

DRONES ON THE FRONTLINE: CHARTING THE USE OF DRONES IN THE RUSSO-UKRAINIAN CONFLICT AND HOW THEIR USE MAY BE VIOLATING INTERNATIONAL HUMANITARIAN LAW

Saba Sotoudehfar

CEDIS, NOVA School of Law, NOVA University of Lisbon, Portugal
sabasotoudehfar@gmail.com

Jeremy Julian Sarkin

CEDIS, NOVA School of LAW, NOVA University of Lisbon, Portugal
and Research Fellow, Department of Criminology,
University of the Free State, Bloemfotein, South Africa

JSarkin@post.harvard.edu

SOTOUDEHFAR, Saba; SARKIN, Jeremy Julian. Drones on the Frontline: Charting the Use of Drones in the Russo-Ukrainian Conflict and How Their Use May Be Violating International Humanitarian Law. *International and Comparative Law Review*, 2023, vol. 23, no. 2, pp. 129–169. DOI: 10.2478/iclr-2023-0018

Summary: The conflict between Russia and Ukraine has been widely recognized as one of the most significant threats to peace and security in Europe since World War II. The large-scale proliferation of unmanned aerial vehicles in this conflict reveals how drones and autonomous weapons systems are transforming warfare. At the same time, they are raising concerns about the way conflicts are being fought, and how international peace and security is being secured through international humanitarian law. This article therefore provides a deep empirical analysis of the types of drones being deployed in the war between Russia and Ukraine, and their specific contributions to the conflict. The study provides several charts that indicate the make of the drones being used, their type, and the function of each drone employed by both parties to the conflict. The charts highlight various parameters such as maximum speed, endurance, and altitude capabilities. The empirical part of the article then feeds into the second part of the article which delves into the question of whether the drones being used there meet the requirements of the principles of distinction and proportionality as mandated in international humanitarian law. It argues that there seems to be evidence of indiscriminate attacks on civilians and civilian infrastructure, and investigations need to be carried out to determine whether there should be accountability. The article argues that the artificial intelligence being used in drones make them distinct from ordinary weapons as it is their autonomy to make decisions which ensures that accountability for IHL violations is problematic. The article argues that IHL ought to be reformed to deal with these new warfare capabilities.

Keywords: Russia-Ukraine War, Drones, International Humanitarian Law, Principle of Distinction, Principle of Proportionality.

1 Introduction

The collapse of the Soviet Union more than three decades ago marked a seminal moment in world history.¹ It ended a protracted geopolitical struggle and unveiled a new era of global politics.² The end of the Soviet Union also saw new global alliances and redeveloped relationships and partnerships. In that context, in recent years Vladimir Putin, the president of the Russian Federation, has expressed the desire to restore the influence and power of the former Soviet Union.³ Some argue that his drive in recent years has been to annex territories that were previously part of the Soviet Union, and exert political domination over these areas.⁴ However, the exact reasons for the war between Russia and Ukraine are mired in controversy. Some believe that it is about reclaiming the legacy of the Soviet Union Empire.⁵ Others cite Ukraine's potential membership in the North Atlantic Treaty Organization (NATO), and Russia's reaction to that.⁶ From that perspective, Putin saw that if Ukraine were to join NATO, its defensive capabilities would be enhanced,⁷ thus decreasing Russia's influence in the region, while expanding the reach of the West.⁸ Therefore, it appears that NATO's possible enlargement served as one of the catalysts of the conflict.

Regardless of the reasons, on 24 February 2022 Russia began its war with Ukraine.⁹ Russian troops were mobilized by land, sea, and air. Attacks were conducted from Russia as well as from Belarus and Crimea (which was annexed by Russia in 2014).¹⁰ Amidst this conflict, the proliferation of unmanned aerial

-
- 1 SZPORLUK, Roman. Ukraine, and the Breakup of the Soviet Union. Stanford: Hoover Institution Press Publication, 2020, pp.17–18.
 - 2 DALSJÖ, Robert, JONSSON, Michael, NORBERG, Johan. A Brutal Examination: Russian Military Capability in Light of the Ukraine War. *Survival*, 2022, vol. 64, no. 3, pp. 7–28.
 - 3 MANKOFF, Jeffrey. Russia's War in Ukraine. *Center for Strategic & International Studies*, 2022, vol. 6, no. 4, pp. 439–440.
 - 4 CAFRUNY, Alan, et al. Ukraine , Multipolarity and the Crisis of Grand Strategies. *Journal of Balkan and Near Eastern Politics*, 2023 vol. 25, no. 1, pp. 1–21.
 - 5 KHURSHID, Roqia. Russia and Ukraine Crisis : From Geo-Political Confrontation to Putin ' s Ambition to Regain Lost Grandeur. *Pakistan Review of Social Sciences*, 2022, vol. 3, no. 2, pp. 51–71.
 - 6 TRUSH, S. M. Crisis between Russia and Ukraine: The China Factor. *Herald of the Russian Academy of Sciences*, 2022, vol. 92 , no. 8, pp. 595–600.
 - 7 MENON, Rajanand, RUGER, William. NATO Enlargement and US Grand Strategy: A Net Assessment. *International Politics*, 2020, vol. 57, no. 3, pp. 371–400.
 - 8 DALSJÖ, Robert, JONSSON, Michael, NORBERG, Johan. A Brutal Examination: Russian Military Capability in Light of the Ukraine War. *Survival*, 2022, vol. 64, no. 3, pp.7–28.
 - 9 KUNERTOVA, Dominika. The War in Ukraine Shows the Game-Changing Effect of Drones Depends on the Game. *Bulletin of the Atomic Scientists*, 2023, vol. 79, no. 2, pp. 95–102.
 - 10 STOICESCU, K Alev, et al. How Russia Went to War the Kremlin's Preparations. *International Centre for Defence and Security*, 2023, pp. 5–7.

vehicles (UAVs), known as drones,¹¹ has introduced a new and significant element in modern warfare,¹² raising concerns for international peace and security.¹³ While using drones in various situations is not novel, their widespread use for military and civilian purposes has increased significantly in recent years.¹⁴ Prior to the current Russia-Ukraine conflict, American drones, for example have been employed for some time to spy, surveil, and conduct attacks in places like Afghanistan, Pakistan, and Yemen.¹⁵ In 2019, Houthi rebels from Yemen attacked oil fields in Saudi Arabia with drones, causing unexpected destruction and demonstrating that even low-quality drones can destroy infrastructure and kill civilians.¹⁶

It is however the ongoing conflict between Russia and Ukraine that marks the first instance of large-scale drone deployment in an officially recognized conflict.¹⁷ This technological advancement has enabled the war between Russia and Ukraine by providing efficient surveillance, targeted attacks, and reconnaissance with fewer risks to the lives of combatants and lower costs.¹⁸ Despite the ongoing conflict being recognized as one of the most significant threats to peace and security in Europe since the end of World War II, the media's coverage of drone deployment has contributed to a general acceptance of this technology amongst the public and politicians, yet prompting legal and ethical debates regarding their use.¹⁹

-
- 11 There are other types of drones, such as maritime drones used in the conflict to attack the Kerch Strait bridge also known as the Crimea Bridge in July 2023. <https://edition.cnn.com/2023/07/17/europe/crimea-bridge-putin-explainer-intl/index.html>
 - 12 SARKIN, Jeremy, Julian, SOTOUDEHFAR, Saba. Artificial Intelligence and Arms Races in the Middle East: The Evolution of Technology and its Implications for Regional and International Security. *Defence & Security Analysis* (forthcoming). DOI: 10.1080/14751798.2024.2302699
 - 13 LAWRENCE, Tony. The Early Air War Prelude: Recent History The Invasion of Ukraine. *International Centre for Defence and Security*, 2022, no. 5, pp. 1–4.
 - 14 LUSHENKO, Paul. U.S. Presidents' Use of Drone Warfare. *Defense & Security Analysis*, 2022, vol. 38, no. 1, pp. 31–52.
 - 15 PAGE, James, Michael, WILLIAMS, John. Drones, Afghanistan, and beyond : Towards Analysis and Assessment in Context. *European Journal of International Security*, 2022, vol. 7, no. 3, pp. 283–303.
 - 16 BRUNSTETTER, Daniel R, FÉREY, Amélie. Armed Drones and Sovereignty: The Arc of Strategic Sovereign Possibilities. In LUSHENKO, Paul, BOSE, Srinjoy, MALEY, William (eds). *Drones and Global Order*. New York: Routledge, 2021, pp. 19.
 - 17 CHÁVEZ, Kerry. Learning on the Fly: Drones in the Russian-Ukrainian War. *Arms Control Today*, 2023, vol. 53, no. 1, pp. 6–11.
 - 18 PONG, Beryl. The Art of Drone Warfare. *Journal of War and Culture Studies*, 2022, vol. 15, no. 4, pp. 377–87.
 - 19 HOFFMANN, Tamás. War or Peace ? – International Legal Issues Concerning the Use of Force in the Russia – Ukraine Conflict. *Hungarian Journal of Legal Studies*, 2022, vol. 63, no. 3, pp. 206–35.

As technology advances, drones are expected to play an evolving role in warfare,²⁰ shaping the dynamics of conflicts worldwide,²¹ and their impact can be observed in several aspects.²² However, in the context of the Russia-Ukraine conflict, it is essential to assess to what extent the drones employed comply with the principles of international humanitarian law (IHL). The increasing reliance on drones in warfare has raised concerns regarding their potential to contribute to violations of IHL. Factors such as imprecise targeting, the risk of collateral damage, challenges in accurately distinguishing between combatants and civilians from a remote location, and instances of misuse during the ongoing conflict have further emphasized these concerns.

These are important concepts, as although war inevitably poses risks to the lives and properties of civilians, belligerent parties are meant to employ methods and means of warfare that minimize unnecessary harm and collateral damage.²³ In response to the unprecedented loss of civilian lives during and after the two World Wars, IHL, also known as the law of armed conflict (LOAC), emerged as the framework of legal standards to establish constraints on the conduct of warfare.²⁴

The Geneva Conventions, along with their Additional Protocols, and the principles of customary international law²⁵ collectively form the basis of IHL, aiming to ensure more effective protection of the civilian population during armed conflicts.²⁶ Traditionally, the fundamental principles of IHL encompass

-
- 20 SARKIN, Jeremy, Julian, SOTOUDEHFAR, Saba. *Artificial Intelligence and Arms Races in the Middle East: The Evolution of Technology and its Implications for Regional and International Security*. Defence & Security Analysis (forthcoming). DOI: 10.1080/14751798.2024.2302699
- 21 SARKIN, Jeremy, Julian, SOTOUDEHFAR, Saba. *Artificial Intelligence and Arms Races in the Middle East: The Evolution of Technology and its Implications for Regional and International Security*. Defence & Security Analysis (forthcoming). DOI: 10.1080/14751798.2024.2302699
- 22 SECHSER, Todd S, NARANG, Neil, TALMADGE, Caitlin. *Emerging Technologies and Strategic Stability in Peacetime, Crisis, and War*. *Journal of Strategic Studies*, 2019, vol. 42, no. 6, pp. 727–35.
- 23 BUDINSKA, Ivana. *On Ethical and Legal Issues of Using Drones*. In ASPRAGATHOS, Nikos A, KOUSTOUMPARDIS, Panagiotis, MOULIANITIS, Vassilis C (Des). *Advances in Service and Industrial Robotics: Proceedings of the 27th International Conference on Robotics in Alpe-Adria Danube Region (RAAD 2018)*. Cham: Springer International Publishing, 2019. pp.710–718.
- 24 VAN DIJK, Boyd. *What Is IHL History Now?* *International Review of the Red Cross*, 2022, vol. 104, no. 920–921 pp. 1621–1637.
- 25 These are found mostly in the four Geneva Conventions and the two Additional Protocols to those Conventions. All the Geneva Conventions and Additional Protocol 1 were ratified by both Russia and Ukraine when they were part of the Soviet Union and remain binding on them. Besides other laws, customary international law also applies.
- 26 SHERESHEVSKY, Yahli. *International Humanitarian Law-Making and New Military Technologies*. *International Review of the Red Cross*, 2022, vol. 104, no. 920–921, pp. 2132–2152.

three core elements: military necessity, distinction, and proportionality.²⁷ Military necessity recognizes that the use of force is permissible only to the extent required to achieve a legitimate military objective.²⁸ Distinction emphasizes the obligation to differentiate between combatants and civilians, as well as between military objectives and civilian objects.²⁹ Proportionality dictates that the anticipated harm to civilians and civilian objects must not be excessive in relation to the anticipated military advantage.³⁰ According to many IHL provisions, but for example Article 35(1) of Additional Protocol I, the methods and means of warfare are not unlimited,³¹ and their deployment must adhere to the specific principles of IHL.³² Civilians and civilian targets may not be targeted unless linked to military necessity.

Therefore, before employing a new weapon or method, such as drones, belligerent parties should assess its compliance with the principles of IHL to minimize harm to civilians while achieving their military objectives.³³ In this context, thus, there is an urgent need for a comprehensive evaluation of the legal and strategic implications of drone use in the Russia-Ukraine conflict. This article thus aims to provide an analysis of the types of drones employed in the recent war between Russia and Ukraine, their specific contribution to the conflict, and their compliance with the international humanitarian legal principles of distinction and proportionality. By investigating the roles and effects of these drones, this article seeks to offer a better understanding of drone technology advancement and the legal issues arising from their use during the first large-scale war involving drones. This is important as many legal and other issues come to the fore. This is of even greater significance considering the profound impact of this conflict on the civilian population, with thousands of innocent individuals los-

27 CRAWFORD, Emily, PERT, Alison. *International Humanitarian Law*. Cambridge: Cambridge University Press, 2020, pp. 194–197.

28 PEDRAZZI, Marco. *The Principles of Military Necessity and Humanity in Light of International Human Rights Law*. In KOLB, Robert, GAGGIOLI, Gloria, KILIBARDA, Pavle (eds). *Research Handbook on Human Rights and Humanitarian Law*. Glos: Edward Elgar Publishing, 2022, pp. 76–89.

29 Blank, Laurie. *Law of Armed Conflict: Purposes and Principles*. In *International Conflict and Security Law*. Glos: Edward Elgar Publishing, 2023, pp. 142–162.

30 BEARD, Jack M. *The Principle of Proportionality in an Era of High Technology*. In FORD, Christopher M, WILLIAMS, Winston S (eds). *Lieber Institute for Law and Land Warfare Book Series-Complex Battlespaces: The Law of Armed Conflict and the Dynamics of Modern Warfare*. Oxford: Oxford University Press, 2018, pp. 261–288.

31 DIENELT, Anne. *The Shadowy Existence of the Weapons Review and Its Impact on Disarmament*. *Sicherheit & Frieden*, 2018, vol. 36, no. 3, pp. 126–32.

32 TSYBULENKO, Evhenand, KAJANDER, Aleksii. *Customary International Humanitarian Law and Article 36 of Additional Protocol I to the Geneva Conventions : A Stopgap Regulator of Autonomous Weapons Systems?*. *TalTech Journal of European Studies*, 2022, vol. 12, no. 36, pp. 87–112.

33 IGUH, Nwamaka, Adaora, AKUBUILO, Florence, Chinenye. *The Position of International Law on the Use of Combat Drones in Armed Conflict*. *UNIZIK Law Journal*, 2022, no. 18, pp. 92–102.

ing their lives.³⁴ Thus, it becomes imperative for international law to address the long-standing legal ambiguities surrounding drone use to prevent further loss of life and safeguard global security.

This article firstly sets out the methodology employed to examine the data around drone usage. It then classified how different types of drones are being used generally in warfare and then specifically how they are being used in the Russian-Ukraine conflict. Then the various types of drones that are being used in the conflict and their functions are examined to understand their capabilities and the way they are being used. The article then proceeds to analyze how IHL principles apply to drone usage. It examines two specific issues relevant within IHL – those of the principle of distinction and the principle of proportionality – to understand how drone warfare could be illegal in the conflict if it is being used disproportionately and indiscriminately to attack civilians and civilian infrastructure targets.

2 Methodology

The central focus of this study is to acquire a thorough understanding of drone utilization in the conflict and understand whether that usage complies with international law. The study is a legal empirical investigation with the primary objective of gathering comprehensive data regarding the deployment of drones in the Russian-Ukraine conflict. Empiricism, in the context of this study, refers to the reliance on observable data and evidence to inform research findings. The use of an empirical legal method in this article provides verifiable data on drones, and therefore unlocks insights unattainable through doctrinal legal research alone. While traditional legal studies usually gravitate towards theoretical analyses, the empirical legal approach adopted here offers a distinctive vantage point. In this study, the data collected offers comprehensive empirical data pertaining to the capabilities, features, and deployment of drones within the ongoing Russian-Ukraine conflict, marking one of the first uses of such data in this conflict.

