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# Artificial Intelligence in Warfare: Ethical Implications and Strategic Considerations

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**Abstract**
This paper examines the impact of AI on warfare, focusing on its strategic implications and ethical dilemmas. It explores how AI enhances military capabilities while raising concerns about accountability, human oversight, and compliance with international humanitarian law. The study aims to provide insights into the governance challenges posed by AI in warfare and propose frameworks for responsible AI deployment. AI incorporation in modern weaponry can be regarded as a double-edged sword. Even though AI provides significant advantages over adversaries, it is often violative of fundamental rights such as privacy and dignity. Therefore, considering the ethical implications of adopting AI technology in military systems, there is a need to develop a proper framework using international and humanitarian laws as guidelines. Only thus, the strategic opportunities presented by AI in military and defence systems can be effectively realised. This study has adopted a secondary qualitative approach and systematic literature review to gather and analyse data on the topic to meet research objectives and establish research findings. As the findings suggest, developing a strategic framework would ensure stability in the world order and can deter war promoting ethical adoption of AI for military purposes. Just usage, transparent systems and processes along with meaningful and relevant human control and moral responsibility can serve as essential principles for regulations on AI adoption. This would further promote safety for mankind and establish a peaceful world order decreasing the risk of unethical usage of AI technology for defence purposes by nations. Such frameworks would promote human and AI collaboration reducing the risk of oversight.

**Keywords:** Artificial Intelligence (AI), Warfare, Ethical Challenges, Strategic Implications, Military Systems, AI weapons, Autonomous Weaponry,

## 1. Introduction

Advancement of technology has increased the use of modern technologies in weaponry and warfare. Modern weapons use technologies such as AI, big data, robotics, IoT and others to sophisticate weapons and improve their quality and precision. AI has become highly relevant in modern warfare and weaponry as it helped with the development of new weapons such as "unarmed aerial vehicles" (UAVs) that enable autonomous flight (Layton, 2021). "Unarmed ground vehicles" (UGVs), AI-powered drones, and cyber weapons have been introduced having advanced capabilities for navigation and autonomous control (Layton, 2021). Especially after the Second World War, the use of technology in weaponry has experienced a significant rise. Technologies such as Cavity magnetron, radar, and atomic energy were used during the Second World War and since then the world of technology has experienced a steep rise with the introduction of AI (Nationalww2museum.org, 2024). The fundamental power of the military changed since the rise of the usage of AI to develop more precise weapons which ensured that technologically advanced nations gain an edge in modern warfare.

The adoption of AI technology in warfare has transformed the overall nature of modern conflicts enhancing the precision and speed of military operations. AI transformed and redefined the status quo in

the military use of technology with highly destabilizing and unpredictable strategic implications (Johnson, 2019). Moreover, there is a lack of international guidelines for the usage and adoption of AI in weaponry leading to legal and ethical questions. Modernised AI-enabled weaponry has altered the traditional notions of responsibility and accountability regarding the delegation of life-and-death decisions to machines (Board, 2019). The U.S. Deputy Secretary of Defense, in a speech, commented that AI-empowered military can provide a better advantage as it improves the capability of DoD to "deter, defend and defeat aggression against America" by enhancing the "speed, quality and accuracy of commenders' decisions" which is essential in deterring and even winning a war (Defense.gov, 2024). Such instances show the attitudes of global world powers towards AI and its use in warfare.

The US has quietly taken initiatives to further increase its autonomous weapons. The "US Navy Task Force" has focused on developing several military applications for AI, such as an "autonomous early-warning drone fleet", unmanned navy boats for attacks, lethal autonomous weapons, AI-powered drones for attacks and others (Cigionline.org (2024). Reportedly, the Pentagon is noted to have more than "800 active military AI projects" suggesting the USA's intention to enhance the capabilities of its weaponry (Cigionline.org (2024). On the other hand, Beijing is noted to actively pursue "autonomous weapons technology" as a part of its strategy regarding "civil-military fusion" (Cigionline.org (2024). Beijing, China intends to utilise AI-enabled weapons to target vulnerabilities of other global powers and counter their specific advantages suggesting that the type of warfare has changed. Therefore, focusing on ethical adoption and the use of AI technology in warfare becomes highly relevant.

