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AUTONOMOUS WEAPONS SYSTEM (AWS): WEAPON REVOLUTIONARY OR WEAPON OF MASS DESTRUCTION?

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Abstract--- *The autonomous weapons system (AWS) is a weapon that no longer involves human in its operation. It will move independently, look for its target, identify, and execute the target. This weapon is controlled by a robot equipped with artificial intelligence. This system is more advanced than drone technology (UCAV), which is still controlled by humans even from very distant range. Various parties claim that these weapons have more advantages compared to conventional weapons that are still controlled by humans. This weapon can eliminate mistakes that are often done by humans. The traits, quicker in scanning and making a decision, and free from situational human psychology (e.g., stress, et cetera.). This paper intends to explore the possible dangers posed by this weaponry system. This weapon system has a high priority on technological sophistication. Therefore, countries with advanced technology will be trapped in the increasingly extended lagging. This model weapon is also very likely to be produced by the private sector. Mass production carried out by the private sector will provide massive opportunities for the use of these weapons which are capable of mass destruction.*

Keywords--- *artificial intelligence, autonomous weapons system, mass production, mass destruction*

I. INTRODUCTION

The enhancing globalization stream is influenced by technological advancement in communication and transportation. These two key factors impact on the transaction among world society generates synergy in all human's life segment. Therefore, technology is a critical factor in determining human civilization. The rapid technological advancement has been developed into the military industry. Military technology is one of the leading industries in developing and implementing the technology.

World War II, for instance, had resulted in a technological revolution in using nuclear as one of the energy sources to be developed into an atomic bomb. The Cold War had created the missiles that could reach the distance of 5000km while carrying a hundred kilograms of explosives. A missile weapon system, of course, is a handy substitute to replace numerous soldiers. In the post-cold war, military technology has developed an Unmanned Combat Arial Vehicle (UCAV), a drone without a pilot which can minimalize the casualties on the party who deployed the weapon. This drone is controlled remotely and equipped with a bomb.

One of the latest technological advancements in military industries is a weaponry system of combination between explosives, unmanned vehicle, and artificial intelligence. This weapon can be produced in a small size that can reach a specific parameter and distance without using a pilot and identify the target automatically and independently. In other words, this weapon can fly, detect, and execute the target by per se without human interference.

Autonomous weapons system (AWS) is one step ahead from the drone that has strategic advantages in the battlefield. First, the used energy effectivity is only using a battery. Second, this technology can

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replace the warfighters that relatively and possibly experience mistarget due to fatigue, depression, and stress. Frequently within a battlefield, there is mistarget and execution failure that cause victims from civilian and non-military target (non-combatant). It drastically commits fewer empirical and practical mistakes than human soldiers (Purves, Jenkins, & Strawser, 2014, p. 859). Hence, by using artificial intelligence, the possibility of mistargeting could be reduced – presumably that this weapon has no fatigues, stress, or depression.

However, this weapon has several weaknesses. One of them is the concern on ethics and legal aspect. It is natural, a certain technology, particularly military robots that have the capacity to deliberately damage and start a war, raise issues to the established law and liability (Lin, Bekey, & Abney, 2015, p. 55). A war – nonetheless, is an action carried out the risk that affects the other parties, considering within combat, weapon usage can be justified, even to kill and wound the enemy. Nevertheless, a war should be based on the International Humanitarian Law (IHL). Many experts are criticizing the usage of AWS will replace the role of human – hence, the legal subject and aspect become blurry and uncertain. If there is a failure or violations against the IHL took place, who will take the responsibility bearing in mind that the AWS could work autonomously without human involvement.

II. METHODOLOGY

The method used in this writing is a qualitative methodology which is defined as an intuitive and systematic research technique. This research uses a qualitative methodology which generates a finding that cannot be achieved by using statistical procedures and other quantification measurements. Furthermore, qualitative research is intuitive and systematic research to help the researcher to score an efficient and coherent knowledge. Qualitative research also aims to increase understanding (Bakri, 2016).

