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Exploring the Impact of Modern Technology on the Transformations of Customary Norms in International Humanitarian Law.

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Abstract:-

This study analyzes how emerging technologies—i.e., autonomous weapons, drones, and cyber warfare—are transforming the development and application of customary norms in international humanitarian law (IHL). Long premised on uniform state practice and legal duty, the norms are increasingly challenged by digital and automated warfare. The study adopts a descriptive-analytical method to examine the legal and ethical dimensions of the integration of advanced technologies in armed conflict. It looks at whether current practice is generating new customary rules and how these developments affect the most significant IHL principles of distinction, proportionality, and accountability. The research, drawing on case studies, recent jurisprudence, and legal scholarship, hopes to contribute to our understanding of how international legal systems can evolve to uphold humanitarian protections in the age of technological change. The paper concludes with suggestions for legal reform as well as prospective interdisciplinary research.

Keywords:

Customary norms; International Humanitarian Law; Technology; Armed Conflict; Cyber Warfare.

1. Introduction .

The modern armed conflict has been dramatically transformed by the fast adoption of the advanced technologies into the realm of the international armed conflict, especially into the customary basis of the international humanitarian law (IHL). The contemporary warfare no longer exists within the traditional battlefields, but rather it is becoming more of a concerted warfare within the virtual, autonomous, and technologically mediated space. The introduction of cyber operations, artificial intelligence (AI), autonomous weapon system (AWS), and unmanned aerial vehicles (UAVs) have caused a fundamental change in the assumptions on which recent IHL historically has evolved. These changes pose serious issues on the question of the applicability, adjustability, as well as legitimacy of customary norms in the regulation of conduct in the face of armed conflict.

The traditional international humanitarian law, which is based on a consistent state practice (usus) and a sense of legal obligation (opinio juris) has traditionally served as a primary supplement to treaty law and as a guarantee of universality of humanitarian protections. It has long been flexible and has been able to keep pace with the fluctuating modes and modes of war. Nevertheless, the current technological advancement with its unprecedented pace, complexity, and opaqueness poses serious threat to this evolution process. Computerized systems of targeting, computerized tools of cyber warfare that can disrupt the civilian infrastructure, and artificial intelligence to make decisions by themselves exist in the contexts that the traditional structure of normal standards did not foresee.

It is on this background that a basic legal conflict between the gradual development of customary law, on the one hand, and the fast, non-transparent development of military technologies, on the other, can be observed. This conflict brings up a fundamental issue: can current customary rules and standards be modified to accommodate technologically oriented warfare, or do we need completely new sets of rules to respond to new realities? This complexity is also exacerbated by the attribution, accountability, and identification of a consistent state practice issues when it comes to cyberspace and autonomous systems where actions are frequently hidden, decentralized or mediated with complicated algorithms.

To this end, the research undertaken attempts to answer the following research question:

How far do new technologies generate and alter the formation and alteration of customary norms in the international humanitarian law?

To address this question, the paper discusses some sub-questions:

- Can patterns of state practice involving autonomous weapons and

cyber operations give rise to new customary rules?

- What is the impact of new technologies on the implementation of the core IHL principles, especially, distinction, proportionality, and accountability?
- Does the existing system of customary IHL contain enough to govern technologically sophisticated forms of conflict or does it need to be reinterpreted or supplemented?

The proposed research follows a descriptive-analytical approach to research that involves both doctrinal analysis of legal issues and the use of specific case studies. It looks into the state practice, international jurisprudence, and reports made by international organizations, especially by international organizations like the International Committee of Red Cross (ICRC) and the United Nations to evaluate the changing interaction between technological innovation and customary law. A comparative analytic method is also used in the study to review the application of traditional principles of IHL in new contexts of operations guided by emerging technologies.

The important thing about this paper is that it tries to fill the gap between the legal theory and the technological reality. The interaction between modern warfare technology and the traditional norms of law is examined by the research thus becoming a contribution to existing scholarly and policy-related discussions about the future of IHL. It also attempts to offer information on how the international legal systems can preserve their protective role when technological change is taking place at high rates.

2. Understanding Customary Norms in International Humanitarian Law.

In this section we deal with the nature and importance of customary rules in international humanitarian law (IHL), which develop by way of judicious state usage and understanding of legally bindingness (opinio juris). In contrast to treaty law, customary IHL is organic and it fills the gaps in the law and binds even where there is no written agreement. The part describes the characteristics of these rules—like universality, flexibility, and obligatory nature—and addresses their development over time in regulating conduct in war.

Customary norms also play a central role in protecting civilians and limiting weapons and methods of warfare, especially in non-international armed conflicts or where treaty law has no application. Since warfare is increasingly being reconfigured by new technology, this section also introduces how these legal customs are being challenged, tested, or reframed. This section lays the groundwork for measuring the future of customary law against evolving military conduct and technological revolution.

2.1 Definition and Characteristics of Customary Norms.

Classic international humanitarian law (IHL) refers to a body of customary rules of international law established based on the practice of states having opinio juris understandable as the acceptance that the practice is a condition of law. They are norms which arise irrespective of treaty commitments and bind all parties to an armed conflict whether they are treaty party or not. They are the guiding principles in situations where the treaty law is not applicable, particularly in non-international armed conflicts and by non-state actors.[1]

Typical characteristics of customary norms are:

1. Universality: They apply to all States and parties to conflict equally.
2. Durability: They persist over time and cannot be ousted easily.
3. Flexibility: They evolve incrementally by changing patterns of behavior and legal perception.

Classic IHL comprises norms such as differentiation between combatants and civilians, prohibition of inflicting unnecessary suffering, and obligation to treat the wounded and sick humanely. Such principles are the backbone of IHL, ensuring that the most fundamental aspect of humanity is maintained even when treaty requirements are absent.

2.2 Historical Development and Importance.

The customary norms of IHL are rooted firmly in historical codes and practices of states, namely:The Lieber Code (1863), one of the early attempts to codify warfare conduct.

The Hague Conventions of 1899 and 1907, which put into code the core practices of the laws of war.The Geneva Conventions of 1949 and their Additional Protocols reaffirmed and expanded protection for victims of armed conflict.[2]

Such tools did not create entirely new obligations but rather codified existing customary norms and brought them more into the limelight. The importance of customary norms became increasingly important with the onset

1 Henckaerts, J.-M., & Doswald-Beck, L. (2005). Customary International Humanitarian Law, Volume I: Rules. Cambridge University Press. Https://Www.Icrc.Org/.../Customary-International...'

2 Vladyslav Lanovoy, 'Customary International Law in the Reasoning of International Courts and Tribunals' in Panos Merkouris, Jörg Kammerhofer and Noora Arajärvi (eds), *The Theory, Practice, and Interpretation of Customary International Law* (1st ed, Cambridge University Press 2022) <https://doi.org/10.1017/9781009025416.012> accessed 25 June 2025.

of non-international armed conflicts and the growing involvement of non-state actors, where treaty law is narrow in scope and application.[3]

In addition, the international courts such as the International Criminal Tribunal for the former Yugoslavia (ICTY) have reaffirmed the binding nature and applicability of customary IHL even in the absence of a treaty obligation. The application of customary law in the Tadić case (1995) confirmed that fundamental IHL norms are binding on all parties to a conflict[4].

