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THE ROLE OF HIGH-TECH WEAPONS IN MODERN WAR

The purpose of writing the article is to justify the need to equip the armed forces with high-tech weapons, including autonomous weapons, based on the examples of war crimes committed by the russian federation against the civilian population of Ukraine. Modern armed conflicts with the use of high-tech weapons, require not only a legal settlement, but also a radical revision of legal norms to meet the new reality. It is shown that most of the russian strikes are aimed at the civilian population of Ukraine. According to the results of the generalization of the military crimes of the russian federation, a table is presented, which shows the non-compliance with International Humanitarian Law by the properties of weapons and by the method of their use. High-tech weapons allow compliance with the IHL principles of distinguish and proportionality, as well as achieving a direct military advantage without harming the civilian population and civilian objects.

Keywords: *combatants, the principle of distinction, the principle of proportionality, high-tech weapons, autonomous weapons.*

INTRODUCTION

War crimes committed by the russian federation against citizens of Ukraine have been occurring since 2014. We see how important it is to have a new high-tech weapon in our arsenal, which allows us to achieve a direct military advantage without harming the civilian population and civilian objects. This is confirmed by the results of the use by the Armed Forces of Ukraine of high-tech weapons provided by our partners. Therefore, the question of compliance of weapons with International Humanitarian Law (IHL) both in terms of their properties and methods of use is gaining relevance. The use of autonomous weapons, which is becoming more and more in demand, requires separate consideration and the world community is actively looking for ways of its legislative recognition and specification of its legal regime as an object of legal regulation.

The purpose of writing the article is to substantiate the need to equip the armed forces with high-tech weapons, including autonomous weapons, based on the examples of war crimes committed by russian federation against the civilian population of Ukraine, as well as to substantiate the concept of «autonomous weapons» based on its key features.

Modern armed conflicts with the use of high-tech weapons, as well as autonomous weapons, require not only a legal settlement, but also a radical revision of legal norms to meet the new reality. Although high-tech weapons make it possible to meet the requirements of International Humanitarian Law regarding distinguish and proportionality, at the same time it creates a new problem − the autonomy of weapons. Modern technologies make it possible to create weapons that can independently not only identify and select targets, but also make decisions about their destruction without human intervention. In this regard, the use of completely autonomous weapons systems or autonomous weapons is considered dangerous.

Most major military conflicts of the twentieth century are known to have resulted in more civilian casualties than military casualties [1]. The same is happening in the current war, when the massive use of outdated weapons by russian federation leads to significant damage to the civilian population of Ukraine, both in terms of human losses and the destruction of residential buildings and industrial facilities.

According to the UN, from February 24, 2022, when the armed attack of russian federation on Ukraine began, until September 18, 2022, the Office of the United Nations High Commissioner for Human Rights (OHCHR) recorded 14,532 casualties among the civilian population in Ukraine: 5,916 killed and 8,616 wounded [2]. Most of the recorded civilian casualties were caused using wide-area explosive weapons, including heavy artillery, rocket launchers, rockets and airstrikes. OHCHR believes that the actual figures are much higher, as information from some places where there has been intense fighting has been delayed and many reports are still awaiting confirmation.

In 2009, the International Committee of the Red Cross made a report in which it was noted that over the past few decades, war has moved closer to populated areas [3]. This trend has blurred the line between combatants and civilians and made it difficult to distinguish between legitimate and illegitimate targets. In this regard, two significant aspects of the laws of war – distinguish and proportionality, which are defined in articles 48 and 51 of the Additional Protocol to the Geneva Convention [4] – become very relevant.

PRINCIPLE OF DISTINCTION

The principle of distinguish prohibits direct attacks on civilians. According to Article 48 of the Additional Protocol to the Geneva Convention (AP I), «in order to ensure the respect and protection of the civilian population and civilian objects, the parties to the conflict shall always distinguish between the civilian population and combatants», as well as between civilian objects and military objects and, accordingly, direct their actions only against military objects. Warring parties are prohibited from carrying out direct or indiscriminate attacks that are «not directed at a specific military objective» [4]. Article 57 of AP I also requires states to «do their best» to verify that a target is a military objective. In addition, they must «take all possible precautions in the choice of means and methods of attack in order to avoid or in any case minimize accidental loss of life among the civilian population, injury to civilians and damage to civilian objects» [4].

