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The Impact of Emerging Technology on warfare; A Case Study of Russo-Ukraine War

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Abstract
This research aims to analyze the impact of emerging technologies on the nature of warfare pattern in Russia-Ukraine war and uses the qualitative approach to study the phenomenon under discussion. However, this study uses both primary and secondary data. To analyze the future consequences of emerging technologies on nature of warfare, this study uses the new approach of techno-politics in the sphere of IR as these technologies show the transformation in dynamic nature of military tactics and politics. This research found the impact and influence in ongoing Russia- Ukraine War and is a clear example of using emerging technologies in Eurasian Region. However, the main findings are the uses of emerging technologies i-e unmanned aerial vehicles (UAVs), and electronic warfare has reshaped traditional notions of warfare. Furthermore, new complexities have been brought by the integration of autonomous systems and artificial intelligence (AI), challenging conventional notions of human agency and decision-making in military operations. Thus, the success of Russian Federation with the use the technological weapons and causalities is a direct and clear evidence of how the emerging technological weapons can be an effective and efficient tool to achieve national interest. From this analytical research, it can be concluded that the development of technological weapons not only resulted into the positive impact on society but also negatively affected modern conflict, such as seen in the Russia-Ukraine War. However, future recommendations include funding R&D to strengthen defenses against cyber-attacks, encouraging international cooperation to control the deployment of autonomous weaponry, and cultivating cross-domain collaboration to foresee and resolve new issues in contemporary warfare.

Keywords: Emerging Technologies, Russia-Ukraine War, Warfare, Technological Weapons, National Interest

Introduction
Today, the world is entering into the digital age, where technology is developing at a very rapid pace. An introduced emerging technology has the potential to revolutionize and transform entire societies, economies, militaries, and governments.[1] In Emerging Technologies, "Emerge" means to come forth, become evident, or come into existence. Goldstein (1999) defined emergence as “the arising of novel and coherent structures, patterns, and properties during the process of self-organization in complex systems”.[2] However, the pace of technological innovation has been extraordinary in the past few decades and is likely to accelerate further. China is set to play a challenging role on the global stage, making it crucial to keep up with

this pace to remain competitive.[3] However, The US is concerned about China dominating big data, quantum computing, AI, and autonomous systems, and its potential impact on economic, educational, and geopolitical realms. Therefore, Emerging technologies have the power to completely change everything, including human conflict, which is thought to be the main factor behind how society generates war and peace.

In the 20th century, During the Cold War era, some conflicts demonstrated the military and economic strength of the opposing camps. By the end of the Cold War, technology has been fundamental to the prosperity of the nation. Russian technological development has been promoted, especially with the space program. Afterwards, Georgia has frequently been the target of simultaneous cyber-attacks and direct warfare by Russia in first decade of 21st century, from 1993-2008. Russia's annexation of Crimea in March 2014 took the world by surprise as Ukraine was forging closer ties with European nations and the EU. However, Russia's military and defense industry has made significant investments in modernization since 2008, expanding in the acquisition and assimilation of autonomous and remotely controlled technologies into battle plans. Since the Crimean War, the US military adopted "hybrid warfare," a term that alludes to Russia's strategy of combining military and non-military methods of combat, as both states use rocket artillery, Heavy machine guns and grenade launchers, tanks, combat infantry vehicles, use of UAVs also caused the great problem.[4] Russia's position as a leader in software, computer design, military hardware, and other technological fields increased as electronic warfare gained popularity. In 1993, strategies continued despite less sophisticated technology: attacks, population collapse, infrastructure devastation, televised propaganda, and unparalleled disaster.[5]

Therefore, Vladimir Putin, the president of Russia, approved a "special military operation" against Ukraine on February 24, drawing strong criticism from around the world. As Ukraine expanded its relationship with NATO and expressed the desire to eventually join the organization as a whole.[6] In the first phase, Russian soldiers attacked along almost the entire Ukraine-Belarus border after Donetsk and Luhansk declared independence.[7] The war's second phase, which lasted from April to July 2022, focused mostly on combat in Ukraine's east and south. Where Ukrainians were also compelled to evacuate into the Donbas and leave Severodonetsk and Lisichansk in June and July.[8] The third phase continued from August to November of 2022 where Ukrainian forces started employing HIMARS systems to strike enemy positions and destroy the Russian logistics base. A month later, Putin declared the annexation of the Donetsk, Zaporizhia, Luhansk, and Kherson regions to Russia on September 30.[9] However, the major focus of the fourth phase of the battle was Russian missile strikes on critical infrastructure located in Ukraine. When losses from Russian missiles and drones were decreased as an outcome of Ukraine acquiring Western anti- aircraft machinery. Total number of casualties on the part of the Russian army is estimated at 200,000 at least till the fourth phase.

