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Kishore Kumar Khera

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Kargil to Balakot

The Tumultuous Journey of Indian Air Power

*Kishore Kumar Khera**

The conceptual and capability changes in a kinetic force remain intertwined with the prevailing and emerging security scenarios. Air power, a key kinetic capability, being technology dependent, needs continuous re-equipping and up gradation. The force structure and organisation too need to adapt to ensure optimal exploitation of available capability. Indian air power has transformed in the last two decades and expanded its capability in all critical facets. The Indian Air Force, in particular, has positioned itself to deliver the punch that today's geopolitics may require: swift, deep, effective, precise, and contained in terms of collateral. With the changing character of war, there is a need to relook at the capability growth plan for air power for it to be relevant in future. With finite financial outlays, rebalancing various facets of air power is essential to achieve the desired end goal.

War unravels the character of individuals and institutions. The participation of the Indian Air Force (IAF) in a conflict situation in Kargil (1999) was after a gap of 28 years, the previous one being the Bangladesh Liberation War in 1971. The generation that had planned and led India to a thunderous military victory in 1971 had gone. Kargil was thus the first battle for almost all participants from the IAF, except for the top leadership. The operational environment, terrain imperatives, rules of engagement, opponents force structure, equipment profile, and force application philosophy in 1999 had nothing in common

* Kishore Kumar Khera served as a fighter pilot in the Indian Air Force for over three decades and was until recently a Research Fellow at IDSA, New Delhi.



with the 1971 war. The lack of adequate intelligence, surveillance and reconnaissance (ISR) equipment and inability to use the limited ISR resources creatively led to an undetected intrusion in Kargil. Even after an accidental detection, the security establishment failed to accurately assess the threat magnitude and potential, resulting in a suboptimal initial operational plan.

It is true that Pakistan was defeated as the intruders failed in their objectives to permanently change the Line of Control (LOC). However, tactically, the loss of a Mi-17, one MiG-27 and a MiG-21 from the IAF, and 527 personnel¹ of the Indian Armed Forces, just to reclaim own territory was a very expensive victory. In the beginning, the IAF operations, named Operation Safed Sagar (White Sea), started slowly and at a low scale. The initial losses quickly drove home the point and the tempo, tactics and operational plan transformed very fast in real time. There was no looking back despite severe operational restrictions imposed by the government on the use of airspace. The IAF certainly proved to be a quick learner,² demonstrating resolute character.

As Pakistan's attempts to redraw the LoC in the Kargil sector in 1999 failed, it changed its tactics. The outcome was a terrorist attack on the Indian Parliament in December 2001.³ While armed forces on both sides of the border were mobilised, a conventional conflict did not take place. However, Pakistan made another attempt to redraw the LoC⁴, in 2002 in the Gurez-Machal sector in Jammu and Kashmir (J&K). Unlike Kargil, the Indian Armed Forces responded differently and the IAF carried out precision strikes to eliminate the intruders in totality⁵—a perfect military mission. Thereafter, Pakistan resorted to using terrorism as the primary tool to inflict damage on India. Multiple terror strikes have been carried out since, for example, in Mumbai (2008), on Pathankot airbase and the Uri military camp (2016), and in Pulwama (2019). After the Mumbai attacks no kinetic response was initiated, even though the capability existed,⁶ despite the fact that Ajmal Kasab's capture established irrevocable links between the Pakistani establishment and terrorism.⁷ After the Pathankot attack too, in an attempt to take the investigation to a logical conclusion, Pakistani agencies were given access to the site of the terror attack.⁸ Like all previous attempts to resolve issues without the use of kinetic means, this too turned out to be a futile exercise.

The Indian security environment has changed considerably in the last two decades. Peace is elusive and various tenets of hybrid war continue to operate.⁹ In this 'no peace, no war' situation, the IAF as a kinetic

tool has undergone many changes to remain relevant in the evolving operational environment. The prime focus of IAF in the last two decades has been to provide multiple options to the polity to choose from. After the Pulwama terror strike where 40 Central Reserve Police Force (CRPF) soldiers were killed on 14 February 2019, the Government of India did select IAF to hit back at a Jaish-e-Mohammed (JeM) terrorist training camp at Balakot in Pakistan on 26 February 2019.¹⁰ For the first time as an independent nation, India used its combat air power in a proactive manner.¹¹ A retaliatory strike by the Pakistan Air Force (PAF) the next day was thwarted and one attacking F-16 shot down,¹² albeit with a combat loss of one MiG-21 Bison¹³ and an unfortunate case of probable fratricide of one Mi-17 helicopter.¹⁴

Such actions, namely, the execution of a surgical strike¹⁵ to hit at terrorist launch pads in Pakistan-occupied Kashmir (PoK) after the Uri attack and hitting the Balakot terrorist training camp in Pakistan after Pulwama, have long-term implications. The closure of airspace by India and Pakistan after an attempted retaliatory air strike by PAF on 27 February 2019 encapsulates this new unfolding story. Unlike a brief closure of the Indian airspace, the Pakistani airspace remained closed for a prolonged duration.¹⁶ The events in February 2019 did prove that the IAF can be an effective proactive tool; however, while reacting, some important lessons are still to be learnt.

