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The Drone Dimension of Modern Warfare & **India's Capacity Building in that Sphere**

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While drones are definitely adding a new dimension to the warfare landscape, it is highly unlikely that conventional weapon systems would lose their relevance merely because of the advent of unmanned systems. India, meanwhile, along with modernisation of its conventional warfare platforms, and acquisition of unmanned combat systems, would do well to formulate an Integrated Long Endurance Drone Development Program, for developing indigenous proficiency in drone making, on the lines of Integrated Guided Missile Development Program that has in the past given positive results and made India self-sufficient in the field of guided missile development.

Late in the evening of 25th November 2020, reports emerged that India has acquired two Predator MQ-9B Sea Guardian drones on lease from General Atomics of USA. Shrouded in secrecy, the two drones, as per reports, had arrived in India in the second week of November and were inducted for real time operations on November 21. With an endurance level that can be stretched up to 40 hours, and ability to fly at 40,000 feet, the Sea Guardian Drones, no wonder, act as a major force multiplier in the realm of reconnaissance and surveillance.

Close on the heels of Indian Navy taking possession of the 9th P8I Poseidon maritime reconnaissance and anti-submarine warfare aircraft, the combination of P8Is, Indian Navy's Dorniers, IL-38s and Herons as well as the newly inducted Sea Guardians would definitely add to Indian Navy's ability to keep a hawk-eye on the entire Indian Ocean Region as well as Arabian Sea and Bay of Bengal.

While, as per reports, the two Sea Guardian Drones have been taken on lease for a year, it is for sure that the fleet augmentation of the same is only a matter of time and that the present lot, in addition to acclimatising the Indian personnel on the machines, were also inducted on an emergency basis, given the rising tension with China. Reports also indicate that even though the systems were acquired for Indian Navy, their deployment in Ladakh cannot be ruled out either. Further, India's leasing of US made military grade drones is also an indication of the operationalisation of Basic Exchange Cooperation Agreement for Geo-Spatial Cooperation or BECA that was recently signed between India and US during the 2+2 Dialogue that was held a month back.

India's Tryst with Military Grade Drones

India's application of drones for military grade surveillance and reconnaissance is not a new thing though. The Indian Armed Forces have been using Israeli made Heron and

Searcher drones for decades now. It also has the Harop loitering munition anti-radiation drones in its arsenal. Especially, India's Israeli made Heron fleet of Medium Altitude Long Endurance (MALE) drones have been extremely effective. However, it is for the first time that India is now getting hold of US made drones.

One thing nevertheless is obvious that India, along with modernisation of its conventional warfare architecture through acquisition of new platforms in the realm of artillery, helicopters, combat crafts, assault rifles, surface to air missiles, warships, and submarines, is also now seriously considering acquisition of armed drones capable of firing missiles and guided bombs. A proposal for acquisition of thirty armed Predator drones from US is in pipeline while India is also actively considering 'Project Cheetah' under which 90 Israeli Heron drones from the existing fleet of drones of Indian Armed Forces would be upgraded with capability of launching guided missiles and bombs. While acquisition of mini drones in considerable numbers have already been taking place, it is in the realm of acquisition of medium and high-altitude combat drones that would witness considerable activities in the years to come.

How Some Recent Incidents Brought Drone Dimension of Warfare Back Into Limelight..

Efficacy of drones needs no specific elaboration. The Americans have been using armed drones to target Al Qaeda and ISIS terrorists for years now. Most major countries of the world now have a fleet of military-grade surveillance drones. However, a few major incidents over the last two years, have brought the whole issue of application of drones in modern conventional and sub-conventional warfare back to limelight with a new vigour. It has also led to scrambling by security agencies of many countries to expedite their armed drones acquisition proposals.

The September-2019 Drone Attack on Abqaiq-Khurais Oil Processing Facilities in Saudi Arab

In September 2019, the Abqaiq-Khurais oil processing facility of Saudi Aramco were attacked by a swarm of drones allegedly sent by Houthi rebels from Yemen. The drones named by Houthis as Qasef-1 had striking similarities with Ababil-T drones of Iranian origin. Surprisingly, the explosive laden drones hit the refining facilities after successfully evading the Skyguard air defence systems as well as Patriot air defence systems of Saudi Arab.

