

The Need for 'Inclusiveness' in the Conceptual Understanding of Air Power

The Indian Case

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The prevalent and common understanding of air power is very capability-centric and limited to bean-counting of aerial platforms, like fixed-wing or rotary-wing aircraft, and their kinetic potential to carry out damage on and impact the will of an adversary. However, this understanding of air power is not inclusive as it does not take into account a country's intrinsic capacity and capability to design and manufacture aircraft, critical components and technologies, like engines, sensors, materials and so on. Such capacities and capabilities ensure that the country is self-reliant in the defence and civil aerospace sector and less reliant on foreign suppliers, thereby strengthening the country's strategic autonomy. This article argues that such capacities and capabilities are important elements that need to be factored in to arrive at a comprehensive assessment of a country's air power, and that such an assessment will be more inclusive and provide the true picture of a country's actual potential as an air power.

Keywords: *Concept of Air Power, Expanding Air Power as a Concept, Inclusiveness in Air Power, Aerospace Ecosystem, Development of Capability and Capacity in Air Power, Indian Air Force Doctrine*

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INTRODUCTION

The world entered the era of aerial warfare, in 1911, with the employment of aircraft for bombing during the war between Italy and the Ottoman Empire over the Libyan territory of Tripoli.¹ This continued into World War I wherein air power was primarily used by Germans to bomb British civilian targets. World War II saw technological advancements like powerful engines, design improvements and advancements in avionics, which led to air power becoming a decisive element of warfare.

The detailed and deliberate conceptualisation of air power as a concept began with the publication of the book, *The Command of the Air*, by Giulio Douhet in 1921.² The primary focus of Douhet's argument was the strategic bombing of military and civilian installations. Similarly, Alexander de Seversky, a Russian-origin American military strategist, underlined the significance of air power in his book, *Victory Through Air Power*, published in 1942. He emphasised long-range strategic bombing and stressed investing additional resources into air power compared to land and sea power.³

India's air power in the military domain has witnessed phenomenal growth and expansion from the creation of the Indian Air Force (IAF) in 1932 to its current position as the fourth-largest air force in the world as per the Global Firepower Index.⁴ However, it is also important to remember that, at present, most of the platforms employed by the IAF are imported. A few, like the Light Combat Aircraft (LCA) *Tejas*, the Advanced Light Helicopter (ALH) *Dhruv* (all variants) and the Light Combat Helicopter (LCH) *Prachand*, are an exception to this general rule.

This article argues that our current understanding of air power should not be capability-centric and limited to bean-counting of aerial platforms, like fixed-wing or rotary-wing aircraft. A country's capacity to design and manufacture aircraft, critical components and technologies, like engines, sensors and materials, is an important element that needs to be factored in to arrive at a holistic assessment of the country's air power. The main focus of this article, thus, is to emphasise the need to broaden the dominant understanding of air power, which is primarily focused on the capability and number of aerial platforms, to include the country's capacity to conduct research and development (R&D) to design and manufacture aircraft and critical components, like engines and sensors, domestically, backed by a robust domestic ecosystem in the aerospace domain. Such an inclusive understanding of the concept of air power will augment India's overall

capacities and capabilities in the aerospace domain with benefits in both civilian and military spheres.

The article is organised into various sections. The next section discusses the genesis of air power theory, followed by an examination of the roles, functions and components of air power. After that, the article takes a look at the Indian understanding of air power, including the doctrine of the IAF. Then, there is a section on the need to expand the conceptual understanding of air power in order to make it more inclusive and ensure that it captures the real potential of the country in the domain of air power. The penultimate section discusses a few policy prescriptions, followed by conclusion.

GENESIS OF AIR POWER THEORY: CLASSICAL AND CONTEMPORARY DEBATES

As mentioned earlier, in the year 1911, the Battle of Tripoli between Italy and the Ottoman Empire introduced to the world the third dimension of warfare, that is, air power, in addition to land and sea power. The scope and role of air power remained limited till World War II due to various reasons, including technological challenges and operational issues. During this period, various military theorists tried to conceptualise air power, particularly its scope, role and impact. Starting from Giulio Douhet to Hugh Trenchard, John Slessor and Alexander P. de Seversky, all produced an ample amount of literature on air power drawing from the expertise and experience gained through their active military service.⁵

However, the literature produced in this period had a large amount of similarity given the fact that it largely focused on: strategic bombing; offensive role of air power; considering air power as a strategic weapon; attacking vital centres in hostile countries; demolishing supply chains; disruption of industrial production; and breaking the morale of the people. These theorists presumed that the weakening of the public morale would ultimately jeopardise the country's ability to wage or sustain war given the waning public support for such a military campaign.⁶