To act in accordance with this principle, combatants must distinguish between those directly engaged in hostilities and those «not actively engaged in hostilities» and then must take steps to avoid harming the latter [5].

During the eight years of the russian federation's war against Ukraine, we see that most of the russian strikes are aimed at the civilian population. This became especially common after February 24, 2022 − the russians hit more than 22,000 civilian objects and only about 300 military objects [6]. So, of all objects fired by the russians, 98.6 % were civilian objects and only 1.4 % were military objects – shown in Fig. 1. This is partly since russian federation has a shortage of high-tech weapons.

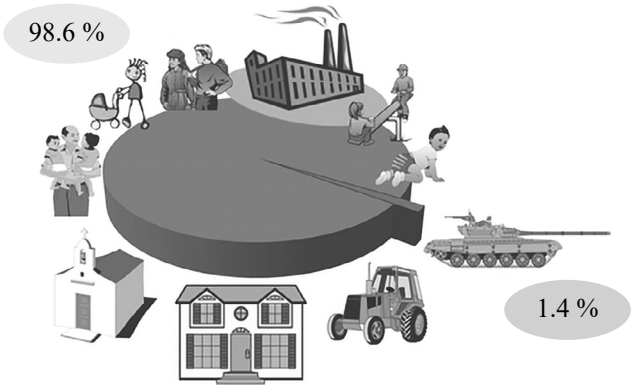

Fig. 1. Share of affected civilian objects (98.6 %) and military facilities (1.4 %)

Since February 24, 2022, the russians have carried out more than 3,000 missile strikes on Ukraine. Half of these strikes were carried out by outdated missiles with low hit accuracy. For example, the X-22 missile, developed in the 50s of the last century, is used. Its accuracy is several hundred meters, so it has an extremely large mass of explosives – 960 kg to hit the target. Using such missiles in urban areas is a deliberate war crime because they are so inaccurate and heavy that it is almost impossible to avoid casualties among civilians.

At the same time, the russians are using faulty weapons against Ukraine. These are missiles whose useful life has already ended, the missiles have been decommissioned, but because of intensive missile attacks on Ukraine, the russians are returning these missiles to service and using them against Ukrainian citizens. A significant number of C-300, X-22 and other missiles produced in the 70s can be considered defective weapons. This weapon is dangerous because its malfunction can cause it to fall not on a military target, but on a civilian population.

In general, among more than 3,000 missile strikes, the russians carried out 95 % on civilian objects, and only 5 % on military objects [7]. Therefore, the russians deliberately destroyed the civilian population, their residential buildings, schools, hospitals and universities. A similar strategy was used during World War II, when both sides deliberately targeted civilians to pressure their governments into surrender [8]. After the Second World War, such a strategy was strongly condemned, which found a place in IHL. Now deliberate attacks on civilians are considered war crimes.

PRINCIPLE OF PROPORTIONALITY

The principle of proportionality is closely related to the principle of distinguish between the civilian population and combatants. According to this principle, the expected military benefit must exceed the expected damage to civilians and their property. Article 51 (5) (b) of AP I prohibits «an attack which is expected to cause accidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof that is excessive in relation to the specific and anticipated direct military advantage» [4].

Assessing whether war crimes occurred in the context of the 2003 Iraq War – specifically during the combat phase between March and May – International Criminal Court Prosecutor Luis Moreno-Ocampo expressed his views on this legal principle. In the letter, he noted that the death of civilians during an armed conflict, however serious and sad it may be, is not in itself a war crime. International humanitarian law, international law applicable to armed conflicts, and the Rome Statute of the International Criminal Court allow belligerents to carry out proportionate attacks on military targets, even if it is known that some civilians will be killed or injured [9].