Furthermore, till 1st March 2024, more than 355,000 Russian personnel have been killed and wounded in the Ukraine war, according to the UK Ministry of Defense.[10] However, the technological weapons launched by Russia includes- loitering Munitions(drones), cyber, Lethal Autonomous Weapons (LAWs) and other advanced weapons such as use of UAVs that is seen on the battleground of Ukraine for surveillances and strikes. Therefore, the Russian-Ukraine war stated as the conventional warfare but now seem to be transforms to into

technological war. As they introduced modern technology warfare to the arsenal of weaponry for conventional conflicts.[11] The Mykhailo Fedorov, the deputy prime minister, formulated equation for Ukrainian victory in 2023; "The courage of Ukrainians + Technologies = the key to Ukraine's future victory"[12]. However, Clausewitz states in Chapter Six of on War: "Very few of the new manifestations in war can be ascribed to new inventions or new departures in ideas. They result mainly from the transformation of society and new social conditions."[13] But, it have seen, that fastest expansion or advancement of emerging technologies has crucial consequences for international politics and warfare. Advances in computing, big data analytics, AI, autonomy, robots, directed energy, hypersonic, and biotechnology are among the emerging military technologies that will be essential to defeating conflicts in the future.[14]

The topic is chosen because governments are using artificial intelligence (AI) and other tactical weapons in conflict, with unforeseen results. Due to unresolved concerns about dependability and trustworthiness, precautions are required. And Vladimir Putin says; whoever gains a monopoly in AI will in his words, be the "ruler of the world". Obviously, the AI identifies the object and, in such objectification, there is sense of dehumanization as AI system kills human at worse. Thus, the rationale of this research lies in its potential to shed light on the impacts of emerging technologies on the make-up of warfare, by analyzing the case study of Russia-Ukraine War as an example. As, the nature of warfare in general will become more complex in the future. However, In Contemporary times, there is very little academic research found that provides an understanding of how these emerging technologies and AI transform the tendency of weaponry in warfare. This study explores the use of drones and cyber warfare, and how Russia's tactics in Ukraine demonstrate the changing nature of conflicts. It also highlights the impact of emerging technologies on civilians, including increased casualties and infrastructure damage.

Thus, by examining the influences of disruptive technologies on the battlefield in Ukraine, policymakers can better anticipate threats and may enhance deterrence strategies. Furthermore, these academic policymakers and strategists may mitigate the risk of escalation that ultimately contributes to regional security and peace. Therefore, the research study holds significance not only in the academic sphere but also addresses practical challenges. Lastly, the paper concludes by suggesting the intellective gateway for controlling the further escalation of technological weapons and providing knowledge to military strategists and decision-makers on how disruptive technology might improve tactical and strategic operations, therefore they formulate certain laws while the usage of these advanced tactical weapons on the battlefields as of Ukraine in present times.

Statement of Problem

Emerging technologies are an ongoing debate in policy discussions and efforts, and they have inspired a lot of attention in academic circles.[15] The emerging technologies are coined as the new technologies empowered by states as there is systemic competition among China and United states in all 3 dimensions (military, economics, and geopolitics) and now technological innovation also become the major part of this competition. As, these technologies become the driving force for escalation of war at international level primarily at place of conventional and tactical weapons. However, disruptive technology is changing the nature of warfare, which is a challenge for states and can lead to unexpected conflicts. States seek to obtain them in their policy-making and decision-making processes. Experts predict technology could escalate

conflicts faster than humans comprehend and cause unintentional actions that increase hostilities over time. However, current studies of various scholars haven't explored the specific ways in which new technologies become the war tools of the conventional warfare, particularity in the context of Russia-Ukraine war. Thus, there is "the lack of understanding of how the disruptive technologies has become war tools of the conventional warfare and it impacts of the transforming nature of Warfare in the context of Russia-Ukraine War". Therefore, there is the need to explore how the technological equipment shows the consequences on the strategies and tactics of warfare on-going in Eurasian regions (Ukraine war).

Research Question

How the developments of emerging technologies influence the changing nature of warfare in Russia-Ukraine War?

Research Objectives

To analysis the influences of advancing emerging technologies on the warfare between Russia and Ukraine War.

To analysis the Russian military objectives increasable utilizing in Ukraine war.

To further recommends the possible way forward for researchers, policymakers to deal with.

Core Argument

The tentative argument will be testing the impact and influence of disruptive technologies on the future make-up warfare at the battleground of Ukraine.

Review of literature

Exciting body of knowledge is very significant for Researchers, as Researchers driven the empirical evidence for supporting their Core Argument. Therefore, literature Review under this research is organized by empirically driven thematically results; which is as follows:

Emerging Technologies

New technologies have been constantly evolving in recent years, and this has had an enormous influence on the non-military world.[16] Emerging technologies like AI, LAWS, cyber-attacks, and hypersonic weapons blur the line between conventional and non-conventional warfare. These new technologies are transforming weapons and affecting military operations. Emerging technologies used as tools of rivalry have changed the nature of warfare and have global security consequences.[17] This Literature Review aims to explore the impact of emerging technologies on nature of warfare, particularly in the context of Russia-Ukraine war.