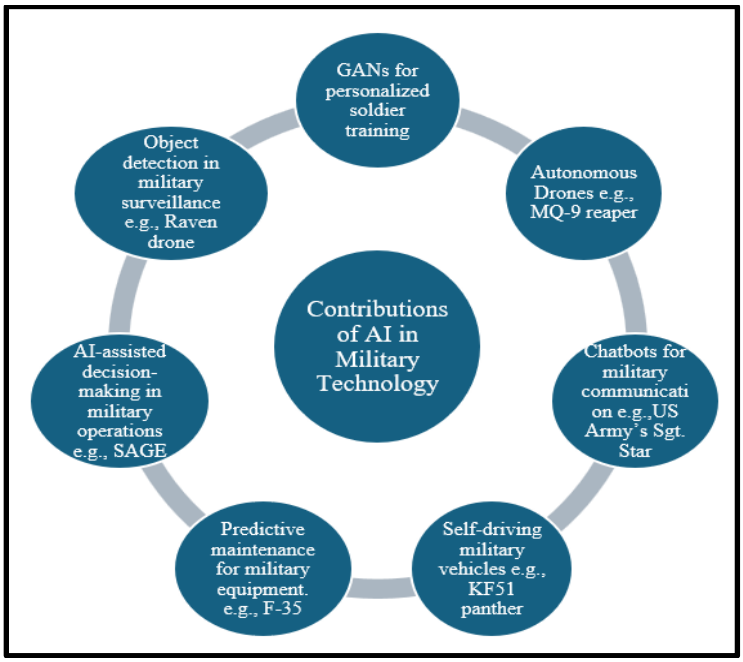



**Figure 1.1: Contributions of AI in military technology**

(Source: Based on Rashid et al. 2023)

AI has contributed towards the military in multiple ways as suggested in the diagram above. As data suggests, the "global military artificial intelligence (AI) and cybernetics market" has become one of the largest market segments as it generated the most revenue since 2018 and is anticipated to bring a revenue of "8.07 billion U.S. dollars" in 2024 as well (Statista.com (2025). Considering the use of AI in warfare and weaponry, this paper aims to analyse the strategic benefits and ethical implications of AI in warfare, highlighting the need for robust governance frameworks to ensure its responsible use. The following

provides a brief literature review on the topic and mentions gaps in existing literature based on which research objectives and questions have been developed. The methodology adopted for this paper is mentioned in the following along with data analysis to establish the findings.

## 2. Literature Review

According to Rashid et al. (2023), AI has revolutionised the armed forces by improving the capabilities of the military as it has been noted that AI systems are able to process data more efficiently compared to traditional systems. AI is further able to enhance the self-regulation, self-control and self-actuation of combat systems. Therefore the usage of AI in military applications has increased rapidly. Real-time data analysis has enhanced the speed and quality of decision-making processes in the military and improved military logistics, and object detection as such systems are devoid of human error and are able to operate in complex and deterrent environments as well. Hence, it can be established that the strategic implication of AI in military warfare is quite substantial. However, as mentioned by Van Den Bosch & Bronkhorst (2018), ill-defined problems and unpredictable circumstances limit the capability of AI in making autonomous decisions suggesting an effective collaboration between human intelligence and AI. An interactive activity between technology and humans would ensure that both parties become better aware of each other's objectives, strengths and limitations. Therefore, collaboration between AI and humans as denoted in the infographic below, especially in the military domain becomes essential to eliminate the risks of using AI.

