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DRONES AS FORCE-MULTIPLIER IN FUTURE WARS

Brig (Dr) Navjot Singh Bedi (Retd)

Abstract

"War is the continuation of policy with other means".[1]

The rationale for waging a war by a nation is to ultimately to achieve its political ends and has been the practice since ancient times. Over the years, only reasons for waging wars and the method by which wars are to be waged have undergone a change. Long ago,wars were fought adhering to codified rules and practices which were adhered to. To quote few such rules / practices; fighting used to be waged only between sunrise and sunset, civilians, women, elderly and children were not to be targeted and fighting was carried out amongst adversaries of equal strength / abilities (for e.g. during Mahabharata, a Maharathi or a great warrior used to only fight against a Maharathi) and those without a weapon were not targeted.

As is the case with all things, over a period of time, dilution crept in these rules ; night attacks previously frowned upon were now acceptable with women, civilians & elderly also open to being at the end of adversaries ire. It was possibly felt that if enough civilians were killed and adequate civilian infrastructure was destroyed, there would be no one to run the production lines / factories & these could not function.

INTRODUCTION

In WW II, use of Air Power became a prominent battle winning factor. The carpet bombing carried out by Germany over UK during the Battle of

Britain and the air raid carried out by the Allies on Berlin, during World War 2 are classic examples of this. Though killing civilians and damaging infrastructure demoralizes the country and thus it affects a nation's ability to wage war, yet it has its associated moral dilemmas. The asymmetrical exploitation, adaptation & innovative use of military drones or cheaper and smaller commercial drones, by an entity against critical assets and armament platforms of a conventionally stronger adversary, has addressed this paradox. Thus now unintended collatoral damage is avoided, yet the adversary is adequately hurt and results provided in a more economical manner.

Critical technologies that have a civil & military use are prone to proliferation and this has speeded up not only the development but also the exploitation of military drones. In the Nagorno-Karabakh war (2020) **UCAVs** were used by Azerbaijan & they are also being used in the Russian Special Military Offensive in Ukraine, which is another inflection point in these rules.

As policies and rules for waging war change, armies also need to adapt themselves. In order to be battle worthy, armed forces need to modernize constantly. ***There is thus a need to optimally manage this change in the ways in which war is likely to be fought****, in order to* minimize collateral damage while employing military power. This is where drones have created a niche for themselves as will be explained in the subsequent paragraphs

FEW DRIVERS OF CHANGE

Certain drivers of change in the way wars will be fought in times to come will be **Economy, Public Opinion, Impact of Emerging Technologies &Punitive Cost of a Nuclear Strike** which incidentally are also in consonance with the ISO primary drivers of change[2] which are Economy, Society (akin to Public Opinion), Technology and Environment (which would be affected due to a nuclear strike). The emphasis on economic development and the prohibitive costs associated with wars makes the likelihood of a full-scale war & collateral damage due to unfettered freedom to use Air Power extremely remote in the present day context (the ongoing Russia –Ukraine war being an aberration). Under the overhang of nuclear weapons, war is a

no win situation because the possibility of total global annihilation cannot be wished away. No government relishes the prospect of its soldiers dying in combat and being answerable to the public for the same, as public opinion matters. Lastly, many technological developments have revolutionised the way wars will be fought. This is nowhere more apparent than in the case of use of drones to assist warfighting.

Post WW-II, a large number of conflicts have primarily been "low intensity" conflicts,[3] as these were proxy wars which were fought within a specified region. These conflicts were though fought using conventional weapons, yet these were combined with tactics used in asymmetric warfare coupled with use of high technology weapon platforms. Drones have a major role to play in this field, from being used as weapon/surveillance platforms to modes of transportation for arms/ammunition/drugs and counterfeit currency. The impact of each of these four factors, with regards to employment of drones, has been analysed in subsequent paragraphs.