With this background, the article covers the journey of Indian air power in the last two decades. Though both the incidents narrated here—Kargil (1999) and Balakot (2019)—have a Pakistan centrality, capability development has remained focused on Indian security in an evolving geostrategic scenario covering all possible players and themes. The development in the aerospace domain in India can be clubbed under three main verticals. Key aspects in each vertical are covered, along with the changes and challenges in the last two decades. The conceptual and capability changes in a kinetic force like air power remain intertwined with the prevailing security scenario, and issues related to this aspect are covered in the first section. Air power is technology dependent and re-equipping is a continuous process. The equipping processes, objectives and outcomes in aerospace power matrix are covered in the next section. The organisational changes that have redefined IAF are given in the next section. The last section is predictive in nature and focuses on the expected path ahead.

CONCEPTUAL AND CAPABILITY CHANGES

With the publication of the IAF doctrine for the first time, a major change in the service's thought process commenced in 1995. Bringing the thought process for force application in open domain helped in the correct articulation of various doctrinal precepts and facets. Additionally, the Kargil conflict and its outcome forced the IAF to re-examine its equipment profile and training pattern. A revised doctrine in 2007, which was further updated in 2012,¹⁷ is a reflection of these changes.¹⁸ A holistic outcome-based approach with an emphasis on effects and efficient integration of all combat and combat support elements are the key changes witnessed in the last two decades. Moreover, under the aegis of Headquarters Integrated Defence Staff (HQ IDS), the publication of a 'Joint Doctrine' in 2017 was a first; although widely criticised, it has set the ball rolling for debates and refinement.¹⁹

Battlespace Transparency

The prime cause of Kargil conflict was the multiple-level failure of the Indian establishment in assessing Pakistan's intent, plan to intrude, undetected intrusion and incorrect assessment about the scale. At an operational level, the Indian Armed Forces, specifically the Indian Army and the IAF, carry the burden of this failure. India's northern borders have inhospitable terrain and severe environmental conditions. This makes the job of defending rather difficult, thereby giving a unique advantage to the aggressor. The only way to minimise the risk is to keep the area under surveillance and initiate action on the first indication of an aggressive design by the intruders. Indeed, it was the failure to keep the border under surveillance that allowed for large-scale mobilisation of Pakistani soldiers to establish well-stocked bases at key hill features in the Kargil sector.

To obviate recurrence of similar incidents, battlespace transparency holds the key. In this regard, the induction of unmanned aerial vehicles (UAVs) has evolved as the most cost-effective option to enhance the capacity to reconnaissance large areas at regular intervals. This has been resorted to by all three services in India, and further augmented by induction of reconnaissance pods for the fighter fleet in IAF. The specialist reconnaissance squadrons of IAF equipped with MiG-25²⁰ and Canberra²¹ have completed their total technical life and been phased out. This role has been taken over by MiG-27, Jaguar and Su-30, with multispectral reconnaissance pods.²² Additionally, space-based

reconnaissance systems are now available to the Indian Armed Forces.²³ Even with these inductions, India has limited reconnaissance capability and very limited surveillance capability to monitor vast expanse of border areas. However, in the maritime domain, induction of P-8I in the Indian Navy (IN) has given a major boost to maritime surveillance capability, the task that vintage Tu-142 and IL-38, along with DO-228, performed for many years.

While the surveillance capability to monitor surface-based combat elements is very limited, the same is not the case for airborne combat elements. A large number of radars have been procured and deployed to keep the airspace under multilayered surveillance. These include medium power radars (MPRs), low level transportable radars (LLTRs) and low level light weight radars (LLLWRs). The most significant change in this arena has taken place owing to the conceptualisation and operationalisation of Integrated Air Command and Control System (IACCS), generating a fused comprehensive picture, amalgamating inputs from various sensors to control tactical action at multiple levels.²⁴ The induction of Airborne Warning and Control System (AWACS) in 2010 and Airborne Early Warning and Control (AEW&C) System in 2017 has allowed a higher degree of battlespace transparency for aerial targets.

Another important change that has taken place to enhance battlespace transparency is network-centric warfare tools that have been developed and deployed, riding on high-speed data communication systems and their integration. The IACCS, Akash Teer (Indian Army), and Trigun (IN), and their interoperability, exemplify this aspect.²⁵ Although some aspects of seamless integration are still being chalked out, movement is taking place in the right direction at the right pace. With Defence Communication Network (DCN) spreading its reach and scope, soon an integrated battlespace picture will be available to relevant field commanders in near real time. This will help clear the fog of war to a large extent.

The multipronged approach adopted to enhance battlespace transparency is the most significant step taken in the last two decades to tackle emerging threats in the fast-changing conflict scenario. Overall, the degree of battlespace transparency has increased for the Indian Armed Forces, but it still is a work in progress to achieve continuous surveillance in relevant areas. Two recent examples demonstrate the prevailing inadequacies in the system: one, a probable fratricide on

27 February 2019²⁶ during a strike by PAF; and second, a time delay of over eight days before the wreckage of a missing An-32 aircraft in Arunachal Pradesh could be located on 11 June 2019.²⁷ Both these events happened well inside Indian territory and the wreckage location work involved Indian Space Research Organisation (ISRO), besides all three wings of the Indian Armed Forces and local administration. In the latter case, eight days of national effort to locate 18 tonnes of metal in Indian territory indicates a capability weakness. Requisite high-fidelity surveillance equipment, training and defined robust surveillance processes are a necessity for keeping crucial areas under surveillance.

