



**RIGA
GRADUATE
SCHOOL OF
LAW**

Taking the ‘human’ out of humanitarian?

States’ positions on Lethal Autonomous Weapons Systems from an International Humanitarian Law perspective

MASTER’S THESIS

AUTHOR:

Henrik Neth

LL.B 2018/2019 year student

student number M018072

ILZE TRALMAKA

SUPERVISOR:

LL.M

DECLARATION OF HONOUR:

I declare that this thesis is my own work, and that all references to, or quotations from, the work of others are fully and correctly cited.

(Signed)

RIGA, 2019

Summary

Lethal autonomous weapons systems (LAWS) are an up-and-coming technology and therefore of interest for some states to do research on it. Often these states point out the advantages autonomous weapons systems may have. For example, is a higher accuracy envisaged when engaging with targets autonomously. Furthermore, is predicted that it will make missions for own troops safer when accompanied, supported or even replaced by an autonomous system. Yet, many states oppose the ideas of having weapons deployed that do not have human control. In 2017 there was a forum introduced where all states equipped with a mandate and other stakeholders could come together and discuss issues about LAWS. This forum was established by the United Nations more specifically under the auspices of the Convention on Certain Conventional Weapons. States' concerns are often political when stating that the proliferation of LAWS would lead to an increase in resorting to violence for smaller conflicts and not resolving it by peaceful means. Furthermore, are moral concerns issued by several stakeholders. This regards especially the killing of human beings by machines without humans having control over it. Lastly legal issues are also raised when it comes to compliance with humanitarian law. Since this is a starting point for further discussions on banning or regulating LAWS the underlying research is focused on that part. Therefore, the research question of this thesis asks: ***In how far are lethal autonomous weapons systems in compliance with international humanitarian law and how strict is it interpreted by individual states?***

After the review of existing literature on weapons and what role they play for states in the international arena two hypotheses are established. On the one hand is the realist view on international relations and their urge to rely on power politics discussed and on the other the liberalist view which builds on cooperation. Henceforth it is hypothesized that States incorporating a realist view on international relations favor a laxer approach when interpreting humanitarian law in the context of LAWS or a possible ban. The liberal view is expected to favor a stricter approach on regulation and interpreting humanitarian law.

Autonomous weapons are conceptualized in a further step. They have three essential characteristics which are human involvement, sophistication of the technology and the functions LAWS have. The first one distinguishes between remote controlled systems, those that need targets and operate under human oversight, so they have the possibility to abort a mission, and those that perform the tasks fully autonomous which need only an input about the objectives and produce an output. The second characteristic is about the sophistication of autonomous technology. This could be systems ranging from simple if-then equations, where

one particular situation is linked to one behavior, to self-learning intelligent systems that learn acquire an own set of behavior. Further are LAWS differentiated when it comes to their functions. Whereas the crucial function of targeting is the most important in this research.

In the legal analysis international humanitarian law (IHL) is consulted and LAWS are analyzed if they are in compliance with it. The legal framework which could be found mostly in the Additional Protocol I to the Geneva Convention of 1949. LAWS and new weapon systems in general that is planned to be deployed on the battlefield must be evaluated on certain factors. Firstly, it cannot cause excessive injury or unnecessary suffering. Furthermore, are weapons not permissible in warfare that have indiscriminate effects and would harm all humans regardless of their status in international armed conflict. With that principle comes a whole subset of other conditions that have to be fulfilled. One is distinction between combatants and the civilian population or those hors de combat i.e. unable to fight. Also, proportionality has to be ensured in case an operation has military necessity and may cause collateral damage. Yet the principle of precaution must also be respected and possible operations with changed or unclear outcomes must be aborted. Yet there is also an environmental consideration where weapons cannot destroy the environment especially that needed by the population to survive. The Martens Clause is also consulted which includes the notions of principles of humanity and public conscience when examining a weapon. Nonetheless, the review of humanitarian law did not establish that LAWS must be banned. At the state of the art and near future development the weapons systems apply force through conventional means for example a simple payload in missiles. Moreover, did the Martens Clause not have effect because it applies only to cases not covered by the aforementioned Additional Protocol I.

The views of the countries differ much. The four countries analyzed have different takes and preferences when it comes to LAWS and what they expect from these systems. This ranges from distrust in the capabilities of technology to ethical considerations. However, on the side of the proponents of LAWS the regulation by the current framework was emphasized as being the most effective control at the moment and the need of a preemptive ban was rejected. Thus, the hypotheses cannot be confirmed, and a more thorough analysis would be needed to predict the positions of individual states.

Inhalt

Summary	2
Abstract	5
List of abbreviations	5
List of Annexes	6
1. Introduction	7
1.1. The issue with lethal autonomous weapon systems	7
1.2. Scientific and societal relevance of research in the field of lethal autonomous weapon systems	9
1.3. Research question	10
2. Chapter 1	12
2.1. Theory	12
2.1.1. Theoretical framework	13
2.1.2. Conceptualization	19
2.2. Methodology	24
2.2.1. Research design	24
2.2.2. Case selection	26
3. Chapter 2	30
3.1. The issue with lethal autonomous weapon systems	30
3.2. Legal background	34
3.3. Legal analysis	42
3.4. Conclusion	47
4. Chapter 3	50
4.1. Austria	50
4.2. Cuba	51
4.3. Australia	52
4.4. Israel	52
4.5. Conclusion	53
5. Chapter 4	55
5.1. Discussion	55
5.2. Final conclusion	57
Bibliography	58
Primary resources	58
Secondary resources	59
Scholarly works	59
Non-scholarly works	60
Annexes	63

Annex I.....	63
Annex II.....	64
Annex III	65

Abstract

Lethal autonomous weapons systems (LAWS) have experienced a further development throughout the last years. Despite coming with certain advantages such as reducing the risk for casualties for the own troops many states are concerned about their development. The nature of concerns is of political, legal and ethical nature. So far under the auspices of the UN Convention on Certain Conventional Weapons was already a forum established where states can exchange their views on LAWS. However, is it crucial to legally examine LAWS prior to their deployment or possible use. If these weapons would fail a legal assessment under humanitarian law, they would be banned from international armed conflict. Two hypotheses how states' positions on LAWS get shaped are developed and analyzed. Both are depending on their general take in international relations. However, at first this research examines and conceptualizes the characteristics of autonomous weapons and conducts a legal analysis on humanitarian law. LAWS are characterized by their amount of human control, sophistication of autonomy, and functions they have. Eventually the legal analysis does not find violations of humanitarian law for autonomous weapons. Also, the views of states on LAWS are manifold and do not show an approval of the hypotheses.

List of abbreviations

AI	Artificial Intelligence
API	Additional Protocol I to the Geneva Convention of 1949
CCW	Convention on Certain Conventional Weapons
DARPA	Defense Advanced Research Projects Agency
EU	European Union
GDP	Gross Domestic Product
GGE	Group of Governmental Experts
ICC	International Criminal Court
ICRC	International Committee of the Red Cross

ICTY	International Criminal Tribunal for the former Yugoslavia
IHL	International Humanitarian Law
LAWS	Lethal Autonomous Weapons Systems
NATO	North Atlantic Treaty Organization
NAM	Non-Aligned Movement
NGO	Non-Governmental Organization
PAL	Personal Assistant That Learns
SIPRI	Stockholm International Peace Research Institute
UAV	Unmanned Aerial Vehicle
UCAV	Unmanned Combat Aerial Vehicle
VCLT	Vienna Convention on the Law of Treaties
WCA	Weapons Cooperation Agreements

List of Annexes

Annex I	Case selection
Annex II	Weapons treaties
Annex III	Working and position papers

Master Thesis

1. Introduction

1.1. The issue with lethal autonomous weapon systems

In a September night 1983 a young military officer was on duty to monitor the Soviet airspace. Once in a sudden the computers issued a post signaled warning that the United States had fired five missiles with nuclear warheads towards the Soviet Union.¹ The assessment the computer gave was of highest certainty indicating that the missiles had actually started. The standard protocol of procedure had foreseen a massive retaliation with mutual assured destruction of the belligerent in case of such an attack. Although officer Stanislav Petrov was under pressure to make a decision since the computer predicted the missiles launched, a possible World War III was on the table. However, the young officer opted for not reporting the incident to Moscow and assuming an error in the computer program. Eventually Petrov assumed that the United States would rather fire several hundreds of missiles in case of an attack on the Soviet Union than just five. It turned out that the system misinterpreted images of sunlight reflected on clouds for rocket engines which the computer could not separate from each other. Therefore, the officer is known today by some as “the man who saved the world”.²

This anecdote shows what grave consequences a situation could have caused where it would have been solely relied on technology. Such a flaw in a computer program that misinterpreted information fed to it falsely could have resulted in World War III. Today, one could argue that the systems of today are more advanced, and this incident would not happen nowadays. After all, civilization is evolving from the third industrial revolution to the fourth one, meaning the development from computers and automation to communicating and learning systems. Yet it is one thing to replace a worker on an assembly line but another when a decision has to be made about life and death of human beings. In recent years there can be witnessed a development in terms of arms systems owed to the technological progress. Lethal autonomous weapon systems³ or LAWS in short are arms that have a wide range of autonomy and human oversight depending on the kind of weapon. However, raises the possible use of some of these systems several legal, political and also ethical questions.

¹ Oliphant, 2017.

² Ibid.

³ Also referred to as “lethal autonomous weapons systems”.

Nonetheless modern weapon systems are also not free from error as in the case of 2007 South Africa. An Oerlikon GDF-005 anti-aircraft twin-barreled gun which the South African National Defense Forces were using in a military exercise was malfunctioning and shooting on own soldiers. It was set in automatic mode and fed data for selecting targets directly to the fire control unit.⁴ In the end the gun killed ten soldiers and wounding several possibly due to a glitch in the computer program.⁵ Finding the cause for the erroneous decision may not be the problem as it becomes clearer at a later stage of this thesis, but it highlights the issue that even when fed with data about the operational environment these systems are not yet fully reliable. Further, shows this malfunctioning of such a weapon that computer-based weapon systems can be faulty out of several reasons and may have dire consequences if so. Though, it must not be neglected that the usage of new weapon technologies comes with a military advantage for the owner.

Both examples mentioned above were just emphasizing the negative consequences computer-based systems might bring along when in use. Yet not everyone shares such a dystopian view when it comes to LAWS but rather point out the advantages these systems can have as well. For once there are military advantages like the cost factor since they are cheaper to acquire, train and maintain than actual soldiers.⁶ Further are LAWS better suited for “dull, dirty or dangerous’ missions”.⁷ These include inter alia long lasting missions where mental and physical strength of soldiers are likely to decrease over time, contaminated environment or bomb disposal. In terms of moral advantages comes into play that autonomous systems can act more humanely when deployed. This could be that robots know no emotions or make irrational decisions under stress. Especially when regarding that robots do not have a self-preservation instinct which may eliminates “the need for a “shoot-first, ask questions later” attitude”.⁸ Also is it more likely that robots will rather report infractions on the battlefield of the own troops than maybe men that share an esprit de corps would do.

However, skepticism towards LAWS outweigh the advantages so far when looking at a global level. For once there is the United Nations body that holds discussion rounds for a potential regulation under the auspices of the Convention on Certain Conventional Weapons (CCW). Furthermore, raised the issues about LAWS awareness among non-governmental organizations (NGOs) across the globe which monitor international development of LAWS and call for a ban

⁴ Shachtman, 2007.

⁵ Ziegler, 2007.

⁶ Etzioni & Etzioni, 2017.

⁷ Ibid, p. 72.

⁸ Ibid, p. 74.

like the NGO PAX.⁹ Their concerns are partially guided in a normative manner when pleading that machines should not make decisions over life and death as this goes against human dignity. Further concerns are doubts if lethal autonomous weapons can adhere to international humanitarian law (IHL). This issue can by a possible infraction also pose the question of accountability for such actions. Additionally, there are concerns about security related topics for example that the development of LAWS might “lower the threshold for the use of force [...] [and] [reduce] the incentive to find political solutions to end conflicts”.¹⁰ Thus, the development and possible use of LAWS is not a point where there was reached general consensus yet.

1.2. Scientific and societal relevance of research in the field of lethal autonomous weapon systems

Since the issue of LAWS are ongoing and still in discourse it can be of great use for further debate to conduct research in this field. Overall this study aims to examine legal questions underlying autonomous weapons, specifically the relation between LAWS and humanitarian law.

After all, there is also no consensus between states, as some strongly oppose lethal autonomous weapons whereas others advocate for a liberal stance in terms of development and deployment of such systems.¹¹ Yet when it comes to legal terms the compliance with international humanitarian law is crucial in order to use LAWS. Especially Article 36 Additional Protocol I to the Geneva Convention¹² is the breaking point for autonomous weapons. The article presents a procedure to legally assess new kinds of weapons that are not yet regulated under IHL. So, since all countries have their own arguments why to call for a ban or opposing a possible ban, some have also based their legal arguments in relation to Article 36 AP I Geneva Convention.

Yet an analysis of how different states handle LAWS would be beneficial for further scientific usage. Such an analysis could help to further shape the definition of LAWS under IHL terms and provides to the topical discourse of a definition under Article 36 AP I Geneva Convention. This can again be used for adjacent research or incorporated when forming a legal argument. So far, there exists a report of PAX¹³ which analyzed country views on LAWS. Nonetheless

⁹ Kayser & Denk, 2017.

¹⁰ Kayser & Denk, 2017, p. 14.

¹¹ Campaign to Stop Killer Robots, 2018.

¹² Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I). 1977.

¹³ Kayser & Denk, 2017.

this report only does focus on European states. It will also provide a digest of certain states on one side advocate for a ban and some on the other side for a liberal take on LAWS which can be consulted by scholars or an audience interested in the issues of lethal autonomous weapons. Since in this field there is much literature but mostly spread across different outlets this research brings multiple sources together and facilitates the understanding of LAWS for an expert audience, but also to a certain extent the public. Moreover, it does combine an analysis about the legality of LAWS under international humanitarian law and examines country perspectives on that matter and provides a broad legal analysis with a view on how it LAWS are looked upon in the international arena. Despite not being applied but purely academic research it is valuable for practitioners or scholars who not only deem the theoretical aspects as important but also how it is dealt with IHL in practice when it comes to lethal autonomous weapons. Furthermore, could a discussion of certain cases help to understand different positions by different states. This could be beneficial for practitioners that are in the field of LAWS or participate in negotiations such as the ones under the auspices of CCW where knowing different positions and how they came to terms is a valuable asset.

The novelty about the underlying research is its legal analysis. Yet there exist certain analyses about the legality of LAWS¹⁴, but these were often from a scholarly side. This research conducted here is incorporating country views and analyzes these positions from the side of the neutral researcher unlike agenda driven NGOs like the Campaign to Stop Killer Robots or the ones issued by individual states. This approach to make research for the purpose of researching will provide a proper analysis of LAWS in the legal field. In order to create a holistic analysis about the legal issues that come along with lethal autonomous weapon systems it is crucial to consult theory as well as practice which is both present in the underlying research. Furthermore, is there no purely academic research undertaken when it comes to the legal analysis of country perspectives regarding autonomous weapons. This research will fill the scientific gap that there is no legal analysis of country views towards international humanitarian law.