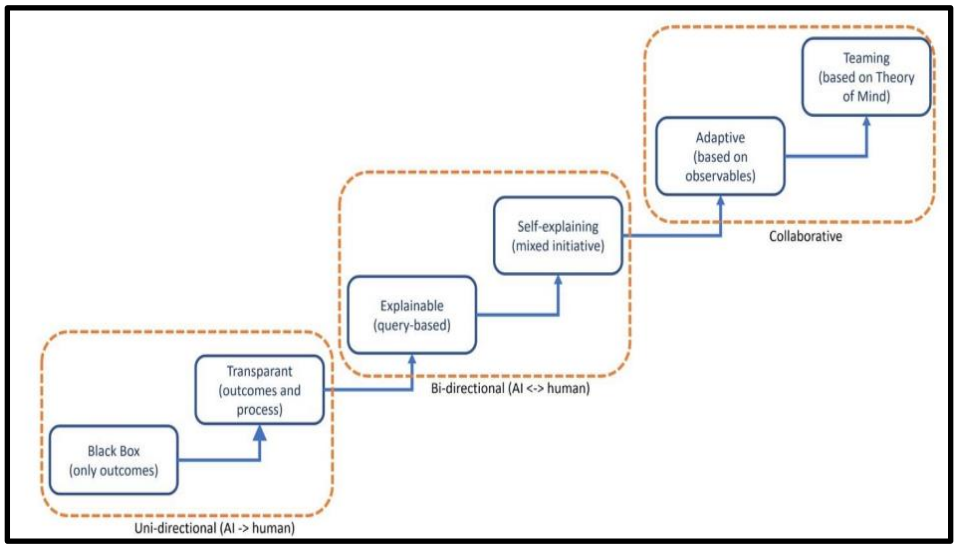



**Figure 2.1: Levels of collaborative decision-making between AI and human**

(Source: Developed based on Van Den Bosch & Bronkhorst, 2018)

Another study by Hoffman & Kim (2023), established that AI's potential in military usage lies in the fact that it is able to drive faster and better decision-making processes which is supposed to bring decisive results for military conflicts in the future. Machine learning (ML) is supposed to influence the way military and political leaders will weigh risks, and options, judge adversaries and perceive the environment for conflict and their responses. However, AI, ML, big data and other technologies make predictions based on the patterns present in the data, however, the potential for failure and unexpected behaviour is quite common due to lack of data raising concern for the adept use of AI in warfare. A study by Holland Michel (2020), mentioned that adversarial environments that have the potential for AI countermeasures, subterfuge and data training render AI systems useless, demanding better

understandability and predictability to ensure that operators are able to identify when AI systems are becoming victims of such attacks. In this context, referring to opaque AI or "black box dilemma" becomes significant. As there are still certain areas of AI that are less understandable resulting in the dysfunction of AI tools in the military. Counter AI and "black box" make AI tools useless in enemy territory resulting in the ineffectiveness of AI military systems.

According to ME (2024), the use of AI in making more dangerous and lethal weapons has become a common phenomenon in modern times. This has increased the complexity for ethicists, legal experts and researchers in terms of deciding which weapons should be allowed to be used on the battlefield. The study established that warfare can be considered a considerably "simple application for AI" as developing a self-driving car can be more complex than developing a system that is able to locate a target on the battlefield and potentially eliminate that target (ME, 2024. p.521). However, the ethical application of AI in warfare can be challenging. It has been argued that AI-aided weapons have better accuracy compared to human-guided weapons reducing collateral damage such as civilian casualties, harm to resident areas, and soldier's death increasing the capability of vulnerable countries to better defend themselves. However, some ethicists, legal experts and researchers expressed that autonomous weapons can often make disastrous mistakes.

As per the opinion of Mensah (2023), unbridled use of AI raises significant ethical dilemmas related to accountability concerns, algorithmic bias, transparency issues, human oversight and others. Lack of human oversight gives room for exploitation and abuse of AI-enabled systems. The absence of proper guidelines for the use and adoption of AI technology becomes confusing for organisations, nations, users and developers as well since they do not have an exact framework to follow which gives rise to unintended consequences and ethical issues. Another study by Taddeo et al. (2022), has established the way the development and use of AI technology to gain an edge over potential adversaries by nations are unmatched with ethical frameworks that guide the application and use of AI, especially with respect to the defence domain. This study further established that transparent and just processes and systems, moral responsibility of humans, reliable AI systems along meaningful and relevant human control over the systems should form the principle framework for the ethical use of AI in defence.