2.3. Theoretical Limits of Customary IHL in Technologically Driven Warfare.

The inherent paradox of the development of the customary international humanitarian law by the gradual, piecemeal practice of state is counterpointed by the accelerating rate of technological advancement in warfare, which highlights fundamental and structural theoretical weaknesses in this venerable legal regimen. The customary IHL that bases its binding force on the two aspects of consistent state practice (usus) and belief that such practice is legally binding (opinio juris) works on a legal logic of historical precedent and consensus through evolution. This critical review assumes that the basic generative and applicative processes of customary IHL are deeply incongruous with the emerging regulatory requirements of cyber operations, autonomous warfare systems (AWS), and remote warfare technologies. These new sites of tension are intangible, algorithmically agency, and physically disengaged and each of these characteristics directly criticizes the ontological assumptions on which traditional rules of distinction, proportionality and, most importantly, responsibility were initially fabricated and perceived. It is these ambiguities which are not merely temporary pauses between the application of law awaiting its fulfillment but they represent something far more fundamental and serious: a theoretical crisis rendering the inner unity and efficacy of the law in the environment of present and future conflict. This crisis has been caused by the fact that the law has not been able to keep up with a lack of correspondence between the factual requirement of a legal system (as seen in the age-old need to observe, attribute to human action) and the reality of remote, automated, and anonymous warfare, which casts existential doubts on the irrelevance of a legal system that was designed to operate in a different age [5].

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3 Kristina Daugirdas, 'International Organizations and the Creation of Customary International Law' (2020) 31 European Journal of International Law 201 <https://doi.org/10.1093/ejil/chaa012>.

4 *ICTY, Prosecutor v Tadić, Case No IT-94-1, Decision on the Defence Motion for Interlocutory Appeal on Jurisdiction, 2 October 1995*.

5 Karl Zemanek, 'RESPONSIBILITY OF STATES: GENERAL PRINCIPLES' *Encyclopedia of Disputes Installment 10* (Elsevier 1987) <https://doi.org/10.1016/B978-0-444-86241-9.50092-0> accessed 4 February 2026.

One of the main theoretical fronts is radically threatened by the phenomenon of cyber warfare that proactively disrupts the baseline causation and kinds of categorization of customary IHL. The most important rules of the law were historically condensed around kinetic acts of violence bombardments, invasions, armed actions, which led to a visible material destruction, failure of infrastructure, and loss of human lives. By comparison, cyber operations have the capability to shut down the financial systems of a country, interfere with its electoral procedures, or even incapacitate its energy infrastructure by silently inserting code, which may or may not result in any physical destruction to the country. Such extreme dislocation produces a thorny and enduring ambiguity in identifying the legal threshold: at what point does a high-technology cyber intrusion or disruptive action become an armed attack according to the jus ad bellum, or are they considered to be elements of an armed conflict according to the jus in bello? This grey area is not an inadvertent omission but a hypothetical weakness of the system. It tactfully allows states to pursue acts of hostility that have deep strategic and coercive consequences- consequences previously accessible solely by means of an open military conflict- and may somehow be withheld deliberately beneath the unsettled and ambiguous legal boundary prompting the full authority of IHL regulatory regime. Moreover, this permanent and frequently impossible challenge of timely, final and legally persuasive attribution of cyber operations is fatal to even the generative process of customary law itself. To bring a new standard of state conduct in cyberspace to crystallize into binding custom, acts which can be observed in public and reliably attributed to states, are needed to establish a consistent, general practice (usus) on which opinio juris can be derived. There is a natural, elusive, and proxy-driven nature of state-sponsored cyber hostility that intentionally hinders this necessary visibility. As a result, the traditional procedure is paralyzed, there is a continuing normative vacuum, in which major and aggressive acts in the absence of definitive legal regulation continue to flourish. This vacuum is a direct challenge to the existing pillars of international responsibility, as the institutions of attributing legal blame are placed in a trap of anonymity and plausible deniability, which is how technology can outrun not only particular rules, but also the very approach to law-making [67].

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6 Nurilloev Shavkat Shukhrat Ugli, 'THE FOUNDATIONS OF STATE RESPONSIBILITY IN INTERNATIONAL LAW: AN IN-DEPTH ANALYSIS OF KEY PRINCIPLES AND NORMS' (2024) 1 European Journal of Contemporary Business Law & Technology: Cyber Law, Blockchain, and Legal Innovations 100 <https://doi.org/10.61796/ejcblt.v1i9.1031>.

7 GA Bialyi, 'On the Problem of Determining International Legal Responsibility in Public International Law' [2024] Analytical and Comparative Jurisprudence 687 <https://doi.org/10.24144/2788-6018.2024.01.121>.these works deal with the issue of international responsibility\ .nTo date ,the issue of liability under international law has been one of the least developed ,although the problem of international legal liability is becoming increasingly important in the practice of international relations as

An even deeper and perhaps existential limitation of theory is experienced with the creation and future implementation of lethal Autonomous Weapons Systems. In its turn, customary IHL is based on a model of individual human agency and moral responsibility. The cardinal principles of distinction (between combatants and civilians) and proportionality (weighing the advantages of a military operation against the incidental civilian harm) are not only mechanical calculations, but require subtle, circumstantial and oftentimes split-second ethical decisions about intent, status, value and foreseeable consequences, which has traditionally been left to the conscience and training of human combatants and commanders.

The transfer of the key functions of identification of targets, selection, and lethal engagement to machines that operate according to pre-written programs and sensor data poses an irreconcilable conceptual challenge: can such an operation as algorithmic processes, however sophisticated, really be called a replica or even a valid replacement of the multi-layered legal and moral

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one of the security institutions that help maintain a certain legal order in the world. \nThe issues of international responsibility are equally important both in the field of public law and private law relations .Moreover ,liability in these two branches of international law has much in common and is closely interrelated ,which is clearly evident in the process of analyzing liability issues in various branches of international law\ .nThe definition of responsibility in international law is a key topic that determines the legal order and relations between states and other actors of the international community .One of the key aspects is the consideration of the principles of determining responsibility in international law\ .nThe definition of responsibility in international law is a key topic that determines the legal order and relations between states and other actors of the international community .One of the key aspects is the consideration of the principles of determining responsibility in international law\ . nThe article examines the essence and main aspects of the concept of international legal responsibility ,which is one of the first principles of international law\ .nFirst of all ,the article examines the principles of responsibility ,such as the principles of sovereignty ,equality of states and non-interference ,and how these principles shape legal standards and mutual relations between states and other subjects of international law\ .nSpecial emphasis is placed on the current challenges facing the concept of international legal responsibility .In particular ,the author analyzes new forms of responsibility ,such as cybersecurity ,human rights violations and other aspects arising from the development of globalization and technology\ .nThe article also emphasizes the need for continuous analysis and adaptation of the concept of international legal responsibility to changes in the modern world ,emphasizing the importance of developing effective tools and mechanisms to address the challenges arising in a globalized and technologically advanced society",".container-title":"Analytical and Comparative Jurisprudence","DOI","10.24144/2788-6018.2024.01.121":"ISSN2788-6":" ","018issue","1":"journalAbbreviation":"АПП","license":"https//:creativecommons.org/licenses/by-nc-nd","4.0/page","687-691":"source":"DOI.org) Crossref

processes that the law demands? The theoretical implication of such delegation is a serious and possibly irreparable accountability disjuncture. The current theories of international responsibility, such as the fundamental concept of state responsibility, are constructed on the basis of the chain of human causality, a wrongful act can be ascribed to a state organ or even an agent whose actions are involved. Such structures do not provide clear and agreed rules on how the internationally wrongful acts of a complex, self-directed machine system can be attributed. Where an AWS violates its duties, such as when it unleashes an attack that is disproportionate because of a breakdown in its object classification algorithm or unforeseen circumstances in a dynamic environment, it will be opaque both in theory and under the law where liability is decisively divided. Is it the responsibility of the software programmer who wrote the code, the systems engineer who added the sensors, the military commander who decided to put it into use in a particular situation, the political leadership that was giving it money, or the state as a corporate entity?

This deep ambiguity risks to bring to the head the crucial conceptual and procedural connection between law breaking and law redress, a connection that is the foundation of any legal system worth its salt. Where responsibility cannot be allocated, the central prohibitions of the law become a figure of speech but legally unenforceable, revealing the theoretical inability of customary IHL to address a future in which the whole matter of lethal decision-making has been depersonalized[8].