A goal of using this data, is to develop an understanding of the burgeoning use of drones in the conflict while illustrating their potential for misuse, and thus how they can infringe IHL. Thus, the empirical data allows an assessment to be made on how drones may be used in violation of the rules of IHL.

To understand what was occurring in the conflict, a multitude of sources were used. Part of the process was to evaluate the credibility of the sources from which the data is obtained. To achieve this objective, the data collection process involved systematic review, extraction, and evaluation of information from various sources, including the manufacturers of these drones, official reports, news articles, expert analyses, and empirical studies. By incorporating data from dro-

34 RUSSELL, Stuart. AI Weapons: Russia's War in Ukraine Shows Why the World Must Enact a Ban. *Nature*, 2023, vol. 614, no. 7949, pp. 620–23.

ne manufacturers, the study aims to understand the capabilities, features, and technical specifications of the drones used in the conflict.³⁵

Following the comprehensive data collection and validation process, this study then analysed the information within the framework of IHL. The legal analysis involves assessing the data against key IHL principles, such as distinction and proportionality. This allows a determination to be made as to whether the deployment and capabilities of drones in the Russian-Ukraine conflict complies with these IHL principles.

The empirical study provides a factual foundation for analyzing the utilization of drones in the conflict. Furthermore, by incorporating data from drone manufacturers alongside other sources, the study validates and strengthens the information, ensuring the reliability and accuracy of the collected data. The involvement of drone manufacturers is crucial in enhancing the robustness of the investigation, as their data provides valuable insights into the design, capabilities, and technical specifications of the drones employed in the conflict.

35 The manufacturers of drones information that were consulted are: Industrial Drone ZALA 421-16E5. ZALA AERO GROUP, [online]. Available at: <<https://www.aeroexpo.online/prod/zala-aero/product-181291-63342.html>> Accessed: 17.3.2023; FLYEYE Mini UAS. WB GROUP, [online]. Available at: <<https://www.wbgroup.pl/en/produkt/flyeye-unmanned-aerial-system/>> Accessed: 17.3.2023; Kalashnikov Takhion (Tachyon). Military Factory, [online]. Available at: <https://www.militaryfactory.com/aircraft/detail.php?aircraft_id=2466> Accessed: 17.3.2023; Puma AE.[online]. Available at: <https://www.avinc.com/images/uploads/product_docs/PumaAE_Datasheet_2017_Web_v1.1.pdf> 17.3.2023; Vector, [online]. Available at: <<https://quantum-systems.com/vector/>>; “Zala KYB Strike Drone, Russia” Accessed: 17.3.2023; ArmyTechnology, [online]. Available at: <<https://www.army-technology.com/projects/zala-kyb-strike-drone-russia/>> Accessed: 17.3.2023; AeroVironment. [online]. Available at: <<https://www.avinc.com/cis/quantix-mapper>> Accessed: 17.3.2023; Orlan-10 Uncrewed Aerial Vehicle (UAV). Airforce Technology, [online]. Available at: <<https://www.airforce-technology.com/projects/orlan-10-unmanned-aerial-vehicle-uav/>> Accessed: 17.3.2023; Orion Technology Group, [online]. Available at: <<https://oriontechnologygroup.com/>> Accessed: 17.3.2023; Punisher. UA DYNAMICS Warfare Technologies, [online]. Available at: <<https://uadynamics.com>> Accessed: 17.3.2023; Forpost ISR. Military Factory, [online]. Available at: <https://www.militaryfactory.com/aircraft/detail.php?aircraft_id=1486> Accessed 17.3.2023; BAYKAR. [online]. Available at: <<https://www.baykartech.com/en/uav/bayraktar-mini-ih/>> Accessed:17.3.2023; BAYKAR Technology.[online]. Available at: <<https://baykartech.com/en/uav/bayraktar-tb2/>> Accessed: 18.3.2023; GRANAT-4.RU.GREY. MVRsimulation, [online]. Available at: <<https://www.mvrsimulation.com/model/granat-4rugrey>> Accessed: 18.3.2023; AERIAL TARGET E95M. Enics, [online]. Available at: <<https://enics.aero/en/products-2/aerial-target-e95m/>> Accessed: 18.3.2023; ELERON-3. enics, [online]. Available at: <<https://enics.aero/en/products-2/931-2/>> Accessed: 18.3.2023; Skydio X2 Built for Business. [online]. Available at: <<https://www.skydio.com/skydio-x2>> Accessed: 18.3.2023; A1-CM Furia. [online]. Available at: <<https://athlonavia.com/en/furia/>> Accessed: 18.3.2023; SWITCHBLADE 600 LOITERING MUNITION. AeroVironment, [online]. Available at: <<https://www.avinc.com/lms/switchblade>> Accessed: 18.3.2023; RAM II UAV. [online]. Available at: <<https://ramuav.com.>> Accessed: 18.3.2023.

The sources were selected because of their relevance to the research objective, and their credibility in providing accurate and reliable information. Key details such as drone types, country of origin, functions, and specific roles were systematically extracted and recorded. Additionally, statistics on the maximum speed, endurance, and altitude of the drones were documented. The reliability and credibility of sources are carefully evaluated, giving increased weight to manufacturer reports, official reports, and expert analyses from reputable institutions or individuals.

These are important indicators as far as determining in the second part of the article whether IHL norms have been violated. Thus, the empirical part of the article has a key connection to the second part which deals with the application of IHL. This is because knowing the capabilities makes it clear whether drones have been used, when they were used, and often by whom they were used. It is also important as whether a particular drone has an AI capability and therefore whether decisions have been made by an operator or by the machine. This is a critical issue for accountability reasons.

The information that has been collated on the drones from all the sources is then placed into two tables and six charts in the article. The tables illustrate the make, type, and function of each drone employed by both parties to the conflict. The charts highlight parameters such as maximum speed, endurance, and altitude capabilities. These charts and tables were constructed by consulting a comprehensive range of sources to gather, analyse, and interpret information, including academic articles, newspapers, drone manufacturers' reports, expert analyses, and military and defence organisations' publications. Citations are provided throughout the article to these sources. Due to the extensive number of references and the word limitation in the article, individual citations are not included in the charts and tables themselves, because of the difficulties of doing so there. The information that is placed in the tables and charts is from the materials referenced throughout the article. Thus, the tables and charts reflect a thorough analysis and interpretation of all the sources used. These tables and charts offer readers a clear and concise overview of the drones used in the conflict, enhancing their understanding of the situation and the advancements in drone technology.

As far as the specific sources are concerned, a range of news organizations reports were used, including, but not limited to, the BBC, Reuters, The New York Times, The Guardian, the Associated Press, Al Jazeera, CNN, Bloomberg, NPR, and The Wall Street Journal.³⁶ These sources were chosen based on their reputa-

³⁶ The news sources examined were: Warmate Drone of the Border Guards Destroyed a Group of Invaders. MILITARYNYI, [online]. Available at: <<https://mil.in.ua/en/news/warmate-drone-of-the-border-guards-destroyed-a-group-of-invaders/>> Accessed: 22.3.2023; ATWOOD, Kylie. Russia to Build Attack Drones for Ukraine War with the Help of Iran, Intelligence Assessment Says. CNN, [online]. Available at: <<https://www.cnn.com/2022/11/21/>

politics/russia-iran-drones-intel-assessment/index.html> Accessed: 18.4.2023; MOHAM-ED, Edna, Siddiqui, Usaid. Russia-Ukraine Updates: Drone Attack 'aimed at Civilian Sites. Al Jazeera, [online]. available at: <<https://www.aljazeera.com/news/liveblog/2023/5/30/russia-ukraine-live-news-moscow-hit-by-rare-drone-attack>> Accessed 5.6.2023; COTOVIA, Vaso, et al. Exclusive: Inside Ukraine's Secretive Drone Program. CNN, [online]. Available at: <<https://edition.cnn.com/2023/06/03/europe/ukraine-secretive-drone-program-russia-war-intl/index.html#:~:text=Under the scorching summer sun,drone maker Valeriy Borovyk says.>> Accessed: 20.6.2023; ADLER, Nils. Eyes and Ears: Could Drones Prove Decisive in the Ukraine War?. Al Jazeera, [online]. Available at:<<https://www.aljazeera.com/features/2023/4/13/eyes-and-ears-could-drones-prove-decisive-in-the-ukraine-war-2>> Accessed:20.5.2023; KIRBY, Paul. Russia Renews Drone and Missile Attacks on Ukraine. BBC News, [online]. Available at < <https://www.bbc.com/news/world-europe-65959145>> Accessed: 22.6.2023; BLANN, Susie. Ukraine Downs Russian Drones but Some Get through Due to Gaps in Air Protection. APNews, [online]. Available at:<<https://apnews.com/article/russia-ukraine-war-attack-kyiv-drones-26e3c4989ed0051baa25abe78e0e3aa6>> Accessed: 27.5.2023; MASON, Jeff, HOLLAND, Steve. Russia Received Hundreds of Iranian Drones to Attack Ukraine, US Says. Reuters, [online]. Available at: <[h https://www.reuters.com/world/europe/russia-has-received-hundreds-iranian-drones-attack-ukraine-white-house-2023-06-09/](https://www.reuters.com/world/europe/russia-has-received-hundreds-iranian-drones-attack-ukraine-white-house-2023-06-09/)> Accessed: 26.6.2023; LANDALE, Ames, LUKIV, Jaroslav Ukraine War: Kyiv Hit by New Massive Russian Drone Attack. BBC News, [online]. Available at: <<https://www.bbc.com/news/world-65736730>> Accessed:6.6.2023; TROFIMOV, Yaroslav. Russia Launches New Wave of Iranian-Made Drones Against Ukraine. The Wall Street Journal, [online]. Available at: <<https://www.wsj.com/articles/russia-launches-new-wave-of-iranian-made-drones-against-ukraine-ba637bd1>> Accessed: 27.3.2023; CARLIN, Maya. How the Turkish-Made TB2 Drone Gave Ukraine an Edge against Russia. Businessinsider, [online]. Available at: <<https://www.businessinsider.com/how-turkish-baykar-tb2-drone-gave-ukraine-edge-against-russia-2022-9>> Accessed:30.4.2023 ; All You Need to Know About Russian Drone Orlan-30. Defense News, [online]. Available at: <<https://sputniknews.in/20230213/all-you-need-to-know-about-russian-drone-orlan-30-823022.html>> Accessed: 17.6.2023; Ukraine Says It Shot down 36 Drones in Overnight Russian Attacks. Reuters, [online]. Available at: <<https://www.reuters.com/world/europe/ukraine-says-it-shot-down-36-drones-overnight-russian-attacks-2023-05-25/>>Accessed: 28.5.2023; MURPHY, Matt, Lukiv, Jaroslav. Ukraine War: Russia Launches 'biggest' Kamikaze Drone Attack. BBC News, [online]. Available at: <<https://www.bbc.com/news/world-europe-65524104>>Accessed: 18.5.2023; HETZNER, Christiaan. The Cheap, Slow, and Bulky Drones Taking down Russian Armored Tanks for Ukraine. Fortune, [online]. Available at: <<https://fortune.com/2022/03/04/bayraktar-tb2-drone-ukraine-russia-war/>> Accessed:12.1.2023; WITT, Stephen. The Turkish Drone That Changed the Nature of Warfare. The New Yorker, [online]. Available at: <<https://www.newyorker.com/magazine/2022/05/16/the-turkish-drone-that-changed-the-nature-of-warfare>> Accessed:17.1.2023; VINGRAD, Cassandra, KIM, Victoria. Russia Targets Kyiv and Lviv With Attack Drones. The New York Times, [online]. Available at: <<https://www.nytimes.com/2023/06/20/world/europe/russia-drones-kyiv-lviv-ukraine-war.html#:~:text=Russia%20unleashed%20dozens%20of%20attack,more%20territory%20in%20eastern%20Ukraine.>> Accessed: 25.6.2023; First People's UAV Complex. [online]. Available at: <<https://www.peoplesproject.com/en/bpla/>> Accessed: 17.2.2023; BEAUBIEN, Jason. In the Russia-Ukraine War, Drones Are One of the Most Powerful Weapons. NPR,[online]. Available at: <<https://www.npr.org/2022/07/30/1114024870/russia-ukraine-war-drones>> Accessed: 18.2.2023; Three Enemy UAVs, One Cruise Missile Shot Down by Ukraine's Air Defense Forces Previous Day. Defense Express, [online]. Availableat:<https://en.defenceua.com/events/three_enemy_uavs_one_cruise_missile_were_destroyed_by_

tion, adherence to journalistic standards, and track record of delivering accurate and objective reporting.

Additionally, official information from the Ukrainian Ministry of Defence's website was used as it provides official updates and information related to defence matters in Ukraine. Analysis was also obtained from organizations like GlobalSecurity,³⁷ as they offer analysis and insights on military and security-related topics.

To ensure the accuracy and consistency of the information gathered, the data collected from news articles, manufacturers' reports, official reports, expert analyses, and empirical studies were cross-referenced with each other, and verified against multiple other reliable sources. This intent was to ensure a comprehensive approach to minimize potential biases and increase the reliability of the findings.

The accuracy of the collected data was assessed by comparing it with information from other reliable sources. Inconsistencies or discrepancies were noted, and efforts were made to reconcile conflicting information through further research or consultation with experts in the field. Critical evaluation of the data was conducted to ensure its accuracy and reliability. The collected data was then

ukraines_air_defense_forces_previose_day-2624.html> Accessed: 18.1.2023; Ukraine Says It Successfully Deploys 1,000 Km Drone. Reuters, [online]. Available at: <<https://www.reuters.com/world/europe/ukraine-says-it-successfully-deploys-1000-km-drone-2023-06-20/>> Accessed: 23.6.2023; DETSCH, Jack, Drones Have Come of Age in Russia-Ukraine War. Foreign Policy, [online]. Available at: <<https://foreignpolicy.com/2022/04/27/drones-russia-ukraine-war-donbas/>> Accessed: 8.1.2023; KAHN, Lauren. How Ukraine Is Using Drones Against Russia. Council on Foreign Relations, [online]. Available at: <<https://www.cfr.org/in-brief/how-ukraine-using-drones-against-russia>> Accessed:14.1.2023; BARNES, Julian E, ISMAY, John. U.S. Adds 'Kamikaze Drones' as More Weapons Flow to Ukraine. The New York Times, [online]. Available at: <<https://www.nytimes.com/2022/03/16/us/politics/us-ukraine-weapons-drones.html>> Accessed: 24.2.2023; KADAM, Tanmay. Used By Elite Indian Commandos, Ukraine To Receive 850 Black Hornet Micro Drones To Penetrate Russian Defenses. The EurAsian, [online]. Available at: <<https://eurasianimes.com/commandos-ukraine-to-receive-850-black-hornet-micro-drones/>> Accessed: 19.02.2023; Roblin, Sebastien. Watch the First Confirmed Use of a Tank-Busting Switchblade-600 Drone In Ukraine. Popular Mechanics, [online]. Available at: <<https://www.popularmechanics.com/military/weapons/a43660797/first-confirmed-use-tank-busting-switchblade-600-drone-in-ukraine-video/>> Accessed: 25.5.2023; RAMZY, Austin. What Is Known about the Iranian-Made Drones That Russia Is Using to Attack Ukraine. The New York Times, [online]. Available at: <[https://www.nytimes.com/2022/10/17/world/europe/russia-ukraine-iran-drones.html#:~:text=It has a triangular wing,launched far from the front.](https://www.nytimes.com/2022/10/17/world/europe/russia-ukraine-iran-drones.html#:~:text=It%20has%20a%20triangular%20wing,launched%20far%20from%20the%20front.)> Accessed: 12.2.2023; FOGEL, Benjamin, MATHEWSON, Andro. Will The Drone War Come Home? Ukraine and The Weaponization of Commercial Drones. Modern War Institute, [online]. Available at: <<https://mwi.usma.edu/will-the-drone-war-come-home-ukraine-and-the-weaponization-of-commercial-drones/>>Accessed: 22.2.2023.

