, the content and typology of military operations, strategy and tactics, forms and methods of application of armed forces will be formed under the influence of scientific and technical progress, mainly in the fields of artificial intelligence, biotechnology, and nanotechnology. For this reason, in order to study the nature of future wars, to predict the methods and forms of military operations, the article considers the causes of wars, discusses the changes in the scientific and technical field, and examines their impact on military art.

Theoretical implications: The paper enhances our understanding of significant transformations due to advancements in technology, changes in geopolitical dynamics, and evolving societal expectations, against the backdrop of the extensive use of autonomous systems, including drones, unmanned vehicles, and AI-powered decision-making tools.

Practical implications: The paper contibutes to the development of military strategies and operational plans, which consider how technological, social, and geopolitical changes will concretely affect the future warfare.

Value: The study offers significant value in understanding and predicting the nature and character of future warfare and provides multiple lenses through which to analyze the war and devise strategies in line with emerging security threats.

Paper type: theoretical.

Key words: war, politics, peace, conflict, contradiction, strategy, hybrid.

Мета: обговорити зміни в науково-технічній сфері, дослідити їх вплив на військове мистецтво.

Метод дослідження: порівняльний аналіз, синтез.

Результати дослідження: Військово-політичні реалії сьогодення вимагають від Збройних Сил бути готовими до воєн, які можуть виникнути в будь-який час, у тому числі й у майбутньому, задля забезпечення національної безпеки країни. Тому що, як і в минулому, боротьба за природні ресурси, конкуренція між державами, прагнення до гегемонії, а також ідеологічні розбіжності та проблеми безпеки, які призводять до військових конфліктів, триватимуть і в майбутньому. Водночас великий прогрес, досягнутий і очікуваний у галузі техніки, суттєво змінить традиційні форми та методи боротьби. Вивчення і вміле застосування цих форм і методів у Збройних Силах буде однією з головних умов успіху в майбутніх війнах. Науково-технічний прогрес зачіпає всі без винятку сфери людської діяльності, помітно впливає на розвиток методів і форм ведення війни. У майбутньому зміст і типологія військових дій, стратегія і тактика, форми і методи застосування збройних сил будуть формуватися під впливом науково-технічного прогресу, головним чином у сферах штучного інтелекту, біотехнологій і нанотехнологій. Тому з метою вивчення характеру майбутніх воєн, прогнозування методів і форм військових дій у статті розглядаються причини воєн, обговорюються зміни в науково-технічній сфері та їх вплив на військове мистецтво.

Теоретична цінність дослідження: стаття покращує наше розуміння значних трансформацій, спричинених прогресом у технологіях, змінами геополітичної динаміки та еволюцією суспільних очікувань на тлі широкого використання автономних систем, зокрема дронів, безпілотних транспортних засобів та систем прийняття рішень на основі штучного інтелекту. виготовлення інструментів.

Практична цінність дослідження: стаття сприяє розробці військових стратегій та оперативних планів, які розглядають, як технологічні, соціальні та геополітичні зміни конкретно вплинуть на майбутню війну.

Цінність: дослідження пропонує значну цінність у розумінні та прогнозуванні природи та характеру майбутньої війни, а також надає різні позиції, через які можна аналізувати війну та розробляти стратегії відповідно до нових загроз безпеці.

Тип статті: теоретичний.

Ключові слова: війна, політика, мир, конфлікт, протиріччя, стратегія, гібрид.

Introduction

The first record of war dates back to about 5,000 years ago and remains a part of human history to this day. Historical events show that no generation and country is immune from the threat of war, and this threat remains one of the most urgent problems in the world. In general, war is a negative phenomenon that disturbs people's peace, lowers the standard of living and causes radical changes in society. Because wars mean fighting, arms, death, suffering and destruction. However, it is noted by some researchers that wars play a positive role in the development of the country. Thus, wars accelerate the development of new technologies, stimulate economic growth and the creation of new jobs. For example, after World War II, the number of both women and foreign nationals working in heavy industry increased significantly. War unites a country's citizens against a common enemy, leading to national self-awareness and awakening. In addition, the armed forces gain some combat experience in military operations. However, the negative aspects of war, the damage it causes to countries are more and therefore undesirable.

Although wars are undesirable in the modern world, the use of military power still plays an important role in resolving conflicts in the system of international relations. Despite the norms of international law, some states do not hesitate to use force against the territorial integrity and political independence of another state, citing various excuses. In our opinion, this trend will continue in the future. Thus, the country's existence as an independent entity in the present and future world, its ability to protect its territorial integrity and interests from possible threats largely depends on its readiness for armed conflicts. This in turn requires the analysis of both past and current wars and the prediction of the forms and methods of future military operations.

In the analysis and forecasting of wars, it is important to study the experience of developed countries, their successes in military operations, as well as the reasons for their failures. However, the imitation of past experiences without deep analysis results in repetition of the same mistakes or failures. In many cases, the states give preference to the number of personnel, weapons and equipment, and do not pay enough attention to the introduction of new methods and forms of warfare. In the Second World War, France, despite being strong in terms of weapons and technology, was defeated by Germany in a short time because technical innovations were not taken into account in France's military doctrines and it remained attached to the combat forms, methods and rules of the First World War (Beverelli, 2020). A similar mistake was made by the political and military leadership of Armenia during the 44-day Second Karabakh war. There is a number of papers dedicated to the Second Karabakh war and present it as a generation war (Guner, et al., 2022; Iskandarov & Gawliczek, 2021a; Iskandarov & Gawliczek, 2021b; Iskandarov & Gawliczek, 2020c; Iskandarov et al., 2022). For this reason, we believe that the development of forms and methods of war is closely related to scientific and technical progress. Along with the adoption of new weapons and equipment, it is important to study their effective application. If the methods and forms of effective application of new weapons and equipment are not worked out, it is of course difficult or even impossible to achieve great results.

As mentioned, the development of science and technology greatly affects the planning and waging wars. For example, firearms such as cannons, rifles, pistols, and machine guns, created as a result of the invention of gunpowder, revolutionized military affairs and significantly changed the methods and forms of warfare (Walsh, 2023). Similarly, trains, tanks, airplanes, and new types of ships emerged due to the invention of steam engines and internal combustion engines, significantly increased the speed and depth of warfare, as well as expanded its scope. The development of nuclear physics giving impetus to the creation of nuclear energy revealed new laws and principles of war and consequently led to the discovery of nuclear weapons, which had a great destructive force. Fuzzy logic theory has encouraged the development of artificial intelligence capable of making decisions in complex and messy environments, as well as conducting various operations without

human intervention. As a result, semi-autonomous controlled weapon systems were created. In this direction, ongoing researches and tests show that autonomously controlled weapons and equipment will be used in battles in the near future. According to several military analysts, future conflicts will usually not have a front and rear, and the defending side may occasionally launch an attack ahead of the aggressor. Is there truly going to be an aggressor? Ultimately, the challenging encounters of the future will take place in new settings. In addition, armies will fight opponents who are members of unidentified alliances. Strange wars also occur where there are unknown foes. These include confrontations in diplomacy, internal civil conflicts, behavioral, informational, financial, economic, and technological battles, in addition to armed engagements on conventional battlefields (Brychkov et al., 2019).