Weapons, Platforms and Expanding Combat Potential

The IAF equipment profile has changed in the last two decades and along with it, the basic character of the force. Till Kargil, the IAF fighter inventory primarily consisted of short-range, short-duration-capable tactical fighter aircraft equipped with short-range weapons. The fighter inventory was dominated by MiG-21, MiG-23, MiG-27 and MiG-29, with Jaguars and Mirage 2000 making up the rest, and Canberra and MiG-25 were for the reconnaissance role. Jaguars were the only platforms capable of aerial refuelling, but the IAF did not have aerial refuellers. Induction of Su-30 had just about commenced. In contrast, today, barring a small fleet of MiG-21 and MiG-27, all combat aircraft in the IAF inventory are aerial refuelling capable and the IAF has a fleet of six IL-78 aerial refuellers. This translates into longer on-station time for defensive missions and longer reach for offensive missions that helps in retaining surprise—amply demonstrated during the Balakot strike.

The availability of low-cost surface-to-air-guided weapons, like Stinger, has altered the cost dynamics of offensive use of high-value combat aircraft and helicopters. While attacking, staying outside the lethal envelope of such surface-based weapons systems is essential to ensure platform safety. To achieve this status, the range of air-delivered surface attack weapons has to be more than the lethal range of weapons defending the target. Loss of aircraft during the Kargil conflict reinforced this assertion and after the first two days, air attacks were from high altitude. From such ranges, owing to large strike errors, the effectiveness of attacks reduces drastically, unless the target is engaged with precision-guided munitions (PGMs). Imbibing this essentiality, a number of PGMs have been acquired and inducted in the IAF and currently, all fighter aircraft in IAF are capable of firing PGMs. The stand-off range of

such weapons varies from 5–6 kilometres (km) from target to over 300 km. This capability was demonstrated during the Balakot strike.

In addition to an enhanced range of air-to-surface weapons, a number of long-range air-to-air missiles have come into the Indian Armed Forces. Practically, this expands the kill envelope of each fighter aircraft armed with such weapons. In other words, with a longer range of weapons, the number of aircraft required to sanitise an area of specified dimension has reduced. Basically, in offensive capability domain, the Indian Armed Forces goals have been in line with the operational necessities.

Moreover, the range and capability of defensive weapons have seen a major jump. Surface-based air defence systems in India bank heavily on the three-decades-old Pechora, OSA-Ak and IGLA systems. All these systems are following ‘reduce to produce’ philosophy for sustenance and are being replaced systematically by indigenous Akash, augmented by multiple types of short, medium and long-range missile systems. Induction of very long-range system S-400 in the coming years will alter this landscape in totality. Even in the ballistic missile defence (BMD) system, Prithvi Air Defence (PAD) and National Advanced Surface-to-Air Missile System (NASAMS),²⁸ as and when inducted, will provide critical capability against missile attacks. There are two direct implications of induction of such high-quality air defence systems. First, larger engagement zones and better single-shot kill probability (SSKP) of these advanced air defence weapons reduce the necessity of fighter aircraft deployment for defensive missions. This helps build offensive capability by freeing up combat aircraft for offensive missions. Second, surface-based systems for defence invariably have low operational, maintenance and administrative costs during peacetime, thus allowing rebalancing budgetary allocations. In the defensive operations, the capability build-up has been much slower so far, but the process for a quantum leap has already begun.

Air Mobility Matrix

The Kargil War, once again, had highlighted the need for faster mobility to achieve the concentration of forces. The IAF capability to shift military hardware and personnel played a pivotal role in relocating units for deployment in the relevant sector. The IL-76 and the An-32 were its workhorses. However, in case of expansion of the conflict zone, this capability would have been stretched to meet the stringent timelines for large-scale relocation. The single-wave airlift capability has since been

more than doubled with the induction of C-17 and C-130 in the last two decades.²⁹ While this has helped in quick mobilisation ability of relevant kinetic elements to the requisite zone, it has been further assisted by activating airstrips like Daulat Beg Oldie (in Ladakh) and upgrading advanced landing grounds (ALGs) to reduce the force employment time further. With the C-130 induction, a capability gap in the 20 tonne category that existed after phasing out of An-12 was bridged; it also brought IAF the ability to undertake special operations.

Helicopters, with their versatility, play a pivotal role in tactical battlespace by providing relocation options, logistical support and if required, firepower. This aspect is crucial in mountainous terrain and heli-lift is the most efficient method of inter-valley troop transfer (IVTT) and placing sensitive military hardware directly at the deployment location. Accordingly, the Indian Armed Forces have doubled their helicopter inventory in the last two decades (see Figure 2 for details). Even qualitatively, there has been a change in the helicopter fleet with high-performance Mi-17 series replacing vintage Mi-8 and induction of indigenous Advanced Light Helicopters (ALHs).³⁰ In the coming months, Chinooks³¹ and Apache³² helicopter units will further augment the hover power of the Indian Armed Forces. Overall, in the last two decades, the IAF's ability for large-scale mobilisation and relocation of combat elements has improved substantially at the strategic, operational and tactical levels—a mandatory requirement in prevailing operational scenario.