37 Ministry of Defence of Ukraine. [online]. Available at: <<https://www.mil.gov.ua/en/>> Accessed: 10.7.2023; Global Security. [online] Available at <<https://www.globalsecurity.org/>> Accessed: 10.7.2023.

analysed and interpreted to identify patterns, trends, and insights regarding the utilization of drones in the Russian-Ukraine conflict. The analysis considered the strengths and weaknesses of the data, and any limitations or uncertainties were acknowledged and appropriately addressed.

It is important to note that gathering information about the military and the weapons used by them can be challenging due to their secretive nature and for security reasons. This is even more so during a conflict. The study recognizes the difficulties in accessing such information and acknowledges that certain details may be undisclosed or confidential. The scarcity of reliable data on military operations adds to the complexity of conducting an empirical study in this context. Nonetheless, through the research and the cross-referencing of multiple sources, the study aims to overcome these challenges and provide an accurate representation of the utilization of drones in the conflict. Additionally, the capability and features of the drones were specifically examined based on their use in other conflicts, such as the Nagorno-Karabakh conflict, involving Bayraktar drones.³⁸

Ethical considerations were upheld throughout the study. Proper attribution was given to the original sources, and any potential conflicts of interest or vested interests of the sources were considered. The study ensured the responsible and ethical use of the collected data.

The study does however acknowledge several limitations and potential biases that should be considered when interpreting the findings. The study's reliance on existing data sources introduces inherent limitations. The availability and quality of data from official reports, news articles, expert analyses, and empirical studies may vary. Certain information, such as estimations or undisclosed confidential data, might be missing, potentially affecting the comprehensiveness of the collected data. Additionally, data gaps and inconsistencies between different sources may exist, necessitating cautious analysis and interpretation.

It is also important to note that despite efforts to select credible sources, bias may exist in the selected materials. This is because official reports and expert analyses might be influenced by political or national preferences, potentially affecting the objectivity of the information presented. News articles, although used from recognized and reputable sources, could still carry inherent biases due to editorial choices or external pressures. The study acknowledges the potential for such biases and aims to critically evaluate information from diverse sources.

The findings of this study are specific to the Russian-Ukraine conflict and may not be directly applicable to other conflicts or regions. The utilization of drones, the strategies employed, and the geopolitical context surrounding the Russian-Ukraine conflict may significantly differ from other conflicts. Therefore,

38 KINIK, Hülya, ÇELİK, Sinem. The Role of Turkish Drones in Azerbaijan's Increasing Military Effectiveness: An Assessment of the Second Nagorno-Karabakh War. *Insight Turkey*, 2021, vol. 23, no. 4, pp. 169–191.

caution must be exercised when generalizing the findings beyond this specific context.

Despite these limitations, comprehensive data on the utilization of drones in the Russian-Ukraine conflict was gathered, and the reliability of the sources was evaluated. The analysis and interpretation of the data within the provided text contributed to the overall validity and trustworthiness of the study's findings.

Critically, the empirical data in the first part of the article is useful for understanding the IHL implications of the use of drones in the second part. Thus, the study uses the empirical data to understand the IHL aspects in the Russian-Ukraine conflict. The results reveal multiple instances of potential misuse, particularly violating the principle of proportionality. Additionally, as is noted, the use of autonomous systems raises accountability challenges, making it difficult to assign responsibility for IHL violations within this conflict.

3 Classifying the Use of Drones in Conflicts

The classification of drones utilized in the war between Russia and Ukraine lacks a universally accepted standard. This is because different variables are employed to categorize them.³⁹ What can be seen is that defence agencies and civilians employ different approaches and understandings.⁴⁰ Through our analysis, we have identified two broad categories of drones involved in the recent conflict: military drones and commercial drones that are also used for military related activities. The military adhere to their own classification standards, whereas those in the commercial sector adopt a more fluid and dynamic approach to classifying drones.⁴¹ It is therefore important to acknowledge that the classification of drones in this conflict is complex due to the presence of drones of unknown types or with undisclosed functions. These instances further complicate the categorization process and highlight the dynamic nature of drone usage in this context.

Military drones are purposefully designed for military applications. These drones serve diverse functions, including intelligence, surveillance, and reconnaissance (ISR), targeting, strike missions, as well as search and rescue.⁴² They play a crucial role in gathering information, conducting surveillance ope-

39 KIM, Mansik, et al. Drone Classification by Available Control Distances. In PARK, James, PAN, Yi (eds). *Advances in Computer Science and Ubiquitous Computing: CSA-CUTE2016*. Singapore: Springer Nature, 2017, pp. 221–223.

40 Ibid.

41 MITKA, Eleftheria, MOUROUTSOS, Spiridon G. Classification of Drones. *American Journal of Engineering Research (AJER)*, 2017, vol. 6, no. 7, pp. 36–41.

42 AHMAD, Hijaz, FARHAN, Muhammad, FAROOQ, Umar. Computer Vision Techniques for Military Surveillance Drones. *Wasit Journal of Computer and Mathematics Science*, 2023, vol. 2, no. 2, pp. 56–63.

rations, and executing precise strikes on specific enemy positions.⁴³ They also aid in collecting reconnaissance data, facilitating search and rescue operations, and functioning as explosive devices.⁴⁴

Commercial drones primarily serve commercial purposes but have also found utility for military purposes in the conflict. While their primary design is for tasks such as photography, videography, search and rescue, surveillance, inspection, mapping, and aerial target acquisition, they have been repurposed for various applications in the conflict.⁴⁵ Commercial drones designed for surveillance, cargo transport, monitoring, anti-jamming and inflicting damage have also been used for these purposes in military context.⁴⁶

In addition to categorizing drones based on their purpose, they can also be classified according to their specific functions in the conflict. For instance, ISR drones are predominantly utilized for gathering intelligence, conducting surveillance operations, and collecting reconnaissance data.⁴⁷ Targeting and strike drones are specifically designed to identify and engage specific enemy positions, enabling precise strikes.⁴⁸ Loitering munitions drones are explosive devices capable of hovering in the air and engaging targets.⁴⁹ Search and rescue drones play a crucial role in locating and rescuing individuals in distress.⁵⁰ Reconnaissance drones are responsible for gathering information about enemy activities, terrain features, and infrastructure.⁵¹

What can be seen is that the development and deployment of drones have significantly influenced the war, introducing new dynamics into the conflict.⁵² The

-
- 43 ADNAN, Wardatul, Hayatand, KHAMIS, Mohd, Fadly. Drone Use in Military and Civilian Application: Risk to National Security. *Journal of Media and Information Warfare*, 2022, vol. 15, no. 1, pp. 60–70.
 - 44 ISLAM, S. M. Riazul. Drones on the Rise: Exploring the Current and Future Potential of UAVs. *ArXiv Preprint*, 2023, pp. 2304–13702.
 - 45 EDULAKANTI, Srinivas, Reddy, GANGULY, Sanjeev. Review Article: The Emerging Drone Technology and the Advancement of the Indian Drone Business Industry. *Journal of High Technology Management Research*, 2023, vol. 34, no. 2, pp. 100464.
 - 46 KAPUSTINA, Larisa, et al. The Global Drone Market: Main Development Trends. *SHS Web of Conferences*, 2021, vol.129, pp. 11004.
 - 47 LIU ,Yao, et al. Cooperative Routing Problem for Ground Vehicle and Unmanned Aerial Vehicle: The Application on Intelligence, Surveillance, and Reconnaissance Missions. *IEEE Access*, 2019, vol. 7, pp. 63504–18.
 - 48 RICHARDSON, Michael. How to Witness a Drone Strike. *Digital War*, 2022, vol. 3, no. 1–3, pp. 38–52.
 - 49 AMBODO, Tri, SAPUTRO, Guntur, Eko, KOMARIAH, Ulfia, Nurhasanah. Multi-Agent Drone as Loitering Munition System to Support Military Operations Carrying Out Policy Mandate. *International Journal of Arts and Social Science*, 2021, vol. 4, no. 5, pp. 2581–7922.
 - 50 Mayer, Sven, et al. Drones for Search and Rescue. In *first International Workshop on Human-Drone Interaction*, 2019, pp. 1–7.
 - 51 CHÁVEZ, Kerry. Learning on the Fly: Drones in the Russian-Ukrainian War. *Arms Control Today*, 2023, vol. 53, no. 1, pp. 6–11.
 - 52 KUNERTOVA, Dominika. The War in Ukraine Shows the Game-Changing Effect of

ability of the drones has introduced new capabilities and strategies, impacting military operations.⁵³ Overall, the utilization of drones has brought about significant changes in the war.⁵⁴ Drones have provided enhanced situational awareness, precision targeting, improved intelligence gathering, flexibility in operations, reduced risk to human forces, and psychological impacts on the opposing forces.⁵⁵ They have become indispensable in intelligence gathering, surveillance, targeting, and reconnaissance.⁵⁶ The diverse functions and capabilities of drones have altered the balance of power on the battlefield.⁵⁷ It is however the deployment of armed drones in densely populated areas that has led to significant civilian casualties.⁵⁸

The complex task of identifying targets, coupled with the potential for technological malfunction, human error, and unethical decision-making, further compounds the risks involved. In general, violations of the principles of distinction and proportionality can have severe humanitarian consequences, undermining the protection of civilian lives and infrastructure.⁵⁹ Addressing these violations and ensuring compliance with IHL requires robust mechanisms of accountability, transparency, and adherence to international legal frameworks. State actors involved in the conflict therefore need to conduct thorough assessments of their drone operations to ensure strict adherence to the principles of distinction and proportionality. It is crucial to prioritize not only the enhancement of training and technology but also the promotion of ethical considerations in the deployment of drone systems. This multi-faceted approach is essential to safeguarding civilian populations and minimizing the risks of harm.

The comprehensive evaluation of the drones used in the conflict, as well as their compliance with IHL principles, is crucial for understanding the humanitarian implications and guiding future policy and legal frameworks. By examining

Drones Depends on the Game. Bulletin of the Atomic Scientists, 2023, vol. 79, no. 2, pp. 95–102.

- 53 CHAARI, Mohamed Zied, AL-MAADEED, Somaya. The Game of Drones/Weapons Makers' War on Drones. In KOUBA, Anis, AZAR, Ahmad, Taher (eds). Unmanned Aerial Systems. London: Academic Press, 2021, pp. 465–93.
- 54 ROCHOWICZ, Robert. Drones in War of Ukraine With Russia. Problemy Techniki Uzbrojenia, 2022, vol. 160, no. 2 pp. 97–117.
- 55 DEL MONTE, Louis A. Genius Weapons : Artificial Intelligence, Autonomous Weaponry, and the Future of Warfare. New York: Prometheus Books, pp. 200–210.
- 56 KONERT, Anna, BALCERZAK, Tomasz. Military Autonomous Drones (UAVs) – From Fantasy to Reality. Legal and Ethical Implications. Transportation Research Procedia, 2022, vol. 59, pp. 292–99.
- 57 DALSJÖ, Robert, JONSSON, Michael, NORBERG, Johan. A Brutal Examination: Russian Military Capability in Light of the Ukraine War. Survival, 2022, vol. 64. No. 3, pp.7–28.
- 58 ALSHAMY, Yahya, et al. Polycentric Defense, Ukraine Style: Explaining Ukrainian Resilience Against Invasion. Journal of Public Finance and Public Choice, 2023, pp. 1–39.
- 59 FARHAT, Salem, Aessa, NURDIN, Rohaida, BASIR , Salawati, Mat. Attacks Against Civilian Objects: An Analysis Under International Humanitarian Law. Hasanuddin Law Review, 2022, vol. 8, no. 1, pp. 60–78.

the extent to which drones employed in the conflict uphold the principles of distinction and proportionality, light can be shone on the challenges and potential violations associated with drone warfare, paving the way for better regulation, accountability, and the protection of civilian lives in future conflict.⁶⁰

What needs to be realized is that using armed drones is a central issue of global security and human rights agendas. Drones are becoming more speedy, smaller, more lethal, stealthier, and easier to operate. This means that they can be in the hands of actors that do not respect the principles of warfare.⁶¹ Thus, more needs to be done to understand their usage and regulate them better.

4 Understanding Drone Warfare in the Russian-Ukraine War

Drones are radio-controlled aircraft capable of flying in any direction and at any altitude.⁶² They are remotely operated and can be launched from the ground, from ships, or even from other aircraft. After accomplishing their missions, some drones can be retrieved and returned to their original launch location or any other site.⁶³ Some drones can be detonated at their target location.⁶⁴ While defensive systems are typically engineered to detect and intercept aircraft and ballistic missiles,⁶⁵ it is the proficiency of certain drones to evade detection by conventional air defence mechanisms that has facilitated their success in battle.⁶⁶ They make the long-distance deployment of targeted lethal force across national borders much easier than before.⁶⁷ Indeed, these remotely controlled aircraft allow states to use them to keep their troops out of harm's way, while gathering information and directing force with great precision against those they target.⁶⁸

60 On the lack of protection see SARKIN, Jeremy, Julian. *The Conflict in Syria and the Failure of International Law to Protect People Globally: Mass Atrocities, Enforced Disappearances and Arbitrary Detentions*. Oxon: Routledge, 2021, pp.70–75.

61 CHÁVEZ, Kerry. *Learning on the Fly: Drones in the Russian-Ukrainian War*. *Arms control today*, 2023, vol. 53, no. 1, pp. 6–11.

62 KEENAN, Patrick J. *Drones and Civilians : Emerging Evidence of the Terrorizing Effects of the U.S Drone Programs*. *Santa Clara Journal of International Law*, 2021, vol. 20, no. 1, pp.3–42.

63 SADRAEY, Mohammad H. *Design of Unmanned Aerial Systems*. Hoboken: John Wiley & Sons, 2020, pp. 256–257.

64 PONG, Beryl. *The Art of Drone Warfare*. *Journal of War and Culture Studies*, 2022, vol. 15, no. 4, pp. 377–387.

65 AL-DOSARI, Khalifa, HUNAITI, Ziad, BALACHANDRAN, Wamadeva. *A Review of Civilian Drones Systems, Applications, Benefits, Safety, and Security Challenges*. In *The Effect of Information Technology on Business and Marketing Intelligence Systems*. Cham: Springer Nature, 2023, pp. 793–812.

66 MARSHALL, Douglas M, TRAPNELL, Benjamin. *History*. In MARSHAL, Douglas M, BARNHART, Richard K, SHAPPEE, Eric J (eds). *Introduction to Unmanned Aircraft Systems*. Oxon: CRC Press, 2021, pp.20–25

67 CHAARI, Mohamed Zied, AL-MAADEED, Somaya. *The Game of Drones/Weapons Makers' War on Drones*. In KOUBA, Anis, AZAR, Ahmad, Taher (eds). *Unmanned Aerial Systems*. London: Academic Press, 2021, pp. 465–93.

68 JURAYEBICH, Ganjiyev, Shuxratjon, RUZIMURODOVICH, Usmonov, Shaxobidding,

In the preceding half-decade, drones have served as indispensable assets in a quintet of recent and significant conflicts, namely in Syria, Libya, Nagorno-Karabakh, Yemen, and Ukraine.⁶⁹ These armaments were initially employed as tools for surveillance and observation in military operations.⁷⁰ However, their utility has expanded over time to include carrying missiles and conducting attacks.⁷¹ It is possible that soon drones will become more sophisticated by joining up with other new technologies, such as autonomous weapons systems.⁷²

The employment of drones in the conflict between Russia and Ukraine surpasses their utilization in any military engagement to date.⁷³ Significantly, while the war in Ukraine is bringing future trends for drone use into view, these systems do not have a decisive war-winning capability.⁷⁴ Yet they play a game-changing role in the conflict, from becoming eyes in the sky to launching fire.⁷⁵ Due to the lack of a substantial military arsenal in the initial stages of the conflict, Ukraine relied on a range of drones, from those locally manufactured to those manufactured by Turkey,⁷⁶ the United States, and China.⁷⁷ While Ukraine has relied on drones for defensive and other purposes, including against tanks, Russia has used them mainly for offensive reasons, including targeting to offset its general deficiencies in this area.⁷⁸

XOLDAROVICH, Karimov, Azamat. *Use of Artillery in Modern War (A Brief Analysis of the Ukrainian Conflict)*. *Galaxy International Interdisciplinary Research Journal*, 2023, vol. 11, no. 3, pp. 88–100.