There is a number of studies dedicated to the nature and character of future warfare. For instance, Brychkov et al. (2019) predict certain features of upcoming wars and armed conflicts based on their examination of the military-political environment globally, the US National Security Strategy, and US military planning documents. According to the authors, asymmetric and indirect activities are becoming more common, armed conflicts are moving into cities and other inhabited areas, and irregular formations are being used more widely. The US officer Amos C. Fox presents the principles for the future of warfare and their roles in the changing landscape (Fox, 2024). The author suggests that army concepts and doctrine need to change as we go from a human-centric to a potentially artificial intelligence-dominated future of warfare that will feature human-machine integrated formations and a myriad of autonomous systems. Therefore, the cooperation among concept developers, doctrine developers, science and technology specialists, and force designers is necessary to provide workable concepts and designs for future forces that incorporate the most important elements of emerging technology while keeping in mind the ongoing difficulties of ground combat. Following the war, which broke out between Russia and Ukraine in early 2022, Tim Sweijs and Jeffrey H. Michaels (2024) have provided the first thorough update and revision of theories regarding the future of warfare. The authors argue that the war has radically changed our understanding of the nature and character of war in the future, but also caution against marginalising many other parallel trends, types of war, and ways of waging them. Mark A. Milley and Eric Schmidt (2024) claim that even the most powerful Army of the World – the US Army is not ready for future wars. Against the backdrop of evolving nature of warfare, Tughral Yamin (2021) presents a radical approach and highlights the necessity of a break from the past and suggests that national leaders and military commanders need to devise new concepts of defense policy that are in line with the emerging threats. However, our study will focus more on the changes in the scientific and technical field and their impact on military art and modern battlefield.

Results

Root causes of wars. Retrospective analysis

Analysis has shown that only eight percent of the current human history has been a period of peace (Hedges, 2003). However, the reasons for the outbreak of war or armed conflict have been different at various times. The situation in Ukraine has brought to light the basic distinctions between two opposing parties, namely Russian and Western conceptions of Euro-Atlantic security, especially with regard to the post-Cold War Euro-Atlantic security framework (Sadiyev & Iskandarov, 2018). Even some scholars suggest that a New Great Game had already begun between the parties. The disintegration of the Soviet Union created a security and influence vacuum, opening up a large amount of “new” territory to potential outside actors and providing the rationale for this New Great Game. There are geographical variances and differences, thus it is important to use caution when using the analogy universally. In addition to troops, European explorers also played a significant role

in the original Great Game, which aimed to conquer and dominate uncharted area. Process was motivated not only by military conquest and territorial expansion but also by a strong desire to establish new trade and markets. Thus, commercial penetration in addition to diplomatic maneuvering. In the New Great Game, trade serves as a tool for both economic reward and coercion, and aid is disguising itself as investment and a way to influence regional politics. In the ancient Great Game, two opposing forces with a parallel but non-contiguous boundary grew closer to one another across an area that was regarded as no-man's land. In the "New Great Game", Russia aims to keep a buffer zone by continuing to exert influence over Western nations. These observations shed light on several important distinctions between the Old and New Great Games, as well as the origins and strategies of the power struggle (Iskandarov & Gawliczek, 2020d). Russia will pull out all the stops in order to exert its influence in its "near abroad" and reassert itself as a dominant power. The only way for the countries (in Russia's so-called "near abroad" is to strike the right balance between the West and Russia, because the latter does not seem to want to give up its political ambitions in the region. But cooperation with NATO has the utmost importance for all three countries in its "near abroad" (Nasirov et al., 2017). Some researchers argue that war is caused by economic, religious and political reasons. Others think that most wars in our time are fought for ideological reasons. In general, the causes of wars are grouped under two approaches: traditional and modern theories (Coccia, 2019). According to the traditional theory, the reason for the outbreak of war is the disruption of the social and economic balance between different nations, states, societies, as well as ethnic and religious groups. The conflict that occurs as a result of the violation of the balance leads the states to use violence. Proponents of this theory believe that war is a manifestation of violence inherent in human nature. According to Thomas Leviathan, a great philosopher who lived in the 17th century, people tend to use violence for the sake of their needs and interests, as well as when those interests are threatened (Finucane, 2013). Since the state and social groups are formed by people who have similar needs and interests in a certain area, they are a means for realizing their wishes. For this reason, a state or a separate social group tends to use violence against other states, political, religious, and ethnic elements, which it considers to be an obstacle or a threat to the fulfillment of its needs or the realization of its interests. This violence involves taking preventive and violent measures to meet growing needs or to protect interests. In the future, it is predicted that the conflict of interests will continue for various reasons and there will be new wars. According to Yakov Novikova, one of the representatives of the traditional theory, in many cases, armed conflicts and wars between different ethnic, ideological and religious groups continue and are repeated due to historical reasons that create a force of inertia in society (Coccia, 2019).

According to the modern approach, the reason for the emergence of war is the irrational solution of conflicts between subjects (state, ethnic, religious groups, etc.). According to this approach, conflicts have always existed, but sometimes decisions are made based on emotion or instinct when there are rational ways to resolve them and achieve peace. For example, in Armenia, which was defeated in the 44-day Patriotic War and whose army was destroyed, it is an irrational and dangerous behavior to carry out revanchism actions after the war and to refuse to sign a peace treaty with Azerbaijan. Because the opinions that the next time if the war breaks out between Azerbaijan and Armenia, the latter will suffer a heavy defeat and will end its existence have been repeatedly voiced by the leading military experts.

The successful anti-terrorist operations carried out by Azerbaijan in Karabakh after the war are proof of this (Hasan et al., 2024). If Armenia acts rationally and signs a peace treaty with Azerbaijan it will allow Erevan to join regional and international projects and get additional income. For this reason, the actions of revanchism in Armenia are not understandable. Representatives of the modern approach believe that geopolitical ambitions, the influence of chauvinist forces inside the country, failure in negotiations and domestic politics, the desire to expand the sphere of

influence of great powers are the main reasons for irrational thinking and modern wars (Matthew & Massimo, 2009).

Both of the above reasons are directly related to the human factor, its nature, as well as the result of its activity. In our opinion, the scientific and technical revolution expected in the future, mainly as a result of artificial intelligence replacing humans in many fields, will cause inter-country war or armed conflict without human will. For instance, it is a possible scenario in which artificial intelligence integrated into the strategic defense systems of any country may mistakenly assess the activities of another country as a real threat and make a decision to launch a pre-emptive strike.

Thus, the analysis of both traditional and modern approaches shows that the use of violence, including military force, is no longer one of the main means of resolving conflicts in the international world. In our opinion, in the future, there will be an increase in the number of wars on ethnic grounds compared to economic and ideological ones. In his book "The Clash of Civilizations", the American sociologist and political scientist Samuel Phillips Huntington notes that, as long as there are nations and groups belonging to different civilizations, conflicts in the world are inevitable, and this, in turn, will lead to the emergence of new wars (Assumpção, 2020).

As mentioned, along with the evolution of the social structure in human history, the characteristics of war are constantly changing. When we talk about the characteristics of the war, we mainly understand its cause, course and termination. This trend is evolving depending on domestic and foreign policy, system of social and international relations, new types of weapons and equipment. As a result of development, new methods and forms of inter-state struggle, including war, come to the fore.