Breaking the Cocoon

The Indian Armed Forces have never been engaged in a force-on-force conflict since 1971, although the events in 1987—Op Brasstacks³³—and 2001—Op Parakaram³⁴—saw major deployments on the western borders for such an eventuality. A major focus area for force application learnt in Kargil was for a short and limited conflict, with very stringent rules of engagement (ROE). The IAF, in particular, had no previous experience in this aspect. To learn from similar experiences, the IAF commenced a journey to interact with other air forces at the operational level through international exercises. First off the block was Exercise Garuda with the French Air Force, in India, in 2003.³⁵ Being first of its kind for the IAF, the focus was on administrative and maintenance aspects of the conduct of such an exercise. Tactically, IAF participants were overwhelmed comprehensively. The tactical aspects of dealing with combat platforms

with superior avionics and weapons systems were invaluable. The IAF's tactical think tank—Tactics and Air Combat Development Establishment (TACDE)—was mandated to find a solution to such an operational problem; and the plan was made, after many iterations and research. The results of the next international exercise, Cope India-04 with the United States Air Force (USAF), reverberated globally, recognising IAF tactical acumen and innovative use of relatively low-tech platforms. The IAF had learnt methods to counter technologically superior force by a combination of quantity and tactics. The most significant aspect of these interactions was that the IAF came out of its cocoon to take bold learning steps forward. Within a year of the induction of aerial refuellers, the IAF fighter fleet managed to fly across half the globe to participate in Exercise Cooperative Cope Thunder 2004 in Alaska, US.³⁶ This demonstrated the resolve to move forward in operational planning, maintenance and logistical management.

There has been no looking back on this aspect of participation in international exercises since then, owing to the immense value that IAF drew from these. In fact, the lessons learnt during these exercises were instrumental in the immediate operationalisation of systems like AWACS, as soon as these were inducted. Participation in these exercises helped the IAF in ironing out operational planning processes and integrating various elements of aerospace power for effective and efficient mission management. A glimpse of this was the Balakot air strike. The IAF's engagement with foreign air forces has increased steadily, from four till 2005 to eight in the next 10 years, and plan is for 32 engagements till 2025.³⁷ This will give comprehensive exposure to the best practices followed in different parts of the world and in air forces of varying sizes.

These international interactions at the functional level have helped in refocusing on certain critical safety aspects as well. In addition to a number of steps taken by IAF to improve its flight safety record, it also learnt valuable lessons to enhance flight safety from these forays. The IAF's declining accident rate is an indication (Figure 1).

Communications: Redefining Concepts

With laying out of the terrestrial network and integrating it with space-based assets, all three services have enhanced their internal communication capability. In the case of IAF, Air Force Network (AFNET) has had the most profound impact on the operational conceptualisation and orchestration. Applications like Integrated Material Management and On-Line System



Figure 1 Aircraft Accident Rate Per 10,000 Flying Hours for the IAF

Source: Ministry of Defence, Government of India (2018).³⁸

(IMMOLS) and Electronic Maintenance Management System (e-MMS)³⁹ have redefined the way logistics and maintenance processes are managed in the IAF, leading to major efficiency enhancements. Digital high-speed communication has also redefined the operational planning process. For one, the output of ISR systems is available to the field commander and operational planners in near real time. Along with this, the status of various combat and combat support elements, equipment and human resources is also available in real time. This helps in efficient planning of follow-up missions and easy synchronisation of strategic goals with operational planning and tactical deployment.

The time cycle for mission planning and modification has been compressed from days to a couple of hours. Additionally, this has permitted virtual co-location of various elements in the planning process, resulting in quick decision making and redeployment of combat and combat support elements. The net outcome of this communication and decision-making efficiency is better utilisation rate of combat assets. While intra-service communication has enhanced tremendously, the inter-service communication is yet to reach that level and the integration work is still in progress. Rolling out of DCN is a step in the right direction, but much more needs to be done to ensure seamless flow of information between all the combatants.

A glimpse of better communication leading to operational efficiency was seen in Exercise Gagan Shakti 2018, with unprecedented high asset utilisation rate.⁴⁰ In fact, a series of exercises, code-named Gagan Shakti, commenced in 2006. The aim was to integrate air assets for an effects-based scenario. Multiple reasons, from leadership and maintenance to administration, led to conduct of its low-scale, low-value next version as Exercise Live Wire in 2013. However, Gagan Shakti 2015 not only regained its nomenclature but also its vision and set the ball rolling to keep all issues subservient to overall objectives. Keeping integration as the central theme, both Army Headquarters and Naval Headquarters were given the opportunity to define the concept, setting, objectives, scale, period, location and duration of the exercise. This was unprecedented. Owing to IN's plan for the International Fleet Review, and operational, training and administrative commitments of the Indian Army, these services had a scaled-down participation. To reiterate IAF's commitment, a sizeable force was kept out of Gagan Shakti 2015 for a follow-on army 'exercise with troops' (EWT)⁴¹ and IN's Exercise Tropex. These actions amply demonstrated the primacy of operational integration for the IAF.

The conceptual convergence between the three services, in this process, was further improved for Exercise Gagan Shakti 2018. Gagan Shakti 2018 followed a similar principle and resulted in enlarged scope and enhanced integration. These internal exercises primarily worked on the principle of flexibility and ubiquity of air power. Although IAF, at various forums, has been opposing the concept of theatre commands,⁴² these pan-India exercises served to demonstrate that operationally the IAF has already imbibed this concept and treats the entire Indian airspace as a single theatre. The geographical boundaries of operational commands had little relevance as was demonstrated by combat aircraft located in one command, getting aurally refuelled in another command, to strike targets in the area of responsibility (AOR) of the third command and land for rearming in the fourth command. By allowing assets to be used in other sectors, each commander demonstrated his readiness to lose a battle to win the war.

