ASSESSING FORCE COMPARISON AND TECHNOLOGICAL LIMITATIONS OF RUSSIAN MILITARY IN RUSSIA-UKRAINE WAR

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Abstract

Russia's multi-front invasion of Ukraine failed to achieve a quick and decisive victory. With its numerical and technological advantage, Russian armed forces were in an advantageous position against the Ukrainian counterparts. However, the high death toll and heavy equipment losses uncovered the technological deficiencies of Russian military forces. The article briefs the initial phase of the Russia-Ukraine war and the territorial gains and losses occurred until April 2023. The article also discusses the technological limitations of Russian forces through the lens of Revolution in Military Affairs. A comparative evaluation of Russian and Ukrainian pre-war strength, as well as their combat losses has also been provided. Analysis of Russian military limitations in the initial phase of the war is important as the majority of contemporary military forces still employ traditional military hardware and strategies. In sum, this study highlights the pivotal role of technology in warfare, offering insights for military strategists and the research community.

***Keywords**: Russia, Ukraine, Technological Limitations, Military Hardware, Modern Technology, Revolution in Military Affairs*

Introduction

Historically, Russia and Ukraine have shared deep cultural and political ties, with Ukraine being part of the former Soviet Union until its dissolution in 1991. From the Russian point of view, the Soviet disintegration discarded the primary rationale for sustaining NATO's existence.[1] However, NATO undertook rapid eastward expansion –

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a move always perceived by Moscow as a major national security challenge.[2] From the Kremlin's perspective, the EU-ward tilt of Ukraine represents a broader and long-term strategy by Western powers to contain Russia and nullify its influence in Eastern Europe.

The annexation of Crimea by Russia in 2014, though initially justified by Moscow as a protective move to safeguard the ethnic Russian community, was primarily directed to secure key strategic interests including Russian dominance in the Black Sea and sustenance of strategic buffer against NATO's South-Eastern flank.[3] From a Western point of view, the Kremlin seeks to challenge the status quo by reestablishing Russian dominance in territories that were previously part of the Soviet Union.[4] This will eventually lead to the diminishing of the geopolitical order dominated by Western powers and the restoration of Russia's status as a global power.

In contrast, Russia feared that the integration of Ukraine into NATO will endanger its South-Western region and would significantly degrade its connectivity to the Black Sea and the Middle East.[5] To proactively nullify the newly emerging threat, Moscow utilized military prowess against Ukraine. But despite significant military superiority, Russian armed forces failed to perform as efficiently as was generally anticipated. Russia has attained territorial gains but has also suffered significant losses against Ukrainian forces.

Theoretical Framework

When a radical transformation in military technology causes a transition in character and dynamics of warfare, then it is termed The Revolution in Military Affairs (RMA).[6] It suggests that transformative advancements in military technology, when effectively integrated with doctrinal and organizational reforms, can provide decisive advantage in

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1 Smith, John. "Patterns of Continuity in NATO's Long History," *International Politics* 56, no. 3 (2023): 570-73. https://doi.org/10.1057/s41311-022-00350-4.

2 Marten, Kimberly. "Reconsidering NATO Expansion: A Counterfactual Analysis of Russia and the West in the 1990s," *European Journal of International Security* 3, no. 2 (2018): 146-48. https://doi.org/10.1017/eis.2017.16.

3 DeBenedictis, Kent. "Russian 'Hybrid Warfare' and the Annexation of Crimea: The Modern Application of Soviet Political Warfare," *International Affairs* 99, no. 1 (January 2023): 397–98.

4 Feinstein, Scott G., and Ellen B. Pirro. "Testing the World Order: Strategic Realism in Russian Foreign Affairs," *International Politics* 58 (2021): 822-23.

5 Kushnir, Ostap. "Russian Geopolitical Advancements in the Black Sea Region: The Annexation of Crimea." *Polskie Studia Politologiczne* 56 (2017): 114-16.

6 MacGregor Knox and Williamson Murray, *The Dynamics of Military Revolution 1300- 2050* (Cambridge University Press; First Edition, 2001): 1-14.

warfare. RMA-driven military forces focus on network-centric warfare (NCW), real-time intelligence, precision-strike capabilities, electronic warfare (EW), and cyber operations to ensure battlefield dominance.[7] It can be argued that key technologies, as highlighted by RMA postulations, are essential in winning modern era warfare.

Before the conflict, Russia had earned the reputation of being a formidable military power – second only to the United States in terms of combat capability. However, when viewed through the lens of RMA, the initial phase of the Russia-Ukraine war exposed major vulnerabilities in Russian military capabilities. It can be hypothesized that the technological limitations of military equipment employed by Russian armed forces significantly contributed to the degrading efficiency of Russian hard power.

Lack of precision strike capability, inadequate anti-air defense potential, limited stock of stand-off munitions, and poor ISR capabilities prevented Russia from achieving air superiority. Similarly, rigid command & control (C&C) and lack of doctrinal flexibility degraded Russia's ability to adapt according to rapidly transforming battlefield conditions. Russia's electronic warfare and cyber operations also failed to disrupt Ukraine's battlefield networks. In addition, poor logistical support and outdated supply chain management also led to fuel shortages and ammunition depletion. In contrast, Ukraine leveraged Western ISR support, encrypted communications, and satellite networks to undertake well-informed and well-coordinated asymmetric counteroffensives against the Russian military. Combined, all these factors greatly undermined the momentum of the Russian offensive and the resulting war of attrition, therefore degrading the relevancy and achievement of Moscow's objectives.

Russia - Ukraine Force Comparison

After Russian President Vladimir Putin vowed to modernize Russian armed forces by spending 22 billion rubles by 2020, efforts were made to upgrade the older equipment to match modern standards.[8] Russia has been increasing its defense budget for three consecutive years. With a 2.9 percent increment, Russian defense expenditure reached $62.2 billion in the year 2021.[9] Despite economic limitations and embargos of vital sub-

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7 Nazirah, Ansori Zaini, and Buddy Suseto, "Implementation of Revolution in Military Affairs in the Russian and Ukrainian Wars," *Formosa Journal of Applied Sciences* Vol.3, No.112024: 4471-4475.

8 "Putin Vows to Continue Russian Military Modernization." *Radio Free Europe/Radio Liberty*, June 25, 2015. https://www.rferl.org/a/putin-vows-military-modernization/27093316.html.

9 "World Expenditure Passes $2 Trillion for the First Time." *SIPRI.org*, April 25, 2022. https://www.sipri.org/media/press-release/2022/world-military-expenditure-passes-2-

systems from abroad, Russia completed the majority of projects. According to the SIRPI fact sheet 2022, with a 19 percent share in the global market, Russia was the second largest exporter of arms in 2017-19.[10]

From an organizational perspective, the Russian Army is divided into four military districts: Central District, Southern District, Eastern District, and Western District - each with a Joint Strategic Command.[11] The order of battle (ORBAT) of Russian armed forces has been revised to incorporate the idea of combined arms in the shape of autonomous military units called Battalion Tactical Groups (BTGs).[12] Each BTG comprises infantry, armour, artillery, air defense, and support units. These BTGs, at least in theory, are self-contained and can conduct the assigned duties without relying on organic support from other branches. The force organization in this form represents a transition from the traditional Soviet Doctrine of amassing firepower using large formations with heavy equipment.[13] Russian armed forces can independently deploy and sustain forces on an extended range beyond its borders. However, this military power projection is of a modest scale as it is limited by size, time, and economy.

After the Russian annexation of Crimea (2014), emphasis was given by Kyiv to modernize Ukraine's armed forces. Ever since, Ukraine steadily increased its military spending. In the year 2021, Kyiv allotted $4.27 billion for defense.[14] However, the country needed a more comprehensive approach to counter intensifying security challenges. The inability of Ukrainian conventional forces to effectively counter possible Russian invasion compelled Kyiv to consider joining NATO as a strategic goal.

Before the Russian invasion, Ukraine's active ground force had raised two mountain brigades, nine mechanized brigades, two tank brigades, and one motorized brigade.[15] Besides reserves, Ukraine had created a territorial defense force in 2015 comprising of light arms

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10 Wezeman, Pieter D., Alexandra Kuimova, and Siemon T. Wezeman. "Trends in International Arms Transfers 2021." *SIPRI Fact Sheet*, March 2022: 2-3.

11 Wazeman. Trends in International Arms Transfers: 192.

12 "Russia New Generation Warfare Handbook." *Info Public Intelligence*, December 2016. https://info.publicintelligence.net/AWG-RussianNewWarfareHandbook.pdf.

13 Defense Intelligence Agency. *Russia Military Power – Building a Military to Support Great Power Aspirations – 2017*, 13.