Economical Factors

A full scale war brings in its wake shortages of food, petroleum, water, clothes, potable drinking water, medicines and habitat. Due to the prohibitive costs involved, for developing nations like ours, a conventional full scale war can at best be fought for ten to 15 days, before the pressure from the international community builds up. The subsequent costs and efforts of reconstruction and rehabilitation are colossal, as is being seen in Afghanistan, Iraq and Syria. So the philosophy of classical full scale war involving carpet bombing style of degradation by air needs a rethink. Drones thus not only provide a cheaper, precision targeting and less manpower intensive alternative for waging warfare to the attacker but also minimise the prohibitive costs of collateral damage to the adversary.

Public Opinion

No democratically elected government would like to receive body bags of its soldiers killed in combat and people also do not take kindly to

news of civilians/women/elderly/children being targeted. One of the major reasons for the defeat of US forces in Vietnam was that they lost the propaganda war at home! When US soldiers returned home, they were called 'Baby Killers" and the US soldiers lost the will to fight. In modern times, collateral damage (even of the adversary) is not acceptable, hence the need to look at other options to wage wars. The need of the hour is two-fold; to devise ways in which wars may be fought without physical involvement of troops and to reduce collateral damage to the adversary. This is possible by use of precision strikes using smart munitions delivered through unmanned weapon platforms or drones like 'Searcher' & 'Herons'. Drones can never replace the conventional assets of the armed forces like manned fighter aircraft, tanks and artillery but are effective force multipliers.

Nuclear Deterrence

Due to the availability of nuclear weapons with a large number of nations, a classical war is actually not an option as it is a no win situation for all concerned because the possibility of Armageddon always exists. Hence there is a need to find other smarter means of waging war, which though does not bring the world to a nuclear precipice, yet achieves the desired end result. This void is filled up by "low intensity" skirmishes/conflicts.[4] These regional conflicts are in a way proxy wars, which are fought within local regional geographical areas, using "conventional weapons," combined with asymmetric warfare tactics. Thus again we can consider precision strikes, unmanned weapon platforms (ground, ariel and marine based), smart weapons & ammunitions and robots duly aided with artificial intelligence and drones.

IMPACT OF MODERN ICT ON DRONES

Emerging modern ICT are innovations which represent **significant developments** within a field to enable credible advantage.[5] Technological growth however is of two types i.e. ***incremental or disruptive.*** Those

technologies where a new method replaces the previous technology and make it redundant are called Disruptive technologies. However **Incremental development builds upon the previous technology.** An example of the latter is the semi-automatic rifles, which were built upon bolt action rifles, which were an improvement upon the earlier flint lock and muzzle fed rifles. Drones is another example of incremental development having disruptive payoffs.

Analysts like Martin Ford argue that "*as information technology advances, machines and software begin to match and exceed the capability of workers to perform most routine jobs,*"[6] even in the realm of military. Drones are one such field where unmanned vehicle platforms enable mass surveillance, eavesdropping, security, anti- piracy ops, border patrol, hunt fugitives etc. They can also be used in carrying out an armed attack from an aerial platform. Their utility in search & rescue missions, especially in inaccessible locations is immense. Disposal of explosives & bombs is another imaginative utilisation of UAVs. Besides this, drones can enhance the efficacy of military raids and also provide a virtual presence in urban streets in an urban setting. Listed below are few other currently emerging technologies, including advances & innovations in various fields their possible military applications, especially in drones:

Emerging Technology	**Perceived / Potential Military Application**
Screen less display[7] (To include retinal display on a virtual screen, contact lens which are Bionic & Tapping a device fixed to Eye)	AR/VR, By tapping a device fixed to Eye, the wearer can reference various blue prints, in a 3 Dimensional manner; for e.g. those of a construction yard. Head mounted display & adaptive optics for next generation soldier which can give command to/ receive a feed from drones.
Flexible electronics[8, 9]	Electronic devices that are flexible & can be folded (like tablets, projection screens, smart-phones etc). Solar cells which are flexible yet lightweight can be rolled up for deployment. These help reduce the All Up Weight of drones.