A successful communication strategy now complements the kinetic missions. Strategic communication is an area that India mastered, after a stuttering start, during the Kargil conflict. Timelines, content and articulation of official communication play a pivotal role in building the required narrative. Once the central theme is articulated, all stakeholders need to be brought on the same page to further the strategic agenda—

any deviations or aberrations derail the entire process. The advantage of a prompt and confident briefing by a subject matter expert military officer after the surgical strike in 2016 was absent after the Balakot Strike in February 2019. This resulted in a very slow build-up of the required narrative. To remain synchronised with unfolding events, it is time that mission planning incorporates strategic communication processes as well. India in general, and the IAF in particular, needs to further hone the art of strategic communication.⁴³

RE-EQUIPPING PROCESSES, OBJECTIVES AND OUTCOMES

The introduction of a well-articulated Defence Procurement Procedure (DPP) was a major change after Kargil that laid down a roadmap for all capital procurements in a time-bound manner. Since its first edition in 2002, it has seen multiple changes and is currently in its seventh incarnation. The DPP has tried to learn from its shortcomings and has incorporated changes to streamline the procurement process. In spite of its flexibility and incorporation of changes, it is always painted black and called the bane of capital procurements in India. Even the Comptroller and Auditor General (CAG) report in 2019 castigates the DPP.⁴⁴ In case one was to objectively compare DPP with similar processes internationally, the DPP stands out as a robust document. It is not the procedure laid out in DPP that has failed the Indian Armed Forces; it is the personnel given the responsibility to implement it. Deviations, intentional or out of ignorance, from laid-down process are galore in almost all capital procurements.⁴⁵ Failure to punish defaulters has been the bane and not the procedure of capital procurement. Inadequate knowledge, poor training and incorrect focus of personnel involved in capital procurement have led to poor capability development of the Indian Armed Forces.⁴⁶

A structural change that altered the capability-building plan was mandatory articulation of Long Term Perspective Plan for individual services and their amalgamation as the Long Term Integrated Perspective Plan (LTIPP). The LTIPP, theoretically, is a good tool as it lays out the capital acquisition roadmap for requisite capability and minimises duplication between all three services. Additionally, it helps in clubbing requirements for cutting down equipment diversity and better negotiating power with the vendors. But it suffers from a fundamental flaw—it does not prioritise acquisitions. As a result, service headquarters, keen to fully exploit the budgetary allocation, procure what they can and not what is essential. Unless caveats like ‘This item can be procured only after items

a, b and c have been contracted for' are added, capability development will remain suboptimal for the given financial outlay.

Uneven Growth and External Dependence

For the first time in the history of military aviation in India, the number of helicopters with the Indian Armed Forces exceeds the number of fighter aircraft (see Figure 2). There has been practically no change in the number of training aircraft and wide-bodied aircraft in the last two decades, but the fighter aircraft strength has been depleting. With the planned induction of more helicopters and the scheduled phasing out of several fighter aircraft on completion of their total technical life/calendar life, this gap is likely to widen. Addition of UAVs has taken place in all three wings of the Indian Armed Forces, but the numbers, capacity and capabilities are still not substantial. The induction of a large numbers of unmanned combat aerial vehicles (UCAVs) is on the anvil, which will further enhance options for kinetic force application.

The helicopter fleet primarily consists of Light Utility Helicopters (LUHs) and Medium Lift Helicopters (MLHs). In the last two decades, this fleet has expanded in all three services, albeit at different rates. The least expansion of about 13 per cent is in the IN. The Indian Army helicopter fleet has expanded by over 38 per cent. However, the most