14 International Institute for Strategic Studies (IISS). *The Military Balance 2021*. 2022, 211.

15 "Ukraine Ground Forces," UkrMilitary. Accessed November 17, 2023. https://www.ukrmilitary.com/p/ukrainian-ground-forces.html.

formation of volunteer fighters.[16] The Eastern and Northern Sectors were also reinforced by armour and artillery. However, considering the scale of obsoleteness and economic limitations, the overall scope of modernization remained limited. To compensate for the shortage of manpower against the backdrop of the Russian invasion, Ukraine declared general mobilization and armed volunteer territorial defense. In parallel, thousands of foreign volunteers were encouraged to join the international brigade.

A numeric comparison of combat manpower suggests that Russia enjoyed over 4.5 times numerical superiority over Ukraine before the conflict.

Table 1: Comparative Manpower Strength of Russian and Ukrainian forces[17]

Military Manpower	Russia	Ukraine
Active Army	280,000	125,600
Active Air Force	165,000	35,000
Active Navy	150,000	15,000
Air Borne Forces	45,000	20,000
Strategic Rocket Forces	50,000	N/A
Special Operation Forces	1,000	1000
Command and Support Forces	209,000	N/A
Total Active Force	900,000	196,600
Paramilitary and Reserve Forces	2,760,000	1,002,000

The Russian army, despite being predominately equipped with Soviet-origin equipment, had a significant advantage over the Ukrainian army. The forward formations of Russian forces were structured around modernized tanks, armored vehicles, artillery, and mobile air defense systems. It was generally believed that with sheer numerical strength and moderately modernized combat capabilities, Russia would secure dominance over Ukrainian forces in quick succession.

16 "Behind the Lines of Kyiv Territorial Defence Force," *Global News*, April 2, 2022. https://globalnews.ca/news/8727949/behind-the-lines-kyiv-territorial-defence-force-ukraine/.

17 International Institute for Strategic Studies (IISS). *The Military Balance 2022.* 2022, 193, 211.

Table 2: Russian and Ukrainian Land Assets Comparison[18]

Military Assets	Russian Army	Ukrainian Army
Main Battle Tanks (MBTs)	2,927	858
Infantry Fighting Vehicles (IFVs)	5,180	1,212
Armored Personnel Carriers (APCs)	6,050+	622
Artillery (Towed/SP/MRL/MOR)	4,894+	1,818
Surface to Surface Missiles (SRBM/GLCM)	150	90
SAM systems	1,520+	81+

The Russian Air Force is predominately defensive but can project power to extended ranges on a moderate scale. Although most of the Russian Air Force comprises Soviet-legacy fighter aircraft, the Russian aerospace industry has struggled to mass produce next-generation fighter aircraft like the Su-57 stealth fighter, and modern drones. However, it has upgraded its existing fleet of fighter and attack aircraft to meet modern standards. Modern combat practices like precision strike capability and network centricity of the force are, however, limited. Similarly, the fleet size of modern drones and their effective employment on the battlefield is believed to be inadequate in comparison with other modern aviation forces.

Russia employs a multi-layer air defense shield based on mobile air defense systems with varying ranges and capabilities. In parallel, Russia operates a large number of force multipliers including AEW&Cs, EW/ELINT aircrafts, and strategic bombers, which augment Russia's overall air power projection capabilities.

The Ukrainian Air Force consists of a few squadrons of basic 4th and older generation aircrafts. The force has limited beyond-visual-range combat (BVR) capability and lacks precision strike and stand-off strike capability. Though Ukraine operated the world's largest and only strategic lifter, the An-225 Mariya, its overall air life capability was also inadequate. Aerial Force multipliers like AEW&Cs and EW/ELINT aircraft were also absent. Only modern development in force was recent procurement of Bayraktar TB2 combat drones from Turkey.[19] The air defense network was moderately capable consisting of long, medium, and short-range air defenses of Soviet origin. In theory, the Russian air power enjoyed superiority over Ukrainian counterparts at the time of conflict.

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18 *The Military Balance 2022.* 194-195, 212.

19 "Ukraine Angers Russia by Buying Turkish Drones," *Bloomberg*, December 3, 2021, https://www.bloomberg.com/news/articles/2021-12-03/ukraine-

Table 3: Russian and Ukrainian Aviation Assets Comparison[20]

Aircrafts/Assets Type	Russian Air Force	Ukrainian Air Force
Fighter/Attack Aircrafts	874+	115
Bomber Aircrafts (BBR)	137	0
ISR/EW/ELINT Aircrafts	89	12
AEW&C Aircrafts	9	0
Tanker Aircrafts (TKR)	15	0
Transport Aircrafts (TPT)	448	29
Gunship Helicopters	400+	35
Transport Helicopters	333	55
SAM systems	714+	322+

The Russian Navy, split into four fleets and one flotilla, is one of the largest navies in the world. Though the majority of the Russian Navy is of Soviet vintage, it is still sufficiently capable of conducting offensive and defensive operations. Instead of decommissioning, the Russian Navy has overhauled and upgraded Soviet-era cruisers and destroyers. In recent decades, Russia has focused on developing lighter warships, including frigates and corvettes armed with modern sensors and long-range cruise missiles. The core of Russian naval strength has remained its underwater arm comprising a mix of nuclear and conventional submarines of varying capabilities.

During the Crimean crisis, Russia seized the majority of the Ukrainian surface fleet stationed in Sevastopol.[21] After this crippling loss, Ukrainian naval presence in the Black Sea practically declined to zero. Kyiv attempted to restore its naval prowess by signing deals with Turkey for Milgem-class Corvettes and TB-02 drones. The drones began delivery in 2021[22] while corvettes' deliveries are scheduled after 2023.[23] When Russia invaded Ukraine in February 2022, the Ukrainian Navy comprised a Krivak-III class frigate,[24] few gunboats and support vessels. The only considerable weapon at the disposal of Ukraine was the coast-based, domestically developed Neptune anti-ship missile system, which was

20 *The Military Balance 2022.*200-201.

21 "Crimean Crisis: Pro-Russian Seize Ukrainian Naval Base," *BBC*, March 19, 2014. https://www.bbc.com/news/world-europe-26643141.

22 "Turkey Delivers First Armed Drone to Ukrainian Navy, Much to Russia's Ire." *Defense News*, July 26, 2021, https://www.defensenews.com/unmanned/2021/07/26/turkey-delivers-first-armed-drone-to-ukraine-much-to-russias-ire/.

23 "Ukrainian Official Reveals Number of Ada Class Corvettes on Order from Turkey," *Defense News*, July 28, 2021. https://www.defensenews.com/naval/

24 "Ukraine Conflict: Ukraine Scuttles Navy's Lone Frigate." *Janes*, March 4, 2022. https://www.janes.com/defence-news/

available in limited numbers. A numeric comparison of the naval forces of both nations is given below.

Table 4: The Fleet Distribution of Russian Navy[25] and Ukrainian Navy[26] in 2022

Naval Assets	Russian Northern Fleet	Russian Pacific Fleet	Russian Baltic Fleet	Russian Black Sea Fleet	Russian Caspian Sea Flotilla	Total Russian Navy Fleet	Ukr. Navy Fleet
Aircraft carrier	1 (in refit)	0	0	0	0	1 (in refit)	0
Battlecruiser/Cruiser	2	1	0	1	0	4	0
Destroyers	5	5	1	0	0	11	0
Frigates	2	4	5	5	0	16	1
Corvettes	0	0	5	8	3	16	0
ASW Crafts/Boats	6	8	6	6	0	26	0
Missile Crafts/Boats	2	14	11	5	1	33	0
Patrol Ships	0	0	0	3	3	6	11
Mine Warfare Ships	8	10	11	10	3	42	1
Landing Ships/Crafts	8	9	13	10	9	49	2
Nuclear Submarines (SSBN/SSGN/SSN)	22 (8+5+9)	7 (3+3+1)	0	0	0	29 (11+8+10)	0
Con. Submarines	5	8	1	6	0	20	0

Russian Invasion on Ukraine

In October 2021, Russia started military deployments near Ukraine borders under the context of military exercise. On February 21st, 2022, Russian President Vladimir Putin unilaterally recognized Donetsk People's Republic and Luhansk's People's Republic as independent states.[27] By that

25 *The Military Balance 2022.*195-206.

26 *Ibid.,* 212-213.

27 "Ukraine: Putin Announces Donetsk and Luhansk Recognition," *BBC*, February 21, 2022. https://www.bbc.com/news/av/world-europe-60470900.

time, Russia had amassed over 190,000 troops near Ukraine's borders.[28] Before launching the "special military operation," the Russian command believed that Ukraine would not raise much resistance, Kyiv would collapse quickly, and the fall of Kyiv would break spirit of Ukrainian forces allowing Russian forces to achieve military objectives with ease.[29] These assumptions proved defective in very early phase of conflict and a quick limited operation transformed into a multi-phase war of attrition. The conflict progression in the form of different phases has been discussed below.

