

THE ROLE OF UNMANNED AERIAL VEHICLE, ARMED UNMANNED AERIAL VEHICLE AND DRONES IN THE SECOND KARABAKH WAR

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ABSTRACT

The aim of this study is to reveal the role played by unmanned aerial vehicle systems in the Second Karabakh War. The Second Karabakh War was fought between Azerbaijan and Armenia from 27 September to 09 November 2020, due to Nagorno-Karabakh and the surrounding territories under Armenian occupation. With the triple declaration signed on November 10, 2020 between Azerbaijan, Armenia and the Russian Federation (RF), Azerbaijan liberated a large part of its occupied territories. Since the beginning of the Nagorno-Karabakh conflict, RF has endeavored to maintain a military balance between Azerbaijan and Armenia. Almost all of Armenia's arms imports and a significant part of Azerbaijan's arms imports come from the RF. Therefore, there are approximately the same weapons in the inventory of Azerbaijan and Armenia. In this case, in the Second Karabakh War, it was necessary to create asymmetry for the two sides to establish superiority over each other. In the Second Karabakh War, the military success of Azerbaijan on the battlefield, unmanned aerial vehicle systems had a large share and showed a force multiplier effect in the battle. Azerbaijan has been able to create an asymmetry that creates difference and superiority against Armenia with the unmanned aerial vehicle systems that it produces and imports from Turkey and Israel. Azerbaijan has an asymmetrical advantage over Armenia by using its unmanned aerial vehicle systems, which are superior in number and technology compared to Armenia, in a common understanding with other fire support systems and forces. This difference and superiority created by Azerbaijan has emerged both with the technological development of the unmanned aerial vehicle systems, their excess in numbers and their doctrinal use in the battlefield. The aforementioned approach has led Azerbaijan to gain superiority both in the battlefield and in the national and international information warfare.

Keywords: Second Karabakh War, Unmanned Aerial Vehicle, Armed Unmanned Aerial Vehicle, Drone.

1. Introduction

The Second Karabakh War between Azerbaijan and Armenia, which lasted from September 27 to November 9, 2020 and resulted in the liberation of a large part of the lands under Armenian occupation by Azerbaijan, attracted the attention of the whole world in some aspects. First of all, this war has been one of the rare conventional wars in which all national power elements were used between the two states in recent years. Azerbaijan has effectively used the unmanned aerial vehicle systems it import from Turkey and Israel in the aforementioned war, and these systems have had a great share in the military success of Baku. With these systems, high-value targets, which constitute the center of gravity of the Armenian defense, were effectively brought under fire, and it was possible to liberate the occupied lands, which was a political goal, by developing military success. Although unmanned aerial vehicle systems have been used in many military operations in the 21st century, the factor that makes the Second Karabakh War different from the others is that unmanned aerial vehicle systems were used for the first time in a conventional war to affect the outcome.

This study tries to reveal the role of unmanned aerial vehicle systems in the Second Karabakh War. In this context, in this study, firstly the use of unmanned aerial vehicle systems in today's wars, then the unmanned aerial vehicle systems in the inventory of Azerbaijan and Armenia, and then the role played by the unmanned aerial vehicle systems in the Second Karabakh War will be discussed and the study will be concluded with the evaluation.

2. Use of Unmanned Aerial Vehicle Systems in the Combat Area:

An unmanned aerial vehicle (UAV) is defined as a "powered, aerial vehicle that does not carry a human operator, uses aerodynamic forces to provide vehicle lift, can fly autonomously or be piloted remotely, can be expendable or recoverable, and can carry a lethal or nonlethal payload".¹ As a continuation of this definition, unmanned aerial vehicle system is a component that includes the necessary equipment, network, and personnel to control an unmanned aerial vehicle.²

According to Army Unmanned Aircraft System Operations, the capabilities of unmanned aerial vehicle systems are listed below:³

- Support target acquisition efforts and lethal attacks on enemy reconnaissance and advance forces,
- Assist in route, area, and zone reconnaissance,
- Locate and help determine enemy force composition, disposition, and activity,
- Maintain contact with enemy forces from initial contact through Battle Damage Assessment,
- Provide target coordinates with enough accuracy to enable an immediate target handover, as well as first-round fire-for-effect engagements,
- Provide or enhance multispectrum sensor coverage of the area of operations,
- Provide information to manned systems, thus increasing survivability,
- Reduce or eliminate exposure time of manned systems in high-risk environments,
- Provide extended three-dimensional vantage, both in distance and time, at critical decision points in difficult terrain,
- Perform decoy, demonstration, feint, and deception operations,
- Support mission duration beyond those of manned systems,
- Provide digital connectivity, allowing for rapid product dissemination.

There are also some limitations of unmanned aerial vehicle systems:⁴

- Vulnerability to enemy fire (especially air defense),
- Weather restrictions (cloud cover, turbulence, and others),
- Must maintain line of sight to ground control stations,
- Limited frequencies for unmanned aerial vehicle systems control,
- Army air space command control issues,
- Limited sensor field of view,

¹ "Unmanned Aerial Vehicle", *Military Factory*, https://www.militaryfactory.com/dictionary/military-terms-alphabet-list.php?letter_group=U (Access: 10.10.2021).

² *DOD Dictionary of Military and Associated Terms*, August 2021, p.225.

³ *Army Unmanned Aircraft System Operations* (FMI 3-04.155), Headquarters, Department of the Army, 4 April 2006. p.1-2.

⁴ *Army Unmanned Aircraft System Operations* (FMI 3-04.155), p.1-2, 1-3.

- Limited detection capability in highly vegetated areas,
- Assembly Area survivability.