This method is used to develop in-depth understanding concerning the world around us, hence it requires a researcher to give attention to the significance and process that form a social phenomenon. Therefore, qualitative research is done through an in-depth study of a social phenomenon in a region, group, or particular individual. The qualitative methodology used is to illustrate various instruments and resources to be utilized as data collection and analysis which comes from both written and verbal that is not formalized into numeral (Bakri, 2016, p. 62).

Within this research, the hypothesis uses the inductive methodology to analyze various occurrences and facts that are specific or particular to acquire conclusion, or at least a common pattern. In the case of the advancement of the autonomous weapons system, there will be specific and particular facts pointing the massive production of this very weapon that can endanger the world. The specific occurrence includes the private sector's capability to develop technology. The current technological access increasingly spread to society and simultaneously driven by the international legal basis that enables the autonomous weapons system advancement.

Regarding the qualitative methodology used, data collection, and strategy or non- numeric data analysis (Bakri, 2016, p. 62). These data could be found in the primary document, an original document that is written by the individual who has direct access to described information, or those who directly experience the occurrence. The secondary data is also collected from documentations including journal articles, books, and newspaper.

AWS Technology

Military Technology

War, despite being disallowed, is one of the instruments to resolve a conflict between country. Whether or not a country wins the war, it is defined by its weaponry system capability. Not only to gain victory, but a weaponry system is also used to deter, support diplomacy, and build national pride, and a connection between science and technology. If we look at the United States' current position as the superpower country, it actually includes the measurement of the capability of a weaponry system that the support defense system. Therefore, the development of weaponry system requires enormous cost in order to develop the technology which focuses on military industry. □

The superiority of the United States over other countries is also influenced by the defense budget that reaches US$ 648,798 million – equals half of the world defense budget (SIPRI Databases, 2017). The technological development in the military sector always takes two steps ahead than the other sectors' technology. For instance, prior to the development of telecommunication technology, 'handphone' has been used in the military sector before being released in the public sphere. It correlates to the enormous budget for research and development (R&D) which maximizes the rapid technological development possible.

From Drone to Missile

Military revolution and its implication as stated by Hoffman (2017, p. 20) assert that the World War I & II are identified to the fourth revolution that had resulted in the combination of weapon, armored blitzkrieg, carrier, bomber, and jet. On the fifth revolution, nuclear and missile revolution had generated during the cold war. The technological revolution on the missile and nuclear, which can reach intercontinental distance was predicted to be the emergence of unmanned weaponry system. Until the sixth revolution regarding the dynamic information, the stream creates command and control, connectivity, and global reach to be accessible. The latest technology on military industry, which is an autonomous revolution, production of autonomous weapon, robot vehicle, self-organizing defense system, automatic weapon, big-data analytics, and deep-learning program.

A combination between the usage of computer and machine to the extended degree which has been resulted from the industrial revolution and information age could change the perspective and the code of conduct of war and its impact on the battlefield.

The capability of the weaponry system is determined by four factors, such as damage power, mobility, protection, and communication. For example, Weapon of Mass Destruction (WMD) has the destruction capacity although it is banned. Aircraft Fighter and Aircraft Carriers are the top inventions in the 20th century in term of mobility because they can reach far away location in a short of time. The average speed of Aircraft fighters is above the speed of sound, which indicates that this weapon is very mobile. For protection, as the means to destroy the enemy without having to sacrifice their troops. The last is the ability to communicate the weapon remotely to hit the target, such as deflecting the routes after the weapon launched. The missile is a weapon that possesses this capability. The missile is a weaponry system which equipped with sophisticated enough mechanism; it has the mobility or roaming power, communication, protection, and can do a duet with atomic bombs or WMD. It shows that the missile is considered as an effective weaponry system so that many countries implement a Ballistic Missile Defense (BMD) system that relies on the ability of the missile system (Sessions, 2008).