Each carrying a 30 kg payload and programmed with loitering munition architecture, the swarm of Houthi drones

showed how a cost-effective method of targeting a critical infrastructure could be activated against which some of the best air defence systems could not achieve much success. For an economy that is so very dependent on export of oil, targeting of the Abqaiq facility was not a random attack but one aimed at hitting one of the most critical economic infrastructures of Saudi Arab. It did have a considerable impact on the oil processing capability of Aramco, for few weeks to the least, and the Houthis, unfortunately created a template for other states and non-state actors, on how to hit an adversary with cost effective yet highly devastating armed drones.

Pakistan's Nefarious Design of Air-Dropping Arms Across the Borders through Chinese Made Drones

The second incident that almost happened in quick succession to the drone attack in Saudi Arab, was a new trend of Pakistan using drones to drop arms in border states like Punjab. In September 2019, it was found that Pakistan's ISI was using Chinese made drones capable of carrying a 10 kg payload, in each sortie, to drop 80 kg of arms and ammunitions in Amritsar and Tarn Taran through several sorties. The payload was meant to fuel Khalistani terror activities in Punjab. The modus operandi, as investigations later revealed, was to launch the drones from Pakistan within two kilometres from international border, and from thereon, the drones travelled for around five kilometres at an altitude of around 2000 feet.

Thereafter, the drones used to descend to a level of 1200 feet to drop off the weapons carrying payload that was usually slung from the drones with the aid of mountaineering ropes.

On quite a few occasions since then, Pakistan has attempted to use drones to drop weapons across LOC into J&K and in Punjab. With India's counter-infiltration grid along the Indo-Pakistan Border becoming more impregnable, it seems that Pakistan found the aerial route more convenient to send in weapons for orchestrating acts of terror. This has invariably alarmed India's security agencies and necessary countermeasures were expedited from thereon.

The Drone Impact on the Azerbaijan-Armenia Conflict

The third major incident that turned quite a few eyeballs across the world was that of the conflict between Azerbaijan and Armenia, a few weeks back, over the Nagorno-Karabakh dispute that witnessed extensive application of drones for offensive operations, more so by Azerbaijan. The Azeri Armed Forces had unleashed a rein of fury over the Armenian deployments using the Turkish made TB-2 drones. The TB-2 drones made by Baykar Defence of Turkey may not be of any match to the US made MQ-9 Reapers in terms of payload carrying capacity, cruising speed or weight, but still these cost-effective machines, each capable of carrying four anti-tank

guided missiles. were extremely effective in the battlefield against Armenia. In a Forbes article titled, 'The 'Magic Bullet' Drones Behind Azerbaijan's Victory Over Armenia', published in November 2020, David Hambling writes,

'By October 3, Azerbaijan already claimed to have destroyed 250 armored vehicles and a similar number of artillery pieces, plus 39 air-defense systems including an S-300 air-defense system. The destruction of air defenses is particularly significant: once these have been knocked out, the drones can pick off targets at will'.

Incidentally, Turkey's TB-2 drones were also deployed in the Syrian, Northern Iraq, and Libyan theatre. In case of Libya, the Government of National Accord or GNA had deployed Turkish TB-2 and Anka-S armed drones, while in case of Syria too, Turkey had allegedly used the drones against Syrian regime. There have also been reports of Turkey using these drones against the Kurdish insurgent groups such as PKK.

Drone Strike on Anad Base in Yemen and Alleged Drone based Assassination Attempt on Venezuelan President

In January 2019, the Houthi rebels launched a daring attack on Al Anad base of the Lahij Governorate in Aden. The attack was executed with application of Qasef drones during a military parade wherein incoming drones exploded 20 metres above

ground unleashing a downpour of shrapnels on key delegates present there to witness the parade. The attack resulted in killing six people while injuring 25 military personnel. Among those who died in the attack was Major General Mohammad Saleh Tamah, the head of Yemen's intelligence agency.

Likewise, in August 2018, while the Venezuelan President Nicolas Maduro was presiding over a military parade by the Bolivarian National Guard, a wing of the Venezuelan Armed Forces, at Avenida Bolivar in Caracas, two explosives laden drones detonated in quick succession in the vicinity of the Avenida Bolivar, triggering strong suspicion of Venezuelan President being the real target of the drones, which had perhaps missed him merely by a whisker. Later, investigations revealed that the two drones were of DJI M-600 category, which are easily available all over, and were packed with lightweight yet effective C4 grade explosives.

Both the above-mentioned incidents brought in a new dimension in the realm of threats to VIP protectees through aerial means of assassination attempts by application of drones, and which necessitates reengineering of security protocols, and making anti-drone systems a critical part of VIP protection entourage.