1.3. Research question

Since states own the monopoly on violence it is their duty that its usage is according to the law. This thesis examines the possible conflict of interests which might exist between states that follow their agenda in terms of security questions and those observing international law and

¹⁴ Cf. Petman, 2017.

agreements on the other side. Therefore, this research concerns the views and preferences of states towards LAWS and in how far they are compatible with humanitarian law. In order to answer the question about the individual views of states one must analyze the legality of autonomous weapons under IHL. Therefore, the first part of the question must be answered in a previous step before the more specific part of the research question can be answered. Thus, the question for this thesis reads as following:

In how far are lethal autonomous weapon systems in compliance with international humanitarian law and how strict is it interpreted by individual states?

On the way ahead, this thesis consists of four chapters in total. Following this introduction to the topic of the underlying research the first chapter of preparatory work follows which consists out of a theory section and a methodological approach. In this section the hypotheses are constructed in order to answer the overarching research question. The first part of this section is a literature review and hypotheses building how states shape their views in terms of weapons especially LAWS in an international arena. This is followed by the conceptualization of lethal autonomous weapons. It discussed the characteristics and different levels of autonomy. The three main traits LAWS can be distinguished on are the amount of human involvement in planning and operation process, the sophistication of autonomy and the different functions which are the tasks that can be carried out by LAWS. After that part the methodology will follow. In the methodological part the approach of legal analysis which is used as research design is elaborated. Further follows a section about the case selection of states that are chosen when examining country views on LAWS with humanitarian law. Lastly the consulted data which is essential to answer the research question is evaluated and possible drawbacks are highlighted and a strategy on how to circumvent these is introduced. The second and third chapter consist of the analysis. In the second one the legality of lethal autonomous weapons in general is examined in relation to international humanitarian law which is the main part for the following analysis. The following part of this research is in chapter three when the compliance of country views towards LAWS is scrutinized in terms of IHL. Lastly the research concludes with the fourth chapter. This chapter includes a critical reflection on the issue and its analysis in this research and a final conclusion about LAWS and especially its compliance with IHL from the perspective of four different states.

2. Chapter 1

2.1. Theory

In the last years military spending increased almost constantly since the post-Cold War low two decades ago in 1998. The total combined military expenditure in 2018 globally were on an all time high in absolute terms since the 1990s making up \$1822 billion.¹⁵ Moreover, in its 2018 report on military expenditure and global security the Swedish NGO operating under the name of SIPRI (Stockholm International Peace Research Institute) pointed out that the situation of international security is worsening since the last decade.¹⁶ This is also due to the proliferation of weapons that can be categorized as conventional weapons which include among other weapons such as small arms or rockets. Yet much money flows into the research and development of new weapons and related military technology. These efforts are supported by states either indirectly by purchasing weapons while the manufacturer puts money in its own research and development unit or through direct funding like the state-owned United States agency DARPA (Defense Advanced Research Projects Agency). The development of defense technologies is often times an interplay with research and development on civil matters and facilitates massive progress by its creations. For example, DARPA laid the cornerstone for the Internet as it exists today. By developing ARPANET in 1969, it was possible to send and receive digital resources throughout geographically separated computer units.¹⁷ In more recent years the government agency developed the so-called Personal Assistant That Learns (PAL). The cognitive computing system was developed in order to “make military decision-making more efficient and more effective at multiple levels of command; reduce the need for large command staffs; and enable smaller, more mobile, and less vulnerable command centers”.¹⁸ Progress that was made in the course of developing PAL was taken for civil use by creating the company Siri Inc. which developed systems for voice-based interaction with machines. The company was later purchased by Apple Inc. where they integrated the software in their devices. However, when it comes to lethal autonomous weapon systems the technology behind it might not have been developed by a defense research center initially but existing technology that emerged over time through civil and military research were both applied to arrive at the state of the art of LAWS of today and tomorrow. Still institutes like DARPA or private companies are continuing to develop autonomous systems in recent years. However, autonomous systems

¹⁵ Tian, et al., 2019.

¹⁶ SIPRI, 2018.

¹⁷ DARPA, 2019.

¹⁸ Ibid.

developed by such companies do not only include weapon systems but also technologies that can be beneficial for civilian usage or for other institutions such as civil defense agencies. The fields of action of these systems can cover the same array as aforementioned for which LAWS are best suited for. These were the “dull, dirty or dangerous’ missions”¹⁹ where autonomous systems could also be deployed for civil usage. Such technologies that are essential for both civil and military usage, for example a camera unit in autonomous systems, fall often under the category of ‘dual-use items’. The European Union defines in a regulation what these items can be:

*‘dual-use items’ shall mean items, including software and technology, which can be used for both civil and military purposes, and shall include all goods which can be used for both non-explosive uses and assisting in any way in the manufacture of nuclear weapons or other nuclear explosive devices*²⁰

Nonetheless this underlying research does focus on lethal autonomous weapon systems, because these are the systems that pose several questions especially when it comes to the compliance with humanitarian law. In order to hypothesize how states, take stances on LAWS, that can be analyzed for compliance with IHL existing literature is consulted and hypotheses built.

2.1.1. Theoretical framework

In international relations theory there exist two major paradigms of which one is realism and the other is liberalism. Both theories have a distinctive view on weapons and armament since the issue of security has a special standing in specific in the former.

Realist international relations (IR) scholars regard the world as anarchic where states are the prime entities which act out of self-interest. The main driver for such a behavior is the urge to survive in an anarchist world where every actor just seeks the same. However, there are also differences in the approach of these behaviors. John Mearsheimer, a neo-realist himself, draws a distinction between defensive and offensive realism. The former is inspired by the works of neo-realist IR luminary Kenneth Waltz and characterized as paradigm in which “states must and do seek power in order to be secure and survive, but who believe that excessive power is counterproductive, because it provokes hostile alliances by other states”.²¹ Thus, the achieving

¹⁹ Etzioni & Etzioni, 2017, p. 72.

²⁰ Council Regulation (EC) No 428/2009 of 5 May 2009 setting up a Community regime for the control of exports, transfer, brokering and transit of dual-use items.

²¹ Jackson & Sorensen, 2013, pp. 83.

of additional power from other states is not worthwhile. Mearsheimer is criticizing this theory and counters it with his thinking of offensive realism. He argues that the theory of Waltz does not correspond with reality as states tend to be more aggressive and eventually seek for hegemony not only seek for a conflict-avoiding cohabitation. Support for his arguments were the upcoming hegemony in the 20th century in the Western hemisphere like the German empire or Nazi Germany and later the Soviet Union where their rise had to be intercepted by the hegemony in that area – the United States. Yet, he defines offensive realism through the assumption that great powers “are always searching for opportunities to gain power over their rivals, with hegemony as their final goal”.²² Nonetheless the element of survival plays a crucial role in this approach as well as states act in that manner with the ultimate goal of self-preservation in an anarchic world.

The other concept that is shared by realist scholars of all categories is the one of state power in the international system. For states power is the last resort to draw back on in order to secure their survival. However, there are different types of power, traditionally it is hard and soft power. Whereas the latter relies on framing, persuasion and attraction and relies on assets such as values and ideas the former works differently. Hard power works with more tangible methods of payments, threatening and coercion. For many realists this is the only suitable source of power as they “tend to argue that global politics is power politics”.²³ Further Nye does dispute that the usage of raw power in the military sense is the best solution for most conflicts. He advocates for a hybrid of both types of power and coins the term ‘smart power’. This could be used for example against terrorist groups – hard power on the one hand to fight existing terrorists combined with soft power on the other to persuade society not even to join in first place.²⁴ Nonetheless is it essential for states to exercise power, may it be hard, soft or smart. This is for the ends to secure their survival. Under realist paradigms a state needs to be able to provide power and this falls eventually back on military resources. Therefore, it is essential to exert more power than the adversary to not face a disadvantage. By acquiring lethal autonomous weapons that are cutting edge the owner of those enjoys an advantage vis-à-vis those who lack this technological progress.

However, the urge to acquire weapons and even engage in an arms race with other states is also shaped by another dynamic. In a classical deterrence model states can easily restore to an arms

²² Jackson & Sorensen, 2013, p. 85.

²³ Nye, 2013, p. 514.

²⁴ Nye, 2013.

race as the armament efforts of one state are interdependent with that of another state.²⁵ Further there exists an equilibrium where both states do not turn to attacking the adversary. A factor that plays a role here is the cost of war that comes with quantitative arms races which would increase the overall costs and prevent armed violence. On the other hand, does a qualitative arms race increase the risk of a preventive attack, since it gives one side an advantage over the other and may tip the equilibrium.²⁶ Nonetheless it can be criticized that in this classical deterrence model there is not an adequate distinction drawn between qualitative and quantitative arms races. This is because the vital point of these arms races that may turn to aggression is the credibility of the threat to use force in first place. Even under the Decision-Theoretic Deterrence Theory that “focuses upon the interplay of outcomes, preferences and rational choices in determining interstate conflict behavior”²⁷ acknowledges the deterrence effects arms race can have.

An earlier study of Paul Diehl examines the effects arms races between states have on the outbreak of war.²⁸ His classic work found that there is no strong correlation between a mutual arms race and dispute escalation also not for unilateral military buildup.²⁹ On the other hand, was also not found that such arms races lead to peace eventually. Still, states are engaging in military buildups and escalations because of a lack of information that lowers the burden to enter when the odds of successfully deterring the other side or keep the power equilibrium. However, this applies only when both states are engaging in an arms race, thus the threat must be credible for the other side to engage.

States that have a realist worldview are more likely to rely on power politics regardless of the actual effectiveness of an arms race towards an adversary. Qualitative arms races can be of special interests because it can, conditional on the credibility of the threat, bring an advantage in the power position to one side. This is especially the case for LAWS since these systems are, depending on the level of autonomy, in early phases of development where not many systems are deployed yet. This could bring an advantage to users that come up with the newest technologies that can be implemented in such systems and are therefore sought to acquire.

Considering the relation of realist scholars towards international law one must keep in mind the anarchic nature of the international system where states struggle for survival. The primary

²⁵ Zagare, 1996.

²⁶ Zagare, 1996.

²⁷ Ibid, p. 365.

²⁸ Diehl, 1983.

²⁹ Ibid.

interest of a state is survival and all other interests or obligations are just secondary to it which also is the case for international law. Therefore “treaties and all other agreements, conventions, customs, rules, law and so on between states merely expedient arrangements which can be set aside if they conflict with the vital interests of the state”.³⁰ Thus, if a state sees an opportunity to secure its survival international law is neglected which also includes international humanitarian law. Therefore, the first hypothesis can be constructed in order to answer the research question of this research:

H1: The more realist views a state incorporates in its international relations, the less strict international humanitarian law is interpreted in terms of lethal autonomous weapon systems.

Yet, there is a counterpart to the realist paradigm which is represented by the IR theory of liberalism. This view is characterized by cooperation rather than power politics. The initial assumption that the world is anarchic and the Hobbesian world view on humans is rejected to a certain degree and replaced by a more positive view of human nature. It depends on following a ‘weak liberalism’ or a ‘strong liberalism’ in how far realist views are taken into account by liberal IR scholars. Whereas weak liberals accept realist points to some extent, especially the omnipresent concept of anarchy in the international system, the latter does not. Strong liberals claim that the anarchical concept is obsolete, and the world is changing towards their liberal expectations.³¹ Events that support this IR theory are the end of the Cold War and globalization that showed that conflicts can be resolved peacefully, and individual states are voluntarily engaging in cooperation. Nonetheless anarchy is in liberal IR theory not considered fundamentally negative but can also have positive effects such as securing peace between democracies which cooperate also due to their commonalities.

The believe that human nature is good is also a precondition for liberal advocacy that international relations can be conducted by cooperation rather than hostile acts. Furthermore, this element of progress is a central one. These factors play into account so modernization is possible including the establishment of the modern state, and through mutual cooperation war can be put to an end. This kind of cooperation of likeminded countries can be observed in the concept of democratic stability which proves that there was no major military conflict between

³⁰ Jackson & Sorensen, 2013, p. 67.

³¹ Jackson & Sorensen, 2013.

two democracies.³² According to Jackson and Sorensen there are four different strands that shape liberalism. This is the sociological one that also considers relationships between people among states which speaks also in favor of facilitating cooperation between states. Furthermore, with respect to interdependence liberalism the focus is mainly on transnational actors and the goal of a state shifts from security to welfare. This is also why states engage voluntarily in international trade and abide by its rules. Institutional liberalism facilitates cooperation between states, reduces lack of trust and further decreases the information deficit. The last characteristic can be crucial regarding coercion tactics by realists and the drawbacks that come with insufficient information such as the overconfidence problem which could result in war. Lastly there is republican liberalism that was mentioned previously that democracies do not go to war against each other but rather restore to peaceful conflict settlement due to “their common moral values [...] and their mutually beneficial ties of economic cooperation and interdependence”.³³ Overall the issue of survival has been surpassed in a strict liberal IR view and the main goal of states is creating welfare through cooperation between states on different levels and the progress resulting from it.

Understanding how liberalism works it becomes clear that the issue of military power is by far less prominent than for realists. It is more important to set the preconditions that no conflict will arise and if so, settle it not by restoring to force. In fact, states rely more on “[international] institution-building and international law [...] [which] entails the fencing-in of raw power and the principle of negotiation to resolve discord”.³⁴ Therefore, liberals regard international law as a tool that works and should be abided to.

Nevertheless, it cannot be claimed that liberal countries neglect the acquisition of weapons. Brandon Kinne analyzes in his 2016 article how bilateral weapons agreements have developed in recent years.³⁵ After the Cold War the conventional bilateral arms trade was gradually replaced by so called weapons cooperation agreements (WCAs) which goes beyond the traditional arms trade. These WCAs “establish long-term cooperative legal frameworks in the areas of procurement and acquisition, defense industrial cooperation, and research and development”.³⁶ The agreements correspond more to its military and defense industry than agreements lead by military alliances would do, because they are better tailored to the individual

³² Ibid.

³³ Jackson & Sorensen, 2013, p. 130.

³⁴ Ibid.

³⁵ Kinne, 2016.

³⁶ Ibid, p. 359.

needs of an individual country. Thus, such cooperation could also be found among states having a liberal perspective on IR. Even though the bilateral arms trade is on the decline weapon flows of, especially those of conventional weapons, have increased since the advent of WCAs. Furthermore, it does enable states to conduct high-cost or high-risk ventures that would not be possible without cooperation. Also is the per-unit cost is decreasing hence states can be more efficient when purchasing weapons.

Kinne found that especially democracies engage with each other in bilateral WCAs.³⁷ This significant correlation corresponds to the liberal IR view that values cooperation and stability between democracies which happens obviously also in defense agreements. Yet, not all democracies share a liberal view when it comes to international relations and may thus more actively engage in WCAs. As a concluding remark it must be mentioned that bilateral weapons cooperation agreements as such does however not imply that the situation will develop into an arms race, since for that two parties in a competitive environment are necessary which is not automatically a given when states engage in WCAs.