According to Fornasier (2021), governance of AI-enabled autonomous weapons can be quite challenging as the present legal framework is inadequate in addressing the legal and ethical implications of AI in warfare. The study further goes on to say that several propositions consider the use and adaptation of AI in warfare and weaponry ethically inadequate as it removes humans from decisions regarding death control which might be considered as a sufficient and relevant premise for the ban of autonomous weapons. However, the adoption of these technologies enables countries to remove human presence from the frontline of the war which in turn decreases direct casualties of war increasing the necessity for the use of AI in warfare. Effective use of AI yet demands effective governance frameworks to decrease the possibility of unethical use of AI in warfare. In this context, another study by Garcia (2018) has mentioned that the use of lethal AI and militarisation of AI would destabilize the entire world order and disrupt peace. Hence, it is essential that a "preventive security governance framework" is developed in line with such changes in warfare tactics considering the safeguards provided by international law which ensures stability. This would strengthen the regulation for ethical adoption of AI for military purposes and prevent any misuse in this regard.

## 3. Literature Gap

Analysis of previous literature shows that the adoption of AI for military and defence purposes has become quite a common phenomenon in modern times. Especially countries such as the US China and

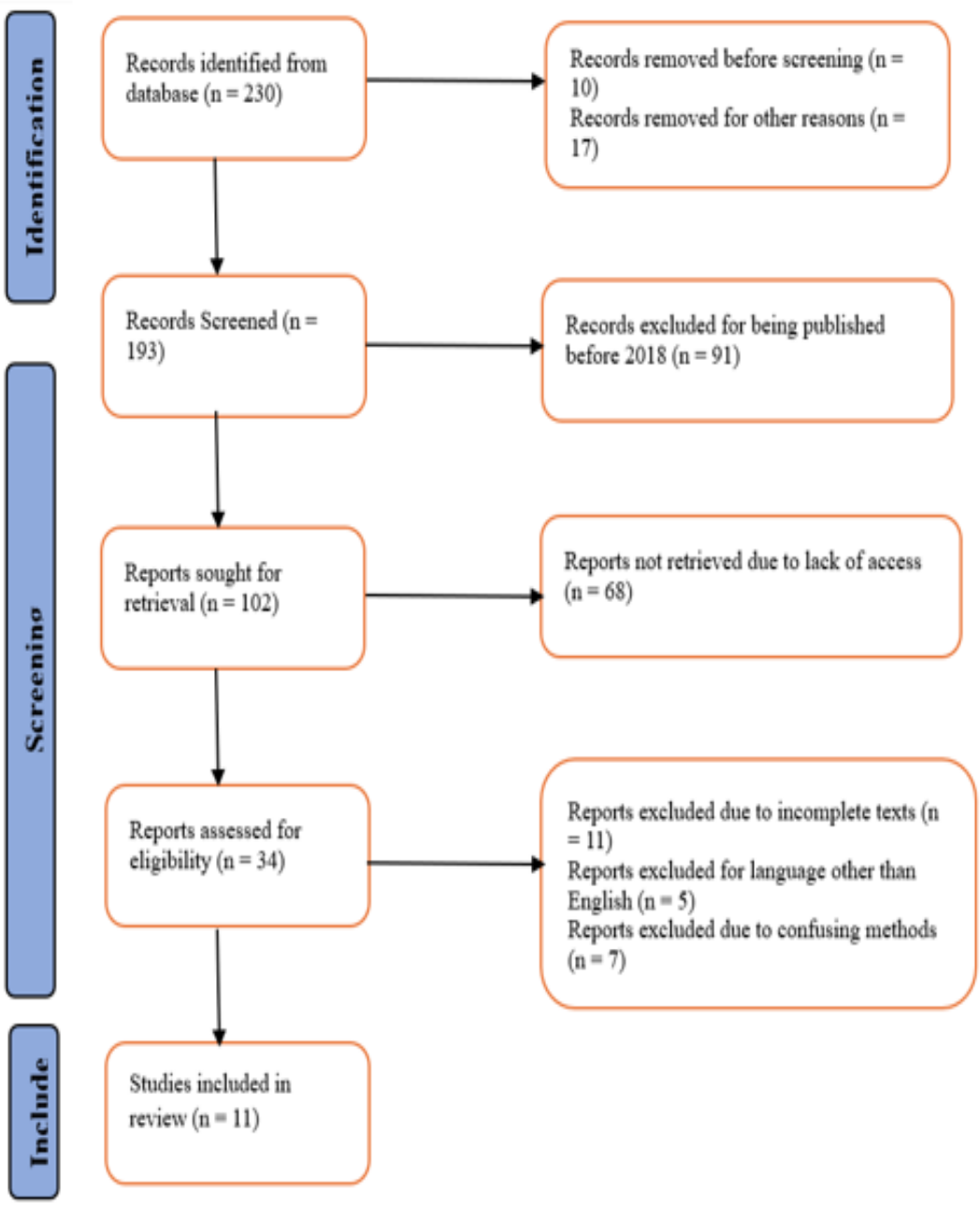
other major technologically advanced military powers adopt AI as it provides strategic advantage to such nations. Studies have discussed the way AI-enabled weapons and technology raise ethical concerns and governance challenges for nations as well. However, very few studies focused on how developing a robust governance framework is critical for the responsible use of AI in military and warfare. Most studies focused on the advantages and challenges of AI adoption. It seems that there is a lack of research on the strategic benefits and ethical implications of AI and how it can be guaranteed through effective governance frameworks,