Although the cold war was over and the international system has begun to change along with the decreasing intensity of heat between countries, the technology must continue to develop. Post-Gulf War II which used many 4th Generation Aircraft Fighter, United States of America and Russia introduce a brand-new technology of stealth for Aircraft Fighter. The 5th generation Aircraft Fighter (F-22 Raptor, T

50 PAKFA) has been equipped with this technology to avoid enemy radar detector. This system allows Aircraft Fighter to have very high protection and will be hard to take down by the enemy (Lambeth, 2005).

The technology continues to advance when Unmanned Aerial Vehicle (UAV) introduced. This technology allows controlling the Aircraft Fighter remotely from a distant location. At first, the UAV is only used for collecting enemy's information (intelligent), but then Unmanned Combat Aerial Vehicle (UCAV) has equipped with weapons or bombs (Blazakis, 2006).

Technology of AWS

AWS is one of the most effective weapons ever created by human to annihilate the enemy. Being entitled autonomous, this weapon is equipped with Artificial Intelligence (AI) that offers a robotized weaponry system. This system is designed to reduce human involvement in its operation. The technology of AWS is a force multiplier considering noxious technology.

As the sophisticated system is being utilized, AWS becomes the leading weaponry system, among others. A report from Defense Science Board (2012), of the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics identifies six main aspects that determine the capability of autonomous weapon, namely: perception, planning, learning, robot-human interaction, natural language understanding, and multi-agent coordination. Numerous advantages that could be gained from AWS is also expressed by the Geneva Academy of International Humanitarian Law and Human Rights as follows: AWS will rapidly accept and process the information; this weapon will increase the flexibility, speed, and precision on the decision-making and determining target; by replacing the human, it will reduce the number of casualties; due to the lack of emotion, AWS could be handling the "dull, dirty, and dangerous" tasks; the absence of fear, vengeance, or self-interest will generate less harmful outcome (Weizman, 2014, p. 4).

AWS Independency from Human Control

Featuring the weaponry system independence from human control, AWS is not entirely alienated the human control in its production or programming chain during the manufacturing process. Although identified as the autonomous system, the human involvement in the AWS operation is distinct into three categories, such as "man-in-the-loop," "man-on-the-loop," "man-out of-the-loop" (Saxon, 2014, p. 103).

However, this label has its difficulties faced by the man or robot in determining and understanding its environment, particularly in the armed conflict. Therefore, a “man-in-the-loop” system is a robot that uses human as the chief director in selecting the target and deploying attack (Amitai & Oren, 2017, p. 78). In other words, the definition of man-in-the-loop could be considered as a human involvement still can select and engage the targets (Leys, 2018, p. 51).

The “man-on-the-loop” system that shows the fluid and complex environment require a human judgment that is continuously shifting (Saxon, 2014, p. 104). The human involvement is also shown when the robot's mechanism in targeting and deploying attack under the supervision of the operator. For example, SGR-A1 developed by Samsung, a sentry robot is used in the Korean Demilitarized Zone. This robot is using a low-light camera and pattern recognition program to detect intruders. If the intruders do not surrender, the robot equipped with a machine gun can be fired from distant by the operator, or by itself which was set to be the fully automatic mode (Prigg, 2014).

The “man-out-of-the-loop” system is a robot that can select the target and deploy the attack without any interference from human interaction or human input (Amitai & Oren, 2017, p. 79). The trend of

human will be progressively removed from the chain of decision-making and responsibility shape the future challenges in determining the fate of human within this industry (Bierri & Dickow, 2014, p. 2).

In contrast, Schmitt and Thurnher (2013) argue that there is no autonomous weapon, the human will not achieve "out of the loop" because the human will eventually decide when and where to deploy this weaponry system and what parameters embedded inside of it.

The Statement of International Committee of the Red Cross in an expert meeting on the Lethal Autonomous Weapons Systems (LAWS), Convention on Certain Conventional Weapons 2016 concluded whatever reason whether it is on legal aspect, ethics, or military operation, there are broad agreement and acknowledgment of a need for human control over the use of weapon and force. Nonetheless, this still becomes a debate whether a human control to the extent of development and deployment of AWS is sufficient to handle the AWS operation –

when it is being equipped with artificial intelligence which is independently choosing and attack the target.