According to Daniele Rotolo and Ben Martin, the emerging technology have a significant effect on the socio-economic system in general through transforming the institutions, players, and patterns of interaction as well as the related processes generating knowledge[18]. The authors aim to define these technologies and identify the gap in understanding through qualitative research, focusing on the Ukraine conflict. However, today the rise of technologies not only effected socio-economic sector but also affect the way of conducting strategic operations as seen on the battlefield of Ukraine. The paper explores how emerging technologies, such as Artificial Intelligence (AI) and unmanned systems, affect military tactics and transform modern warfare.

Michael T. Klare (2018), narrates through the mixed approach that with the continuous development in emerging technologies such as artificial intelligence (AI), robotics, hypersonic, and cyber technology change the nature of warfare and show new challenges for

those who are looking to diminish the frequency, violence[19]. However, today the analysts concerned the use of robotics in warfare may intensify conflicts beyond human understanding, leading to accidental exacerbation of tensions and causes major challenge for policymakers and strategists. This paper explores the implications of technological weapons for global security and their future outcomes.

According to Liivoja and McCormack (2015), The evolution of warfare has been linked with periods of rapid change in military concepts and tactics known as "revolutions in military affairs," which have been mostly attributed to advances in science and technology[20]. However, author also examines some of the most critical legal and regulatory issues that come with the military use of particular technologies through empirically driven chronological method. Therefore, there is the need for assessing the legitimate military tactics for the neutral use the technology in future which isn't been discussed by author. Thus, this paper tends the explores the real military tactics and strategies and primarily for war in Russia and Ukraine.

Watling (2023), examines how modern technologies like artificial intelligence, layered precision fires, autonomous systems, and high-fidelity sensors could affect warfare in the future through thematical approach.[21] Further, it highlights that these capabilities should not be evaluated in a vacuum, but rather in the framework of a system that is able to field and assist them. The essay focuses on how these technologies may assist or impede the development of warfare in the future. However, there is need to do comprehensive analysis of offensive electronic warfare, space-based asserts by exploring the clear case-study, that are significant to understand future operations and haven't been mentioned by author. Therefore, this paper will do the comprehensive analysis to explore the impact of emerging technologies in the context of Ukraine war.

According to Williams (2023) five key areas including digital information and communications technology, Artificial Intelligence, biotechnology, quantum computing, and missile technologies, technological advancement is having serious safety consequences, as well as how international politics impacts both the pace and nature of technical advancements.[22] However, there must be requirement to assess the various ways and challenges to global security through the lens of clear example happening the world, that isn't properly explored by author. Therefore, this study analysis the new technologies and poses challenges to security worldwide.

Emerging Technologies and Warfare

New technology plays the prevailing role in the lives of homo-sapiens as it has arrived at a unique and critical juncture than it was during the entire history of humanity.[23] The adaptation of these advanced technologies isn't varnishing the fear for various challenges that it poses on international security worldwide. Therefore, this literature review aims to explores the consequences and challenges posed by the integration of developed technologies on the make-up the future warfare, especially on the battle-ground of Ukraine.

Huang (2012) explores how novel innovations are changing the nature of warfare, with particular emphasis on information operations, unmanned aerial vehicles, and advances in cognitive sciences that are sought after by militaries and communities to gain an advantage in combat through chronological technique.[24] Therefore, there the immediate need to examine the how these advanced uses of technology persist to influence the lives the mankind and how states are operationalized to protect humans through certain strategies in long run, which isn't

being discussed by author's critical lens. Thus, this paper aims to explain the ways and strategies to secure humans' lives in the context of Russia-Ukraine War. Favaro (2023) narrates that that emerging technologies have given Russia a false sense of supremacy in the war in Ukraine, which leads to amplified dependence on nuclear weapons and coercions by Russian.[25] Further, the author analyzes advanced technology's role in modern conflicts, highlighting nuclear escalation risks in the Ukraine war.

Therefore, it is essential to understand why Russia is take too long in Ukraine and the reasons behind the failure of the Russia. Thus, this paper aims to explain how the technological weapons in battle-field of Ukraine influence the future actions the both states for the transforming make-up of warfare. Balmus (2022) emphasizes technology's impact on modern warfare, including autonomous vehicles, increased violence, and drone invisibility technologies used for producing, transporting, and concealing weapons of mass destruction.[26] Though, today the advanced technological weaponry led to destruction at global level, it is unpredicted to explain how the new technologies reshape the nature of warfare, that isn't been mentioned by author. Therefore, this paper aims to explain the consequences of technological weaponry such as ATGMs, Rocket launchers and recoilless rifles, drones, UAVs and LAWs etc. at the Ukraine War.