In other words, the accidental or unintentional killing of civilians is not prohibited by international law. But harm to civilians that clearly exceeds the expected military advantage, that is, disproportionate harm, is prohibited. Obviously, the question arises: how to determine the amount of damage to civilians, which clearly exceeds the expected military advantage? Fig. 2 shows the possible range of the ratio between «military destruction» and «civilian killing». The best option is on the left side of the chart. It is characterized by the fact that the destruction of the military reaches 100 % and the killing of civilians approaches 0 %. With this version of the ratio between «destroying the military» and «killing civilians», it can be considered that the use of weapons is justified. The opposite option is on the right side of the diagram. It is characterized by the fact that the destruction of the military is close to 0 % and the killing of civilians reaches 100 %. With such a variant of the ratio between «destruction of the military» and «killing of civilians», it can be considered that a war crime is taking place and the use of weapons is unjustified. Of course, this option is the worst.

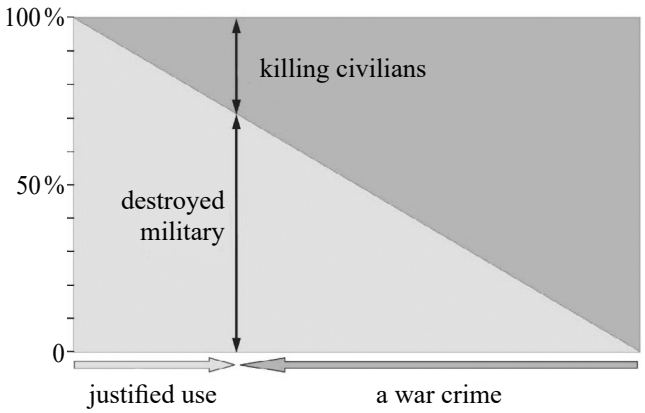

Fig. 2. Proportionality of damage to military and civilians

But during a real armed conflict, the ratio between «destroying the military» and «killing civilians» is between these two extreme options. Military commanders face a difficult question: how many civilians can be killed to achieve victory? There is no answer to this question. There are only recommendations of International Humanitarian Law to «do everything possible» to reduce harm to civilians and ensure that direct military advantage outweighs civilian harm. Based on these recommendations, it is proposed to consider the use of weapons as justified if the number of destroyed military personnel exceeds the number of killed civilians. To achieve a generally accepted understanding of «acceptable civilian casualties», it would be expedient to agree on a relevant international document. In Fig. 2, such a variant of the ratio between «destruction of the military» and «killing of civilians» is in the middle of the horizontal scale. Such an approach may seem cruel, but we are dealing with war, which in its essence is a barbaric way of resolving conflict situations between states.

It was already mentioned above that the russians used the obsolete X-22 missile, which has an extremely large mass of explosives – 960 kg, against the citizens of Ukraine. With such a mass of explosives, this missile has an excessive impact power, which causes a disproportionate effect on the target, especially when used in urban buildings − its destructive power destroys not so much military objects as civilians and their homes. In Fig. 2 consequences of this way of using the weapon correspond to the extreme right of the diagram. With such a variant of the ratio between «destruction of the military» and «killing of civilians», it can be considered that a war crime is taking place and the use of weapons is unjustified. A similar war crime is committed by the russians with an excessive number of strikes on the target, which also does not meet the requirements of IHL as a method of using weapons.

During the russian aggression against Ukraine, it became a rule to use weapons not for their intended purpose. In particular, the X-22 missile was designed to fight US aircraft carriers, but the russians use it against ground targets. The C-300 missile was designed for air targets, but the russians use it against ground targets. The russians also use anti-ship missiles Onyx and X-35 against ground targets, which is also not in line with their purpose. The use of weapons for the wrong purpose becomes the reason for the deterioration of the accuracy of hitting targets, as a result of which missiles hit non-military objects.