- 69 AL-GARNI, Ahmed, Daifullah. *Drones in the Ukrainian War: Will They Be an Effective Weapon in Future Wars?*. *International Institute for Iranian Studies*, 2022, pp. 18.
- 70 ABRO, Ghulam, E.Mustafa, et al. *Comprehensive Review of UAV Detection, Security, and Communication Advancements to Prevent Threats*. *Drones*, 2022, vol. 6, no. 10, pp. 284.
- 71 BOYLE, Michael J. *The Drone Age: How Drone Technology Will Change War and Peace*. Oxford: Oxford University Press, 2020, pp 96–99.
- 72 RUSCHI, Filippo. *The Rise of Drones and the Transformation of Warfare: A View from Philosophy of International Law*. *Revista de Estudos Constitucionais, Hermeneutica e Teoria Do Direito*, 2020, vol. 12, no.1, pp. 147–56.
- 73 ALSHAMY, Yahya, et al. *Polycentric Defense, Ukraine Style: Explaining Ukrainian Resilience Against Invasion*. *Journal of Public Finance and Public Choice*, 2023, pp.1–39
- 74 KALLBERG, Jan. *Drones Will Not Liberate Ukraine – but Tanks Will*. CEPA, 2022.
- 75 KUNERTOVA, Dominika. *The Ukraine Drone Effect on European Militaries*. *Policy Perspectives*, 2022, vol. 10, no.15, pp. 15.
- 76 ALL, Muhamed. *The Role of Turkiye in the Black Sea and the Russo-Ukrainian War: A Short Overview*. *Journal of Liberty and International Affairs*, 2022, vol. 8, no. 3, pp. 356–67.
- 77 KERSTEN, Mark. *A War Crime Coalition : Russia ' s Iranian and Chinese Drones Target Ukrainian Civilians*. [online]. Available at: < <https://justiceinconflict.org/2023/02/22/a-war-crime-coalition-russias-iranian-and-chinese-drones-target-ukrainian-civilians/> > Accessed : 29.2.2023
- 78 JURAYEBICH, Ganjiyev, Shuxratjon, RUZIMURODOVICH, Usmonov, Shaxobidding, XOLDAROVICH, Karimov, Azamat. *Use of Artillery in Modern War (A Brief Analysis of the Ukrainian Conflict)*. *Galaxy International Interdisciplinary Research Journal*, 2023, vol. 11, no. 3, pp. 88–100.

As far as the future use of drone use in the war is concerned, according to military analysts and combatants, the longer this war lasts, the more likely it is that drones will be used to identify, select, and attack targets without human intervention.⁷⁹ Ukraine already has semi-autonomous attack drones and counter-drone weapons endowed with AI.⁸⁰ Russia claims to possess an AI weaponry system, although these claims are unverified.⁸¹ It is however only a matter of time before Russia, Ukraine, or both deploy complicated AI weaponry systems in the war.⁸² The implications of this are discussed in this section later.

What is noticeable however, currently, is that some of the drones have been used in violation of the rules of war.⁸³ Russia has employed Iranian-made Kamikaze drones to attack civilian areas and has targeted Ukraine's critical energy infrastructure all over the country. Consequently, millions of Ukrainians have been left without access to electricity, water, heating, and other vital services.⁸⁴ According to the United Nations, during October and November of 2022, 92 drone attacks were carried out on Ukrainian energy infrastructure, 77 civilians killed, and severe injuries caused to 272 non-combatants.⁸⁵ This is despite empirical evidence, such as a study conducted by Avery Plaw, that supports the contention that drone strikes are better at distinguishing between civilian and military targets, resulting in lower civilian casualties than other forms of warfare.⁸⁶ However, while drones provide operators with better situational awareness, the decision to

-
- 79 VERESS, Csongor, Balázs. The Limits of Protection of Human Rights in Warfare Led by AI. *Acta Universitatis Sapientiae Legal Studies*, 2022, vol. 11, no. 2, pp. 81–97.
- 80 CERNAT, Romică. Lethal Autonomous Weapon Systems-Emerging and Potentially Disruptive Technology. *Romanian Military Thinking*, 2022, no. 4, pp. 156–175.
- 81 BAJAK, Frank, ARHIROVA, Hanna. Drone Advances in Ukraine Could Bring Dawn of Killer Robots. *APNews*, [online]. Available at: < <https://apnews.com/article/russia-ukraine-war-drone-advances-6591dc69a4bf2081dcdd265e1c986203> > Accessed: 8.2. 2023.
- 82 BOSWINKEL, Lotje, VAN HOOFT, Paul. No one without the other: Realigning Deterrence and Arms Control in a European Quest for Strategic Stability. [online]. Available at: < <https://hcss.nl/report/not-one-without-the-other-deterrence-and-arms-control/> > Accessed 20.2.2023.
- 83 RUSSELL, Stuart. AI Weapons: Russia's War in Ukraine Shows Why the World Must Enact a Ban. *Nature*, 2023, vol. 614, no. 7949, pp. 620–23; US Warns of 'War Crimes' after Russian Drone Attack on Ukraine. *Al Jazeera*, [online]. Available at: <<https://www.aljazeera.com/news/2022/10/18/us-warns-of-war-crimes-after-russian-drone-attack-on-ukraine>> Accessed 17.2.2023; KUNERTOVA, Dominika. Drones Have Boots: Learning from Russia's War in Ukraine. *Contemporary Security Policy*, 2023, pp. 1–16.
- 84 KNIPP, Kersten. Russia's 'Iranian Drones' Tear at Ukrainian Infrastructure. *Deutsche Welle*, [online]. Available at: < <https://www.dw.com/en/russias-iranian-drones-tear-at-ukrainian-infrastructure/a-63564040> > Accessed: 16.5.2023.
- 85 Missile Strikes on Ukraine and Alleged POW Executions Underscore Why International Law Must Be Respected – UN Human Rights Chief. *United Nations*, [online]. Available at: <<https://www.ohchr.org/en/press-releases/2022/11/missile-strikes-ukraine-and-alleged-pow-executions-underscore-why>> Accessed: 23.03.2023.
- 86 SCHMIDT, Dennis R, TRENTA, Luca. Changes in the Law of Self-Defence? Drones, Imminence, and International Norm Dynamics. *Journal on the Use of Force and International Law*, 2018, vol. 5, no. 2, pp. 201–45.

launch an attack still requires ethical judgment and does not guarantee the legitimacy of such decisions.⁸⁷ Indeed, the fact that operators can better differentiate amongst different potential targets does not mean that the decision to attack will be moral or justified.⁸⁸ Despite the use of these technologies in the recent war, the number of casualties among both civilians and combatants is considerably high, revealing that not only are combatants being targeted by these systems, but also, in some cases, civilians and civilian infrastructure, causing harm in violation of IHL principles.⁸⁹

As with other weapons, drones are not illegal weapons per se, and there are currently no regulations specifically banning or regulating their use.⁹⁰ Additionally, the autonomous lethal targeting is considered lawful if it adheres to the principles of distinction and proportionality.⁹¹ However, their unique characteristics such as the absence of a human pilot onboard, set them apart from traditional warfare tools, necessitating special care in their use. It also necessitates a focus on how they are precisely regulated.⁹² This is because no one is present when an attack occurs, and at times no decision is taken by human. It may be even difficult to determine which state launched the specific attack in question, particularly if many states use the same technology. These issues might make accountability impossible, or near impossible. Critically, as drones are unmanned systems, their AI systems allows these drones, at times, and dependent on their capabilities, to make decisions entirely independently of their operators.⁹³ This might mean that the drones may go after targets which are in violation of the rules of IHL. If the target is acquired by AI, it would not be the fault of the person operating it. Further, who would know whether the decision on a particular target was because of the software or because the operator decided to acquire it. These issues seem to underscore the need for a deeper examination of the impact of these weapons on IHL. In fact, a key question is whether IHL must be reformed to allow this technology's capabilities to be dealt with? This is an imperative issue, as in recent con-

87 KONERT, Anna, BALCERZAK, Tomasz. Military Autonomous Drones (UAVs) – From Fantasy to Reality. Legal and Ethical Implications. *Transportation Research Procedia*, 2023, vol. 59, pp. 292–299.

88 MELANCON, Andree-anne. What 's Wrong with Drones ? Automatization and Target Selection. *Small Wars & Insurgencies*, 2020, vol. 31, no. 4, pp. 801–21.

89 KEENAN, Patrick J. Drones and Civilians: Emerging Evidence of the Terrorizing Effects of the U.S Drone Programs. *Santa Clara Journal of International Law*, 2021, vol. 20, no. 1, pp. 3–42.

90 METE, Muhammet, Derviş. New Weapons and Old Law: Can International Humanitarian Law Treaties Deal Adequately with Modern Technologies?. *Uluslararası Hukuk ve Sosyal Bilim Araştırmaları Dergisi*, 2022, vol. 4, no. 1, pp. 1–11.

91 MICKEVIČIŪTĖ, Neringa. Lessons from the Past for Weapons of the Future. *International Comparative Jurisprudence*, 2017, vol. 2, no. 2, pp. 99–106.

92 VOGEL, Ryan J. Drone Warfare and the Law of Armed Conflict. *Denver Journal of International Law & Policy*, 2020, vol. 39, no. 1, pp.101–138.

93 TAHIR, Muhammad, Amir, MIR, Imran, ISLAM, Tauqeer UI. Control Algorithms, Kalman Estimation and Near Actual Simulation for UAVs: State of Art Perspective. *Drones*, 2023, vol. 7, no. 6, pp. 339

flicts the role of drones has surged, making it essential to consider their capabilities and their potential implications for future warfare. As drone warfare becomes even more prevalent, it is thus crucial to assess how these autonomous systems may reshape the nature of warfare itself by introducing new challenges and violations of IHL that demand scrutiny and regulation.

5 Understanding the Types and Functions of the Drones Being Used in the Conflict

To acquire insights into the utilization of drones in the Russian-Ukraine conflict, a detailed examination of drone types and functions is necessary. Thus, the initial pair of tables elucidate the drones deployed by Ukraine against Russia. These delineate the respective country of origin, drone classification, and the specific roles or functions assumed by each drone during the conflict. Notably, this war has witnessed not only the substantial deployment of military drones, but also the utilization of commercial drones primarily for surveillance and reconnaissance purposes. The second table analyzes identical information but focuses on the drones deployed by Russia against Ukraine. Then the six charts provide a comprehensive overview of the drones deployed by Russia and Ukraine in the conflict. They focus on their maximum speed, endurance, and altitude. Each chart presents information about the respective drones, offering valuable insights to compare and contrast the capabilities of these drones, providing a comprehensive understanding of their technological advancements and complexities within the context of the first large-scale drone war.

It is important to note that not all the data is precise, as some of the statistics seem to have been estimated by the respective militaries or by the drone manufacturers,⁹⁴ the most precise and accurate information may not have been disclosed.⁹⁵ This is because such information is often considered confidential by states⁹⁶ since it is crucial for the success of a conflict. Confidentiality prevents other countries from gaining complete and precise knowledge of a state's military power.⁹⁷ Despite these limitations, our analysis offers a comprehensive overview of the features and capabilities of the drones utilized in this conflict. However, the function of these drones may change over time depending on the situation and weather conditions, which can result in variations in the data in different conflict scenarios.

94 TAHIR, Muhammad, Amir, MIR, Imran, ISLAM, Tauqeer UI. Control Algorithms, Kalman Estimation and Near Actual Simulation for UAVs: State of Art Perspective. Drones, 2023, vol. 7, no. 6, pp. 339.

95 It is important to note that some of the data regarding maximum speed, endurance, and altitude for the drones used by both Ukraine and Russia is missing. This is because not all the information was available.

96 CARNEGIE, Allison, CARSON, Austin. Secrets in Global Governance: Disclosure Dilemmas and the Challenge of International Cooperation. Cambridge: Cambridge University Press, 2020.

97 KNUCKEY, Sarah. Autonomous Weapons Systems and Transparency: Towards an International Dialogue. Autonomous Weapons Systems: Law, Ethics, Policy, 2016, pp. 164–84.

Table 1 illustrates a selection of drones used by Ukraine in the war against Russia. It includes information on the drone’s name, country of origin, type (military or commercial), and its associated functions. Some data for some of the drones may be missing because it remains undisclosed.

Table 1 Drones used by Ukraine

Drone	Made in	Type	Function
Bayraktar (TB2)	Turkey	Military	ISR, Targeting, Strike missions
Phoenix Ghost	USA	Military	Loitering munitions, Surveillance
WB Group Warmate	Poland	Military	ISR, Loitering
RAM II	Ukraine	Military	Loitering
Spectator-M1	Ukraine	Military	Reconnaissance, Search, Rescue
UJ-22 Airborne	Ukraine	Military	Intelligence, Search, Rescue
Punisher	Ukraine	Military	Strike military targets
Leleka-100 (stork)	Ukraine	Military & Commercial	Reconnaissance, Surveillance, Target acquisition
Athlon Avia A1-CM Furia	Ukraine	Military	Reconnaissance, Surveillance
R18	Ukraine	Military	Surveillance, Search, Delivery of cargo, Inflicting damage
Autel Evo II	China	Commercial	Photography, Videography, Inspection, Mapping
DJI Mavic Series	China	Commercial	Photography, Videography, Search, Rescue
Golden Eagle	USA	Commercial	Surveillance
Skydio X2	USA	Commercial	Search, Inspection, Rescue Mapping
PD-1 (People’s Drone)	Ukraine	Military	Reconnaissance, Monitoring, Anti-jamming
WB FlyEye	Poland	Military	Unknown
Quantum System Vector	Germany	Commercial	ISR
RQ-20 Puma	USA	Military	ISR
Tupolev Tu-143 Reis	Former Soviet Union	Military	Reconnaissance, Surveillance

AeroVironment Quantix			Inspection
Mini-Bayraktar	Turkey	Military	Reconnaissance, Surveillance
Switchblade 300	USA	Military	Reconnaissance, surveillance, Target acquisition, Loitering
Switchblade 600	USA	Military	Loitering munition

Table 2 provides information on a selection of drones used by Russia in the war against Ukraine. It includes the drone's name, country of origin, type (military or commercial), and its associated functions. Some of the data may be missing because it has not been disclosed.

Table 2 Drones used by Russia

Drone	Made in	Type	Function
Zala KYB	Russia	Military	ISR, Kamikaze
Shahed136 (Geran-2)	Iran	Military	Kamikaze
Mohajer 6	Iran	Military	ISR, Air to ground strike
Orlan-10	Russia	Military	ISR, Jamming
Orion	Russia	Military	ISR, TA, Battle damage assessment
KBLA-IVT	Russia	Military	Aerial target, Reconnaissance
Forpost	Russia	Military	ISR
Zala 421	Russia	Military	ISR
Granat-4	Russia	Military	ISR
Orlan-30	Russia	Military	Reconnaissance, Surveillance
E95 (E95M)	Russia	Military	Aerial target, Reconnaissance
Zastava	Russia & Israel	Military	Reconnaissance
Tachyon	Russia	Military	Reconnaissance
Eleron-3	Russia	Commercial	Reconnaissance

Figure 1 represents the maximum speeds (in miles per hour) of drones utilized by Ukraine against Russia. It is important to note that some drones do not have corresponding bars as the information regarding their maximum speeds was not available.

Figure 1 Drones used by Ukraine (top speed mph)

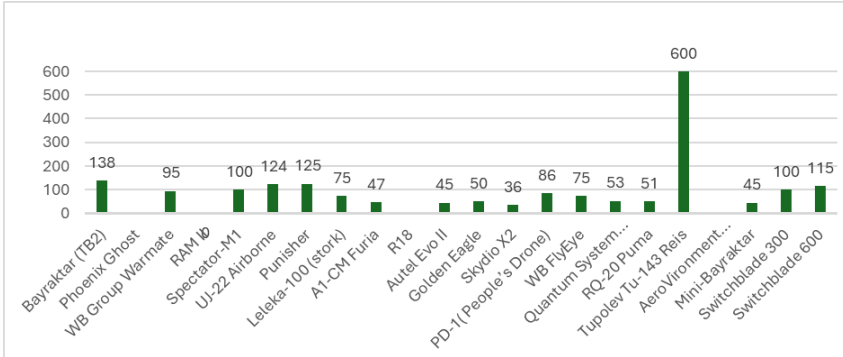


Figure 2 represents the maximum speeds (in miles per hour) of drones utilized by Russia against Ukraine. Not all drones are covered as the information regarding their maximum speeds was not available.