Currently, the technological revolutions taking place in the field of bio, nano, material, artificial intelligence and information, on the one hand, have caused significant positive changes to human life and health, the quality of working conditions, and on the other hand, the uneven distribution of opportunities between states and within the country and increased tensions resulted in new armed conflicts and wars. New trends are observed in the conduct of armed conflicts in our time. These trends are inextricably linked to the wide application of new weapons and techniques based on artificial intelligence, information technologies in battles as an effect of rapid development. In our opinion, the widespread use of these weapons and techniques will determine the nature of future wars and significantly differentiate the forms and methods of warfare from the previous ones.

The possible nature of future warfare

Warfare is "the mechanism, method, or modality of armed conflict against the enemy". While war hasn't changed for thousands of years, warfare, specifically, the technology used to conduct war, is constantly changing. It evolved from soldiers with broadswords and bows, to soldiers on horseback with repeating rifles, to soldiers with machine guns, driving tanks, and calling in airstrikes from drones. The current security environment is characterized by rapid changes, unpredictable instability, and complexity. Wars in this modern age are no longer fought on conventional battlefields but asymmetrically over the digital world, cyberspace, social media, etc. Cyberspace is a vital component of the security environment and is essential to enhancing operational capabilities. To put it briefly, cyber security has swiftly transformed from a technical field to a strategic idea, and it is now an essential part of national and economic security policy (Hasanov et al., 2019). This approach to solving "problems" will remain prevalent for the foreseeable future. In addition, digitalization and technology will slowly penetrate all levels of society and private life (Iskandarov & Gawliczek, 2020a). The world witnessed several confrontations in the last decade, where different techniques were employed in pursuit of national objectives. However, these techniques fell far short of physical conflict. This approach does not cross the threshold of war, nevertheless the consequences are dire. The term "hybrid warfare" has dominated much of the

discussions about modern and future warfare since the 2006 Lebanon war. It has been adopted by senior military leaders and promoted as a basis for modern military strategies (Iskandarov & Gawliczek, 2020b). Hybrid warfare theorizes changes in contemporary warfare and contains key assumptions about 4th and 5th generations of warfare. In those types of warfare economic, political and social factors are used to break the opposing leadership. In this situation, military superiority alone is not helpful and knowledge of local culture and history are essential. A key concept in these types of warfare is the exploitation of emerging information technology, which allows non-state military actors to undermine the states' will by affecting the decision makers and the population through the globalized and networked media. Thus, incorporating cultural, social, legal, psychological and moral dimensions into the war makes the wider use of armed forces redundant (Iskandarov & Gawliczek, 2020b).

According to Carl Von Clausewitz, the characteristics of war change depending on circumstances and time like a chameleon (James, 2018). By characteristics, he meant the paradoxical trinity of war: passion, creativity, and politics (Cole, 2020). Passion, as the primary element of war, includes the reactions and hostile actions inherent in human nature, such as hatred, malice, enmity, and violence. Creativity is related to the art of war, the activity of the army, mainly the skills and abilities of commanders in the uncertain and confused environment of war, methods and forms of battle. The third is the rational decisions taken by the government, which turns the war into a tool of politics (Waldman, 2009). Changes in social and political life, cultures, as well as scientific and technological progress give new forms to each of the three mentioned above. As a result, new forms and methods of initiating, conducting and terminating the war appear. If the changes in the social structure of the society, as well as in the systems of political and international relations, mainly affect the first and third elements of the trinity, the scientific and technological progress significantly changes the methods and forms of the battle related to the second element.

The methods and forms of war have always played a key role in achieving the goals of war. The biggest factor on which these methods and forms have depended is weapons and equipment. In the present era, this dependence remains the same. According to an action plan approved by NATO, interoperability has three dimensions: technical (hardware and systems), procedural (doctrine and procedures) and human (language, terminology and training) (Iskandarov & Gawliczek, 2019). All three dimensions are inextricably linked to each other and it will remain all the same as far as the future nature of warfare is concerned. If in previous wars the effect of conventional weapons was measured only by the power of kinetic, chemical and thermal energy, in the future it will be measured by the ability to hit targets with high accuracy and autonomous operation. Based on the latest achievements of fundamental and applied sciences such as advanced information and communication technologies, artificial intelligence, nanoparticle and particle physics, these weapons will lead to radical changes in the methods and forms of battles.

In recent decades, great progress has been observed in the development of the production of new materials, information, communication and biotechnology. This progress has led to the production of new types of weapons, military and special equipment. In our era, the introduction of high-precision weapons based on information, artificial intelligence and other advanced technologies, their installation on unmanned aerial vehicles and other remotely controlled vehicles has significantly changed the nature of battles. These changes brought innovations called "revolution in military art". "Revolution in military art" is related to the emergence of new progressive ideas about the strategic, operational and tactical levels of war, the nature, goals, possibilities and limits of the use of military force, as well as the methods and forms of the battle. In fact, "revolution in military art" is not a new concept. As mentioned above, as military equipment and weapons developed throughout history, the methods and forms of battle also gradually changed. A so-called revolution occurs when the changes are significantly different from the previous ones, when they give a great advantage and a decisive victory to the party who introduced

them, and when there are important political and historical consequences. In the 21st century, humanity approached the threshold of a new revolution comparable to the changes in military art with the mass application of firearms in the 15th-17th centuries. The types of traditional combat, such as attack and defense, which have played a key role in achieving the goals of military operations for many years and require direct contact with the enemy, are fading away.

In new circumstances, the superiority is achieved not by concentrating forces and means in a decisive direction with the maneuver of the troops, but by precise and devastating blows from a distance, without coming into close contact with the enemy. Modern warfare has shown that it is possible to inflict heavy casualties on enemy forces, disable their equipment, and thereby debilitate them without direct contact from a long distance. In addition, the rapid development of artificial intelligence and high technologies and the significant expansion of their scope paves the way for the creation of autonomously controlled weapon systems and special equipment with greater capabilities in the future. Leading scientists predicting the development of techniques and technologies and studying their impact on the course of wars believe that the appearance of battles by the mid-21st century will be shaped by the influence of new discoveries and inventions that will occur in the following fields:

- *High energy physics*. High energy physics (also known as particle physics) is the branch of physics that studies the nature of the particles that make up matter and radiation (Fernow, 2022). High energy physics is one of the fastest growing research fields in the world and occupies an important place in the scientific research of leading countries. We believe that as a result of technological development in this field, weapons based on the use of new physical principles will be improved or new types will be created. These are directed energy (laser) weapons, as well as siper-high frequency and radio-wave, electromagnetic, geophysical and infrasound weapons. The general features of these weapons are that they can be used covertly and suddenly, they can disable electronic systems instantly, and they can destroy manpower without using conventional weapons. Currently, in developed countries, work on increasing the capabilities of these weapons is being continued. The creation of new types of directed energy (laser) weapons and increasing their effectiveness is one of the most successful activities in this field. The achieved success is due to numerous researches conducted in this direction and the emergence of new techniques. To date, leading countries have managed to develop and test directed energy (laser) weapons for various purposes. The US military announced the creation of a prototype of a high-power laser weapon in 2022, and that it will be accepted into service in the coming years (Rodgers, 2024). The biggest advantage of this weapon is that it destroys the target instantly by transferring energy at the speed of light. Due to the directed energy, the accuracy of hitting the target is very high, and this weapon does not make a sound and does not recoil when firing, unlike conventional weapons. The ability to adjust the power of another energy in this allows the weapon to be used for various purposes, such as measuring distance, disabling and destroying the target. Finally, these weapons have almost unlimited firepower, because the number of possible shots depends only on the characteristics of the energy source (Bothwell, 2023). The elimination of the shortage of currently available weapons and the rapid continuation of improvement will increase their effectiveness. In the near future, it is planned to shoot down warplanes, unmanned aerial vehicles, satellites and missiles with an improved laser weapon;

- *Artificial intelligence*. Artificial intelligence is usually defined as the development of computer systems that can perform tasks that require human intelligence, such as visual perception, speech recognition, decision making, and translation between languages (Marcin, 2019). In recent years, great progress has been made in the field of artificial intelligence (AI). Recent advances in this field make it possible to realize what previously seemed like science fiction. Thus, computers, robotics and other techniques working on the basis of artificial intelligence instantly process huge amounts of information and make decisions. Examples of autonomously controlled artificial

intelligence systems without human intervention have already been created and tested. However, with modern artificial intelligence, human-like activities such as thinking, understanding, explaining and posing problems are not yet possible. However, we believe that the improvement carried out on algorithms will increase the capabilities of artificial intelligence in the abovementioned activities in the future.

