

# *Use of Artillery Fire Support Assets in the Attrition Approach in the Russia-Ukraine Conflict*

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**Abstract.** The armed conflict between Russia and Ukraine since February 24, 2022 does not appear to have a clear end, but to trace the possible paths of development, a better understanding of the strategy of waging war by the armed forces of both countries is needed. More detail on the attrition approach would facilitate realistic estimates of the duration of military conflict and the likely costs of artillery systems and munitions used in it.

The causes and aspects of the implementation of exhaustion and its relationship with the amount of artillery ammunition used, develop the direct dependence on the increased need for their use. The influence of post-Soviet fire support assets on the different combat use procedures applied by the Ukrainian forces and the provision of Western-style weapons of varying types and quantities indicate the reasons for the implementation of the attrition strategies.

The use of the artillery systems according to the stock method and the available amount of ammunition for them leads to the impossibility of applying their capabilities in a full profile on the battlefield to achieve the goals set by the political demands.

**Keywords:** *attrition approach, artillery, fire support, conflict between Russia and Ukraine.*

## I. INTRODUCTION

Historically, wars between states have varied in duration, influencing the outcome of each of them, regardless of the plans of the opposing sides. In this aspect of the statement is also what was indicated by the Prussian general and military theorist Carl von Clausewitz, who observed that armed conflicts are full of unpredictability, as "things happen differently from what we expected [1]".

Regardless of advances in technology, the factors of space and time remain valid today for the conduct of operations by the armed forces. For the advancing troops, the goal is to gain space as quickly as possible while the defenders try to maintain control of the territory and delay or deny further action to the attacking enemy. Therefore, any time gained is to the advantage of the defender, because the combat power of the attacker is likely to decrease over time. For the smaller country, ceding space may not lead to any advantage, but any space gained will equal time gained.

For any conflict, the type and manner of use of the armed forces and, in particular, the means of artillery fire support are relevant to the above factors. Applying their effect in conjunction with tactics, techniques and procedures affects the duration of each operation. Their application is related to the possibility of use in any weather conditions and in a prolonged time interval in a direct combination with the approaches of the operational and tactical actions of the maneuver formations, bordering on endurance and exhaustion, as a means of achieving the goals.

## II. MATERIALS AND METHODS

Various literary sources related to the initial analysis of the war in Ukraine point to the development of the situation leading to a war of attrition. The effects of which and the role of field artillery in it are the subject of research, through the separation of different triggers, consistently argued by the author, who, from the point of view of an artillery specialist with practical experience with post-Soviet guns, characteristic of the conflict and theoretically examining the problems of this type means of shooting, shows the transformation of artillery in different directions.

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The report uses a variety of scientific methods to analyze the role, functions and tasks of artillery in the conflict - scientific analysis and synthesis, argumentative analysis, analysis of individual statements. The influence of the number of artillery rounds fired, the performance of field artillery tasks, compared to the theory of fire support planning, but not least on the endurance of artillery systems in the conflict, has been studied consistently.

### III. RESULTS AND DISCUSSION

To indicate the changes in the use of artillery in the conflict, the analysis of the fighting will be dated February 24, 2022, when Russia launched a full-scale attempt to take the capital of Ukraine by invading and conquering the entire country. These actions resembled the Soviet occupation of Czechoslovakia in August 1968, as well as the takeover of Afghanistan on 27 December 1979 [2].

This so-called "special military operation" [3], [4], [5] according to some researchers failed to achieve its political goal of replacing the incumbent Ukrainian government, which the Kremlin expected to fall within four days [5], [6], but according to others, "Russia's aim was not to conquer territory [4]".