Russian Invasion (February 2022 – April 2022)

On February 24, Russia initiated the military operation by launching more than a hundred missile strikes against the Ukrainian military targets.[30] The strikes were followed by the Russian ground offense from four different fronts: the northern front from Belarus towards the capital Kyiv; North-Eastern front from Belgorod towards Kharkiv; Eastern front into Donbas region; and Southern front from Crimea across the coastal belt towards Odesa in West and Mariupol in East. The Russian objective was to penetrate deeper from multiple directions and quickly capture the key population centers of Ukraine – including the capital Kyiv, to topple the current government and install a pro-Russian regime.

The Russian forces in the North, entering Ukraine from Belarus, were tasked to quickly traverse the Chernobyl Exclusion Zone and capture the Ukrainian capital, Kyiv, located merely 75 km from the border. Supported by elite units, like VDVs and spetsnaz, Russian forces reached the outskirts of Western Kyiv within days.[31] From North-West of the Dnipro River, Russian forces invaded the cities of Chernihiv and Sumy with eventual objective of assisting the capturing of Kyiv.[32] Similarly, from the Belgorod, Russia attacked the city of Kharkiv but couldn't make any considerable progress.

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28 "Russia Has Amassed up to 190,000 Troops on Ukraine Border: US Warns." *The Guardian*, February 18, 2022. https://www.theguardian.com/world/2022/feb/

29 Wasielewski, Philip, "The Evolving Political-Military Aims in the War in Ukraine After 100 Days," *Foreign Policy Research Institute*, June 2022, 2-4.

30 "Missiles Rain Down Around Ukraine," *Reuters*, February 25, 2022. https://www.reuters.com/world/

31 "Fighting Reaches Kyiv as Russian Invasion of Ukraine Intensifies," *The Guardian*, February 24, 2022, https://www.theguardian.com/world/2022/feb/25/ukraine

32 "Russia Bombards Chernihiv Hours After Pledging to Halt Shelling," *The Guardian*, March 30, 2022. https://www.theguardian.com/world/2022/mar/30/

In the South, the Russian forces breached the Ukrainian border from Crimea and made two prongs of East-West advance to seize Ukraine's shoreline. Towards the west, the Russian forces first captured Kherson[33] and then reached the outskirts of Mykolaiv city[34] before getting pushed back by Ukrainian defenses. Gradually, the Russian ground invasion in the South-West lost its momentum. In the South-West, however, Russian forces managed to capture the entire Eastern coastal belt and established a land connection with Donetsk in the Donbas. The biggest challenge on this front was to capture the Southern port city of Mariupol, which remained besieged for over a month by the Russian forces.[35]

In the Black Sea, Ukrainian naval presence was almost non-existent. The Russian Black Sea Fleet, led by cruiser *Moskva*, seized control of the strategically important Snake Island in the opening days of the conflict. While facing a naval blockade, Ukraine employed asymmetric means to challenge Russian naval dominance. On March 24, a Russian Alligator class landing ship stationed at Berdyansk was struck by a Ukrainian tactical ballistic missile.[36] The missile attack compelled Russia to move the warships to the Sevastopol naval base away from the potential strike range of Ukrainian missiles. Despite Ukrainian counter-attacks, the Russian Navy easily established sea control in the Black Sea and imposed a naval blockade on Ukraine.

In first phase of conflict, the intense Ukrainian resistance repulsed further Russian attacks and delivered heavy losses. The Ukrainian defensive strategy, termed by Michael Kofman as trading space for time, was based on orderly with-drawl of forces to population centers to compel Russians into urban warfare while attacking the Russians' vulnerable supply lines.[37] The strategy worked. Mounting casualties, logistical issues, and poor command and control stalled Russian offense, particularly in the North and the North-Eastern regions. This compelled Moscow to redefine its political objectives concerning the emerging realities on ground. On March 30th, Russia began to withdraw forces from the Northern and the North-Eastern fronts. By first week of April, Ukraine had reestablished its control over the lost territories in the Northern and the North-Eastern

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33 "Russia Says It Captures Ukrainian City of Kherson," *Reuters*, March 2, 2022. https://www.reuters.com/world/europe/russia-says-it

34 "Ukraine War in Maps: Tracking the Russian Invasion," *BBC News*, April 25, 2022. https://www.bbc.com/news/world-europe-60506682.

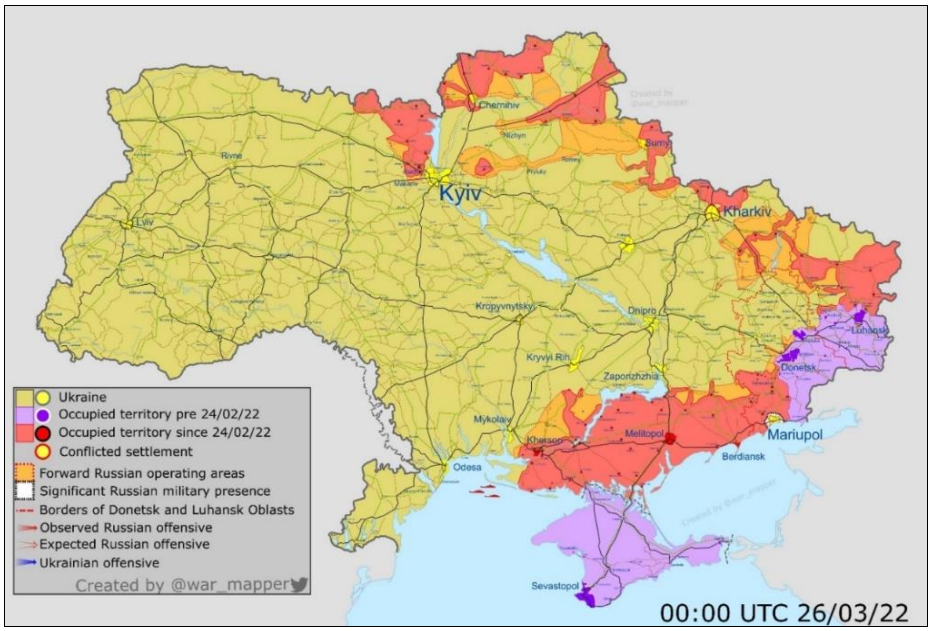
35 "Putin Claims Victory in Mariupol; Ukrainians Fighters Hold On," *Reuters*, April 21, 2022. https://www.reuters.com/world/middle-east/\

36 "In Fiery Video, Ukraine Says It Destroyed Russian Warship," *The Washington Post*, March 25, 2022. https://www.washingtonpost.com/world/2022/03/24/russian-ship-fire/.

37 Beauchamp, Zack. "Is Russia Losing?" *Vox*, March 18, 2022. https://www.vox.com/2022/3/18/

front.[38] In parallel, corresponding increment of Russian forces in the Donbass began to take place indicating the relocation of forces from North to East.

Figure 1: Approximate Situation of Russia-Ukraine Conflict during March 2022[39]



Halting of Russian Invasion (April 2022 – August 2022)

Despite shifting forces to Donbas, Russian armed forces failed to secure supremacy on battlefield. In North-West, Ukraine began to mount counter attacks to recapture the Kherson but failed to make any considerable progress. In North-West, Russian forces entered the city of Mariupol but a determined Ukrainian pocket of resistance in Azovastal Plant repeatedly repulsed Russian offenses. The city eventually fell to Russian forces.[40]

In the Black Sea, Ukraine secured the biggest victory on April 13 when it sank the flagship of the Russian Black Sea Fleet, the *Moskva* cruiser.[41] The cruiser sank after getting hit by a pair of shore-launched

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38 "Russian Forces Fully Withdrawn from Northern Ukraine;" *Forbes*, April 8, 2022,https://www.forbes.com/sites/roberthart/2022/04/08/russian-

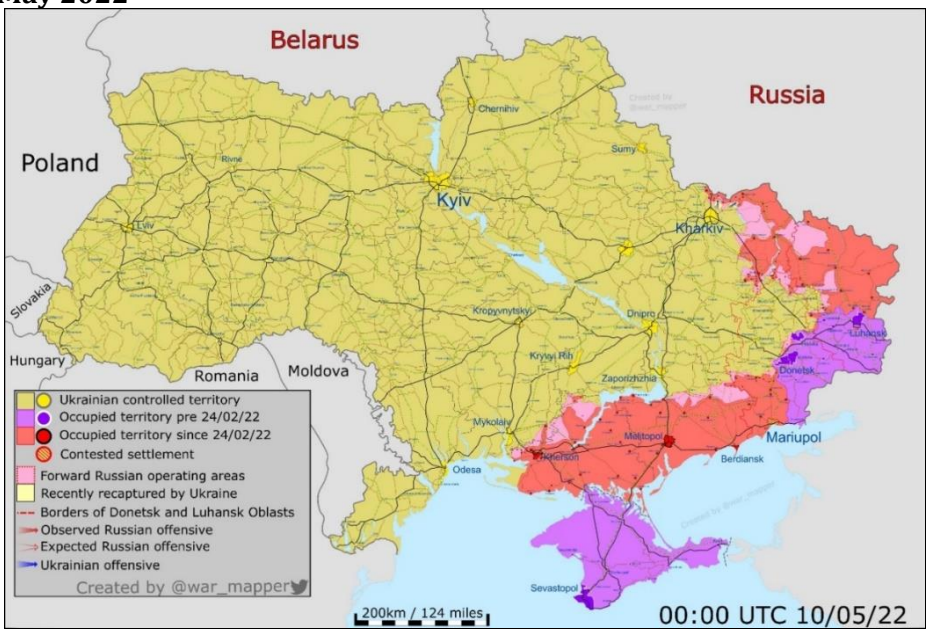
39 War Mapper (@War_Mapper). "A Map of Approximate Situation on the Ground in Ukraine." Twitter, March 26, 2022, 05:00 am. https://pbs.twimg.com/media/FhWmA5iWIAABfsy.jpg.