Considering that all scientific and technological achievements are widely used in military, artificial intelligence will also be integrated into weapons and weapon systems. In recent years, advanced armies have been paying special attention to the development, and application of "smart" weapon systems based on artificial intelligence. It is clear that the combat potential of the armed forces in the future will be determined by the capabilities of "smart" weapon systems. "Smart" weapon systems that will work in sync with the command center will play an important role in all stages of war as a key element of future battles. Thus, "smart" weapon systems will be able to assess the conditions in all depths of military operations and deliver an effective strike independently according to the type of target. Thus, thanks to sophisticated algorithms, the artificial intelligence will make a flexible decision to strike targets based on their type, coordinates and sequence of destruction without human intervention. Compared to artificial intelligence, this activity will take more time when performed even by the most professional people in the command center. However, in modern and future wars, where conditions change rapidly, the time factor is very important in causing damage by fire. It is for this reason that armies with "smart" weapon systems will already have an advantage at the very beginning of the war.

The abovementioned weapon systems are currently under development, but their semi-autonomous samples are already in service. The further improvement of weapon systems operating with artificial intelligence, the creation of autonomous fighting robotics, and the use of high-precision ammunition in those weapon systems will both reduce the loss of manpower and enable the destruction of targets from a long distance. Thus, since the weapon systems controlled by artificial intelligence, including military robotics, will have the capabilities of autonomously identifying the area, face and target, determining coordinates, analyzing the situation and making decisions, firing, it will greatly reduce the direct use of manpower on the battlefield. According to the specialists of the US Department of Defense, artificial intelligence will completely change the principles of armed conflicts, leading to the third revolution in military art after gunpowder and nuclear weapons (Etzioni & Etzioni, 2017). However, it is a strak reality that artificial intelligence will create certain problems for its users. These are problems such as the enemy interfering with the artificial intelligence and directing the weapon against its user, confusing the enemy and friendly forces on the battlefield, attacking the civilian population and objects. In order to achieve success in future wars, it is imperative to solve such problems in the use of artificial intelligence in weapons and equipment.

- *Nano technology.* In fact, nanotechnology has emerged as a result of great advances in bio and material engineering. This technology is related to the field of science dealing with the design, creation and use of new structures, devices and systems by interfering with substances or combinations of substances on a molecular or atomic scale (Matthew, 2024). Nanotechnology enables the development of small, miniature devices with various functions and their use as a system. We believe that military equipment, weapons and equipment developed on the basis of nanotechnology will be widely used in the future. The great progress achieved and expected in this field of technology enables the mass production and application of small-scale military robotics, drones, surveillance devices, as well as lightweight but multifunctional clothing and equipment, body armor and camouflage. In addition, as a result of the development of nano technologies, the dimensions of the active components of modern electronics have been significantly reduced. Along with reducing the size of these components to 0.1 microns or less, their memory capacity has increased to more than 10^{12} bits (Grewal et al., 2020). The speed of modern development in the

field of nanotechnology strongly suggests that these indicators will be further improved in the near future. The widespread application of the achievements in the field of nanotechnology in information and communication technologies shows that in the next two decades, the size of practical memory devices will decrease significantly, and their information processing speed (reading, writing and transmission) will increase by about four times, and the cost will decrease significantly. As a result of these achievements, the mass production and use of various equipment based on artificial intelligence, including small-sized military equipment, unmanned devices such as robotics, will begin. Because the army needs equipment that will independently destroy the enemy and defuse mines and unexploded bombs without risking the lives of its soldiers, as well as without detection.

Integrating artificial intelligence into military mini-robotics and drones will allow them to be deployed en masse on the battlefield and strike autonomously without operator intervention. Due to their small size, it will be difficult to detect and destroy them. At the same time, mini-robotics and drones will operate both independently and in close contact with each other during the execution of the mission, and will have the ability to determine the order of distribution and destruction of targets among themselves. In our opinion, in the future, high-energy physics, as well as the integration of “smart” nano-technologies into small and medium-sized weapons, will significantly increase the ability of these weapons to accurately hit the target. For example, it is planned to equip these weapons and ammunition with a laser designator and a miniature sensor, which will allow them to hit the manpower located in shelters.

- *Information and communication technology*. In our age, information plays an important role against the backdrop of relentless strategic competition between states. Thanks to the revolutionary changes in information technology, power based on information (knowledge) has been added to the power system based on material wealth and physical force. Thus, the first condition for success in the modern world is to obtain important information on time, process it quickly, and make the right decision. The analysis shows that the revolutionary changes in the abovementioned technologies are taking place in two main directions: information processing and information transmission. Today's computers have the ability to store and process large amounts of data at once. In the future, with the advent of quantum computers, the volume and speed of information to be stored and processed is expected to be much greater than today. Unlike ordinary ones, the computers that will work based on quantum mechanics are supposed to process data all at the same time, not one by one. As a result, the processing time will be reduced multiple times. For example, if the most powerful computer in use today needs a billion years to break down a number of 30-40 characters into prime factors, a quantum computer will do the same job in 18 seconds. The revolution in information technology will lead to an exponential increase in the computing power necessary to collect, store, process and analyze large volumes of data. In addition, thanks to this revolution, secret information in various forms (text, audio, video, etc.) will be transmitted and deciphered in real time at any point of the world, to any person, including those participating in military operations. At present, the achievements in the transmission and processing of large-scale information over a single network allow remote control of various operations at the same time. The ongoing development in the field of information and communication technologies indicates that the exchange of information will be much faster in the future than it is today, as well as that more complex operations will be conducted quickly over the network. In such conditions, timely and comprehensively analyzed information will play a major role in ensuring success in all cases. For this reason, continuous control of the information domain at all stages of military operations and maintaining the advantage here will be the main condition for winning future wars. Thus, the commanders who dominate the information domain will get information about the situation in real time. This will allow them to analyze the situation, make the right decision in time, and effectively use forces and resources, including high-precision weapons. All these will change the

traditional methods and forms of fighting. In our opinion, innovations in the field of information and communication, together with other high-tech products, will bring a revolutionary change to military art.