Ukraine's military strategy was initially based on defense in depth or, in some cases, mobile defense, which then shifted to the offensive. In this aspect, offensive efforts proved partially successful in the fall of 2022, as the conditions were determined by the structural shortage of personnel of the Russian forces. The impact of attrition resulted in significant combat losses, refusal to enter combat, and low morale [7]. The war in Ukraine has become a war of attrition, a major approach for both Ukraine and Russia at the tactical level, with neither side having gained much territory from Ukraine's successful offensives (defined by Jacques Baud [8] as counterattacks) in late 2022 although the number of victims has increased. In this context, John J. Mearsheimer concludes that "... the cost of an attrition strategy is always high" and "... success is relatively uncertain." from their stronger opponents [9].

More broadly, attrition is a key element of Ukraine's shift in strategy. This finding should not be surprising since its army has artillery units similar in structure to Russian forces. Neither army looks like it did at the beginning of the war, each of which has become a heterogeneous force made up of mobilized personnel, auxiliaries, foreign fighters and, in the case of Russia, mercenaries (including ex-prisoners in the private military Wagner Company) [10]. Also, even emphasized at the beginning of the conflict "continuous successes of the defense complex and the armed forces of the country in terms of putting into operation novelties in armaments and equipment in the troops, which completely changes the tactics and operational art of the Russian army" [11] have reduced to the current state of attrition strategy.

The effects of exhaustion are evident on both sides. The Ukrainian military appears incapable of executing a large-scale combined maneuver, and a key question is how quickly the Ukrainian armed forces can restore their

capability to conduct sustained operations against Russian forces. On the other hand, "Russia operates within a Clausewitzian mindset in which operational successes are used for strategic purposes. Therefore, operational strategy plays an essential role in defining what counts as a victory" [4].

In the midst of the analyzed conflict and over time, as well as the way the operation was conducted, it showed that the possibility of victory of the armed forces of Ukraine decreases significantly, due to the fact that Russia is becoming stronger in every element of power. In the context of this statement is the statement of General Christopher Cavoli, Supreme Allied Commander Europe (SACEUR) and Commander, U.S. European Command, to a US Congressional committee that "Russia's air, naval, space, digital and strategic capabilities have not suffered significant degradation during this war [4]".

Characteristic of the last months of the military conflict is that the contact line stretches over 1,000 km. [12] and affects tactics, with both sides having distributed their manpower and firepower along the entire front. Although the nature of the fighting may yet change, most signs point to a protracted war of attrition in eastern and southern Ukraine [13]. In recent months, attacks and attempted breakthroughs have occurred only in isolated parts of the battlefield. This enables the troops to entrench and systematically expand their own defensive positions, and trenches, mined areas, destroyed roads and bridges, and support from their own artillery make it almost impossible to overcome the enemy's defensive lines [12].

A claim that field artillery could play an important role in hostilities between Ukraine and Russia was published by Sam Cranny-Evans at The Royal United Services Institute just ten days before the escalation of the conflict. It analyzes the Russian way of waging war, using tactical and operational systems for indirect fire support against enemy forces, contrasting Ukraine's ability to conduct counter-battery combat as a decisive influence on the outcome of the conflict between the two countries [14].

This statement is confirmed by the way the war was conducted, where both sides made significant use of missile troops and artillery, which became the main means of fire support for ground forces due to limitations in the use of aviation [15], [16]. An important fact is that at the beginning of the war, Ukraine had over 1,000 122 mm, 152 mm and 203 mm guns and 1,680 rocket launchers, 122, 220 and 300 mm calibers, more than Great Britain, France, Italy, Spain and Poland combined, placing it as the second European artillery power after Russia [16], [17].

In the approach of attrition applied by both sides, the use of means of artillery support are the subject of research by a number of experts [2, 10, 12]. Analyzing the conflict, Franz-Stefan Gady and Michael Kofman point out that "Ukraine's preferred mode of warfare centers on the use of artillery fire in the interest of decisive and debilitating effects on the enemy combined with maneuver [10]." An example of this type of action are large conventional wars involving attrition, maneuver

and recovery. Winning a war of attrition requires a willingness to incur significant casualties and significant losses of armaments, equipment and materiel.