Figure 2 Drones used by Russia (top speed mph)

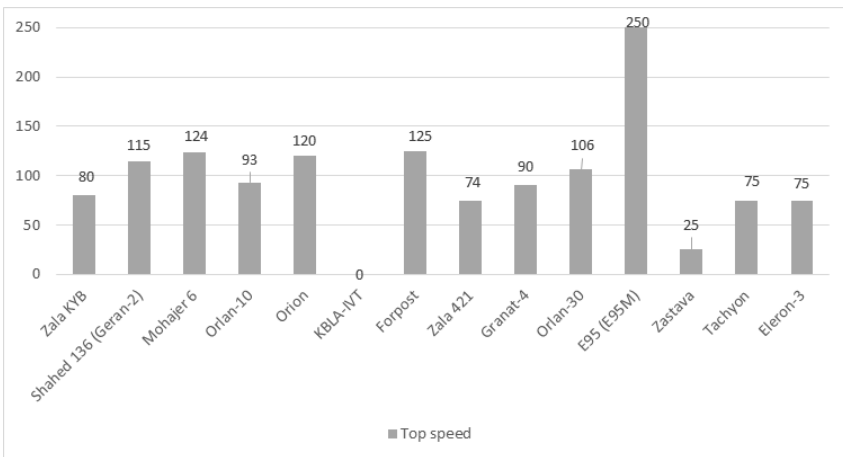


Figure 3 represents the maximum endurance of the drones employed by Ukraine in the conflict against Russia, measured in minutes. Each bar corresponds to the uninterrupted flight time achieved by a specific drone model.

Figure 3 Drones used by Ukraine (endurance mins)

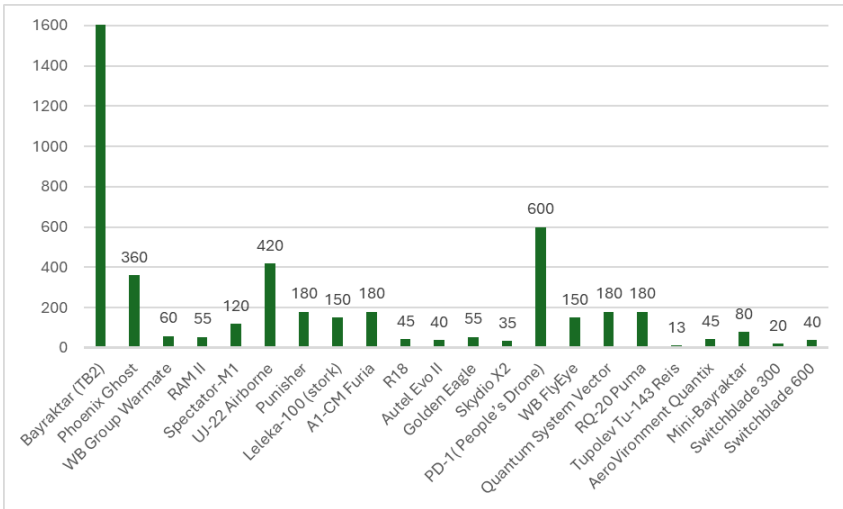


Figure 4 represents the maximum endurance of the drones employed by Russia in the conflict against Ukraine, measured in minutes. Each bar corresponds to the uninterrupted flight time achieved by a specific drone model.

Figure 4 Drones used by Russia (endurance mins)

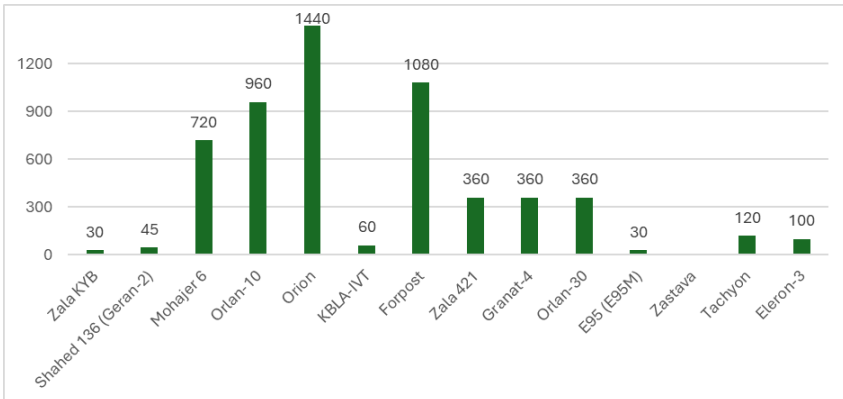


Figure 5 represents the maximum altitude achieved by the drones employed by Ukraine in the conflict against Russia, measured in feet. Each bar corresponds to the highest altitude reached by a specific drone model during its operational flights. Some data points are missing from the chart due to their unavailability.

Figure 5 Drones used by Ukraine (altitude ft)

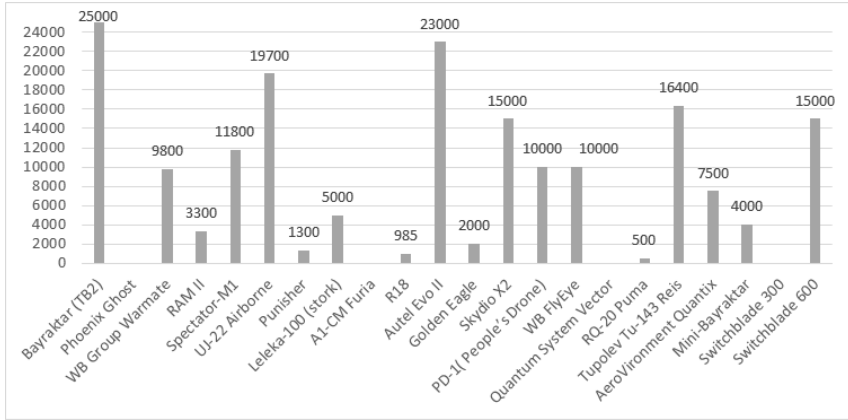
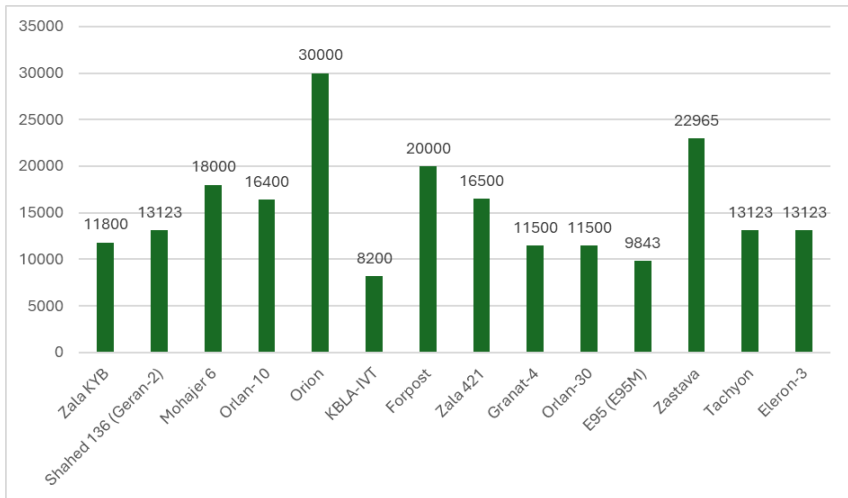


Figure 6 represents the maximum altitude achieved by the drones employed by Russia in the conflict against Ukraine, measured in feet. Each bar corresponds to the highest altitude reached by a specific drone model during its operational flights.

Figure 6 Drones used by Russia (altitude ft)



As far as military support to Ukraine is concerned, to date at least 32 countries have provided military assistance through weapons, equipment, or financial

aid.⁹⁸ Among these nations are 22 members of NATO, the largest military alliance in the world.⁹⁹ While some countries have provided non-lethal assistance to Ukraine, others have covertly provided equipment to Ukraine.¹⁰⁰ The military aid provided to Ukraine includes helicopters, drones, artillery, small arms, armored vehicles, ammunition, anti-tank weapons, anti-aircraft weapons, and body armor helmets.¹⁰¹ Recent data indicates that the United States, the European Union, and the United Kingdom have provided the most aid to Ukraine so far.¹⁰²

Concerning the provision of assistance to Russia is concerned, Belarus, North Korea, China, and Iran have supported Russia in the conflict.¹⁰³ While there is no official evidence that China has directly supplied weapons to Russia, there are concerns that it has provided indirect or covert support.¹⁰⁴ With respect to Iran, while it has had conflicts with Russia on various political issues before, it has become Russia's ally due to its shared anti-US and anti-West ideologies.¹⁰⁵ Iran has provided Russia with drones, which have been used to launch indiscriminate attacks on Ukrainian civilians and civil infrastructure.¹⁰⁶

The use of Iranian drones by Russia is however complicated by UN Security Council resolution 2231 (2015) which placed sanctions on Iran over its nuclear

98 List of the countries that have provided military aid to Ukraine: Australia, Austria, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Italy, Japan, Latvia, Lithuania, Luxembourg, Netherlands, New Zealand, Norway, Poland, Portugal, South Korea, Romania, Slovakia, Slovenia, Spain, Sweden, Turkey, the United Kingdom and the United States.

99 HADDAD, Mohammed. Where Does Your Country Stand on the Russia-Ukraine War?. Al Jazeera, [online]. Available at: <<https://www.aljazeera.com/news/2023/2/16/mapping-where-every-country-stands-on-the-russia-ukraine-war>> Accessed: 13.4.2023.

100 GROSSI, Giuseppe, VAKULENKO, Veronika. New Development: Accounting for Human-Made Disasters—Comparative Analysis of the Support to Ukraine in Times of War. Public Money and Management, 2022, vol. 42, no. 6, pp. 467–71.

101 DUGGAL, Hanna, ALI, Marium. What Weapons Has Ukraine Received from the US and Allies?. Al Jazeera, [online]. Available at: <<https://www.aljazeera.com/news/2022/6/15/infographic-what-weapons-has-ukraine-received-from-the-us-and-al->> Accessed: 5.4.2023.

102 WOLF, Christopher. Countries That Have Sent the Most Aid to Ukraine. US News & World Report, [online]. Available at: < <https://www.usnews.com/news/best-countries/articles/2023-02-24/these-countries-have-sent-the-most-aid-to-ukraine>> Accessed: 17.2.2023.

103 RUEHL, John .The Countries Openly or Quietly Helping Russia's War against Ukraine. Mail & Guardian, [online]. Available at:< <https://mg.co.za/thoughtleader/opinion/2022-09-13-the-countries-openly-or-quietly-helping-russias-war-against-ukraine/>> Accessed: 26.2.2023 .

104 CARLSON, Brain G. Russia's War in Ukraine : China's Calculus. CSS Analyses in Security Policy, 2022 no. 303, pp.1–4.

105 PHILLIPS, James, BROOKES, Peter. Undermining Joint Russian–Iranian Efforts to Threaten U.S. Interests. Institute for National Security and Foreign Policy, 2023, no. 5312,pp.1–8.

106 THERME, Clément. Iran's 'Neither East nor West' Slogan Today. International Institute for Strategic Studies (IISS), 2019, vol. 8, no. 5, pp 1–3.

programme.¹⁰⁷ In terms of this mandatory resolution all transfers of weapons need Security Council approval. The UN Secretary General has been under pressure to investigate the transfer of such weapons including drones.¹⁰⁸ Ukrainian President Zelensky has accused Iran of being complicit in war crimes by supplying these drones.¹⁰⁹

6 The International Humanitarian Law Principles that Apply to Drones

During armed conflict, there are many rules of international humanitarian law that need to be abided by. For example, while there are some weapons that cannot be used at all, States must also ensure that lawful weapons are not used unlawfully and need to consider the impact on civilian populations.¹¹⁰ In this regard, one primary imperative of warring parties is to mitigate the adverse effects of war, particularly on non-combatant populations.¹¹¹ As such, IHL demands that belligerent factions must take all reasonable precautions when conducting warfare. This would also apply in drone attacks to minimize harm to civilians, even if such attacks are deemed lawful in terms of the law of armed conflict.¹¹²

At present, the most crucial aspect of utilizing drones in armed conflict is ensuring adherence to the three fundamental principles of IHL, namely the principles of distinction, proportionality, and military necessity.¹¹³ In the subsequent sections of this article, an analysis will be conducted to ascertain the extent to which the principles of distinction and proportionality were upheld during recent conflicts involving the employment of drones in the context of the Russia-Ukraine conflict.

107 Resolution 2231 (2015) on Iran Nuclear Issue. United Nation Security Council, [online]. Available at: < https://www.un.org/securitycouncil/content/2231/background?utm_source=PassBlue+List&utm_campaign=3807b167e4-RSS_PassBlue&utm_medium=email&utm_term=0_4795f55662-3807b167e4-55079513 > Accessed: 17.3.2023

108 Implementation of Security Council resolution 2231 (2015), United Nation Secretary-General, Available at: <<https://documents-dds-ny.un.org/doc/UNDOC/GEN/N23/160/36/PDF/N2316036.pdf?OpenElement>> Accessed :17.3.2023

109 The first Ukrainian F-16 will be one of the strongest signals from the world that Russia will only lose – address by the president of Ukraine. President of Ukraine Official Website, [online]. Available at: < <https://www.president.gov.ua/en/news/pershij-zhe-ukrayinskij-f-16-stane-odnim-iz-najsilnishih-sig-83129> > Accessed: 29.5.2023.

110 EKELHOF, Merel. Moving Beyond Semantics on Autonomous Weapons: Meaningful Human Control in Operation. *Global Policy*, 2019, vol. 10, no. 3, pp. 343–48.

111 KATHMAN, Jacob, BENSON, Michelle. Cut Short? United Nations Peacekeeping and Civil War Duration to Negotiated Settlements. *Journal of Conflict Resolution*, 2019, vol. 63, no. 7, pp. 1601–29.

112 Geneva Convention Relative to the Treatment of Prisoners of War. 1949; Hague Convention (II) with Respect to the Laws and Customs of War on Land. 1899. See WINALDI, Yuanda, SETIYONO, Joko. Russian Conflict on Ukraine Based on Humanitarian Law Perspective. *Law Reform*, 2022, vol. 18, no. 2, pp. 252–63.

113 ZAJĄC, Maciek. AWS Compliance with the Ethical Principle of Proportionality: Three Possible Solutions. *Ethics and Information Technology*, 2023, vol. 25, no. 1, pp. 1–13.

7 Principle of Distinction

The principle of distinction stands at the core of IHL.¹¹⁴ It mandates that parties involved in armed conflicts must accurately differentiate between combatants and civilians and between military targets and civilian objects.¹¹⁵ While it is acceptable for belligerent parties to target combatants and military objectives lawfully, targeting civilians and civilian objects is strictly prohibited.¹¹⁶ Indiscriminate attacks that fail to distinguish between these categories are deemed illegal.¹¹⁷ Indeed, the principle safeguards civilians and their possessions from becoming targets, provided they are not actively participating in hostilities.¹¹⁸ To effectively execute a lawful offensive operation, it is imperative for the involved parties not only to distinguish between non-combatants and combatants but also to guarantee the legality of the weaponry employed.¹¹⁹

There are many articles of Additional Protocol I which render attacks on civilians or civilian infrastructure illegal. For example, Article 51(4) prohibits indiscriminate attacks, and Article 51(2) states that “[a]cts or threats of violence the primary purpose of which is to spread terror among the civilian population are prohibited.” Such actions are alleged to have been occurring on Ukraine.¹²⁰ Another relevant article is Article 52, which provides that attacks can only take place where there is a military objective. It is also alleged that Article 54, which provides protection for infrastructure that are indispensable to the survival of the civilian population, such as hospitals and electrical installations, is also being violated.¹²¹ Another article that is deemed to have been infringed is Article 56, which protects specific items such as dams against attacks even when they may be a military target.¹²² This article is specifically seen to have been violated in the

114 MAČÁK, Kubo. Will the Centre Hold? Countering the Erosion of the Principle of Distinction on the Digital Battlefield. *International Review of the Red Cross*, 2023, vol. 105, no. 923, pp. 965–991.

115 PACHOLSKA, Magdalena. Military Artificial Intelligence and the Principle of Distinction : A State Responsibility Perspective. *Israel Law Journal*, 2023, vol. 56, pp. 3–23.

116 WINTER, Elliot. The Compatibility of Autonomous Weapons with the Principle of Distinction in the Law of Armed Conflict. *International and Comparative Law Quarterly*, 2020, vol. 69, no. 4, pp. 845–876.

