Accelerating Tactical Drone Procurement for India

Outpacing Obsolescence with a Service-Based Approach

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Takshashila Discussion Document 2026-23
Version 1.0 July 2026

Recommended Citation: Adya Madhavan, Vikrant Shinde, "Accelerating Tactical Drone Procurement for India", Takshashila Discussion Document 2026-23, Version 1.0 July 2026, The Takshashila Institution

The authors would like to disclose the use of AI for the purpose of formatting and citations for this document.

Executive Summary

- As drone technology evolves rapidly, defence procurement will struggle to keep pace with condensed upgrade cycles. This problem will be even more acute for smaller, tactical drones, since they often require frequent upgrades and modifications.
- This document proposes an approach to drone procurement akin to a service contract. This approach enables long-term engagement between the armed forces and vendors, rather than reliance on one-off purchases. Such an approach allows the armed forces to have an efficient system for upgrades and modifications. It also enables vendors to avoid the 'valley of death' by maintaining a more stable, sustained order book.
- This approach is intended to address the specific challenge of remaining technologically competitive amid rapid change, while helping grow India's military drone ecosystem.

Introduction

India is reportedly going to spend as much as $2 billion on purchasing military drones over the next 24 months. Following Operation Sindoor, there were reports of increased demand for drones and of purchases through emergency procurement, but this is the first report of a large financial commitment to meet this demand. India has a rapidly growing domestic drone industry—ranging from large players like IdeaForge and Tata Advanced Systems, to an assortment of smaller firms and startups. Hopefully, this order will provide a market to many of these firms and meet the requirements of the Indian armed forces simultaneously. As drone technologies evolve and the government ramps up the use of drones in military operations, procurement practices will need to adapt to keep pace with these changes.

Drones undergo rapid and near-continuous development. Furthermore, as these systems are tested in conflicts across the world, their potential becomes more apparent, as do potential shortcomings that can be quickly fixed. As production capacities improve and drone technology from commercial sectors is adapted for military use, today's state-of-the-art hardware can become obsolete in a few years. Therefore, the challenge for India is to streamline drone procurement, given that these small platforms have short shelf lives. The recommendations in this document focus on the types of drones currently being inducted for tactical operations. These systems typically fall between nano and small drones, and are sometimes simply referred to as tactical drones. These drones are not among the most high-end systems, such as the Bayraktar TB2 or the MQ-9B Reaper, which cost millions of dollars and are procured through the capital acquisition route. This document explains how to address procurement issues for tactical drones capable of ISR (Intelligence, Surveillance, Reconnaissance) and strike missions.

> Tactical UAVs typically span the nano-to-small drone classes: nano/micro systems under two kg, and small UAVs up to roughly 25 kg. They usually operate below 1,000–15,000 feet, with line-of-sight ranges spanning a few hundred metres to around 10 km, and endurance of 20 minutes to a few hours. Unlike large Unmanned Combat Aerial Vehicles, they're cheap (often under $50,000), rotary or fixed-wing, and increasingly dual-use—commercial airframes adapted for ISR, strike, or loitering-munition roles at the tactical, sub-unit level.

The Global Picture

In early 2020, the Chinese Wing Loong II had only been in service for three years. The US-made General Atomics' MQ-9 Reaper and the Turkish Bayraktar TB2 were its only major competitors. All three Uninhabited Combat Aerial Vehicles (UCAVs) resembled sleek, futuristic combat aircraft and were being employed for intelligence, reconnaissance, and limited strikes at the time. 'Military drones' were seen as synonymous with these advanced, and more expensive systems. Although they may have been cheaper than inhabited combat aircraft, any state would rue their loss if they were shot down in combat.