## 4. Research Questions

- How does AI enhance military strategic capabilities in modern warfare?
- What are the primary ethical concerns associated with the use of AI in warfare?
- What governance frameworks are needed to ensure the responsible deployment of AI in military operations?

## 5. Research Methodology

This study has adopted a qualitative research approach as it is highly time-efficient and cost-effective. Qualitative research helps the way people in general interpret their social reality along with establishing that perspectives and experiences of researchers shape the overall meaning of a phenomenon (Phillips, 2023). Considering the flexibility and ease of access to secondary qualitative data, this study has chosen scientific journals, scholarly articles, government policy documents and other relevant research on the use of AI and strategic considerations for such usage in warfare as the secondary data sources. Moreover, secondary data in the form of expert opinions and case studies have been gathered to explore the ethical implications and strategic considerations of AI deployment in warfare as well. A database search has been conducted in Google Scholar, Scopus and WoS with keywords such as "AI", "Warface", "ethical implications" and others. The articles chosen for this study are from 2018 and thereafter to ensure the relevance of the study especially in the present global scenario. Based on PRISMA, the framework for the inclusion of relevant articles has been developed and the image below explains the selection, inclusion and exclusion of articles. A systematic literature review has been done to analyse the data and establish the findings.


Identification
Screening
Include
Records identified from database (n = 230)
Records removed before screening (n = 10)
Records removed for other reasons (n = 17)
Records Screened (n = 193)
Records excluded for being published before 2018 (n = 91)
Reports sought for retrieval (n = 102)
Reports not retrieved due to lack of access (n = 68)
Reports assessed for eligibility (n = 34)
Reports excluded due to incomplete texts (n = 11)
Reports excluded for language other than English (n = 5)
Reports excluded due to confusing methods (n = 7)
Studies included in review (n = 11)

**6. Results and Analysis**

| Author Name (Citation APA) | Aim of the Study | Design and Methodology | Primary Findings |
|---|---|---|---|
| Cave & ÓhÉigeartaigh (2018) | To analyse the strategic advantage of AI in civil and military affairs | Secondary qualitative approach gathering data from government reports, scholarly articles and peer-reviewed journals. | Computing power and innovation in AI algorithms is necessary but not sufficient for the effective performance of AI.<br>The strategic significance of AI lies in the collaboration between humans and machines.<br>Effective adoption of AI leads to faster, cheaper and better predictions enhancing the decision-making processes which becomes advantageous during wartime. |
| Davis (2019) | To analyse the rewards and risks associated with the adoption of AI technology in the military | Secondary qualitative method | One of the primary advantages of AI is that it increases the quality, accuracy, speed and capability of decision-making processes which helps during military crises.<br>However, there is still a significant scope for improvement with regard to AI's application for military purposes.<br>However, developing a strategic framework to assure stability in world order can serve as a deterrence to war and promote the ethical adoption of AI for military purposes. |
| Soare, Singh & Nouwens (2023) | To analyse existing processes and practices regarding the development and | A secondary qualitative approach and data were gathered | AI facilitates modernisation across multiple existing and future weapons platforms by enhancing “surveillance and reconnaissance (ISR) capabilities” intelligence capabilities and logistics, workforce and healthcare productivity.<br>The uptake of AI in weapons systems |