The Impact of the Above-Mentioned Events

The four above-mentioned incidents invariably brought the focus back to the development of both unmanned systems capabilities, as well as adequate capacity building to counter enemy drones. While there can never be any comparison between India's air defence capability vis-à-vis that of Armenia, with India having massive edge on both counts of quantitative and qualitative air-defence architecture when compared to Armenia, nevertheless, the extensive application of seemingly cost-effective drones in a real-time conflict between two sovereign states invariably hold some valuable lessons for India so far as future of warfare, limited or full-fledged, is concerned.

The concern arises primarily because it is widely anticipated that drones would henceforth be used extensively both for conventional and sub-conventional warfare, and by both state actors as well as state sponsored non-state actors. Nowhere else this is more relevant than it is in the realm of South Asian theatre. In the realm of VIP protection as well, especially for the security of the heads of states, drones definitely have become a new headache necessitating additional precautions. The bigger concern is the easy availability of quadcopters in the ecommerce market and the ease with which seemingly innocuous drones can be improvised into lethal assassination machines by loading them with explosives that can be remotely detonated.

It is also important to mention here that drones having extremely small radar cross section signatures, make it challenging for conventional radars associated with air defence systems to identify them as enemy platforms. Often, they are mistaken as birds thereby giving the incoming drones the opportunity to bypass such systems and execute their missions.

Pakistan's Drone Acquisition Program: A Headache for India

Reports of the recent past indicate that Pakistan is in the process of acquiring a limited number of armed drones from China. The Wing Loong II is a Medium Altitude Long Endurance (MALE) Unmanned Combat Aerial Vehicle (UCAV) made by Chengdu Aircraft Industry of China. Ostensibly supplied by China to Pakistan for security of China Pakistan Economic Corridor (CPEC), as well as the Gwadar Port, the possibility of Pakistan also deploying the same for anti-India activities cannot be ruled out. Especially, against the backdrop of the Sino-Indian face-off in Eastern Ladakh where China was apparently taken aback by India's resilience and mirror deployment of armed forces to match Chinese presence, the possibility of China instigating Pakistan to do something nefarious is always an open option and the chances of use of drones in the same cannot be ruled out either. Further, reports also indicate that China may coproduce 48 GJ-2 armed

drones with Pakistan for use by Pakistan Armed Forces. Also, it is only a matter of time before Pakistan possibly acquires the TB-2 drones from Turkey.

The Challenge for India

Against this backdrop, the challenge for India is not just the augmentation of UCAV fleet of Pakistan but also one cannot rule out the possibility of Pakistan's state backed non-state actors using armed drones to attempt an Abqaiq-Khurais kind of attack on India's critical infrastructures. The reason being that terror organisations across the world have shown a penchant to target critical economic infrastructures of a nation that may hurt the nation's economy in the most profound manner and debilitate its ability to keep the economy running seamlessly. The attack on the Abqaiq-Khurais oil processing facility as well as previous attacks on critical installations by some of the most vicious non-state actors have vindicated the importance of securing critical installations.

The Need for a Critical Infrastructure Protection Act

While India's lead agency for protection of critical infrastructure, namely Central Industrial Security Force (CISF) is now gradually getting prepared for dealing with the menace of rogue drones, especially in the vicinity of critical infrastructures, including airports, India may need to have a

new set of critical infrastructure protection protocols preferably through enactment of a Critical Infrastructure Protection Act. While many of the states are following the CISF template to create their own industrial security forces for securing critical infrastructures in respective states, in this game of cat and mouse, there is a perpetual need for improving the Standard Operating Procedures (SOPs) all the time.

The Challenge from China's Rapidly Increasing Drone Arsenal

What also needs to be kept in mind are the strides made by China in terms of development of high altitude and medium altitude drones and the threat they pose for India. China's armed forces apparently seem to be in possession of BZK-005, GJ-1 and GJ-2 drones in the Medium Altitude Long Endurance (MALE) category, the latter two with ability to launch missiles, primarily the KD-9/10 Laser Guided Anti-Tank Missiles. Among those falling in the High-Altitude Long Endurance (HALE) category of drones in Chinese arsenal may include WZ-7 and WZ-8 drones with the latter one, as per claims, having stealth capability and is powered by a rocket engine with ability to fly at supersonic speed.

While some defence analysts apparently have been trying to project a scenario that unmanned systems, especially the aerial ones, would entirely alter the architecture of modern

warfare thereby making manned systems entirely redundant, the reality may be far from that. There is no doubt that drones are definitely adding a new dimension to the warfare landscape, but it is highly unlikely that conventional weapon systems would lose their relevance merely because of the advent of unmanned systems.