The military drone ecosystem has since exploded. Drones were used extensively for kinetic effect in the 2020 Nagorno-Karabakh war. The salience of tactical drones has become especially apparent in the Russia-Ukraine war. Ukraine's innovative use of smaller, attritable drones has made them central players on modern battlefields. Militaries worldwide are adopting technologies like inexpensive First-Person-View (FPV) drones, which can be deployed in large numbers and used as both surveillance tools and disposable ammunition. Drones are also being used for an increasing range of functions, such as maritime domain awareness, logistics, and the supply of high-altitude bases.

In addition to a significant shift in the kinds of uses of drones, even larger, more expensive drones have been upgraded. For instance, the TB2 has a variant equipped with satellite communications capabilities for long-range ISR. Bayraktar also manufactures the naval TB-3 and the Akinci, which are considered more advanced models.[12] Similarly, the Wing Loong II is a version of the Wing

Loong I that has been upgraded to have an improved airframe and potentially equipped with advanced payloads for advanced ISR, as well as precision munitions.[3] There are also spin-off variants such as the Wing Loong-10, a higher-speed UCAV better equipped for strike roles.[4]

These changes are most evident in the transformation of First-Person View (FPV) drones from basic reconnaissance tools to sophisticated, modular strike platforms with AI-enabled autonomous capabilities. This transformation has occurred within four years through iterative research and development driven by frontline user feedback.[5] Fibre-optic controls quickly replaced the earliest DGI drones performing ISR functions, thereby enabling them to operate in dense Electronic Warfare (EW) environments. They were also modularised for payload adaptability and tweaked to be amenable to mass production.

Since tactical drones evolve rapidly and continuously, procuring them can be challenging. Militaries need UAVs to be state-of-the-art, attritable, and capable of receiving upgrades, repairs, and modifications.

This problem is also peculiar to mid-range workhorse drones, which can at times perform more sophisticated functions—such as precision strikes—while also offering the range and endurance for tasks like ISR. Technology is also enabling the integration of different drone categories into drone systems, thus populating inventories across procurement modes.

Other systems that require frequent upgrades provide us with a guide for thinking about drone procurement. For example, the procurement of computers highlights some of these requirements. When a company buys computers, it enters into a service agreement with service providers to install, service, and upgrade/ replace them as needed. Replicating a system like this for drone procurement could help address some of the issues that exist today. A seller becomes more of a service provider and is responsible for upgrades, modifications, and replacements of drones lost over a given period.

A shift towards contracting a sustained level of capability could work better for the tactical drone ecosystem. Provisions could include guaranteeing a minimum number of flight-ready airframes and allowing periodic upgrades, such as new sensors and autonomy features. A preset tempo for replacing losses would also enable a more dynamic drone ecosystem. This would not mean combat power is outsourced to vendors. Instead, it would mean having the industry share the burden of keeping fleets current and battle-ready, rather than having the armed forces carry the bulk of the weight.

Understanding Capability Evolution Cycles

Current state-of-the-art Medium-Altitude, Long-Endurance (MALE) UAVs and UCAVs are invariably upgraded versions of earlier iterations. These upgrades can range from smaller modifications such as changes to sensors, power packs and communication links, to larger structural changes. On occasion, the entire airframe is modified. While some of these larger upgrades may not be feasible for manufacturers to provide, replacing individual components seems possible within a procurement strategy that focuses on sustained engagement between the armed forces and the supplier, as is the case with a lot of military hardware that is procured for long-term use such as fighter jets and tanks.

Some of today's top models have emerged over the years with features such as longer endurance, specialised radar systems, foldable wings, and more efficient engines. These upgrades have enabled systems that once had niche capabilities and served limited functions to emerge as more robust, workhorse UAVs. As India's needs change, it is likely to require industry to regularly modify such systems to keep up with emerging battlefield realities.