To hypothesize the view on LAWS of countries following liberalism in terms of international relations one must regard the nature of the liberal concept as a critique towards realism. Yet this is not a naïve critique which is just the opposite of realism but consists of more nuances and idiosyncrasies. Nonetheless are weapons and military power not that important for liberal countries this also does not change with the engagement of democracies in weapons cooperation agreements and the proliferation of conventional weapons of which the CCW handles regulation just as for a possible ban of LAWS. When it comes to abiding international law however the liberalist view is respecting these obligations in law and agreements, since this is believed to constitute a factor of stability and reliability between states. This compliance with international law is also the case when it comes to international humanitarian law that guide the usage and development of LAWS. Thus, it would set rules to the game and make issues revolving about LAWS more predictable and less anarchic. Therefore, the hypothesis from the standpoint of states that are coined by a liberal paradigm in international relations reads:

H2: The more liberal views a state incorporates in its international relations, the more strict international humanitarian law is interpreted in terms of lethal autonomous weapon systems.

³⁷ Kinne, 2016.

The two classical IR theories of realism and liberalism are best suitable for hypothesizing the views on LAWS of different states. Both theories represent a quasi-bipolarity when it comes to the views on weapons or international law. For each IR theory either the former or the latter plays an essential role. Moreover, other renowned theories exist outside the main cleavage between liberalism and realism. For example, social constructivism or the English School try to explain the shortcomings in both theories. These theories both build *inter alia* upon society in different ways.³⁸ This is however not suitable as the issue of LAWS is not yet rooted in the minds of all societies where the corresponding state has a stance on LAWS. Therefore, these theories are less suitable than the classical IR theories for building hypotheses in order to answer the research question.

2.1.2. Conceptualization

In order to assess the legality of LAWS towards IHL a precise description is necessary. This section deals with the conceptualization of autonomous weapons especially the node of autonomy that is crucial in the legal analysis towards international law. Yet first the concept of a weapon must be examined since this is of importance in the later stage of the legal analysis. However, later in the second chapter of this research some specificities of LAWS are scrutinized and examined in such a way how it corresponds to applicable international law.

Steven Haines defines weapons in the Oxford Handbook on autonomous weapons as a broader concept than just a simple handgun would be.³⁹ He states that the term is used as a generic term that includes weapons, means and methods of warfare. This corresponds with Article 36 Additional Protocol I to the Geneva Convention⁴⁰ which concerns the regulation of “a new weapon, means or method of warfare”.⁴¹ A weapon is thus defined by its characteristic to have the capability of “either destroying or reducing the military effectiveness of the objective or incapacitating the combatant to the extent that he (or she) is rendered incapable of further effective combat”.⁴² Means on the other hand refer to objects, devices, munitions or other facilities capable of being weaponized, because if it is not weaponized it cannot be regarded as a means of warfare. Notably is also the differentiation between means of war that are

³⁸ Jackson & Sorensen, 2013.

³⁹ Haines, 2014.

⁴⁰ Hereinafter also just referred to as Additional Protocol I.

⁴¹ Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I). 1977.

⁴² Haines, 2014, p. 4.

weaponized and certain dual-use items. However, integral parts of a weapon system must be assessed with caution in a legal analysis, since the radar unit in a weapon is essential for targeting and thus for the weapon system to be considered as such. Lastly there are methods of warfare which regard the actual use of the weapon when made use of it. This is especially of relevance when analyzed for compliance with humanitarian law as some weapons are banned from warfare because they cause amongst other unnecessary suffering to the attacked. This would include phosphorus flares that are used as methods of warfare to illuminate the battlefield or set ammunition depots on fire. Nonetheless can it not be used against enemy combatants, since it would cause superfluous suffering such as melting the flesh from the bones when hit.⁴³

The definition of autonomous weapon systems or just autonomy itself is manifold and there is not a shared common consensus among scholars and practitioners. When it comes to defining its boundaries especially those within the degree of autonomous systems these lines are even harder to draw. Yet, there are many shared characteristics that many experts in the field highlight.

First, of all there must be made a distinction between autonomous systems and others that that can be considered as automatic. A simple line however can be drawn between automated and autonomous weapon systems. Whereas the former can include features like an autopilot but can also feature targeting. Yet the decision to fire is left to a human operator that may be alerted by the system. On the other hand, there is autonomy which can aim and engage with targets without intervention of a human operator. Firing on their own once activated without a human is therefore the main characteristic of an autonomous weapon system.⁴⁴ Yet, this is a rather simplified conceptualization by John Lewis. In fact, the differentiation between the systems and especially within autonomous systems is less dichotomous with rigid boundaries than John Lewis presents them. The International Committee of the Red Cross (ICRC) distinguishes between remote controlled, automated or semi-autonomous, and autonomous systems. While the first one is in need of direct control by an operator remote to the deployed system, semi-autonomous ones can be independent of human control, but react to a predefined set of programmed alternatives. Lastly autonomous systems “can act without external control and define their own actions albeit within the broad constraints or bounds of their programming and software”.⁴⁵ Yet, the generic term of ‘robots’ the ICRC uses for the aforementioned systems is

⁴³ Haines, 2014.

⁴⁴ Lewis, 2015.

⁴⁵ ICRC, 2014, p. 62.

only applicable if they are not entirely controlled by human operators and follow a “sense-think-act paradigm”⁴⁶ in relation with the context they are acting. Hence, the boundaries between systems in the ICRC definition are rooted in the interaction with their environment and how advanced systems are implementing this paradigm. Whereas semi-autonomous systems can make decisions on their own they are limited in their adaptability to a small set of pre-programmed alternatives. Autonomous systems on the other hand are able to interact with a changing environment in a way that still suits its tasks, but these actions are also limited to pre-programmed rules and boundaries. Therefore, they depend on boundaries levied on these systems by human design of the system.⁴⁷ Nonetheless the ICRC definition starkly underestimates the range autonomous systems are capable of conducting specifically when it comes to learning systems.

A more precise definition of autonomy is made by SIPRI emphasizing the “ability of a machine to execute tasks, without human input, using interactions of computer programming with the environment”.⁴⁸ A NATO manual describes the autonomy in a similar fashion, but emphasizes the capability of planning, decision-making and executing a goal that was set by human operators. The emphasis that characterizes autonomy is as well on the level of human dependence.⁴⁹ Nonetheless a certain consensus can be unveiled which appears also in the literature. The issue with autonomy is threefold, on the one hand there is the control and human intervention in the system question especially emphasized by NATO. Further there is the sophistication of the decision-making process especially in relation to the environment of a system which is highlighted by the ICRC. It also mentions that even in changing environmental circumstances truly autonomous systems “would have artificial intelligence that would have to be capable of implementing IHL”.⁵⁰ Lastly there is a differentiation on the types of decisions and functions a system can make. Between the NATO manual and the SIPRI report is a common consensus about the first two out of the three points. Still, the third category on how to characterize autonomous systems has its *raison d’être* chiefly when assessing its compliance with humanitarian law.

The human-machine command-and-control relationship knows a different specification of levels depending on the source. The US Navy uses six steps, Clough has ten⁵¹ whilst SIPRI

⁴⁶ Ibid, p. 61.

⁴⁷ ICRC, 2014.

⁴⁸ Boulanin & Verbruggen, 2017(1), p. 5.

⁴⁹ Williams, 2015.

⁵⁰ ICRC, 2014, p. 64.

⁵¹ Cf. cf. Williams, 2015.

categorizes human control in three levels.⁵² Human-input levels can be summarized in three categories as SIPRI is doing in order not to fall too much into specifics by listing individual systems types. Thus, the SIPRI three level approach is applicable for all kinds of autonomous systems and those yet to come. A system which requires human command in order to conduct tasks are so called ‘semi-autonomous’ or ‘human-in-the-loop’ systems. ‘Human-on-the-loop’ or ‘human-supervised autonomous’ systems are not controlled directly by humans and “can operate independently but [...] under the oversight of a human who can intervene”.⁵³ Finally, there is the ‘fully autonomous’ or ‘human-out-of-the-loop’ system that can do the whole process of sense-think-act without human input. Yet there is the term of ‘sliding autonomy’ which means human control of systems can be switched from fully autonomous to semi-autonomous or vice versa depending on the circumstances of the mission that is conducted.⁵⁴

The second trait of autonomous systems relates to how advanced decision-making processes are. This includes how much control a system can exert over itself for the completion of a task and further how it is dealt with uncertainties that can occur in the environment of operation. SIPRI knows three categories of decision-making capability. Firstly, there are reactive systems which follow a simple ‘if-then’ rule meaning that it decides on a given situation and changes in the environment according to a pre-programmed protocol. Therefore, the behavior is known if the set of rules are known because the protocol is strictly adhered to and only one way to react is possible for the system depending on the conditions of the environment. Secondly, deliberative systems use a “model of the world (information on how the world works and the reactions to the system’s actions), a value function, which provides information about the desired goal, and a set of potential rules”.⁵⁵ The latter is applied in order to achieve the goal however are these rules weighted with consequences for the system and the most viable approach is taken. These individual actions may not be predictable in detail, but the overall behavior of a system can be. Learning systems are the most sophisticated type of autonomous systems and are able to improve the more they are employed. Machine learning gets better when fed new information which it will include in its system. Parameters that are used by the system to conclude a task such as identifying a military target is re-parameterized through new input and re-programs the system partially. This comes with some degree of uncertainty as “the behavior of the system can become highly unpredictable unless the learning parameters (input

⁵² Boulanin & Verbruggen, 2017(1).

⁵³ Boulanin & Verbruggen, 2017(1), p. 5.

⁵⁴ Boulanin & Verbruggen, 2017(1).

⁵⁵ Boulanin & Verbruggen, 2017(2), p. 18.

data) are well known and understandable to an operator”⁵⁶ which cannot be taken as a given. The NATO manual knows eight levels where the differentiation follows the sense-think-act paradigm of robotics only that it is split up into four categories, namely observe, orient, decide and act. In essence the NATO definition hovers between the definitions elaborated earlier, from no human control only seeing the results eventually through reactive systems to human control. However, their lowest levels of sophistication begin with full human control respectively oversight whereas the SIPRI starts its classification with semi-autonomous systems.⁵⁷ The dominant element in all approaches to assess decision-making capabilities is the predictability of actions of the system by human operator or controller. In order to evaluate this the SIPRI approach to decision-making capabilities serves best.

A dystopia or utopia depending on the point of view for some can be fully autonomous systems on such an advanced level that only knowing the objective of a mission would be sufficient for LAWS to effectively engage in the completion of tasks. That means autonomous weapon systems knew the objective and would start automatically when the weighting for a possible engagement with a target concluded a positive result without informing a human command unit except after the task is completed. The system would start on its own navigate there and engage with the target possibly in a coordinated action in swarms of the same systems or with other autonomous weapons which can range from stationary missile firing stations to naval, ground or airborne forces. Afterwards it would park on its own in the starting position and if needed refuel itself. This is also made possible through the interoperability and information exchange between systems. However, there is yet another issue that needs special attention when conceptualizing autonomous systems. This is beyond human control and technical capability which is a main characteristic especially when focusing on legal issues, namely the functional aspect.

In the third category of what makes a system autonomous the functions are analyzed that are featured in an autonomous weapon system. This is a purely functional approach to autonomous systems and is not conflicting with the human control or sophistication of decision-making by systems. Whilst not all functions of an autonomous system require the same attention when it comes to legal or ethical considerations, some are more sensitive. Five functions are pointed out by SIPRI that relate to the capabilities of autonomous systems. Firstly, there is mobility of the systems, followed by targeting functions and then intelligence which includes the detection

⁵⁶ Ibid.

⁵⁷ Williams, 2015.

of objects of interest for a mission such as a gunfire. Further is interoperability like information sharing with other systems a function. Also, the health management of systems is important to stay operable such as error detection.⁵⁸ Henceforth is it comprehensible that a different degree of attention must be applied when considering legal or ethical question since engaging with targets or navigating come with different kinds of risks.⁵⁹

Even though all parts of a system do not necessarily need to be fully autonomous yet a system consisting only in parts of autonomous units is sufficient to be considered an autonomous system. Yet, the legal analysis will be made on the functions that implement the essential functions thus a further discourse of what constitutes a system is redundant to this research. Therefore, the characteristics to autonomous systems are human control, sophistication of decision-making and the functions carried out.

2.2. Methodology

2.2.1. Research design

This research deals with the compatibility of LAWS with IHL and how individual states take a view on that matter. Therefore, a legal analysis is the most suitable way forward in order to answer the underlying research question.

On search for methodology there must be drawn a line in what ways the law is analyzed. Since this research analyzes the compliance of LAWS with international law it is not looking for a normative approach on what the law should say. In order to do so a more argumentative methodology like in humanities has to be applied and less a data-driven one that is used in social sciences or natural science.⁶⁰ The argumentative methodology is based more on reasoning and logic. However, one must be cautious about the interpretation of rules, because outcomes can vary depending on the reasoning of the researcher. To avoid such a pitfall and produce reliable results the arguments can be strengthened. This can often be done easily by interpreting “an uncertain or ambiguous legal ruling [...] when viewed in its proper historical or social context”.⁶¹ Because of that the thesis follows a holistic approach where at a later stage the level of abstraction is decreased, and views of individual states are analyzed in terms of their compliance with humanitarian law in the matter of LAWS. Nonetheless is the purpose still to

⁵⁸ Boulanin & Verbruggen, 2017(2).

⁵⁹ Boulanin & Verbruggen, 2017(1).

⁶⁰ Chynoweth, 2008.

⁶¹ Ibid, p. 30.

create pure research and not provide applied knowledge possible with a particular purpose in mind.

The issue about autonomous weapon systems is firstly an ongoing one and secondly is there no definite answer how sophisticated LAWS can become in their capabilities. In such a case a doctrinal research methodology, where arguments are developed in order to answer what the relation of the law is between LAWS and IHL, is the best approach for this research. This is because to some extent the level of autonomy is yet hypothetical. Thus, a doctrinal research is applicable because some of the situations considered in the analysis are still “hypothetical and the purpose is to undertake a more in-depth analysis which is capable of informing the deliberations of practitioners and judges in future cases”⁶² even though this is not the only target audience of this research.

Such a doctrinal analysis is carried out through a deductive approach of research by following a syllogism. The syllogism answers a research question by identifying the major premise first which identifies a general rule of law that is applicable to a certain situation. Then the situation is described in detail which is also known as minor premise. It finishes with a conclusion stating if the identified legal rule applies to the factual situation and takes effect on it. However, there is the phenomenon of ‘open texture of rules’ meaning that a rule has a certain degree of freedom in its interpretation and may vary depending on the researcher. As aforementioned this can be circumvented. By taking the draft history and other factors like the preamble into account the researcher is aided when it comes to interpret law in the proper context. Otherwise the element of doubt will pertain if a rule applies to a specific factual situation.⁶³ When applying the deductive method one can also follow the principles of IRAC the concepts behind this abbreviation look at issue, rule, application, and conclusion. At first the question that needs to be answered is identified which was already done in this research, but the issues are broken down in smaller ones to fully answer the research question. Next, the applicable law is stated which is analyzed in and applied to the underlying issues. Lastly a conclusion is drawn from the application of rules to the factual situation.⁶⁴ A peculiarity which this research deals with is the state of the art of LAWS which are analyzed. Since the highest level of autonomy as described earlier is not reached yet or at least not at a stage where it can be employed in actual missions, parts of the legal issues are hypothetical. Therefore, the IRAC approach to legal

⁶² Ibid, p. 32.