The war in Ukraine was characterized by extensive use of engineering equipment, various forms of offensive actions of infantry formations characteristic of mass armies, significant use of fire support and heavy losses in personnel, weapons and equipment on both sides.

During the hostilities, Ukrainian forces sought to degrade the physical, mental and morale of Russian forces by targeting critical support systems such as command and control posts and logistics storage facilities. These actions were achieved primarily through attrition tactics combined with increased artillery fire as a result of significant military support from various types of artillery systems. Such, that affected their combat use, because their availability, as well as the ammunition provided for them, varied daily.

Analysis the indicate relatively independent use of artillery systems, which is not characteristic of their combat use procedures. This leads to inefficiencies in the offensive actions of the maneuver forces against a prepared enemy defense, often with a high density of positions, because a number of literary sources, both from the post-Soviet era [18] and current ones [19, 20] point out, that the characteristic features of modern combined-arms combat include simultaneous or sequential powerful fire action along the entire depth and the entire front.

The extent of the use of the means of fire support is also evidenced by the analyses of the ammunition used for the field artillery, launchers and anti-tank means. Despite the presence of many inaccuracies and large tolerances in the data in the following lines, the hypothesis of the massive use of artillery in this conflict is confirmed.

It is an indisputable fact that at the beginning of the war, Russia had vast stockpiles of 122, 152 and 203 mm shells, as well as 122, 220 and 300 mm rocket ammunition [16] which included post-Soviet quantities, as the storage methods used (also used in the other countries of the former Warsaw Pact) allows their use in the conflict, even with increased risks of accidents.

Some reports indicate that up to 20,000-40,000 shells and rockets are fired per day by Russia [14] while the European Commission figures that in early 2023, Russia was firing between 40,000 and 50,000 artillery shells each day, and the Ukrainian fire support forces use between 5,000 and 6,000 shells to perform fire missions [21]. Expert estimates by the Estonian government point to altered figures of between 20,000 and 60,000 Russian shells and 2,000 to 7,000 Ukrainian artillery shells per day on average [22].

Various estimates of the Russian artillery fire are also given by a number of American and Ukrainian officials, the first of which indicates that the rate has dropped from 20,000 to about 5,000 per day on average, while according to Ukraine the drop is from 60,000 to 20,000 per day [23]. Estimates from another source [24] indicate an average of 4,000-7,000 artillery shells per day throughout the conflict for Ukrainian forces by the

end of 2022, while Russian rates ranged from double to quadruple the Ukrainian rate.

Analyzing that the line of contact has been almost unchanged for quite some time, which can be pointed out as a crisis and an element of exhaustion, the artillery has become the most important factor in holding this parity. Artillery requirement data is an important part of planning any operation involving fire support systems, being the key to success in solving war objectives.

The tasks of field artillery do not differ from the doctrinal concepts of both the armed forces of the Russian Federation and Ukraine [16]. This is a fact for both countries, as part of a former union (Warsaw Pact), for Russia to a greater extent, for Ukraine, as a legacy, insurmountable even after training by Western specialists. In this context, analyzing the theory of fire support planning [20], it can be determined that the targets of the post-Soviet era were determined three times more than the capabilities of the guns, as a large part of them were unobservable. Perhaps this is precisely the seed of the problem tied to the way ammunition is spent.

Both sides most likely used at the beginning of the conflict the rules for hitting single and group targets inherent in the theory of ground artillery fire. According to them, the number of munitions to hit non-observable targets is four times higher than that of visible ones. Characteristic of this type of fire attacks are the different procedures determining the method of firing at the targets. The number of batteries (platoons, guns) performing the firing task depends on the nature, importance and dimensions of the target, firing tasks, firing distance and mode of fire, as well as on the available time and conditions for performing the firing task. In such a case, the mass use of fire support (fire massing) leads to the simultaneous or sequential concentration of the most important groups and objects of the enemy or to the distribution of fire to simultaneously strike several groups or objects, leading to the indicated large amounts of ammunition expenditure for day or month.