Jeopardy of AWS

Military technology and weapon industry have swiftly developed. It advances the weaponry and defense system, including the AWS which has considerable advantages. Equal with the number of advantages received – hence, the jeopardy of AWS could also generate several threats (Weizman, 2014, pp. 4–5).

The value of human life will be questioned if the decision to kill someone's life is being determined by a machine (Heyns, 2016, p. 20).

Every weapon will possibly generate proliferation and misused or abused massively.

AWS will conceivably experience malfunction and imperfections.

A weapon that is developed to reduce the risk to the party who deploy the attack has the real risk to the fighters and civil society of the enemy who possess no equal weapon – this is an asymmetric and unfair situation (Sassòli, p. 310).

AWS, which has no genuine emotion like a human, tends to act without compassion and mercy.

The physical and emotional distance between the persons who programmed or deployed the AWS to the target generates affective indifference or 'video game mentality' (Sassóli, 2014, p. 310).

AWS and its Legal Aspect

AWS and International Law

As the technological revolution on the autonomous weapon, AWS is being criticized by many experts on the legal aspect. Besides the harmful and deadly impact could be resulted, the legal subject becomes one of the primary sources of problems in its operation. Although it is still a prototype, AWS could not be used at large.

Some military experts argue that AWS is not only having significant strategic and tactical advantages in the battlefield but also having concern on the moral ground and ethics. It also becomes a debate on the government and civil society in which

degree AWS can be used that covers usage, legal, and desire to develop this weapon into law enforcement, and armed conflict (Weizman, 2014, p. 4). There are broad of individuals, organizations, and states that call for a preemptive ban on AWS, including the European Parliament, which adopted a vote of banning AWS that can carry out strikes without human intervention. Likewise, more than 3,000

AI and robotic experts stated that they have no interest in developing AI weapons which potentially creates a major backlash. The same statement also came from Canadian technology company indicated to choose the value of ethics more than future revenue which concerning the weaponized robot that remove humans from the loop (Goose & Wareham, 2016, pp. 32–33).

The potential impact that can be resulted from AWS on peace and international security cannot be undermined. The use of force by the government has been regulated in the UN Charter. The use of force towards foreign territories without the express of consent violates Article 2(4), UN Charter. "…which requires every state to refrain from threatening or using force against the territorial integrity or political independence of another state."

A broad understanding could be generally accepted towards this regulation that will violate the provisions unless one of two specific criteria is fulfilled. First, when the UN Security Council has authorized the use of a weapon in order to maintain or restore world peace and security. Second, the use of force is used as the form of self- defense by an individual or collective interest.

However, the use of AWS and its purpose of achieving world peace and security is also limited by the IHL which has been covered in Article 36 1977 Additional Protocol I, that express. "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"

Therefore, AWS and its legal subject is still a blurred issue to be addressed. It requires many experts and meetings to conclude whether the use of AWS can be implemented in the combat considering the impactful damage left. As the Expert Meeting on Autonomous Weapons System of ICRC (2016, p. 27) set a standard of AWS on the decision of killing is can be approximated to the aspect of predictability. Hence, the predictability on AWS should be addressed to consider the legal aspect under the IHL. Like most requirements on IHL, the predictability is the foundation of a standard of reasonableness, rather blaming computers a violator and its in compliance with the IHL (ICRC, 2016, p. 27).

Dragging the Human Rights Violator

At the individual level, under the IHL and International Criminal Law, individuals will be fully responsible for the war crimes that they have committed (ICRC, n.d.). An individual that deploy AWS for attempting, assisting in, facilitating, aiding, abetting, planning, or instigating the commission of a war crime (Weizman, 2014, p. 21). Such systems are reasonably challenging due to the presence of a human operator should enable the launch. Furthermore, hand over to the computer system for a "judgement" raises the question who takes the liability (Steele & Heinze, 2014).