40 "Russia Claims Capture of Ukraine's Mariupol, Ramps up Assault in East." *Voice of America*, May 20, 2022. https://www.voanews.com/a/6582949.html.

41 "The Sinking of Moskva: What Do We Know and Why Does It Matter?" *The Guardian*, April 15, 2022. https://www.theguardian.com/world/2022/

Neptune anti-ship missiles. For Ukraine, the sinking of *Moskva* marked a remarkable feat and acted as a major morale booster. Since WW-II, *Moskva* has been the largest ship to have sunk during combat.[42] *Moskva*, with its long-range air defense missiles, was a key Russian naval asset for establishing air space denial zone over the Black Sea. The sinking of *Moskva* opened up the Black Sea to the Ukrainian air power. Russian patrol vessels and assets deployed on Snake Island came under frequent attacks by the Ukrainian TB-02 drones. The persistent losses against drones and coastal anti-ship missiles eventually compelled Moscow to abandon Snake Island by the end of June.[43]

Figure 2: Approximate Situation of Russia-Ukraine Conflict during May 2022[44]



Similarly, after losing the *Moskva* cruiser and amphibious warships, Russia also lost the capability to mount an amphibious assault on the Ukrainian western coast. Thus, for Russian forces, it became nearly impossible to reach the strategically important city of Odesa. However, Russian forces in Kherson Oblast managed to capture Kinburn Spit, which

42 "Russian Warship Sinks; Ukraine Says Its Missile Is Responsible," *Reuters*, April 15, 2022. https://www.reuters.com/world/europe/

43 "Russia Slinks Away from Snake Island: How Ukraine Won the Battle?" *Forbes*, June 30, 2022. https://www.forbes.com/sites/sebastienroblin/2022/06/30/

44 War Mapper (@War_Mapper). "A Map of Approximate Situation on the Ground in Ukraine," Twitter, May 10, 2022, 05:00 am. https://twitter.com/war_mapper/

granted Russia the strategic capability to block the transit between the Dnipro River and Black Sea.[45]

Throughout the second phase of the conflict, neither side made any decisive gain despite suffering major losses. Russia undertook an operational pause to regroup its forces and resumed its operation in the Donbas. But its progress remained sluggish, and the only considerable territorial objective it captured was the city of *Lysychansk*.[46] In West, Russian forces retained defensive position suggesting that Moscow had given up on the plan of capturing the western coast of Ukraine. The continuous supply of western arms helped Ukraine to halt further Russian offenses but failed to dislodge Russian army from occupied territories.

Ukraine's Counter-offense (September 2022 – November 2022)

The third phase of conflict began when Ukraine initiated its counter-offense in South on August 29. Throughout summer, Ukrainian leaders kept pledging to retake the Kherson oblast by launching a counter offense.[47] Before initiating the offense, Ukraine strategically targeted Russian military infrastructure, particularly ammo depots, using HIMARS to soften Russian defenses and weaken logistical support.[48] On August 08, Russia's Saki Air Base in Crimea came under attack from multiple blasts damaging multiple fighter bomber aircrafts.[49]

Before initiating counter-offense, Kyiv retained opaqueness regarding its nature, pattern, and objective. Moscow assumed that Ukraine would attack the Kherson oblast and moved additional troops and military hardware to Kherson from the North-East. However, this assumption turned out to be a deception. The Ukrainian counter-offense was a practical manifestation of Sun Tzu's words that "all warfare is based on deception."[50] The movement of troops and equipment weakened Russian

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45 "Russian Troops Liberated the Kinburn Spit, Opening the Waterway to Ochakov," *Top Power*, August 24, 2022. https://en.topwar.ru/197555-

46 "Ukraine Confirms That Russia Has Captured Eastern City Lysychansk," *BBC*, July 03, 2022. https://www.bbc.com/news/world-europe-62030051.

47 "Eyeing a City Captured by Russia, Ukraine Prepares an Ambitious Counterattack," *The New York Times*, July 28, 2022. https://www.nytimes.com/2022/07/25/world/europe/u

48 Zinets, Natalia. "Ukraine Says It Has Destroyed 50 Russian Ammunition Depots Using HIMARS," *Reuters*, July 25, 2022. https://www.reuters.com/world/europe/

49 "Satellite Pictures Show Devastation at Russian Air Base in Crimea," *Reuters*, August 11, 2022. https://www.reuters.com/world/ukraine-suggests-

50 Giles, Lionel. "The Art of War by Sun Tzu," *Classic MIT*, 2009. http://classics.mit.edu/Tzu/artwar.html.

strength in North-East. Ukraine exploited this vulnerability and on September 06, launched a surprise attack on the Kharkiv oblast.[51]

Within a few days, Ukraine swept through the Russian-occupied territories in the North and compelled Russian forces to retreat. By September 14, Ukraine had reclaimed almost 8,000 square kilometers of territory in the Kharkiv oblast.[52] By the end of September, Ukrainian forces had captured the city of Lyman – a crucial Russian logistics and rail hub for supporting its troops in Donetsk.[53]

Interestingly, Russia initially dismissed these territorial losses as a regrouping strategy. Moscow's political actions were not in synergy with ground realities. For example, while Russian forces were in retreat, Putin unilaterally annexed four Ukrainian oblasts namely Luhansk, Donetsk, Zaporizhzhia, and Kherson into Russia.[54] The annexed region, roughly 90,000 square kilometers in land, was still not in complete Russian military control and repeatedly faced partisan and direct strikes by Ukraine. The attack on the Kerch Strait Bridge - connecting Crimean Peninsula with Russian mainland - on October 08 was a prime example in this regard.[55] The degradation of supply routes through bridge further strained Russian presence in the Kherson oblast.

In parallel, Ukraine also sustained counter-offense in Kherson. Despite losing some territory in the West of the Dnipro River, Russia initially retained a defense line stretching from Mylove in the North, Snirhurivka in the East, to Kherson in the South of the Dnipro River. However, resupplying Kherson – the only provincial capital in Russian control - became increasingly difficult due to the Ukrainian force's continued attack on logistical lines. On November 09, Russia eventually announced with-drawl from Kherson (West bank of Dnipro River) without fighting a decisive battle for the city.[56] However, Russian forces still controlled the Kherson region in south and east of Dnipro River, accounting for almost 60 percent of Kherson oblast. The retreat from

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51 "Ukraine Launches Surprise Counterattack in Kharkiv Region," *The Guardian*, September 8, 2022. https://www.theguardian.com/global/2022/sep/07

52 "Ukraine Liberated 8,000 Sq. Km in North Eastern Region of Kharkiv, Says Volodymyr Zelenskyy," *CNBC*, September 14, 2022. https://www.cnbctv18.com/world/ukraine-liberated-8000

53 "Russian Troops Pull Out of Lyman as Ukraine Forces Enter," *Euronews*, October 1, 2022. https://www.euronews.com/2022/10/01/