It should also be remembered that it is not the weapon that kills, but the person who makes the decision to use the weapon. The famous saying of Martin Luther King: «We have guided missiles and misguided men» [10]. Therefore, it is necessary to make a distinction between those cases when the properties of the weapon do not correspond to IHL and those cases when the method of using the weapon does not correspond to IHL. According to the results of the generalization of military crimes of the russian federation, a Tab. 1 is presented, which shows the inconsistency of IHL by the properties of the weapon and by the method of its use.

Throughout the war against Ukraine since 2014, the russian federation has not complied with IHL. This is evident in almost all points of the table shown above. The russian federation did not use weapons of mass destruction yet, although it constantly threatens to do so.

Table 1. IHL non-compliance

Weapon properties	The method of using weapons
1) weapons of planar action; 2) inaccurate weapons; 3) defective weapon; 4) weapons of mass destruction (nuclear, chemical, biological).	1) targeted strikes on civilians and objects; 2) unsighted blows; 3) excessive impact power; 4) excessive number of blows; 5) improper use.

There are some measures to mitigate the risks of killing civilians that are not, strictly speaking, measures to control the types of targets, but which can significantly affect the performance of a weapon system and can be useful in terms of mitigating the risks of killing civilians. In particular, the experience of modern wars shows that to minimize the risks of killing civilians, it is necessary to use high-precision weapons and other high-tech weapons. High-tech weapons allow compliance with the IHL principles of distinguish and proportionality. In this regard, high-precision ammunition is a kind of panacea. They are useful in the military domain and minimize civilian casualties and thus enable states to comply with international legal obligations. Even the name of this weapon − «smart weapon» − indicates the expectation that it will meet the dual requirements of military utility and international norms.

At a press conference in 2003, former Secretary of Defense Donald Rumsfeld said: «Our military capabilities are so devastating and accurate that we can destroy an Iraqi tank under a bridge without damaging the bridge» [11].

Confirming the relevance of the military benefit, Air Force Lieutenant General Buster Glosson wrote that to stop the industry of the Third Reich during World War II, we were forced to target entire complexes because of the inaccuracy of our weapons; today we would only need to hit a couple of key buildings. What we have historically achieved with volume, we can now achieve with precision. After all, the goal of war has never been the large number of bombs we can drop, the goal has always been to achieve military superiority [12].

Huge technological advances in the use of high-precision weapons, as well as the development of air and space intelligence gathering tools, have greatly simplified the distinction between military and civilian targets, which significantly improves the effectiveness of their destruction without significant harm to the civilian population [13].

High-precision weapons can be considered a synonym and a means of observing the international principles of distinguish and proportionality. High-tech weaponry gives the military more information to distinguish between combatants and civilians. They also allow the military to precisely identify and target some individuals while sparing others. At the same time, collateral damage to the civilian population is reduced or eliminated, injuries and deaths of persons who are not the specific target of the attack are limited.

Ukraine cannot give a symmetrical response to russian aggression in quantitative terms. No European state will be able to do this. But European states do not strive for this. Their military security is based on a system of collective

security and technological superiority. Based on the experience of waging war with the russian federation, the development and reform of the Armed Forces of Ukraine requires a rethinking of approaches to their construction. After the successful use of high-tech weapons obtained by Ukraine from partner states, the technological advantage is seen as an asymmetric response to russia's massive use of obsolete weapons. It is necessary to look for options for the technical equipment of the Armed Forces of Ukraine, which will make it possible to inflict devastating damage on the enemy while minimizing damage to the civilian population. It is necessary to thoroughly change the approaches to building the Armed Forces of Ukraine. First, the defence industry of Ukraine should find its place in the processes of development and production of high-tech weapons of partner states.

The basis of the military-technical policy of Ukraine should be the implementation of a course for a high technological level of armament of the Armed Forces of Ukraine, which should exceed the technological level of the enemy's armament today and in the future. One of the key problems of timely equipping the Armed Forces of Ukraine with high-tech weapons is the need for effective use of aid resources from partner states.