At the corporate level, the approach is made to ensure the accountability of companies that manufacture, sell, or distribute the system, and the auxiliary system is criminally liable. Although not all jurisdiction adopts a regime of corporate criminal liability, the number of countries that possess the potential to develop AWS does have domestic laws that regulate the sanctions of corporate entities. The imposed sanctions include fines, debarment, loss of license, restitution, forfeiture, and other sanctions (Weizman, 2014, p. 22).

As well as a state, of course, has a limitation on deploying attack using AWS. A state using AWS that violates international law must be responsible for its action (Weizman, 2014, p. 23). Correspondingly, the civil responsibility that can become the victims can claim the case to national civil courts against the state agent who deploys or order the AWS attack, including the person involved in the production chain, such as manufacturer or programmer (Weizman, 2014, p. 24). The principle of

Jus ad Bellum and Jus ad Bello also question the liable states and the responsible parties to the distribution of liability (Sparrow, 2007, p. 67).

A robot is not a Human

No matter how sophisticated this technology is, relying on artificial intelligence in deciding and executing the target is not an ethical option when deploying the attack. The capability of this machine will be questioned – whether the AI will be ready to select the target and execute the enemy without a failure. Of course, this issue is still debated by many supporters and opponent to this technology. The failure that may occur becomes the main concern to the people involved in the deployment of the attack. For instance, a passenger Iran Air Flight 6555, was shot down in 1988 by a U.S. naval vessel used the Aegis targeting computer which mistakenly identified the passenger jet like an F-14 fighter jet (Steele & Heinze, 2014, pp. 104–105).

Therefore, the incompetence of AWS or AI to have ethics in deciding the target will be the subject of discussion whether it can replace the human role. The decision of killings is always emphasized on human, not a robot. The failure of a robot in selecting the target to kill could not be the main subject to be blamed - rather, a human is.

The AIs must be effective, within the amorphous, unbalanced, swiftly altering, messy, combative atmosphere, they must learn in real-time, under extreme constraints, uncertain accuracy and meaning, and misleading and deceptive situation. Noticeably, the stage of AI has not achieved this phase (Kott, 2018, p. 64). However, if the robots select the target independently without human involvement, then who is the one to be blamed, this leaves a big question mark to the current debate.

AWS Lead to A Weapon of Mass Destruction

WMD Covers Chemical, Biology, and Nuclear Weapons

Weapon of Mass Destruction (WMD) is a weapon with massive destructive power. The tragedy of atomic bombs in Hiroshima and Nagasaki has proved that a hundred kilogram of explosives could destroy two cities. The atomic bomb was developed prior to the world war, but it took place within World War II

For countries, especially the developed ones, have developed the nuclear to be the core energy of the atomic bomb. The bomb could be located on the missile warhead. Thus, we can imagine the destructive power of this weapon which leaves impactful damage and a wide range area of thousand kilometers. However, it could be predicted if the Cuban Missile Crisis in 1962 takes place, it can turn into an open war which will destroy most of the earth surface.

In the development of WMD, this weapon is also equipped with the biological and chemical weapon. A biological weapon is designed to use the microbial bacterial and viruses to the enemy's territory that can spread and infect causing human death. While the chemical weapon is designed to use chemical compounds to be launched via air which can cause death when the enemy inhales that compounds, this three WMD are currently banned by international law due to the dangerous impact and could be threatening the civilians which have been regulated by the Vienna Convention.

The main disadvantage of WMD is its incompetence to differentiate between combatant and non-combatant. At the moment we let the WMD choose its own target, we have on someone's fate to the machine (DeLanda, 1991, p. 46). Nevertheless, the atomic bomb has been banned through the Nuclear-Test-Ban Treaty and Treaty on the Non-Proliferation of Nuclear Weapons.

AWS as a Weapon of Mass Destruction

If we take a look at the WMD which covers the biological, chemical, and nuclear weapon - therefore, an AWS is also equipped with the power to become a WMD. The difference is, if a nuclear, chemical, and biological weapon can cause massive destruction due to its impactful explosion power and incompetence to choose the target, thus an AWS could also cause massive destruction if it is produced massively. This mass production is defined by three factors, namely economy, technological industry capability, and disinvolvement of human responsibility (legal aspect) in this autonomous weaponry system.