The following examples illustrate how some major UAVs have evolved over the past few decades to reach their current form. It is worth noting that these timelines are relatively long (approximately five to ten-year cycles) for larger, capital-intensive UAVs

- **Bayraktar Akinci:** The Turkish Akinci is a UCAV capable of precision strikes but is also well-suited for reconnaissance missions. It can reach altitudes of up to 40,000 feet and has a 25-hour flight time. It has been employed in both the Russia-Ukraine war and the Nagorno-Karabakh war. [6] In 2025, the UCAV was equipped with an Active Electronically Scanned Array (AESA) radar.[7] The MURAD AESA radar allows the Akinci to conduct both ground surveillance and aerial target detection from hundreds of kilometres away.
- **Wing Loong III:** The Chinese Wing Loong series has been considered a leading class of UAVs since the inception of the Wing Loong I in 2007. The Wing Loong II can carry a larger payload and has a longer range. It has been battle-tested in Libya and Yemen.[8] The Wing Loong III further improved upon

these capabilities and features intercontinental range, a much higher payload, and multi-mission capabilities. These enhancements enable it to be used for both anti-submarine warfare and electronic warfare, which have been developed rapidly.

Wing Loong I has an external payload of up to 200 kg. Wing Loong II reportedly has the capacity to carry up to 480 kg of munitions.

- **MQ 9B SkyGuardian:** General Atomics' MQ 9B SkyGuardian is a system that was designed for multi-role, beyond-line-of-sight models. Its lineage can be traced to the famous MQ-9A Reaper, which was first introduced in 2001.[9] The Reaper had a much shorter lifespan, compared to the SkyGuardian, which has a reinforced airframe which allows it to last 40,000 flight hours —twice as much as the Reaper.[10] The SkyGuardian also has an extended wingspan, which gives it the lift it needs for its long endurance flights.

The smaller, tactical UAVs that this document focuses on are likely to have even shorter capability evolution cycles, with navigation systems, software, and imaging capabilities requiring frequent upgrades. Smaller UAVs are also closer to dual-use systems such as agricultural drones, and innovations made in the commercial drone industry are quickly absorbed for military applications. Smaller, dual-use drones which are often adapted for military use, have even faster cycles of evolution than large systems like the Wing Loong. For these systems, upgrades and modifications are often required much more quickly, in terms of both hardware and software. These transition quickly from being sold primarily to hobbyists, or for commercial purposes, to being used for defence purposes. Analysts have also found that when a new system is deployed, the enemy's EW units take only six to eight weeks to adapt their jammers. This forces quick upgrade cycles and rapid innovation.[11] The following examples illustrate the need for a system that caters to these compressed timelines.

- **DJI Mavic:** The DJI Mavic is one of the best-known examples of how a commercial system has been rapidly retrofitted and modified to be used for military purposes. This series of drones have evolved from high-end travel photography tools to military drones. Commercial drones were originally retrofitted with 'drop-hooks'. These 3D-printed additions allowed the drone to work like a crude bomber. DJI then released the Mavic 3 and the Enterprise series that incorporated thermal sensors and tools which could help guide artillery through mapping.[12] Today, field engineers change signal frequencies often to bypass geofencing.

- **FPV Drones:** FPV drones built originally for high-speed videography soon became absorbed into military functions.[13] GoPro cameras have reportedly been replaced with warheads, and the drones' high speeds make them difficult to shoot down with small arms. Ukrainian companies, such as the Wild Hornets, have been at the forefront of demonstrating how these drones have transformed in under a year into 'sting' interceptor drones that ram into and destroy enemy reconnaissance drones. Sting drones are capable of flying at close to 300 kmph—more than double the speed of the original FPV drones from which they evolved.[14]

Drone Technology Absorption in the Indian Context

Modern drones first entered service with the Indian armed forces in the late 1990s and early 2000s (Searcher Mk I, II, and Herons). Leveraged for ISR at the operational level during the Kargil conflict (1999) and for the domination of the rugged Line of Control (LOC) with Pakistan and the Line of Actual Control (LAC) with China, high-end drones with high-technology sensors were a centrally controlled resource—coordinated at the level of Command Headquarters, on a user-generated demand-based operations protocol.