As mentioned, the development of information and communication technologies will lead to revolutionary changes in military art. The integration of high-tech network, computing, surveillance and "smart" technologies into the automated control system of troops allows for the rapid processing of a large amount of various information without operator intervention or with little intervention, predicting the development of operational conditions, simultaneously providing all levels of the battlefield, operation will allow observation of the regions, as well as an effective strike. The development of military network technologies has created the concept of "Network-centric warfare". The concept of this war was first put forward by the US Department of Defense at the end of the 90s of the last centuries, and it is based on the idea of winning the battle thanks to the advantage gained in the information and communication space (Mallick, 2020). In the "network-centric warfare" intelligence, management, navigation, fire support, systems and complexes are connected to a single information-communication network, and the transfer and reception of reliable and complete information about operational (battle) conditions is carried out in practically real time. It is intended to increase the combat power of the unit by achieving rapid and high-precision destruction. The increase in the effectiveness of combat power occurs as a result of the acceleration of the process of managing forces and assets and the pace of combat, as well as the synchronization of combat activities. The transmission and reception of real-time data over a large area allows network users to monitor the current activities of all friendly and enemy units according to their authorization levels on an electronic map or screen, and to intervene directly in battlefield activities when necessary (Jonjo, 2014).

David Steven Alberts, a former American Director of Research for the Office of the Assistant Secretary of Defense for Networks and Information Integration, noted the following advantages of "network-centric warfare" (Smith, 2010):

1. A strong and fast network greatly improves information exchange and interaction in warfare;

2. The improvement of information exchange and interaction increases the reliability and accuracy of information, as well as awareness of the general situation;

3. General situational awareness allows units to self-synchronize;

4. Self-synchronization, in turn, dramatically increases the effectiveness of activities.

The main point that stands out from the above is self-synchronization. In military organizations with a traditional centralized hierarchical structure, command, decision, information, tasking, and interaction issues are transmitted from top to bottom, and usually all activities are carried out under the command of superiors. In self-synchronization, however, many complex activities are organized from the bottom up and interactions are regulated. This is because commanders on the battlefield can interact directly with both the fighting soldiers and their superiors at various levels. This allows them to be constantly aware of the situation, to transmit that information to their superiors in real time, to quickly adapt to changing conditions, to make independent decisions and move according to the conditions, to request fire support and additional forces. In short, the commanders on the battlefield will determine the tasks and objectives, as well as the form and method of conducting the battle, according to the intentions of the higher command. Self-synchronization gives a huge advantage over the enemy in terms of speed, control, and suddenness. This advantage allows you to conduct combat operations without interruption. As a result, tactical and operational interruptions that the enemy can take advantage of are eliminated, combat activities become more dynamic, continuous and decisive. The ability of units to operate independently, as well as a high level of awareness, will enable the simultaneous conduct of combat activities at the tactical, operational and strategic levels.

Thus, having considered the revolutionary changes in military art as a result of the development of technologies and the further acceleration of these changes in the near future we may describe the characteristics of future wars. In our opinion, in the wars that will occur in the next ten years, the form of fighting “non-contact” or “from a distance” will increase, and in the future, these forms will become more advanced and widespread. The reason they are called “non-contact” or “from a distance” is that in the initial or main phase of the war, the crushing blows to the enemy will be delivered by high-precision weapons located on (flying) vehicles far from the contact line, or by remotely or autonomously controlled armed robotics (a swarm of drones). etc.) operating on the battlefield. In previous wars, the main burden fell on the ground troops, and it was impossible to win without coming into direct contact with the enemy, destroying them and capturing a certain area.

The next revolution in the military art will fundamentally change the essence of winning a war. Thus, at the beginning of the war, striking the enemy's important military and civilian infrastructure with high-precision weapons from a long distance, causing serious damage to its military, economic and combat potential, will create fear and panic among the population and military personnel. In the next phase, the enemy units, which are already in fear and panic, will be destroyed by a quick assault of special forces or tactical groups. We believe that at this stage, the use of artificial intelligence and autonomously controlled military robotics, a flock of drones together with the aforementioned forces and groups, or in a synchronized manner with them, is pretty plausible.

The revolution in military art will affect and significantly change existing understandings of the strategic, operational, and tactical levels of warfare. If in previous wars there was a certain border between tactical, operational and strategic levels in terms of territory, space, time, purpose and force, in the future this border will disappear and it will be difficult to define the levels. Thus, the scope of military operations will expand in terms of territory and space. Space, cyber domains will be added to traditional land, air and sea domains. The targets of military-technological development will make it possible to choose and destroy both tactically and operationally, as well as in strategic depth at the same time. However, if there is to be any contact with the enemy on the battlefield, it will be short-lived. As it was mentioned, in earlier conventional wars, decisive engagements were mainly fought on the ground by land forces and had a certain depth and breadth. In this war, the forces and means operating vertically above and horizontally behind (Air Force, missile-artillery units) were usually given to the support of troops conducting combat activities on land. In future non-contact wars, everything will be the other way around.

In conventional wars, battles were planned and conducted at the tactical and operational levels to achieve a strategic goal. For this, the movement and deployment of large forces was organized, reserves and logistics points were created, the main direction in attack, the direction of concentration of main efforts in defense was determined, near, far and further tasks were indicated or defense in depth was organized. In our opinion, many of these will not be needed in future wars. Because there will be no clear idea of where and how the main blow or threat will come from. A well-thought-out and well-chosen strategy will determine the fate and the winner of future wars. In addition, we think that in the future, the use of large numbers of manpower, as well as large armed units and formations in combat, will create a potential risk, not an advantage. Thus, the movement and deployment of such forces will be immediately detected by various surface and aerial (space) reconnaissance and surveillance means, and high-precision weapons will strike at their location and equipment. In these conditions, well-prepared mobile tactical groups equipped with small but multifunctional drones and robotics, as well as advanced surveillance and information-communication systems, will play a crucial role in increasig the efficiency of operations.

Since large numbers of manpower are not involved on the battlefield, maneuvering with fire, one of the most important elements of the battle, will gradually lose its importance. Terms such as “front line”, “defensive area”, “front”, “main attack direction”, will be replaced by terms such as,

"accurate strike", "main strike location", "area of responsibility", "accurate strike range", "quick strike", "network intensity". The outcome of the battle will be determined by the effectiveness of these activities: detect rapidly; analyze quickly; make decisions quickly; quickly intervene or destroy from a distance with a precision strike. The party that gains the upper hand in these activities will definitely win future wars.

Conclusion

The intense struggle for limited opportunities against the backdrop of population growth, urbanization, and environmental pollution, as well as nationalism and ethnic conflicts, international terrorism, refugee flow, illegal drug trafficking, and the spread of weapons of mass destruction will continue in the future and lead to the emergence of new wars.

War, as a part of human civilization, is certainly ever-evolving. It should be noted that this development has become more dynamic in recent years. Thus, the observed scientific and technical revolution has affected all areas of human activity and social relations, as well as the methods and forms of armed conflicts to a large extent. Today's wars are very different from the conflicts of 20 or 10 years ago. The wars of current time now include physical domains (land, air, sea) as well as information, cyber and space. In our opinion, in the next ten years, the achievements in the scientific and technical field will further expand the integration of these domains and radically change the nature of wars.