One element of the theoretical formulation mentioned in the previous paragraph is the mode of fire of the artillery systems, the indicators of which are limited mainly by the capabilities of the cannon calculations and the material part. As it refers to the guns during firing of arbitrary duration, it is necessary to distribute the shots approximately evenly throughout the entire time of conducting fire, while after an interruption (interruptions) lasting less than 20 min, it is determined by the total time of firing, including the interruption(s). However, cannon barrels have a set lifespan that varies from manufacturer to manufacturer. In his article, Patrick Hinton [25] states that howitzer barrels have a life of between 1500-2500 rounds before needing to be replaced. I cannot agree with him, especially for the post-Soviet types, for which it is stated that at 4000 rounds the wear of the charging chamber has a variable sign, affecting the initial velocity of the projectiles (in rifled systems). However, pressing questions about reparability remain because nearly 1/3 of the artillery inventory is out

of service for maintenance and repair at any given time [25].

The aspects mentioned here have certainly determined the change in tactics and the concept of the combat use of fire support assets. The decrease in ammunition consumption is certainly influenced by the method of firing on the targets and reduced supplies, both to Russia and Ukraine. Various data indicate the use of single systems, somewhat up to two, and in extreme cases in a platoon, caused by the need to protect the forces on the one hand and a shortage of gun systems and ammunition for them on the other.

The shortage of ammunition is clearly discernible. Data on supply reduction are conflicting, but various studies on the matter [16] point to the limitations imposed.

For Ukraine, there is a serious shortage of artillery ammunition, both for post-Soviet equipment and for provided Western samples. For the first type, even if they were provided with those from the countries of the former Eastern bloc, the increased amount produced in Ukraine and other countries could not provide the needs of the artillery, and over time, however, their stocks were exhausted. Ukrainian artillery, along with the supply of Western guns, became entirely dependent on the supply of Western ammunition, mainly 155 mm cannon ammunition and 227 mm rocket ammunition. At the beginning of 2024, it turned out that the situation was becoming critical, and the Minister of Defense Rustem Umerov described the situation as "shell hunger [26]".

The European Union has pledged to deliver one million shells by March 2024, but it appears that the amount will be less than half that by the end of the year.

The United States has already provided Ukraine with over 800,000 155 mm shells [27], while Ukraine is asking for 250,000 per month [28]. Although the Pentagon believes it can expand production of 155 mm ammunition, the war has nevertheless consumed at least six years of 155 mm production [29].

For Russia, stocks of ammunition were starting to run out, and production rates were not enough, which forced the country to increase their production by about 50 times, but in addition, shells were purchased from North Korea, Egypt and Iran [16], [26].

Another direction in the current analysis is the type of artillery systems. It was pointed to the availability of Ukrainian artillery at the beginning of the conflict, but the depletion of ammunition reserves for them, combined with the approach of deterrence through the supply of arms, equipment and ammunition by the countries supporting the country, changed the nature of the artillery potential. In mid-2023, Ukraine had 14 different modifications of Western-made artillery systems in its ground forces [25]. Their main caliber is 155 mm according to the NATO standard, but not every artillery installation can use every projectile of this caliber. Guns and ammunition must be compatible. The difference in ammunition creates many opportunities to supply unsuitable ammunition because some NATO standard 155 mm guns are more compatible with some shells than others.

At the heart of the rift is the question in the ongoing war at a key geopolitical location [30]: how long can the two powers sustain the supply of said ammunition and the maintenance of artillery systems? With the answer, the need to change the tactics of using field artillery in a conflict of attrition, where fire support is one of the significant factors for its implementation, can be unambiguously determined.

#### IV. CONCLUSIONS

The continuation of hostilities between Russia and Ukraine with the use of attrition tactics by both sides inherently affects the development of the art of war. Artillery formations, as means of implementing fire support for the ground forces, are undergoing transformation in various directions.