China's domestic drone development capacity may be presently a few notches higher than that of India, yet India's resilient armed forces have shown in Eastern Ladakh that a perfect combination of battle-hardened men on ground armed with conventional weapon systems, is any day way more effective than men laced with fancy gadgets but with little battle experience. Also, it has to be kept in mind that much like rest of Chinese arsenal, its drones, especially the armed ones, have not yet been tested in real time battlefield theatres and thus remain paper tigers, at best, for the time being.

Therefore, analysis of capacity building for any nation in the realm of military modernisation has to take into account the entire gamut of modernisation instead of merely development of drones. From this perspective, one has to consider how India has worked on military modernisation over the last six years, time since PM Modi led NDA came to power.

India's Military Modernisation Efforts in the Last Six Years

Over the last six years, PM Modi led NDA Government has been consistently plugging the security loopholes that plagued India for years. Modi Government has been working tirelessly to develop border infrastructure, especially along the Indo-China border. It has started deploying several squadrons of Akash Surface to Air Missiles (SAMs) and a dedicated regiment of Brahmos cruise missiles for Northeast India , finished construction of strategically important bridges like Bogibeel bridge or tunnels like Atal Tunnel that has significantly reduced deployment time frame for armed forces, raised a special squadron of specially configured Su-30MKIs armed with deadly Brahmos missiles to compliment the P8I Poseidons of Indian Navy for keeping an eye on China's Achilles' Heel in Malacca Strait in the Indian Ocean Region, sanctioned seven more squadrons of Akash Surface to Air Missiles for Indian Air Force, six additional Pinaka Regiments for Indian Army, signed deals for S-400 air defence system , one more Akula class nuclear submarine, four additional Krivak class frigates from Russia, agreed for joint development of medium range surface to air missiles (MR-SAM) with Israel for Indian Army, procured state-of-the-art helicopters like Apache, Chinook and MH-60, signed deals for M-777 ultra-light howitzers with BAE Systems, Rafale fighters from Dassault of France, tested

indigenously developed anti-satellite missile system, started production of 16 Anti-Submarine Warfare Shallow Water Craft, gave nod for construction of 7 new stealth frigates and 6 nuclear submarines, cleared purchase of 464 T-90 tanks and 156 BMP-2 Infantry Combat Vehicles (ICVs), signed contract with HAL for production of 73 Dhruv Advanced Light Helicopters for Indian Armed Forces and a contract of Rs 48,000 crore, also with HAL, for production of 83 Light Combat Aircraft LCA Tejas MK1A , inducted a state of the art Missile Tracking Ocean Surveillance Ship, started acquiring high end drones from US, deployed tank regiments in Ladakh even as India's latest aircraft carrier, INS Vikrant, is on the verge of getting commissioned by 2021.

Also, India's Defence Acquisition Council has given nod for 15 Light Combat Helicopters (LCH) and 12 more Su-30MKI, as well as acquisition of 21 MiG-29 from Russia. It is expected that the final sanction by the Cabinet Committee for Security (CCS) for this would be given soon. Further, in 2018, PM Modi led NDA Government approved Rs 32,000 crore for capacity augmentation of Indian Coast Guard that includes acquisition of patrol vessels, helicopters, and aircrafts with an objective of making Indian Coast Guard equipped with a fleet strength of 200 ships and 100 aircrafts by 2025.

India's Drone Story

As part of the above-mentioned modernisation programs, as mentioned earlier, there is an active proposal for acquisition of at least thirty armed drones for all the three wings of armed forces, ten for each for the time being. This apart, Project Cheetah that aims to arm at least 90 of India's existing fleet of Heron UAVs of Israeli origin, has already been given green signal by Defence Acquisition Council and is expected to get cabinet nod soon. Also, India is ramping up its border surveillance architecture with induction of both drones and anti-drone systems. BSF recently has got approval for acquisition of 436 small and micro drones, which as part of Comprehensive Integrated Border Management system would see extensive application along with sensors and CCTVs across almost 1900 border outposts that are manned by BSF along Bangladesh and Pakistan border.

It is important to mention here the recent declaration by Indian Air Force about its development of 'Swarm Drone technology' that harnesses the forte of artificial intelligence to bolster the combat prowess of unmanned systems. The tweet by Indian Air Force read as follows, 'Harnessing indigenous talent and technological capability, IAF is leading the way in using Artificial Intelligence to add to its combat potential. Swarm drones is a prime example.'