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| | advancement of defence software and assess current efforts in software-defined defence | from five countries as UK, the US, Germany, France and China | delivered an outsized impact since AI helps in efficient planning, execution, cyber defence, collaborative combat, autonomy and robotics, health and administration.<br>AI provides relevant operational superiority to the decision-making of armed forces which provides them a significant advantage over their adversary. |
| Wilson (2020) | To evaluate the application of AI in warfare and its challenges | Secondary qualitative approach gathering data from China, Russia and the US | AI, as compared to traditional weapons, has a better potential to gather and synthesize large amounts of data quickly from an extensive number of sources which helps produce “highly accurate estimates of locations for missile launch”.<br>Thus accuracy of land-based mobile launchers, submarines and aerial launchers has improved significantly.<br>AI has increased the ability to wield “autonomous weapons” at a miniaturized level.<br>Autonomous synchronisation enables mini flare devices powered by AI to fly towards a target and deliver a coordinated and powerful blow.<br>However, this increased the potential risk of neutralizing "mobile nuclear assets for deterrence" after the first strike on any nation making it vulnerable to further strikes.<br>Therefore, policymakers need to develop frameworks to ensure the ethical use of AI-enabled weapons to facilitate civilian safety. |
| Taddeo et al. (2022) | To identify principles for developing ethical frameworks for AI usage in military and defence | Secondary qualitative approach | "International Humanitarian Law" provides necessary guidance in developing ethical principles for the usage and adoption of AI for defence purposes.<br>Such principles that provide a framework for the ethical usage of AI in the military need to be consistent with "broader ethical principles" that underpin the uses of AI in society from a broader perspective. |

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| | | | Overridable and justified usage, transparent and just systems and processes, reliable AI systems meaningful and relevant human control and moral responsibility of humans are essential principles for developing frameworks for ethical usage of AI for defence purposes. |
| Wasilow & Thorpe (2019) | To assess and present an "ethics assessment framework" regarding emerging robotics and AI technologies, especially for defence purposes. | Case study approach | AI can provide effective solutions to a variety of military gaps, deficiencies and gaps in defence and military.<br>However, the rapidly evolving and unique nature of AI poses significant challenges to existing regulations, policies and values leading to critical ethical issues which impede the usage of AI in armed forces.<br>The framework for ethical usage of AI demands meaningful discussion addressing the existing lack of common language and clear definitions on the topic.<br>Developing a "professional military code of ethics and policy AI" demands thoughtfulness and inclusionary processes proceeding towards policy development and uniform regulation.<br>Determining the capabilities and future scope of AI in military and warfare in clear terms by all universal players coming together would bring better results in terms of developing a policy framework for ethical AI usage. |
| Morgan et al. (2020) | To analyse the ethical implications regarding defence applications of AI and the way such capabilities change the characteristics of modern warfare | Primary qualitative research through the interview method | The consensus regarding the timeline of AI development is considerably low however with time military systems will steadily increase AI adoption for performance improvement.<br>However, AI adoption might violate human dignity, privacy and human rights as reliability and trust on AI-enabled systems is low and there is an extensive risk of data poisoning, adversarial attacks and hacking.<br>Therefore, there is growing consensus and |

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| | | | recognition that risks regarding the military use of AI require human operations to have positive control over its employment.<br>Moreover, organising, training and equipping forces to deal with AI and ensure ethical usage of weaponry and military systems has gained prominence. |
| Svenmarck et al. (2018) | To examine the challenges and possibilities of ethical adoption of AI in various military applications | Secondary qualitative approach | With the increasing use of AI in military systems, it has become essential that nations address the challenges and ethical concerns that come along.<br>AI techniques being black-boxes lack transparency. Therefore, transparency in the AI systems must be enhanced to increase trust of decision-making in the systems which would further provide better risk analysis.<br>The risks related to unpredictable manipulations of data must be curbed in AI systems to ensure resilience and robustness of such systems which in turn would enhance reliability.<br>AI-enabled military applications must incorporate sufficient input data to make sure that ML, which requires large data sets, performs effectively. Thus operational and ethical constraints of AI-enabled military systems can be managed. |
| Asaro (2020) | To analyse the ethical issues related to "simple autonomous weapons" and complexity due to highly capable AI systems | Secondary qualitative approach | It has been identified that targeting and automating weapons and using violence has moral and ethical significance. Therefore, recognising lacking in existing legal and moral principles has become highly essential to make sure that machines do not exercise the right to kill without human intervention and authority. Developing frameworks to ensure meaningful, necessary and effective human control over machines hence becomes critical to the ethical usage of AI-enabled lethal military weaponry. Having a clear universal guideline would ensure |