Memristor[10, 11]	These can be used in electronics which are smaller yet faster. These consume lower power & are analogue storage devices & also in AI. These can help give enhanced capability & longer range to drones.
Bio-fuels[12]	These are apt for storage of energy especially in case of long range transportation requirements.
4G/5G Cellular Communications	Pervasive computing. LTE networks. Creating intelligent devices. Ideal for drones especially when operating in swarm configuration
Machine vision[13]	These can be used in controlling various processes and in Biometrics; for example in guidance of an autonomous vehicle). Also used in visual surveillance & where there is a need for human to interact with a computer for egrobot vision. Ideally suited for drone
Quantum computing[14, 15]	Enhanced computing speeds for situations which need a reduced OODA loop for quick decision making. Suited for sending commands to/receiving data from drones.
Quantum cryptography[16]	Secure communications. A force multiplier for drones.
Radio-frequency Identification[17, 18, 19]	This will especially be relevant if drones are operating in a swarm mode & in a hostile Air Defence environment.
Anti-matter weapon	This with Directed energy weapon, Electro -laser, EM weapons & Particle beam will be weapons for next generation warfare. Ideally suited to be mounted on drones. Can also be effectively used against drones.
Molecular nano-technology, nanorobotics	Machines can make anything given the materials. Drone fabrication made easier, lighter and more economical.
Swarm Robotics[20]	The intelligence potential of a swarm of robots is enhanced. Robots may also function in autonomous mode. Nano robotics is another potential use case as is operation of robots in a swarm. The behaviour of robots can also be controlled. Especially relevant for drones operating in swarm mode.

Scramjet[21, 22]	Hypersonic aircraft. May be used to enhance speed of drones if propulsion can be remotely controlled.
High Altitude Platforms	Communications. Orbiting drones may be used to as a relay platform to provide communication
Cloak of invisibility[23, 24]	Camouflage, cloaking microscope tips at optical frequencies. An invisible drone would be a tremendous force multiplier.

DRONES IN FUTURE CONVENTIONAL WARFARE

Conventional wars with massed armies supported by Air Dominance or total Air Superiority is a thing of the past. Future wars are more likely to be primarily Network Centric Wars (NCW),[25] with small task oriented forces/mission oriented teams to put boots on ground when and where required, **duly facilitated by a favourable air situation, over the desired area of operations.** NCW uses the advantage provided by information into a tactical advantage. This is achieved by networking of forces which are geographically dispersed.[26] NCW[27] operates on the premise that a 'system' is comprised of many interlinked smaller/sub systems. This is feasible with drones**,** especially when operating in a Swarm mode.

Future wars will see a predominance of sensors and unmanned platforms (both aerial, terrestrial and marine), which will be guided on to undertake precision strikes/operations, based on specific intelligence, supported by a multi-layered communication network, with built in redundancy. Human presence will be relegated to the background, controlling the operations from network control centres. Troops will be sent in to carry out the mopping up once the bulk of the opposition has been obliterated. **Ground forces and drones are also likely to be employed to carry out surgical operations/ precision strikes respectively, based on specific intelligence**. The idea of employing drones to carry out a "*Balakot type of precision air strike*" and for effective aerial border patrol with deterrence capability has immense potential and is pregnant with immense possibilities, especially in the backdrop of India likely to acquire MQ-9B HALE drones.

TASKS AND ROLES FOR DRONES IN PEACETIME AND IN WAR

Drones perform a variety of tasks throughout the world. These include Intelligence gathering, Surveillance and also Reconnaissance. Communication, Air Support & neutralisation of enemy air defences can also be assigned to drones. Target Acquisition, Post -Strike Battle Damage Assessment, Mine Detection & an aerial Radio Relay post are few other ways in which drones can be used. They can also be used as target drones, for Tactical Reconnaissance and for Correction of Artillery fire. Drones like the Hunter and Predator can carry weapons if modified to do so. UAVs can also be used as aerial Observation posts, for Surveillance of Maritime boundaries and for Border Security. Global Hawk is an example of a strategic reconnaissance high-altitude UAV.

The employment of drones is limited only by imagination. The Arab Israel war in 1973 & the Bekaa Valley battle of 1982 saw Israel using UAVs to deceive enemy SAM radars. This it did by using UAVs to simulate aircraft. Missiles were launched at the UAVs by many SAM sites. This enabled the attack aircraft to home on to these SAM sites and destroy them.