At the same time, the emergence of long-range warfare technology is effectively blurring the spatial, temporal, and factual assumptions on which the most important IHL dogmas, in particular the law of occupation, are founded. What is termed as the emergent concept of an occupation by ghosts, facilitated by a combination of persistent aerial drones, the ability to loiter and long-range munitions, and the ubiquitous surveillance of satellite or AI-facilitated surveillance is that a state is able to assume an overbearing, life-and-death military occupation of a territory, tracking movement, implementing no-go zones, and making precision strikes, without permanent, administrative, and physically present occupation of the territory by boots on the ground. This situation essentially discredits the classical legal meaning of occupation under IHL, whereby it is subject to the existence of real occupying power over the territory by the occupying power and, most importantly, the ability to exercise the authority. The law of occupation, in its turn, gives the occupier great positive humanitarian and administrative responsibilities to maintain law and order, safety, and well-being of the civilian population. When combined with remote and technology mediated control, there is a dangerous legal and ethical gap, creating a way where a state can project decisive and lethal power along with some manner of dominant influence without taking on the legal responsibilities of civilian life and administration that has long been

8 Zemanek (n 5).

the historical counterbalance to such control. This loss of evident spatial and factual doctrine is not only a problem of classification, but it provides a power policy without immediate accountability. It also makes the use of the principles of international state responsibility even more complex because boundaries of effective control and direct command, which are usually required in making a clean attribution of specific military acts and their resulting humanitarian effects of a responsible state, have been blurred by geographical and operation disconnect. The war front turns limitless and the record of responsibility gets diluted, and the fundamental premises of the law regarding the nexus between control, presence, and obligation are put to the test [9].

9 Bialyi (n 7).these works deal with the issue of international responsibility\ .nTo date ,the issue of liability under international law has been one of the least developed ,although the problem of international legal liability is becoming increasingly important in the practice of international relations as one of the security institutions that help maintain a certain legal order in the world\ .nThe issues of international responsibility are equally important both in the field of public law and private law relations .Moreover ,liability in these two branches of international law has much in common and is closely interrelated ,which is clearly evident in the process of analyzing liability issues in various branches of international law\ .nThe definition of responsibility in international law is a key topic that determines the legal order and relations between states and other actors of the international community .One of the key aspects is the consideration of the principles of determining responsibility in international law\ .nThe definition of responsibility in international law is a key topic that determines the legal order and relations between states and other actors of the international community .One of the key aspects is the consideration of the principles of determining responsibility in international law\ .nThe article examines the essence and main aspects of the concept of international legal responsibility ,which is one of the first principles of international law\ .nFirst of all ,the article examines the principles of responsibility ,such as the principles of sovereignty ,equality of states and non-interference ,and how these principles shape legal standards and mutual relations between states and other subjects of international law\ .nSpecial emphasis is placed on the current challenges facing the concept of international legal responsibility .In particular ,the author analyzes new forms of responsibility, such as cybersecurity ,human rights violations and other aspects arising from the development of globalization and technology\ .nThe article also emphasizes the need for continuous analysis and adaptation of the concept of international legal responsibility to changes in the modern world ,emphasizing the importance of developing effective tools and mechanisms to address the challenges arising in a globalized and technologically advanced society”,”.container-title”:”Analytical and Comparative Jurisprudence”,”DOI”,”10.24144/2788-6018.2024.01.121”:”ISSN27”:”,”88-6018issue”,”1”:”journalAbbreviation”:”АПП”,”license”:”https//:creativecommons.org/licenses/by-nc-nd”,”4.0/page”,”687-691”:”source”:”DOI.org) Crossref

3. Modern Technology in Conflict Zones.

This section examines how the environment of the current armed conflicts is evolving due to new technologies. It shows key novelties, such as drones, autonomous weapon systems, or cyber operations, and discusses their impacts on the humanitarian postulates and the international legal systems. It further discusses the dual-use aspect of these technologies, how their advantage in humanitarian operations, and the laws and morality of using these technologies. It establishes the groundwork to deliberations on whether these tools go beyond or reiterate the existing customary regulations in the international humanitarian law.

3.1 Types of Modern Technology Used.

Incorporation of modern technology in the war has witnessed a drastic reorganization in the performance and management of wars. The traditional war fronts have been replaced by the ones that incorporate long range operations, autonomous vehicles and computer-based warfare.. These new weapons pose not only challenges to operations at the tactical level but also to the very fundamental tenets of international humanitarian law (IHL), particularly the principles of distinction, proportionality, and military necessity.

1. Unmanned Aerial Vehicles (UAVs): UAVs have transformed warfare in the contemporary world too because of their ability to provide real-time surveillance, reconnaissance, and precision strike capabilities. Technologies can be used to decrease the combatant casualties and enhance the precision of the targets. Nevertheless, the application of drones in the absence of the checks and balances provokes questions concerning the legality of the cross-border strike and adherence to the IHL mandate to discriminate between civilians and combatants. In addition, the use of drone surveillance over long duration will cause psychological damage to civilian populations in conflict theaters[10].
2. Autonomous Weapons Systems (AWS): Autonomous weapons that can make lethal choices without human choice have brought forth much controversy on the ethics and the law. AWS questions the idea of an effective human control that is widely believed in as the basis of holding force use to account. AWS may be

10 Isabelle Côté, 'Internal Migration and Resource Conflict: Evidence from Riau, Indonesia' (2021) 7 Journal of Global Security Studies ogab025 <https://doi.org/10.1093/jogss/ogab025>.

incapable of assessing context, intent, and proportionality—concerns so integral in lawful decisions regarding targeting under IHL[11] .

3. Humanitarian Drones and Robotics: Besides their use in combat, the technologies of drones are increasingly being utilized for humanitarian purposes such as the provision of materials and infrastructure surveys. The dual-use technology, however, blurs the line between military and humanitarian uses, creating problems of neutrality and the unintended consequences of using the same technology for conflicting purposes .
4. Cyber Operations: Armed conflicts do not remain confined to physical war zones anymore; cyberspace has also become a battlefield. Cyberattacks on infrastructure, communications, and information systems can leave critical services helpless without applying traditional kinetic force. Although such operations may avoid immediate causation of death, they remain amenable to the application of IHL in case they result in effects tantamount to traditional armed attacks .
5. Space-Based Technologies: Satellites play a main role in the modern warfare, whether in communications and navigation or intelligence collection. The dual use nature of space based assets means that, when military uses these assets, it may threaten to disrupt civilian services. With space getting more and more contested, there is a need to have clear legal frameworks that will address the militarization.. As space becomes increasingly contested, the imperative for unambiguous legal frameworks dealing with the militarization.

3.2 Impacts and Benefits on Humanitarian Efforts.

Though new technologies complicate observance of IHL, they are also valuable tools for advancing humanitarian objectives—if used responsibly.

1. Precision Targeting: Advanced surveillance capabilities and precision-guided munitions, if used responsibly, can reduce civilian harm by employing enhanced target discrimination. They also improve the situational awareness of the commanders,

11 Ioannis Kalpouzos, 'Double Elevation: Autonomous Weapons and the Search for an Irreducible Law of War' (2020) 33 Leiden Journal of International Law 289 <https://doi.org/10.1017/S0922156520000114>.

limiting the possibility of disproportionate strikes and promoting the observance of IHL standards more..