Unmanned aerial vehicle systems have actually been used in the military for years. They were used as a target for anti-aircraft gunners and pilots during and after the First World War.⁵ The United States sent radio-controlled B24s on bomber missions to Germany in the Second World War. In the following period, the USA took pictures with remotely-controlled reconnaissance aircraft in the Vietnam War. However, the real transformation in military-purpose unmanned aerial vehicle systems was experienced in 1995 with the development of Gnat, later known as Predator.⁶

The first targeted attack with an armed unmanned aerial vehicle was made by the USA against Taliban leader Mullah Omar in Afghanistan on October 7, 2001. The unmanned aerial program, which was initiated by the USA during the George W. Bush era to neutralize members of Al-Qaeda and other terrorist organizations, was expanded due to its success. In the following period, the US Army developed the unmanned aerial vehicle program and used it extensively in Afghanistan, Iraq and Pakistan. By 2014, the US military was training more unmanned aerial vehicle system pilots than fighter jet pilots. While the number of countries using unmanned aerial vehicle systems was eight in 2015, this number increased to twenty in 2021.⁷ Currently, 30,000 military unmanned aerial vehicle systems are in use worldwide. While the military unmanned aerial vehicle systems market had a volume of 10.53 billion dollars in 2019, it is expected to reach 23.78 billion dollars in 2027.⁸ Today, some states such as Turkey, China, Israel, USA, England and Iran manufacture and use unmanned aerial vehicle systems and also sells them to other countries. Armed unmanned aerial vehicle systems can be produced by a limited number of countries in the world. Among these countries, there are countries such as Turkey, USA, China and Israel.

Unmanned aerial vehicle systems have recently become a part of combat. Their increasing use in military operations and the increase in the number of countries using them have brought a dynamic dimension to the modern battlefield. Unmanned aerial vehicle systems have been used for 20 years to gather intelligence, monitor and destroy targets for military purposes. The increase in the functions of unmanned aerial vehicle systems in the battlefield leads countries to develop and acquire this technology. Recently, unmanned aerial vehicle systems are not only for intelligence, reconnaissance, surveillance and destruction of the target, but also to manage the maneuvers of tank and mechanized operations, to adjust and direct artillery fire, and to command and control the troops in real time in general. Unmanned aerial vehicle systems used in the battlefield today range from unmanned aerial vehicle systems used only for reconnaissance to armed unmanned aerial vehicle systems that can be used for both reconnaissance and attack, on the other hand, there are loitering munitions that seek their target and then attack and explode on the target. Recently, it has been studied on unmanned aerial vehicle systems that attack the target in swarms. In addition, studies on the development of artificial intelligence unmanned aerial vehicle systems continue.

Unmanned aerial vehicle systems have become indispensable elements of the modern battlefield due to their effective use, precision strike capability, not carrying the risk of

⁵ Adam Leong Kok Wey, "Has Azerbaijan's Use of Drones in Karabakh Transformed Warfare?", *The National Interest*, Marc 30, 2021, <https://nationalinterest.org/blog/buzz/has-azerbaijan%E2%80%99s-use-drones-karabakh-transformed-warfare-181526> (Access: 18.10.2021)

⁶ "The future of drone warfare", *The Week*, 20 June 2021, <https://theweek.com/politics/1001660/the-future-of-drone-warfare> (Access: 01.10.2021).

⁷ "The future of drone warfare", *ibid.*

⁸ Falk, Thomas O. "How Drones Have Added a New Dynamic to Conflicts", *Aljazeera*, 20 February 2021, <https://www.aljazeera.com/news/2021/2/20/how-drones-have-added-a-new-dynamic-to-conflicts>, (Access:20.09.2021).

personnel loss, relatively low costs and unclaimability.⁹ On the other hand, unmanned aerial vehicle systems can have flight endurance as long as 24 hours until they perform reconnaissance and attack and find a suitable target, without the need for frequent refueling like warplanes and without causing flight fatigue in the crew.¹⁰ In addition, unmanned aerial vehicle systems provide great benefits to the integration of the battlefield with intelligence, reconnaissance, surveillance and command and control functions. On the other hand, it allows commanders to overcome bureaucratic limitations in decision-making, which is their most important task, and to make instant decisions. Operative and tactical commanders can use unmanned aerial vehicle systems with different loads in different roles according to the designed mission.¹¹

Unmanned aerial vehicle systems have recently become war system primarily used by states. States have come to prefer to use unmanned aerial vehicle systems rather than risking the lives of their soldiers by embarking on a costly military operation. However, not only states use unmanned aerial vehicles systems, but also non-state actors and terrorist organizations use unmanned aerial vehicle systems. If active and passive measures and systems against unmanned aerial vehicle systems are not developed and training is not provided, the scale of the damage caused by these systems is growing.¹²

The frequent use of unmanned aerial vehicle systems and the tendency towards an unmanned aerial vehicle-based approach have also revealed the result of questioning the conventional functions of combat.¹³ For example, the fact that tanks is an easy target for unmanned aerial vehicle systems has made the reason for the existence of tanks questionable. However, there have been similar discussions in the past as tanks were an easy target against anti-tank guided missiles. After all, every weapon system has its strengths and weaknesses. While attacking a fortified position, the tank provides very strong direct fire support and needs infantry protection against enemy infantry and anti-tank missiles.¹⁴ Likewise, it is a clear reality today that tanks need an effective air defense system against the threats of unmanned aerial vehicles.

However, although unmanned aerial vehicle systems provide significant benefits in different functional areas, they are not systems that can provide success alone in combat. For example, in the 2008 RF-Georgia War, Georgia was superior to the RF in terms of unmanned aerial vehicle systems. However, Russian air defense systems, warplanes and electronic warfare measures have eliminated the effectiveness of Georgian unmanned aerial vehicle systems. Therefore, the effectiveness of unmanned aerial vehicles on the enemy varies according to the capabilities of the enemy.¹⁵ It would be an appropriate approach for the armed forces to take measures to eliminate their disadvantages while trying to make the most of the advantages of unmanned aerial vehicle systems. In this context, it is necessary to mention the military term force multiplier. Force multiplier is a capability that, when added to and employed by a combat force, significantly increases the combat potential of that force and thus enhances the probability of successful mission accomplishment according to US

⁹ Falk, *ibid.*

¹⁰ “The future of drone warfare”, *ibid.*

¹¹ Peter Dombrowski, Eugene Gholz, *Buying Military Transformation: Technological Innovation and the Defense Industry*, Columbia University Press, New York, 2006, p.59.