The current robotic industry could replace the human role effectively. Robots have been equipped with artificial intelligence (AI) which possibly replace the role of a soldier in warfare. From the economic interest, as stated by David Francis in The Fiscal Times – a TALON rover robot equipped with complete weaponry system costs only the US $230.000. The data received by Francis from the Department of Defense show us the state will do the long-term saving by using a robot to replace the soldier's function in the battlefield. Moreover, the Pentagon spent roughly US $850.000 for every soldier in Afghanistan per year (Francis, 2013).

A robot that only cost the US $230.000 equals three times of an assigned soldier. Therefore, this is a strategic advantage, considering the military advantage of AWS that can replace the soldiers' tasks on the battlefield and cut the defense budget to be more efficient. The economic theory of military robotics also supports the industrial revolution and a potential source of economic growth. However, it is also defined as the allocation of scarce resources to meet spending and policy goals which can be understood as a systematic study of choices, like many other sciences, that shapes the future of armed forces with diverse stages of a combination of military robots (Olejníček, 2017, p. 138).

However, this was perceived as a golden opportunity for the Military Industrial Complex (MIC) in utilizing the autonomous weapon industry. With the high demand and low-cost production, this motivates the industry to be firm in developing and manufacturing this weaponry system.

The rapid technological advancement, followed by technological and production, also drives the manufacturers to produce AWS massively – in other words, mass-production. The developed nations and strong defense system are competing to spend the national budget on research and development of this weaponry system. It also drives the interested parties to obtain the ability of AWS in automating the data analysis across multiple domains which will allow a state to gain an information and temporal advantage, through enhanced understanding of the social, political, economic, and military factors affecting a strategic environment (Price, Walker, & Willey, 2018, p. 99).

Nonetheless, the blurry legal aspect in the usage of AWS initiates the irresponsible actors to use the unmanned weapon in large amount and without control. Hence, the AWS users will be departed from the binding legal subject. When

the AI-equipped autonomous weapon uses its capability to select and eliminate the target, then the owner of AWS cannot be legally bound bearing this weapon is independently operationalized. The lack of regime to control this weapon usage could generate extensive damage. Frank Sauer (2016, p. 10) on his argument asserted that from the ethical point of view, it is argued that autonomous weapons systems violate fundamental human values.

From these three factors above, this deadly autonomous weapons system could be the weapon of mass destruction. These three factors that could become the key factor in world society's fear in the upcoming times. A war we have never face, a weapon system that is never broadly used – is a deadly tic tac bomb once AWS can be produced massively and abused by the negligent third parties.

III. CONCLUSION

It drives the conclusion that AWS as the latest military technological advancement becomes one of the profitable industries for several concerned parties. With sophisticated technology, AWS enables the automated and independent decision-making process in terms of its target selection and in-depth data processing to gain more strategic benefits.

However, despite being a controversy which leads back to the moral and ethical ground and often in compliance with the international law, AWS is still being developed and profitable in foreseeable prospects for several concerned parties. Independence from human control is also addressed as the main concern if this autonomous technology produced massively. The robotic judgement over a life of someone cannot be legally and ethically justified.

In sum, as future technology and its foreseeable prospect, AWS could be misused and becomes a setback for the producer, user, and target. Although the current artificial intelligence is not capable of being used massively in AWS for replacing human soldiers entirely – yet, the development of AI is also continuously evolving.

The biggest concern, as this paper is focused, is located to the AWS capability in the foreseeable future that it can be produced massively by many industries if the moral and ethical ground is not yet to be addressed as well as the international law that has no real action to conduct a preemptive ban on automated robotic weapon. Nevertheless, the three factors that determine the mass production of AWS include economy, technological industry capability, and disinvolvement of human responsibility must be directly addressed as a center of attention to prevent a neo-weapon of mass destruction.

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