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THE EFFECTIVNES OF THE USE OF DRONES IN MODERN CONFLICT

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Abstract: *We are witnessing armies participating in the conflict posting videos on social media depicting drones as cheap weapons that can effectively destroy expensive artillery pieces or tanks worth millions of dollars. Drones have transformed from performing specialized functions into one of the most important and widespread weapons on the battlefield. The deployment of smaller drones, which was inconsistent at the beginning of the war, has now become extremely organized. Almost every combat brigade has a company of attack drones, while most units have small reconnaissance drones. If we are at the beginning of the drone revolution, world politics will change dramatically in the near future. If the drone revolution is in the making, states will have to significantly revise their defense policies. Troops on the battlefield will become increasingly vulnerable and all states will have to restructure their armed forces away from expensive and complex military platforms in favor of new, less sophisticated and cheaper technologies such as drones. However, drone technology is most effective when used in conjunction with other types of weapons.*

Keywords: *drone, revolution, efectivnes, frontline*

1. INTRODUCTION

How do we remember all the wars of the 1990s, Middle East (certainly by names and abbreviations „BGM-109A Tomahawk", „MQ-1 Predator", „RQ-4 Global Hawk" or in 1991. Operation „Desert Storm" and 2003. Operation „Iraqi Freedom", the former Yugoslavia NATO aggression on the strongholds of the VRS in BiH in 1995. and the NATO aggression on the FRY in 1999.). In all of the aforementioned conflicts, in addition to classic military aviation, drones and unmanned aerial vehicles were used. The price of that weaponry at the time was available only to the great powers and big military alliances. How its starts.

The economy and air defense of the attacked country first would be exposed to all kinds of sanctions and simply had no chance of sustaining against long-term conflict with the massive deployment of sophisticated smart missiles, guided bombs and drones.

However, a change was announced from the far East at the end of the eighties of the last century, microchips, semiconductors, micro electric motors... The commercial industry of entertainment and cheap electronic cameras, the application of a new type of batteries and reliable electric motors, the development of technology for the production and processing of composite materials and its mass accessibility led to the mass production and civilian application of new aircraft that were cheap, easy to use, extremely agile, small in overall dimensions, undetectable by radars and, most importantly, there were lot of them on the market.

2. IN THE BEGINNING

The use of drones of all kinds is related to the conflict between Armenia and Azerbaijan in 2020, which ended with the victory of Azerbaijan. Without going into the tactical developments on the ground, the conflicting forces inflicted serious losses on each other using drones of various types . Drones of Russian, Turkish, Israeli, and indigenous designs performed both reconnaissance missions to support artillery use and strike missions. Unmanned aerial vehicle (UAV) and loitering munition attacks were able to destroy heavy ground units, including T-72 tanks and advanced S-300 air defenses [1]. The conflict's use of these various weapons provides important information and insights into how modern wars will employ the growing spectrum of missiles, drones, and artillery. At the end, the opponent who had more drones and unmanned aerial vehicles won the war.

The war in Ukraine began with a massive invasion of the Russian army, with hundreds of state-of-the-art tanks, armored personnel carriers, artillery dominated by VBR,

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and a mass landing of helicopters bringing special forces deep into Ukrainian territory.

In a very short time, using the network of highways, the Russians broke out in the vicinity of Kiev, Kharkov and stopped, waiting for the surrender of Kiev.

But nothing like that were happened, motivated and determined to defend themselves, the Ukrainian forces inflicted heavy losses on the Russian army and forced the columns of combat vehicles to return to their starting positions.

Since then, for almost two years the frontline doesn't move, which is more and more reminiscent of the First World War. What has changed is that pictures from the ground have started coming in, showing drones, $1,000 drones destroying radar equipment, missile systems, tanks with multimillions dollars value. Even the mighty Black Sea fleet was decimated and driven into ports by drone strikes from the sea and from the air.