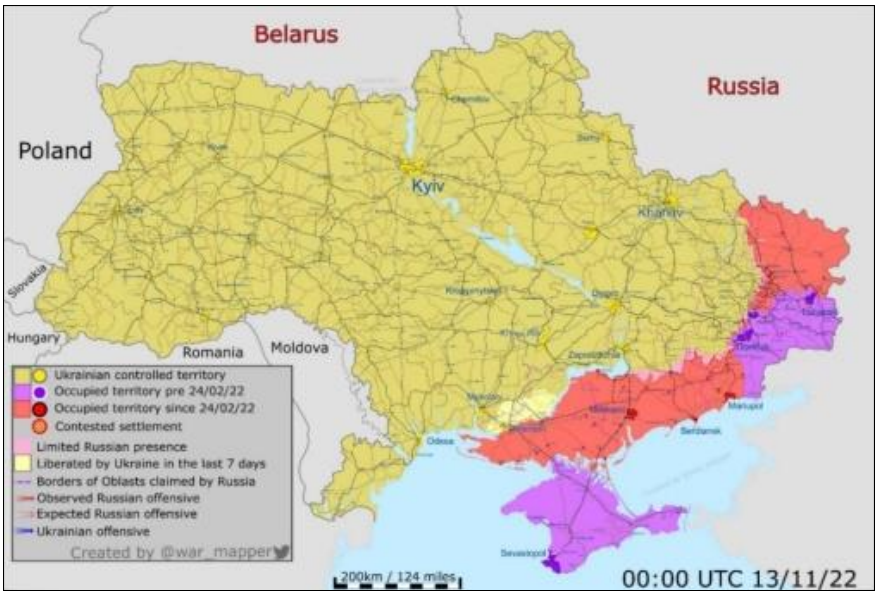
54 Harding, Luke. "Putin Annexes Four Regions of Ukraine in Major Escalation of Russia's War," *The Guardian*, September 30, 2022. https://www.theguardian.com/world/2022/sep/30/

55 "Blast on Crimean Bridge Deals Blow to Russian War Efforts in Ukraine," *New York Times*, October 8, 2022. https://www.nytimes.com/2022/10/08/world/europe/ukraine-crimea-bridge-explosion.html.

56 "Russia Says It Has Completed Its Retreat from Kherson," *Reuters*, November 11, 2022. https://www.reuters.com/world/europe/

Kherson, before the arrival of winter, marked a major defeat for Moscow as it made several key areas, including the Crimean Peninsula, vulnerable to Ukrainian rocket attacks.[57]

Figure 3: Approximate Situation of Russia-Ukraine Conflict during November 2022[58]



Ever since the liberation of Kherson, the front line has remained same with minor variations at few fronts. The war of attrition has continued and both militaries have kept striking enemy's positions with long range weapons. In February, Russia remounted offense in Eastern Ukraine to capture strategically important city of Bakhmut but failed to attain any credible success despite suffering heavy losses.[59] Currently, Kyiv is retaining pressure on Russian occupied territory across the front before launching a new major counter-offense. The offense will mark initiation of new phase of conflict and the success rate of this offense will determine the future course of Russia Ukraine War.[60]

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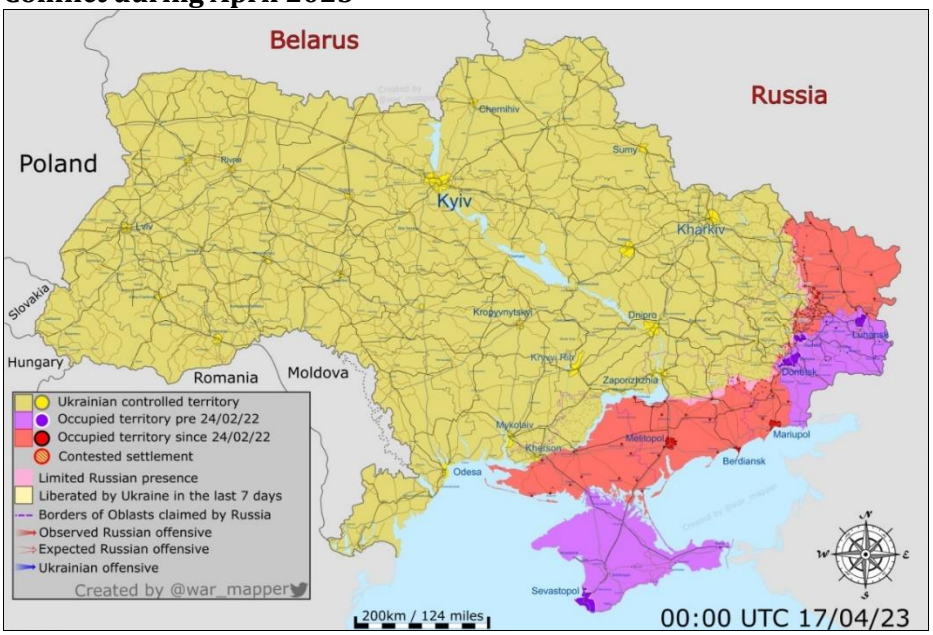
57 Lister,"Russia's Withdrawal from Kherson Is a Humiliating Setback."

58 War Mapper (@War_Mapper) "A Map of Approximate Situation on the Ground in Ukraine," Twitter, November 13, 2022, 05:16 am. https://twitter.com/War_Mapper/status/1591585876987240448/photo/1.

59 ""Ukraine War: Battle for Bakhmut 'Stabilizing'." *BBC News*, March 25, 2023. https://www.bbc.com/news/world-europe-65072173.

60 Lister, Tim. "Ukraine Is Preparing to Strike Back Again." *CNN*, April 6, 2023. https://edition.cnn.com/2023/04/06/europe/ukraine-strike-back-offensive-russia-intl/index.html.

Figure 4: Approximate Situation of Russia-Ukraine Conflict during April 2023[61]



Combat Losses of Russia and Ukraine in Conflict

Determined resistance from Ukrainian forces, Russian incompetence in planning and execution, and inadequacy of military equipment have turned the conflict into an unsustainable war of attrition. The increased volume of lethal force used by Russian forces and intensifying Ukrainian resistance has mounted the sum of causalities on both sides.

The official estimates of the office of the United Nations High Commissioner for Human Rights (OHCHR) suggest that as of April 02, 2023, more than c 8,451 civilian lives have been lost, and over 14,156 people have reportedly been injured.[62] UN, however, believes that actual figure will be far higher than current estimates. Similarly, as of March 28, 2023, almost 20 million refugees have left their homes and moved to neighboring countries.[63]

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61 War Mapper (@War_Mapper). "A Map of Approximate Situation on the Ground in Ukraine." Twitter, April 17, 2023, 05:29 am. https://twitter.com/War_Mapper/status/1647759127588773889/photo/1.

62 "Number of Civilian Casualties in Ukraine as Confirmed by OHCHR." *Statista*, April 2, 2023. https://www.statista.com/statistics/1293492/ukraine-war-casualties/.

63 "Number of Refugees from Ukraine to Neighboring Countries." *Statista*, March 28, 2023. https://www.statista.com/statistics/1293403/cee-ukrainian-refugees-by-country/.

The official sources of both sides have repeatedly claimed inflated number of enemy troops killed in action. On April 17, 2023, Ukrainian General Staff stated that over 112,470 Russian troops have been killed since the start of invasion.[64] Some sources claim that as many as 270,000 Russian troops have been killed or wounded in Ukraine.[65] Russia's last official account of war causalities was given by Russian Defense Minister, Sergey Shoigu, on September 21, 2022. He stated that 5,937 Russian and 61,207 Ukrainian troops had been killed to date.[66] Mediazona, an independent Russian media outlet, has calculated Russian military deaths to be 19,668 and the Ukrainian death toll at 14,300 as of April 06, 2023.[67] Pentagon's sources estimate Russian causalities between 189,500 - 223,000, with 35,500 – 43,000 servicemen killed in action.[68]

Table 5: Russian[69] and Ukrainian[70] Military Equipment Losses

Military Assets Type	Russian Losses (Destroyed/Damaged/ Captured)	Ukrainian Losses (Destroyed/Damaged/ Captured)
Tanks (MBTs)	1900	479
Armored Vehicles	4248	1379
Artillery (MLRS/SPA)	769	299
Air Defense Systems	122	95
Support Vehicles	2586	685
Fixed wing aircrafts	79	61
Rotary wing aircrafts	81	29
Drones	212	110
Naval Vessels	12	25

64 "Russian Military Death Toll in Ukraine Rises to 112,470." *Ukrinform*, April 17, 2023. https://www.ukrinform.net/rubric-ato/3649584-russian-military-death-toll-in-ukraine-rises-to-112470.html.

65 Axe, David. "It's Possible 270,000 Russians Have Been Killed or Wounded in Ukraine." *Forbes*, February 7, 2023. https://www.forbes.com/sites/davidaxe/2023/02/07/its-possible-270000-russians-have-been-killed-or-wounded-in-ukraine/?sh=2f6aa67c2eec.

66 "Russia Reveals Military Losses in Ukraine." *RT News*, September 21, 2022. https://www.rt.com/russia/563213-ukraine-donbass-military-losses/.

67 "Russian Casualties in Ukraine – Count Updated." *MediaZona*, April 6, 2023. https://en.zona.media/article/2022/05/11/casualties_eng.

68 "Ukraine War: Pentagon Leaks Reveal Russian Infighting over Death Toll." *BBC News*, April 14, 2023. https://www.bbc.com/news/world-europe-65260672.