Models with scaled-down capabilities in range (platforms and sensors), endurance, and payload are enabling tactical exploitation of the third dimension for battlefield advantage. The rapid technological upscaling of their performance variables within their lifecycles is possible through software or chip-level upgrades.

The Indian armed forces have also doubled down on absorbing this technology at the tactical level. Budgetary support is a fair indicator of priorities, and a substantial share of the ₹40,000 crore sanctioned for Emergency Procurement (EP) in the follow-up to Operation Sindoor has been earmarked for the procurement of surveillance drones, kamikaze drones and loitering munitions.[15]

Organisational structures are also being tweaked to maximise the impact of these systems. From bottom to top, the following organisational restructuring has been implemented at the tactical level, without any manpower accretions in infantry, artillery, and the armoured corps:

- **Ashni Platoons**: A platoon has been incorporated into all 385 infantry battalions, equipped with ten drones—four for surveillance and six for loitering munitions.[16]
- **Bhairav Battalions**: A total of 25 battalions, with approximately 250 personnel each (including personnel from air defence, artillery, and signals co-opted to integrate multifaceted skill sets), are planned to be raised to fill the capability gap between regular infantry battalions and Para (Special Forces) for application in hybrid operations.[17] One such battalion per infantry regiment will be affiliated with the operational corps deployed in the Northern and Western theatres. Each such battalion will also have an Ashni platoon that will integrate drone technology.
- **Divyastra Batteries**: As a fusion of precision-strike capability with massed artillery, five regiments are planned by reorganising existing gun batteries—integrating traditional guns with drones and loitering munitions for hybrid precision attacks.[18]
- **Shaktiban Regiments**: In contrast to the Divyastra batteries, which plan on an optimising mix of precision targeting and saturation firepower, these regiments plan to maximise the battlefield impact of drones' unmanned precision-strike capability and loiter munitions. Three such regiments are planned, presumably forming a part of the Artillery divisions.
- **Rudra Brigade:** These are all arms formations on the cusp of tactical and operational levels of the battlefield.[19] The high-tempo employment philosophy of these formations relies on leveraging the integration of combat, and combat support, to enhance manoeuvrability. This is enabled by technology infusion through the use of modern C4ISR enablers as a system, rather than aggregated platforms. Three such brigades have already been operationally validated through exercises.

The Indian Army has set an ambitious target of training one lakh personnel in drone operations, employing 30,000 drones within a year, and making all personnel drone-literate as a training objective. These priorities are reflected in the DPM 2025 (Defence Procurement Manual) and the draft DAP 2026 (Defence Acquisition Procedure). Both documents make some provisions to streamline and simplify drone procurement for the armed forces.

5.1 Existing mechanisms and frameworks:

The DAP primarily outlines provisions and recommendations pertaining to drones, as it largely concerns their capital acquisition. The DPM provides the supporting frameworks for the maintenance and repair of its assets, since it focuses on revenue expenditure.

The Draft DAP 2026:

- Institutionalises civil-military fusion, as traditional boundaries have blurred.
- Allows the armed forces to purchase Commercial Off-The-Shelf (COTS) drones and make minimum upgrades where required. This provision is designed to allow the armed forces to leverage advancements in civilian technology.
- The DAP 2026 has classified the manufacturing of engines for drones/ Remotely Piloted Vehicles (RPVs) as 'projects of national importance' in order to prioritise domestic production.
- These domestically produced engines are to be mandatorily procured by the armed forces.
- To overcome some of the regulatory hurdles usually faced by domestic vendors that may be the only ones manufacturing a particular engine, the DAP states that these procurements will not be classified as Single Vendor Cases (SVCs), which often face many regulatory hurdles.
- When it comes to concerns about the rapid obsolescence of drone technologies, upgrades have been streamlined under the Other Capital Procurement Procedure (OCPP).
- The OCPP framework is utilised for modifications, payload upgrades, and repairs.