117 PRIDDY, Alice. Who Is the Civilian Population? Ensuring IHL Is Implemented for the Protection of the Entirety of the Civilian Population – Including Persons with Disabilities. *International Review of the Red Cross*, 2023, vol. 105, no. 922, pp. 242–51.

118 BENVENISTI, Eyal. The Birth and Life of the Definition of Military Objectives. *International and Comparative Law Quarterly*, 2022, vol. 71, no. 2, pp. 269–95.

119 SEHARWAT, Vivek. Legality of Drones under LOAC and International Law. In *Drones and the Law*. Bingley: Emerald Publishing Limited, 2020, pp. 23–53.

120 VAN COLLER, Arthur. Detonating the Air: The Legality of the Use of Thermobaric Weapons under International Humanitarian Law. *International Review of the Red Cross*, 2023, vol. 105, no. 923, pp. 1125–51.

121 HARTMANN, Jacques, et al. Artificial Intelligence, Autonomous Drones and Legal Uncertainties. *European Journal of Risk Regulation*, 2023, vol. 14, no. 1, pp. 31–48.

122 BLUM, Gabriella. The Shadow of Success : How International Criminal Law Has Come to

case of the blowing up of the Kakhovka dam in June 2023.¹²³ Further, Article 57 requires that in military operations there is a duty of care to spare civilians. It stresses that “all feasible precautions in the choice of means and method of attack” need to be taken. As far as customary international law is concerned, weapons whose nature causes superfluous injury or unnecessary suffering, such as chemical or biological weapons, or which are indiscriminate are deemed illegal and cannot be used on the battlefield.¹²⁴

In this context, it remains an important question whether the drone systems, which experts tout as being technologically advanced and possessing high precision to provide real-time images and videos, have been used to deliberately target civilians and civil infrastructure, and have been exploited to conduct attacks on illegitimate targets. Therefore, the use of armed drones seems to present challenges to the principle of distinction.¹²⁵ This is particularly so in the Russian-Ukraine conflict, where Russia has conducted devastating drone attacks.¹²⁶ Russia’s initial implementation of such attacks began on 13 September 2022, with a military operation aimed at several strategic sites in the Kharkiv region.¹²⁷ The subsequent phase of the conflict saw the deployment of drones in repeated attacks on military and civilian targets in several areas, including Kyiv, Odesa, and Mykolaiv.¹²⁸ The Russian military’s preference for targeting power stations is notable, the objective being to deprive Ukraine’s population of electricity and heating during the harsh winter months.¹²⁹ In January 2023, a hospital in Ivanivka near Kramatorsk was struck. Indiscriminate attacks also targeted hospitals in Chernihiv and Viliansk, resulting in the deaths of pregnant women and infant children.¹³⁰

Shape the Battlefield. *International Law Studies*, 2023, vol. 100, pp. 133.

123 SALLSBURY, Josh. Ukraine War: Explosive-Laden Car Was on Blown-up Kakhovka Dam, Drone Photo Shows. *Evening Standard*, [online]. Available at: <<https://www.standard.co.uk/news/world/kakhovka-dam-ukraine-war-russia-kyiv-blown-up-drone-photos-b1088926.html>> Accessed: 30.6.2023.

124 SASSÖLI, Marco. *International Humanitarian Law*. Glos: Edward Elgar Publishing Limited, 2019, pp. 50–67.

125 SHERESHEVSKY, Yahli. *International Humanitarian Law-Making and New Military Technologies*. *International Review of the Red Cross*, 2022, vol. 104, no. 920–921, pp. 2131–2152.

126 WINALDI, Yuanda, SETIYONO, Joko. *Russian Conflict On Ukraine Based On Humanitarian Law Perspective*. *Law Reform*, 2022, vol. 18, no. 2, pp. 252–263.

127 *Ukraine Conflict Update*. Institute for the Study of War (ISW), [online]. Available at: <<https://www.understandingwar.org/backgrounder/ukraine-conflict-updates>> Accessed: 18.3.2023.

128 *Ukrainian Defense Official Says Russian Troops Redeploying In Southern Ukraine*. *Radio Free Europe*, [online]. Available at: <<https://www.rferl.org/a/ukraine-odesa-mykolayiv-strikes-russia-invasion-svitlodarsk/31961614.html>> Accessed: 28.03.2023

129 BUFACCHI, Vittorio. *War Crimes in Ukraine : Is Putin Responsible?*. *Journal of Political Power*, 2023, vol. 16, no. 1, pp.1–6.

130 KERSTEN, Mark. *A War Crime Coalition : Russia ’ s Iranian and Chinese Drones Target Ukrainian Civilians*. [online]. Available at: < <https://justiceinconflict.org/2023/02/22/a->

To achieve its strategic aims, a number of different drones have been used. For example, commercial drones produced by DJI were utilized for capturing aerial photography and videos. These provided better information about the situation and allowing Russia to achieve comprehensive surveillance over Ukraine.¹³¹ However, Russia has predominantly employed the Iranian-manufactured Shahed 136 (Geran 2) kamikaze drone, which has served as a crucial element of its offensive capabilities.¹³² The Shahed 136 is a Loitering Munition drone and is designed to operate as a precision-guided munition system, capable of carrying a high-explosive warhead and conducting a kamikaze-style attack on ground targets.¹³³ It can operate autonomously, without requiring a human pilot to control it remotely.¹³⁴ Once it is launched, it can fly pre-programmed missions or conduct real-time surveillance and reconnaissance, using its onboard sensors and guidance systems to navigate and identify targets.¹³⁵ Thus, it can do things, as noted by acquiring targets without human intervention. Thus, it will create difficulties for possible accountability when IHL rules are violated. However, this is not a problem when the drone is operated remotely by a human operator which it can.¹³⁶ Despite the proponents' claim that drone deployment causes fewer civilian casualties and less collateral damage than other weapons due to their accuracy and precision when targeting combatants,¹³⁷ the number of civilian casualties caused by its deployment remains alarmingly high.¹³⁸ Therefore, in the scenario of the Russia and Ukraine conflict, if the semi-autonomous drones such as Shahed-136 are used without direct communication with the operator and do not differentiate between combatants and non-combatants, or other unlawful targets, it highlights significant concerns regarding the interna-

war-crime-coalition-russias-iranian-and-chinese-drones-target-ukrainian-civilians/>
Accessed : 29.2.2023

- 131 YAN, Shaohua, YAO, Xu, MA, Bin. Chinese Transnational Corporations in the Ukraine Crisis: Risk Perception and Mitigation. *Transnational Corporations Review*, 2022, vol. 14, no. 4, pp. 371–81.
- 132 ALTMANN, Jürgen, SUTER, Dieter. Preventive Arms Control for Small and Very Small Armed Aircraft and Missiles. *German Foundation for Peace Research*, 2023, no. 3, pp.1–41.
- 133 DAVENPORT , Kelsey. UN Diplomats Spar Over Iranian Drone Sales. *Arms Control Today*, 2023, vol. 53, no. 1, pp. 27–28.
- 134 BWANA, Ronald, Odhiambo. Kicking Man Out of the Loop: The Case of Loitering Munitions and Implications for International Humanitarian Law. [online]. Available at: < SSRN: <https://ssrn.com/abstract=4383978>> Accessed: 5.4.2023.
- 135 RUBIN, Michael. A Short History of the Iranian Drone Program Executive Summary. *American Enterprise Institute*, 2020, pp.1–20.
- 136 CIOLPONEA, Constantin-Adrian. The Integration of Unmanned Aircraft System (UAS) in Current Combat Operations. *Land Forces Academy Review*, 2022, vol. 27, no. 4, pp. 333–47.
- 137 HWANG, Won-june, SONG , Seung-hoon. The Extension of Turkish Influence and the Use of Drones. *Comparative Strategy*, 2022, vol. 41, no. 5, pp. 439–58.
- 138 RUSCHI, Filippo. The Rise of Drones and the Transformation of Warfare: A View from Philosophy of International Law. *Revista de Estudos Constitucionais, Hermeneutica e Teoria do Direito*, 2022, vol. 12, no. 1, pp. 147–156.

tional law regulating such weaponry. This is because the catastrophic outcomes that can result from such drone use, underscores the urgency of addressing the ethical and legal implications of deploying such drones. This is not a problem if human operators remotely controlled armed drones and deliberately targeted civilian infrastructure and properties. In that case, it is evident that indiscriminate attacks have been intentionally executed. As already analysed, the utilisation of the Shahed 136, which possesses features enabling relatively accurate target information, points towards intentional actions by the Russian military.

Consequently, these actions may constitute a violation of international humanitarian law and qualify as war crimes, necessitating legal action within the international law system. If there was intentional targeting of civilian infrastructure and properties, the Russian military may have disregarded the principle of distinction, resulting in significant harm to civilians and a blatant violation of their rights. If these places were specifically targeted, in direct contravention of the principle, such actions would be illegal and actionable. In these cases, if done purposefully, given the severity of the results, appropriate sanctions could be imposed either in an international court, should one be available, or before a national court should it accept jurisdiction.

However, the problem is that unlike conventional artillery, drones are unmanned and at times make decisions on their own. While the outcome in terms of civilian harm and damage to infrastructure appear similar, the underlying mechanisms and decision-making processes diverge. With conventional weaponry, such as artillery, we have a deep understanding of their mechanisms, trajectory, targeting methods, and the human agency involved in their deployment. By contrast, drones introduce, at times, an element of automation. That autonomy impacts decision-making, accountability, and therefore issues concerning compliance with IHL. As noted, it raises questions about whether the Geneva and Hague Conventions, as currently formulated, are fully equipped to address all the challenges posed by drone warfare. It may be time to update IHL considering the capabilities of drones. This would ensure that IHL remains relevant and effective in regulating contemporary conflicts where emerging technologies like armed drones play a significant role.¹³⁹

8 Principle of Proportionality

The principle of proportionality also plays a pivotal role in IHL as it governs when using force in armed conflicts is justified.¹⁴⁰ It requires parties involved in a conflict to ensure that their military actions are proportionate to the antici-

139 SARKIN, Jeremy, Julian. *The Conflict in Syria and the Failure of International Law to Protect People Globally: Mass Atrocities, Enforced Disappearances and Arbitrary Detentions*. Oxon: Routledge, 2021, pp 70–75.

140 BLANCHARD, Alexander, TADDEO, Mariarosaria. *Autonomous Weapon Systems and Jus Ad Bellum*. *AI and Society*, 2022, no. 0123456789, pp.1–16.

ted military advantage, thereby minimizing harm to civilians and civilian objects while targeting military objectives.¹⁴¹ It necessitates exercising human judgment, obliging commanders to evaluate options based on experience and situational awareness.¹⁴²

When examining the situation of Russia's drone attacks on Ukraine's power infrastructure, it is essential however to consider the dual-use (civilian and military) nature of these facilities.¹⁴³ While it is true that targeting such infrastructure may be legally justifiable under specific circumstances, such as aiming to disrupt military systems, it is crucial to carefully consider the potential impact on civilians resulting from these actions.¹⁴⁴ According to the International Committee of the Red Cross's (ICRC) Commentary on Additional Protocol 1, to which both Russia and Ukraine are parties, attacks on facilities providing services to civilians and the military may be legitimate. However, any attacks or acts of destruction that significantly impact the civilian population, resulting in death or forced displacement, are not permissible.¹⁴⁵ Thus, the attacks on the hospitals in Ivanivka near Kramatorsk, Chernihiv, and Viliansk, resulting in the loss of civilian lives, may be illegal if they were intended to inflict widespread civilian suffering.¹⁴⁶

The repercussions of Russia's drone-guided attacks have seemingly been to cause immense civilian suffering.¹⁴⁷ Such attacks, if done with foreseeable civilian harm, would constitute unlawful acts and war crimes.¹⁴⁸ This is because, as noted above, the laws of war explicitly prohibit acts of violence whose primary purpose is to instill terror among civilian populations without significant mili-

141 COHEN, Amichai, ZLOTOGORSKI, David, *Proportionality in International Humanitarian Law: Consequences, Precautions, and Procedures*. Oxford: Oxford University Press, 2021.

142 WINTER, Elliot. *The Compatibility of Autonomous Weapons with the Principle of Distinction in the Law of Armed Conflict*. *International and Comparative Law Quarterly*, 2020, vol. 69, no. 4, pp. 845–876.

143 KUSA, Lliya. *Russia-Ukraine War : Harbinger of a Global Shift A Perspective from Ukraine*. *Pluto Journals*, 2022, vol. 19, no. 1, pp. 7–12.

144 BEARD, Jack M. *The principle of proportionality in an era of high technology*. In FORD, Christopher M, WILLIAMS, Winston S (eds). *Lieber Institute for Law and Land Warfare Book Series-Complex Battlespaces: The Law of Armed Conflict and the Dynamics of Modern Warfare*. Oxford: Oxford University Press, 2018, pp. 261–288.

145 CROOTOFF, Rebecca. *War Torts: Accountability for Autonomous Weapons*. *University of Pennsylvania Law Review*, 2016, vol. 164, no. 6, pp. 1347–1402.

146 KERSTEN, Mark. *A War Crime Coalition : Russia 's Iranian and Chinese Drones Target Ukrainian Civilians*. [online]. Available at: < <https://justiceinconflict.org/2023/02/22/a-war-crime-coalition-russias-iranian-and-chinese-drones-target-ukrainian-civilians/> > Accessed : 29.2.2023

147 KALLBERG, Jan, et al. *Drones Will Not Liberate Ukraine – but Tanks Will*. CEPA, 2022.

148 BEARD, Jack M. *The principle of proportionality in an era of high technology*. In FORD, Christopher M, WILLIAMS, Winston S (eds). *Lieber Institute for Law and Land Warfare Book Series-Complex Battlespaces: The Law of Armed Conflict and the Dynamics of Modern Warfare*. Oxford: Oxford University Press, 2018, pp. 261–288.

tary advantage.¹⁴⁹ This has been specifically alleged by Ukraine, whose ambassador to the UN noted on 6 July 2023 that “Since September 2022 the Russian Federation has massively used the Iranian Unmanned Aerial Vehicles (UAVs) of the “Shahed-131,” “Shahed-136” and “Mohajer-6” types in its full-scale war of aggression against Ukraine, in particular as an element of its terror strategy against the civilian population and critical infrastructure.”¹⁵⁰ The deliberate targeting of Ukraine’s critical energy infrastructure by Russian forces, knowing that it will have unacceptable effects on civilians’ basic and primary needs, seems to expose Russia’s aim of unlawfully spreading terror among the civilian populace and making life difficult for them.¹⁵¹ These attacks have also had debilitating consequences for the healthcare sector, with hundreds of hospitals and healthcare facilities having been destroyed or crippled, compromising their ability to meet the healthcare needs of the population.

As far as whether the use of drones in these circumstances violates the proportionality principle, the circumstances of each attack would need to be evaluated against the goals sought to be achieved. If the attacks were carried out to specifically attack civilian targets, or were deliberate targeting of hospitals and critical infrastructure, then these actions would not be justified under the principle of proportionality. It also depends on the type of drone used, as some have precision targeting capabilities, which thus offers the potential to minimize collateral damage and civilian casualties.¹⁵²

9 Conclusion

In the context of the war between Russia and Ukraine, this article has conducted an analysis of the deployment of drones by both parties. By examining their key features and capabilities, it has shone a light on the technological advancements that have fuelled this conflict and enabled sophisticated drone operations. The article has also critically addressed the central question in the debate

149 HAUGSTVEDT, Håvard. A Flying Reign of Terror? The Who, Where, When, What, and How of Non-State Actors and Armed Drones. *Journal of Human Security*, 2023, vol. 19, no. 1, pp. 1–7.

150 Ukraine, Statement by the Permanent Representative of Ukraine, Ambassador Sergiy Kyslytsya at the UN Security Council meeting on “Non-proliferation”, [online]. Available at: <http://ukraineun.org/en/press-center/628-statement-by-the-permanent-representative-of-ukraine-ambassador-sergy-kyslytsya-at-the-un-security-council-meeting-on-non-proliferation-6-july-2023/?utm_source=PassBlue+List&utm_campaign=3807b167e4-RSS_PassBlue&utm_medium=email&utm_term=0_4795f55662-3807b167e4-55079513> Accessed: 8.7.2023.

151 BUFACCHI, Vittorio. War Crimes in Ukraine : Is Putin Responsible?. *Journal of Political Power*, 2023, vol. 16, no. 1, pp. 1–6.