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| | | | that there is a uniform consensus and necessary foresight regarding the ethical usage of AI-enabled military systems. |
| Maas (2018) | To analyse the challenges regarding the safe deployment of AI technology especially in the defence context | Secondary qualitative approach | Responsible application of AI can be complex due to its opaque nature and the systems being prone to “normal accidents”.<br>However, anticipating specific "field conditions" which make AI systems more susceptible to errors and accounting for all risk factors beforehand can help develop practical solutions and tentative principles for the ethical adoption of AI, especially in the defence industry.<br>Having a proper framework will make sure that developers, industry specialists and users have clear guidelines regarding responsible adoption of AI. |
| Bistron & Piotrowski (2021) | To assess the use of AI in military sectors and the way it impacts the sense of security among the general population | Survey conducted on citizens from 2011 to 2019 | The general population is still highly apprehensive of the adoption of AI for military purposes such as cybersecurity, object detection, logistics, robotics and others.<br>Experts in the field do not possess enough understanding and knowledge on the development and future of AI in military warfare. |

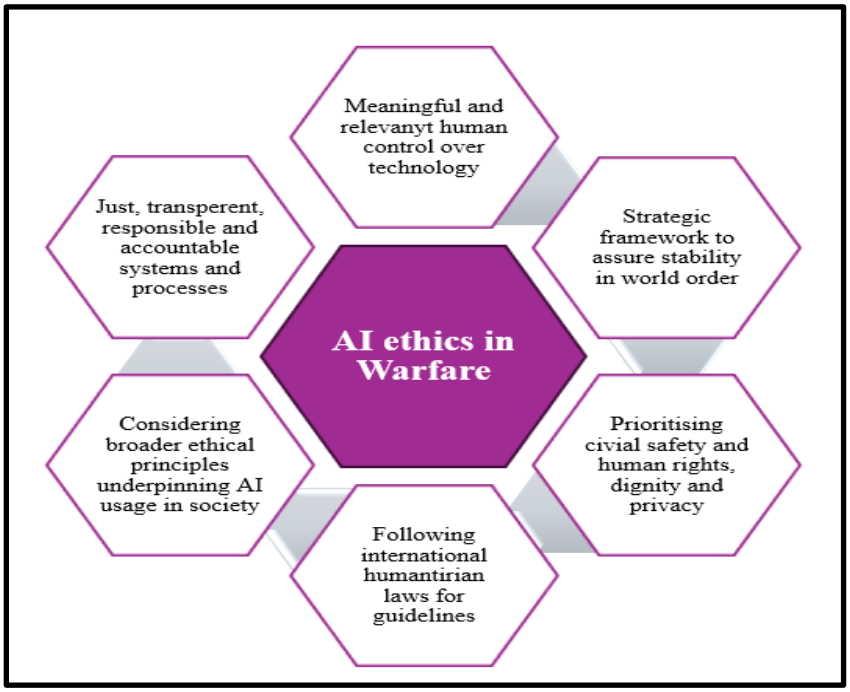


**Figure 7.1: Infographic based on the suggested theoretical framework**
(Source: Based on data analysis)

## 7. Discussion

As per the above systematic literature review, it can be established that the use of AI in military applications and warfare is on the rise due to the strategic advantages that it poses. Studies have shown that effective adoption of AI can have the potential to provide faster, cheaper and better predictions which enhances the decision-making processes during times of war (Cave & ÓhÉigeartaigh, 2018), (Davis, 2019). As per the findings, the incorporation of AI in weapon systems helps gain a better edge over adversaries during armed conflicts through efficient planning, execution, cyber defence, collaborative combat, autonomy and robotics, health and administration (Soare, Singh & Nouwens, 2023). The adoption of AI in military systems enhances the precision and accuracy of attacks (Wilson, 2020). However, scholars have argued that there is still much scope for the improvement of AI technology in military systems especially with regards to ethical usage. As per the findings, certain challenges such as violation of human dignity, privacy and human rights can be considered the primary challenges related to AI adoption in military systems (Morgan et al. 2020).