3. TACTICAL DRONES – MILITARY DRONES DESIGNS

Various producers offer various types of Tactical Drones and Military Drones for emergency management and mission-critical operations. These rugged military drones are designed to meet the demanding needs of Border Security and Armed Forces and are optimal for a range of applications such as high-altitude logistics delivery, ISR, mine detection and neutralization, combat, and target decoys, among others. On the market can be found customized tactical drones based on user-specific requirements, to meet the varying demands of weight, flight altitude, payload capability, endurance, armament and ammunition integration, electro-optical features and ruggedness.

The advanced AI technologies and visual algorithms in tactical drones and tactical military drones aid intelligent mapping of defined geographical areas; detect and classify objects of interest at low light and harsh weather conditions. These cutting-edge features make tactical military drones ideal for cross-border surveillance and to gather crucial situational awareness during a conflict and gather intelligence on border activities. The rugged tactical drones are designed to transport in small SUVs and trucks and can be deployed in minutes from any terrain. These tactical military drones have a varying operational range of 3-10 km and can fly at an altitude of 1.500 m to 6.800 m, based on the payload, Electro-optical sensor specifications. [2]

Tactical military drones are equipped with advanced technology that enables them to perform a variety of functions, including surveillance, reconnaissance, target acquisition, and even weapon delivery. Producers offer Tactical military drones in a range of sizes and capabilities, from small quadcopters to large Octocopters.

The tactical drones usually come with three flight modes, Manual, fully Autonomous and pre-mapped Autonomous. The user can define the mode of flight based on perational needs in these rugged Military Drones. For instance, for periodic cross-border surveillance at a defined area, a fully autonomous mode would be ideal. However, during a conflict wherein every second is crucial, Manual or semi-autonomous operation would provide quick insights to the operator. In case of link loss (loss of connectivity with GCS) due to signal jamming or extreme weather conditions, the Auto Return Home feature aids the drones to return to the launch safely. Producers also offers Tactical Military drones for distant surveillance with a range of up to 45 km, especially with stealth capabilities.

Rugged tactical drones come with ergonomically designed, user-friendly Ground Control Stations (GCS). The multi-layered safety protocols ensure secure communication between GCS and the drones. Based on the application and use case, the GCS can be designed to have single or dual displays to provide maximum usability and operational convenience to the operator on the field.

4. ANTI TANK DRONES

The AeroVironment Switchblade is a miniature loitering munition designed by Aero Vironment and used by US Army small enough to fit in a backpack, the Switchblade launches from a tube, flies to the target area, and crashes into its target while detonating its explosive warhead. The name Switchblade comes from how the spring-loaded wings are folded inside a tube and flipped out once released.

Introduced in 2011, the original Switchblade was rebranded the Switchblade 300 after the much larger and very different Switchblade 600 anti-armor variant was unveiled in 2020. The Blackwing is unarmed variant of the Switchblade 300, was released in 2015. More than 700 Switchblade 300 drones were sent to Ukraine by the United States as part of an arms package after the 2022 beginning Russian-Ukraine conflict.

4.1 TYPICAL REPRESENTATIVE, SWITCHBLADE 300

The Switchblade 300 Block 20 is the next-generation successor to the Switchblade 300, Figure 1. Building on the Switchblade's battle-proven performance, the Switchblade Block 20 offers enhanced operational features including a high-resolution EO/IR panning camera suite, longer endurance, and a new touchscreen Fire Control Unit (FCU) allowing the operator to train, plan and execute missions with ease. Weighing just about (2-4) kg, this lightweight, miniature, precision-guided lethal missile can be deployed in less than 2 minutes via tube-launch from land, sea, or mobile platforms providing greater mission flexibility. Delivering 20-plus minutes of tactical reconnaissance, surveillance, and target acquisition (RSTA), the Switchblade 300 Block 20 provides real-time video for use against beyond-line-of-sight (BLOS) targets and its open architecture system allows it to interface with external C2 systems. Cursor-on-target GPS coordinates provide situational awareness, information collection, targeting and feature/object recognition, that together deliver the actionable

intelligence and precision firepower needed to achieve mission success across multiple domains [3].
Range: 30 km (with extended range antenna)