2. Improved Supervision and Tracing: Drones and satellite imaging would allow conflict to be captured in good time, which allows humanitarian agencies and international institutions to gather IHL observance and store any evidence to be used in a court of law. Data analysis based on blockchain and artificial intelligence are used to track the process of aid delivery and indicate trends of rights violation [12].
3. Humanitarian Logistics and Aid Delivery AI-based logistics systems, drone technology, and mobile phone applications have greatly enhanced the delivery of humanitarian relief to remote/conflict regions. They aid to better response time and better allocation of the limited resources, besides providing the transparency and traceability that are improved .
4. Early Warning Systems and Crisis Prevention: Predictive modeling and big data analysis is now applied to predict humanitarian catastrophes, forced displacement, and early violence. These technologies allow humanitarian responders to anticipate proactive interventions that can interrupt suffering and check the escalation of worsening conflict.

Yet, the benefits of these technologies are not guaranteed. Without clear legal norms, good ethical regulation, and international coordination, there is a risk that their misuse can negate the very protections IHL tries to provide. With technology spreading its wings, so too must the regimes that govern its use in conflict[13].

4. Challenges and Ethical Considerations.

This section addresses the legal, ethical, and practical issues raised by the entry of high-tech warfare into the military arena. It examines the way complex systems—such as robotic weapons and cyber capabilities—place obstacles in the path of respect for basic principles of international humanitarian law, that is, distinction, proportionality, and responsibility.

12 Aimee Van Wynsberghe and Tina Comes, 'Drones in Humanitarian Contexts, Robot Ethics, and the Human–Robot Interaction' (2020) 22 Ethics and Information Technology 43 <https://doi.org/10.1007/s10676-019-09514-1>.

13 Michael Hallek, Barbara Eichhorst and Daniel Catovsky (eds), *Chronic Lymphocytic Leukemia* (Springer International Publishing 2019) <https://doi.org/10.1007/978-3-030-11392-6> accessed 25 June 2025.

The section also addresses more general moral challenges, such as the erosion of human agency, illegibility of decision-making algorithms, and diffusion of responsibility in technologically empowered warfare. This analysis exposes gaps in existing legal frameworks and highlights the urgent necessity for recalibrated norms and regulatory oversight.

4.1 Legal and Ethical Challenges.

The use of advanced technology in war raises fundamental legal and ethical challenges that test the normative structures of international humanitarian law (IHL). Although the law of armed conflict is meant to be flexible, the rate and character of technological development tend to outpace the processes of legal interpretation and enforcement .The majority of emerging technologies, such as cyber weapons and autonomous weapons systems (AWS), are not addressed by any particular legal tools to govern their employment in warfare. Although existing IHL principles such as distinction, proportionality, and precaution are still generally applicable, their application to independently operating or invisibly operating technologies is extremely problematic.. For example, it is an open technical and ethical problem to guarantee that AWS can distinguish between combatants and civilians. And so, likewise, in cyberspace, it is unclear when a cyberattack is deemed an armed conflict, excluding the invocation of IHL protection.[14]

Among the central principles of IHL is responsibility for violations, either through individual criminal liability or state liability. New technologies undermine such mechanisms by making attribution harder and spreading responsibility thinner. With systems aided by AI and autonomous decision-making systems, it will be challenging to tell who is to blame for illegal attacks—the programmer, the commander, or the machine. Such ambiguities threaten to undermine enforcement regimes and diminish the deterrence of further violations.[15]

Several sophisticated military technologies are ‘black boxes’ in the sense that even their developers and operators cannot confidently predict the outcome. This is problematic for legal examination as required by Article 36 of Additional Protocol I to the Geneva Conventions. Without open explanations of the reasoning process behind AI or autonomous system decisions, this precludes legal accountability and moral justification.

14 Ioannis Kalpouzos, ‘Double Elevation: Autonomous Weapons and the Search for an Irreducible Law of War’ (2020) 33 Leiden Journal of International Law 289 <https://doi.org/10.1017/S0922156520000114>.

15 Isabelle Côté, ‘Internal Migration and Resource Conflict: Evidence from Riau, Indonesia’ (2021) 7 Journal of Global Security Studies ogab025 <https://doi.org/10.1093/jogss/ogab025>.

The increased reliance on machines in the decision to target puts the moral agency of human agents at risk. Deontological ethical principles focus on the importance of human dignity and the moral responsibility of human actors in war. Permitting machines to render life-or-death decisions trivializes the ethical concern that should attend deadly force and promotes moral disengagement. Besides, the use of technologies originally developed for humanitarian interventions in military contexts can risk diminishing the neutrality, impartiality, and independence principles underpinning humanitarian action. Dual-use technologies could render humanitarian actors subject to suspicion or retaliatory action and thus endanger civilian populations[16].

4.2 Technological Advancements and Compliance with International Law.

Though problematic, technological innovations can also facilitate IHL compliance if regulated and put into ethical use. It is paramount to be aware of how technology can be used to support, rather than undermine, humanitarian protection. The technologies applied in monitoring, big data analyses, and AI-enabled surveillance can facilitate enhanced compliance via real-time, precise information to commanders and legal professionals. This supports more fact-based proportionality and precaution in attack planning. Sophisticated imagery and biometric identification, for instance, would reduce misidentification and illegal targeting.

Machine learning computer systems and simulation software are being developed to assist with legal analysis of new weapons, along with training military officers in IHL principles. These systems can potentially raise awareness, offer standardization, and reduce the likelihood of human error in complex operational environments. Technologies such as digital forensics, satellite imagery, and blockchain-based evidence management systems are increasingly used to trace violations of IHL. This serves to improve the judicial process, particularly at the International Criminal Court or ad hoc tribunals, by making sound evidence collection and authentication.[17]

These possibilities are, however, based on robust governance, regulation, and norm-making. International cooperation is crucial in developing consensus regarding the regulatory law of emerging technologies. States must engage in transparency, peer review, and responsible military technology development and utilization according to IHL.

16 Aimee Van Wynsberghe and Tina Comes, 'Drones in Humanitarian Contexts, Robot Ethics, and the Human–Robot Interaction' (2020) 22 Ethics and Information Technology 43 <https://doi.org/10.1007/s10676-019-09514-1>.

17 Ian Stoner, 'Barbarous Spectacle and General Massacre: A Defence of Gory Fictions' (2020) 37 Journal of Applied Philosophy 511 <https://doi.org/10.1111/japp.12405>.

4.3. Judicial Interpretation and the Role of International Courts in Adapting IHL to New Technologies.

The increasing use of digital and automated technologies in the armed conflicts has subjected the International Humanitarian Law to significant interpretative difficulties, especially concerning the role of international courts in ensuring the relevance and soundness of its normative framework. As the new types of warfare are highly dependent on autonomous decision making systems and cyber attacks, judicial interpretation has emerged as one of the most important methods that allow the transformation of the existing humanitarian regulations into new operational contexts. Lack of extensive treaty regulation in those spheres makes international courts the forefront of legal adaptation that obliges them to provide an interpretation of traditional principles in the light of technological change instead of legal reform as a matter-of-course[18].

Among the most important consequences of new technologies is the issue of the implementation of core humanitarian principles, including distinction and proportionality. The autonomy of the weapons systems present a structural conflict with these principles and the delegation of combat decisions to technologies. In the cases where a system has the capability of identifying and interacting with targets with little or no direct human intervention, the courts have a challenge of determining whether the party is adhering to humanitarian duties that were initially based on human judgment. The use of autonomous technologies by judges in this regard is an attempt to maintain the normative content of International Humanitarian Law by highlighting the fact that the use of autonomous technologies would not substitute the relevance of current legal standards despite a different mode of implementation compared to traditional warfare approaches[19].

18 Badreldin Hamad, 'The Impact of Digital Technology on International Humanitarian Law: Ethical and Legal Implications of Autonomous Weapons Systems' (2026) 4 European Journal of Law and Political Science 1 <https://doi.org/10.24018/ejpolitics.2025.4.4.182>.