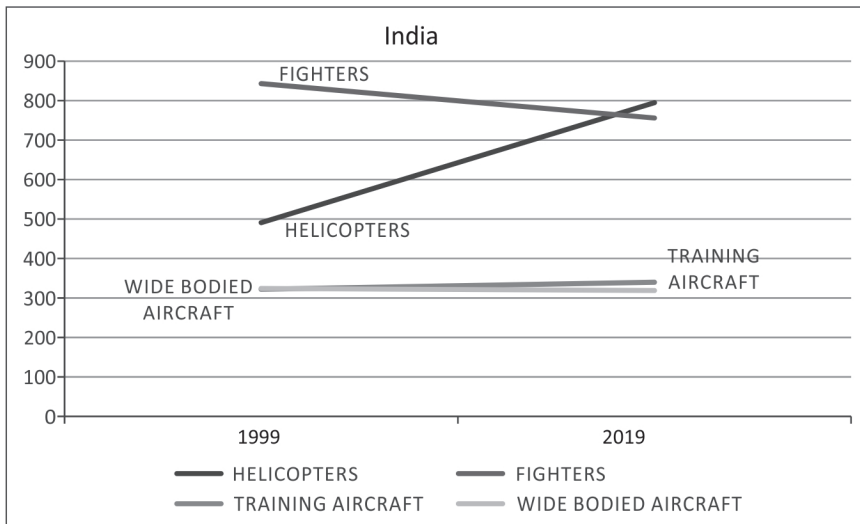


Figure 2 Indian Military Aviation Assets Categorisation

Source: Based on data from *The Military Balance* for various years.⁴⁷

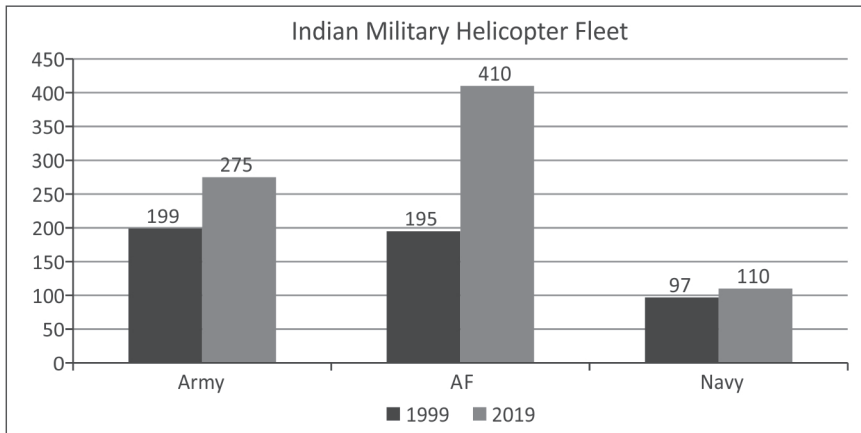


Figure 3 Indian Military Helicopter Fleet

Source: Based on data from *The Military Balance* for various years.⁴⁸

significant expansion in the helicopter fleet, over 110 per cent in the last two decades, has taken place in the IAF (see Figure 3).

The number of fighter aircraft per helicopter for the Indian Armed Forces has dropped since 1999 from 1.71 to 0.95. In contrast, this ratio for China stands at 2.01 and for Pakistan, at 1.36.⁴⁹ This is a clear indication of military air power reorientation in India. A well-thought-out equipping plan, synchronous with the current and envisaged operational environment, is a prerequisite for building necessary capability.

Owing to a long life cycle and high costs of combat equipment in the air power domain, mid-life upgrades are a norm. The IAF has resorted to this for combat aircraft and transport aircraft only. Thus, in the last two decades, MiG-21, MiG-27, Jaguars, Mirage 2000 and MiG-29 have gone through major upgrade programmes, specifically for avionics and weapon integration. The rate of upgrades has been slow, resulting in only limited availability of these platforms during the upgrade cycle. In fact, in case of Mirage 2000, cost of each aircraft upgrade turns out to be more than the cost of a new equally capable combat aircraft.⁵⁰ Avionics upgrade for An-32 aircraft is still in progress. Entire upgradation process for all cases is moving rather slowly.

As far as training aircraft are concerned, IAF's profile has changed completely in the last two decades: from the indigenous HPT-32 and HJT-16, the IAF has switched to imported PC-7 and Hawks. This is a result of the failure of Hindustan Aeronautics Limited (HAL) to provide an alternative to problem-ridden HPT-32 and ageing HJT-16.

A similar story is unfolding in combat aircraft arena as well with slow Light Combat Aircraft (LCA) production, and import of another type of aircraft after the deal for 36 Rafale seems inevitable. In the wide-bodied transport aircraft, no headway has been made and India has always relied on imports. With the Tata–Airbus consortium, the C-295 may become first in this category to be manufactured in India.⁵¹ The narrative in the helicopter seems most encouraging with the success of the ALHs. But here again, with just 12 helicopters⁵² produced last year, soon another imported helicopter may be inducted against a requirement of over 300 for Indian Army and IN. Once the Indo-Russian Helicopter Limited (IRHL) joint venture takes off, the Ka-226 is likely to become the mainstay of Indian military helicopter fleet.⁵³ Figure 4 reflects the

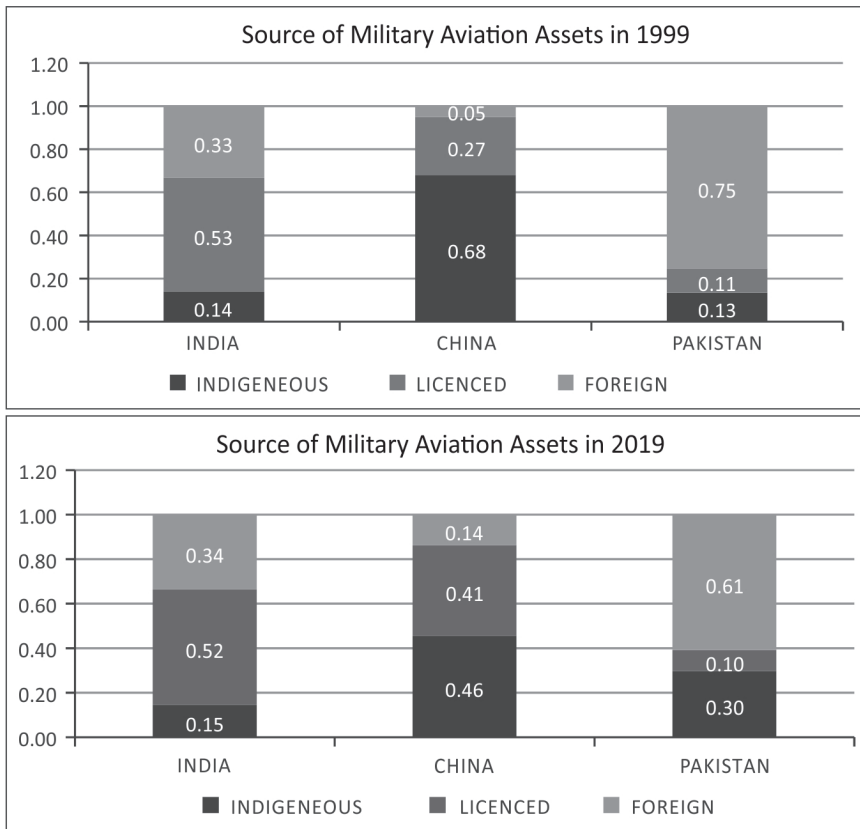


Figure 4 Source of Military Aviation Assets in India, China and Pakistan

Source: Based on data from *The Military Balance* for various years.⁵⁴

lacklustre military aviation industry in India with indigenous content stuck around 15 per cent mark and in comparison, Pakistan has more than doubled indigenous share to 30 per cent.