¹² Falk, *ibid.*

¹³ Falk, *ibid.*

¹⁴ Oğuzhan Çakır, “Interview with Dr. Çağlar Kurç: The Second Nagorno-Karabakh War andUCAVs”, *Political Reflection*, Vol.7, No.3, p.34.

¹⁵ Çakır, *ibid.*, p.34.

Joint Publication 3-05.1 definition.¹⁶ So unmanned air vehicle systems are force multiplier in combat operations.

Some of the tasks that could be performed by a powerful air force previously can be performed by unmanned aerial vehicle systems today. Close air support, battlefield air interdiction and reconnaissance missions in which the air force directly supports the ground forces, can now be performed by unmanned aerial vehicle systems and loitering munitions. States with low national income will now be able to have unmanned aerial vehicle systems and loitering munitions and air power that can fulfill some of the duties of the air force. Therefore, the cost of carrying out a joint operation has become lower today.¹⁷ Unmanned aerial vehicle systems will constitute a significant part of the air forces of the countries in the future.

With armed unmanned aerial vehicle systems and loitering munition, the battlefield becomes more lethal with precision kinetic strikes, while intelligence, reconnaissance and surveillance on the battlefield become easier. Unmanned aerial vehicle systems can also effectively perform battlefield damage assessment tasks. In this context, the effect on the target is observed and, if necessary, the target is engaged again. In addition, the casualty videos obtained by the high-definition cameras of the unmanned aerial vehicle systems are used to shape both national and international public opinion and to break the will and determination of the enemy to fight.

It is possible to state that especially with the development of loitering munition technology and the decrease in production costs, unmanned aerial vehicle system will take more place on the battlefields in the future. Unmanned aerial vehicle systems will cause armed forces to reconsider their concealment, dispersal and deception measures. Troops will have to make an effort to hide their electronic and thermal traces from the enemy. In addition, there is a need to develop electronic countermeasure and air defense measures against unmanned aerial vehicle systems for survival of units on battleground.

3. Unmanned Aerial Vehicle Systems of Azerbaijan and Armenia

Since they were former USSR republics before their independence and the main country they imported weapons from is the RF, the weapon inventory of Azerbaijan and Armenia generally consists of the same type of weapons, ammunition and equipment. Since the beginning of the Nagorno-Karabakh conflict, RF has endeavored to maintain a military balance between Azerbaijan and Armenia. According to Sipri, Armenia carried out 94% of its arms imports from the RF between 2011 and 2020. Baku, on the other hand, supplied 60% of its total arms imports from the RF at the same time.¹⁸ Especially since 2010, Azerbaijan has developed and diversified its military inventory by purchasing unmanned aerial vehicle systems and precision guided rocket and missile systems from Israel and Turkey. Azerbaijan has allocated a significant part of its arms imports to unmanned aerial vehicle systems. By

¹⁶ *Joint Special Operations Task Force Operations (Joint Publication 3-05.1)*, April 26 2007, p.GL-11.

¹⁷ Jack Detsch, "The U.S. Army Goes to School on Nagorno-Karabakh Conflict", *Foreign Policy*, March 30, 2021, <https://foreignpolicy.com/2021/03/30/army-pentagon-nagorno-karabakh-drones/>, (Access August 20, 2021)

¹⁸ Pieter D. Wezeman, Alexandra Kuimova, Jordan Smith, "Arms transfers to conflict zones: The case of Nagorno-Karabakh", *Sipri*, 30 April 2021, <https://www.sipri.org/commentary/topical-backgrounder/2021/arms-transfers-conflict-zones-case-nagorno-karabakh> (Access: 05.10.2021).

making 7.8% of the world's unmanned aerial vehicle imports between 2010-2014, it ranked fourth in the world in this field.¹⁹

The biggest partner of Azerbaijan in terms of unmanned aerial vehicle systems has been Israel for a long time. Azerbaijan procured weapons worth 1.6 billion dollars from Israel Aerospace Industries (IAI) in 2012. Baku administration bought weapons from Israel for 5 billion dollars in 2016 and 127 million dollars in 2017. Most of these purchases were made up of unmanned aerial vehicle systems.²⁰ Since the early 2010s, Azerbaijan has purchased the Orbiter ultra-light reconnaissance unmanned aerial vehicle of Israel Aeronautics Defense Systems, and later its larger versions, the Elbit Hermes 450 and IAI Searcher reconnaissance unmanned aerial vehicles. In the mid-2010s, IAI-made Heron and Elbit-made Hermes 900 unmanned aerial vehicle systems, which have heavier and longer flight times, were purchased. As a loitering munition, the main system in the hands of Azerbaijan is IAI's Harop²¹ system. The Harop system was used by Azerbaijan in the 4-day conflict with Armenia in April 2016. The lighter and newer loitering munitions in Azerbaijan are Aeronautics' Orbiter1K, Elbit's SkyStriker and Turkish STM's Kargu²² portable rotary-wing striker system.²³ Bayraktar TB2s²⁴, armed with Roketsan MAM-L laser guided munitions, produced by Baykar Company from Turkey constitute the backbone of the armed unmanned aerial vehicle systems in Azerbaijan inventory. Bayraktar TB2s were delivered to Azerbaijan in mid-2020.

Azerbaijan not only imports but also manufactures unmanned aerial vehicle systems and loitering munitions. Baku signed an agreement with Israel in 2009 to establish a factory to produce unmanned aerial vehicle systems in Azerbaijan. In 2011, the Azerbaijan state company AZAD Systems established the aforementioned factory in cooperation with Israel Aeronautics.²⁵ In 2014, Azerbaijan exhibited the Aerostar reconnaissance and Orbiter 2M attack drones, produced jointly with Israel at the ADEX-2014 defense industry fair.²⁶ Azerbaijan produced the Zarba-1K loitering munition under the license of Orbiter-1K in 2018. In the same year, an Azerbaijani company stated that it was working on a kamikaze drone of different sizes that could stay in the air for 3 hours. Azerbaijan National Academy of Sciences has announced that it produces a kamikaze drone named Bat (Bat), which weighs 12 kilograms, can carry 5 kilograms of cargo, can reach a speed of 160 km/h, can reach a height of 2000 m, and allows it to be reused when it is not used. In 2019, Baku signed a contract with Israel's Aeronautics Defense Systems Company for missile and defense systems, as well

¹⁹ Arzu Abbasova, "Game of Drones in the South Caucasus: How did the Winter Come", *Topchubashov Center*, December 2020, p.6.