Further, it has been reported that Indian Navy has shortlisted Israeli SMASH 2000 fire control system for procurement for application in anti-drone operations. Made by an Israeli firm named Smart Shooter, SMASH 2000 systems have the ability to locate and shoot down even high-speed drones.

Recent media reports also indicate that ITBP, which is responsible for manning the Indo-China border would also soon be given approval for equipping its forces with cutting edge surveillance systems which, apart from Long Range Reconnaissance and Observation Systems (LORROS), ATVs and radars, also include UAVs to keep a hawk-eye vigil on Chinese troop movements. These capacity developments in ITBP would primarily be meant for equipping personnel who would be deployed in the border outposts especially the 47 new Border Outposts that the Union Home Ministry has recently given sanction to.

On the anti-drone system development sphere as well, some major progress has been made. Reports indicate that DRDO has already developed an anti-drone system and as per an article titled, 'DRDO ready with anti-drone system for armed forces, PM Modi to have drone killer as part of his security detail' published in The Hindustan Times in November 2020, Shishir Gupta writes, 'The Defence Research and Development Organization (DRDO) has designated Bharat Electronics as the lead agency for development and production of much

needed anti-drone system for the armed forces'.

The Hindustan Times article further states, 'The anti-drone system, which was deployed during 2020 Republic and Independence Day, has a range of over two to three kilometres with radar capability to pick up the drone and then use frequencies to jam the unmanned aerial vehicle. The other developed option includes spotting the drone through radar and then targeting it by laser beam.'

In the realm of private sector as well, some positive results can be seen in the development of anti-drone systems in India. As per reports, a Bangalore based technology start-up namely IIO Technologies has developed an anti-drone system which, as per their claims, can detect drones up to a range of five kilometres. It has also been reported that IdeaForge, one of India's leading manufacturers of UAVs, has tied up with engineering giant L&T to develop both unmanned systems and anti-drone solutions for the security agencies.

Making India Self Reliant in Drone Manufacturing

While India has made giant strides in the sphere of making missiles and warships, in the realm of making drones, India has quite a bit of distance to cover. However, it is not to say that nothing is being developed or being made in India. In the recent past, Indian Army ordered an unspecified number of mini drones namely SpyLite from Cyient Solutions &

Systems Pvt Ltd (CSS), which incidentally is a collaborative venture between Blue Bird Aero Systems of Israel and Cyient Ltd of India. Recently, Indian Army also signed a $20 million (approximately Rs 140 crore) with IdeaForge for an unspecified number of SWITCH UAV, which is a hybrid fixed wing UAV with vertical take-off and landing capability (VTOL). Recent reports also indicate that India may be acquiring a few more Heron UAV embedded with satellite communication architecture, specifically for LAC.

(Made in India: Indian Army has ordered SWITCH UAVS worth $20 million from IdeaForge) Image Credit: IdeaForge)

DRDO has also supplied Indian Army with indigenously developed Bharat drones for surveillance in Ladakh in the midst of the Indo-China face-off there. Driven by Artificial Intelligence based architecture with ability to distinguish 'friend' from 'foe', the Bharat Drones haves proved to be extremely proficient in real time intelligence gathering and surveillance amidst the immensely harsh climatic conditions and low temperatures of Ladakh.

Apart from IdeaForge, many top Indian industrial houses are also showing interest in venturing into the drone development sector. Tata Advanced Systems from the Tata Group has been making UAVs for quite some time now. There were also reports in the recent past of Adani Group forming joint venture with Elbit System of Israel to develop a large array of drones ranging from the mini drones to the Medium Altitude Long Endurance (MALE) Hermes 900 drones that they intend to offer to Indian Armed Forces. Earlier this year, it was also reported that the Adani-Elbit Joint Venture through its production facility in Hyderabad has exported 'hundreds of Mini-UAV systems' to a global customer.

With India's armed forces slated to acquire more than 150 Medium Altitude Long Endurance (MALE) drones in the coming years, and possibly an even more number of mini drones, it is a real opportunity for India to become a major manufacturing hub for high-end drones.

In October 2020 meanwhile, DRDO successfully flight tested Rustom-2 Medium Altitude Long Endurance Drone, which executed eight hours of flying at an altitude of 16,000 feet. Even though there were initial hiccups with the Rustom program, it is expected that by the end of 2020, the Rustom-2 prototype would be able to endure at heights of around 26,000 feet for no less than 18 hours at a stretch.

