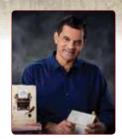*Russian tanks train in Belarus near Ukraine border-*

Lessons from the Ukrainian Battlefield

Ajay Singh

Wars, Old and New

The Economist magazine ran a very interesting cover story on the Ukraine war recently. To illustrate it, they showed the photo of a long line of tired soldiers making their way through a muddy, trench infested battlefield, pock-marked by artillery. It could have been a scene straight out of Ypres or Somme in World War I. Except for one vital difference - in the sky above, a swarm of drones hovered overhead. The image depicted tellingly the fact that though warfare has changed, it still remains more or less the same. The incessant shelling, the barbed wire and lines of trenches, the hand-to-hand fighting in cities and buildings, and the tanks lurking in the background are all scenes out of earlier wars. But the drones show how new technology dominates the battlefield. In other words, though warfare and its principles have remained the same, modern technology and concepts have added a new dimension to it.

The Ukraine war which was to be over in a week or so, has gone on for over a year and a half and will continue for some time to come. Nor has it been restricted in space. The initial Russian attacks on 24 Feb 22 took place over the entire frontage of northern and western Ukraine – an area extending 2400 kilometers. Even today, though the fighting has

subsided in the North and Northeastern regions, the front still extends over 1200 kilometers. It is not a restricted war; it is the closest Europe has come to total war since World War II. And rather than the world closing ranks to halt the Ukraine war, there seems to an active movement to prolong it by vested powers.

The battle has now degenerated into a slow attritional war, with lines of trenches and fortifications along the front lines. Here, troops hunker down as artillery rains upon them and drones peer from above. In fact, the deep battles of maneuver have taken place only once twice during this war. The first time when Russia launched an audacious airborne campaign to capture Hostomel airport, near Kyiv, which failed by a whisker - and then later by the Ukrainians during their Autumn offensive when their mechanized columns blitzed their way across 90 kilometers in just three days.

All this implies that the era of long wars is back. But if we examine closely, that era never really went away.

years have been the Arab-Israel wars of 1967 and 73; the brilliant Indian victory over Pakistan which created a new nation in just 13 days in 1971; the Falklands War and the Russian invasion of Georgia in 2008.

One of the lessons that emerged from the war, is that small compact groups often operated more successfully than large unwieldy formations. The large Russian divisions and armies often stalled and clogged at the start of the operation. The problem was compounded by the fact that their offensive did not have a central commander in the initial months, adding to the problems of coordination. The Ukrainians with their Brigade sized battle groups often performed better and with greater flexibility. Keeping a smaller force optimally sustained for longer durations was also easier.

The Drones Overhead

It is not just sophisticated, high-end technology that made the difference. Even basic, off-the-shelf equipment like drones, mobile phones and

Drones used in the Ukraine war

The US war in Afghanistan lasted twenty years, the Soviet invasion took ten; the Iran-Iraq war went on for eight. Why even the stand-off with the Chinese after Galwan has gone on for over four years now. The only short, swift and conclusive war in the past fifty

IT services acted as huge force multipliers when brought to bear on the battlefield. Around 50-100 drones hummed overhead in the Ukrainian battlefield, especially in critical areas like Bakhmut. Both sides used drones extensively, but the

Ukrainians homed on to their use as 'seeker-killers' and integrated them into "kill-chains" and "kill-webs" far more effectively. Observer drones sent images and coordinates to controllers on ground, who passed them on to a killer drone which engaged it with missiles or homed on to a designator beam on to the target.

The optimal way of using them was to interlink them with the "shooter" - either artillery batteries, tank units, missiles or other killer drones. The Ukrainians developed a unique App called KROPYVA – which the soldiers nick-named "Uber for Artillery" - in which the drone operator could simply mark the position of a target detected by a drone and the info would be instantly transmitted to the artillery unit best suited to engage it. This allowed fire to be delivered on to the target in just 2-3 minutes instead of 8-10 minutes it took earlier.

Drones proliferated down to sub-unit level and the use of hand-held drones by both sides became a virtual norm. They were also in different ways – even in mine clearance. Drones equipped with heat sensors

This Ukrainian drone unit is named Karlson after a flying character from a classic Swedish children's book, Karlsson on the Roof

were flown over suspected minefields at dawn – a time when the ground would be cold, but the mines beneath still have a higher temperature. This helped identify the mines underneath which were cleared later.

The greatest problem with drones lay in relaying back massive amounts of information via video – which required immense bandwidth and power. Small Artificial Intelligence enabled chips allowed the cameras to identify objects below as tanks, artillery systems, logistic dumps, troop concentrations, or any likely target and then send back only those images and their coordinates. This used just a few kilobytes of data and prevented the operator below from being swamped with a plethora of needless information.