DRONES vs MANNED AIRCRAFT

In environments which are contested and where command & control may be a constraint, manned aircraft is preferred. This is because such situations entail greater autonomy in decision making. A UAV however has advantage of having no risk of fatal casualty or of being captured as it has no aircrew. Moreover the range and endurance of UAV is considerably more. Drones, like manned aircraft have also now evolved to be used for specific purposes like Air Interdiction or Reconnaissance or Air Defence etc. To perform different functions, the payload of UAV is changed and the same UCAV can be used in Peacetime or War, depending upon its payload.

DYNAMICS OF ESCALATION CONTROL OF A DRONE

A standard drone is controlled by a Ground Control Station (GCS). In a few cases (like in case of Predator UAV), till the UAV takes off, the

control is with a pilot who mans a local LOS ground station through a satellite. After take-off, the control is handed to a second pilot who is sitting in a ground station, at a Command Post, which is at another location, geographically displaced. The satellite link is used to fly the UAV mission in this way. Then for landing, control is again given back to a local station on ground. During normal peace time use, the standard procedure i.e. control by a local line-of-sight GCS could be used. This control, during times of hostilities/war could be escalated to the control through a Command Post, at another geographically displaced location, with adequate oversight.

ETHICAL AND MORAL ASPECTS OF EMPLOYMENT OF DRONES

Firstly, employment of drones for kinetic action in areas with population may cause extensive collateral damage and civilian casualties, which can be avoided by specific intelligence and precision targeting. Secondly, at times valuable intelligence may be lost when 'Seek & Destroy' type of strike mission is executed by drones. This is because it leads to elimination of the terrorist on the spot thus foreclosing the option of intelligence that one might have been able to obtain had the terrorist been captured alive. Then is the issue of Reliability of Drones'. Reportedly,crashes of the Predator drone, purely due to mechanical reasons/error, was 43 times for every 100,000 flying hours, against 02 for a typical manned aircraft crash. Last issue is whether elimination of suspected individuals is justifiable either legal grounds or on ethical issues. Though as a fallout of the 9/11 attacks, a law had been passed by the US government which enabled the President of US to use military force, if required, to pursue those who are perceived to be responsible, yet world over the jury is still out on this issue.

CONTRADICTORY VIEWS ON NCW & ITS EFFECT ON EFFICACY OF DRONES

Gen Raduege Jr, Director, DISA, said that U.S. troops in Operation OIF, "the weapon platforms used were essentially the same as those which were used

in Operation Desert Storm; the only difference being that the effectiveness of those used later in Op OIF had been considerably increased"[28] However over dependence on NCW is fraught with its own hazards as has been amply brought out by Charles Perrow, in his talk[29] on Information Assurance, delivered in NDU, in May 2003 said; "*Our incipient NCW plans may suffer defeat by [adversaries] using primitive but cagey techniques, inspired by an ideology we can neither match nor understand; or by an enemy who can knock out our vulnerable Global Positioning System or use electromagnetic pulse weapons on a limited scale, removing intelligence as we have construed it and have come to depend upon. Fighting forces accustomed to relying upon down links for information and commands would have little to fall back upon*."

Also, since NCW dwells on dissemination of information, thus the effect of misleading or misinterpreted data which may entering the system needs to be guarded against. This spurious data can enter either through deception by the enemy or by a genuine error. This is where drones will actually be tested because unlike piloted aircraft, where a highly trained pilot is making decisions based on inputs and analysing the same with his experience and gut feeling, the drone has to rely on AI, GPS coordinates and the ability of a pilot sitting at a remote location.

PROBLEM AREAS IN EMPLOYMENT OF DRONES ESPECIALLY IN HYBRID WARFARE

Though the future of conventional/non-conventional wars are likely to be shaped by extensive use of drones, duly enabled by latest tactics and technology, yet certain areas where we need to tread with caution, while adopting this approach are as listed below:-

- In the future battle field, each piece of mobile equipment as also personnel are potential sources of RF emissions. Thus, it is a herculean task to coordinate the use of frequency spectrum in a battle space. Due to the dependence of drones on data, command and PNT links, this is likely to increase in future as there will be conflicting demands from commercial telecom operators on the scarce spectrum resource. This will be even more

prominent whenever drones are expected to operate in swarm mode. Moreover EW is a very successful counter-measure and is the Achilles heel of drones.