²⁰ Edward J. Erickson, "The 44 -Day War in Nagorno Karabakh", *Military Review Online Exclusive*, August 2021, p.2.

²¹ With a communication range of 200 km, Harop has endurance up to 9 hours and speed up to 225 knots. Harop, which has a maximum altitude of 15,000 feet, can fire the target with an accuracy of 1 meter with its 16 kg warhead. "HAROP Loitering Munition System", *Israel Aerospace Industries*, <https://www.iai.co.il/p/harop> (Access:12.10.2021).

²² The communication range of the Kargu Rotary Wing Attack drone is 5/10 km, the endurance is 30 minutes, and the weight of the warhead is 1.3 kg. "Rotary Wing Attack UAV", *STM*, <https://www.stm.com.tr/en/kargu-autonomous-tactical-multi-rotor-attack-uav> (Access: 01.10.2021).

²³ Alexander Yermakov, "Unmanned Aerial Vehicles over Nagorno-Karabakh: Revolution or Another Day of Battle", *Valdai Discussion Club*, December 4, 2020, <https://valdaiclub.com/a/highlights/unmanned-aerial-vehicles-over-nagorno-karabakh/> (Access: 05.10.2021).

²⁴ Bayraktar TB2 Tactical armed unmanned aerial vehicle has a maximum altitude of 27.000 feet and endurance up to 27 hours. "Bayraktar TB2", *Baykar*, <https://www.baykartech.com/iha-15.html> (Access: 06.10.2021).

²⁵ Abbasova, *ibid.*, p.7.

²⁶ Shahin Abbasov, "Azerbaijan Pursues Drones, New Security Options", *Eurasianet*, Sep 17, 2014, <https://eurasianet.org/azerbaijan-pursues-drones-new-security-options> (Access: 17.08.2021).

as unmanned aerial vehicle systems.²⁷ Also in 2019, SkyStriker drones were purchased from Israel.²⁸

Unmanned aerial vehicle systems in the Azerbaijan Armed Forces are in service in the Air Force, Land Forces and Azerbaijan Border Services. Turkish-made Bayraktar TB2²⁹ and Israeli-made Heron, Aerostar, Hermes 450 and Hermes 900 unmanned aerial vehicle systems are in service in the Air Force. Israeli-made Aerostar is in service in the Land Forces, and Israeli-made Hermes 450 and Hermes 900 unmanned aerial vehicle systems serve in the Border Services. Unmanned aerial vehicle systems imported by Azerbaijan from Israel are not armed and used only for intelligence, reconnaissance and surveillance purposes. However, Azerbaijan has Israeli-made Harop, Orbiter 1K, Skystriker and Turkish-made STM KARGU loitering munition.³⁰ Azerbaijan opened a training center in 2018 in order to train the personnel of the unmanned aerial vehicle systems, which are increasing in number.

On the other hand, in Armenia, there is the KrunK (Crane) unmanned aerial vehicle, which was exhibited for the first time in 2011, and the latest versions of this model, KrunK-9 and KrunK-11. The unmanned aerial vehicle systems owned by Azerbaijan are 3 times more effective than the KrunK drone owned by Armenia.³¹

4. The Use of Unmanned Aerial Vehicles in the Second Karabakh War

After gaining their independence, as a result of the conflict between Azerbaijan and Armenia focused on Nagorno-Karabakh, which was under the sovereignty of Azerbaijan, Armenia occupied Nagorno-Karabakh and seven districts around it. In 1994, a ceasefire agreement was signed between the parties under the mediation of the RF. Armenia has not implemented the United Nations Security Council resolutions regarding the unconditional withdrawal from the occupied territories in and around Nagorno-Karabakh. Negotiations conducted within the framework of the Organization for Security and Co-operation in Europe (OSCE) Minsk Group in order to find a solution to the problem did not yield any results. There were numerous ceasefire violations, including serious clashes in April 2016 and July 2020, on the ceasefire line. After the Armenian forces attacked on the occupied Nagorno-Karabakh ceasefire line on September 27, 2020, the Azerbaijani Armed Forces launched a general counterattack to seize the occupied lands. It ended with the triple declaration signed between RF, Azerbaijan and Armenia on November 10, 2020, which lasted for 44 days. Azerbaijan has liberated a large part of the occupied lands. Within the framework of the triple declaration, Russian peacekeepers were placed in the ceasefire line and the Lachin Corridor, and it was decided to provide transportation between Azerbaijan and Nakhchivan, an autonomous republic affiliated to Azerbaijan, via Armenia. The declaration, which had heavy provisions for Armenia, had to be signed by Yerevan, thanks to the overwhelming superiority

²⁷ Joanna Frew, "Armenia, Azerbaijan and Nagorno-Karabakh", *On the Edge: Security, protracted conflicts and the role of Drones in Eurasia*, January 2021, p.23, <https://dronewars.net/wp-content/uploads/2021/01/DW-Eurasia-WEB.pdf> (Access:20.08.2021)

²⁸ David Hambling, "The Weird and Worrying Drone War In The Caucasus", *Forbes*, June 22 2020, <https://www.forbes.com/sites/davidhambling/2020/06/22/the-weird-and-worrying-drone-war-in-the-caucasus/?sh=1d83c7f145da> (Access:20.08.2021)

²⁹ It is stated in open sources that Azerbaijan has 36 Bayraktar TB2 and 48 Harop loitering munitions. Erickson, *ibid.*, p.4.

³⁰ Douglas Barrie, Niklas Ebert, "Armed UAVs: An asset, but not alone all-conquering", *Military Balance Blog*, July 5, 2021, <https://www.iiss.org/blogs/military-balance/2021/07/nagorno-karabakh-armed-uavs> (Access: 02.09.2021).