⁶³ Chynoweth, 2008.

⁶⁴ Finch & Fafinski, 2017.

analysis cannot be followed to strictly, because the first part about the issues are not so certain. However, are these parts discussed in the assessment when the applicable law is known, and the legality of functions that autonomous weapons can possess in the future will be analyzed. So, the analysis of autonomous systems of the future depends also on how the current systems are analyzed and which functions need special attention in course of the analysis.

Yet another way to approach the research question must also be incorporated. An analogy is the opposite of deductive reasoning and moves not from general rule to specifics, but from one specific ruling where the facts are sufficiently similar to another specific case in question. Still no cases are ever completely identical and therefore if such an analogy would be conducted in practice for instance by judges the outcome would vary, because judges have discretion in their decision which is ultimately a subjective one.⁶⁵ However, the factual situation is manifold as there exist different degrees of autonomy and different functions, therefore adding analogies to the analysis when applicable to applicable situations would give the legal analysis more clout.

To conclude, this part about the research design a distinctiveness of legal research must be pointed out. As mentioned earlier the process of legal research is not as rigid as in many other disciplines and a variety of techniques can be applied and combined. A certain amount of reasoning is necessary for a legal analysis which is usually acquired at an instinctive level and develops by exercising legal analyses. This is also applied in the second part of the analysis for the country perspectives on LAWS. Here the crucial points in the country views which are elaborated in the third chapter are analyzed for compliance with IHL. In order to still give the analysis credibility, it is crucial for the researcher to properly “[demonstrate] an understanding and adherence to the accepted conventions and norms of its discourse”.⁶⁶ Thus, reliability of the research can be increased when well structuring the line of argument and the legal reasoning in order to answer the research question.

2.2.2. Case selection

The case selection affects the main part of the research question and is so a crucial part in order to give the research relevance by showing a holistic picture of the different views in the current debate and the applicable law.

⁶⁵ Chynoweth, 2008.

⁶⁶ Ibid, p. 35.

In Annex I there is a list of countries that took a stance on lethal autonomous weapons until late 2018. These forty countries either oppose or call for a ban of LAWS, China being the only exception as they advocate for a ban on the usage but not for their development or production. However, the country is still marked as calling for a ban by the author.⁶⁷ Furthermore, is the military spending in 2018 provided for countries that took a stance on LAWS. There are two points where caution must be applied. Firstly, two countries in the list do not have military spending at all, because they do not deploy an army. For one, this is the Holy See which stands for the Vatican and the other one is the state of Palestine that cannot deploy an official military also due to their special status not being recognized as a sovereign country by some states. Secondly the figures for two states might be outdated. The case for Djibouti is that after 2008 there were no new figures included so the latest one from 2008 was included in the table. Moreover, was the military spending for Venezuela flagged as ‘highly uncertain data’ hence the latest reliable figure from 2014 was used.⁶⁸ Military spending is given as percentage of the gross domestic product (GDP) of a country. The advantage of taking the GDP is to put the figures in relation to economic strength that different countries have. Hence absolute numbers would create massive discrepancies between a superpower like the US and smaller and economically weaker like Cuba but under military spending as percentage of GDP these two countries are comparable. Military spending is a factor in the sense that it functions as a proxy for a state following a more realist or liberal approach when it comes to international relations. As elaborated earlier, states that act according to a realist mindset focus more on power and thus devote more money to military spending. On the other hand, a strong military is not playing such a central role for countries that follow a more liberal approach in international relations and spend thus less money on it. On a purely descriptive note countries opposing a ban spend on average 2.24% of their GDP on defense whilst the countries calling for a ban, excluding the special cases mentioned above, spend only 1.24% of their GDP on average.⁶⁹ These numbers are only for a descriptive note and do not imply statistical significance.

For the analysis in the third chapter four cases are selected in order to conduct a legal analysis. The cases are selected according to a diverse case strategy i.e. the variance along the relevance dimension is maximized. Meaning that the relevant dimension is military spending and diverse cases along this line is picked. However as there are two hypotheses two cases are picked for each hypothesis. Two are picked from those which are presumed to be have liberal views in IR

⁶⁷ Campaign to Stop Killer Robots, 2018.

⁶⁸ SIPRI, 2019.

⁶⁹ Annex I.

and call for a ban of autonomous weapons and two are chosen opposing a ban and are presumed sharing realist views in IR according to this case selection strategy. In order to analyze if there is a variance within these categories one case each is taken with a high and one with a low military spending and their country views on LAWS are legally analyzed. The countries chosen for answering the research question are Austria and Cuba both calling for a ban, and Israel and Australia opposing a ban. All of these countries are also engaging in talks under the auspices of the CCW on the issue of LAWS and are parties to the Convention on Certain Conventional Weapons and all its protocols. Further is a geographical variance included also bearing in mind that EU and members of the Non-Alignment Movement often share positions in the international arena.

2.2.3. Data

The most important data that is consulted will be international law, specifically international humanitarian law. The Geneva Convention has provisions relating to the permissibility of weapons in armed conflict but also international conventions like the CCW are analyzed. When applicable or in need for aid when interpreting legal provisions, preparatory works to the conventions or scholarly opinions are used. Additionally, is literature and publications of NGOs consulted like the International Committee of the Red Cross which has a big stake in IHL and is also a regular participant to CCW discussions. The ICRC has however an agenda and is thus not free from bias which is still not reducing their expertise in the field, but caution will be applied if it is detected.

Most of the data will however be used for the case studies in the second part of the analysis. The easiest way would be to read a weapon review of the countries on LAWS that they do if they own such weapons. However, such country reviews are often times undisclosed, because it is a secret and could become a tactical disadvantage in case a state has to go to court or a tribunal and justify the way they used LAWS. So, if the weapon review is known by the applicant also parts of their strategy are, and the respondent could face a tactical disadvantage. Further does a weapon review always reveal the stage of development the defense industry has achieved. Also, the effectiveness of weapon reviews in light of Article 36 Geneva Convention AP I is doubted by many NGOs.⁷⁰ Evidently every system is prone to errors in one way or the other, may it be the technical reliability of performance or that systems function not as planned

⁷⁰ Article 36, 2016.

do to external influences like different weather conditions or the operating environment. This is included in such a review as well and there must be made a decision what margin of error is accepted when deploying autonomous systems.⁷¹ Thus, a high number of accepted errors in a weapon review could change public perception about LAWS. Therefore, the position of countries has to be elaborated by examining available data for individual states on that issue. This array is comprised of official statements from e.g. conferences, position papers, speeches or other information. Eventually it will be fused together in order to figure out the view of a state on autonomous weapons. This data can however not be regarded as always reliable since it is subject to political dynamics and can thus easily change. In order to produce a valid outcome that corresponds to the actual situation several sources are consulted. This technique of triangulation can exclude or verify data that has been found. Basically, if in doubt about sources there is another type of data consulted in order to verify or reject data in case of outdated information. But during the analysis process it can also strengthen the validity of the elaborated country position on LAWS.

⁷¹ Article 36, 2016.

3. Chapter 2

3.1. The issue with lethal autonomous weapon systems

This first section of the analysis covers the factual situation of LAWS at the state of the art and in the future. The definition of LAWS was described earlier, and the essential characteristics of human control, technological sophistication and functions is the definition mostly agreed on and used for the analysis. Moreover, is special attention drawn on the learning process when it comes to technical capabilities of weapon systems.

The issues in need of legal analysis are therefore the three aforementioned about human control. Specifically, it must be answered who is responsible in case of malfunctioning and if operations can be aborted if needed. Next, the issue of the learning process is analyzed. Especially, since most of these systems apply machine learning, especially the ones still on trial phase not yet in use. The issue here is if compliance with humanitarian law can still be guaranteed and resulting from the question if the actions are predictable. Lastly, the issues about functions where different ones have to be considered, namely targeting, tracking, selection, and attack.

Different weapon systems exist for different purposes and do not fulfill the same functions. A line must be drawn between the platform carrying the weapon in case it is in need of a platform and the environment in which it is used. Types of weapons include fixed weapon systems which are mounted to a ship or guarding objects like a camp but also active protection systems for the protection of vehicles can be autonomous. If these active protection systems are considered as hard-kill measure, they apply kinetic force against incoming objects that seek to destroy the vehicle. The primary objective is to defend a vessel, vehicle or installation from attacking missiles, mortars or other arms. Yet these systems are not deployed to human targets.⁷² However, they are able to attack manned systems such as incoming boats or aircraft, especially when fixed on a vessel. These systems engage autonomously with attacking forces under human supervision since decisions to detect, process and engage with an incoming object can be too fast for a human operator to engage with. However, there are systems in the trial stage which are able to engage with human targets. A prominent example for a fixed weapon system is the Israeli built Iron Dome. This counter rocket artillery and mortar system can also be used against attacking helicopters or aerial drones. The system is already in use to protect Israeli cities from attacks from the Gaza strip. It is fed with data from connected radar units and if armed can launch counter attacks on incoming objects on its own only with human oversight, so a human-

⁷² ICRC, 2014.

on-the-loop system. In case the system calculates that an incoming object would hit the open seas or uninhabited land it would not start a counterattack.⁷³

Ground weapon systems have similar traits only that they have a more sophisticated element of navigation. An autonomous example for that is more sophisticated than remotely controlled robots would be the Israeli Guardian which can independently navigate to a certain area. But the autonomy in these kinds of systems is not as advanced as in the ones for fixed weapon systems, as operational data has to be fed to the system by a human operator which must also supervise the system. However, the system itself controls some functions besides navigating these are the identification, communication and usage of light weaponry.⁷⁴ Yet when it comes to communication a human-in-the-loop is needed because the objective of the Guardian is to detect intruders from the Gaza border fence and communicate to them that they cannot trespass where communication is spoken by the human who has oversight. Still in case of evasion of the intruder it is able to detect this and can engage with the target autonomously under human oversight.

Further aerial weapon systems are already in use. The development here moves towards autonomy in selecting and attacking targets. Earlier versions of unmanned aerial systems are at the stage of navigating and newer developments are capable of detecting targets. However, for the process of selecting and attacking a target must still be chosen by a human-in-the-loop. The US Air Force holds 150 of the MQ-1B Predator drones which is the smaller version to the MQ-9 Reaper. The Predator has the typical features but needs a crew of two people with one pilot and one sensor operator. The latter is responsible for the evaluation of reconnaissance data that was collected during the flight. Also, the crew would have to decide on their own if they want to engage with a target and provide that information to the weapon system. The Predator is then just functioning as a weapon-carrier platform because it can be equipped with two Hellfire air-to-ground missiles with an own built-in guidance system.⁷⁵ In contrast, the controlling unit of e.g. missiles or loitering munitions constructed in a way that it is one unit with an integrated warhead and destroys itself when attacking. These systems are more advanced when it comes to selecting and attacking targets. Examples include the Hellfire missile and the British air-to-ground missile Brimstone. The latter can be remotely controlled by a human operator or act autonomously but usually need human input about which target to attack. Brimstone can even

⁷³ Bloomberg, 2016.

⁷⁴ IAI, 2019(1).

⁷⁵ US Air Force, 2015.

attack multiple targets or launched in salvos to attack swarming objects autonomously.⁷⁶ Loitering munitions work according to the same principle of ‘fire and forget’ where no human control or guidance is needed after the launch.⁷⁷ But these systems are designed to stay in the air for long hours and wait until the system decides on the right time to attack. These munitions are not necessarily designed to return to the ground station but can return from attacking mode back to loitering if the status of the target changes. The loitering munition Harop from Israel Aerospace Industries for instance is constructed to destroy enemy targets especially ships and radar systems on the ground. It has the capability to search, find, identify and attack a target autonomously. Yet, a human operator can abort a mission, but there is also a human-in-the-loop mode available to avoid collateral damage.⁷⁸ However, this mode can also be selected to attack human targets. In 2016 the Harop was fired by Azerbaijan on a bus with Armenian reserve soldiers.⁷⁹ Even if the technical capabilities are not that sophisticated it can be manipulated by a human operator.

Furthermore, are there maritime weapon systems which can be either on the surface for attacks on and above the water, but also track down and engage with submarines, or it can be underwater systems for submarine targets, laying mines or alike.⁸⁰ The range of weapons can reach from active protection measures against incoming torpedoes like the hard-kill systems for vehicles to unmanned ships. The latter must be equipped with weapons in order to be a lethal weapon system, otherwise it could also be used for civilian purposes like extinguishing fires on boats or oil rigs. Underwater missiles can also be used as loitering munitions and lurk for potential targets for hours. Such systems can also be used as ‘fire and forget’ or as ‘fire and observe’ where the attacking process is human supervised can be aborted or targets changed.⁸¹

Lethal autonomous weapon systems show a broad range of sophistication in technical capabilities and also different degrees in the way humans are integrated in the loop. The systems with most degree of autonomy are the ones functioning as a vessel and warhead alone combined like loitering munitions not as an autonomous platform alone that is able to launch weapons. Regarding the functions autonomous weapons are able to perform it can be witnessed that there

⁷⁶ MBDA Missile Systems, 2015.

⁷⁷ ICRC, 2014.

⁷⁸ IAI, 2019(2).

⁷⁹ Sanchez, 2016.

⁸⁰ ICRC, 2014.

⁸¹ Ibid.

is the same difference among types of weapon systems. However, are the functions that are necessary to be lethal mostly semi-autonomous or remote controlled.

An issue that is falling short in many of these systems is the learning process some weapons are capable of. For future generation weapons this is important because LAWS are rapidly developing especially in that field. To answer the question about compliance with humanitarian law the state of the art for artificial intelligence (AI) has to be examined. There are two main types of learning that are used for LAWS in the developing and testing phase. For once machine learning depends much on the system developer. A system using that approach is fed with data and the developer marks features of the data which the system can apply to new data fed in or gathered during use. For example, if a system would need to learn what a dog is or how it looks like it would get a picture of a dog and the developer would need to manually select relevant features of the dog like their edges or corners. This creates a model what an object is and trains the machine. During usage or training it will refer to this knowledge when analyzing new objects.⁸² The advantage is that it does not need a lot of training time, because it knows the features to look for when identifying objects. This would obviously also work for detecting weapon systems or armed forces. Deep learning on the other hand is a sub-category of machine learning where the manual selection of features is not necessary. Images are fed directly into the system which predicts the object according to a statistical model. However, a huge amount of data and long training time is needed in order to get strong predictions, but if so, the results are highly accurate.⁸³ The underlying problem is the one of datasets fed in the system not the algorithms.⁸⁴ Further can a real environment be too complex to map out and being fed to AI systems. Therefore, the learning processes are highly dependent on human engineers and developers by either feeding them the right information to train them or defang the features of objects correctly. Moreover, is the problem with deep learning systems that they run deep neural networks which they improve over time by training. This can be depicted like a black box where input and output are known but not the process of decision-making in between. It is unknown or difficult for the engineer to understand how an AI system came to a conclusion especially if this is happening during deployment. Thus, systems could learn something which was not intended for it to learn.⁸⁵

⁸² MATLAB, 2017.