152 BEARD, Jack M. The principle of proportionality in an era of high technology. In FORD, Christopher M, WILLIAMS, Winston S (eds). *Lieber Institute for Law and Land Warfare Book Series-Complex Battlespaces: The Law of Armed Conflict and the Dynamics of Modern Warfare*. Oxford: Oxford University Press, 2018, pp. 261–288.

surrounding the use of drones, which is whether the deployment of drones in this conflict be justified under the principles of IHL, specifically the principles of distinction and proportionality?

While the article has primarily focused on how Russia utilises drones in an illegal manner, it is important to delve deeper into what sets drones apart in the context of IHL. It is not solely the technology itself, but rather the combination of unmanned systems and their advanced capabilities that make them a critical issue for IHL. The autonomy and precision of drones, along with their ability to conduct surveillance and strike with reduced or not human intervention, introduce unique challenges for international law. Drones possess a level of autonomy that differentiates them from traditional weaponry. This renders their usage distinct.

As far as the specifics of the use of drones in the Russian Ukraine conflict is concerned, this article has found that depending on what factual situation concerning the intended goals of the attack, Russia may have employed drones as a means of unlawful warfare, targeting civilians, civilian objects, and critical infrastructure. What is clear is that these attacks have resulted in excessive and unnecessary harm to civilians. While this article does not deal with the military advantages gained by Russia through these attacks, it is the foreseeable consequences on civilians which need to be examined, as well as whether these attacks were indiscriminate and whether constitute violations of IHL principles. Article 51 of Additional Protocol I to the Geneva Conventions, prohibits indiscriminate attacks. Thus, if the attacks were indiscriminate and purposefully targeted civilians and civilian infrastructure, they would be in violation of the principles of IHL and be war crimes as outlined in Article 8 of the Rome Statute of the International Criminal Court. This would allow the ICC and others to prosecute those responsible for those crimes.

If these attacks are war crimes, international accountability may also extend to the actors involved in supplying and transferring drones to Russia, particularly Iran. This is because they have facilitated the commission of war crimes. However, their intent to be involved in the commission of these crimes would need to be proved. This may be difficult if drones were used, particularly those using AI.

It is therefore imperative for the international community to conduct a thorough investigation into the deployment of drones and other foreign weaponry in Ukraine. This investigation should focus on gathering evidence regarding the participation of personnel from manufacturing companies, air transport and logistical firms, mercenaries, and brokers involved in the commercial supply and transfer of items used by Russia to perpetrate these international crimes. The investigation would need to show that there was knowledge or foresight that these weapons would be used to target civilians or civilian infrastructure. Commencing these investigations at the earliest opportunity will ensure

the establishment of a comprehensive post-conflict accountability framework encompassing a range of actors. This will serve the purposes of justice, deterrence, and prevention of future violations.¹⁵³ However, in the long terms adjusting IHL to deal with the complexities of modern warfare, seems to be an imperative.

List of References:

- ABRO, Ghulam, E.Mustafa, et al. Comprehensive Review of UAV Detection, Security, and Communication Advancements to Prevent Threats. *Drones*, 2022, vol. 6, no. 10, pp. 284.
- ADNAN, Wardatul, Hayatand, KHAMIS, Mohd, Fadly. Drone Use in Military and Civilian Application: Risk to National Security. *Journal of Media and Information Warfare*, 2022, vol. 15, no. 1, pp. 60–70.
- AHMAD, Hijaz, FARHAN, Muhammad, FAROOQ, Umar. Computer Vision Techniques for Military Surveillance Drones. *Wasit Journal of Computer and Mathematics Science*, 2023, vol. 2, no. 2, pp. 56–63.
- AL-DOSARI, Khalifa, HUNAITI, Ziad, BALACHANDRAN, Wamadeva. A Review of Civilian Drones Systems, Applications, Benefits, Safety, and Security Challenges. In *The Effect of Information Technology on Business and Marketing Intelligence Systems*. Cham: Springer Nature, 2023, pp. 793–812.
- AL-GARNI, Ahmed, Daifullah. Drones in the Ukrainian War: Will They Be an Effective Weapon in Future Wars?. *International Institute for Iranian Studies*, 2022, pp. 18.
- AL JAZEERA, US Warns of ‘War Crimes’ after Russian Drone Attack on Ukraine. *Al Jazeera*, [online]. Available at: <<https://www.aljazeera.com/news/2022/10/18/us-warns-of-war-crimes-after-russian-drone-attack-on-ukraine>> Accessed 17.2.2023.
- ALI, Muhamed. The Role of Turkiye in the Black Sea and the Russo-Ukrainian War: A Short Overview. *Journal of Liberty and International Affairs*, 2022, vol. 8, no. 3, pp. 356–67.
- ALSHAMY, Yahya, et al. Polycentric Defense, Ukraine Style: Explaining Ukrainian Resilience Against Invasion. *Journal of Public Finance and Public Choice*, 2023, pp. 1–39.
- ALTMANN, Jürgen, SUTER, Dieter. Preventive Arms Control for Small and Very Small Armed Aircraft and Missiles. *German Foundation for Peace Research*, 2023, no. 3, pp. 1–41.
- AMBODO, Tri, SAPUTRO, Guntur, Eko, KOMARIAH, Ulfia, Nurhasanah. Multi-Agent Drone as Loitering Munition System to Support Military Operations Carrying Out Policy Mandate. *International Journal of Arts and Social Science*, 2021, vol. 4, no. 5, pp. 2581–7922.
- BAJAK, Frank, ARHIROVA, Hanna. Drone Advances in Ukraine Could Bring Dawn of Killer Robots. *APNews*, [online]. Available at: <<https://apnews.com/article/russia-ukraine-war-drone-advances-6591dc69a4bf2081dcdd265e1c986203>> Accessed: 8.2.2023.
- BEARD, Jack M. The principle of proportionality in an era of high technology. In FORD, Christopher M, WILLIAMS, Winston S (eds). *Lieber Institute for Law and Land Warfare Book Series-Complex Battlespaces: The Law of Armed Conflict and the Dynamics of Modern Warfare*. Oxford: Oxford University Press, 2018, pp. 261–288.

153 SARKIN, Jeremy, Julian. Towards a greater understanding of guarantees of non-repetition (GNR) or non-recurrence of human rights violations: How GNR intersects transitional justice with processes of state (re) building, the rule of law, democratic governance, reconciliation, nation building, social cohesion and human rights protection. *Stan. J. Int’l L.* 2021, vol. 57, pp. 191.

- BENVENISTI, Eyal. The Birth and Life of the Definition of Military Objectives. *International and Comparative Law Quarterly*, 2022, vol. 71, no. 2, pp. 269–95.
- BLANCHARD, Alexander, TADDEO, Mariarosaria. Autonomous Weapon Systems and Jus Ad Bellum. *AI and Society*, 2022, no. 0123456789, pp.1–16.
- Blank, Laurie. Law of Armed Conflict: Purposes and Principles. In *International Conflict and Security Law*. Glos: Edward Elgar Publishing, 2023, pp. 142–162.
- BLUM, Gabriella. The Shadow of Success : How International Criminal Law Has Come to Shape the Battlefield. *International Law Studies*, 2023, vol. 100, pp. 133.
- BOSWINKEL, Lotje, VAN HOOFT, Paul. No one without the other: Realigning Deterrence and Arms Control in a European Quest for Strategic Stability. [online]. Available at: < <https://hcss.nl/report/not-one-without-the-other-deterrence-and-arms-control/> > Accessed 20.2.2023.
- BOYLE, Michael J. *The Drone Age: How Drone Technology Will Change War and Peace*. Oxford: Oxford University Press, 2020, pp 96–99.
- BRUNSTETTER, Daniel R, FÉREY, Amélie. Armed Drones and Sovereignty: The Arc of Strategic Sovereign Possibilities. In LUSHENKO, Paul, BOSE, Srinjoy, MALEY, William (eds). *Drones and Global Order*. New York: Routledge, 2021, pp. 19.
- BUDINSKA, Ivana. On Ethical and Legal Issues of Using Drones. In ASPRAGATHOS, Nikos A, KOUSTOUMPARDIS, Panagiotis, MOULIANITIS, Vassilis C (Des). *Advances in Service and Industrial Robotics: Proceedings of the 27th International Conference on Robotics in Alpe-Adria Danube Region (RAAD 2018)*. Cham: Springer International Publishing, 2019. pp.710–718.
- BUFACCHI, Vittorio. War Crimes in Ukraine : Is Putin Responsible?. *Journal of Political Power*, 2023, vol. 16, no. 1, pp.1–6.
- BWANA, Ronald, Odhiambo. Kicking Man Out of the Loop: The Case of Loitering Munitions and Implications for International Humanitarian Law. [online]. Available at : < SSRN: <https://ssrn.com/abstract=4383978>> Accessed: 5.4.2023.
- CAFRUNY, Alan, et al. Ukraine , Multipolarity and the Crisis of Grand Strategies. *Journal of Balkan and Near Eastern Studies*, 2023 vol. 25, no. 1, pp. 1–21.
- CARLSON, Brain G. Russia's War in Ukraine : China's Calculus. *CSS Analyses in Security Policy*, 2022 no. 303, pp.1–4.
- CARNEGIE, Allison, CARSON, Austin. *Secrets in Global Governance: Disclosure Dilemmas and the Challenge of International Cooperation*. Cambridge: Cambridge University Press, 2020.
- CERNAT, Romică. Lethal Autonomous Weapon Systems-Emerging and Potentially Disruptive Technology. *Romanian Military Thinking*, 2022, no. 4, pp. 156–175.
- CHAARI, Mohamed Zied, AL-MAADEED, Somaya. The Game of Drones/Weapons Makers' War on Drones. In KOUBA, Anis, AZAR, Ahmad, Taher (eds). *Unmanned Aerial Systems*. London: Academic Press, 2021, pp. 465–93.
- CHÁVEZ, Kerry. Learning on the Fly: Drones in the Russian-Ukrainian War. *Arms Control Today*, 2023, vol. 53, no. 1, pp. 6–11.
- CIOLPONEA, Constantin-Adrian. The Integration of Unmanned Aircraft System (UAS) in Current Combat Operations. *Land Forces Academy Review*, 2022, vol. 27, no. 4, pp. 333–47.
- COHEN, Amichai, ZLOTOGORSKI, David, *Proportionality in International Humanitarian Law: Consequences, Precautions, and Procedures*. Oxford: Oxford University Press, 2021.

- CRAWFORD, Emily, PERT, Alison. *International Humanitarian Law*. Cambridge: Cambridge University Press, 2020, pp. 194–197.
- CROOTOF, Rebecca. War Torts: Accountability for Autonomous Weapons. *University of Pennsylvania Law Review*, 2016, vol. 164, no. 6, pp. 1347–1402.
- DACHKOVSKIY, Volodymyr, et al. Some Views on the Detection and Determination of Unmanned Aerial Vehicle of the Shahed-136 (Geran-2) Type. *Political Science and Security Studies*, 2022, vol. 3, no. 3, pp. 35–43.
- DALSJÖ, Robert, JONSSON, Michael, NORBERG, Johan. A Brutal Examination: Russian Military Capability in Light of the Ukraine War. *Survival*, 2022, vol. 64, no. 3, pp. 7–28.
- DAVENPORT, Kelsey. UN Diplomats Spar Over Iranian Drone Sales. *Arms Control Today*, 2023, vol. 53, no. 1, pp. 27–28.
- DEL MONTE, Louis A. *Genius Weapons : Artificial Intelligence, Autonomous Weaponry, and the Future of Warfare*. New York: Prometheus Books, pp. 200–210.
- DIENELT, Anne. The Shadowy Existence of the Weapons Review and Its Impact on Disarmament. *Sicherheit & Frieden*, 2018, vol. 36, no. 3, pp. 126–32.
- DUGGAL, Hanna, ALI, Mariam. What Weapons Has Ukraine Received from the US and Allies?. *Al Jazeera*, [online]. Available at: <<https://www.aljazeera.com/news/2022/6/15/infographic-what-weapons-has-ukraine-received-from-the-us-and-ali>> Accessed: 5.4.2023.
- EDULAKANTI, Srinivas, Reddy, GANGULY, Sanjeev. Review Article: The Emerging Drone Technology and the Advancement of the Indian Drone Business Industry. *Journal of High Technology Management Research*, 2023, vol. 34, no. 2, pp. 100464.
- EKELHOF, Merel. Moving Beyond Semantics on Autonomous Weapons: Meaningful Human Control in Operation. *Global Policy*, 2019, vol. 10, no. 3, pp. 343–48.
- FARHAT, Salem, Aessa, NURDIN, Rohaida, BASIR, Salawati, Mat. Attacks Against Civilian Objects: An Analysis Under International Humanitarian Law. *Hasanuddin Law Review*, 2022, vol. 8, no. 1, pp. 60–78.
- GENEVA CONVENTION RELATIVE TO THE TREATMENT OF PRISONERS OF WAR. 1949.
- GETTINGER, Dan. Drones Operating in Syria and Iraq. *Center for the Study of the Drone at Bard College*, 2016, pp. 1–21.
- GROSSI, Giuseppe, VAKULENKO, Veronika. New Development: Accounting for Human-Made Disasters—Comparative Analysis of the Support to Ukraine in Times of War. *Public Money and Management*, 2022, vol. 42, no. 6, pp. 467–71.
- HADDAD, Mohammed. Where Does Your Country Stand on the Russia-Ukraine War?. *Al Jazeera*, [online]. Available at: <<https://www.aljazeera.com/news/2023/2/16/mapping-where-every-country-stands-on-the-russia-ukraine-war>> Accessed: 13.4.2023.
- HAGUE CONVENTION (II) WITH RESPECT TO THE LAWS AND CUSTOMS OF WAR ON LAND. 1899.
- HARTMANN, Jacques, et al. Artificial Intelligence, Autonomous Drones and Legal Uncertainties. *European Journal of Risk Regulation*, 2023, vol. 14, no. 1, pp. 31–48.
- HAUGSTVEDT, Håvard. A Flying Reign of Terror? The Who, Where, When, What, and How of Non-State Actors and Armed Drones. *Journal of Human Security*, 2023, vol. 19, no. 1, pp. 1–7.
- HERNÁNDEZ, Gabriela, Rosa. Iran Supplies Arms to Russia. *Arms Control Today*, 2022, vol. 52, no. 9, pp. 21–22.

- HOFFMANN, Tamás. War or Peace ? – International Legal Issues Concerning the Use of Force in the Russia – Ukraine Conflict. *Hungarian Journal of Legal Studies*, 2022, vol. 63, no. 3, pp. 206–35.
- HWANG, Won-june, SONG , Seung-hoon. The Extension of Turkish Influence and the Use of Drones. *Comparative Strategy*, 2022, vol. 41, no. 5, pp. 439–58.
- IGUH, Nwamaka, Adaora, AKUBUILO, Florence, Chinenye. The Position of International Law on the Use of Combat Drones in Armed Conflict. *UNIZIK Law Journal*, 2022, no. 18, pp. 92–102.
- ISLAM, S. M. Riazul. Drones on the Rise: Exploring the Current and Future Potential of UAVs. *ArXiv Preprint*, 2023, pp. 2304–13702.
- JURAYEBICH, Ganjyev, Shuxratjon, RUZIMURODOVICH, Usmonov, Shaxobidding, XOLDAROVICH, Karimov, Azamat. Use of Artillery in Modern War (A Brief Analysis of the Ukrainian Conflict). *Galaxy International Interdisciplinary Research Journal*, 2023, vol. 11, no. 3, pp. 88–100.
- KALLBERG, Jan, et al. Drones Will Not Liberate Ukraine – but Tanks Will. *CEPA*, 2022.
- KAPUSTINA, Larisa, et al. The Global Drone Market: Main Development Trends. *SHS Web of Conferences*, 2021, vol.129, pp. 11004.
- KATHMAN, Jacob, BENSON, Michelle. Cut Short? United Nations Peacekeeping and Civil War Duration to Negotiated Settlements. *Journal of Conflict Resolution*, 2019, vol. 63, no. 7, pp. 1601–29.
- KEENAN, Patrick J. Drones and Civilians : Emerging Evidence of the Terrorizing Effects of the U.S Drone Programs. *Santa Clara Journal of International Law*, 2021, vol. 20, no. 1, pp. 3–42.
- KERSTEN, Mark. *A War Crime Coalition : Russia ’ s Iranian and Chinese Drones Target Ukrainian Civilians*. [online]. Available at: < <https://justiceinconflict.org/2023/02/22/a-war-crime-coalition-russias-iranian-and-chinese-drones-target-ukrainian-civilians/>> Accessed : 29.2.2023.
- KHURSHID, Roqia. Russia and Ukraine Crisis : From Geo-Political Confrontation to Putin ’ s Ambition to Regain Lost Grandeur. *Pakistan Review of Social Sciences*, 2022, vol. 3, no. 2, pp. 51–71.
- KIM, Mansik,et al. Drone Classification by Available Control Distances. In PARK, James, PAN, Yi (eds). *Advances in Computer Science and Ubiquitous Computing: CSA-CUTE2016*. Singapore: Springer Nature, 2017, pp. 221–223.
- KINIK, Hülya, ÇELİK, Sinem. The Role of Turkish Drones in Azerbaijan’s Increasing Military Effectiveness: An Assessment of the Second Nagorno-Karabakh War. *Insight Turkey*, 2021, vol. 23, no. 4, pp. 169–191.
- KNIPP, Kersten. Russia’s ‘Iranian Drones’ Tear at Ukrainian Infrastructure. *Deutsche Welle*, [online]. Available at: < <https://www.dw.com/en/russias-iranian-drones-tear-at-ukrainian-infrastructure/a-63564040>> Accessed: 16.5.2023.
- KNUCKEY, Sarah. Autonomous Weapons Systems and Transparency: Towards an International Dialogue. *Autonomous Weapons Systems: Law, Ethics, Policy*, 2016, pp. 164–84.
- KONERT, Anna, BALCERZAK, Tomasz. Military Autonomous Drones (UAVs) – From Fantasy to Reality. Legal and Ethical Implications. *Transportation Research Procedia*, 2022, vol. 59, pp. 292–99.
- KUNERTOVA, Dominika. Drones Have Boots: Learning from Russia’ s War in Ukraine. *Contemporary Security Policy*, 2023, pp. 1–16.
- KUNERTOVA, Dominika. The Ukraine Drone Effect on European Militaries. *Policy Perspectives*, 2022, vol. 10, no.15, pp. 15.