Information and Cyber War

The first salvos of the war – as will be the first salvoes of any war to come – were a wave of cyber-attacks that crippled Ukraine's banking, transportation, communication and internet services. Denial of services attacks also hit the Viasat KA-SAT satellite, disrupting their telecommunications network.

The manner in which Ukraine's networks were targeted, highlights the vulnerabilities of such an attack. Can India's railways, airports, banking and communication systems be similarly disrupted by a series of cyber-attacks? The recent train accident involving three trains has been attributed to a fault in the signaling system. What if the computerized signaling systems are hacked into, leading fast moving trains onto the paths of other trains? What if the much-vaunted UPI payment gateways are hit, and banking services crippled? And if military communication systems are hacked to pass conflicting signals? Our cyber defense means have to be strengthened to identify an impending attack, block it and mitigate its effects. Else it could create havoc within the country.

It is to Ukraine's credit that they maintained communication and internet services virtually throughout the war, in spite of repeated denial of services attacks. This was largely due to the SpaceX Starlink terminals helpfully provided by Elon Musk. SpaceX provided over 20000 mobile terminals, making internet services available to even the most remote commander in the field. Commanders had access to information via hand held tablets and laptops, and became connected to a vast information network. The mobile phone itself became a weapon of war. On it the Ukrainians developed Apps - like the KROPYVA and DELTA apps - for targeting, secure

HIMARS dominated the battlefield for some time

communication and sharing of information.

Identification of mobile signals also became a vital way of targeting the enemy. Over half a dozen Russian generals were killed when they revealed their positions using mobile telephones. A missile attack on a Russian base at Makiyivka in Eastern Ukraine killed 63 soldiers in a single strike, when newly arrived conscripts used their mobiles to speak to their homes, thus giving away the location of a large concentration of troops.

The information war also contributed towards winning the battle of perception. In that, the Ukrainians were the clear winners (if not on the actual battlefield). Every media channel, every social media platform was used to convey the Ukrainian point of view – a point of view, helpfully circulated widely by western media.

The Ukrainian success in the info warfare domain

helped maintain morale on the home front. It painted a somewhat rosy picture that ensured that Western allies continued to fund and aid the war which was projected as one in which Ukraine would eventually prevail. The information campaign was also used in deception and misinformation. In August 22, while Ukraine prepared for its Autumn offensive, Zelensky announced in his nightly address to the nation, that Ukrainian forces would be launching an offensive to liberate the Southern areas. The Ukrainian Southern Command also released a series of tweets from their official web site that the offensive towards the south was starting soon. Russia pulled out troops from the North eastern sector to reinforce the South. The Ukrainian attack did follow, but it did not fall on the south as had been indicated. Rather it came in the depleted areas of the North east, where it succeeded in making rapid gains. The info warfare ruse had succeeded.

Artillery and Firepower

If anything, this war has demonstrated once again that superior firepower usually carries the day. Both sides have their doctrines based on the Soviet concepts of massed fire, and used artillery extensively. The opening months of the war were characterized by long range missile and rocket strikes on Ukrainian cities deep in the rear including Kyiv and Lyiv – the border town which received and funneled western aid. All along the battlefield, especially in the crucial battles of Mariupol, Bakhmut and Donbas, the issue was decided by firepower – and in that the Russians held a marked edge. Ukraine was outnumbered 12:1 in artillery resources of guns and ammunition. Russian artillery fired around 60,000 rounds a day in the peak of the fighting, dwarfing the Ukraine response of around 10-20,000 roads per day. That extensive consumption of ammunition has far outstripped supply. Ukraine already expends in a month, ammunition which its western allies produce in over a year. Soon, even western stocks and reserves will start running out and in this battle of attrition, the side with greater firepower resources will invariably prevail.

Precision munitions, in spite of their much higher cost proved more cost effective and provided more bang for the buck. Excalibur guided shells and GMLRS precision guided rockets fired by the HIMARS systems attained the same effect at the target end which required dozens of dumb munitions. It also reduced the logistics burden of moving and stocking hundreds of rounds. As the war progressed, Ukraine modified their munitions by inserting chips in the warhead to guide it to the target. But even precision munitions had their limits. Russia used jammers to block the GPS signals to oncoming shells deflecting them from their targets, which even reduced the effectiveness of the much-vaunted HIMARS ammunition. Increasingly, the use of jammers to deflect a precision-guided munition or pre-maturely detonate an incoming missile or drone became a favoured tactic by both sides.

Armored and Mechanized Operations

When the Russian invasion stalled in the initial months and images of armored fighting vehicles being knocked out by missiles, mines and drones began making the rounds on social media channels, the 'naysayers' were quick to darkly prophecy that "the day of the tank is over." They missed a vital point. The mechanized forces – largely the Russians - did not perform optimally in the initial days, but both sides refined their operations considerably as the war progressed.