³¹ Ridvan Bari Urcosta, "Drones in the Nagorno-Karabakh War", *Small War Journals*, October 23, 2020, <https://smallwarsjournal.com/jrnl/art/drones-nagorno-karabakh> (Access 02.10.2021)

Azerbaijan provided on the battlefield. The so-called Nagorno-Karabakh leader Arayik Harutyunyan declared that if the ceasefire agreement had not been signed, they would have lost all of Karabakh.³²

Azerbaijan did not use its unmanned aerial vehicle systems for the first time in the second Karabakh War, and the aforementioned systems were also used in the short-term conflict with Armenia in April 2016. Azerbaijan used the Harop loitering ammunition in the four-day war with Armenia in Nagorno-Karabakh. However, in the aforementioned conflicts, unmanned aerial vehicle systems became a tool used according to the emerging need, not in an integrated manner with the operation plan.³³ However, despite this, Azerbaijan was able to take back some of the occupied territories for the first time since the ceasefire agreement signed in 1994. The effectiveness of the Harop loitering munition imported from Israel in these battles confirmed that Azerbaijan's investments in military modernization were appropriate.³⁴ Even at the end of these conflicts, the then Deputy Minister of Defense of Armenia stated that while it was possible to destroy the target with a conventional rocket launcher, it was not necessary to purchase expensive unmanned aerial vehicle systems.³⁵ Armenia purchased Verba portable SAM and TOR-1M mobile SAMs from the RF after the April 2016 conflicts with Azerbaijan. Yerevan evaluated that air defense systems would provide protection to unmanned aerial vehicle systems within the framework of the old Soviet doctrine. In addition, Armenia did not make any changes in the existing defense and weapon positions, and did not pay attention to camouflage and concealment.³⁶

In fact, the Second Karabakh War is also titled the "South Caucasus Drone War"³⁷ or the "First Drone War"³⁸ due to the intense use of unmanned aerial vehicles. According to Artsrun Hovhannisyán, a special representative of the Armenian Defense Ministry, the Second Karabakh War was a fifth generation war in which armed unmanned aerial vehicle systems, artillery and missiles were used intensively. Hovhannisyán described the situation of the Armenian troops at the beginning of the war as follows: "*For ten days, our unit used a Kalashnikov rifle only once. All other days, drones and cannon shells were pouring down like hail. Soldiers use shovels [to dig defensive trenches] more than arms in this war*".³⁹ The war in question, which lasted as short as 44 days, revealed the importance of unmanned aerial vehicle systems and clearly revealed the disadvantages of those who do not have defense systems against them.⁴⁰

In fact, in this war, Azerbaijan used unmanned aerial vehicle systems in combination with electronic warfare measure and information superiority in a network centric command control, in accordance with the operational plan to meet the requirements of today's

³² "Armenia, Azerbaijan and Russia sign Nagorno-Karabakh peace deal", **BBC**, 10 November 2020, <https://www.bbc.com/news/world-europe-54882564> (Access 10.10.2021)

³³ Barrie, Ebert, *ibid.*

³⁴ Can Kasapoğlu, "Hard Fighting In The Caucasus: The Azerbaijani Armed Forces' Combat Performance and Military Strategy In The 2020 Nagorno-Karabakh War", **Center for Strategic Research**, No:18, February 2021, pp.12-13, <http://sam.gov.tr/pdf/sam-papers/SAM-Papers-No.-18.pdf> (Access:04.10.2021)

³⁵ Urcosta, *ibid.*

³⁶ Çakır, *ibid.*, p.34.

³⁷ Joanna, Frew, "Armenia, Azerbaijan and Nagorno-Karabakh", **On the Edge: Security, protracted conflicts and the role of Drones in Eurasia**, January 2021, p.20, <https://dronewars.net/wp-content/uploads/2021/01/DW-Eurasia-WEB.pdf>, (Access August 20 2021)

³⁸ Heiko Borchert, Torben Schütz, Joseph Verbovszky, "Beware the Hype: What Military Conflicts in Ukraine, Syria, Libya, and Nagorno-Karabakh (Don't) Tell Us About the Future of War", **Defense AI Observatory**, https://www.researchgate.net/publication/351614718_Beware_the_Hype_What_Military_Conflicts_in_Ukraine_Syria_Libya_and_Nagorno-Karabakh_Don%27t_Tell_Us_About_the_Future_of_War (Access: 15.10.2021)

³⁹ "Karabakh Crisis: UAVs a Gamechanger in Karabakh", **Institute for War&Peace Reporting**, October 30, 2020, <https://iwpr.net/global-voices/uavs-gamechanger-karabakh> (Access: 10.10.2021)

⁴⁰ Barrie, Ebert, *ibid.*

battlefield. On the other hand, Armenia adopted a doctrine based on fortified positions in mountainous and dominant terrain, escalating the conflict with ballistic missiles and prioritizing firepower at depths. The defense organization of Armenia in the Second Karabakh War was based on Soviet military thought. The defense was provided by the lines staggered to the depth. These defense lines were interconnected by kill zones and interconnected strong points. In addition, minefields were laid to stop the advance of Azerbaijani units.⁴¹ The Armenian side thought that the Bagramyan line built with the help of the diaspora in the First Karabakh War would protect them.⁴² Considering the mountainous and steep nature of Nagorno-Karabakh, Armenia adopted a land based defense doctrine and a tactic that would make it difficult for the Azerbaijani armored and mechanized units to advance. However, by using drones as a priority, Azerbaijan has frustrated Armenia's land-based defense doctrine. As a result, Azerbaijan gained absolute superiority on the battlefield and liberated a large part of its lands under Armenian occupation.⁴³

Azerbaijan used unmanned aerial vehicle systems before the Second Karabakh War to produce operative and tactical intelligence. Azerbaijan has carried out intelligence, surveillance and reconnaissance activities for Nagorno-Karabakh and its surroundings, which has been under occupation for a long time, with its unmanned aerial vehicle systems. In this way, it was possible to search, find, track and ultimately destroy enemy positions and assets located at the depth of the contact line and on the contact line. Ballistic missiles and unmanned aerial vehicle systems, which Azerbaijan has given importance and priority in military modernization in the last decade, gave Baku the opportunity to conduct deep battle against the Armenian Armed Forces.⁴⁴ As a result, tactical and operative targets were brought under fire with great precision by the Azerbaijan Armed Forces in harmony.