19 IV Zakharchuk, 'Adapting International Law to the Challenges of New Technologies: Artificial Intelligence, Autonomous Weapon Systems, and Their Regulation' (2025) 3 Analytical and Comparative Jurisprudence 398 <https://doi.org/10.24144/2788-6018.2025.04.3.58>.security law, and international criminal law – to ensure effective, ethical, and accountable regulation of military AI technologies. The study presents a systematic typology of legal risks associated with AI and AWS, including potential violations of the principles of distinction and proportionality under international humanitarian law, issues of legal attribution, gaps in state and individual responsibility, and the insufficiency of current export control regimes and institutional oversight mechanisms. \nSpecial attention is given to existing legal

The judicial interpretation of humanitarian law is also complicated by cyber operations as regards the categorization of armed conflicts. Indicators that are traditionally used to determine whether a situation constitutes a non-international armed conflict are the intensity and organization. However, cyber operations can have considerable strategic and operational impacts without physically destroying and killing people. The international courts must thus be involved in a functional evaluation of cyber operatives in terms of their overall effect and military intent and not just on the kinetic nature of the operatives. This interpretation method is based on an attempt to make sure that humanitarian law is not rendered irrelevant in the technologically mediated conflicts, leaving loopholes in the law due to the intangible character of cyber hostilities[20] .

The courts are also important in mitigating the accountability issues that new technologies give rise to. The arrangement of responsibility of autonomous and digitally mediated warfare makes the attribution of behavior and identification of actors responsible in law difficult. Using interpretative reasoning, courts reiterate the fact that the utilization of sophisticated technologies will not be used to excuse the states and individuals in their duties under the International Humanitarian Law. Judicial interpretation on the contrary, though, focuses on continuity in legal responsibility to ensure that accountability mechanisms develop with technological innovation, not be sabotaged by it.

Though the adaptation of judicial interpretation is possible, having courts as a main source of legal development is associated with some risks. The lack of consistent standards of regulation on new technologies can lead to the division of the interpretation of humanitarian norms, especially in scenarios where judicial forums have divergent interpretations. The inconsistency in the judicial logic on autonomy, human control and cyber operations threatens to disrupt legal certainty and decrease the protective role of International Humanitarian Law. This issue highlights the restrictions of judicial reinterpretation in the face of fast changing military technology [21].

instruments such as the Convention on Certain Conventional Weapons (CCW

20 ibid.security law ,and international criminal law – to ensure effective ,ethical ,and accountable regulation of military AI technologies .The study presents a systematic typology of legal risks associated with AI and AWS ,including potential violations of the principles of distinction and proportionality under international humanitarian law ,issues of legal attribution ,gaps in state and individual responsibility ,and the insufficiency of current export control regimes and institutional oversight mechanisms\ .nSpecial attention is given to existing legal instruments such as the Convention on Certain Conventional Weapons) CCW

21 Hamad (n 18).

Judicial interpretation is in answer to these difficulties becoming more and more intertwined with wider normative debates of reform. Courts are also involved in these debates indirectly by making statements in the form of interpretative standards which point to the need to subject hi-tech warfare to human control, ethical limits, and accountability. Although judicial authorities are not supposed to invent new treaty duties, their interpretative practice is significant in the development of the legal discourse of the regulation of autonomous weapons systems and cyber operations. In this respect, international courts are playing a stabilizing role, in the sense that International Humanitarian Law remains a consistent and efficient legal system despite the radical technological change [2223].

5. Case Studies.

In this section presents case studies that reveal how new technologies are shaping the practice and interpretation of international humanitarian law (IHL) in dynamic ways. In exploring the use of drones for targeted killings and cyber capabilities in warfare, the section illustrates how emerging tools are testing the boundaries of established legal norms.

The selected cases do not only reveal the difficulties in the operation but also indicate the legal conflicts which occur when the codified rule is outrun by the state practice, which can indicate which ways the development of new customary norms in the sphere of IHL may be possible.

These illustrations present empirical evidence about how state practice with emerging technologies can help to build customary law. The examples that have been selected illustrate the tensions between operational utility, humanitarian shelter, and legal obligation and help to cast further illumination on the evolving dynamic between technological innovation and the normative structure of IHL.

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22 ibid.

23 Zakharchuk (n 19).security law ,and international criminal law – to ensure effective ,ethical ,and accountable regulation of military AI technologies .The study presents a systematic typology of legal risks associated with AI and AWS ,including potential violations of the principles of distinction and proportionality under international humanitarian law ,issues of legal attribution ,gaps in state and individual responsibility ,and the insufficiency of current export control regimes and institutional oversight mechanisms\ .nSpecial attention is given to existing legal instruments such as the Convention on Certain Conventional Weapons) CCW

5.1 Drones and Targeted Killings.

The employment of unmanned aerial vehicles (UAVs), or commonly referred to as drones, in contemporary warfare has brought about grave legal and ethical debates. In targeted killings, the drones have been extensively used by states in counterterrorist operations, particularly in territories outside traditional battlefields. This has been a paradigm in the case of the United States drone wars in Pakistan, Yemen and Somalia whereby the strikes were usually launched without the consent of the host states.

This poses a challenge to the legality of such operations in relation to the international law and casts doubts on the scope of state sovereignty and the use of force. In the light of international humanitarian law, drones usage is subject to the principles of distinction, proportionality and the necessity. However, doubt arises whereby drone attacks are made in locations that are not formally covered in an armed conflict.

The distinction between legitimate combatants and civilians becomes more difficult to discern in those cases, and civilian deaths are a source of global concern. Drone technology, using constant and remote observation, provides enhanced capabilities for precise targeting, but their application in operation has not equally translated into greater protection for civilians.[24]As drone technology is more precise in terms of targeting, the fact that countless innocent people continue to die indicates that there is a discrepancy between the technological capability and the law, which questions the implementation of the current customary norms.

The widespread and general use of drones for targeted killings gives rise to questions regarding the emergence of new customary rules. Where different states make uniform patterns of conduct and legal arguments, and where these usages are accompanied by an opinion regarding their legality (opinio juris), they might lead to the evolution of customary international humanitarian law. However, opposition by other states and human rights organizations currently suggests that such convergence has not yet crystallized .this suggests that, despite the emerging patterns in the state practice, the divergence of the legal stands does not allow the crystallization of a new customary rule and there is a necessity to keep on observing the behavior of states.

24 Laurent Gisel, Tilman Rodenhäuser and Knut Dörmann, 'Twenty Years on: International Humanitarian Law and the Protection of Civilians against the Effects of Cyber Operations during Armed Conflicts' (2020) 102 International Review of the Red Cross 287 <https://doi.org/10.1017/S1816383120000387>.

5.2 Cyber Warfare.

Cyber operations represent one of the most advanced challenges to current perceptions of international humanitarian law. They can destroy essential infrastructure, impair military systems, or spread false data, all of which can take place without the physical destruction associated with conventional warfare. The 2007 cyber assaults on Estonia, and later other incidents such as assaults on the infrastructure of Ukraine, have been used to demonstrate the growing importance of cyber weapons in conflict today.

The main challenge to the applicability of IHL to cyber war is that of attribution, scale, and visibility of impact. In contrast to conventional weapons, cyberattacks are often launched anonymously and can have indirect or even delayed impacts. It makes it harder to determine when a cyber operation meets the test of an "armed conflict" or when it violates the principle of distinction. The indirect impact and anonymity of cyberattacks make it difficult to assign responsibility or determine liability, and this aspect can be difficult to fit within conventional mechanisms of defining customary norms on the basis of observable state practice.

Secondly, the infrastructure will often be dual-purpose, and proportionality calculations become difficult.

Recent academic and institutional efforts, according to the International Committee of the Red Cross, indicate the inadequacy of current legal regimes to meet the innovative nature of cyber threats. to the fact that current interpretations of IHL are not sufficiently directed toward safeguarding civilian populations against the humanitarian effects of cyberattacks and urge states to clarify and reaffirm the application of the principles of IHL to the new domain .