The DPM 2025:

- The DPM notes that when drones are sent for repair, new modifications or upgrades are often required. To prevent delays in processing payments and approvals, the DPM recommends an additional financial sanction of 15% of the initial order value to cover unforeseen requirements at a later date.
- For imported drones and RPVs, the DPM suggests conducting long-term mapping to anticipate spare parts requirements. Once the foreign contracts expire, the DPM aims to have domestic industries manufacture the necessary parts.
- The DPM also recommends long-term sustenance contracts for equipment procured in smaller quantities or without technology transfers from foreign firms (Original Equipment Manufacturers, or OEMs). It recommends Long-Term Support Agreements (LTSA) to ensure platforms are supported over the long term.

Given the high dependence of this doctrinal shift on technologies with rapidly shrinking development cycles, two challenges emerge. These challenges are partially addressed by some provisions in the DAP and the DPM, but more focused policy changes are needed to mitigate them more effectively.

- **'Future Proofing' of Inventory**: The rapid evolution of tech and counter-tech poses a challenge of potential inventory obsolescence within operational life cycles. Therefore, it is imperative to 'future-proof' the inventory.
- **Sustainable Ecosystem vs Transactional Relationship**: The Emergency Procurement (EP) route enables plugging operational gaps through annual contracts with option/repeat clauses, as provided for in the DPM 2025. This allows procuring up to an additional 50% of the originally contracted numbers. Delegated procurement at the command and corps levels enables decentralised acquisition to fill critical operational gaps. The initial high-order volumes of the armed forces—coupled with low wastage rates during peacetime, and extremely high wastage rates during periods of conflict—present a peculiar, fluctuating demand-and-supply challenge. It requires nurturing a sustainable ecosystem among the armed forces as users, public and private R&D establishments as tech developers, and industry as manufacturers; all of which are strengthened by favourable policy formulations.

The DPM 2025 is rooted in the procurement principles of efficiency, economy, transparency, fair and equitable treatment of suppliers and promotion of competition in public procurement.[20] It aims to safeguard against inventory carrying costs and capital tied up in stock. At the same time, it accounts for procurement lead times, maintaining minimum stock levels, and addressing criticalities as and when they occur.

The need to keep the inventory relevant and technologically up to date can be achieved through tweaking the procedure. Formulating contracts to fill critical voids through emergency procurement of Minimum Ordered Quantities (MOQs), cater for in-service Maintenance, Repairs and Overhaul (MRO), and expression of assured commitments to future upgrades based on a spiral development cycle over a time cycle, for instance, five to ten years.

Recommendations

This paper recommends a procurement model based on Supply, Service, and Upgrade (SSU) contracts, similar to those used in the software industry. This would be similar to the LTSA the DPM suggests, but would not be restricted to foreign OEMs and would apply to domestic manufacturers as well. Given their rapid evolution in capabilities, tactical drones require frequent modifications and upgrades. Instead of annual supply commitments for 'here and now' technology, this model proposes contracts that aim to enable sustained innovation in the military drone ecosystem.

- **Supply:** The supply component of this contract will address current operational voids through time-based supply of defined quantities (MOQs), giving the industry a semblance of demand predictability to enable the suitable leveraging of economies of scale. To meet the gaps between regular peacetime demand spikes during periods of conflict, suppliers will need to demonstrate the ability to meet heightened demand.
- **Service**: The service component addresses the need for sustained commitment to R&D to retain a technological edge in the face of emerging counter-tech. It also focuses on the need for performance enhancements through tech upgrades to 'future-proof' the inventory at all times, and a 'skin in the game' approach for all stakeholders of the ecosystem. For this to be effective, buyers and vendors must discuss and anticipate future trends that may need to be addressed. This should involve both performance-enhancing changes that may need to be made, as well as the counter-tech that may need to be effectively combatted. Given that many tactical drones share similarities with dual-use and agricultural drones, innovations in the civilian drone ecosystem should be leveraged to understand and quantify the performance enhancements that may be required.
- **Upgrade**: The upgrade portion of the contract will ensure user commitment to assured demand for substantially upgraded versions with enhanced capabilities over contractual periods. This will cater to futuristic development trends. The initial operational requirement could detail a broader range of probable future capabilities at the time of purchase, rather than a short list of current, specific capabilities. For instance, operational range, endurance, sensor range, communication networking architectures, Electronic Counter Measures (ECM), etc, have a current performance bracket based on available technology and a predictable enhanced performance bracket based on viable outcomes from ongoing R&D in the field. To make this appealing to manufacturers as well, the model proposes a system akin to an Annual Maintenance Contract (AMC), in which any upgrades beyond a defined scope incur an additional charge. For the