⁸³ Ibid.

⁸⁴ Boulanin & Verbruggen, 2017(1).

⁸⁵ Ibid.

3.2. Legal background

To determine if it is legally possible to deploy a weapon system on the battlefield the corresponding provisions in international law must be consulted. The main part deals with humanitarian law specifically the law of armed conflict - jus in bello which is laid down in the Additional Protocol I to the Geneva Convention.

Before restoring to Article 36 and make a legal assessment if a new weapon system must be banned it is necessary to scrutinize humanitarian law treaties that already regulate certain types of weapons and are thus regulated already so a separate legal review would be redundant. Most lethal autonomous weapons are working with classic explosive payloads and rely on their precision and also lethality which is often pointed out by proponents of LAWS. Therefore, weapons such as biological, chemical or blinding lasers are not in question. However, among the treaties on the prohibition of weapons there exist regulations potentially affecting LAWS.⁸⁶ Treaties in question are the Protocol II to the Convention on Certain Conventional Weapons⁸⁷ and the Convention on Cluster Munitions⁸⁸. The former regulates the use of mines, booby-traps and other devices it would also be the only fitting protocol of the CCW framework that does fit to the current state of the art and future developments in lethal autonomous weapons. Its main scope can be found in Article 1(1):

*This Protocol relates to the use on land mines, booby-traps and other devices, defined herein, including land mines laid to interdict beaches, waterway crossings or river crossings, but does not apply to the use of anti-ship mines at sea or inland waterways.*⁸⁹

However, the laying of mines and shooting torpedoes were so far only a feature of autonomous naval weapon systems and those in the trial stage. The use of anti-ship mines is not regulated in this treaty but can be found in the Hague Convention VIII from 1907. Article 1 states that floating mines must become harmless after one hour, anchored mines as soon as they are detached from the anchor, and torpedoes if they missed their target.⁹⁰ Therefore, the use of mines and torpedoes is regulated but not prohibited. On the other hand, the regulation of cluster munitions prohibits in its first article explicitly the use of cluster munition as well as under Article 1(1)(b) to “[develop], produce, otherwise acquire, stockpile, retain or transfer to anyone,

⁸⁶ Annex II.

⁸⁷ Protocol II to the Convention on Certain Conventional Weapons. 1996.

⁸⁸ Convention on Cluster Munitions. 2008.

⁸⁹ Ibid, Article 1(1).

⁹⁰ Hague Convention VIII, 1907.

directly or indirectly, cluster munitions”.⁹¹ The preamble states the reason for this, because civilians are often the victims of cluster munitions and deprive them of their livelihood. However, this is a treaty having not many high contracting parties as many countries still make use of it. Thus, it cannot be regarded as international customary law since state practice and *opinio juris* is not commonly shared among states. Most notably, the US is developing these kinds of munition as autonomous weapons for example the Cluster Bomb Unit-105 Sensor Fuzed Weapon that can engage with targets autonomously.⁹²

Yet, the most fitting provision is Article 36 of the Additional Protocol I to the Geneva Convention⁹³ which is also the basis for individual countries that conduct a weapon review. This article where the assessment of compatibility of LAWS with *jus in bello* will mainly revolve around, reads the following under the heading of ‘new weapons’:

*In the study, development, acquisition or adoption of a new weapon, means or method of warfare, a High Contracting Party is under an obligation to determine whether its employment would, in some or all circumstances, be prohibited by this Protocol or by any other rule of international law applicable to the High Contracting Party.*⁹⁴

According to this article states must ensure prior to deploying a new weapon that it is compliant with that rule, i.e. weaponry that was not evaluated according to this article is violating it and the use of the weapon is against *jus in bello*. The objects that have to be in compliance are new weapons, means and methods of warfare. Weapons is everything that has the capability to destroy military effectiveness of an opponent. Means are objects, munition or other devices that are weaponized in order to be used as a weapon, for example could an unmanned aerial vehicle (UAV) used for reconnaissance be equipped with missiles and become an unmanned combat aerial vehicle (UCAV). However, means can also be equipment that is needed to field military capacity like a unit that does the targeting, so force can be applied.⁹⁵ Methods of warfare refers to the manner how items or strategies are used like using phosphorus flares against human targets and bring excessive injuries even though it was not meant to be used that way. This section is however outlined in more detail in the conceptualization section of this research.⁹⁶

⁹¹ Convention on Cluster Munitions, 2008, Article 1(1)(b).

⁹² ICRC, 2014.

⁹³ Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I). 1977.

⁹⁴ *Ibid*, Article 36.

⁹⁵ Boulanin & Verbruggen, 2017(2).

⁹⁶ *Supra* 2.1.2. Conceptualization.

High contracting parties are 177 countries that signed the Additional Protocol I to the Geneva Convention which is less than the Geneva Convention from 1949 being signed by 196 parties. However, three of these parties only signed the protocol and did not ratify it. Since the document is already into force for the parties that have ratified it but for the signatories alone this is not the case. These three signatory-only states are Iran, Pakistan and the US. However, if a case on the violation of this article should ever be brought to an international tribunal justification of the signatory-only states on the fact that it was not ratified would most likely not count. Hence the International Court of Justice (ICJ) stated in its Nuclear Test case (New Zealand v France) that “[once] the Court has found that a State has entered into a commitment concerning its future conduct it is not a Court’s function to contemplate that it will not comply with it. However, the Court observes that if the basis of this Judgment were to be affected, the Applicant could request the examination of the situation in accordance with the provisions of the Statute”.⁹⁷ Therefore, this intention to be a party of the protocol is sufficient for the ICJ to make a ruling on that ground. Consequentially all of the high contracting parties must do weapon review based on this article before deploying LAWS. The weapon systems under normal use must be checked for compliance with the provisions in this article and other sources of international law. Nonetheless the reviewing party is not obliged to publish any of the results if the weapons are still developed. At this stage found violations of IHL does not create an international rule to ban this weapon nor does it preclude that reviewing party from developing or manufacturing, but the deployment will violate IHL.⁹⁸

As the second part of the title to the Additional Protocol 1 indicates it was drafted ‘relating to the protection of victims of international armed conflict’. Article 36 is intended to protect the most vulnerable during war. These are especially persons hors de combat who are unable to fight for example when surrendering. Further is the main purpose of the protocol to protect civilians. The underlying principles on how to ensure compliance of a new weapon can also be found in the Additional Protocol I which are the prevention of superfluous injury, prohibition of indiscriminate effects, and prohibition of weapons causing damage to the natural environment.⁹⁹ Of special attention are principles of proportionality and precautionary as well as military necessity of an attack which correspond to the prohibition of weapons having indiscriminate effects.¹⁰⁰

⁹⁷ ICJ, 1974, para. 63.

⁹⁸ ICRC, 1987(1).

⁹⁹ Boulanin & Verbruggen, 2017(2).

¹⁰⁰ Boothby, 2009.

Regarding injury and suffering humanitarian law under Article 35(2) Additional Protocol I states:

*It is prohibited to employ weapons, projectiles and material and methods of warfare of a nature to cause superfluous injury or unnecessary suffering.*¹⁰¹

Already in the Saint Petersburg Declaration of 1868 the underlying argument for the necessity of such a rule was that Russian military engineers developed a projectile which was able to detonate on soft surfaces which included people. This was considered inhumane and a ban on explosive projectiles under 400 grams was adopted initiated by the Russians.¹⁰² In course of that also the objective of a battle was defined and included in the Saint Petersburg Declaration of 1868. It states that “the only legitimate object which states should endeavor to accomplish during war is to weaken the military forces of the enemy”.¹⁰³ Determining what is superfluous injury and unnecessary suffering is difficult from a medical perspective, as there are many parameters included and perception can be highly individual especially because the provision refers not only to physical but also psychological suffering.¹⁰⁴ In 1996 the ICRC started an approach to quantify what suffering and injury means in a very technical fashion. However, the project was folded after it was heavily criticized that it does not include military necessity in its considerations. For example, did it not consider the design of the weapon and its effects under normal circumstances but applied amongst others a mortality rate cutoff value for a weapon by which it would be violating humanitarian law.¹⁰⁵ Therefore, this provision must be applied on the design and normal use of a weapon in question.

The prohibition on weapons having indiscriminate effects was implemented to guarantee special protection for civilian population during wartime. In Part IV of the Additional Protocol I three articles outline this special protection. As is stated in Article 48:

In order to ensure respect for and protection of the civilian population and civilian objects, the Parties to the conflict shall at all times distinguish between the civilian population and combatants and

¹⁰¹ Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I), 1977, Article 35(2).

¹⁰² ICRC, 2019.

¹⁰³ Saint Petersburg Declaration, 1868.

¹⁰⁴ Boothby, 2009.

¹⁰⁵ Ibid.

*between civilian objects and military objectives and accordingly shall direct their operations only against military objectives.*¹⁰⁶

Article 51 specifies the protection of civilians even further and prohibits indiscriminate attacks which are:

*a) those which are not directed to a specific military objective; b) those which employ a method or means of combat which cannot be directed at a specific military objective; or c) those which employ a method or means of combat the effects of which cannot be limited as required by this protocol*¹⁰⁷

Thus, means and methods of warfare can only be applied to target the civilian population not taking part in hostilities. Civilians is referring to a population and civil objects are the counterpart of military ones where its destruction, capture or neutralization could come along with a military advantage.¹⁰⁸ Further, Article 55 states that the environment shall be protected against severe long-term damage thereby not jeopardizing the health and survival of the civilian population.

The foundations for the prohibition on indiscriminate attacks was codified in the Lieber Code which was developed for the US Civil War and has only legal relevance as it was used as a starting point for the development of the principle of distinction. Article 25 in that code states that “[in] modern regular wars of Europeans, and their descendants in other portions of the globe, protection of the inoffensive citizen of the hostile country is the rule; privation and disturbance of private relations are the exceptions”.¹⁰⁹

That principle developed into international customary law to make a distinction between military targets and civilians. Also, the refraining from destroying civilian infrastructure was owed to the fact that after conflicts in the last decades the winning party helped the losing one to reconstruct its infrastructure. Thus, it was in their own interest to not destroy civilian infrastructure.¹¹⁰ Nowadays the face of war has changed a lot. Conflicts between state parties and irregular forces such as terrorist groups have increased, and asymmetric warfare has become more prominent. This posed a challenge for regular forces observing humanitarian law.

¹⁰⁶ Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I), 1977, Article 48.

¹⁰⁷ Ibid, Article 51.

¹⁰⁸ Cf. Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I), 1977, Article 52.

¹⁰⁹ Liber Code, 1863, Article 25.

¹¹⁰ Boothby, 2009.

Often irregular forces make use of civilians and civilian infrastructure to engage in warfare. This could be hiding weapons in a hospital or covering in a school often times combined with human shields by civilians. Yet the parties to a conflict can also not take human shields and are obliged to remove the civilian population from military objectives. Especially during asymmetric warfare these rules are not adhered to. Therefore, it is necessary when fielding force to have pinpoint accuracy and a high reliability of the weapon system and operator. Nonetheless may it occur that collateral damage happens. However, this is not forbidden per se.¹¹¹ This is also the case for civilian objects which enjoy special protection under IHL. In case of doubt Article 52(3) states that if “an object which is normally dedicated to civilian purposes [...] is being used to make an effective contribution to military action, it shall be presumed not to be so used”.¹¹² This approach was later also confirmed by the International Criminal Tribunal for the former Yugoslavia (ICTY) in the judgement of the Galic case.¹¹³

Furthermore, is the prohibition of indiscriminate attacks closely related to the one of distinction and proportionality. The former principle requires an assessment if a target is lawful. This is a two-way approach because the attacker needs to be sure to engage with no unlawful target but all belligerent parties to the conflict need to be distinctive. Combatants shall distinguish themselves when engaging in attacks. Article 4 of the Geneva Convention III defines combatants as either members of armed forces or militias acting as such and wearing uniforms. Militias or organized resistance movements operating in or outside their own territory are considered as combatants as well, if they act under command, be recognizable by wearing a distinctive element which make them appear uniform, carry arms openly and follow the principles of IHL.¹¹⁴ Yet there is a further classification of combatants which are for example guerrilla fighters under an occupational regime. They can maintain their combatant status, if they carry arms openly during engagement with the adversary and if seen by them.¹¹⁵ Those are combatants of international armed conflict, however in non-international armed conflict, which takes place between a state party and non-official armed groups the status of combatant does not exist. However, armed forces exist, and they can be attacked if they are characterized as such by their function which is the active participation in hostilities and being under command.

¹¹¹ Ibid.

¹¹² Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I), 1977, Article 52(3).

¹¹³ ICTY, 2003, para. 51.

¹¹⁴ Geneva Convention III, 1949.

¹¹⁵ Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I), 1977, Article 43.

Henceforth belligerent parties to a conflict must be distinctive in order to engage in hostilities. Still, the provisions in Additional Protocol I only refer to international armed conflict where the notion of combatant is known.

As noted above it is strictly prohibited to attack the population as such. This was confirmed by the Kunarac case following the Yugoslavian wars. The ICTY stated that civilian population cannot be attacked as such.¹¹⁶ However, it can happen that the civilian population or parts of it suffer from attacks which is not targeted at them. This leads to the principle of proportionality and precaution.

Proportionality refers to the incidental harm done to the civilian population and objects in comparison to the military advantage gained by an attack. The incidental harm which is also known under the euphemist term collateral damage must be weighted with military advantage in order to prevent civilian losses be it among the population or objects.¹¹⁷ Not only the targeting of an objective itself is subject to proportionality but also other factors that endanger civilians such as weather conditions reducing visibility of the target or military objectives like fuel depots which could cause greater damage as first anticipated.¹¹⁸ Article 57(2)(b) regulates that an attack shall be cancelled when “it becomes apparent that the objective is not a military one [...] or the attack causes incidental loss of civilian life [or objects] [...] which would be excessive in relation to the concrete and direct military advantage anticipated”.¹¹⁹ The Supreme Court of Israel ruled in 2005 that the killing of a combatant or terrorist would not be proportionate if the military advantage, also by means of saving lives of innocent bystanders, is smaller than the harm done to combatants or terrorists.¹²⁰ Thus, the court stated that “in international law, as in internal law, the ends do not justify the means”.¹²¹ Further shall the civilian population be warned by the attacker effectively about eminent attacks if the situation permits it.¹²² However, determination of excessiveness falls under the discretion of a court or tribunal. Yet it refers especially to willful attacks where excessive casualties are accepted by the belligerent themselves.

¹¹⁶ ICTY, 2002.

¹¹⁷ Boulanin & Verbruggen, 2017(2).

¹¹⁸ ICRC, 1987(2).

¹¹⁹ Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I), 1977, Article 57(2)(b).

¹²⁰ ILSC, 2005, para. 46.

¹²¹ Ibid.

¹²² Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I), 1977, Article 57(2)(c).