69 "Documenting Russian Equipment Losses During the 2022 Russian Invasion of Ukraine," *Oryx*. https://www.oryxspioenkop.com/2022/02/

70 "Documenting Ukrainian Equipment Losses During the 2022 Russian Invasion of Ukraine," *Oryx*. https://www.oryxspioenkop.com/2022/02/attack-on-europe-documenting-ukrainian.html.

Oryx, an OSINT forum, has calculated Russian and Ukrainian military equipment losses by utilizing imaging and photographic evidence. The details of these losses are tabled above.

Analyzing Technological Failures of Russian Armed Forces

The ongoing Russian-Ukrainian conflict has exposed the limitations of Russian hard power. The mounting Russian losses, both material and mortal, can be attributed to conservative war fighting methodology, defective intelligence, inadequate training, poorly organized logistics, the rigid chain of command, poor morals, foreign military support to Ukraine, and technological limitations of Russian military equipment.[71] The technological deficiencies in Russian forces, which have played a paramount role in undermining Moscow's military objectives in initial phases of the war, deal with land, air, and naval forces. Details of a few major limitations are discussed below.

Limitations of Airpower

As discussed earlier, the Ukrainian Air Force was near obsolete and was in no position to challenge the Russian Air Force. Numerous Ukrainian aerial assets, including 1/5th of the Mig-29 fighter aircraft fleet, were destroyed on the ground by Russian pre-emptive missile strikes.[72] The world's largest cargo aircraft, An-225 Mriya, was also destroyed on the ground during the battle for Kyiv.[73] However, the Ukrainian air defense systems survived initial Russian strikes and helped in retaining air defense envelop over Ukrainian air space. The Russian Air Force performed rather limited sorties and did not undertake comprehensive operations to nullify Ukrainian air defense capabilities.[74] Thus, despite the near obliteration of the Ukrainian combat aircrafts fleet, the airspace above Ukraine has remained contested.

The lack of SEAD-DEAD (Suppression of Enemy Defense – Destruction of Enemy Defense) operations can primarily be attributed to technological limitations of Russian Air Force. In brief, there are two important requisites for conduct of successful SEAD-DEAD operations. First, dedicated Electronic Warfare (EW) suite is needed to jam or disrupt

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71 Denys Davydenko,"Lessons for the West: Russia's Military Failures in Ukraine," *European Council on Foreign Relations*, August 11, 2022. https://ecfr.eu/article/lessons-for-the-west-russias-military-failures-in-ukraine/.

72 "New Footage Shows One Fifth of Ukraine's Mig-29 Fleet Destroyed in Russian Missile Strike," *Military Watch Magazine*, February 27, 2022. https://militarywatchmagazine.com/article/new-footage-

73 "Antonov An-225 Mriya: World's Largest Plane Wrecked in Kyiv Fight," *Al Jazeera*, April 9, 2022. https://www.aljazeera.com/news/2022/4/9/

74 "Investigating Russia's Lack of SEAD/DEAD Capabilities over Ukraine," *Key Aero*, August 19, 2022. https://www.key.aero/article/

enemy's active-sensors and communications. EW suite also provides safety against hostile SAMs.[75] Second, modern munitions like Anti-Radiation Missiles (ARMs) and stand-off weapons (SOWs) are required to destroy enemy air defense assets. ARMs, equipped with passive seeker, are directed to home-in on radio emission sources like radar units and radio communication networks.[76] Similarly, fire and forget stand-off guided munitions are used for destroying SAM sites from safe distance.[77]

Unlike the U.S., which has specialized SEAD-DEAD formations, Russia treats SEAD-DEAD at the tactical level and does not employ dedicated units for these operations. Almost 30 percent of air operations by NATO in the initial conflict phase are directed to engage and destroy air defenses of the enemy.[78] In contrast, Russian doctrinal posture gives no primary importance to such operations due to technological, operational, organizational and budgetary limitations of Russian Air Force. As a result, Russian pilots lack the expertise and experience for SEAD-DEAD missions. These deficiencies undermined the air superiority efforts of Russian air power.

Besides the aforementioned limitations, Russian Air Force also has inadequate stand-off precise munitions and targeting sensors. These munitions allow accurate targeting from a safe distance and altitude. This not only adds to the high success rate of the mission but also significantly lowers the risks of exposure to enemy air defenses. The insufficiency of this capability, further degraded by the presence of Ukrainian S-300 long-range air defense systems, compelled Russian aircraft to fly at low altitudes to evade radar coverage and engage targets with unguided weapons.[79] The flight at low altitudes increases vulnerability against man-portable air defense systems (manpads). As a result, over 100 fixed and rotary wing aircrafts have been shot down by Ukrainian defenses in initial phases of conflict.[80] This subsequently led to less usage of air power which

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75 Mike Pietrucha, "The Need for SEAD: The Nature of SEAD," *War on Rocks*, May 17, 2016. https://warontherocks.com/2016/05/the-need-for-sead-part-i-the-nature-of-sead/.

76 "Does Ukraine Now Have AGM-88 Anti-Radiation Missiles?" *The Drive*, August 7, 2022. https://www.thedrive.com/the-war-zone/does-ukraine-.

77 Gunzinger, Mark. "Stand In, Standoff." *Air Force Magazine*, July 1, 2020. https://www.airforcemag.com/article/stand-in-standoff/.

78 Bronk, Justin. "Getting Serious About SEAD: European Air Forces Must Learn from the Failure of Russian Air Force over Ukraine." *RUSI*, April 6, 2022. https://rusi.org/explore-our-research/publications/rusi-defence-systems/

79 "Russian Pilots Have No Choice but to Fly Straight Through Ukraine's Man-Portable Missiles," *Forbes*, March 16, 2022. https://www.forbes.com/sites/davidaxe/2022/03/16/r

80 "List of Russian Aircraft Losses During Russian Invasion of Ukraine," *Oryx*. https://www.oryxspioenkop.com/2022/03/list-of-aircraft-losses-during-2022.html.

significantly hampered Russian combat prowess in land as well as naval domain.

Deficiencies of Ground Forces

The lack of air cover allowed Ukrainian resistance to employ asymmetric countermeasures against Russian ground forces. The high number of losses can also be attributed to several technological limitations of Russian ground forces, few of which are discussed below.

The military hardware used by Russian forces is generally non-modular and designed to perform specified tasks. Simultaneous employment of various generations of military systems complicated the command & control, operability, maintenance, and logistics. Different systems belonging to different generations of technology created compatibility issues, thus causing complications in command and control.[81]

Most of the Russian armour fleet is of Soviet vintage, as Russia has been unable to develop and mass-produce modern tanks. The top-of-line T-90A/M series is operational in limited numbers. The rest of the fleet is based on modernized versions of T-72 (T-72B3) and T-80 (T-80BVM). Despite modernization in armour, powerplant, and fire control systems, these tanks still lack credible hunter-killer capability and active protection systems. This degrades the tank's situation awareness and protection. Additionally, due to the carousel autoloader tank design, a single successful penetration in autoloader can ignite the rounds and blow up the entire tank.[82] As a result, Russian tanks became easy victims of modern anti-tank weapons like Javelin, NLAW, and Stugna-P.

Russian logistics have also proven to be a weak link in its military operations. Russia has an extensive rail network optimized for military movements. But outside Russian territory, Russian forces have to rely on trucks columns for maintaining the supply line. In initial phase of conflict, the deeper penetration of Russian forces overstretched their logistical lines. Ukrainian forces targeted the vulnerable truck columns and ground lines of communications to disrupt supply connectivity with Russian forces. Resulting ammo, fuel, and food shortages compelled Russian troops to abandon their vehicles and other equipment.[83]

Additionally, Russia is overwhelmingly dependent on land-based artillery for fire support. In contrast to NATO, which emphasizes the

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81 Michal Fiszer, "Why Are Russian Forces Fighting in Ukraine So Primitive?" *Discourse Magazine*, May 31, 2022. https://www.discoursemagazine.com/

82 "Why Do Russian Tanks Explode Violently When Hit?" *Forbes*, April 1, 2022. https://www.forbes.com/sites/davidhambling/

83 Denys Davydenko, "Lessons for the West: Russia's Military Failures in Ukraine," *European Council on Foreign Relations*, August 11, 2022. https://ecfr.eu/article/lessons-for-the-west-russias-military-failures-in-ukraine/.

relatively precise use of high explosives, the Russian military relies on mass firepower to overcome fortified defenses. Though abundant in number, Russian artillery is mediocre at best and lacks range and precision. This is why Russian artillery strikes have been poorly directed and not agile enough to do effective counterbattery fights. To compensate for these capability gaps, Russia has relied on mass firepower, burdening logistics even further.[84]

Similarly, network centricity is an essential component of modern war-fighting. However, Russian forces, with few exceptions, have been unable to demonstrate any credible network-centric capability. There has been little evidence of Russian forces' usage of computerized data exchange and digital mapping. Moreover, the efficiency of Russia's intelligence, surveillance, and reconnaissance (ISR) capabilities has remained questionable. Once perceived as a dominant power in the electromagnetic spectrum, the Russian army is yet to demonstrate its perceived electronic warfare (EW) capability.[85]

Shortcomings in the Naval Front

Considering the force disparity between the Ukrainian Navy and the Russia Black Sea Fleet, Russian naval superiority in Black Sea was highly anticipated. Regardless of limitations in the naval front, Ukrainian forces threatened Russian naval forces with asymmetric measures consisting of drones and shore-based missiles. Although Russian Navy successfully imposed naval blockade in initial phase of conflict and conducted several cruise missile strikes against targets in Ukraine,[86] but it failed to retain its dominance in Black Sea, lost control of Snake Island, and was also unable to launch amphibious operations across Ukrainian coastline.