A number of Defence Research and Development Organisation (DRDO) labs have been attempting to design and develop indigenous air-launched precision weapons but success has invariably eluded them.⁵⁵ The most successful model has been that followed by a Government of India joint venture with NPOM, in production of BrahMos supersonic cruise missile.⁵⁶ Its integration with Su-30 has given India air-launched cruise missile (ALCM) capability for the first time. A number of systems by DRDO are still under various stages of development and integration, including the Smart Anti Airfield Weapon (SAAW) and Astra Missile.⁵⁶ Once mass produced and integrated with relevant combat aircraft, this will enhance IAF potency.

The LCA, ALH, Rohini, Akash and BrahMos are five major indigenous systems that have been inducted in the IAF and are doing well. However, on the space front, the situation is much more encouraging with good progress in satellite building, launching and operating capabilities. Additionally, the GPS Aided Geo Augmented Navigation (GAGAN) project for navigation over Indian airspace, and the Indian Regional Navigation Satellite System (IRNSS) for independent and self-reliant satellite-based navigation services over Indian region are progressing well. Overall, the indigenisation content of current combat and combat support capability is still very low and India has a long way to go in this regard.

ORGANISATIONAL CHANGES

Three significant issues related to the organisation of the IAF in the last two decades need a relook. First, the IAF has developed and trained robust special force units, Garuds, with a primary focus on defensive and offensive IAF-related operations. Second, besides the Indian Army, IAF inventory now includes the surface-to-surface missile, BrahMos. Third, Attack Helicopters (AHs), that were earlier only in the IAF inventory, have been allowed to be a part of Indian Army aviation corps as well. The main reason for relooking at these decision is to cut out duplication of effort and setting up avoidable parallel structures for logistics, maintenance, training, command and control. Indian Army has the renowned Special Forces that is capable of undertaking all tasks envisaged by the IAF for Garuds. So, the creation of Garuds is neither

operationally nor functionally nor administratively economical for India. Similarly, equipping two services with the same equipment, as in the case of BrahMos and AH, is suboptimal. Such decisions ought to be governed by overall operational, functional, administrative and financial efficacy to build national capability. A single organisation controlling a specific capability is optimal and its exploitation can be by any organisation based on necessity.

On the human resource front, in the last two decades, one of the most significant changes has been fine-tuning the training so that all personnel are utilised effectively and have adequate on-the-job training with just-in-time training (JITT) concept, introduced in 2004. Although the initial phase of JITT implementation had numerous problems, gradually an optimal solution has been achieved for enhancing the effectiveness of the training process. Implementation of JITT evolved into the Encapsulated Pattern of Training (EPT) till March 2006, and then Modular Pattern of Training (MPT) till December 2013. The new training policy on the Integrated Pattern of Training (IPT) was introduced from January 2014.⁵⁷ The evolution of this training pattern was a result of flexibility to quickly incorporate lessons learnt during the process.

Another aspect relates to the officer cadre. Gradually, the scope and number of Short Service Commission (SSC) officers has been increased. The prime aim has been to trim down the base of the very steep promotional pyramid and curtail outflow on account of pension. In most cases, on judicial intervention, SSC officers inducted were granted Permanent Commission, nullifying the intent with which the scheme was started.⁵⁸ As far as gender diversity is concerned, induction of women in the Indian Armed Forces began in 1992 in the non-medical branches. The numbers have gradually increased post-Kargil, but the share remains still minuscule at 3.89 per cent in the Indian Army and 6.7 per cent in the IN, with IAF taking the lead with 13.28 per cent in the officer cadre, including fighter pilots.⁵⁹ The IAF can be proud of this.

Infrastructure Development

Air operations depend heavily on infrastructure, including runways, hardened aircraft shelters, weapon storage areas, radio and navigation aids, etc. A comprehensive plan to upgrade airfield infrastructure, under Modernisation of Airfield Infrastructure (MAFI) project, has taken off well and has covered almost all airbases.⁶⁰ Development of ALGs in forward areas is progressing well too.⁶¹ The most significant change

in this arena is IAF's integration with National Highway Authority of India (NHAI) for incorporating certain stretches of upcoming highways that are suitable for aircraft operations.⁶² This has opened up many opportunities, both during the war and in peacetime, for disaster relief. Such stretches of national highways act as alternative aircraft operating surfaces and can be used for dispersing aircraft and for recovering in case of an attack on the designated airfield. However, an area that needs immediate attention is availability of high-altitude air-to-ground firing ranges for training pilots in weapon-firing skills at high altitude.

The aircraft are most vulnerable when on ground, and thus the salience of security of airbases that host such valuable assets. The Pathankot attack demonstrated this vulnerability. Many steps have been taken to enhance the security of airbases and posters like 'Intruders will be shot' have sprung up on IAF bases. Yet, this remains a weak area in the kind of existing hybrid conflict state of 'no peace, no war'. Airfield security, owing to its vast area, is manpower intensive, unless the right kind of technology is incorporated. Thrust on upgrading airfield security ought to be a key priority for the IAF.