The principle of precaution refers more to the planning unit and stipulates them to take all necessary measures to ensure that the target is of military nature and civilian objects and people are protected. This is ensured during the choice of the means and methods to attack a target. Since the duty of the planner is “avoiding or minimizing injury to civilians and damage to civilian objects”.¹²³ As mentioned in the previous paragraph, an attack shall be canceled if these conditions are not met. If an attack is conducted whatsoever the civilian population shall be removed and targets in densely populated areas shall be avoided.¹²⁴

Another interrelated concept is the one of military necessity which decides whether an attack has to be conducted to get a military advantage. Though there must always be a nexus between the destruction of property and the purpose of a military advantage. This means in return that attacks using means and methods according to humanitarian law are permissible if they are limited to military objectives which “by their nature, location, purpose or use make an effective contribution to military action and whose total or partial destruction, capture or neutralization [...] offers a definite military advantage”.¹²⁵

The prohibition of the employment of weapons harming the natural environment is often neglected when conducting a weapon review. Though there are certain provision regarding that topic in the Additional Protocol I which was ratified shortly after Agent Orange polluted the forests in Vietnam and had lasting effects on the local population as well. Especially Article 55(1) regulates the conduct of warfare when it comes to the environment. However, it is not a prohibition as such, but more a conduct of behavior to not bring long-term and severe damage to the environment. Yet, a conduct that destroys the environment and thus endangers the health and survival of the population is prohibited.¹²⁶ Thus, the usage of weapons, means and methods of warfare must not harm the environment.

If there is no treaty or customary law to determine if a weapon is compliant with IHL the Martens Clause has to be consulted. It was included in some sources of international humanitarian law also in Article 1(2) of the Additional Protocol I:

¹²³ Boulanin & Verbruggen, 2017(2), p. 22.

¹²⁴ Cf. Additional Protocol I, 1977, Article 58.

¹²⁵ Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I), 1977, Article 52(2).

¹²⁶ Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I), 1977, Article 55(1).

*In cases not covered by this Protocol or by other international agreements, civilians and combatants remain under the protection and authority of the principles of international law derived from established custom, from the principles of humanity and from the dictates of public conscience.*¹²⁷

Thus, public perception on certain means and methods of war could also hinder the employment of LAWS. Though the Martens Clause was implemented keeping in mind the developing weapon technologies and is consulted when existing humanitarian law may not be applicable. Even though not all states are a party to the treaties incorporating the Martens Clause, the ICJ stated in an advisory opinion that the fundamental rules of the Hague and Geneva Conventions have become customary law and “are to be observed by all States whether or not they have ratified the conventions that contain them, because they constitute intransgressible principles of international customary law”.¹²⁸

3.3. Legal analysis

For the assessment if LAWS are compliant with IHL they must be reviewed and scrutinized if the weapon systems or parts of it is already prohibited by international law. This can be in existing treaties specifically about certain weapons, law of armed conflict or international customary law. Yet, the latter is mostly codified by now. The treaty provisions especially the ones laid down in Additional Protocol I are interpreted as the Vienna Convention on the Law of Treaties (VCLT) states it in Article 31(1). This article reads that international treaties “shall be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose”.¹²⁹ Since the Additional Protocol I was drafted with the object and purpose to first and foremost protect the victims of armed conflict as it says in the preamble, the analyzed weapon systems are assessed on grounds of their critical functions.

In principle all lethal autonomous weapon systems work according to the same principle. The advantage of these systems is precision directed to a target. Thus, the weapons are so precise that they create maximum effect in terms of military gains with minimal effort. So far, many autonomous systems did not yet surpass the trial phase in a fixed training environment. However, these systems have to be evaluated on their normal use which is also possible in the

¹²⁷ Ibid, Article 1(2).

¹²⁸ ICJ, 1996, para. 79.

¹²⁹ VCLT, 1969.

trial phase. Therefore, in the consideration are no malicious engineers taken into account that purposely manipulate the AI of the autonomous weapon systems and but were expected to work with the considerations of humanitarian law.

Autonomous systems collect data of the environment through different sensors. If the system must decide on something many weapon systems have already created a set of alternatives and opt for the best one according to their trained knowledge.¹³⁰ For most functions of LAWS humanitarian law is actually not applicable because the provisions concerning new weapons is almost exclusively connected with humans may it be persons hors de combat or civilian population. The core functions of mobility and navigation of a system without considering attacking like in a kamikaze mission do not necessarily affect humans as such. Further coincides the own health management of an autonomous system for example refueling with humans and needs to be regulated under humanitarian law. Interoperability between systems and intelligence sharing among autonomous systems or with a command post is also not problematic under IHL and would work the same way as human-operated weapons especially when it comes to intelligence information sharing which nowadays is directly shared from a camera unit on a reconnaissance plane may it be manned or unmanned to the command post. Even the legal provisions on protection of the natural environment or civilian objects are not affected in any other manner by these functions as they would be under corresponding conventional weapon systems.

One existing autonomous weapon can be ruled out already for not being in compliance with IHL. The US Cluster Bomb Unit 105 Sensor Fuzed Weapon violates the Convention on Cluster Munitions. Therefore, such a weapon would not be permissible in armed conflict. However, a big number of states abstained from signing the treaty and continue use and production of cluster bombs which does not release the parties to the convention from their obligations under the Convention. Cluster bombs are specifically ousted due to their indiscriminate effects they have on civilians.¹³¹ Yet, the autonomous US bomb is designed to distinguish between military and civilian targets. However, under the Convention it is still not compliant with IHL because it applies molten copper which can set armored vehicles on fire. Thus, there could also be made an argument against the excessive injuries and unnecessary suffering provision. Further do other existing LAWS not violate the CCW Protocol II on mines and booby-traps, because these

¹³⁰ Ansell, 2014.

¹³¹ Convention on Cluster Munitions, 2008.

systems do not apply them and if so, they need to comply with the regulations under this convention to comply with IHL. The same is for autonomous naval vessels laying sea mines. Unless they do not lay a new type of mines the autonomous weapon system must not violate the regulations on sea mines to be in accordance with humanitarian law. Also loitering munition like torpedoes is not armed constantly but only when the decision for conducting an attack was taken.

The critical element that can make or break compliance of lethal autonomous weapons with international humanitarian law is the targeting function. It consists out of three important elements which are tracking, selection and attack. These elements have to be in compliance with existing provisions. When it comes to superfluous injury or unnecessary suffering the design must be regarded. As the Saint Petersburg Declaration pointed out that the use of certain weapons can be inhumane.¹³² Nonetheless are LAWS by design not inhumane nor do they use such means or methods. The functions are designed to kill the enemy effectively according to the military objective and not wound them. This is the case for all systems targeted against humans for aerial defense systems like the Iron Dome an assessment cannot be done because they are designed to intercept missiles. However, they can also intercept helicopters but use the same payload as a regular surface-to-air missile would use to effectively destroy the aircraft foremost and not the pilot. If those weapons would not engage with targets effectively, they would not be lethal weapons. It is even argued that LAWS cannot be inhumane because they do not have human behavior which would make them more reliable in following IHL and do no unnecessary harm.¹³³ Therefore, the targeting functions are in compliance with not causing excessive injuries and suffering.

Indiscriminate attacks are linked to distinction which LAWS must be in compliance with. This is something where the AI needs to be trained in order to make a distinction between a person participating in combat and those hors de combat, non-fighting personnel which also must not be attacked like chaplains, cooks or medical units in uniform, and the civilian population. Through machine learning systems are able to make a distinction between combatants and the civilian population. They can be fed with information about enemy combatants, even if they are irregular forces wearing no uniform attire but only shared emblems. The same can be for persons hors de combat, so LAWS are able to recognize a soldier surrendering or unable to

¹³² Saint Petersburg Declaration, 1868.

¹³³ Sassoli, 2014.

fight. The civilian population are those that are not in this exhaustive database so the weapon can discriminate between them. The systems are able to receive information to apply with IHL and is able to discriminate even between combatants and retained personnel like medical personnel when they are distinctive.¹³⁴ However, there are dissenting opinions that these systems can easily become erroneous due to programming and interacting with the environment that fosters an unwanted learning process.¹³⁵ Though there is room for certain concern in non-international armed conflict. Armed forces do only need to carry arms openly to be labeled as such. However, this is the only distinctive character a weapon system is then looking for. Yet the AI works with a probability model to detect such a characteristic. Thus, the system could falsely detect a weapon hence a threat which could be a shadow and then engage with the target. Therefore, the whole targeting process of tracking, selection and attack could be flawed and pose a possible violation of IHL. However, the weapon system can be engineered in a way that it creates a very high certainty up to the level of differentiating between a real and a toy gun. Some expect that this will also be safer than human beings, because they have emotions like fear or a survival instinct that LAWS do not have.¹³⁶

Another facet of the prohibition of indiscriminate attacks is proportionality and the precautionary principle which is interlinked with military necessity. Proportionality is also dependent on distinction if a system can detect e.g. civilian objects and do a proportionality test. An attack can however not be excessive which is however in the discretion of a tribunal do decide on that.¹³⁷ In order to launch an attack, the AI of a system has to make a proportionality test with the data it has acquired. Thus, commanders themselves can determine what is appropriate and militarily necessary. These systems can be adapted to the military objectives by human operators as well. Currently the commander must ensure proportionality and precaution of an attack. This is also the case for LAWS and would create problems if for example communication is lost in how far proportionality and precaution can be ensured.¹³⁸ Yet, this is also the case for conventional weapons especially long-range guided missiles may get interrupted from communication lines. The same applies to LAWS, if the commander ensures human oversight and can abort missions there is no issue with IHL compliance. But also, fully autonomous systems may safeguard the principles of proportionality and precaution.

¹³⁴ Sassoli, 2014.

¹³⁵ Ansell, 2014.

¹³⁶ Sassoli, 2014.

¹³⁷ Cf. Additional Protocol I, 1977, 57(2)(b).

¹³⁸ Davison, 2017.

Especially, the Harop loitering munition is able to abort attacks on their own if the target is changing or certain parameters in the environment.¹³⁹ Hence, the employment of autonomous weapons for military necessity can be lawful if the principles of proportionality and precaution are met. The weapon systems like the Harop already follow the precautionary principle as they go back to the loitering position if parameters around the targets changed and estimate the situation with new data. Even the proportionality requirement can be met, since LAWS can calculate a proportionality test as human commanders can. However, the parameters for that have to be determined by human engineers in order not to get outcomes with excessive collateral damage in order to meet military objectives.¹⁴⁰

Concerns about environmental issues of autonomous weapon systems are not that many. Most of the armory which either are the weapon system itself or used by a platform is rather conventional. The main difference is the precision of the weapons. Higher effectiveness is achieved with the same warheads as they are directed more precise. The systems do not work with aerial bombings or substances having the potential to contaminate the environment. Also, the destruction of nature as such is not a military objective and can be excluded from the programmed objectives. Thus, there is no special concern about that issue about protection of the environment when it comes to compliance with IHL.

Finally, there is the question about the Martens Clause. In short can this be answered as LAWS being compliant to existing humanitarian law and treaties and does therefore not need an assessment under the Martens Clause. However, this clause is referred to by many critics of autonomous weapons. The argument is that the human becomes so far detached from the making of the life-and-death decision in war that the fundamental question occurs why there even is a need for humans to engage on the battlefield.¹⁴¹ LAWS will replace the human aspects of war. Though it replaces a lot of negative sides of human beings like hate, anger, desperation or fear which would decrease inhumane behavior like unnecessary brutality, rape and other negative human traits. Nonetheless is there also no room for the positive traits of humanity. For example, can the survival instinct result in reason and people come to terms especially in long lasting wars. LAWS would fight until a military advantage is achieved but in a lingering mutual destruction the battle between autonomous systems can get easily protracted. Furthermore, could the detachment of humans from the killing process, result in an estrangement of war. So,

¹³⁹ IAI, 2019(2).

¹⁴⁰ Boulanin & Verbruggen, 2017(2).

¹⁴¹ Davison, 2017.

people of the populations to the conflict parties will not yield to reason and protract conflicts more and more, because they lost any personal relationship to war unlike when human beings are fighting, and many people have relations to the fighting parties. On the other hand, this can also be a benefit since no one knows a fallen person and has thus grudge against the other party as it is still today in many regions of the world. Nonetheless, the principles of humanity may be violated by employing LAWS. According to the first Kantian categorical imperative humans should act in a way that it becomes in the same time a universal law. This is combined with the second categorical imperative on humanity which commands that one shall “[act] in such a way as to treat humanity, whether in [...] [ones] own person or in that of anyone else, always as an end and never merely as a means”.¹⁴² Both imperatives can hardly be followed if LAWS would take the human aspect out of war and people would not have a stake in it if there is no awareness of war anymore. Therefore, employment of autonomous weapons in conflict may present a burden for humans to restore to reason.

Public conscience is also not a valid argument at this stage to call for a ban of LAWS on grounds of the Martens Clause. Even though an increasing number of, from 56% in 2017 to 61% in 2018 across the globe in 26 different countries oppose the use of lethal autonomous weapon systems the numbers are not the whole truth.¹⁴³ It has to be mentioned that the sample consists mostly of Western oriented countries and can thus not create an international rule based on public conscience. Furthermore, depends it the public perception of LAWS strongly on context and scenario which also shows that there is not yet a general consensus on the issue. Among US support for the development of LAWS significantly increased when considering that other countries or non-state actors are developing these weapons. Also were autonomous weapons increasingly supported when they were able to better protect US troops.¹⁴⁴ Thus, at this moment the issue of LAWS is not sufficiently represented in the in public perception to be violating IHL at this stage.

3.4. Conclusion

Generally lethal autonomous weapon systems are in compliance with humanitarian law. However, does the notion of autonomy not play such a central role during the assessment. The

¹⁴² Kant, 2017, p. 29.

¹⁴³ Deeney, 2019.

¹⁴⁴ Horowitz, 2016.

weapon system must eventually be analyzed on its critical functions which are all directly related processes to autonomous targeting which are tracking, selection and attack. For this process the sophistication of autonomy is only in so far important as to figure out how it was programmed and if it can observe humanitarian law in the targeting process. Also, human oversight is not that important if LAWS can ensure compliance in critical functions, for example aborting an attack when circumstances are unclear, and the precautionary principle applies. Therefore, autonomous weapon systems are not so abstract from many conventional systems used right now. Only the level of abstraction of the human involved in operating a weapon system increases from directly involved to a controller that can intervene if needed to a silent observer in the future that plans ahead and assigns tasks to autonomous weapon systems. Nonetheless is international humanitarian law all time observed under normal use of these weapons.

Yet it must be noted that especially self-learning systems are difficult to analyze, because the knowledge that it gains through employment can change the AI and its assessment of certain situations. Possibly this can change a weapon assessment, but its initial design is made to be precise and efficient and during this course not violating IHL principles. Moreover, could it be possible to limit the learning of these systems in a way that human engineers determine what an autonomous system can learn and what not.¹⁴⁵ The programing can of course be subject to malicious individuals, but this is not the purpose of the system for what it was designed and the conformity with international law is based on that. The actions of individuals knowingly construct errors or even train AI unlawfully is however a criminal act which gets prosecuted but does not alter the weapon as such when it complies with IHL.