Endurance: 20+ min
Weight: munition 1,65 kg
AUR: 3,27 kg (Included payloads, louncher, transport bag)
Speed: Loiter 101 km/h, sprint 161 km/h

Figure 1. Drone Switchblade 300

4.2 Lancet, Russian response

The Lancet-3's airframe and distinctive dual X-wing shape (see Figure 2) are built from composite materials enabling it to have a lightweight design. The drone is stored in a case that can be carried onto the battlefield, where the drone can be unfolded at the designated launch point. A crew of two trained soldiers operate the system. The drone is then launched via a catapult system and is controlled by a ground operator. The drone can be communicated with using an antenna or a mobile ground station. A camera at the front of the drone is used for visual identification of targets and guidance in the attack. According to ZALA-Aero Group, the Lancet-3 has a purported range of roughly 40 kilometers (km) and has an advertised maximum speed of 80-110 km/hour. The drone is powered by an electric motor. The drone system carries a warhead towards the front of the UAV weighing 1-3 kg.

Figure 2. Drone Lancet

The drone system has made a dramatic impact on the battlefield and has successfully targeted and destroyed or damaged a multitude of combat systems operated by the Ukrainian armed forces, including Western supplied armored vehicles and artillery. The Lancet-3 reportedly has the ability to identify and attack targets autonomously in groups with the help of AI processing modules embedded in the drone system. Lancet drone strikes occur when reconnaissance UAVs are conducting operations, indicating that they operate in conjunction. Once the drone system has identified a target, it locks on to the target and explodes at a designated distance from the target using a rangefinder, enabling it to defeat anti-drone protection cages, which often confuse the impact fuses on other drone systems. Prior to the war in Ukraine, the Lancet had been tested in the combat theater of Syria against Turkish forces.

Newer versions of the drone, purportedly called "Product 53" or the "Izdeliye-53," can be launched from a four pneumatic tube launching system, which enables multiple next generation Lancet drones to be launched in short succession. According to the Institute for the Study of War, the Russian government claims that the new Izdeliye-53 had been used in combat missions in Ukraine, although no evidence of actual use has been found. Images of the Izdeliye-53 show that it is very similar in design to the Israeli Hero-120 loitering munition, produced by UVision. [4]

5. CONFLICT COSTS

Comparation the costs of employing various weapons against infantry and armor. Analysys shows incorporated data on the price of multiple weapons, the cost per shell, the probability of destroying the target, and the number of shots per unit required [Volodymyr Dacenko 2023.]. Furthermore comparation was done not only for the cost of utilizing various weapons but also for their efficiency. To do this, calculation was done including a cost ratio, which is derived by comparing the cost of eliminating a single target with a specific weapon – to the value of the target being destroyed.

Evaluation shows that the target cost for infantry is $60,000. This represents the average compensation for a dead or seriously wounded soldier. Comparation was done for the cost of eliminating a single target using various weapons, such as a drone with a drop-down mechanism, a heavy drone, a Switchblade 300, mortar, and artillery. Figure 3, Figure 4.

Drones dropping grenades or an FPV drone are the cheapest and most effective way of destroying enemy infantry. Utilizing a drone proves to be almost seven times less costly than using the Switchblade 300, the most expensive infantry-targeting tool in his comparison. Additionally, using drones (FPV drones or drones equipped with a drop-down mechanism) are nearly three to four times cheaper than using mortars, artillery, or heavy drones to take out infantry targets.