Prior to World War I, only a few scholars delved into the subject of the possible impact of air power on warfare. In a 2010 essay, Tami Davis Biddle highlighted such scholars and authors, like Victor Hugo, who:

speculated that aircraft would bring about the universal abolition of borders, leading to the end of wars and a great 'peaceful revolution.' Jules Verne's widely-read novel *Clipper of the Clouds* (1886) asserted that the

future belonged to aerial warfare machines. In 1893, Major J.D. Fullerton of the British Royal Engineers theorized about an aerial 'revolution in the art of war.'⁷

Similarly, Biddle further said that:

Octave Chanute argued that because no territory would be immune from the horrors of the air war, 'the ultimate effect will be to diminish greatly the frequency of wars and to substitute more rational methods of settling international misunderstandings.' In a 1911 essay for *Collier's magazine*, noted military inventor Sir Hiram Maxim argued that there would be no defense against the aeroplane, the most potent machine of destruction ever invented.⁸

As stated earlier, the conceptualisation of air power in its modern sense began with the publication of the book, *The Command of the Air*, by Italian scholar-warrior Giulio Douhet in 1921.⁹ The core argument of Douhet's theory centred around strategic bombing of the enemy. He defined air power as a strategic weapon and not a tactical weapon, through which strategic gains could be achieved. To shatter the public will, Douhet argued, it was essential to target the vital centres of the enemy country, like industry, arms depots, transportation, infrastructure, communication nodes and government buildings.¹⁰

According to Colonel Phillip S. Meilinger, Douhet was ahead of his contemporaries since he emphasised the role of industry in the country's air power. Douhet saw a strong and symbiotic relationship between an air force and the aviation industry. Further, he argued that the government must fund R&D of the aircraft and their high-performance engines as it is prohibitively costly, involves high and complex technologies and has long gestation periods.¹¹ The argument put forth by Douhet about the role of industry and R&D has generally received much less focus in the arguments made by other air power theorists.

Douhet argued for the creation of a separate air wing of Italian Armed Forces consisting of 500 bombers to enhance the effectiveness of air power. Due to the vastness of the airspace, Douhet did not consider air power as a defensive instrument of war and hence, he emphasised the offensive use of air power. He stressed the development of long-range bombers which can penetrate deep into the enemy airspace and deliver large amounts of ordinance in order to destroy crucial targets. Such targeting measures could, in fact, contribute to the breakdown of the adversary's will to fight.

In the same period, Hugh Trenchard emerged as a strong proponent of air power in Britain. He too considered air power as a strategic weapon and advocated its use in an offensive manner. To withstand the German air strikes, Trenchard stressed an offensive air strike on German airfields as a result of which they would not be able to employ their aerial assets in the war theatre. Under strategic bombing, he identified some critical targets to be eliminated, such as iron and coal mines, steel mills, chemical production facilities, explosive factories, miscellaneous armament industries, aero engines and magneto works, submarine and shipbuilding work, large gun foundries and engine repair shops. In addition to the significance of these targets in the warfighting potential, Trenchard justified these targets given their large size, which made them easy to locate with the naked eye from high altitudes.¹²

Unlike Douhet, Trenchard did not support attack on civilian targets. He stressed on the need to weaken the morale of public at large by bombing the industries and military targets that supported the warfighting potential of the country, which would result in unemployment and ultimately break the will of people. Trenchard argued that the damage to the morale of the public via aerial bombing was 20 times higher than the actual physical damage caused due to the aerial bombings. Thus, he focused on air power's psychological effects rather than the material damage it inflicted.¹³

In the United States (US), it was Soviet émigré Alexander de Seversky who emerged as the predominant air power theorist. In his 1942 book, *Victory Through Air Power*, Seversky reaffirmed air power as the key to victory in warfare. Similar to other air power theorists, he considered air power as a strategic weapon, given its longer range, speed and ability to survive an attack into enemy territory. Further, he argued that capturing hostile territory was an outdated concept and hence, he preferred attacks on strategically valuable locations. Seversky too underlined the necessity of air superiority, but he differed from other theorists, such as Douhet and William 'Billy' Mitchell, on the meaning of the concept. For Douhet and Mitchell, air superiority could be achieved by destroying enemy airfields, aircraft and aircraft factories on ground; Seversky, on the other hand, argued that air battle was imperative to achieve air superiority.¹⁴