The Martens Clause does not apply at this stage of the development of LAWS. Yet, this is not definite and certain systems could be overwhelmed by the amount of data and the environment they have to operate in that there is no reliability that IHL can be observed.¹⁴⁶ The Martens Clause was precluded because humanitarian law in the Additional Protocol I has a very technical approach under which circumstances weapon systems are permitted. Scholars that refer to this clause also point out the moral issues that autonomous weapons pose. The opponents towards these weapon systems are increasing. The Martens Clause could become more important in the future when autonomous weapons are further researched and developed.

¹⁴⁵ Sassoli, 2014.

¹⁴⁶ Ansell, 2014.

In case weapon systems cannot live up to the expectations and prove not to be able to follow international humanitarian law in practice it can be referred to that clause and possibly applied. So, the determination of LAWS is not definite but refers to the state of the art and future development as they are designed to be and at this moment legal considerations are in compliance with IHL, but ethical questions prevail in the view of the opponents. Yet some states are not willing to wait for a first incident and advocate for a ban or regulation already in the CCW forum.

4. Chapter 3

The CCW is a chapeau convention including several additional protocols for the prohibition and restrictions on the use of certain conventional weapons that are deemed to have indiscriminate effects or cause excessive injury in international armed conflict¹⁴⁷, thus it is also known as Inhumane Weapons Convention.¹⁴⁸ Under the auspices of the CCW a Group of Governmental Experts (GGE) was set up in 2017 and equipped with a mandate by the respective governments to “examine emerging technologies in the area of lethal autonomous weapons systems” (ibid) and possibly work out an additional protocol on LAWS. Therefore, is the GGE on LAWS the primary forum where exchange between states and also other stakeholders happen. The official position of states on issues concerning autonomous weapons can be found here.

4.1. Austria

Austria has mainly expressed its concerns about LAWS in the forum of GGE. Their concerns start already by the possible employment of autonomous weapons. They bring the argument that the threshold to use force will be lower when LAWS are established, thus peaceful dispute settlement will be in decline.¹⁴⁹ As a country of the European Union (EU) Austria stands with their position, in those cases they speak for all their member states in international fora. The EU advocates also strongly for a regulation, but on the other hand acknowledges the applications of autonomous systems as dual-use products which can be used for non-military purposes. In the general view at the 2018 GGE meeting Austria confirmed its support with the EU position but emphasized its views of human control. It saw an undermining of IHL if critical functions of LAWS have no effective human control. Despite not questioning the applicability of Article 36 Additional Protocol I.¹⁵⁰ However, they state it lacks legal clarity and only that could constitute a legal instrument.¹⁵¹

Furthermore, they are concerned that LAWS using machine learning will develop faulty patterns if there was an initial error in the programming process. At the GGE conference one year later, it was stated that human control over functions as targeting must be kept, since it is

¹⁴⁷ Cf. CCW, 1980, Article 1.

¹⁴⁸ UNOG, 2019.

¹⁴⁹ Kayser & Denk, 2017.

¹⁵⁰ Annex III.

¹⁵¹ Ibid.

morally unacceptable the have an AI where only the output is known and the learning process that guides targeting is inexplicable.¹⁵² Therefore, they call for a full prohibition of systems without effective human control and characterize LAWS in terms of level of autonomy and human involvement in critical functions.¹⁵³ Austria is concerned that state responsibility and individual accountability would be outsourced to machines, yet the norms made were based on humans.¹⁵⁴ They highlight the difficulties of national weapons reviews and question their transparency and reliability also because of the complexity of autonomous systems.¹⁵⁵ Therefore, they call for a meaningful control of LAWS in IHL while also taking the Martens Clause into account.¹⁵⁶

4.2. Cuba

Cuba as a party to the Non-Aligned Movement (NAM) of the UN is sharing their positions. The NAM advocated for legally binding instruments for issues which will be discussed in the GGE including the observance of IHL and state responsibility for international wrongful acts of LAWS.¹⁵⁷ In 2018 it was demanded that autonomous systems must be under human control and supervision at all times. Voluntary measures also weapon reviews under Article 36 Additional Protocol I were rejected as being not effective and legally binding measures were demanded.¹⁵⁸

Cuba considers that the IHL principles of distinction and proportionality cannot be upheld by LAWS since Cuba doubts that machines can replace human qualitative judgements. Also, would state responsibility and accountability for international wrongful acts be hard to assess. Thus, a ban would be in line with the precautionary principle.¹⁵⁹ Moreover, is also a ban on semi-autonomous weapon systems such as drones demanded due to their high number of civilian casualties.¹⁶⁰

¹⁵² Annex III.

¹⁵³ *Ibid.*

¹⁵⁴ *Ibid.*

¹⁵⁵ *Ibid.*

¹⁵⁶ *Ibid.*

¹⁵⁷ *Ibid.*

¹⁵⁸ *Ibid.*

¹⁵⁹ *Ibid.*

¹⁶⁰ *Ibid.*

4.3. Australia

Australia who is not calling for a ban is acknowledging the advantages autonomous technologies can have. However, they also point out possible risks that can come with the advent of LAWS. Those would be the proliferation of low-cost autonomous technology may it be hardware or software.¹⁶¹ Also were dual-use items called problematic, because the progress on their development has to be protected otherwise civilian items can be transformed to military ones and vice versa.¹⁶² Regarding the legality of autonomous weapons under IHL Australia is committed to hold on a weapon review under Article 36 Additional Protocol I and states its value shall not be underestimated.¹⁶³ Australia is transparent in how they conduct their review but obviously not about the content so far. The Australian Defense Forces are conducting a multi-stage review. Thus, there are several reviews during developing, testing, training, phase, etc. and only by passing these stages a system can be developed further. International customary law and the law of armed conflict is consulted firstly but also the national law. Even the Martens Clause is consulted but in a narrow sense meaning that everything that is not expressly prohibited is permissible.¹⁶⁴ Eventually the weapons will get a permission, a permission with restrictions or are denied for usage. Australia is convinced of their review system and states that there is no need for a ban of LAWS at this stage.¹⁶⁵ Their system of control is also tailored to different types of weapons and their deployment in an environment which determines how much human involvement would actually be needed. The aspect of human control many opponents of LAWS mention are rejected by Australia as not covering adequately what their review and control system does in order to assess legality. Thus, a notion of human control is not useful to them as long as there is no common definition for it. Which is also why Australia offers their manual on Article 36 review and controls to other states as a blueprint for assessing autonomous weapons.¹⁶⁶

4.4. Israel

Israel is always stressing in the GGE meetings that it is ready for a reasonable dialogue without dealing with apocalyptic scenarios that arise from LAWS like weapons that develop

¹⁶¹ Annex III.

¹⁶² Ibid.

¹⁶³ Ibid.

¹⁶⁴ Ibid.

¹⁶⁵ Ibid.

¹⁶⁶ Ibid.

themselves. It states that the concern that autonomous weapons cannot comply with IHL is unfounded. It will be employed under normal use and is thus subject to humanitarian law as any other weapon.¹⁶⁷ LAWS will operate as designed and programmed by humans claims Israel further.¹⁶⁸ Hence the state is not supporting a ban on autonomous weapons.

An issue Israel is especially focusing on is the human-machine interaction which should be explored, and a preemptive ban would constitute a hindrance for it. This interaction is divided into two crucial periods where an appropriate level of human judgement is involved, even though the whole lifecycle of LAWS is broader than that. Firstly, there is the planning and development phase where humans are ensuring compliance with humanitarian law already.¹⁶⁹ For example, can limitations to the capabilities of a system be made on the basis of expected environment or scope of deployment. Thus, they can be limited in functionality to ensure IHL compliance and lesser errors. In the planning and deployment phase military commander decides on a mission, which means also on the objective and parameters that LAWS have to abide by and select the fitting weaponry for the mission.¹⁷⁰ Thus, in a life and death decision is always a human involved and the deployment happens under aspects of IHL. Israel is against a ban and advocates for national reviews as well and is willing to share their best practices so countries can have a meaningful review process and autonomous weapons are guided by international law.¹⁷¹

4.5. Conclusion

The countries have all very different approaches to undermine their claims. Whereas the two countries favoring a ban or regulation of autonomous weapons doubt compliance with IHL they take different approaches. Austria on the one hand acknowledges the potential of autonomous systems but moral concerns prevail in their argumentation since they deem it unacceptable that a machine can make a decision about life or death on its own. Cuba on the other hand does simply not trust the technical capabilities and have even distrust in semi-autonomous weapons which they oppose. The states supporting LAWS are also emphasizing the dual-use qualification of autonomous systems by stressing its civilian capabilities. Both states put trust

¹⁶⁷ Annex III.

¹⁶⁸ *Ibid.*

¹⁶⁹ *Ibid.*

¹⁷⁰ *Ibid.*

¹⁷¹ *Ibid.*

in the regulation by weapons review and the human commander when deploying. While Australia is a bit concerned about the proliferation of cheap LAWS technology Israel is stressing the human involvement in the process of developing and deploying LAWS.

5. Chapter 4

5.1. Discussion

The debate about the legality of LAWS under humanitarian law is still ongoing. This is also due to the developing of autonomous weapon systems which might reach new milestones in autonomous technology. Thus, new legal reviews would be required. An issue which was not much discussed in this research is responsibility. State responsibility on the one side and individual liability on the other. The former entails international wrongful acts which can be linked to the state and violates international law. In Additional Protocol I there is a provision that parties to the conflict that violate the protocol are responsible for their acts and may even pay compensation.¹⁷² Since in international armed conflict states are mostly the parties to the conflict, they can be responsible. Thus, there is an interest of the state that everything is according to law.

Further is there individual criminal liability that can be exercised by the state having jurisdiction over it or if it is unwilling or unable also by the International Criminal Court (ICC).¹⁷³ The ICC has jurisdiction over the crime of genocide, crimes against humanity, war crimes and the crime of aggression.¹⁷⁴ However, a criminal intent or mens rea must be proven in order to prosecute these crimes. Thus, a malfunction in the software would not be sufficient to prove a crime in the ICC. However, states and individuals may it be commanders or engineers must fulfill their duty mindfully. Nonetheless the aspect of responsibility was not featured much in this research because it is not directly linked to the question if LAWS can be deployed under IHL. In this stage they are however compliant with humanitarian law.

Countries opposing LAWS based their arguments often on responsibility that it will not be effective. Whereas Cuba was distrusting the capabilities of systems Austria saw more an ethical dilemma. Furthermore, proponents of LAWS referred to responsibility. Meaning that there is always a human involved at least in the act of attacking. Even though something would go wrong it would be possible to find out the responsible person. Through logbooks the situations can be reconstructed and then traced back on which level the error happened. This can be somewhere on the line between the commander and the developing company. Thus, impunity can be avoided. Still, the states favoring LAWS were always stressing that there must at least

¹⁷² Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I). 1977, Article 91.

¹⁷³ Rome Statute of the International Criminal Court, 1998, Article 17.

¹⁷⁴ Ibid, Article 5.

be a human on-the-loop when on such missions. The ethical concern was not discussed here but if weapons can be reviewed under Article 36, they end up with a very technical outcome. Thus, if ethical or moral issues shall be included in the assessment of LAWS the way to go is through the GGE.

In general, the rules laid down in humanitarian law are interpreted in a different manner depending on the position of a state on autonomous weapons. Through the forum of the GGE the different views of countries are shared and the argumentation process backing their position on LAWS. It is difficult to draw general conclusion on all states in the world from these four because other states have other moral values or different political interest. It is not exhaustive but shows concerns in several countries geographically separated. Moreover, were the countries positions consistent over the time span of the last two to three years and did not move more towards a consensus. However, a consensus might still be achieved because the positions of countries are not that far apart on some issues. For example, is human involvement for the states using LAWS not that much detached and not planned as opponents of LAWS are concerned of and proponents are open to regulation in such a way that their research and development can be protected.

Yet, for the decisions of the countries to oppose LAWS or not looking at the perspective in IR might not be enough. This gets visible in the different positions countries share. Yet for Australia and Austria the issue of security is not so central as it is for Israel. Thus, for interpreting this a view from a constructivist side could give more insight. Because certain factors like the history of the countries and e.g. their attitude on uncertainty avoidance is neglected in this research.

Nonetheless it still seems that the weapon review under Article 36 has become outdated to the rapid development of technology. Yet, the Martens Clause seems to gain momentum these days. Thus, the return from technocratic based laws to more humanitarian law could develop if there are enough supporting states. However, this thesis could only present a research on LAWS at this stage in time and in the close future. Thus, the outcomes of the thesis may only be valid in the short run. Moreover, should be examined what effects the public perceptions will have on the position of states on LAWS, since people get more and more exposed to autonomous technologies may it be at the workplace, self-driving cars or other areas of life.

5.2. Final conclusion

States relied on IHL whenever it was favorable for them. This was not hypothesized as such. Yet, the current legislation is favorable for the proponents of LAWS, thus they are applying it and refer to it. On the other hand, are opponents referring to other provisions in IHL which should prevail according to their understanding. This is often done by referring to morals and ethics which is a shortcoming in the current weapon review. Both sides of the cleavage interpret IHL strict, however they are picking the one side is referring to the ordinary weapon review procedure while the other side tries to apply legal provisions as the Martens Clause.

This is also the final answer on this research in short that under the ordinary weapon review procedure LAWS can be considered to be in compliance with IHL. Yet, there are certain pitfalls such as the application of the Martens Clause which have to be accounted and can hardly be rejected when an international guiding rule shall be established. Countries have different concerns or wishes about the further proceeding with LAWS, but at least have a common forum to discuss it within the GGE.

Bibliography

Primary resources

Convention on Certain Conventional Weapons. 1980. Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons which may be deemed to be Excessively Injurious or to have Indiscriminate Effects of 10 October 1980.

Convention on Cluster Munitions. 2008. Diplomatic Conference for the adoption of a Convention on Cluster Munitions of 30 May 2008.

Council Regulation (EC) No 428/2009 of 5 May 2009 setting up a Community regime for the control of exports, transfer, brokering and transit of dual-use items. Official Journal of the European Union L 134/1.

Geneva Convention III. 1949. Geneva Convention Relative to the Treatment of Prisoners of War of 12 August 1949.

Geneva Convention IV. 1949. Geneva Convention Relative to the Protection of Civilian Persons in Time of War of 12 August 1949.

Group of Governmental Experts. 2018. “Report of the 2018 session of the Group of Governmental Experts on Emerging Technologies in the Area of Lethal Autonomous Weapons Systems”.

Hague Convention VIII. 1907. Convention Relative to the Laying of Automatic Submarine Contact Mines of 18 October 1907.

International Court of Justice. 1974. *Nuclear Test Case (New Zealand v France)*. Reports of Judgements, Advisory Opinions and Orders (Judgement of 20 December 1974).

International Court of Justice. 1996. *Legality of the Threat or Use of Nuclear Weapons*. Reports of Judgements, Advisory Opinions and Orders (Advisory Opinion of 8 July 1996).