AUTONOMOUS WEAPONS

Modern technologies make it possible to create weapons that can independently not only identify and select targets, but also make decisions about their destruction without human intervention. In this regard, the use of completely autonomous weapons systems or autonomous weapons is considered dangerous. It is not without reason that it is believed that robotic weapons will not be able to distinguish civilians from combatants, therefore international rules of conduct of military operations will be seriously violated.

Considerable attention is paid to the moral issues associated with giving autonomous weapons the right to make decisions about killing people. For the first time, this question was considered in 1969 in the novel by Kurt Vonnegut, Jr. «Slaughte Rhouse-Five» [14]. The author described robots that independently dropped napalm on people from airplanes. The novel emphasizes that the robots had no conscience or understanding of what was happening to humans on earth after napalm was dropped.

The legality of the development and use of autonomous weapons has been actively discussed in recent decades. In particular, the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons System of the UN Office for Disarmament works on a permanent basis [15]. A series of command and staff exercises were conducted in several regions of the world with various scenarios of the possible use of autonomous weapons systems.

After a detailed study of a considerable number of scientific articles, it can be concluded that autonomous weaponry refers to the ability of a machine to perform a given task without human intervention through the interaction of sensors and computer programming with the environment.

Autonomy relies on various technologies, but primarily on software. The capabilities of autonomy depend on the ability of software developers to formulate the task in terms of mathematical logic and finding a solution, as well as the ability to pre-map or simulate the operating environment.

The following definition of the term «autonomous weapon» or autonomous weapon system is quite successful – it is «a weapon system that, based on the conclusions obtained from the collected information and pre-programmed restrictions, is able to independently select and hit targets» [16].

Each type of robotic weapon operates according to the program embedded in it. All of them have a certain degree of autonomy, that is, they are capable of some actions without human intervention. The degree of autonomy of robotic weapons will vary greatly depending on the type of weapon. Conventionally, robotic weapons can be divided into three categories: «human in the loop», «human on the loop», «human out of the loop», which shown in the table below (Tab. 2).

Table 2. Classification of robotic weapons according to the degree of autonomy

	human in the loop	human on the loop	human out of the loop
Who chooses the target for destruction	**robot**	**robot**	**robot**
Who makes the decision to destroy the target	**human**	**robot**	**robot**
The role of a person in controlling a robot	**human controls the robot**	**human can stop the robot**	**human does not control the robot**
The degree of weapon autonomy	**remotely controlled weapons**	**automated weapons**	**autonomous weapons**

The first category implies that robotic weapons can independently detect and select targets, but the decision to destroy them is made by a human operator. Such a robotic weapon is tentatively proposed to be called a «remotely controlled weapon». The second category includes robotic weapons capable of independently identifying and selecting targets, as well as making decisions about their destruction, but a human operator can intervene in this process at any time and change the robot's decision. Such a robotic weapon is tentatively called an «automated weapon». And the third category includes systems capable of independently identifying and selecting targets, as well as making decisions about their destruction without human intervention. Such a robotic weapon is tentatively called an «autonomous weapon».

There is an opinion that an important feature of autonomous weapons is the presence of artificial intelligence [17]. But an important feature of artificial intelligence is the ability to learn [18, 19], which autonomous weapons cannot have, because learning requires repeated actions and autonomous weapons make one-time decisions to defeat the enemy, so autonomous weapons do not have the ability to learn.

Based on the analysis of the properties of autonomous weapons, the following definition of the term «autonomous weapon» is proposed. An autonomous weapon is a weapon capable of independently identifying and selecting targets based on signs set by a person, as well as making decisions about their destruction without human intervention.

The advantages of using autonomous weapons during missions are speed, accuracy and the ability to operate in the absence of communication. The use of autonomous weapons systems does not reduce legal responsibility for the consequences of those decision makers.

For several decades, they have been talking about the need to ban the development, production and use of autonomous weapons as such, which can seriously violate the international rules of warfare. However, the world experience of many armed conflicts shows that only democratic states that value people's lives faithfully fulfil the requirements of IHL. States with authoritarian regimes, for example, the russian federation and North Korea, practically do not comply with the requirements of IHL and use any weapon in any way to achieve military goals.