- KUNERTOVA, Dominika. The War in Ukraine Shows the Game-Changing Effect of Drones Depends on the Game. *Bulletin of the Atomic Scientists*, 2023, vol. 79, no. 2, pp. 95–102.
- KUSA, Lliya. Russia-Ukraine War : Harbinger of a Global Shift A Perspective from Ukraine. *Pluto Journals*, 2022, vol. 19, no. 1, pp. 7–12.
- LAWRENCE, Tony. The Early Air War Prelude: Recent History The Invasion of Ukraine. *International Centre for Defence and Security*, 2022, no. 5, pp. 1–4.
- LIU ,Yao, et al. Cooperative Routing Problem for Ground Vehicle and Unmanned Aerial Vehicle: The Application on Intelligence, Surveillance, and Reconnaissance Missions. *IEEE Access*, 2019, vol. 7, pp. 63504–18.
- LUSHENKO, Paul. U.S. Presidents ' Use of Drone Warfare. *Defense & Security Analysis*, 2022, vol. 38, no. 1, pp. 31–52.
- MAČÁK, Kubo. Will the Centre Hold? Countering the Erosion of the Principle of Distinction on the Digital Battlefield. *International Review of the Red Cross*, 2023, vol. 105, no. 923, pp. 965–991.
- MANKOFF, Jeffrey. Russia's War in Ukraine. *Center for Strategic & International Studies*, 2022, vol. 6, no. 4, pp. 439–440.
- MARSHALL, Douglas M, TRAPNELL, Benjamin. History. In MARSHAL, Douglas M, BARNHART, Richard K, SHAPPEE, Eric J (eds). *Introduction to Unmanned Aircraft Systems*. Oxon: CRC Press, 2021, pp.20–25.
- Mayer, Sven, et al. Drones for Search and Rescue. In *first International Workshop on Human-Drone Interaction*, 2019, pp. 1–7.
- MELANCON, Andree-anne. What ' s Wrong with Drones ? Automatization and Target Selection. *Small Wars & Insurgencies*, 2020, vol. 31, no. 4, pp. 801–21.
- MENON, Rajanand, RUGER, William. NATO Enlargement and US Grand Strategy: A Net Assessment. *International Politics*, 2020, vol. 57, no. 3, pp. 371–400.
- METE, Muhammet, Derviş. New Weapons and Old Law: Can International Humanitarian Law Treaties Deal Adequately with Modern Technologies?. *Uluslararası Hukuk ve Sosyal Bilim Araştırmaları Dergisi*, 2022, vol. 4, no. 1, pp. 1–11. Autonomous Weapon Systems (AWS
- MICKEVIČIŪTĖ, Neringa. Lessons from the Past for Weapons of the Future. *International Comparative Jurisprudence*, 2017, vol. 2, no. 2, pp. 99–106.
- Ministry of Defence of Ukraine. [online]. Available at: <<https://www.mil.gov.ua/en/>> Accessed: 10.7.2023; *Global Security*. [online] Available at < <https://www.globalsecurity.org/>> Accessed: 10.7.2023.
- MITKA, Eleftheria, MOUROTSOS, Spiridon G. Classification of Drones. *American Journal of Engineering Research (AJER)*, 2017, vol. 6, no. 7, pp. 36–41.
- PACHOLSKA, Magdalena. Military Artificial Intelligence and the Principle of Distinction : A State Responsibility Perspective. *Israel Law Journal*, 2023,vol. 56, pp. 3–23.
- PAGE, James, Michael, WILLIAMS, John. Drones, Afghanistan, and beyond : Towards Analysis and Assessment in Context. *European Journal of International Security*, 2022, vol. 7, no. 3, pp. 283–303.
- PEDRAZZI, Marco. The Principles of Military Necessity and Humanity in Light of International Human Rights Law. In KOLB, Robert, GAGGIOLI, Gloria, KILIBARDA, Pavle (eds). *Research Handbook on Human Rights and Humanitarian Law*. Glos: Edward Elgar Publishing, 2022, pp. 76–89.
- PHILLIPS, James, BROOKES, Peter. Undermining Joint Russian–Iranian Efforts to Threaten U.S. Interests. *Institute for National Security and Foreign Policy*, 2023, no. 5312,pp.1–8.

- PONG, Beryl. The Art of Drone Warfare. *Journal of War and Culture Studies*, 2022, vol. 15, no. 4. pp. 377–87.
- PRIDDY, Alice. Who Is the Civilian Population? Ensuring IHL Is Implemented for the Protection of the Entirety of the Civilian Population – Including Persons with Disabilities. *International Review of the Red Cross*, 2023, vol. 105, no. 922, pp. 242–51.
- Radio Free Europe, Ukrainian Defense Official Says Russian Troops Redeploying In Southern Ukraine. *Radio Free Europe*, [online]. Available at: <<https://www.rferl.org/a/ukraine-odesa-mykolayiv-strikes-russia-invasion-svitlodarsk/31961614.html>> Accessed: 28.03.2023.
- RICHARDSON, Michael. How to Witness a Drone Strike. *Digital War*, 2022, vol. 3, no. 1–3, pp. 38–52.
- ROCHOWICZ, Robert. Drones in War of Ukraine With Russia. *Problemy Techniki Uzbrojenia*, 2022, vol. 160, no. 2 pp. 97–117.
- ROSSITER, Ash. Drone Usage by Militant Groups: Exploring Variation in Adoption. *Defense and Security Analysis*, 2018, vol. 34, no. 2, pp. 113–26.
- RUBIN, Michael. A Short History of the Iranian Drone Program Executive Summary. *American Enterprise Institute*, 2020, pp.1–20.
- RUEHL, John .The Countries Openly or Quietly Helping Russia's War against Ukraine. *Mail & Guardian*, [online]. Available at:< <https://mg.co.za/thoughtleader/opinion/2022-09-13-the-countries-openly-or-quietly-helping-russias-war-against-ukraine/>> Accessed: 26.2.2023 .
- RUSCHI, Filippo. The Rise of Drones and the Transformation of Warfare: A View from Philosophy of International Law. *Revista de Estudos Constitucionais, Hermeneutica e Teoria Do Direito*, 2020, vol. 12, no.1, pp. 147–56.
- RUSSELL, Stuart. AI Weapons: Russia's War in Ukraine Shows Why the World Must Enact a Ban. *Nature*, 2023, vol. 614, no. 7949, pp. 620–23.
- SADRAEY, Mohammad H. *Design of Unmanned Aerial Systems*. Hoboken: John Wiley & Sons, 2020, pp. 256–257.
- SALLSBURY, Josh. Ukraine War: Explosive-Laden Car Was on Blown-up Kakhovka Dam, Drone Photo Shows. *Evening Standard*, [online]. Available at: <<https://www.standard.co.uk/news/world/kakhovka-dam-ukraine-war-russia-kyiv-blown-up-drone-photos-b1088926.html>> Accessed: 30.6.2023.
- SARKIN, Jeremy, Julian, SOTOUDEHFAR, Saba. Artificial Intelligence and Arms Races in the Middle East: The Evolution of Technology and its Implications for Regional and International Security. *Defence & Security Analysis* (forthcoming). DOI: 10.1080/14751798.2024.2302699
- SARKIN, Jeremy, Julian. *The Conflict in Syria and the Failure of International Law to Protect People Globally: Mass Atrocities, Enforced Disappearances and Arbitrary Detentions*. Oxon: Routledge, 2021, pp 70.75.
- SARKIN, Jeremy, Julian. Towards a Greater Understanding of Guarantees of Non-Repetition (GNR) Or Non-Recurrence of Human Rights Violations: How GNR Intersects Transitional Justice with Processes of State (Re)Building, The Rule of Law, Democratic Governance, Reconciliation, Nation Building, Social Cohesion and Human Rights Protection. *Stanford Journal of International Law*. 2021, vol. 57, pp. 191–229.
- SASSÒLI, Marco. *International Humanitarian Law*. Glos: Edward Elgar Publishing Limited, 2019, pp. 50–67.

- SCHMIDT, Dennis R, TRENTA, Luca. Changes in the Law of Self-Defence? Drones, Imminence, and International Norm Dynamics. *Journal on the Use of Force and International Law*, 2018, vol. 5, no. 2, pp. 201–45.
- SECHSER, Todd S, NARANG, Neil, TALMADGE, Caitlin. Emerging Technologies and Strategic Stability in Peacetime, Crisis, and War. *Journal of Strategic Studies*, 2019, vol. 42, no. 6, pp. 727–35.
- SEHARWAT, Vivek. Legality of Drones under LOAC and International Law. In *Drones and the Law*. Bingley: Emerald Publishing Limited, 2020, pp. 23–53.
- SHERESHEVSKY, Yahli. International Humanitarian Law-Making and New Military Technologies. *International Review of the Red Cross*, 2022, vol. 104, no. 920–921, pp. 2132–2152.
- STOICESCU, K Alev, et al. How Russia Went to War the Kremlin's Preparations. *International Centre for Defence and Security*, 2023, pp. 5–7.
- SZPORLUK, Roman. *Ukraine, and the Breakup of the Soviet Union*. Stanford: Hoover Institution Press Publication, 2020, pp.17–18.
- TAHIR, Muhammad, Amir, MIR, Imran, ISLAM, Tauqeer UI. Control Algorithms, Kalman Estimation and Near Actual Simulation for UAVs: State of Art Perspective. *Drones*, 2023, vol. 7, no. 6, pp. 339.
- THERME, Clément. Iran's 'Neither East nor West' Slogan Today. *International Institute for Strategic Studies (IISS)*, 2019, vol. 8, no. 5, pp 1–3.
- TRUSH, S. M. Crisis between Russia and Ukraine: The China Factor. *Herald of the Russian Academy of Sciences*, 2022, vol. 92 , no. 8, pp. 595–600.
- TSYBULENKO, Evhenand, KAJANDER, Aleks. Customary International Humanitarian Law and Article 36 of Additional Protocol I to the Geneva Conventions : A Stopgap Regulator of Autonomous Weapons Systems?. *TalTech Journal of European Studies*, 2022, vol. 12, no. 36, pp. 87–112.
- UKRAINE Conflict Update. *Institute for the Study of War (ISW)*, [online]. Available at: <<https://www.understandingwar.org/backgrounder/ukraine-conflict-updates>> Accessed: 18.3.2023.
- UKRAINE, The First Ukrainian F-16 Will Be One of the Strongest Signals From the World That Russia Will Only Lose, Address By the President of Ukraine. *President of Ukraine Official Website*, [online]. Available at: < <https://www.president.gov.ua/en/news/pershij-zhe-ukrayinskij-f-16-stane-odnim-iz-najsilnishih-sig-83129>> Accessed: 29.5.2023.
- UKRAINE, Statement by the Permanent Representative of Ukraine, Ambassador Sergiy Kyslytsya at the UN Security Council meeting on “Non-proliferation”, [online]. Available at: < http://ukraineun.org/en/press-center/628-statement-by-the-permanent-representative-of-ukraine-ambassador-sergy-kyslytsya-at-the-un-security-council-meeting-on-non-proliferation-6-july-2023/?utm_source=PassBlue+List&utm_campaign=3807b167e4-RSS_PassBlue&utm_medium=email&utm_term=0_4795f55662-3807b167e4-55079513> Accessed: 8.7.2023.
- UNITED NATIONS, OFFICE OF THE HIGH COMMISSIONER FOR HUMAN RIGHTS Human Rights Chief Missile Strikes on Ukraine and Alleged POW Executions Underscore Why International Law Must Be Respected – UN Human Rights Chief. *United Nations*, [online]. Available at: <<https://www.ohchr.org/en/press-releases/2022/11/missile-strikes-ukraine-and-alleged-pow-executions-underscore-why.>>> Accessed: 23.03.2023.

- UNITED NATION SECRETARY-GENERAL Implementation of Security Council resolution 2231 (2015), Available at: <<https://documents-dds-ny.un.org/doc/UNDOC/GEN/N23/160/36/PDF/N2316036.pdf?OpenElement>> Accessed:17.3.2023.
- UNITED NATION SECURITY COUNCIL, Resolution 2231 (2015) on Iran Nuclear Issue. [online]. Available at:<https://www.un.org/securitycouncil/content/2231/background?utm_source=PassBlue+List&utm_campaign=3807b167e4-RSS_PassBlue&utm_medium=email&utm_term=0_4795f55662-3807b167e4-55079513> Accessed: 17.3.2023
- VAN COLLER, Arthur. Detonating the Air: The Legality of the Use of Thermobaric Weapons under International Humanitarian Law. *International Review of the Red Cross*, 2023, vol. 105, no. 923, pp. 1125–51.
- VAN DIJK, Boyd. What Is IHL History Now?. *International Review of the Red Cross*, 2022, vol. 104, no. 920–921 pp. 1621–1637.
- VERESS, Csongor, Balázs. The Limits of Protection of Human Rights in Warfare Led by AI. *Acta Universitatis Sapientiae Legal Studies*, 2022, vol. 11, no. 2, pp. 81–97.
- VOGEL, Ryan J. Drone Warfare and the Law of Armed Conflict. *Denver Journal of International Law & Policy*, 2020, vol. 39, no. 1, pp.101–138.
- WINALDI, Yuanda, SETIYONO, Joko. Russian Conflict On Ukraine Based On Humanitarian Law Perspective. *Law Reform*, 2022, vol. 18, no. 2, pp. 252–263.
- WINTER, Elliot. The Compatibility of Autonomous Weapons with the Principle of Distinction in the Law of Armed Conflict. *International and Comparative Law Quarterly*, 2020, vol. 69, no. 4, pp. 845–876.
- WOLF, Christopher. Countries That Have Sent the Most Aid to Ukraine. *US News & World Report*, [online]. Available at: < <https://www.usnews.com/news/best-countries/articles/2023-02-24/these-countries-have-sent-the-most-aid-to-ukraine>> Accessed: 17.2.2023.
- YAACOUB, Jean, Paul, et al. Security Analysis of Drones Systems: Attacks, Limitations, and Recommendations. *Internet of Things (Netherlands)*, 2020,vol. 11, pp. 100218.
- YAN, Shaohua, YAO, Xu, MA, Bin. Chinese Transnational Corporations in the Ukraine Crisis: Risk Perception and Mitigation. *Transnational Corporations Review*, 2022, vol. 14, no. 4, pp. 371–81.
- ZAJĄC, Maciek. AWS Compliance with the Ethical Principle of Proportionality : Three Possible Solutions. *Ethics and Information Technology*, 2023, vol. 25, no. 1, pp. 1–13.