Johnson (2019), examines the effects of AI on military power, conflicts, and geopolitical rivalry. He highlights the potential threats and challenges of AI as a multipurpose technology and its projected radical impact on the economic success of the United States.[27] However, the author overlooked the impact of technological advancements on military operations and how they reshape warfare dynamics. Thus, this paper aims to clarify the transforming nature of warfare due to advanced technological weapons in the context of Russo-Ukraine War. Zhang (2021) stated the electronic warfare is evolving from land, sea, and air to space as one of the primary operational forms of information warfare.[28] However, these technological weaponries have become the limelight that how the going to operate in future. Therefore, it is crucial to understand how electronic warfare affects conflicts and how states can counter its impact, an aspect overlooked by the authors. Thus, this paper aims to explores the how the technologies and warfare are interconnected and explain the impact of emerging technologies on the warfare in the context of Ukraine war that is coined as first technological war at international level.

Emerging technologies and Russia- Ukraine war

New technological developments have greatly influenced the conflict in Ukraine is seeing both sides, particularly Russia has depended on developing technologies, which has given them an erroneous impression of superiority and influenced their choice to intensify the conflict.[29] Disruptive technology has increased the complexity of planning and operating military forces in confrontations. This literature review looks to explore the how modern technology impact the societal sectors of both states in conflict. It emphasizes technology's role in state relations and disputes, including new principles like technological sanctions and electronic warfare.[30] Further, the author presents an in- depth study of the impact of modern technologies on international relations using the Ukraine war as the case study to explain it. Today, various authors overlook the crucial interconnectedness of emerging technology with the Russia-Ukraine war and its long-term challenges. Therefore, this paper aims to explore how the use of emerging technologies in Ukraine war would impact the nature of warfare in long-run.

Ronzhes (2022) explores how digital technologies have assisted the people of Ukraine adjust to Russia's military actions. Further, he looks at the technological solutions that the government and its agents were across to offer timely communication, knowledge, and infrastructural alterations during the conflict.[31] Now the Ukraine war looked to be gone beyond the conventional warfare. It is important to provide an in-depth analysis of the impact of the drones, hypersonic weapons and others technologies operated by both sides in the war. Thus, this paper aims to analysis the impact of advanced technological weaponry in Ukraine war.

Existing Gap in the Study

Throughout the literature review the main factor is to identify that how the emerging technologies poses the consequences on traditional notion of warfare in between the Russia and Ukraine were as follow

1) There is arms race in developing advanced technological weapons between Russia and Ukraine.

2) The usage and the investment in development of technological weapons in war by both sides.

3) The emergence of the complexity in terms of relations of Russian with Europe and West.

While the existing research describes that the modern technologies play important role in state relations and the technological weapons i-e drones, hypersonic weapons, and UAVs etc. applied by both states.

Several distinguished authors have provided their perspectives on how various countries, including the United States, China, and Russia, acquire and utilize technology. In recent times, the concept of techno-politics has gained attention, albeit not being fully integrated into academic research. Furthermore, there remains a gap in understanding the implications of emerging technological weaponry on the nature and strategies of warfare, particularly in the Eurasian region where Russia and Ukraine are currently at war. To fill this gap, research aim to study how technological weapons have transformed warfare in Russia, particularly in the Ukrainian war. However, the paper will analyze the shift from conventional to technological warfare and why Russia has faced difficulties in achieving their military goals despite having advanced weaponry.

Methodology

This research design follows a qualitative analysis to compare the Russia-Ukraine war within the realm of the arms race in advanced technological weaponry. However, the nature of research questions the "how" is explanatory and will lead to the use of case study on explaining how the developing technologies can shift the make-up of the traditional warfare. Furthermore, this research also explains these perspectives with interpreting the theoretical analysis too. Techno- politics is a new paradigm that explains the ongoing technological conflict in the Eurasian region. It analyzes how technology and politics shape each other, especially in the military sectors of Russia and Ukraine, distorting the line between conventional and tactical warfare, raising global concerns.

Additionally, the research directed to analysis the quantitative data, where the methodology is comparatively, analytical and descriptive. However, the adapted research approach is probably the case study style as it analyzes the use of technological weaponry in ongoing Russia Ukraine war. Therefore, primary data have been collected for case study in

which in-depth interview would be conducted. The collection of data is from both primary and secondary sources. For instance, for primary data the in-depth interview is conducted from experts includes policy makers and other academicians. However, the structured and open-ended questions have been used for taking interview taken through online platforms. The interview questionnaire included the following questions, how you see the emerging technologies in the sphere of modern warfare? how the use of emerging technologies would transform the landscape of military conflicts? And how have the development in technologies like drones, electronic warfare, or cyber warfare affected the manner of warfare in this conflict? What is the danger associated with in continued advancement of emerging technologies militarily? However, secondary data from sources like journal articles, reports, books, and newspaper articles enables a comparative analysis of technology adaptability, with a focus on Lethal Autonomous Weapons. Lastly, the research aims to summarize key findings and discuss the future implications of emerging technologies on military operations. The focus is on how these technologies impact the nature of warfare in the context of the Ukrainian conflict.