The Azerbaijan Armed Forces used unmanned aerial vehicle systems as part of the operation plan in the Second Karabakh War, which supported other functional areas but was also supported by them.⁴⁵ The task in which Azerbaijan used unmanned aerial vehicle systems in a way that would affect the outcome of the war was to suppress the enemy air defense (SEAD). According to the unmanned aerial vehicle systems part of the operation plan, the primary target was the low and medium altitude air defense systems of the Armenian Armed Forces. In this direction, the Azerbaijani army destroyed the 9K33 OSA and 9K35 Strela-10 SAMs (SA-8 and SA-13 NATO designation) surface-to-air defense systems of the Armenian army with Bayraktar TB-2 and Harop loitering munition in a high-paced operation. Azerbaijan supported the unmanned aerial vehicle system operation by blinding the enemy air defense systems with electronic warfare.⁴⁶ On the tenth day of the war, 60 Armenian surface-to-air missile systems and nine mobile air defense systems were destroyed.⁴⁷ 2 Russian-made S-300 air defense systems owned by Armenia and deployed to Nagorno-Karabakh since the beginning of the war were destroyed on 30 September 2020 and in the middle of October with the Harop loitering munition⁴⁸ with its anti-radiation capabilities.⁴⁹ In October 2020, an Armenian SCUD-B ballistic missile launcher was destroyed by an Azerbaijani unmanned

⁴¹ Kasapoğlu, *ibid.*, p.9.

⁴² Çakır, *ibid.*, p.34.

⁴³ Kasapoğlu, *ibid.*, p.3.

⁴⁴ Erickson, *ibid.*, p.3.

⁴⁵ Barrie, Ebert, *ibid.*

⁴⁶ Çakır, *ibid.*, p.36.

⁴⁷ Kasapoğlu, *ibid.*, p.15.

⁴⁸ Kasapoğlu, *ibid.*, p. 16.

⁴⁹ Abbasova, *ibid.*, p.5.

aerial vehicle system. This was the first example of the destruction of a ballistic missile launcher by an unmanned aerial vehicle system in the history of war.⁵⁰

Azerbaijan also converted the old Soviet-era Antonov An-2 aircraft into unmanned aerial vehicles and flew them in the areas where Armenian air defense weapons were located in Nagorno-Karabakh, thus identifying the positions of the Armenian air defense elements that opened fire. Subsequently, these positions were brought under fire and destroyed by an armed unmanned aerial vehicle system and loitering munition.⁵¹

The deactivation of the air defense systems at the beginning of the operation deprived Armenian armored and mechanized units and fire support systems from the air defense protection, causing them to become targets for unmanned aerial vehicle systems. The neutralization of Armenian air defense and radar systems with unmanned aerial vehicle systems and other fire support systems prevented the coordinated action of the Armenian forces and paved the way for the ground-winning maneuvers of the Azerbaijan Armed Forces equipped with T-90, T-72 tanks and BMP-3 AFVs.⁵²

In addition, unmanned aerial vehicle systems were not only used to detect and strike the target, but also to define targets to different fire support systems and to evaluate the battlefield damage after the fire support missions.⁵³ Armenian tanks, armored combat vehicles, artillery and air defense weapons were destroyed by integrating unmanned aerial vehicle systems with other fixed and rotary wing air platforms and artillery/rocket/missile systems. The integrated use of unmanned aerial vehicle systems with indirect fire systems has shortened the sensor to shooter gap.⁵⁴ Armed and unarmed unmanned aerial vehicle systems have been used day and night as an integral part of the fire support system.

While Azerbaijan neutralized the Armenian armored and mechanized troops with armed unmanned aerial vehicle systems and loitering munitions, Armenia was able to use only guided antitank missiles against Azerbaijani tanks. Therefore, unmanned aerial vehicle systems have created an asymmetry between Azerbaijan and Armenia in favor of Azerbaijan. One aspect of this asymmetry is that Azerbaijan has unmanned aerial vehicle systems in multi-functional role that will perform reconnaissance, surveillance, intelligence and attack missions, while the other aspect is that they are more numerous than the Armenian side.

Unmanned aerial vehicle systems, which brought Armenian troops under fire and destroyed a large number of Armenian tanks, artillery and air defense weapons, have greatly benefited Azerbaijan. Until the 24th day of the war, 114 tanks, 42 radar systems, 249 military vehicles and 44 command centers were destroyed by Bayraktar TB-2 alone.⁵⁵ Using unmanned aerial vehicle systems and loitering munition systems, Azerbaijan destroyed Armenia's military weapons, equipment and materials worth 1 billion dollars. The ability to penetrate the rear of the enemy with unmanned aerial vehicle systems prevented the Armenian forces from providing combat, combat support and combat service support to the front. With its unmanned aerial vehicle systems and loitering munitions, Azerbaijan has gained great advantage by setting fire to Armenia's supply routes, ammunition and supply depots, and deep

⁵⁰ Kasapoğlu, *ibid.*, pp.18-19.

⁵¹ Robyn Dixon, "Azerbaijan's drones owned the battlefield in Nagorno-Karabakh — and showed future of warfare", *Washington Post*, November 11, 2020, https://www.washingtonpost.com/world/europe/nagorno-karabakh-drones-azerbaijan-aremenia/2020/11/11/441bcbd2-193d-11eb-8bda-814ca56e138b_story.html (Access: 10 August 2021); Azerbaijani "unmanned" An-2 biplanes, *Scramble*, October 6, 2020, <https://www.scramble.nl/military-news/azerbaijani-unmanned-an-2-biplanes> (Access: 27.08.2020).

⁵² Borchert, Schütz, Verbovszky, *ibid.*, p.34.

⁵³ Kasapoğlu, *ibid.*, s.17.