Similarly, the development of cyber-enabled autonomous lethal weapons also raises fundamental issues of explainability, traceability, and human accountability.

The use of autonomous cyber-enabled weapons also points to possible accountability failures, meaning those areas in which customary norms require reinterpretations to meet the requirements of the IHL principles. inbuilt accountability processes within IHL may be undermined. It is necessary that these systems remain under human command and oversight and are subject to legal review to uphold the integrity of international humanitarian norms[25] .

Although treaty law has yet to catch up with technological reality, growth in customary law remains a possibility, founded on continuing state practice and interpretive consensus. In the cyber environment, however, states are

25 Edward Hunter Christie and others, 'Regulating Lethal Autonomous Weapon Systems: Exploring the Challenges of Explainability and Traceability' (2024) 4 AI and Ethics 229 <https://doi.org/10.1007/s43681-023-00261-0>.

reluctant to reveal how extensive their activities are, and therefore obstructive the openness required for good customary norms to be established. The future of cyber-governance-related IHL may well lie with greater international cooperation and the development of soft law instruments to structure norm development.

Overall, these case studies have demonstrated that technological advances are transforming the realities of operations, but the establishment of traditional international humanitarian law is based on the convergence of the state practice and legal argumentation. The existing gaps highlight the necessity to engage in international collaboration and academic leadership to adjust the IHL to the modern conflict.

6. Institutional and Legal Mechanisms for Regulating Autonomous Technologies.

This part reflects on the institutional and legal responses to the growing use of autonomous weapon systems (AWS) under international humanitarian law (IHL). It starts with Article 36 of Additional Protocol I that is the only binding provision states take into account new weapons. It further explains the technical issues of implementing this rule to AI-based systems.

It is also the section that evaluates the contribution of the Group of Governmental Experts (GGE) under the CCW, as well as the shortcomings of the soft law in regulating the emerging technologies. Through this type of analysis, the section questions whether the present legal systems are adequate to address the issues of AI in war and why an increase in binding international mechanisms is justified.

6.1 Article 36 of Additional Protocol I: A Legal Review Obligation.

Article 36 of Additional Protocol I to the Geneva Conventions obligates states to conduct a legal review of any new weapon, means, or method of warfare to determine its compliance with international law. This need, although adopted in 1977, has gained new relevance in the era of autonomous weapon systems (AWS) since it is today the only binding international legal obligation that specifically demands pre-deployment assessments of new technologies. It is a gatekeeping step that seeks to ensure compliance with customary and treaty-based international humanitarian law (IHL) before new military capabilities are used on the battlefield .

Despite its clear legal requirement, applying Article 36 to AI-driven systems is extremely challenging. The complexity of machine learning

technologies and their adaptive character require an interdisciplinary approach to review, including technical, ethical, and legal views. Most states have either institutional or technical inefficiencies in inspecting the performance of autonomous systems under different scenarios on the battlefield. Specifically, it is uncertain how Article 36 reviews can sufficiently consider dynamic AI systems, whose functionality can change post-deployment due to the input and information processing in real-time. Secondly, the review process tends to be non-transparent and states do not present criteria, methods, and results. This discourages the legitimacy of the review mechanism as well as the growth of coherent international standards. With no additional harmonization and pressure, Article 36 will be made a nominal safeguard, formally adhered to but substantively irrelevant. Yet it is a necessary first step in the regulation of AWS deployment, since it codifies the principle that legal review should precede technological use in warfare[26] .

6.2 Challenges in Implementing Article 36 Across States.

Although Article 36 constitutes a binding obligation, its implementation is extremely variable between states. Whereas some have established robust national weapons review procedures, others have either delayed institutionalization or withheld information regarding their procedures. This lack of such consistency is generating wide variations in how AWS technologies are reviewed legally before they can be deployed. Non-disclosure of national review procedures also discourages comparative analysis, eroding confidence and making international cooperation more difficult .

These inequalities are compounded by the absence of a shared methodology. Recommendations from humanitarian and legal bodies exist but are non-binding and largely underutilized. Where states do carry out such reviews, they may be confined to assessments of physical properties of a weapon system—such as range, payload, or duration—without addressing the broader implications of algorithmic operation or the ability of the system to distinguish between lawful and unlawful targets. Such a narrow focus is inadequate in the case of AI-driven weapons that are capable of operating independently and taking context-dependent decisions.

The other perplexing situation is the lack of technical knowledge in legal review institutions. To ensure a successful implementation of the Article 36 in the era of AI, one should involve experts in the field of artificial intelligence, ethics, and battlefield simulation. Nonetheless, at most the internalization

26 Evhen Tsybulenko and Aleksi Kajander, 'Customary International Humanitarian Law and Article 36 of Additional Protocol I to the Geneva Conventions: A Stopgap Regulator of Autonomous Weapons Systems?' (2022) 12 TalTech Journal of European Studies 87 <https://doi.org/10.2478/bjes-2022-0013>.the law governing such systems in the scope of international humanitarian law) IHL

of such experience into current review processes is spotty. This gap within institutions is a risk factor that AWS will be passed to be deployed without clear issues on the questions of legality, accountability, and humanitarian effects[27] .

To close these gaps, some calls for the application of international standards that would harmonize the review process, render it more transparent, and promote shared legal standards have been made. Without such efforts, this disparity in application not only weakens Article 36's regulatory function but also normative fragmentation in IHL more broadly.

6.3 CCW's Group of Governmental Experts (GEE) Role.

One of the primary diplomatic platforms on which the legal and ethical aspects of AWS are addressed is the Convention on Certain Conventional Weapons (CCW). In this context, the Group of Governmental Experts (GGE) was mandated with the examination of potential regulatory measures. Since its formation, the GGE has conducted state-level discussions and a list of guiding principles to design the formation and application of AWS in the framework of IHL.

Some of the most important principles include maintaining human responsibility, adherence to the current IHL and demand of human contribution in force decision-making. Among the key principles are preserving human responsibility, compliance with existing IHL, and the requirement of human input in decisions to use force .

Despite these normative advances, the GGE has been confronted with structural and political challenges. Its consensus-based decision-making process enables any participating state to veto any further movement. This has allowed major military powers—particularly those with large investments in AWS—to resist demands for binding legal agreements. The result is a stalemate: while there is broad agreement on the imperative of legal compliance and human control, there is no agreement on how these goals are to be encoded and translated.

However, the GGE has been contributing positively to the normative arena. Its history of state office can educate the new state practice and the shaping of the progressive creation of the customary international law.. The GGE's proceedings also create pressure for transparency and public accountability, if not for binding legal commitments. Lacking the mandate, however, to mandate treaty negotiations or enforce compliance, the GGE's prospects for achieving substantive legal change are limited [28].

27 ibid.the law governing such systems in the scope of international humanitarian law (IHL

28 Agnieszka Szpak, 'Artificial Intelligence and International Humanitarian Law in the Work of the Parties to the Conventional Weapons Convention: Lethal Autono-

There are growing demands for a shift from voluntary forums to formal treaty processes, possibly within the UN General Assembly. The GGE, however, is a useful vehicle for shaping soft law and maintaining open lines of communication in a highly polarized legal environment.

6.4 The Limits of Soft Law and the Need for Binding Instruments.

The soft law mechanisms developed over the past few years—political statements, non-binding principles, and expert reports—have helped initiate international discussions on AWS regulation. These instruments are adaptable and inclusive, allowing broad participation and evolving norm development. Their limitations are becoming increasingly clear, however. Soft law is not enforceable, consistent, or invested with the legal authority to bind states to particular conduct, particularly on issues involving national security and military doctrine .