Theoretical Application

A theory is a well-substantiated exploration and explanation of an aspect of the natural world that can incorporate laws, hypothesis, and facts. There are two main approaches that explain the technologies (Realism and techno-politics). The realist's theorist i-e classical and structural argues that "it is politics that shapes technologies, in the anarchic world order"[32]. In contrast the techno-politics underlines that "technology influences the politics and technologies either good, bad or neutral depending on the use of technologies". However, this paper aims to justify the use of techno-politics to explore how the emerging technologies would impact the transforming nature of warfare in the military context of Ukraine war as the theories are concerned with the emerging technologies and politics in the international global system.

Today the world faces a "clash of automation" instead of a "clash of civilization" and makes the discussion important.[33] Techno-politics is the new paradigm in the domain of international relations, as approach of STS (science, technology, security). However, Technology-driven globalization has fundamentally reshaped international relations, as the rapid dispersion of technology transforms power dynamics and conflict strategies. Techno-politics, according to Edwards and Hecht (2010), is the entanglement of *"hybrids of technical systems and political practices that produce new forms of power and agency."* Politics and technology interact to shape national and social identity narratives, specific policy views, and tangible results. However, the paradigm of techno-politics seeks to 'cover the deserted area between technological determinism and human agency'[34]. From the end World War -II, Today the technology become the important tool for to be used us in the daily life and has become the concern in national security and economic development by various states. Because of technology, the political landscape has changed globally, and experts believe that the "technology cold war" will begin and that nations' interactions will shift due to rapid technological innovation.

And Geopolitics is thought to be a security risk resulting from the Sino-US dispute over the development of the fifth-generation (5G) network. The potential impact of manipulating 5G technology on the world economy is increasing as data control gains

importance. For example, China's rise by 2007–2008 created an economic threat by inciting a technical battle with the US. By 2030, militaries will be using precise and lethal long-range weaponry to concentrate on high-intensity conflict. Defense strategies will give priority to adaptable response plans based on revolutionary arms, while new Internet-related innovations transform conventional wisdom in communication. The prosumer era, initially predicted by Alvin Toffler, was characterized by the ease and flexibility with which information could be distributed and the ability for any subject to generate information and interact.[35]

However, the ongoing war which seen with the change in Ukraine's relationship with Russia from friendly to a state of conflict since 2014 is illustrative of the country's social and political transformation of its identity narrative from one of "brotherhood" to "the other as foe." Thus, Russia's political backlash helped to strengthen Ukraine's national narrative of independence and different from Russia. On February 24, 2022, Russia invaded Ukraine, starting a conflict that had been waging since 2014, when the Russian Federation acquired Crimea and chaos broke out in the Donbass. Now Russia and Ukraine both have been using the advanced technologies weaponries i-e Artificial Intelligence, Lethal Autonomous weapons (LAWs), Drones and other Hypersonic Weapons in combat. However, it also transforming the tactics and strategies of Russia been applied in the battleground of Ukraine. The equitable application of disruptive military technologies is a serious worldwide dilemma, with technology playing a critical role in socializing warfare, particularly in the classic conflict between the worldwide South and the Global North. Ukraine's importance has escalated for Vladimir Putin, as NATO and the West press against its NATO membership.

In response, Western partners and NATO have invested considerably in modern techniques and weaponry to influence Ukrainian politics and fight Russian pressure. Techno-politics uses ICTs to improve democratic processes by improving efficiency and transforming them to meet current needs. However, in the modern age, it has quickly become a means of war. Therefore, the techno-politics strategy makes clear how emerging technologies impact national security dynamics and conventional combat between nation-states. It highlights how important it is to investigate how politics, popular culture, and technology interact when deploying ICTs, IoT, artificial intelligence (AI), and robotics in weapons of mass destruction (WMDs). Thus, the Techno-politics as the emerging new sub-theory or paradigm should be intended to analysis the Russian war which is the Frist technological war being fought the global fronts.

Discussion

The US and the Soviet Union's post-Cold War successors had to contend with international instability. Since 1991, the successor state of Ukraine has sided with the US and EU and shunned cooperation with Russia in political, economic, and security issues. Three significant uprisings against pro-Russian influence resulted from tensions with Russia: the ongoing Russia-Ukraine war, the Crimea Operation (2014), and the Orange Revolution (2007). Russia considers the Operation in Crimea to be the Operation of Dignity. This Operation, witnessed that Russian employed asymmetric, covert, and other novel military instruments; the majority of the tactics and theory on show were old Soviet or Russian warfighting tenets modified for contemporary warfare.[36] Though he, used the traditional weapons i-e rocket artillery, Heavy machine guns and grenade launchers, tanks, combat infantry vehicles and from then the

concept of hybrid warfare and cyber warfare came to limelight. However, Zelenskyy' NATO offer in 2020 set off Russian action in Ukraine and the First Technological War. This fight, which uses cutting-edge technology like drones, AI, and hypersonic missiles, calls for urgent attention to be paid to the intersection of politics, technology, and military on a global scale.