There are also media reports surrounding DRDO's secretive Ghatak drone project which is supposedly an unmanned combat aerial system with stealth capabilities. IIT Kanpur is collaborating with DRDO on this project for the development of the first prototype of Ghatak named SWiFT, which, as per Livefist web portal, would be powered by a Russian NPO Saturn 36MT turbo engine. Likewise, in the recent past reports also emerged of Aeronautical Developmental Agency (ADA) having collaborated with Indian Institute of Science (IISc) for developing and successfully flight testing a delta winged UAV prototype powered by a Micro Jet Engine Propulsion System.

Meanwhile, HAL is working on two drone projects namely CATS WARRIOR and RUAV. As per reports, CATS or Combined Air Teaming System is based on the concept of a fighter jet (can be a Tejas or a Jaguar), acting as a mother ship, along with a number of fixed wing combat drones, called CATS WARRIOR, acting as wingman, with considerable capacity for deep penetration strikes. RUAV on the other

hand is a helicopter drone system that is being developed as a payload delivery system for inaccessible and inhospitable terrains.

(Prototype of CATS WARRIOR Drone of HAL @ Aero India 2021, Image Credit: Vayu Aerospace Review and Infotoline)

The Need for an Integrated Long Endurance Drone Development Program

However, given the pace with which drones are altering the landscape of warfare, a lot more is expected from DRDO and ADA, in terms of expediting projects and reducing the time lag between development of prototypes to final induction of

unmanned systems platforms in armed forces. Given DRDO's success stories in the realm of missile development projects and ISRO's proficiency in space programs, it would be great if DRDO and ISRO can join hands to develop world class drones, with high levels of endurance and payload carrying capacities, for Indian Armed Forces. It would be even better if on the lines of Integrated Guided Missile Development Program (IGMDP), an Integrated Long Endurance Drone Development Program is formulated with participation from DRDO, ISRO, ADA and private sector in the same.

Exploring the Potential of Public-Private Partnership Model

Given India's proficiency in industrial engineering and the interest many of India's engineering conglomerates showing to enter the defence equipment manufacturing arena stimulated also by PM Modi's AtmaNirbhar Bharat Initiative, private sector's quest, and efforts to make India self-reliant in drone manufacturing, either in collaboration with foreign companies or through public-private partnership in collaboration with public sector undertakings such as BHEL, BEL. HAL, NAL or DRDO, would be a win-win situation for India primarily because developing an indigenous supply chain instead of depending on foreign vendors is extremely necessary in the long run.

From DRDO's collaboration with Indian private sector for successful development of the Pinaka Rocket Systems to development of ATAGS artillery guns, to ISRO's collaboration with numerous private sector enterprises to develop India's space programs, there are enough examples of successful templates which can be emulated for development of high-end drones in India.

Interestingly, the success of Turkish TB-2 drones made by a private sector company named Baykar and spearheaded by MIT returned Selcuk Bayraktar, which overshadowed even Turkish Aerospace Industries to create better drones for Turkish Armed Forces, is also a classic example to emulate in India. Having evolved over the years, India now has a well-entrenched ecosystem for tech start-ups, and as part of that, the country has witnessed the proliferation of a large number of start-ups focussing on drone manufacturing and development of drone-based solutions. It should not come as a surprise if some of them, with a certain level of hand-holding by the likes of ISRO, DRDO, ADA or other agencies, emerge as makers of world class military grade drones in the years to come.

On a Concluding Note…

The necessity of developing a completely indigenous drone manufacturing architecture in India, from basic components to finished products, also emanates from the fact that over the next

one decade, India would possibly witness an exponential jump in application of drones in the sphere of ecommerce, product delivery as well as project surveys and even broadcasting. With increasing use of drones also arises the possible cyber security threats, including surreptitious transmission of drone generated critical data without consent of end-users. There have been murmurs surrounding the threat that arises from application of Chinese drones in critical commercial and infrastructure sectors. Therefore, it would be prudent for India to make sure that India has adequate capacity development in the realm of drone manufacturing so that dependence on external sources of either drones or drone components is nullified completely.

On a concluding note, it can be said that a considerable amount of good work has been done by PM Modi led NDA Government in terms of capacity augmentation and modernisation of Indian Armed Forces. Modernisation of India's drone fleet and development of a fleet of armed drones is definitely a critical part of the overall agenda of the government. While drones are definitely adding a new dimension in terms of the overall threat perspective from state and non-state actors, it certainly does not mean that effectivity of conventional warfare doctrines are getting obsolete. India is well poised to take on the ensuing challenges of the future.

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