Practically, the fragmentation of state practice and interpretation undermines the consistency of international norms. States interpret soft law principles either as moral imperatives or as non-binding political statements. Absence of consistent interpretation weakens their regulatory function. Moreover, in the lack of formal accountability mechanisms, nothing much prevents violations or guarantees that autonomous systems are confined within IHL boundaries.

With the increased sophistication and spreading of AWS, most people claim that a binding international treaty is the way forward. The proposals are ranging between an extra protocol to the Geneva Conventions or a new independent treaty under the UN but basically on the subject of AWS, AI-based targeting, and algorithm decision-making in warfare. Such an instrument would need to set out the scope of prohibited conduct, detail minimum levels of human control, and outline verification and enforcement arrangements.

Until such legal instruments are adopted, soft law remains an important but ultimately unsatisfactory foundation for the governance of AI-enabled warfare. The normative gap between technological possibility and legal safeguard is growing, placing the humanitarian aims of IHL in serious peril[29] .

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mous Weapons' in Michał Balcerzak and Julia Kapelańska-Pręgowska (eds), *Artificial Intelligence and International Human Rights Law* (Edward Elgar Publishing 2024) <https://doi.org/10.4337/9781035337934.00023> accessed 25 June 2025.

29 'UNIDIR. (2021). The Regulation of Autonomous Weapons: A Legal and Policy Framework for the Future. Geneva.'

6.5. Between Custom and Hybrid Normativity: Does Customary IHL Still Have a place in the regulation of AI Warfare?

The growing use of artificial intelligence in modern military conflicts has brought about the underlying reevaluation of the ability of the traditional International Humanitarian Law to govern new types of warfare. Traditional IHL has traditionally been based upon the progressive fusion of state practice and a sense of legal duty, which in turn assumes a level of transparency, predictability and human agency in the way hostilities are conducted. Introducing opaque and self-learning AI systems into the military decision-making world overturns these assumptions and casts grave doubts on whether customary IHL, as it has been traditionally understood, is still suitable to regulate AI-driven warfare [30].

The level of AI model transparency in the military domain is also one of the greatest obstacles that face customary IHL in this sense. The sophisticated algorithmic systems are commonly black box-like in nature, with their results inaccessible or unintelligible to even its programmer. Such lack of transparency directly goes against the foreseeability to comply with humanitarian obligations. Customary IHL presupposes that parties involved in a conflict can predict the effects of their actions and modify their behavior respectively. In cases where the AI system makes targeting or engagement decisions via a complex and non-transparent mechanism, this assumption holds less ground, and thus, the practical enforceability of customary norms is hampered[31].

Very similar to this issue is the intricacy of AI-based decision-making on the battlefields. In comparison with conventional weapons systems, AI-driven platforms can process large amounts of information and can change dynamically as circumstances change. Though this technological capability has benefits on the efficiency of operations, it also brings up the question of how the system can appropriate contextual factors that form part of legitimate conduct in IHL like the subtle determination of military necessity, distinction, and proportionality. The existing technological constraints indicate that AI systems do not include the contextual and moral reasoning to ensure that these principles are always applied to complex situations on battlefields, creating an institutional disconnect between customary legal norms and technological facts[32] .

30 Jonathan Kwik and Tom Van Engers, 'Algorithmic Fog of War: When Lack of Transparency Violates the Law of Armed Conflict' (2021) 2 Journal of Future Robot Life 43 <https://doi.org/10.3233/FRL-200019>."plainCitation":"Jonathan Kwik and Tom Van Engers' ,Algorithmic Fog of War :When Lack of Transparency Violates the Law of Armed Conflict2021) '

31 ibid.weapon capabilities and their use are regulated by legal requirements set by International Humanitarian Law) IHL

32 Elliot Winter, 'The Compatibility of Autonomous Weapons with the Principles of International Humanitarian Law' (2022) 27 Journal of Conflict and Security Law 1

These problems have led to a new debate on the adaptability of customary IHL. In the past, customary norms have been found to possess a certain flexibility in adapting to new forms of warfare where the majority of state conduct, and legal recognition intersect. The development of the legal norms that address the cyber activities offers a comparative framework. The evolution of interpretative direction with respect to cyber-attacks is an example of how customary IHL can be applied to new areas of conflict by a process of normative reinterpretation instead of by treaty amendment [33]. This experience leads to the inference that customary law is not necessarily fixed but can be altered in the face of technology, in some circumstances.

This debate is further informed by the concept of accelerated customary formation which is usually linked to the events of radical change in warfare. The radical transformation of the means and methods of war can trigger the swift proliferation of new customary norms through the compression of the time-honored time needed by the traditional state practice and legal belief. In this regard, the increasing militarization of artificial intelligence might become a historical event that can alter the boundaries of the conventional IHL. Nonetheless, the actualization of such development lies in the degree to which states can express definite legal stands on the occasions that AI is legally allowed in armed fight and are inclined to follow such standpoints in action [34].

Although this is possible, there are still numerous challenges. The lack of uniformity of technological capabilities that states have makes the establishment of the similar customary norms in the area of AI warfare more difficult. The states that have a high level of AI might be unwilling to sign restrictive understandings of customary law that might constrain their strategic benefits, whereas technologically inferior states might not have the ability to make their presence in the practice influential enough to affect the formation of norms. Such imbalance has the danger of generating piecemeal or incomplete customary standards thus threatening the integrity and uniformity of customary IHL[3536] .

The developments indicate a point of emergence of a shift to a hybrid normative framework with the attributes of the customary law, interpretative guiding and new emerging principles of regulation. Instead of replacing <https://doi.org/10.1093/jcsl/krac001>.

33 Iradhati Zahra and Diajeng Wulan Christianti, 'THE BEGINNING OF THE INTERNATIONAL HUMANITARIAN LAW APPLICATION TO CYBER ATTACK: THE STATUS OF RULE 30 TALLINN MANUAL 1.0' (2021) 5 Padjadjaran Journal of International Law 98 <https://doi.org/10.23920/pjil.v5i1.366>.International Humanitarian Law) IHL

34 ibid.International Humanitarian Law) IHL

35 Winter (n 32).

36 Kwik and Van Engers (n 30).weapon capabilities and their use are regulated by legal requirements set by International Humanitarian Law) IHL

traditional IHL, this hybrid strategy is indicative of trying to retain the traditional humanitarian values of the approach but complement its shortcomings by developing an adaptive approach to interpretation and normative innovations. Such hybrid normativity can be a more realistic way to hold accountability and comply than customary law can do on its own in the context of AI warfare [37].

Finally, whether the customary IHL can be applicable in AI warfare is a question that cannot be answered absolutely. As its basic framework is under greater pressure than ever before because of technological intransparency as well as complexity, its built-in flexibility offers grounds of apprehensive hope. But without conscious endeavors to explain the expectations of laws and bring forth the new realities of technology, traditional IHL will become even more divorced with the behavior that it is attempting to govern. The historical shift between traditional custom and hybrid normativity, therefore, does not seem to be a disregard of customary law, but it is a required adaptation to ensure its relevance in the era of artificial intelligence.

7. AI and the Future of Customary Norms in International Humanitarian Law.

The section examines the role of artificial intelligence (AI) on the development and use of customary international humanitarian law (IHL). It takes into account the challenges that AI presents to the key aspects of custom- state practice and opinio juris. It additionally evaluates the impact of AI on fundamental IHL principles including distinction and proportionality, especially when there is a diminished human control.

The part wraps up by reflecting on the possibility of the emergence of new customary principles to govern AI use in armed conflict, as well as the ability of IHL to adapt in the context of the accelerated advancements in technology.