Moreover, black-boxes in AI lack transparency and insufficient data renders AI-enabled predictions valueless (Svenmarck et al. 2018). These challenges increase ethical complexity in the use of AI in warfare. The findings further show that existing regulations and policies cannot effectively deal with the rapidly growing and unique nature of AI and its usage in the military (Wasilow & Thorpe (2019). Therefore, policymakers need to develop proper guidelines and frameworks to ensure the ethical use of AI-enabled weapons to facilitate civilian safety (Wilson, 2020). "International Humanitarian Law" can serve as a necessary guideline for developing principles for ethical AI technology adoption in military applications. In this context, principles for justified usage, transparent and just systems and processes, reliable AI systems along meaningful and relevant human control and moral responsibility of humans can serve as essential principles for frameworks for ethical AI usage (Taddeo et al. 2022). Moreover, having common language and clear definitions on the topic developing an AI-adoption policy and "code

of ethics" and determining the capabilities and future scope of AI in military and warfare in clear terms will enhance the capability of AI in the defence sector.

Previous research has established various advantages as well as challenges related to the use of AI technology in military systems. Previous research on the topic has established that decision-making during wartime can be enhanced with the effective application of AI (Hoffman & Kim (2023). This observation is substantiated by the findings of this study as it is noted that faster, cheaper and better predictions improve military decision-making processes (Cave & ÓhÉigeartaigh, 2018). Another study by ME (2024) has argued that AI-aided weapons have better accuracy compared to human-guided weapons. This is supported by the findings of this study where it has been established that AI-enabled weapons are better in terms of precision and accuracy (Wilson, 2020). Mensah (2023) in a study opined that the use of AI increases ethical dilemmas regarding accountability, algorithmic bias, transparency issues and human oversight. This has been supported by the findings of this study stating that black-boxes in AI diminish transparency and insufficient data makes AI predictions valuable for the military. However, studies lack insight regarding the way governance framework can help with the ethical adoption of AI for defence purposes. This is rightly projected in the findings of this study as it mentions the principles and guidelines that might be followed to develop necessary frameworks which would decrease the risk of unethical usage of AI in warfare and military systems.

This study has only considered qualitative data from secondary sources due to time and resource constraints. However, gaining first-hand insight from military personnel, researchers in the defence industry and developers through an interview in the form of primary data would further substantiate the findings of this study and provide a more practised overview of the topic, moreover, considering the rapid growth of AI technology, it can be assumed that this technology would further transform modern military applications and weaponry. Future studies can focus on such novel changes and further develop an understanding of this topic.

## 8. Conclusion

The use of AI in military systems and warfare provides a significant edge to a nation over adversaries. However, the rapid growth of AI technology and its unique nature pose significant ethical challenges. Hence, it is considered a double-edged sword as it provides strategic and operational advantages while posing ethical challenges. It has been argued in this study that AI is able to improve the precision and accuracy of missiles, improve the capacity of drones, and enhance the quality of surveillance. Moreover, the adoption of AI eliminates the necessity of using soldiers in battle frontlines. However, having access to AI technology poses a threat to human rights, often violating human dignity and privacy. Therefore, even though there are multiple advantages of adopting AI for warfare, such as able decision-making, automated weaponry and others, ethical considerations must be prioritised by nations.

There is a lack of clear guidelines, policies and frameworks for the effective and ethical adoption of AI in military systems in the defence industry. Therefore, considering international laws, just and fair practices, transparency and moral human oversight, moral responsibility and meaningful control over AI-enabled systems can help realise the advantages of adopting AI in warfare and defence equipment. Robust defence policies and frameworks will further make sure that AI adoption for military purposes is ethical and does not destabilise global order. Moreover, it must be noted that AI cannot completely take over decision-making processes, especially concerning the defence and military of a nation. Therefore, collaboration between human intelligence and AI is essential for effective AI usage. This further needs to be governed by international statutes, government policies, guidelines and frameworks which clearly state the ethical use of AI for military purposes.

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