Figure 1: The latest Mavic (pictured) is fitted with a low-quality telephoto lens

https://www.rferl.org/a/ukraine-russia-invasion

Loitering Munitions (Drones)

Emerging military technologies, such as cyberattacks, AI-driven intelligence, armed drones, and electronic warfare weapons, are being used extensively by both Russia and Ukraine in the conflict in Ukraine. Drones, which were formerly thought of as just being useful for remote warfare, are now essential weapons that can deliver bombs and conduct precision combat. In line with their changing significance in contemporary combat, NATO classifies drones according to their impact and range. Class I drones, that consist of small, micro, and mini drones, weigh less than 150 kg (331 lbs); class II tactical drones, which weigh between 150 and 600 kg lbs (1,323 and 331 kg); and class III drones weighing more than 600 kg; low-cost, one-way "kamikaze" attack drones offer known as Loitering Munitions[37].

However, commercial drones are not as powerful as their military-grade counterparts, soldiers may still be afraid of them since they are vulnerable to jamming and spoofing, which can indicate that enemy artillery is not far away. For example, Ukraine has deployed over 7,000 small-range drones (including 6,000 FPV drones and 1,000 small UAVs), while Russia has deployed over 2,500 small- range drones (including 1,500 Shahed-136 and Geran-2 drones, and 1,000 Zala drones) and in class II, Ukraine deployed long-range drones like UJ-22 (800km), Barakat TB2 (300km), and Sokil-300 (1,000km), while Russia deployed Shahed-136 (1,931km), Geran-2 (1,500km), and Orion (1,000km). On the other hand, Russia installed its own Lancet and KUB-BLA systems, Ukraine was already using its own RAM II system, which was built and manufactured in the country. The initial arms transfer from the United States to Ukraine in March 2022 included loitering munitions as well.

Therefore, the encounter has led to an increase in drone proliferation both horizontally and vertically, with Turkey and Iran emerging as new drone powers. Drones are spreading vertically down to the tank level, and loitering weapons demonstrate how important disruptive technology is to geopolitical strategies by highlighting their continuous utility in

military operations. Thus, the drone warfare witnessed to be the significantly explains the influence of technology on geo-political tactics.

Figure 2: Bayraktar TB2 Armed Unmanned Aerial Vehicle

(https://www.turkishdefencenews.com/)

Hypersonic Weapons

Weapon systems with hypersonic capabilities can travel faster than Mach 5 in atmospheric conditions. Hypersonic weapon systems are special because they can avoid defensive systems and have a high rate of speed and maneuverability. However, with the advancement of technologies several countries are developing hypersonic weapons, which fly at speeds of at least Mach 5 (five times the speed of sound). There are two primary types of hypersonic weapons i-e Hypersonic glide vehicles (HGV), Hypersonic cruise missiles.[38] However, the three nations leading the development of hypersonic weapons are the US, China, and Russia. Specifically, China and Russia have declared that they have already implemented dual-capable missiles that may surpass the US missile defense systems and travel at hypersonic speeds.[39]

Figure 3 Launch of a Tsirkon hypersonic missile from the frigate Admiral Gorshkov in the White Sea

Press Service of the Russian Ministry of Defense

Although Russian advancements in hypersonic technologies have received a lot of attention lately, the research on these research and development (R&D) on weapons began, much as in the US, in the 1960s and continued until the USSR collapsed in the 1980s, and President Putin's speech to

the Federal Assembly on March 1, 2018, marked an outcome that included references to multiple hypersonic weaponry, including the Avangard glider and the Kinzhal airbreathing missile. Since the start of war therefore Russia keeps on deploying the hypersonic weapon primarily hypersonic cruise missiles. *For example; first tests of the Tsirkon/Zircon hypersonic cruise missile were conducted by the Russian military in January 2020.*

The deployment of Russia's hypersonic glide vehicle formerly designated as Objekt 4202, Yu-71, and Yu-74, can be transported as a MIRV payload by the heavy ICBMs RS-28 Sarmat, R-36M2, and UR-100UTTKh in Ukraine signifies a pivotal shift in warfare technology, challenging efforts by the USA and NATO to support Ukrainian defenses against Russian missiles. This intersection of geopolitics and advanced weaponry underscore the critical role of technology in shaping 21st- century politics across economic, political, and military domains.