7.1 Customary Law Under Strain: Autonomy and Opinio Juris.

Establishment of customary international humanitarian law (IHL) is based on two inseparable pillars that include constant state practice (usus) and the perception that practice is legally binding (opinio juris). Yet the development of artificial intelligence (AI) and its incorporation into autonomous weapon systems (AWS) place both aspects under enormous strain. AI weapons are typically developed by states secretly, and their use is neither transparent nor readily assessable. Without transparency or general revelation, it is virtually impossible to identify state behavior patterns that would satisfy the demands

37 Winter (n 32).

of usus.[38]

Likewise, the broken global consensus on AWS undermines opinio juris. While some states advocate permissive use based on military necessity, others call for tight control or outright ban. These opposing legal and ethical approaches thwart the emergence of a shared conviction of legal obligation. Moreover, AI systems erode attribution and legal responsibility whereby the decision-making mechanisms may be inexplicable or rely on likely results to isolate human judgment in the use of lethal force.

The secrecy surrounding AI software, the absence of shared operational data, and the absence of a clear consensus on legal norms collectively frustrate the formation of new customary norms. Thus, customary IHL's ability to keep pace with technological progress is jeopardized. The traditional driver of norm creation is now confronted with a digital environment wherein neither visibility nor agreement can be easily obtained .

7.2 Distinction, Proportionality, and Human Oversight in AI-Based Warfare.

The principles of distinction, proportionality, and precaution are the foundation of international humanitarian law (IHL), particularly in their customary international law form. These principles are meant to ensure that parties to an armed conflict differentiate between civilians and combatants, do not cause excessive collateral damage, and take all feasible precautions before launching an attack. The development of artificial intelligence (AI) in weapon systems threatens the operational and legal accuracy of these principles.

The use of autonomous weapon systems, which have been programmed to choose and attack targets according to the preset parameters, has a chance of meeting the formal requirements but will be unable to consider the moral and circumstantial ranges of a battlefield setting. One legitimate point is that an IHL-consistent target may be ethically questionable in a certain situation, which again cannot be evaluated by AI systems as they are today. Such deficiency weakens the ethical foundation, in which the principles of proportionality and distinction are base.

The use of AI to surveil and target also erodes the requirement of human oversight. While some frameworks propose a model of "human-in-the-loop" or "human-on-the-loop," rapid decision-making in automated systems increasingly marginalizes human input. Without substantial oversight, accountability gaps occur, particularly when harm is inflicted through errors in target identification or system failure.

38 Yatish Ojha, 'Artificial Intelligence in Armed Conflict: Perspectives from International Humanitarian Law' (2025) 6 Unity Journal 34 <https://doi.org/10.3126/unityj.v6i1.75547>.

With growing reliance on AI, the normative content of these principles is liable to be undermined. The norms that were hitherto based on quintessentially human abilities—like empathy, moral judgment, and contextual understanding—are progressively being transferred to algorithmic logic. Short of developing viable legal frameworks for introducing human oversight and ethical alignment, the very character of such customary norms can be diluted beyond recognition[39].

7.3 Ethical and Interpretive Challenges in Autonomous Systems.

The employment of autonomous weapon systems (AWS) raises inherent ethical and interpretive issues that transcend traditional legal analysis. While existing international humanitarian law (IHL) offers a principles-based framework of humanity, necessity, and proportionality, these principles presume an ability for moral and contextual judgment, qualities paradoxically human in nature. AI systems, however advanced, have no genuine moral judgment or ability to assess ethically complex situations.

One immediate challenge concerns accountability in ethically demanding situations. On battlegrounds, combatants are often faced with life-and-death decisions within a matter of seconds that are determined not only by legal factors but also by moral intuition. Machiating such choices to machines will jeopardize the humanization of war and eroding some ethical brakes built in customary standards of IHL. Hermeneutic uncertainty is also created when AI systems operate in an unpredicted manner by their developers or customers, especially where the environment is dynamic, unstructured, or sparse in data.

In these cases, it is questionable whether the accountability should be given to the programmer, the deploying state, or the autonomous processes of the machine. This diffusion of responsibility undermines both the legal and moral basis of IHL. With more complex and autonomous AI systems, the gap between legal norms and technological capacity widens. In the absence of ethical governance frameworks that underpin human oversight and accountability, autonomous warfare could normalize conduct that would otherwise be stigmatized under existing customary law.

7.4 Possibilities for Emerging Customary Norms for AI Warfare.

As artificial intelligence (AI) continues to revolutionize modern conflict, there is a possibility that new customary norms will emerge to explicitly regulate its use. Customary international humanitarian law (IHL) arises from habitual state practice combined with a conviction of legal obligation. Although AI unsettles these bases, it can also serve as a driver for innovation in legal norms. Signals

39 'UNIDIR. (2021). The Regulation of Autonomous Weapons: A Legal and Policy Framework for the Future. Geneva.'

of state positions in diplomatic forums, research by international organizations, and embryonic best practices suggest the beginning stages of norm development for AI-enabled warfare .

Certain norms—such as the requirement of meaningful human control, the insistence on legal accountability, and the prohibition of indiscriminate attacks—are increasingly mirrored in state and institutional announcements. Although such announcements are not yet reflected in binding law, they can build up over time to opinio juris, particularly where increased number of states start to translate such norms into national practice or by showing support towards them in a multilateral context. Furthermore, military alliances can be viewed as a means of instilling habitual behavior in states through transparency in reviewing arms, a common set of moral norms and interoperability.

Yet, the emergence of new customary norms is hindered by technological asymmetry, political divisions, and disputes regarding the interpretation of legal obligations. Some states treat AI in warfare as a continuation of existing legal regimes, while others insist that completely new regimes are required. Without convergence in state practice and legal argument, norm emergence remains fragmented.

Yet, the engagement of states and international actors in current debates illustrates that there is a recognition of the need for normative evolution. If current trends continue—particularly through fora like the CCW and UN processes—AI warfare can pave the way not only for the innovation of new technologies, but also for the innovation of new norms that can address the moral and operational dilemmas of autonomy[40].

40 'UNIDIR. (2021). The Regulation of Autonomous Weapons: A Legal and Policy Framework for the Future. Geneva.' (n 29).

8. Conclusion.

This paper has traced how emerging technologies such as drones, autonomous weapon systems and cyber war are altering the boundaries of the conventional postulates of international humanitarian law (IHL).

Technological innovation under situations of armed conflict has raised piercing questions regarding the adequacy, elasticity, and responsiveness of customary IHL. While the underlying rules of distinction, proportionality, and humanity remain the building blocks, their application in technologically mediated conflict often runs into interpretive and operational challenges.

The descriptive-analytical method has enabled it to investigate systematically how opinio juris and stable state practice are influenced by new weapons of war. It has been revealed that some state practices involving new technology are potentially creating emerging customary norms, but consensus remains limited and sporadic. Additionally, non-state actors, increasing roles of private sector technologies, and decentralized cyber operations make it even more challenging to attribute and examine IHL legal obligations.

Hence, customary IHL is in a bind: either it must be interpreted broadly enough to encompass new technologies of warfare, or additional instruments must be developed to fill normative gaps that current customs could not easily cover.

9. Recommendations.

1. Elucidate Customary Norms for New Technologies:International organizations such as the ICRC and UN have to organize specialized consultations to explain how current customary norms apply to new technologies like AI weapons and cyber operations.
2. Develop Open State Practice:States should promulgate and share their functioning doctrines related to emerging technologies in the context of armed conflict to enable coherent customary practices to develop.
3. Enhance Military and Tech Designer Legal Training:Legal advisers and tech designers should receive reciprocal training to ensure that new systems conform to IHL in the beginning.
4. Authorize Normative Codification Processes:States should consider normative openness in practice and opinion juris by making treaties, interpreting normative ambiguity.
5. Stimulate Multidisciplinary Investigations:Legal scholarship

ought to cover the domains of ethics, computer science, and military research to formulate subtle frameworks of comprehending how contemporary technology approaches conventional IHL.

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