However, the use of mortars and artillery on group targets in open terrain dramatically increases their effectiveness. But if the infantry is in the trenches, the effectiveness of traditional military means is drastically reduced. In this case, drones can have a much greater advantage. Also, estimation was made for the average cost of destroyin an armored unit at $750,000. In this context, comparation of the FPV drone, heavy drone, Switchblade 600, ATGM Stugna, ATGM Javelin, and artillery augmented with the M982 Excalibur.

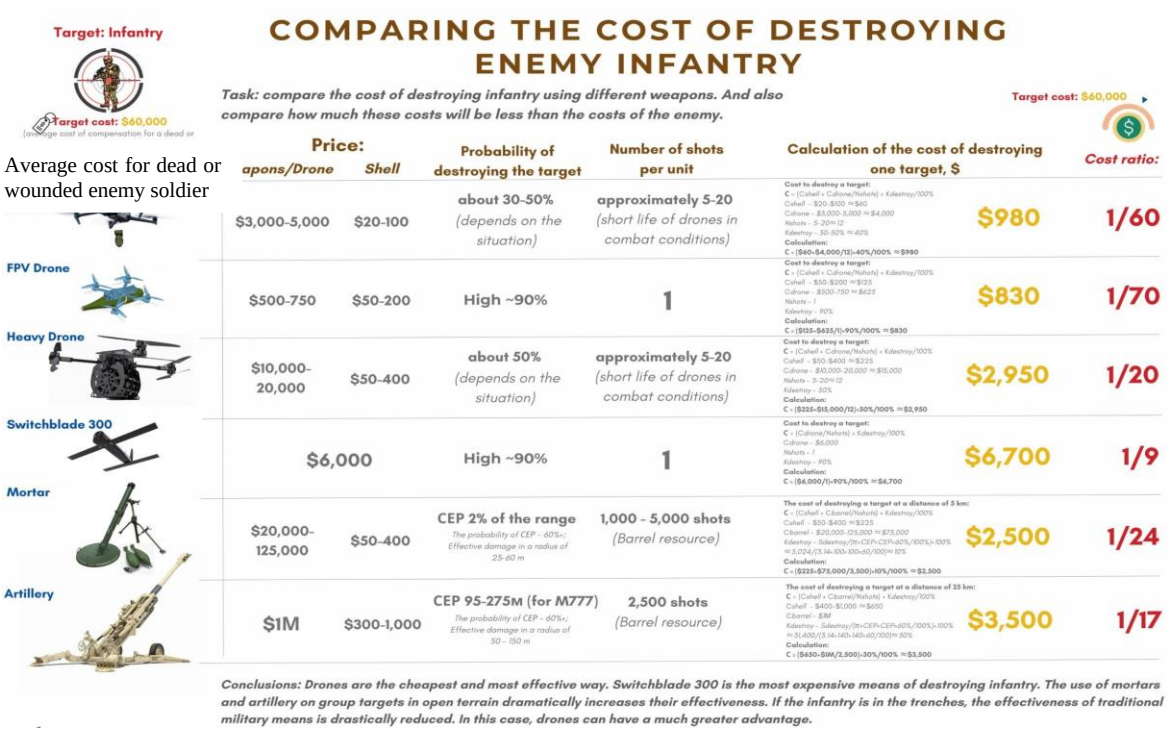

Figure 3. Cost comparasion for destroying infantry with different weapons

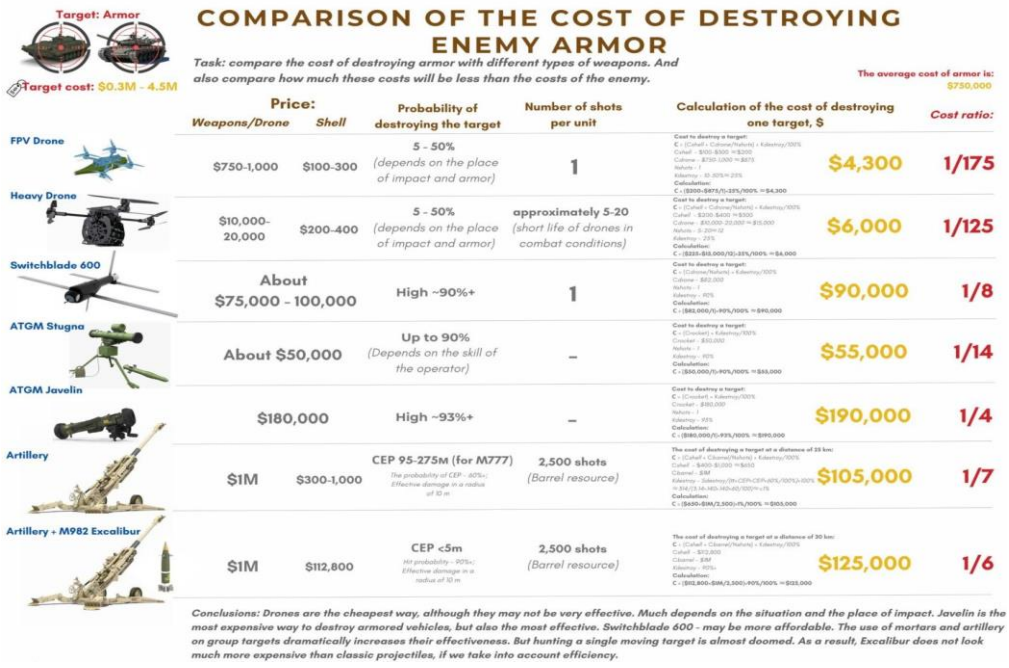

Figure 4. Cost comparison for destroying armored vehicles with different weapons

While it is recognized that drones to still be the cheapest method for eliminating a single target, they may not be very effective. Their effectiveness may vary considerably based on the terrain situation.

5.1 STUGNA-P (SKIF)

The **Skif**, also known as the **Stugna-P** or **Stuhna-P**, is a Ukrainian anti-tank guided missile (ATGM) system developed in the early 2010s by the Luch Design Bureau, a unit of UkrOboronProm. The initial guidance device PN-S (ПН-С) of the Skif was developed and manufactured by Belarusian design bureau Peleng based in Minsk.

The Skif is designed to destroy modern armored targets with combined carried or monolithic armor, including explosive reactive armor (ERA). The Skif can attack both stationary and moving targets. It can be used to attack from both long range (up to 5 km in the daytime) and close range (100 m). It can attack point targets such as weapon emplacements, lightly armored objects, and hovering helicopters. The Skif has two targeting modes: manually steered, and automated fire-and-forget that uses no manual tracking of a target, figure 5.

Figure 5. Stugna-P on tripod

The Javelin shoulder-fired anti-tank missile is the most expensive way to destroy armored vehicles, but also the most effective. The Switchblade 600 – may be more affordable. The use of mortars and artillery on group targets dramatically increases their effectiveness. But hunting a single moving target is almost doomed. In particular, it can be pointed out that Excalibur is GPS-guided and is not effective against moving targets [5]

6. CONCLUSION

Just as it was said a long time ago: "There is no such thing as a perfect kill", so „There is no almighty weapon that will solve war". From the moment when atomic weapons ceased to be the property of only one country, they lost their meaning, the fear of mutual destruction remained. World peace on earth will last as long as the fear of self-destruction lasts. When someone thinks they can win a world war, civilization will come to an end as it has so many times before.

Drones have become the hit of limited-intensity conflict in the early 21st century. War has become a game again, and drones are the enforcers of punitive measures. However, the main drawback of drones as a perfect weapon for now is its limitations in terms of the payload it can carry and the possibility of electronic jamming. When these issues are resolved, we will be able to talk about weapons that can bring victory in the war and create the conditions for the penetration of larger army groups on the front line. For now, we can say that victory in the war cannot be achieved only through use of drones.

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