- When operating in areas where the GPS coverage is weak, the accuracy of locational awareness is limited. It can however be overcome by fusion of positional data which is obtained from diverse number & type of sensors. In the absence of this, drones are not likely to be successful as they can be easily steered off course due to jamming/spoofing of signals, as GPS can be controlled by adversaries.
- Besides kinetic means, drones can also be targeted by lasers and high power microwave weapons. Thus future drones need to be built with some basic inherent capabilities to ward off these threats. This will in turn increase their All Up Weight, thus impacting the payload/range/cost. It is thus a trade-off between survivability, lethality, economy, complexity and capability.
- Transferring information between networks which have diverse levels of classification as regards security,is difficult. Successful key management for encryption, especially with mobile systems is a challenge. This gets compounded with the as drones need to be deployment speedily. Also, as a response to rapidly evolving situations in the battle zone, various military units/teams need to be reconfigured in quick time. Thus human intervention is required to facilitate correct and cogent decision-making regarding the nature of data which can be transferred. This can however be facilitated by security systems which are multi-layered.
- The successful use of drones like the Reaper had earlier been restricted to benign AD environments like Afghanistan, Iraq & Central Africa. Azerbaijan however used drones extensively during the Nagorno-Karabakh war in 2020 and they have also been used by both sides in the ongoing Russian Special Operation in Ukraine. The survivability of a drone in a contested air space has thus only recently been battle evaluated, post their use in active hostile environment. It has been seen that despite their losses, drones can support and even augment air power, land forces

and maritime assets because there are innovative ways in which the kill-chains of drones can be operationalised.

- Drones are however plagued by certain limitations. They are constrained by terrain, inclement weather, limitations of power, limited payload and average speed. However, their biggest asset is their cheap cost as because if one uses sophisticated and costly missiles to neutralise cheap drones, it is not an economically viable option for the defender.

CONCLUSION

Vice Admiral A. K. Cebrowski (Retd), U.S. Navy had said:

> *"At the turn of a millennium we are driven to a new era in warfare. Society has changed*[30] *and the underlying economics and technologies have changed. Now fundamental changes are affecting the very character of war. We are in the midst of a revolution in military affairs (RMA)."*

The scenario is changing dynamically and to survive in such a scenario, it's important to make strategic choices. Attrition bombing by conventional Air Force planes and massed tank columns yields decreasing returns on investment (as was seen due to the efficacy of Ukrainian tank hunting teams), reversals are possible, threat of loss of life is there and at times the outcome could be in doubt. In comparison, the RoI (Return on Investment) provided by drones is increasing, with the increase in fluidity of operations. This drastically shortens the OODA loop and effectively denies the adversary the option to adopt an alternate strategies, thus enabling success.

Massed military and commercial drones have augmented multi-domain combat capabilities & have contributed to successful offence and defence. Though the attrition of drones in contested battle zones might be high, yet their reduced costs and low risks of commercial drones (which can be repurposed), makes them an attractive option to be there in the arsenal of all militaries as well with various non state actors. Likewise it will be wise to also have in place countermeasures (especially EW measures) for drones.

Such an approach in terms of their military reforms is needed because recent advances in technology allow the US and other developed nations to engage in warfare half a world away; the drones are launched from Afghanistan but guided from the USA. In order to usher in a change, we must take a conscious decision as regards putting in the intellectual capital and earmarking requisite financial resources, as also putting in place processes and a mechanism for sufficient indigenous capacity in this field.

Brig (Dr) Navjot Singh Bedi (Retd), is a 1987 batch signal officer from NDA. He led a new Signal Regiment in J&K operations and was the Chief Signal Officer in the North East. He has held staff roles in the Army & HQ IDS, specializing in Frequency Spectrum & Emerging Technologies, including Cyber, AI, & 5G. He's authored two books and contributed to various national/international journals/ forums.

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