Analysis has shown that the major advances in technology, including bio-, nano-, and digital technologies, will affect the military art and cause revolutionary change. The forms and methods of fighting will change significantly compared to the past. Many of the forms and methods used successfully since the invention of gunpowder and firearms, as well as the main components of combat, will no longer be effective. So, from the main components of the battle, such as fire, strike and maneuver, which have been tested together until today, the importance of the strike will be maintained in the future. In previous wars, in order to achieve strategic goals, it was considered an important condition to come into direct contact with the enemy at the tactical and operational level, destroy its main forces by fire and maneuver, and hold the territory. A special place was reserved for land operations here. In future wars, it will be possible to disable the opponent's important facilities, including critical infrastructure, control centers, security points, and military equipment with a long-range accurate strike and thereby make it accept your conditions. In the future, countries that do not have advanced technologies for warfare, including artificial intelligence, long-range high-precision weapons, will try to replace this deficiency by increasing the number of manpower, as well as traditional weapons and equipment. However, we believe that in future wars, unprepared manpower and an abundance of conventional military equipment will be a major disadvantage rather than a superiority. Because as a result of accurate strikes, fear and confusion will arise among the people of the opponent, which will cause them lose control and several heavy equipment, and thus the fighting ability will decrease. As a last resort, it is highly likely that that party will use weapons of mass destruction, banned ammunition, or launch terrorist activities. İn addition to high-precision weapons, various robotics autonomously controlled by artificial intelligence, unmanned aerial vehicles, including a swarm of drones will play a leading role on the future battlefield. Their widespread use in armed conflicts will significantly change the structure of the Armed Forces. In the near future, traditional forces of different levels (tactical, operational and strategic) of the Land, Air and Naval Forces will be connected to a single command and control network, consisting of strategic intelligence-strike and high-precision weapon systems, as well as will be replaced by small, but mobile, prepared, fully equipped special forces (tactical groups). In future wars, events will unfold rapidly, the situation will change quickly, and the strikes will be short-term, but accurate and devastating. In such a situation, leadership qualities such as initiative,

knowledge, flexibility, deep thinking, thorough preparation, and strong motivation will come to the fore to win the battle.

Funding

This study received no specific financial support.

Competing interests

The authors declare that they have no competing interests.

References

Assumpção, C. (2020). Is Huntington's "Clash of Civilizations" a Self-fulfilled Prophecy? Available at: https://www.e-ir.info/pdf/81197 (Accessed: 06.09.2024).

Beverelli, L. (2020). Why France Lost in 1940. Available at: https://warwriters.com/why-france-lost-in-1940/ (Accessed: 06.09.2024)

Bothwell, B. (2023). Science & Tech Spotlight: Directed Energy Weapons. Available at: https://www.gao.gov/products/gao-23-106717 (Accessed: 08.09.2024).

Brychkov, A.S., Dorokhov, V.L., Nikonorov, G.A. (2019). The Hybrid Nature of Future Wars and Armed Conflicts, *Military Thought,* Vol. 28, No. 2, pp. 20-32. http://dx.doi.org/10.21557/MTH.54208774 (Accessed: 04.09.2024).

Coccia, M. (2019). Comparative Theories and Causes of War in Global Encyclopedia of Public Administration, Public Policy, and Governance, pp.1-7, Springer. Available at: https://www.researchgate.net/publication/337890175_Comparative_Theories_and_-Causes_of_War (Accessed: 23.08.2024).

Cole, B. (2020). Clausewitz's Wondrous Yet Paradoxical Trinity: The Nature of War as a Complex Adaptive System, *Joint Force Quarterly 96*, pp. 42-49. URL: https://ndupress.ndu.edu/Media/News/News-Article-View/Article/2076059/clausewitzs-wondrous-yet-paradoxical-trinity-the-nature-of-war-as-a-complex-ada/ (Accessed: 03.09.2024).

Etzioni, A., Etzioni, O. (2017). Pros and Cons of Autonomous Weapon Systems, *Military Review*. May-June. Available at: https://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/May-June-2017/Pros-and-Cons-of-Autonomous-Weapons-Systems/ (Accessed: 02.09.2024).

Fernow, R. C. (1986). *Introduction to experimental particle physics*, Cambridge University Press. Available at: https://library.oapen.org/handle/20.500.12657/59210 (Accessed: 01.09.2024).

Finucane, M. (2013). Is War Primarily the Product of "Human Nature". Available at: https://www.e-ir.info/2013/10/31/is-war-primarily-the-product-of-human-nature/ (Accessed: 23.08.2024).

Fox, A. (2024). The Principles for the Future of Warfare and Stand-Off Warfare. Available at: https://www.ausa.org/publications/principles-future-warfare-and-stand-warfare (Accessed: 06.09.2024).

Grewal, D., Noble, S.M., Roggeveen, A., L., Nordfalt, J. (2020). The future of in-store technology, *Journal of the Academy of Marketing Science*, Volume 48. – p. 96-113. Available at: https://link.springer.com/article/10.1007/s11747-019-00697-z (Accessed: 01.09.2024).

Guner, E., Iskandarov, K., & Gawliczek, P. (2022). Theories of war in practice: causes and termination (in the example of the Second Karabakh War). *Wiedza Obronna*. https://yadda.icm.edu.pl/baztech/element/bwmeta1.element.baztech-89aad26d-dfd7-43bb-bd20-7a03a28fee22 (Accessed: 14.08.2024).

Hasan, A.H., Iskandarov, K. and Gawliczek, P. (2024). Azerbaijan's 2023 counterterrorism operation in Karabakh region: causes and consequences. *Social Development and Security*, *14*(3), pp.1-13. https://doi.org/10.33445/sds.2024.14.3.1

Hasanov, A.H., Iskandarov, K.I. and Sadiyev, S.S., 2019. The evolution of NATO's cyber security policy and future prospects. *Journal of Defense Resources Management*, *10*(1), pp.94-106. Available at: https://www.ceeol.com/search/article-detail?id=770728 (Accessed: 01.09.2024).

Hedges, C. (2003). *What Every Person Should Know about War*. Turtleback Books. Available at: https://www.simonandschuster.com/books/What-Every-Person-Should-Know-About-War/Chris-Hedges/9780743255127#:~:text=About%20The%20Book&text=Hedges%20allows%20U.S.%20military%20documentation,from%20medical%20and%20psychological%20studies.

Iskandarov, K. & Gawliczek, P. (2021a). Characteristic features of the second Karabakh war. *Social Development and Security*, *11*(3), pp. 30-40. https://doi.org/10.33445/sds.2021.11.3.3 (Accessed: 16.08.2024).

Iskandarov, K., & Gawliczek, P. (2020a). Hybrid warfare as an instrument of political leverage (With a special focus on the South Caucasus). *The Russian federation and international security* edited by Miroslaw Banasik, Piotr Gawliczek and Agnieszka Rogozinska (Poland: Difin publishing house, 2020), pp. 117-136.

Iskandarov, K., & Gawliczek, P. (2020b). Hybrid warfare as a new type of war. The evolution of its conceptual construct in Miroslaw Banasik, Piotr Gawliciczek and Agnieszka Rogozinska (eds) *The Russian federation and international security*, Poland: Difin publishing house, 2020, pp. 96-107.

Iskandarov, K. & Gawliczek, P. (2020c). The impact of social media on the war. Case study: The Second Karabakh War in *Information, Media, Security Environment* edited by Miroslav Banasik, Piotr Gawliczek, Agnieszka Rogozinska. Warsaw: Difin. Pp. 162-178.

Iskandarov, K., & Gawliczek, P. (2020d). The "new great game" in the south caucasus: competition for power and influence. *Social Development and Security*, *10*(1), pp. 25-33. https://doi.org/10.33445/sds.2020.10.1.4 (Accessed: 12.05.2024).