The increment in the number of drone strikes against Russian vessels has demonstrated how the northern Black Sea became a safer place for Ukrainian air power after the sinking of the *Moskva* cruiser.

A distinctive feature of conflict in the Black Sea has been the employment of aerial drones in naval combat. Instead of relying on traditional means, TB02 UCAV earned a reputation as a weapon of choice for the Ukrainian navy to counter Russian naval dominance. However, TB02 does not carry anti-ship missiles and is only equipped with laser-guided micro munitions. However, lower radar signature and high

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84 Jack Watling,"Russia's Underperforming Military Capability May Be Key to Its Downfall." *The Guardian*, September 18, 2022. https://www.theguardian.com/world/2022/

85 Tanmay Kadam,"Russian Electronic Warfare Capability Exposed in Ukraine War." *The Asian Times*, April 18, 2022. https://eurasiantimes.com/russia

86 "Russia Launches Kalibr Cruise Missiles on Ukraine from the Black Sea," *Navy Recognition*, September 12, 2022, https://www.navyrecognition.com/index.php/naval-news/naval-news-archive/2022/september/

endurance allow TB02s to be utilized for over-the-horizon (OTH) sensor coverage for ISR duties. These characteristics of TB02 augmented the capabilities of other conventional assets, as is evident in the sinking of the *Moskva* cruiser and *Vasily Bukh* rescue tugboat.[87] Besides acting as a force multiplier, TB02 also directly engaged numerous targets in the Black Sea and destroyed several patrol vessels.[88]

Since Turkey has closed the Dardanelles and Bosporus straits to warships under the Montreux Convention (1936),[89] Russia can no longer send surface combatants to fill up the losses of its Black Sea Fleet. These losses have undermined Russian ambitions of launching an amphibious assault at the Western coast of Ukraine, caused loss of Snake Island, and compromised Russian ability to sustain sea control in Black Sea.

As far as the naval front is concerned, losses on the Russian side can be attributed to three major reasons. First, as described earlier, air power is absent in the naval theater. Employment of air power in the naval theater would not only have secured air superiority over the Black Sea but would also have undermined Ukrainian efforts of deploying shore-based anti-ship missile systems. It would also have granted airborne ISR, which would have augmented Russian situation awareness and strike prowess by many folds.

Second, the limited air defense capability of the Black Sea Fleet allowed Ukraine to mount missile and drone attacks against Russian assets. Black Sea Fleet was overwhelmingly dependent on *Moskva* for area-defense, and once the cruiser was sunk, Russia had no credible means to thwart Ukrainian air power. The growing losses forced the Russian Navy to hastily install air defence systems on Snake Island and to rely on *Shtil-I* medium-range air defence systems on Admiral Grigorovich class frigates for protective air coverage.[90] However, this strategy did little, and the losses of Russian patrol and landing crafts against TB02 UCAVs continued.

Third, poor situation awareness, chiefly due to the absence of sufficient ISR and the outdated sensor suite of the Russian Navy, undermined Russia's ability to mount defense against surprise attacks. For example, the *Moskva* cruiser was caught off-guard due to a poor sensor suite. Despite having triple-layer air defense comprising of long-range S-300F SAMs, short-range Osa-MA SAMs, and six AK-630 CIWS (close-in

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87 "Listing Russian Equipment Destroyed by Bayraktar TB2s," *Oryx*, June 27, 2022. https://www.oryxspioenkop.com/2022/02/

88 "Ukrainian TB2 Striking Two Russian Raptor Class Assault Boats," *Naval News*, May 2, 2022. https://www.navalnews.com/naval-news/2022/05/

89 "Turkey Closes Dardanelles, Bosporus Straits to Warships," *USNI News*, February 28, 2022. https://news.usni.org/2022/02/28/

90 David Axe, "The Russian Frigate Admiral Makarov Might Be the Juiciest Target in the Black Sea," *Forbes*, May 6, 2022. https://www.forbes.com/sites/davidaxe/2022/05/06/

weapon systems),[91] it was still unable to timely detect and intercept the upcoming sea skimming subsonic missiles.

Fourth, although Ukraine has pre-dominantly established sea-denial envelopes in the Northern and Western regions of the Black Sea, Russia's Black Sea fleet still retains the capability to effectively engage Ukrainian targets with cruise missiles. However, with a limited stockpile of sea-launched cruise missiles and no other low-end guided weapon at its disposal, the Black Sea Fleet can neither provide sustained firepower nor engage against low-tier threats at long ranges. Therefore, a sufficient arsenal of cruise missiles and a diversity of guided weapons is crucial for engaging multi-spectrum threats. This is the reason that the employment of asymmetric tactics by Ukraine, primarily based on coastal missile batteries, mines, and drones, has successfully pushed the Russian navy from the North-Western Black Sea to the naval base of Sevastopol and the shores of the Russian mainland.

Western Military Support to Ukraine

In the initial phase of the conflict, the U.S. and its allies were reluctant to provide any significant military support to Ukraine. Initially, U.S., UK, Germany and Sweden supplied man-portable weapons like anti-tank guided missiles (ATGMs), including Javelin and N-LAW, and man-portable air-defense systems (MANPADS) like Stinger and Starstreak.[92] This allowed Ukrainian forces to target low flying aircraft and armoured vehicles with precision. The enhanced lethality of these weapons allowed Ukrainian forces to slow down or halt Russian advance at various fronts in the initial phase of the war.

As the Ukrainian resistance succeeded in repelling Russian offense, the Western stance towards providence of military support also changed substantially. When Ukraine began to prepare counter-attack after halting Russian offense, Western nations decided to supply heavy weapons to Ukraine.

United States, Germany, United Kingdom delivered modern tanks including Abram M1, Leopard 2A6, Challenger 2 MBTs, and armoured fighting vehicles including Bradley IFV, Stryker AFV, and Warrior IFV.[93] United States also provided armoured vehicles (200 M-113 APCs, hundreds of Humvees), towed howitzers (126x M-777 ULH with Excalibur GPS guided rounds), guided rocket systems (HIMARS), NASAMS air defense systems, 20 Mi-17V5 helicopters, HARM anti-radiation missiles,

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91 David Axe, "Russian Cruiser Moskva Dominates the Black Sea." *Forbes*, January 20, 2022. https://www.forbes.com/sites/davidaxe/2022/01/20/

92 "What Weapons Have Other Countries Supplied To Ukraine?" *The Guardian*, March 17, 2022, https://www.theguardian.com/world

93 "Ukraine Weapons: What Tanks And Other Equipment Are The World Giving?" *BBC News*, Feb 22, 2023, https://www.bbc.com/

switchblade loitering munitions, recon UAVs, radar units, and supportive equipment.[94]

From United Kingdom, Ukraine received armored vehicles (40x CVR-T AFV, 80x Husky IMVs, and Mastiff MRAPs), 105mm towed artillery (50x L118/119), 155mm self-propelled artillery (20x M109A4), rocket artillery (3x M270B1), mobile air defense system (Stromer HVM), and Brimstone missiles in initial phases of war.[95] Germany gave 155mm self-propelled artillery (PzH-2000 SPA), M-270 MLRS, Gepard air defense artillery and one battery of IRIS-T SLM air defense system to Ukraine.[96] Turkey supplied more than dozen Bayraktar TB-02 armed drones to Ukraine,[97] and hundreds of armored vehicles.[98] Czech Republic supplied Soviet era heavy weapons including dozens of T-72M1 tanks, armored vehicles, and towed, self-propelled and rocket artillery to Ukraine.[99] Poland provided more than 230 T-72 M/M1R tanks alongside armored vehicles and artillery.[100] Slovakia sold 8 units of 155mm Zurzana self-propelled artillery and one battery of S-300PMU air defense system.[101]

Australia,[102] Canada,[103] France,[104] Italy,[105] Portugal,[106] Netherlands[107] and Norway[108] also supplied armored vehicles and 155mm