The first of these is the massing of artillery fire as a means of achieving enemy attrition with heavy expenditure of artillery ammunition of all types and calibers, leading to wear on gun barrels and leading to ammunition supply challenges.

The second is a change in combat use depending on the available artillery systems, their type, available ammunition stocks, and the need for battlefield survivability.

The third is the resurgence of the role of artillery in armed conflict, a fact that is little dismissed but practically confirmed in the circle of military art over the years and proves that the joint action of the various components in the domains of the operational environment is a factor of application according to availability and necessity.

#### REFERENCES

- [1] C. v. Clausewitz, *On War*, Book Three, New York: Penguin Books, 1668.
- [2] F. Heisbourg, "How to End a War: Some Historical Lessons for Ukraine," *Survival, Global Politics and Strategy*, vol. 65, no. 4, Jul. 7, 2023.
- [3] Ya. Streletskiy, "Spetsialnaya voennaya operatsiya Rossii na Ukraine: Aksiologicheskiy aspekt," *Gumanitarnye, sotsialno-ekonomicheskie i obshtstvennyye nauki.*, vol. 6, June 2023. [Я. Стрелецкий, "Специальная военная операция России на Украине: Aksiologicheskiy aspekt," *Гуманитарные, социально-экономические и общественные науки.*, vol. 6, June 2023.]
- [4] J. Baud, "The Russian Art of War: How the West Led Ukraine to Defeat," Jan. 1, 2024. [Online]. Available: <https://www.thepostil.com/the-russian-art-of-war-how-the-west-led-ukraine-to-defeat/> [Accessed Feb. 7, 2024].
- [5] D. Minic, "What Does the Russian Army Think About its War in Ukraine? Criticisms, Recommendations, Adaptations," *IFRI*, vol. 44, Sept. 21, 2023.
- [6] A. Coleman, "Ukraine Crisis: Russian News Agency Deletes Victory Editorial," Feb. 28, 2022. [Online]. Available: <https://www.bbc.com/news/technology-60562240> . [Accessed Dec. 16, 2023].
- [7] R. Dalsjö, M. Jonsson and J. Norberg, "A Brutal Examination: Russian Military Capability in Light of the Ukraine War," *Survival, Global Politics and Strategy*, vol. 64, no. 3, p. 7–28, June 2022.
- [8] J. Baud, "Our Latest Interview with Jacques Baud," Sept. 1, 2022. [Online]. Available: <https://www.thepostil.com/our-latest-interview-with-jacques-baud/> . [Accessed Dec. 21, 2023].