Iskandarov, K. & Gawliczek, P. (2021b). The second Karabakh war as a war of new generation. *Social Development and Security*, *11*(2), pp. 91-99. https://doi.org/10.33445/sds.2021.11.2.9 (Accessed: 18.08.2024).

Iskandarov, K., & Gawliczek, P. (2019). The south Caucasus and NATO'S defence education enhancement programme. Retrospective analysis. *Social Development and Security*, *9*(5), 3-14. https://doi.org/10.33445/sds.2019.9.5.1.

Iskandarov, K., Gawliczek, P., & Tomasik, J. (2022). Termination of war: factors affecting the outcome (in the example of the Second Karabakh War). *Civitas et Lex*, *35*(3), pp. 7-17. Available at: https://czasopisma.uwm.edu.pl/index.php/cel/article/view/7736/6136 (Accessed: 01.09.2024).

James, M.D. (2018). No guarantees when it comes to war. Available at: https://www.ausa.org/articles/no-guarantees-when-it-comes-war (Accessed: 01.09.2024).

Jonjo, R. (2014). Modern Militaries and a Network Centric Warfare Approach. Available at: https://www.e-ir.info/2014/01/09/modern-militaries-and-a-network-centric-warfare-approach/ (Accessed: 08.09.2024).

Mallick, P. (2020). Network centric warfare. Available at: https://www.researchgate.net/publication/344737587_NETWORK_-CENTRIC_WARFARE (Accessed: 02.09.2024).

Marcin, M. M. (2019). What is Artificial Intelligence? Available at: https://www.researchgate.net/publication/337089782_What_is_Artificial_Intelligence (Accessed: 01.09.2024).

Matthew, O.J., Massimo, M. (2009). The Reasons for Wars – an Updated Survey. Handbook on the Political Economy of War. Available at: https://www.researchgate.net/publication/238529380_The_Reasons_for_-Wars_-_an_Updated_Survey (Accessed: 02.09.2024).

Matthew, U. (2024). What Is Nanotechnology? Available at: https://builtin.com/hardware/nanotechnology (Accessed: 06.09.2024).

Milley, M.A., Schmidt, E. (2024). America isn't ready for the wars of the future. Available at: https://www.foreignaffairs.com/united-states/ai-america-ready-wars-future-ukraine-israel-mark-milley-eric-schmidt (Accessed: 04.09.2024).

Nasirov, E., Iskandarov, K., & Sadiyev, S. (2017). The South Caucasus: A Playground Between NATO and Russia? *Connections*, *16*(3), pp. 47-56. Available at: https://www.jstor.org/stable/26867919 (Accessed: 23.06.2024).

Rodgers, E. (2024). Directed-Energy Weapons Come of Age. Available at: https://aerospace.honeywell.com/us/en/about-us/blogs/directed-energy-weapons-come-of-age (Accessed: 07.09.2024).

Sadiyev, S. & Iskandarov, K. (2018). The evolution of the security environment in the South Caucasus since the end of the Cold War, *17th Workshop of the PfP Consortium Study Group Regional Stability in the South Caucasus, "What a New European Security Deal" could mean for the South Caucasus*, 14/2018, pp. 47-53. Available at: https://www.academia.edu/37852657/_What_a_New_European_Security_Deal_could_mean_for_the_South_Caucasus (Accessed: 19.08.2024).

Smith, C. R. (2010). Network Centric Warfare, Command, and the Nature of War. Available at: https://researchcentre.army.gov.au/sites/default/files/sp318ncwcommandandnatureofwarchristopher_smith.pdf (Accessed: 03.09.2024).

Sweijs, T., Michaels, J.H. (2024). *Beyond Ukraine: Debating the Future of War.* Hurst publishers Available at: https://www.waterstones.com/book/beyond-ukraine/tim-sweijs/jeffrey-h-michaels/9781911723165 (Accessed: 05.09.2024).

Waldman, T. (2009). War, Clausewitz, and the Trinityhttps, A Thesis Submitted for the Degree of PhD at the University of Warwick. Available at: https://core.ac.uk/download/pdf/40048786.pdf (Accessed: 05.09.2024).

Walsh, T. (2023). The defence review fails to address the third revolution in warfare: artificial intelligence. Available at: https://theconversation.com/the-defence-review-fails-to-address-the-third-revolution-in-warfare-artificial-intelligence-204619 (Accessed: 04.09.2024).

Yamin, T. (2021). Future Wars and Change in National Policy. *Strategic Thought* (3): 113-125. Available at: https://strategicthought.ndu.edu.pk/site/article/view/29 (Accessed: 06.09.2024).

Список використаних джерел

Assumpção, C. (2020). Is Huntington's "Clash of Civilizations" a Self-fulfilled Prophecy? Available at: https://www.e-ir.info/pdf/81197 (Accessed: 06.09.2024).

Beverelli, L. (2020). Why France Lost in 1940. Available at: https://warwriters.com/why-france-lost-in-1940/ (Accessed: 06.09.2024)

Bothwell, B. (2023). Science & Tech Spotlight: Directed Energy Weapons. Available at: https://www.gao.gov/products/gao-23-106717 (Accessed: 08.09.2024).

Brychkov, A.S., Dorokhov, V.L., Nikonorov, G.A. (2019). The Hybrid Nature of Future Wars and Armed Conflicts, *Military Thought,* Vol. 28, No. 2, pp. 20-32. http://dx.doi.org/10.21557/MTH.54208774 (Accessed: 04.09.2024).

Coccia, M. (2019). Comparative Theories and Causes of War in Global Encyclopedia of Public Administration, Public Policy, and Governance, pp.1-7, Springer. Available at: https://www.researchgate.net/publication/337890175_Comparative_Theories_and_-Causes_of_War (Accessed: 23.08.2024).

Cole, B. (2020). Clausewitz's Wondrous Yet Paradoxical Trinity: The Nature of War as a Complex Adaptive System, *Joint Force Quarterly 96*, pp. 42-49. URL: https://ndupress.ndu.edu/Media/News/News-Article-View/Article/2076059/clausewitzs-wondrous-yet-paradoxical-trinity-the-nature-of-war-as-a-complex-ada/ (Accessed: 03.09.2024).

Etzioni, A., Etzioni, O. (2017). Pros and Cons of Autonomous Weapon Systems, *Military Review*. May-June. Available at: https://www.armyupress.army.mil/Journals/Military-Review/English-Edition-Archives/May-June-2017/Pros-and-Cons-of-Autonomous-Weapons-Systems/ (Accessed: 02.09.2024).

Fernow, R. C. (1986). *Introduction to experimental particle physics*, Cambridge University Press. Available at: https://library.oapen.org/handle/20.500.12657/59210 (Accessed: 01.09.2024).

Finucane, M. (2013). Is War Primarily the Product of "Human Nature". Available at: https://www.e-ir.info/2013/10/31/is-war-primarily-the-product-of-human-nature/ (Accessed: 23.08.2024).

Fox, A. (2024). The Principles for the Future of Warfare and Stand-Off Warfare. Available at: https://www.ausa.org/publications/principles-future-warfare-and-stand-warfare (Accessed: 06.09.2024).

Grewal, D., Noble, S.M., Roggeveen, A., L., Nordfalt, J. (2020). The future of in-store technology, *Journal of the Academy of Marketing Science*, Volume 48. – p. 96-113. Available at: https://link.springer.com/article/10.1007/s11747-019-00697-z (Accessed: 01.09.2024).