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94 "Weapons to Ukraine: Which Countries Have Sent What?" *Aljazeera*, June 05, 2022, https://www.aljazeera.com/news/2022/6/5

95 "UK Confirms Supply Of Vehicles, Drones And Anti-Tank Weapons To Ukraine," *Reuters,* April 23, 2022, https://www.reuters.com/world/europe/uk-

96 "Germany Steps up Weapons Aid to Ukraine," *Radio Free Europe*, May 06, 2022, https://www.rferl.org/a/ukraine-germany-supplying-howitzers-antiaircraft/31837562.html; also see, "Germany To Supply Modern IRIS-T Air Defense System To Ukraine," *Aljazeera*, June 01, 2022, https://www.aljazeera.com/news/2022/6/1/germany-to-send-kyiv-anti-aircraft-missiles-radar-systems

97 "What Do We Know About Ukraine's Use Of Turkish Bayraktar Drones?" *AlJazeera*, March 11, 2022, https://www.aljazeera.com/news/2022/ 3/11/

98 "Ukraine Claimed to be Provided Turkish BMC-Made Personnel Carriers," *Daily Sabah*, August 09, 2022, https://www.dailysabah.com/business/ defense/

99 "Czech Republic Sends Tanks And Infantry Fighting Vehicles To Ukraine," *Reuters*, April 5, 2022, https://www.reuters.com/world/europe/czech-republic-sends-tanks-ukraine-czech-tv-reports-2022-04-05/

100 "UK Offers Tanks To Poland In Bid To Help Ukraine," *The Independent*, April 23, 2022, https://www.independent.co.uk/news/

101 "Slovakia Gives S300 Air Defense System to Ukraine," *VOA*, April 8, 2022, https://www.voanews.com/a/

102 "Australia Joins The Ukraine Bandwagon; Agrees To Supply Heavy Weapons To Kiev To Battle Russia," *The Eurasian Times*, April 28, 2022, https://eurasiantimes.com

towed and self-propelled artillery units to Ukraine. Similarly, Baltic nations including Estonia, Lithuania, and Latvia, also donated military equipment to Ukraine.[109] Numerous air defense batteries with varying ranges and capabilities were transferred to Ukraine by Western allies. These air defense systems were crucial in denying effective employment of Russian air power and in intercepting ballistic and cruise missile threats.[110]

On the naval front, an undisclosed number of Harpoon missiles and coastal launchers were supplied by Denmark, the United Kingdom, and the United States.[111] Similarly, Sweden also provided Robot-17 coastal defense missiles to augment Ukrainian coastal defense.[112] U.S. supplied patrol boats and the undisclosed type and number of unmanned underwater vehicles (UUVs) was delivered by Germany, Belgium, and Netherlands.[113]

Capability wise, the armaments being supplied to Ukrainian forces can be split into two broad categories. First, weapons of Soviet heritage were given in large quantities from stocks of Western nations. These

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103 "Canada has sent heavy artillery and ammunition to Ukraine," *CTV News*, April 23, 2022, https://www.ctvnews.ca/canada/canada-has-sent-heavy-artillery-and-ammunition-to-ukraine-1.5872534

104 "France sending significant equipment to Ukraine to fight Russia," *Al Jazeera*, April 22, 2022, https://www.aljazeera.com/news/2022/4/22/france-sending-heavy-weapons-significant-equipment-to-ukraine

105 "Italy MULLS SENDING HOWITZER TO UKRAINE," *Politico*, June 29, 2022, https://www.politico.eu/article/italy-send-howitzer-ukraine-mark-rutte-dutch-pm/

106 "Portugal Approves Delivery To Ukraine of 15 M113 APCs and 5 M114 155mm Howitzers," *Army Recognition*, May 09, 2022, https://www.armyrecognition.com/defense_news_may_2022_global_security_

107 "The Dutch Are Sending German Armoured Howitzers To Ukraine," *Forbes*, April 21, 2022, https://www.forbes.com/sites/sebastienroblin/2022/04/21/

108 "Norway Supplies Self-Propelled Howitzers To Ukraine," *Army Technology*, June 09, 2022, https://www.army-technology.com/news/norway-m109-self-propelled-howitzers-ukraine/

109 "Weapons to Ukraine: Which Countries Have Sent What?" *Aljazeera*, June 05, 2022, https://www.aljazeera.com/news/2022/6/5/weapons-to-ukraine-which-countries-sent-what

110 "Answering the call – Heavy Weapons Supplied to Ukraine," *Oryx*, https://www.oryxspioenkop.com/2022/04/answering-call-heavy-weaponry-supplied.html

111 "Ukraine receives Harpoon missiles, says Defense Minister," *Reuters*, May 29, 2022, https://www.reuters.com/world/europe/

112 "Sweden Is Sending Robot-17 Coastal Defense Missiles To Ukraine," *The Drive*, June 02, 2022, https://www.thedrive.com/the-war-zone/

113 "Answering The Call – Heavy Weapons Supplied To Ukraine," *Oryx*, https://www.oryxspioenkop.com/2022/04/answering-call-heavy-weaponry-supplied.html

weapons were readily available and did not demand comprehensive additional training. However, these weapons offered no qualitative advantage over Russian counterparts. Second, NATO standard modern weapons offered a major qualitative edge over Russian systems but were available in limited numbers and required time-consuming additional training before deployments.

Ukrainian forces have employed Soviet-era weapons as a bulk while high-end assets have been used at key fronts. For example, HIMARS has been used to precisely hit strategically critical Russian installations situation behind the combat zone.[114] This significant military aid is in addition to the provision of intelligence support to Kyiv by U.S. and Western allies, which allowed Ukraine to keep information superiority over Russian counterparts. The continuous military support to Ukraine undermined the overall efficiency of the Russian offense and significantly strengthened Ukrainian counter-offensive capabilities. Ukraine was able to retake lost territories in Kharkiv and Kherson, and thwarted Russian navy in Black Sea, primarily due to western military support.

In sum, Western military assistance played a decisive role in enabling Ukraine to counter Russia's initial offensives by capitalizing on key Russian technological and operational shortcomings. Russia's reliance on outdated command structures, logistical inefficiencies, and vulnerability to precision strikes allowed Western-supplied military assets to maximize their effectiveness. By equipping Ukraine with advanced capabilities in firepower, surveillance, and air defense, the West helped neutralize Russian advantages in conventional warfare and disrupted their offensive momentum. This support not only strengthened Ukraine's resilience but also forced Russia into a prolonged war of attrition, highlighting the effectiveness of modern Western military technology against Russia's traditional war-fighting approach.

Conclusion

When Russia invaded Ukraine, many analysts and observers believed that the conflict would not last for more than a few weeks. Russian ambitions were to establish Ukraine as a buffer against NATO's eastward expansion. Nevertheless, Ukraine's determined resistance, and consistent support by the West turned the conflict into an unsustainable war of attrition. Despite having overwhelming conventional superiority, Russia was unable to achieve any considerable military objective in the initial phases of the war. Instead, Moscow was compelled to abruptly reshape its policies with respect to rapidly transforming battlefield situations. This proves that numeric comparison of forces does not give a precise reflection of the hard power of any military. Problems like the

[114] "Ukraine Says It Has Destroyed 50 Russian Ammunition Depot Using HIMARS," *Reuters*, July 25, 2022, https://www.reuters.com/world/europe/

economic degradation leading to subsequent military budget cuts, decline in military R&D, retaining of conservative military planning and execution process, inadequate training, abundance of outdated military equipment and inability to develop new systems for force modernization have hampered the net military capability of Russia.

Furthermore, the findings strongly support the hypothesis that technological limitations in Russian armed forces significantly contributed in degrading the efficiency of Russian hard power. Russia's inability to fully implement RMA principles—particularly in network-centric operations, precision warfare, and electronic dominance—neutralized much of its numerical and firepower superiority. In contrast, Ukraine, despite being conventionally weaker, effectively exploited RMA-driven warfare strategies through superior ISR integration, decentralized command structures, and real-time intelligence coordination with Western allies. These technological and doctrinal gaps not only weakened Russia's offensive momentum but also altered the strategic balance of the conflict.

Thus, despite paying a heavy price in terms of life and material, Russia suffered failure as far as the achievement of initially planned political and military objectives in Ukraine was concerned. The Russian military failures in the initial phase of the Russia-Ukraine war have highlighted crucial lessons for modern militaries that still rely on traditional war-fighting strategies and military equipment. The importance of modern armoured and artillery systems, long-range precise munitions, employment of niche technologies, robust supply chains, network-centricity and advanced ISR capabilities have been underscored as essential elements for success in modern conflicts. Consequently, modern militaries must evolve beyond conventional doctrines and incorporate advanced technology and adaptive strategies to remain effective in future warfare.