- [9] J. Mearsheimer, *Conventional Deterrence*, NY, 1985.
- [10] F. Gady and M. Kofman, "Ukraine's Strategy of Attrition, Survival," *Survival, Global Politics and Strategy*, vol. 65, no. 2, pp. 7-22, Mar. 28, 2023.
- [11] V. Vasilev, "Realizirani ot Rusia hibridni zaplahi v sektora na sigurnostta i otbranata na Republika Bulgaria", *Veliko Tarnovo*, p. 215-220, 2023. ISSN 2367-7473. [ В. Василев, "Реализирани от Русия хибридни заплахи в сектора на сигурността и отбраната на Република България" стр. 215-220, 2023. ISSN 2367-7473.]
- [12] T. Lachan, "Okopna voyna: novata deystvitelnost na fronta v Ukrayna," [Т. Лачан, "Окопна война: новата действителност на фронта в Украйна,"] Nov. 5, 2023. [Online]. Available: <https://www.dw.com/bg/okopna-voyna-novata-dejstvitelnost-na-fronta-v-ukrajna/a-67308708> [Accessed Feb. 1, 2024].
- [13] S. Jones, R. McCabe and A. Palmer, "Ukrainian Innovation in a War of Attrition," February 2023. [Online]. Available: <https://www.csis.org/analysis/ukrainian-innovation-war-attrition> [Accessed Jan. 10, 2024].
- [14] S. Cranny-Evans, "The Role of Artillery in a War Between Russia and Ukraine.," *The Royal United Services Institute*, Feb. 14, 2022.
- [15] A. Jash, "A Litmus Test for the Future," Jan. 25, 2024. [Online]. Available: [https://www.researchgate.net/publication/377691343\\_A\\_Litmus\\_Test\\_for\\_the\\_Future\\_of\\_Artillery](https://www.researchgate.net/publication/377691343_A_Litmus_Test_for_the_Future_of_Artillery) [Accessed Feb. 8, 2024].
- [16] N. Świętochowski, "Field Artillery in the defensive war of Ukraine. Part I. Combat potential, tasks and tactics," *Scientific Journal of the Military University of Land Forces*, vol. 55, pp. 341-358, 2023.
- [17] S. Ganjiyev , S. Usmonov and A. Karimov, "Use of artillery in modern war (A brief analysis of the ukrainian conflict," *Galaxy International Interdisciplinary Research journal (GIIRJ)*, vol. 11, no. 3, March 2023.
- [18] *Taktika na artileriyata*, Sofia: Darzhavno voenno izdatelstvo, 1971. [Тактика на артилерията, София: Държавно военно издателство, 1971.]
- [19] *Tashkov i kolektiv, Taktika na mehaniziranite i tankovi formirovaniya*, Sofia, 2023. [Ташков и колектив, Тактика на механизираниите и танкови формирования, София, 2023.]
- [20] R. Chalakov, "Vliyanie na metoda za planirane na ognevata poddrzhka v operatsiite," *Sbornik dokladi ot mezhdunarodna nauchna konferentsia, Faculty of Artillery, Air Defense and Communication and Information Systems* pp. 206-212 2020 [Р. Чалъков, "Влияние на метода за планиране на огневата поддръжка в операциите," Сборник доклади от международна научна конференция, pp. 206-212, 2020. ISSN 2367-7902]
- [21] J. Rankin, "EU seals deal to supply Ukraine with a million rounds of shells," *The Guardian*, Mar. 20, 2023. [Online]. Available: <https://www.theguardian.com/world/2023/mar/20/eu-deal-supply-ukraine-ammunition> [Accessed Feb. 8, 2024].
- [22] M. R. Sahuquillo, "Ukraine Outgunnes 10 to 1 in massive artillery battle with Russia," 2023.
- [23] N. Bertrand, O. Liebermann and A. Marquardt, "Russian Artillery Fire Down Nearly 75%, US Officials Say, in Latest Sign of Struggles for Moscow," *CNN*, 10 January 2023.
- [24] C. Kube, "Russia and Ukraine Are Firing 24,000 or More Artillery Rounds a Day," *NBC News*, Nov. 10, 2022.
- [25] P. Hinton, "Lean on the Barrage: The Role of Artillery in Ukraine's Counteroffensive," *Royal United Services Institute*, Jul. 12, 2023.
- [26] V. Melkozerova and E. Hartog, "Ukraine's army is suffering artillery 'shell hunger'," *Politico*, Feb. 1, 2024.
- [27] M. Peck, "The US has given Ukraine nearly 1 million 155 mm artillery shells. Now it's looking for US companies to build more of them.," *Business Insider*, Sept. 14, 2022.
- [28] A. Bounds, "Ukraine asks EU for 250,000 artillery shells a month," *The Financial Times*, Mar. 3, 2023.
- [29] M. Cancian, "Rebuilding U.S. Inventories: Six Critical Systems," *Center for Strategic and International Studies (CSIS)*, Jan. 9, 2023.
- [30] T. Dimitrov, "Aspects in usage of unmanned surface vehicle in Ukrainian war", *Black Sea Security, Nikola Vaptsarov Naval Academy, Varna*, 2023.