⁵⁴ Frank Christian Sprengel, Drones in Hybrid Warfare: Lessons from Current Battlefields, *Hybrid Center of Excellence*, Working Paper, June 2021, p.23.

⁵⁵ Abbasova, *ibid.*, p.5.

positions. Azerbaijani President Aliyev stated that the losses of Azerbaijan on the front line decreased with the advanced Turkish unmanned aerial vehicle systems.

Unmanned aerial vehicle systems, which are used effectively by Turkey in the fight against terrorists at home and abroad, have subsequently, had a significant impact on the battles in Syria and Libya. Turkey, seeing that wars have turned into dronization wars, has used drone-based war strategies in all operational areas.⁵⁶ Bayraktar TB-2s have been used effectively in target acquisition and destruction of targets. Bayraktar TB2s can set targets under fire with small guided ammunition, and with their high-definition cameras, they allow the transmission of videos that will break the enemy's will to fight in information operations.⁵⁷ In order to gain superiority in the information operations, Azerbaijan has continuously served the media organs with the high-resolution cameras of the unmanned aerial vehicle systems. Unmanned aerial vehicle systems have been the real eyes of the war in real time, both for the commanders of the Azerbaijan Armed Forces, who commanded the war, and for the national and international public.

In the Second Karabakh War, air defense came to the fore. Unmanned aerial vehicle systems are vulnerable to air defense weapons. Armenia's short-range low-altitude defense system has been exploited by unmanned aerial vehicle systems used by Azerbaijan. Most of the Armenian air defense weapons are from the Soviet era. These systems include the 2K11 Krug, 9K33 OSA, 2K12 Kub, and 9K35 Strela-10. The Bayraktar TB2 system flew far above the engagement altitude of the aforementioned air defense weapons. Although Armenia's Buk and Tor-M2KM air defense weapons were able to shoot down some unmanned aerial vehicle systems, they could not be effective due to their late participation in the operation and being the target of armed unmanned aerial vehicle systems and loitering munitions. On the other hand, Armenia's more advanced and long-range air defense systems, the S-300, were not designed to be used against unmanned aerial vehicle systems and were destroyed with loitering ammunition owned by Azerbaijan. Armenian MANPADs could not see and aim clearly due to the small size of the Azerbaijani unmanned aerial vehicle systems. Although Azerbaijan inflicted great casualties on Armenia with unmanned aerial vehicle systems during the war; Armenia was able to inflict limited casualties on Azerbaijan. Azerbaijan has 7 Harop, 1 Orbiter 1K and 1 Bayraktar TB2 casualties.⁵⁸

In the field of electronic warfare, which is another area of vulnerability of unmanned aerial vehicle systems, the Polye-21 electronic warfare system provided by Russia to Armenia was able to stop Azerbaijan's unmanned aerial vehicle operation for four days. After the Second Karabakh War, a question arose as to how conventional air and ground forces would be affected by the entry of unmanned aerial vehicles into the battlefield. It has been revealed that especially armored, mechanized units and fire support systems need organic air defense units and weapons that will provide effective air defense against unmanned aerial vehicle systems. Unmanned aerial vehicle systems have not only been used before and during the war, but are also currently used to observe the ceasefire between Azerbaijan and Armenia. The Second Karabakh War was the first conventional war won by unmanned aerial vehicle systems, but it will not be the last war.⁵⁹

⁵⁶Urcosta, *ibid.*

⁵⁷Shaan Shaikh, Wes Rumbaugh, "The Air and Missile War in Nagorno-Karabakh: Lessons for the Future of Strike and Defense", *Center for Strategic & International Studies*, December 8, 2020, <https://www.csis.org/analysis/air-and-missile-war-nagorno-karabakh-lessons-future-strike-and-defense> (Access:01.09.2021).

⁵⁸Sprengel, *ibid.*, p.23.

⁵⁹Hambling, *ibid.*

5. Conclusion

As the Second Karabakh War showed, unmanned aerial vehicle systems are increasingly used in different roles in battles effectively. In addition to intelligence, reconnaissance, surveillance and strike missions, unmanned aerial vehicle systems are also used for close air support, suppression of enemy air defenses, command and control of units, target acquisition, call for fire operations of fire support systems especially indirect artillery fire and information operations. Having unmanned aerial vehicle systems in battles carries an element of force multiplier and gives the owner an advantage. In this direction, the role of unmanned aerial vehicles in the victory of Azerbaijan in the Second Karabakh War was great and they created a force multiplier effect. Azerbaijan has an asymmetrical advantage over Armenia by using its unmanned aerial vehicle systems, which are superior in number and technology compared to Armenia, in a common understanding with other fire support systems and forces. This difference and superiority created by Azerbaijan has emerged both with the technological development of the unmanned aerial vehicle systems, their excess in numbers and their doctrinal use in the battlefield. The aforementioned approach has led Azerbaijan to gain superiority both in the battlefield and in the national and international information warfare.

On the other hand, states such as Armenia that do not have active and passive measures against unmanned aerial vehicle systems can inflict heavy losses in battles. Today, since air defense systems are mostly designed for conventional warplanes and helicopters, they cannot be used effectively against unmanned aerial vehicle systems. However, there is no doubt that measures will be developed against unmanned aerial vehicles in a short time and the competition in unmanned aerial vehicles will turn into a race between capabilities and countermeasures.