Seversky also differed from Douhet and Mitchell on the importance of strategic bombing. While Seversky did not support bombing cities or targeting the population, he stressed the importance of bombing industrial centres of the enemy. He argued that targeting the population might prove counterproductive because 'dead people don't revolt'. Instead, he sought to drive a wedge between the people and their leaders by attacking

communication and transportation networks—by ‘disarming the government’. This would result in an ‘internal blockade’ of the country, which, he believed, would damage the country’s will to continue waging war.¹⁵

Giulio Douhet, Billy Mitchell, Hugh Trenchard, John Slessor and Alexander de Seversky, all emphasised on jointness between land, air and sea power for a decisive victory in warfare. However, it was only Douhet and Seversky who emphasised the importance of a strong and vibrant scientific and industrial base for successful projection of air power. While comparing American and Russian air power, Seversky argued that such a strong industrial base existed in the US but was absent in Soviet Russia, which enabled the successful growth of American air power.¹⁶

Apart from thoughts on air power, Seversky greatly contributed to expand the capability of air power with his technological innovations, which have definitely increased the efficacy of aircraft in general. He invented many key aerospace-related technologies, such as air-to-air refuelling, retractable landing gears and pontoons, specialised flight instruments and a complete metal body monoplane, P-35.¹⁷

This discussion about air power theorists brings out certain commonalities in their thinking. All the major air power theorists—Douhet, Trenchard, Mitchell and Seversky—gave prominence to strategic bombing and the offensive use of air power to cause damage to important sites, thereby damaging the morale of the people. In addition, importance was also given to hitting vital centres and jointness between air, land and sea power. All the theorists stressed on the importance of having an independent air force. These theorists were primarily focused on how air capabilities would help countries in taking punitive action against their adversaries, thus impacting the course of war or conflict. Douhet and Seversky, however, were the only two classical air power theorists who paid attention to the need for developing a domestic aerospace industry or stressed the importance of R&D in the aerospace sector.

This article argues that the above-mentioned conceptualisation of air power, which is limited to various combat and support roles and functions in warfare and peacetime, is far from a holistic understanding of the concept of air power. The authors argue that air power as a concept has to be understood in a broader sense by including the country’s domestic prowess in designing, developing and manufacturing various types of aircraft, aero engines and related sub-systems.

The next section studies the various components of air power and the roles and functions that air forces have performed, both in combat

and peacetime, since World War I. The contemporary imagination of air power has largely been shaped by the classical theoretical understanding of air power. Therefore, the roles and functions of air power are limited to the employment and execution of aerial platforms in various combat and peacetime roles. This excludes important capabilities, like designing, developing and manufacturing aircraft, aero engines and related sub-systems in the aerospace sector.

ROLES, FUNCTIONS AND COMPONENTS OF AIR POWER

Roles of Air Power

During the World Wars, air power was at a stage of infancy with the technology used to design, develop and manufacture aircraft yet to mature fully. Due to these limitations, the role of air power was comparatively limited as compared to the contemporary roles performed by aircraft and other aerial platforms.

In the first phase of evolution of air power from 1921 to 1945, its role was confined to strategic bombing, interdiction and surveillance. With technological advancements, such as the integration of cannons on the airframe and development of ground-based air defence artillery, the role and nature of air power and air operations changed from the earlier role of bombing targets; indeed, the presence of ground-based air defence artillery necessitated the need for escort aircraft in order to bomb and neutralise air defence artillery.

Further, air denial was also a key role of air power during the World War. Under this role, the aggressor air force attempted to eliminate hostile air force aircraft on the ground even before they could become airborne and retaliate. Until the invention of nuclear weapons, air power—given its range, reach, speed, medium of delivery and payload-carrying capacity—was considered as a strategic weapon with the ability to deter. Following the advent of the nuclear age, long-range bombers became an important leg of the triad of nuclear power, especially in the first half of the Cold War.

At present, advancement in aviation technology has transformed the role and scope of the operational capabilities of air power. Particularly, the development of force multiplier platforms, such as strategic and tactical transport aircraft, airborne early warning and control (AEW&C) aircraft, electronic warfare (EW) aircraft, air-to-air refuellers, intelligence, surveillance, target acquisition and reconnaissance (ISTAR) aircraft, anti-

submarine warfare (ASW) aircraft and unmanned aerial vehicles (UAVs), has expanded the role of air power. Further, the employment of the space for military application has enlarged the scope of air power through data fusion and network-centric warfare capability.