Lethal Autonomous Weapons (LAWs)

With the development of technologies there is the intense arm race looking to be emerged from last half of decade, i-e Lethal Autonomous Weapons are the leading among the hypersonic missile system. The Autonomous weapons systems employ artificial intelligence (AI) systems in conjunction with a variety of combat platforms, such as ships, tanks, and aircraft, to detect, track, and assault adversaries. Resources all by themselves. In particular lethal autonomous weapons systems (LAWS): "weapon systems that, once activated, can select and engage targets without further intervention by a human operator", which include missile systems, cars, submersibles, sentry turrets, armed drones, and other kinetic artificial intelligence (AI) applications [40].

Currently, the armed forces of the other major nations and every branch of the United States military are creating—and in certain circumstances fielding—multiple families of Unmanned aerial vehicles (UAVs), unmanned ground vehicles (UGVs), unmanned surface boats (USVs), and unmanned underwater vehicles (UUVs) are examples of autonomous warfare systems. In contrast, these kinds of autonomous systems are reportedly being developed and implemented by China and Russia as well. For instance, in war areas like Syria and Ukraine, Russian and Ukrainian troops use commercial drones in addition to disruptive autonomous weapons like Uran-6 and Uran-9 tanks. Artificial intelligence is used to enhance data-driven operations in these areas. Meanwhile, the strategic ramifications of China's military UAVs, as demonstrated by their flights across the Taiwan Strait, highlight the increasing influence of unmanned technologies in geopolitical conflicts.

Table 1: Show the establishment and adorations of Lethal Autonomous Weapons i-e UAVs and loitering Munition by the sates for the future warfare

Type	Name	Developer	Country	Usage	Autonomy	Year
Loitering Munitions	Drone 40	Defend Tex	Australia	Quadcopter+ grenade	Nav + Target	2016
	Mini Harpy	Israel Aerospace	Israel	Mini-UAS+munition	Nav+Target+Fire	2019
	KUB- BLA			Loitering	Nav+Target+Swarm	2019
	Kargu	Industries	Russia	munition		
		Kalashnikov		Loitering		2020
		STM	Turkey	munition	Nav + Target	

Unmanned Aerial Vehicle	Bayraktar TB2 MQ-9 Reaper	Bayraktar General Atomics	Turkey USA	Unmanned aerial combat vehicle ISR	Nav Nav + identify	2014 2020

However, In the crisis in Ukraine, Russian military leaders are investigating applications of artificial intelligence (AI) including robotics, information warfare, and command and control. Among them, the Kalashnikov ZALA Aero KUB-BLA drones are a prime example of how autonomous AI-powered weapons are developing for use in combat. An NVIDIA Jetson TX2 processor was found inside a Lancet drone that was taken prisoner by Ukrainian forces in the start of 2023[41]. Thus, Russia incorporates AI into its arsenal by creating anti-tank marker robots by fusing AI robots with suicide drones like Bas-80, improving defense capabilities. This technological advance portends increased deadly diversion and casualties in conflict in the future.

Space-based technologies

The battle between Russia and Ukraine has signaled the start of a two-front space war in which military operations are supported by commercial capabilities provided by US and European service providers to both sides.[42] In contrast to early projections, during the Cold War era and the Soviet Union's 1957 Sputnik 1 launches, space has largely supported terrestrial military operations by offering support such as space-based ISR, PNT, and SATCOM, rather than developing into a direct theater of combat. The space capabilities of major powers are proliferating in the geopolitical landscape. The US leads the way in intelligence-sharing (ISR), the EU is the champion of Galileo and Copernicus, China is the leader in ASAT and BeiDou, Russia is a launcher powerhouse, and since 2019, NATO has integrated space into its operational domains, reflecting increased competition and strategic stakes in space militarization.

Since the invasion, Ukraine did not possess or use any satellites, but space help has been made available in a number of ways by the US and its NATO allies. However, the majority of Ukrainian TV channels are broadcast via a number of commercial satellite communication (SATCOM) systems, Starlink satellites (SpaceX), and Luxembourg-based satellite operator SES.[43] However, Russia uses its limited but powerful space capabilities, including as GLONASS for precision-guided munitions and a fleet of about 30 modern ISR satellites, to interfere with space assets that are helping Ukraine. This puts problems for Ukrainian defenders in the midst of the fight. Russia appears to have closed out a crucial Gap, and launches the Condor FKA radar surveillance satellite using Soyuz 2.1 a rocket will transform the surveillance game of combat.

Therefore, The Russo-Ukrainian War has made it possible for satellite-based technology to become widely available, daily instruments for both civilian and military populations. This has the potential to strengthen psychological as well as military resistance to hybrid threats. The capacity to make a tangible and meaningful contribution in times of crisis or war will support and maintain people's psychological fortitude and willingness to defend themselves. And, while not necessarily the most obvious elements of space strategy, this dynamic shows that doctrine, policy, information-sharing mechanisms, and data-processing capabilities can be a motivating factor for military superiority. Thus, in these and

countless other ways, the current war in Ukraine offers a lesson and a warning to other Western countries hoping to arm themselves against future hostilities.