REFERENCES

- ABBASOV, Shahin, "Azerbaijan Pursues Drones, New Security Options", *Eurasianet*, September 17 2014, <https://eurasianet.org/azerbaijan-pursues-drones-new-security-options>, (Access:17.08.2021).
- ABBASOVA, Arzu, "Game of Drones in the South Caucasus: How did the Winter Come", *Topchubashov Center*, December 2020.
- Army Unmanned Aircraft System Operations (FMI 3-04.155), *Headquarters, Department of the Army*, 4 April 2006.
- "Azerbaijan Academy of Sciences produces kamikaze drone", *Azernews*, September 26 2018, <https://www.azernews.az/nation/138175.html>, (Access: 15.08.2021)
- Azerbaijani "unmanned" An-2 biplanes, *Scramble*, October 6 2020, <https://www.scramble.nl/military-news/azerbaijani-unmanned-an-2-biplanes> (Access: 27.08.2020).
- BARRIE, Douglas, EBERT, Niklas, "Armed UAVs: An asset, but not alone all-conquering", *Military Balance Blog*, July 5 2021, <https://www.iiss.org/blogs/military-balance/2021/07/nagorno-karabakh-armed-uavs>, (Access: 02.09.2021).
- "Bayraktar TB2", *Baykar*, <https://www.baykartech.com/iha-15.html> (Access: 06.10.2021)
- BORCHERT, Heiko, SCHÜTZ, Torben, VERBOVSZKY, Joseph, "Beware the Hype: What Military Conflicts in Ukraine, Syria, Libya, and Nagorno-Karabakh (Don't) Tell us about the Future of War", Defense AI Observatory, https://www.researchgate.net/publication/351614718_Beware_the_Hype_What_Military_Conflicts_in_Ukraine_Syria_Libya_and_Nagorno-Karabakh_Don%27t_Tell_Us_About_the_Future_of_War (Access:15.10.2021)
- ÇAKIR, Oğuzhan, "Interview with Dr. Çağlar Kurç: The Second Nagorno-Karabakh War andUCAVs", *Political Reflection*, Vol.7, 33-38.
- DETSCH, Jack, "The U.S. Army Goes to School on Nagorno-Karabakh Conflict", *Foreign Policy*, March 30, 2021, <https://foreignpolicy.com/2021/03/30/army-pentagon-nagorno-karabakh-drones/>, (Access: 20.08.2021)
- DIXON, Robyn, "Azerbaijan's drones owned the battlefield in Nagorno-Karabakh — and showed future of warfare", *Washington Post*, November 11, 2020, https://www.washingtonpost.com/world/europe/nagorno-karabakh-drones-azerbaijan-aremenia/2020/11/11/441bcbd2-193d-11eb-8bda-814ca56e138b_story.html (Access: 10.08. 2021).
- *DOD Dictionary of Military and Associated Terms*, August 2021.
- DOMBROWSKI, Peter, GHOLZ, Eugene, *Buying Military Transformation: Technological Innovation and the Defense Industry*, Columbia University Press, New York, 2006.
- ERICKSON, Edward J. "The 44 –Day War in Nagorno Karabakh", *Military Review Online Exclusive*, August 2021, 1-15.
- HAMBLING, David, "The Weird and Worrying Drone War in the Caucasus", *Forbes*, June 22 2020, <https://www.forbes.com/sites/davidhambling/2020/06/22/the-weird-and-worrying-drone-war-in-the-caucasus/?sh=1d83c7f145da> (Access August 20, 2021)

- “HAROP Loitering Munition System”, *Israel Aerospace Industries*, <https://www.iai.co.il/p/harop> (Access:12.10.2021).
- FREW, Joanna, “Armenia, Azerbaijan and Nagorno-Karabakh”, *On the Edge: Security, protracted conflicts and the role of Drones in Eurasia*, January 2021, <https://dronewars.net/wp-content/uploads/2021/01/DW-Eurasia-WEB.pdf> (Access: 20.08.2021).
- FALK, Thomas O. “How Drones Have Added a New Dynamic to Conflicts”, *Aljazeera*, February 20 2021, <https://www.aljazeera.com/news/2021/2/20/how-drones-have-added-a-new-dynamic-to-conflicts>, (Access:20.09.2021).
- Joint Special Operations Task Force Operations (Joint Publication 3-05.1)*, April 26 2007, p.GL-11.
- “Karabakh Crisis: UAVs a Gamechanger in Karabakh”, *Institute for War&Peace Reporting*, October 30 2020, <https://iwpr.net/global-voices/uavs-gamechanger-karabakh> (Access: 10.10.2021)
- KASAPOĞLU, Can, “Hard Fighting in the Caucasus: The Azerbaijani Armed Forces’ Combat Performance and Military Strategy in the 2020 Nagorno-Karabakh War”, *Center for Strategic Research*, No: 18, February 2021, <http://sam.gov.tr/pdf/sam-papers/SAM-Papers-No.-18.pdf> (Access: 04.10.2021)
- SHAIKH, Shaan, Rumbaugh, Wes, “The Air and Missile War in Nagorno-Karabakh: Lessons for the Future of Strike and Defense”, *Center for Strategic&International Studies*, December 8 2020, <https://www.csis.org/analysis/air-and-missile-war-nagorno-karabakh-lessons-future-strike-and-defense> (Access: 01.09.2021).
- SPRENGEL, Frank Christian, Drones in Hybrid Warfare: Lessons from Current Battlefields, *Hybrid Center of Excellence*, June 2021, p.23.
- “The future of drone warfare”, *The Week*, June 20 2021, <https://theweek.com/politics/1001660/the-future-of-drone-warfare> (Access 01.10.2021).
- “Unmanned Aerial Vehicle”, *Military Factory*, https://www.militaryfactory.com/dictionary/military-terms-alphabet-list.php?letter_group=U (Access: 10.10.2021).
- URCOSTA, Ridvan Bari, “Drones in the Nagorno-Karabakh War”, *Small War Journals*, October 23 2020, <https://smallwarsjournal.com/jml/art/drones-nagorno-karabakh> (Access:02.10.2021)
- WEZEMAN, Pieter D. - Alexandra Kuimova - Jordan Smith, “Arms transfers to conflict zones: The case of Nagorno-Karabakh”, *Sipri*, April 30 2021, <https://www.sipri.org/commentary/topical-backgrounder/2021/arms-transfers-conflict-zones-case-nagorno-karabakh> (Access:03.10.2021)
- YERMAKOV, Alexander. “Unmanned Aerial Vehicles over Nagorno-Karabakh: Revolution or Another Day of Battle”, *Valdai Discussion Club*, December 04 2020, <https://valdaiclub.com/a/highlights/unmanned-aerial-vehicles-over-nagorno-karabakh/> (Access:05.10.2021).