For starters, the timing of the operation was awry. Putin launched his offensive in February when Rasputitsa, the spring thaw was setting in and the melting snow turned the ground to slush. The movement of tanks and heavy armored vehicles was thus confined to roads. They lost their prime advantage of mobility and the road bound columns were sucked into tank ambush after ambush. There were no maneuvers, just a slow, creeping plod.

As the ground hardened, tanks were used in a better manner. The Ukrainians excelled in using them in a defensive role, skillfully concentrating their limited number of tanks to launch vital counter attacks and regain lost ground. Sophisticated anti tanks weaponry like Next Generation Light Anti-Tanks Weapons (NLAWS) and Javelins with their top attack mode, helped inflict tremendous tank casualties. Combined with drones, they could identify approaching tank columns at long ranges and then ambush them with crippling missile and artillery fire.

The Russians seem to have made the initial mistake of not using all-arms teams. That was surprising, since their concept hinges around all-arms Battalion Tactical Groups. But their BTGs were usually short of matching infantry, reconnaissance resources, and most of all compatible logistics. As the war

progressed, their armored columns too used drones to scour the area ahead and clear suspected enemy positions by artillery fire or infantry attacks.

Mechanized forces were increasingly sucked in towns and built-up areas. But that will be the norm across the world, with its growing urbanization. Some innovative tactics were developed by Ukrainians to clear small towns and villages. Rather than surround the town, invest it, establish a foothold and then clear it block-by-block; they raced through the town with tanks and BMPs in a 'thunder run' firing as they moved. The tanks smashed through the town and took up positions in the rear to prevent any withdrawals. The Mechanized Infantry dismounted, captured cross roads, communication centers, radio and TV stations and other vital objectives, with their BMPS providing intimate fire support with machine guns and cannons.

The war has not seen any wide sweeps of maneuver or classical encirclements, that were seen on the same battlefields in World War II. But one noteworthy example stands out during the Ukrainian Autumn offensive. By then it had become clear that it would not be possible to conceal large tank concentrations. The Ukrainians learnt the lesson from Russian Army's mistakes. During their own offensive they first deceived the Russians by depicting actions in the South instead of their true objective in the Northeast. They deliberately pruned down their mechanized force to just two brigades to ensure they were not detected, sending a portion of their mechanized forces southwards to aid deception. Their armoured columns raced 90 kilometers deep in just three days and reached the line of the Oskil River. The following infantry (largely mechanized) cleared the towns that had been bypassed en route. In most cases, the psychological dislocation caused by this deep maneuver made the defenders upstick and withdraw virtually without a fight.

Air and Naval Aspects

One of the inexplicable mysteries of the war is why did the Russians not use their Air force better. It was expected that with their qualitative and quantitative superiority, they would gain complete control of the skies in the first few days and that would pave the way for the ground invasion.

But the Russians never fully utilized their air resources. They flew around 90 odd SU-25 ground attack fighters and did not employ their best aircraft. Complete air superiority was never attained, nor could Russian aircraft fly with impunity because of the effectiveness of the Ukrainian Air Defence.

Even the Russian naval operations seemed to come to a standstill with the sinking of the MOSKVA by two Harpoon missiles that were fired from the shore at ranges of over 90 kilometers. The Russian fleet kept a safe distance from the shore thereafter. An amphibious operation was planned for the capture of Odessa port in the first few months of the war, but was inexplicably called off at the last moment. The only amphibious operation conducted was a landing and the establishment of a beach head near Mariupol, which helped in its eventual capture. But overall, the less-than-optimal utilization of air and naval resources had a great bearing on the ground war and led to it extending interminably.

As on land, drones were used effective in the maritime domain as well. Ukraine' uncrewed surface vessels (USVs) – essentially drone boats –entered Russian waters undetected. Paired with aerial drones that passed back information, they attacked Sevastopol, the Headquarters of the Russian Black Sea fleet, an oil depot in Novorossiysk, and a ship harbored in Bosporus. These naval raids helped dilute the Russian control of the seas.

Conclusion

From the historical perspective, the Russia-Ukraine War is one of the most significant events of this century. It has changed the world as we know it and will impact power equations for decades thereafter. It can be compared to World War I of the last century, which triggered off a chain of events, leading to the Second World War, the Cold War, the nuclear arms race, the breakup of the Soviet Union and other global events long after it was over.

From the military perspective too, it has shifted the arena back to Europe and diverted attention from the main threat of China. It has also brought out that long, intense wars are here to stay – contrary to expectations – and nations should prepare for them.

Ajay Singh is the international award-winning author of six books and over 200 articles. This article has been excerpted from his latest book, "The Russia-Ukraine War"