Functions of Air Power

Combat Functions

The advancement in aircraft technology has resulted in the expansion of functions of air power and has contributed in enhancing its effectiveness in warfare. Air power and air force platforms perform various roles during peacetime and crises, such as strategic bombing, intelligence, surveillance and reconnaissance (ISR) operations, EW, air defence, interception, air patrolling, interdiction, punitive action, special operations, maritime role, suppression of enemy air defences (SEAD) and destruction of enemy air defences (DEAD), unmanned warfare, maintaining logistics supply and nuclear deterrence roles.

Support Functions

In addition to hardcore military operations, air power and air force platforms carry out other functions, such as humanitarian assistance and disaster relief in case of natural calamity; air diplomacy; air exercise with friendly countries to build combat effectiveness through mutual learning; and demonstration of a country's technological advancement through participation in air shows and air exhibitions.

Components of Air Power

Over the years, the nature of warfare has drastically changed and that has shaped force structure. In the case of air power, there are two interdependent factors which have played a vital role in shaping its structure or composition. First, the advancement in technology and second, its incorporation with warfare. Both factors have played a critical role in modifying the structure of air power as it is employed in modern day warfare. All classical air power theorists had advocated a separate air force, free from the control of land and sea power, given the fact that the nature of air power is intrinsically different from that of sea and land power. Figure 1 gives the classical components of air power.

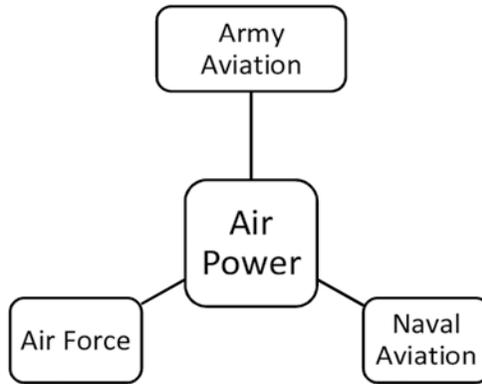


Figure 1 Classical Components of Air Power
Source: The figure has been prepared by the authors.

The contemporary understanding of the components of air power comprises all airborne assets and their related equipment possessed by all wings of the defence forces (Figure 2). For instance, all types of fixed- and rotary-wing aircraft; air-launched missiles and munitions, such as air-to-air missiles, air-to-surface missiles and guided munitions; UAVs; ground-based air defence systems; and space-based assets, such as satellites, and their associated command and control components, are considered as components of air power.



Figure 2 Contemporary Components of Air Power
Source: Modified by the authors using the IAF 2012 doctrine.

INDIAN UNDERSTANDING OF AIR POWER

In the case of India, the genesis of its air power was under the British rule with the establishment of the Royal Indian Air Force in 1932. In the past, India's air force and air power assets have played a critical role in various military conflicts, beginning with the 1948 Indo-Pak War, 1965 India–Pakistan War, the 1971 India–Pakistan War and most recently, the 1999 Kargil War. In all of these conflicts, air power has played an important role in shaping the course of the war. In contrast, in the 1962 Indo-China War, India restrained from using the air force in response to the Chinese aggression along the Sino-Indian border. It is a counterfactual yet interesting question as to whether the use of air power in 1962 might have altered the course and the outcome of the war.

Apart from military-centric roles, the IAF has also played a vital role in assisting civilian authorities and other disaster relief forces in times of natural disasters, pandemics and evacuation of Indian nationals from conflict areas. In addition, the IAF's involvement in the cross-border attacks in response to the Pulwama terror attack of 2019 demonstrates India's ability to employ its air power in sub-conventional warfare.

In order to understand the Indian approach to air power in a more structured manner, the article will now analyse the IAF doctrine, which was first released in 1995. Subsequently, the doctrine of the IAF has been published three times: 2007, 2012 and most recently, 2022. Primarily, the doctrinal documents comprise the experience and expertise gained by armed forces through previously fought wars and battles, which can be employed to deal with future wars or potential conflicts to minimise the losses and maximise the chances of victory through optimum utilisation of the existing resources.¹⁹

The 1995 doctrine of the IAF dealt with the theory of war, characteristics of air power and its relationship with strategy, various air campaigns, combat support operations conducted by the IAF and aspects related to prosecuting an air war. It provided an exhaustive narrative of the basics of air power employment.²⁰ In 2007, the revised version of the doctrine was published. However, both of these doctrines are not available in the open domain, hence this article has not delved into them further.