Guner, E., Iskandarov, K., & Gawliczek, P. (2022). Theories of war in practice: causes and termination (in the example of the Second Karabakh War). *Wiedza Obronna*. https://yadda.icm.edu.pl/baztech/element/bwmeta1.element.baztech-89aad26d-dfd7-43bb-bd20-7a03a28fee22 (Accessed: 14.08.2024).

Гасанов Хасан, А., Іскандаров, Х., & Гавлічек, П. (2024). Антитерористична операція Азербайджану в Карабахському регіоні 2023 року: причини та наслідки. *Social Development and Security*, *14*(3), 1-13. https://doi.org/10.33445/sds.2024.14.3.1

Hasanov, A.H., Iskandarov, K.I. and Sadiyev, S.S., 2019. The evolution of NATO's cyber security policy and future prospects. *Journal of Defense Resources Management*, *10*(1), pp.94-106. Available at: https://www.ceeol.com/search/article-detail?id=770728 (Accessed: 01.09.2024).

Hedges, C. (2003). *What Every Person Should Know about War*. Turtleback Books. Available at: https://www.simonandschuster.com/books/What-Every-Person-Should-Know-About-War/Chris-Hedges/9780743255127#:~:text=About%20The%20Book&text=Hedges%20allows%20U.S.%20military%20documentation,from%20medical%20and%20psychological%20studies.

Iskandarov, K. & Gawliczek, P. (2021a). Characteristic features of the second Karabakh war. *Social Development and Security*, *11*(3), pp. 30-40. https://doi.org/10.33445/sds.2021.11.3.3 (Accessed: 16.08.2024).

Iskandarov, K., & Gawliczek, P. (2020a). Hybrid warfare as an instrument of political leverage (With a special focus on the South Caucasus). *The Russian federation and international security* edited by Miroslaw Banasik, Piotr Gawliczek and Agnieszka Rogozinska (Poland: Difin publishing house, 2020), pp. 117-136.

Iskandarov, K., & Gawliczek, P. (2020b). Hybrid warfare as a new type of war. The evolution of its conceptual construct in Miroslaw Banasik, Piotr Gawliciczek and Agnieszka Rogozinska (eds) *The Russian federation and international security*, Poland: Difin publishing house, 2020, pp. 96-107.

Iskandarov, K. & Gawliczek, P. (2020c). The impact of social media on the war. Case study: The Second Karabakh War in *Information, Media, Security Environment* edited by Miroslav Banasik, Piotr Gawliczek, Agnieszka Rogozinska. Warsaw: Difin. Pp. 162-178.

Iskandarov, K., & Gawliczek, P. (2020d). The "new great game" in the south caucasus: competition for power and influence. *Social Development and Security*, *10*(1), pp. 25-33. https://doi.org/10.33445/sds.2020.10.1.4 (Accessed: 12.05.2024).

Iskandarov, K. & Gawliczek, P. (2021b). The second Karabakh war as a war of new generation. *Social Development and Security*, *11*(2), pp. 91-99. https://doi.org/10.33445/sds.2021.11.2.9 (Accessed: 18.08.2024).

Iskandarov, K., & Gawliczek, P. (2019). The south Caucasus and NATO'S defence education enhancement programme. Retrospective analysis. *Social Development and Security*, *9*(5), 3-14. https://doi.org/10.33445/sds.2019.9.5.1.

Iskandarov, K., Gawliczek, P., & Tomasik, J. (2022). Termination of war: factors affecting the outcome (in the example of the Second Karabakh War). *Civitas et Lex*, *35*(3), pp. 7-17. Available at: https://czasopisma.uwm.edu.pl/index.php/cel/article/view/7736/6136 (Accessed: 01.09.2024).

James, M.D. (2018). No guarantees when it comes to war. Available at: https://www.ausa.org/articles/no-guarantees-when-it-comes-war (Accessed: 01.09.2024).

Jonjo, R. (2014). Modern Militaries and a Network Centric Warfare Approach. Available at: https://www.e-ir.info/2014/01/09/modern-militaries-and-a-network-centric-warfare-approach/ (Accessed: 08.09.2024).

Mallick, P. (2020). Network centric warfare. Available at: https://www.researchgate.net/publication/344737587_NETWORK_-CENTRIC_WARFARE (Accessed: 02.09.2024).

Marcin, M. M. (2019). What is Artificial Intelligence? Available at: https://www.researchgate.net/publication/337089782_What_is_Artificial_Intelligence (Accessed: 01.09.2024).

Matthew, O.J., Massimo, M. (2009). The Reasons for Wars – an Updated Survey. Handbook on the Political Economy of War. Available at: https://www.researchgate.net/publication/238529380_The_Reasons_for_-Wars_-_an_Updated_Survey (Accessed: 02.09.2024).

Matthew, U. (2024). What Is Nanotechnology? Available at: https://builtin.com/hardware/nanotechnology (Accessed: 06.09.2024).

Milley, M.A., Schmidt, E. (2024). America isn't ready for the wars of the future. Available at: https://www.foreignaffairs.com/united-states/ai-america-ready-wars-future-ukraine-israel-mark-milley-eric-schmidt (Accessed: 04.09.2024).

Nasirov, E., Iskandarov, K., & Sadiyev, S. (2017). The South Caucasus: A Playground Between NATO and Russia? *Connections*, *16*(3), pp. 47-56. Available at: https://www.jstor.org/stable/26867919 (Accessed: 23.06.2024).

Rodgers, E. (2024). Directed-Energy Weapons Come of Age. Available at: https://aerospace.honeywell.com/us/en/about-us/blogs/directed-energy-weapons-come-of-age (Accessed: 07.09.2024).

Sadiyev, S. & Iskandarov, K. (2018). The evolution of the security environment in the South Caucasus since the end of the Cold War, *17th Workshop of the PfP Consortium Study Group Regional Stability in the South Caucasus, "What a New European Security Deal" could mean for the South Caucasus*, 14/2018, pp. 47-53. Available at: https://www.academia.edu/37852657/_What_a_New_European_Security_Deal_could_mean_for_the_South_Caucasus (Accessed: 19.08.2024).

Smith, C. R. (2010). Network Centric Warfare, Command, and the Nature of War. Available at: https://researchcentre.army.gov.au/sites/default/files/sp318ncwcommandandnatureofwarchristopher_smith.pdf (Accessed: 03.09.2024).

Sweijs, T., Michaels, J.H. (2024). *Beyond Ukraine: Debating the Future of War.* Hurst publishers Available at: https://www.waterstones.com/book/beyond-ukraine/tim-sweijs/jeffrey-h-michaels/9781911723165 (Accessed: 05.09.2024).

Waldman, T. (2009). War, Clausewitz, and the Trinityhttps, A Thesis Submitted for the Degree of PhD at the University of Warwick. Available at: https://core.ac.uk/download/pdf/40048786.pdf (Accessed: 05.09.2024).

Walsh, T. (2023). The defence review fails to address the third revolution in warfare: artificial intelligence. Available at: https://theconversation.com/the-defence-review-fails-to-address-the-third-revolution-in-warfare-artificial-intelligence-204619 (Accessed: 04.09.2024).

Yamin, T. (2021). Future Wars and Change in National Policy. *Strategic Thought* (3): 113-125. Available at: https://strategicthought.ndu.edu.pk/site/article/view/29 (Accessed: 06.09.2024).