Analysis and Finding

Today, the emerging technologies i-e Artificial Intelligence, Robotics and other become the future concerns of technological companies as the new type of warfare of emerging. China's military development is exceeding expectations, the Russia-Ukraine conflict is redefining warfare through the extensive use of advanced technologies such as autonomous weapons, space satellites, and armed drones. This represents a significant shift towards technologically-driven warfare dynamics on the modern battlefield.

However, The Ukraine war, which has spurred a worldwide arms competition among great countries, has alarmed theorists about the implications of developing technology on modern warfare. The approach of "techno-politics" emphasizes how advances in technology are reshaping military and political processes and altering the nature of the struggle for global dominance. China today is investing ten time more than Unites States. For instance, a scientist in China has created a new aircraft technology called Plasma Stealth, which has the qualities of invisibility, silence, and adaptability. Additionally, the scientist has created a disruptive electronic warfare weapon that can target multiple military assets at once with never-before-seen capabilities.

With Russia's $65 billion military budget and 900,000 troops being matched by Ukraine's $6 billion budget and 200,000 troops, using radical disruptive technologies like drones, artificial intelligence, and precision missiles, the war in Ukraine demonstrates a revolutionary turn in modern warfare. With NATO and the US poised to further escalate their military and surveillance capabilities, this conflict serves as a stark reminder of the critical role that technological advancements play in determining geopolitical dynamics and igniting arms races among major powers.

Furthermore, Previous research has addressed the employment of advanced technology in the political, military, and economic spheres as well as the philosophical ramifications of military technology. For instances, without providing workable alternatives solution, Favaro (2023) criticizes Russia's over-reliance on developing technologies, which has resulted in a delusion of military might and nuclear coercion.[44]. However, despite escalating geopolitical tensions, Rotolo and Martin ignore hazards by arguing that technological improvements may assure responsible power accumulation. But, not explores how the new technologies continuously transform the make-up of warfare. As there is intense use of the technologies in the battleground of Ukraine along with Israel.

Therefore, this paper critically examines the Ukraine war's deployment of new technology including AI, drones, UAVs, autonomous weapons, and hypersonic weapons, showing how nations and military industries slowly innovate and modify conflict. It also investigates the complex integration of autonomous systems and AI, questioning traditional concepts of human agency and decision-making in military operations, and demonstrating the tremendous impact of developing technology on modern combat. Thus, main finding of paper is to analysis the modern technologies been use for military encounters in Ukraine and that the war drives innovation, as long as this battle continues, we will undoubtedly see creative uses of counter-armed drone technologies, which, unlike Hamas and ISIS, will attack drone operators and then be referred to as an artillery strike on both states and non-state entities.

Conclusion and Recommendation

In conclusion, the today's advanced new technologies play an important role in transforming the nature of warfare. For instance, cyberattacks that take down vital port infrastructure or disinformation campaigns, deep faking that rig presidential elections or space satellites, hordes of deadly drones with facial recognition that recognize our movements, uncontrollably armed robots that are practically impossible to defeat, autonomous fighter jets that can travel at supersonic speeds and are more effective at work than humans—all of these are extremely intelligent weapons of terror that propel innovative approaches to C5ISTAR. We are thus witnessing the beginning of a new era in conflict, one in which technology has profoundly impacted global diplomacy and national security as well as geopolitics.

This paper has explored the impacts of emerging advanced technologies on the transforming nature of warfare with the special focus on Russia-Ukraine war. By the lens of newly develop theoretical approach in International Relations i-e techno-politics, this research how technological equipment shows the consequences on the strategies and tactics of warfare on-going in Eurasian regions (Ukraine war) as the finding of paper shows that technological innovations and advancement is the causally done in states institutions and by militaries. Which posed the challenges on the state's future implications, actions and national security concerns. Thus, this paper has the important consideration on future studies as it analysis the technological use of weapons by war-torn countries i-e Russia and Ukraine though the lens new approach of techno-politics and tend to take force researcher, military personals, and policymakers to go for immediate initiative before in its too late as the digital technologies is more the dystopian reality tucking away in a far way future and those Autonomous weaponry which are today deductible tomorrow would be invisible.

Future recommendations include funding research and development (R&D) to strengthen defenses against cyber-attacks, encouraging international cooperation to control the deployment of autonomous weaponry, and cultivating cross-domain collaboration to foresee and resolve new issues in contemporary warfare. Secondly, the transforming possibly couldn't be wiped out though treaties and diplomatic agreements should make the future safely unlike in 1950s where great powers managed to limit of development of nuclear weapon. Therefore, policymakers should take the sustainable steps and forms the entangled strategies with tech industries and companies like SpaceX, Amazon, NASA, Blue Origin and others.

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