International Criminal Tribunal for the former Yugoslavia. 2002. Prosecutor v Dragoljub Kunarac, Radomir Kovac and Zoran Vukovic. IT-96-23.

International Criminal Tribunal for the former Yugoslavia. 2003. Prosecutor v Stanislav Galic. IT-98-29-T.

Lieber Code. 1863. Instructions for the Government of Armies of the United States in the Field (Lieber Code) of 24 April 1863.

Protocol II to the Convention on Certain Conventional Weapons. 1996. Protocol on the Prohibitions or Restrictions on the Use of Mines, Booby-Traps and Other Devices as Amended on 3 May 1996 (Protocol II as Amended on 3 May 1996).

Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I). 1977.

Rome Statute of the International Criminal Court. 1998. United Nations, Treaty Series, vol. 2187, No. 3854

Saint Petersburg Declaration. 1868. Declaration Renouncing the Use, in Time of War, of Explosive Projectiles Under 400 Grammes Weight of 11 December 1868.

Supreme Court of Israel. 2005. *Public Committee against Torture in Israel et al. v. Government of Israel et al.* HCJ 769/02.

Vienna Convention on the Law of Treaties. 1969. Vienna Convention on the Law of Treaties Done at Vienna on 23 May 1969.

Williams, Andrew. 2015. "Defining Autonomy in Systems: Challenges and Solutions. In NATO Headquarters Supreme Allied Commander Transformation *Autonomous Systems – Issues for Defence Policymakers*. pp. 27-62.

Secondary resources

Scholarly works

Anderson, Kenneth & Waxman, Matthew C. 2017. „Debating Autonomous Weapon Systems, their Ethics, and their Regulations under International Law”. Oxford Handbooks Online (Feb 2017): 1-21. doi: 10.1093/oxfordhb/9780199680832.013.33

Ansell, Darren. 2014. "Research and Development of Autonomous "Decision Making" Systems". Speakers summary. In ICRC *Autonomous Weapon Systems – Technical, Military, Legal and Humanitarian Aspects*. pp. 39-40.

Boothby, William H. 2009. *Weapons and the law of armed conflict*. New York, NY: Oxford University Press.

Chynoweth, Paul. 2008. "Legal Research". In Knight, Andrew & Ruddock, Les [eds] *Advanced Research Methods in the Built Environment*. West Sussex, UK: Wiley-Blackwell. pp. 28-38.

Davison, Neil. 2017. "A legal perspective: "Autonomous weapon systems under international humanitarian law"". *UNODA Occasional Papers* No. 30 (November 2017): 5-18.

Diehl, Paul F. 1983. "Arms Race and Escalation: A Closer Look". *Journal of Peace Research* Vol. 20 (No. 3): 205-212.

Etzioni, Amitai & Etzioni, Oren. 2017. "Pros and Cons of Autonomous Weapons Systems". *Military Review* May-June 2017: 72-81.

Finch, Emily & Fafinski, Stefan. 2017. *Legal Skills*. Oxford, UK: Oxford University Press (Sixth Edition). pp. 338-361.

Haines, Steven. 2014. "The Developing Law of Weapons: Humanity, Distinction, and Precautions in Attack". Oxford Handbooks Online (Jun 2014): 1-23. doi: 10.1093/law/9780199559695.003.0011

Horowitz, Michael C. 2016. "Public opinion on the politics of the killer robots debate". *Research and Politics* January-March 2016: 1-8. doi: 10.1177/2053168015627183

Jackson, Robert & Sorensen, Georg. 2013. *Introduction to International Relations – Theories and Approaches*. Oxford, UK: Oxford University Press (Fifth Edition).

- Jevglevskaja, Natalia. 2018. "Weapons Review Obligation under Customary International Law". *International Law Studies* 94 (186): 1-26.
- Kant, Immanuel. 2017. "Groundworks for the Metaphysics of Morals". pp. 1-52. Retrieved 16th May 2019, from <https://www.earlymoderntexts.com/assets/pdfs/kant1785.pdf>
- Kinne, Brandon J. 2016. "Agreeing to arm: Bilateral weapons agreements and the global arms trade". *Journal of Peace Research* Vol. 53 (3): 359-377.
- Lewis, John. 2015. "The Case for Regulating Fully Autonomous Weapons". *Yale Law Journal* Vol. 124 (4): 1309-1325.
- McClelland, Justin. 2003. "The Review of Weapons in accordance with Article 36 of Additional Protocol I". *IRRC* 85 (850): 397-415.
- Nye, Joseph S. Jr. 2013. "Hard, Soft, and Smart Power". In Cooper, A. et al. [eds.] *The Oxford Handbook of Modern Diplomacy*. pp. 510-544.
- Petman, Jarna. 2017. "Autonomous Weapons Systems And International Humanitarian Law: 'Out of the Loop'?". *Ulkoministeriö*. pp. 1-76.
- Sassoli, Marco. 2014. "Can Autonomous Weapon Systems Respect the Principle of Distinction, Proportionality and Precaution?". Speakers summary. In ICRC *Autonomous Weapon Systems – Technical, Military, Legal and Humanitarian Aspects*. pp. 41-43.
- Zagare, Frank C. 1996. "Classical Deterrence Theory: A Critical Assessment". *International Interactions* 21 (4): 365-387.

Non-scholarly works

- Article 36. 2016. "Article 36 reviews and addressing Lethal Autonomous Weapons Systems". Briefing paper for delegates at the Convention on Certain Conventional Weapons (CCW) Meeting of Experts on Lethal Autonomous Weapons Systems (LAWS).
- Bloomberg. 2016. *Here's how Israel's Iron Dome Actually Works*. Video. Bloomberg. Retrieved 12th May 2019, from https://www.youtube.com/watch?v=b4a_ie0J0hU
- Boulanin, Vincent & Verbruggen, Maaïke. 2017 (1). "Mapping the Autonomy in Weapon Systems". SIPRI (November 2017).
- Boulanin, Vincent & Verbruggen, Maaïke. 2017 (2). "Article 36 Reviews – Dealing with the challenges posed by emerging technologies". SIPRI (December 2017).
- Campaign to Stop Killer Robots. 2018. "Country Views on Killer Robots". *Campaign to Stop Killer Robots* 22 November 2018.
- DARPA. 2019. "DARPA Sixty Years". Retrieved 7th May 2019, from: <https://www.darpa.mil/Timeline/index.html>.

- Deeney, Chris. 2019. "Six in Ten (61%) Respondents Across 26 Countries Oppose the Use of Lethal Autonomous Weapons Systems". *IPSOS*. Retrieved 16th May 2019, from <https://www.ipsos.com/en-us/news-polls/human-rights-watch-six-in-ten-oppose-autonomous-weapons>
- IAI. 2019 (1). "Guardium". Retrieved 12th May 2019, from http://www.iai.co.il/2013/37135-31663-en/Business_Areas_Land.aspx
- IAI. 2019 (2). "Harop". Retrieved 13th May 2019, from http://www.iai.co.il/2013/36694-46079-en/Business_Areas_Land.aspx
- ICRC. 1987(1). "Commentary of 1987 New Weapons". Retrieved 14th May 2019, from <https://ihl-databases.icrc.org/applic/ihl/ihl.nsf/Comment.xsp?action=openDocument&documentId=F095453E41336B76C12563CD00432AA1>
- ICRC. 1987(2). "Commentary of 1987 Precautions in Attack". Retrieved 15th May 2019, from <https://ihl-databases.icrc.org/applic/ihl/ihl.nsf/Comment.xsp?action=openDocument&documentId=D80D14D84BF36B92C12563CD00434FBD>
- ICRC. 2014. "Autonomous Weapon Systems – Technical, Military, Legal and Humanitarian Aspects". ICRC Expert Meeting (26-28 March 2014).
- Kayser, Daan & Denk, Stepan. 2017. "Keeping Control – European Positions on lethal autonomous weapon systems". PAX.
- MATLAB. 2017. *Introduction to Deep Learning: Machine Learning vs Deep Learning*. Video. MATLAB. Retrieved 13th May 2019, from <https://www.youtube.com/watch?v=-SgkLEuhfbg>
- MBDA Missile Systems. 2015. "Brimstone Sea Spear – Advanced Multi-Role Naval Weapon". *MBDA UK*.
- Oliphant, Roland. 2017. "Stanislav Petrov, the 'man who saved the world' dies at 77. The Telegraph. Retrieved 25th April 2019, from: <https://www.telegraph.co.uk/news/2017/09/18/man-saved-world-dies-77/>*
- Sanchez, Raf. 2016. "'Suicide drone' used for first time in fighting between Azerbaijan and Armenia". The Telegraph. Retrieved 13th May 2019, from <https://www.telegraph.co.uk/news/2016/04/08/suicide-drone-used-for-first-time-in-fighting-between-azerbaijan/>*
- Shachtman, Noah. 2007. "Robot Cannon Kills 9, Wounds 14". WIRED. Retrieved 25th April 2019, from: <https://www.wired.com/2007/10/robot-cannon-ki/>*
- SIPRI. 2018. "SIPRI Yearbook 2018 – Armaments, Disarmament and International Security (Summary)".
- SIPRI. 2019. "Military expenditure by country as percentage of gross domestic product, 1988-2008". Retrieved 12th May 2019, from <https://www.sipri.org/sites/default/files/Data%20for%20all%20countries%20from%201988%E2%80%932018%20as%20a%20share%20of%20GDP%20%28pdf%29.pdf>
- Tian, N., Fleurant, A., Kuimova, A., Wezeman, P. D. & Wezeman, S. T. 2019. "Trends in World Military Expenditure, 2018". SIPRI Fact Sheet (April 2019).

UNGO. 2019. "Background on Lethal Autonomous Weapons Systems in the CCW". United Nations Geneva Office. Retrieved 16th May 2019, from [https://www.unog.ch/80256EE600585943/\(httpPages\)/8FA3C2562A60FF81C1257CE600393DF6?OpenDocument](https://www.unog.ch/80256EE600585943/(httpPages)/8FA3C2562A60FF81C1257CE600393DF6?OpenDocument)

US Air Force. 2015. "MQ-1B Predator". *US Air Force*. Retrieved 12th May 2019, from <https://www.af.mil/About-Us/Fact-Sheets/Display/Article/104469/mq-1b-predator/>

Ziegler, Peter-Michael. 2007. "Defektes Computersystem für den Tod von zehn Soldaten verantwortlich?". *Heise Online*. Retrieved 26th April 2019, from: <https://www.heise.de/newsticker/meldung/Defektes-Computersystem-fuer-den-Tod-von-zehn-Soldaten-verantwortlich-186999.html>

Annexes

Annex I

<u>Country</u>	<u>Favors</u> <u>ban</u>	<u>mil. spend in % of</u> <u>GDP</u>
Algeria	yes	5,3
Argentina	yes	0,9
Australia	no	1,9
Austria	yes	0,7
Belgium	no	0,9
Bolivia	yes	1,5
Brazil	yes	1,5
Chile	yes	1,9
China	yes	1,9
Colombia	yes	3,2
Costa Rica	yes	1,3
Cuba	yes	2,9
Djibouti	yes	3,7*
Ecuador	yes	2,4
Egypt	yes	1,2
El Salvador	yes	1
France	no	2,3
Germany	no	1,2
Ghana	yes	0,4
Guatemala	yes	0,4
Holy See	yes	-
Iraq	yes	2,7
Israel	no	4,3
Mexico	yes	0,5
Morocco	yes	3,1
Nicaragua	yes	0,6
Pakistan	yes	4
Panama	yes	0
Peru	yes	1,2
Republic of Korea	no	2,6
Russia	no	3,9
Spain	no	1,3
State of Palestine	yes	-
Sweden	no	1
Turkey	no	2,5
Uganda	yes	1,4
United Kingdom	no	1,8
United States	no	3,2
Venezuela	yes	1,2*
Zimbabwe	yes	2,2

Annex II

Weapon	Treaty
Explosive projectiles weighing less than 400 grams	Declaration of Saint Petersburg (1868)
Bullets that expand or flatten in the human body	Hague Declaration (1899)
Poison and poisoned weapons	Hague Regulations (1907)
Chemical weapons	Geneva Protocol (1925) Convention on the prohibition of chemical weapons (1993)
Biological weapons	Geneva Protocol (1925) Convention on the prohibition of biological weapons (1972)
Weapons that injure by fragments which, in the human body, escape detection by X-rays	Protocol I (1980) to the Convention on Certain Conventional Weapons
Incendiary weapons	Protocol III (1980) to the Convention on Certain Conventional Weapons
Blinding laser weapons	Protocol IV (1995) to the Convention on Certain Conventional Weapons
Mines, booby traps and "other devices"	Protocol II, as amended (1996), to the Convention on Certain Conventional Weapons
Anti-personnel mines	Convention on the Prohibition of Anti-Personnel Mines (Ottawa Treaty) (1997)
Explosive Remnants of War	Protocol V (2003) to the Convention on Certain Conventional Weapons
Cluster Munitions	Convention on Cluster Munitions (2008)

Source: ICRC, 2019.

Annex III

State	Name	Year
All states	General debate	2018
Australia	General Exchange of views	2017
	General Exchange of views	2018
	The Australian Article 36 Review Process	
	Australia's System of Control and applications for Autonomous Weapon Systems	2019
Austria	TOP 6 (a) - Characterization of the systems under consideration in order to promote a common understanding on concepts and characteristics relevant to the objectives and purposes of the Convention	2018
	TOP 6 (b) - Further consideration of the human element in the use of lethal force; aspects of human-machine interaction in the development, deployment and use of emerging technologies in the area of lethal autonomous weapons systems	2018
	TOP 6 (d) - Possible options for addressing the humanitarian and international security challenges posed by emerging technologies in the area of lethal autonomous weapons systems in the context of the objectives and purposes of the Convention without prejudging policy outcomes and taking into account past, present and future proposals	2018
	General Exchange of views	2018
	5(c) Review of the potential military applications of related technologies in the context of the Group's work	2019
	5 (e) Possible options for addressing the humanitarian and international security challenges posed by emerging technologies in the area of lethal autonomous weapons systems in the context of the objectives and purposes of the Convention without prejudging policy outcomes and taking into account past, present and future proposals.	2019
Bolivia for NAM	General principles on Lethal Autonomous Weapons Systems	2017
	General principles on Lethal Autonomous Weapons Systems	2018
Cuba	General Exchange of views	2017
EU	Review of potential military applications of related technologies in the context of the Group's work	2019
Israel	TOP 6 (a) - Characterization of the systems under consideration in order to promote a common understanding on concepts and characteristics relevant to the objectives and purposes of the Convention	2018
	TOP 6 (b) - Further consideration of the human element in the use of lethal force; aspects of human-machine interaction in the development, deployment and use of emerging technologies in the area of lethal autonomous weapons systems	2018
	TOP 6 (d) - Possible options for addressing the humanitarian and international security challenges posed by emerging technologies in the area of lethal autonomous weapons systems in the context of the objectives and purposes of the Convention without prejudging policy outcomes and taking into account past, present and future proposals	2018
	Human Element in the use of lethal force (Agenda item 5 c)	2019
	Possible options for addressing the humanitarian and international challenges (Agenda item 5 e)	2019