If democratic states refuse to develop, manufacture and use autonomous weapons, then authoritarian regimes will consider this as an opportunity to gain an advantage in armaments. This will encourage them to escalate the military threat. You can't give them that opportunity. Autonomous weapons provide significant advantages over the enemy. Its use will be justified provided that certain rules are followed. There is nothing new in this, it applies to any dangerous object, even a kitchen knife. We offer the following rules for the development, production and use of autonomous weapons:

1) an autonomous weapon must be designed in such a way that it hits only those targets whose characteristics are specified by the operator;

2) the characteristics of the targets set by the operator must clearly correspond only to military targets;

3) autonomous weapons must be manufactured with high quality, without violations of technologies, with mandatory control of correct functioning.

The proposed rules for the development, production and use of autonomous weapons do not require improvement of the existing IHL. The authors believe that IHL sufficiently regulates the use of the latest technologies in the military sphere. Autonomous weapons enable the operator to use lethal force without violating the requirements of IHL and to achieve a direct military advantage without harming the civilian population and civilian objects. A comparison of the consequences of the use of non-autonomous weapons systems by the russians against citizens of Ukraine and the assessment of the consequences of the use of fully autonomous weapons systems shows that autonomous weapons can better than humans solve various tasks with more thorough observance of IHL norms.

CONCLUSION

The necessity of equipping the Armed Forces of Ukraine with high-tech weapons, including autonomous weapons, is justified on the examples of numerous war crimes committed by the russian federation against the civilian population of Ukraine. High-tech weapons allow compliance with the IHL principles of distinguish and proportionality, as well as achieving a direct military advantage without harming the civilian population and civilian objects. This is confirmed by the results of the use by the Armed Forces of Ukraine of high-tech weapons provided by our partners.

The use of high-tech weapons obtained by Ukraine from partner states and the technological advantage are considered as an asymmetric response to russia's massive use of obsolete weapons. It is necessary to look for options for the technical equipment of the Armed Forces of Ukraine, which will make it possible to inflict devastating damage on the enemy while minimizing damage to the civilian population. It is necessary to thoroughly change the approaches to building the Armed Forces of Ukraine. First of all, the defense industry of Ukraine should find its place in the processes of development and production of high-tech weapons of partner states.

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РОЛЬ ВИСОКОТЕХНОЛОГІЧНОЇ ЗБРОЇ В СУЧАСНІЙ ВІЙНІ

Метою написання статті є обґрунтування необхідності оснащення збройних сил високотехнологічним озброєнням, у тому числі, автономною зброєю на прикладах воєнних злочинів російської федерації проти мирного населення України. Сучасні збройні конфлікти із застосуванням високотехнологічної зброї вимагають не лише правового врегулювання, але й радикального перегляду правових норм відповідно до нової реальності.

Показано, що удари росіян у своїй більшості націлені проти мирного населення України. Пропонується вважати виправданим використання зброї, якщо кількість знищених військових перевищить кількість убитих цивільних. За результатами узагальнення військових злочинів російської федерації представлено таблицю, у якій показано невідповідність Міжнародному гуманітарному праву за властивостями зброї і за способом її використання.

Високотехнологічна зброя дозволяє дотримуватись принципів МГП розрізнення та пропорційності та досягати прямої військової переваги без шкоди для цивільного населення та цивільних об'єктів. Це підтверджують результати використання Збройними Силами України високотехнологічного озброєння, наданого нашими партнерами. Потрібно шукати такі варіанти технічного оснащення Збройних Сил України, що дадуть можливість завдати нищівної шкоди противнику при мінімізації шкоди мирному населенню.

Надано класифікацію роботизованої зброї за ступенем автономності. Сформульоване поняття «автономна зброя» за її ключовими ознаками. Обґрунтовано необхідність автономної зброї в демократичних державах. Запропоновано правила розроблення, виробництва і використання автономної зброї.

Ключові слова: *комбатанти, принцип вибірковості, принцип пропорційності, високотехнологічна зброя, автономна зброя.*

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