In the last two decades, civil aviation in India has grown at a very rapid rate with the induction of a number of private players. This has led to the growth of infrastructure and availability of aviation-related services at various airfields. Three major implications of this expansion are: first, the ready availability of a large number of aircraft for movement of personnel and military hardware in times of crisis, thus reducing the requirement of maintaining a large fleet of military transport aircraft. Second, a number of additional airfields activated for civil aviation can also be utilised for military aircraft operations with minimal augmentation of equipment and services. This has been demonstrated time and again during IAF exercises. Third, the training facilities of IAF are stretched owing to an exodus of a number of trained pilots and maintenance personnel from IAF to the more lucrative civil aviation sector. For building this national capability and enabling the success of UDAN⁶³ ('Ude Desh ka Aam Nagrik'/let the common Indian citizen fly), this is a very small price to pay.

FUTURE TRAJECTORY AND THE WAY FORWARD

India has an ideal window of opportunity at this juncture to recast its armed forces. Pakistan, under severe economic stress, has been forced to cut down the allocation for its defence.⁶⁴ Additionally, with Pakistan

continuing on Financial Action Task Force (FATF) 'jurisdictions with strategic deficiencies' list, also known as the grey list, a greater threat of its isolation persists.⁶⁵ These factors will result in cutting down funding for terrorist organisations. On the sub-conventional threat, on one hand, curtailed funding will have its implication and, on the other, India's surgical strike in 2016, and the air strike in 2019, have increased the cost of using terrorism as a tool. Hopefully, this will lead to a gradual reduction in terror attacks. With respect to Pakistan, this is an ideal time for recalibrating defence posturing as the likelihood of a conventional conflict remains low.

With regard to China, although border demarcation remains an issue, peace has prevailed for over four decades. Aiming to reach the top of world hierarchy by 2049, it is unlikely that China will look to militarily engage India. With China looking for ways to handle trade war with the US and focus on its maritime zone in the east, it seems unlikely that military conflict will take place on India's northern borders in the near future.

On both these accounts, the best window of opportunity exists for India to focus on enhancing capabilities that India needs and not spend money on accumulating military assets that India can buy. Curtailing adhocism and laying out a roadmap would be ideal, as has been done internationally by various forces of varying sizes.⁶⁶ This time slot is ideally suited for taking 'Make in India' for defence requirements to a logical conclusion. The central aim for 2019–24 ought to be to relinquish the top slot and go down by three to four steps in the list of the biggest arms importers of the world. Policy decisions to infuse funds and revitalise and redefine the role and accountability of DRDO, defence public sector undertakings (DPSUs), and the Ordnance Factory Board (OFB) need to be taken now so that results start showing by 2022–24.⁶⁷ Alongside, providing a level playing field to the private sector and hand-holding for initial orders will assist in creating an ecosystem that will pay long-term dividend. Practically, it is a make or break period for 'Make in India' in the defence sector.

The IAF has shown exemplary flexibility in its thinking and has given multiple operational options to the polity for the entire spectrum of conflict. Induction of weapons with long range has altered the target engagement zone substantially. While in the air-to-air weapons induction of long-range missiles has opened up the envelope, availability of air-launched cruise missile like BrahMos has redefined the air-to-

surface capability. All this put together means a longer reach for offensive and defensive missions. Areas that need immediate attention include operationalisation of operational data link (ODL), enhancing the force enablers, like AWACS and intelligence, surveillance, target acquisition and reconnaissance (ISTAR) system, and flight refuelling aircraft (FRA) that will assist in effective combat force application in the aerospace domain, to ensure dwindling combat aircraft strength does not lead to a major combat disadvantage.⁶⁸ Rather than focus on the number of platforms, especially fighter aircraft and growing chorus for 42 squadrons, the IAF needs to focus on enhancing the combat capability of existing fleet by induction of more capable sensors, weapons, electronic warfare and networking subsystems. The IAF needs to continuously remind itself of the goal it had set for itself in 2000, that is, to substantially reduce the inventory diversity in its aircraft fleet.⁶⁹

Organisationally, some major steps can be initiated in this time block so that all teething troubles are resolved by 2024. The Indian Army has initiated some reorganisational steps to enhance operational efficiency—a move in the right direction. Consolidation is the need of the hour and high-speed digital communication can facilitate that. In consolidation, all assets with similar role need to be reorganised under one central head for economies of scale and optimisation. Some examples in this category are: logistical management; communication networks; mechanical transports; land-based aviation; and air defence assets. Such consolidation will not only cut down costs but assist in forces integration—a dream that everyone chases. All stakeholders will have to show flexibility and maturity and be ready to lose individual battles to be able to win the next war.

Indian air power has transformed in the last two decades and expanded its capability in all critical facets. The IAF, in particular, has positioned itself to deliver the punch that today's geopolitics may require: swift, deep, effective, precise and contained in terms of collateral. To build this capability, the IAF has spent over Rs 7,000,000,000,000⁷⁰ (yes, you have counted it right, there are a dozen zeros) during the last two decades and a substantial amount is already committed for the contracted equipment and services. In this process, the IAF did get a severe image jolt with the arrest of one of its former Chief of the Air Staff on charges of corruption⁷¹ and the Central Bureau of Investigation filing another charge sheet in Pilatus trainer aircraft deal.⁷² Will such issues derail the modernisation? Would cutting out duplication and focusing

on crucial aspects like surveillance have given this capability at a lower price, or faster? Alternatively, with this kind of financial outlay, should India have built a much better capability? These moot hypothetical questions remain. The answers lie in the way India looks at her security and manages various stakeholders. Hopefully, adequate lessons have been learnt in the last two decades and similar questions will not haunt us two decades later.

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