armed forces, this is beneficial as it can reduce unexpected repair and upgrade charges.

Tradeoffs and Conclusion

The implementation of the SSU model is likely to have certain costs associated with it that come from making some significant tradeoffs.

- **On competition:** One thing that the DPM 2025 explicitly chooses to prioritise is the 'equitable treatment of suppliers' and promoting competition. By design, the SSU model hinders competition, instead choosing partnerships over a longer term in favour of upgrades and long-term service. This unavoidable lock-in comes with selecting vendors today based on an initial capability bracket to become default suppliers for several years. The proposed mechanism to mitigate some of these risks, checks and balances to prevent suppliers from over-promising and under-delivering, does not resolve this tension that exists. The model in its current form requires the acceptance of reduced competitive pressure to a certain extent, as the price of sustained capability.
- **On the predictability of demand:** The supply component of the SSU model is built around the fact that it provides industry with predictable MOQs. However, if MOQs are set at levels that are closer to wartime requirements, there will inevitably be a standing premium paid by the armed forces, for surge capacity that may go unused.
- **On vagueness:** The upgrade component of the model specifies that a broad capability bracket should be provided, as opposed to a fixed list. This is an effort to enable the armed forces and industry to absorb technological change collectively and quickly. However, this lack of specificity can lead to scope disputes, since upgrades are not self-defining. As a result, the armed forces and industry may have different interpretations of whether a certain upgrade falls within the base contract or requires an additional charge. This requires more iterative discussions between both parties, despite the fact that it could lead to more friction. It is left intentionally unresolved, since bringing about too much specificity would reduce disputes, but reintroduce the rigidity that the SSU model is designed to try and fix.
- **On the risks of vendor concentration:** The drawback of long-term sustained contracts is that certain vendors find themselves

locked in, while other players struggle to attract interest from the armed forces. Players with an existing balance sheet, like Tata Advanced Systems and IdeaForge may be advantaged by such a model, while smaller firms and startups could suffer.

The ecosystem thus nurtured will have to develop resilience against supply chain disruptions. This model will have to incorporate clauses to safeguard users in the face of mergers and takeovers. It will also have to establish checks and balances to prevent malpractice and address issues of over-promising and under-delivering, through participation by all stakeholders and transparent, time-bound, iterative processes to audit, evaluate and predict deliverables. If implemented, this model will have the potential to solve some of the current issues with drone procurement, where industries face the brunt of uncertain demand, and the military grapples with the need for upgrades and modifications.

If implemented with clear criteria for what the requirements are today and clarity on what counts as a chargeable upgrade, the SSU model has the potential to close the gap between India's drone requirements and targets, and its ability to keep its fleets current. If implemented more loosely with contracts that are less attuned to the realities of the ecosystem, it is more likely that a handful of established vendors will absorb most contracts. Although some of the bureaucratic delays the model seeks to prevent will be bypassed, the more 'sustainable' ecosystem that this paper argues for, may not materialise. It would still represent an improvement on today's one-off purchase model, but the departure from the status-quo would unfortunately not be nearly as drastic as one would hope.

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