2012 Doctrine of the IAF

The IAF 2012 doctrine offers a comprehensive understanding of the Indian point of view on air power. The fundamental concept of air power described

in this doctrine is quite similar to the point of view of classical air power theorists, who have emphasised some key characteristics of air power, such as strategic use of air power, air power as an offensive weapon, force interdiction, mobility, reach and flexibility. Apart from this, the doctrine also describes the limitations of air power in terms of sustainability, air base dependency, sensitivity to technology, vulnerability, impermanency, weather and political constraints in its employment. In operational terms, the doctrine stresses the synergy between air power and other wings of the armed forces to get favourable results in war. Further, it discusses the structure of air power, principles of war and air power, jointness, air and space paradigm, sub-conventional warfare and technology.

The IAF 2012 doctrine describes air power in the following words:

Air power is a derivative and also an indicator of national power. Its the ability of a nation to utilise all air power resources at its disposal that determines its air power capabilities. Air power, hence, is the sum total of a nation's aviation and related capabilities. It comprises national aviation assets usually described as air forces, air arms and civil aviation, along with their associated organisations, infrastructure, logistics and personnel. The use of space, either independently or in support of air power, is on the rise and consequently the term aerospace power is coming increasingly into vogue.²¹

2022 Doctrine of the IAF

In 2022, the IAF released the latest iteration of its doctrine. The 2022 doctrine attempts to enlarge the scope of the concept of air power by bringing in the space element and emphasising the broader aspect of aerospace power. However, it continues drawing upon the previous IAF doctrines and classical air power thinking about the strategic use of air power, air power as an offensive weapon, force interdiction, mobility, reach and flexibility.

Nevertheless, the IAF's doctrine of 2022 is unique in its nature compared to its predecessors for two reasons. First, the 2022 doctrine briefly highlights India's need for self-sufficiency in defence production and considers self-sufficiency in defence production as a crucial aim of India's national military objective. The 2022 doctrine, in the sections, 'National Military Objectives' and 'Objectives of the Indian Air Force', states: 'to foster and contribute towards enabling the required degree of self-sufficiency in defence equipment and technology through indigenisation to achieve the desired degree of technological independence.'²²

Second, the doctrine has also adopted a broader approach towards air power with the inclusion of space elements. The 2022 doctrine thus builds upon the 2012 doctrine, which highlighted the fact that space had become a crucial element of modern-day warfare. The 2012 doctrine had also highlighted the use of space-based technologies and assets as a force multiplier for offensive operations and daily decision-making processes by the allied forces against Iraqi Armed Forces during Operation Desert Storm.²³

Thus, an analysis of the 2012 and 2022 IAF doctrines highlights the fact that they are steeped in the classical understanding of air power, which is largely focused upon the ability of the country's air power assets to assert its will on the adversary. This strengthens the central argument made in this article that the concept of air power needs to be re-imagined in an inclusive manner. This can be done by broadening and expanding beyond aerial capabilities in terms of the numbers of aircraft the country possesses to include domestic capabilities to design, develop and manufacture civil and military aircraft, jet engines and associated sub-systems. Such an understanding of air power will be more inclusive and reflect the real capabilities of a country as a comprehensive air power.

INCLUSIVENESS IN THE CONCEPTUAL UNDERSTANDING OF AIR POWER

As discussed earlier, among the classical air power theorists, only Douhet and Seversky have given importance to the relationship between industrial capability and air power. In Douhet's view, there is a strong and symbiotic relationship between an air force (air power) and the aviation industry. Further, he argues that the government must fund R&D of the aircraft and their special high-performance engines. Since aerospace is cost-extensive in nature, the industry alone would not be able to bear the financial burden for R&D.²⁴

The 2012 and 2022 IAF doctrines, as highlighted earlier, are largely steeped in the classical understanding of air power. They stress that the source of India's air power relies on the air-fighting capabilities of the forces. However, it is also a well-known fact that all the three services of the Indian military rely heavily on imports from the international market, especially for aerial platforms. In case of the IAF, beginning from basic trainers to large-size strategic airlifting aircraft, weapon packages and related systems, most of the assets are of foreign origin. While some have been outrightly purchased

in government-to-government contracts to meet the immediate operational requirements, others have been manufactured under licenced production.

Nonetheless, there are a few exceptions to the general rule, such as trainers (HTT-40) and rotary-wing aircraft, like ALH Dhruv, the soon-to-be inducted LCH Prachand in the attack helicopter category and the Light Utility Helicopter (LUH).²⁵ In the fixed-wing aircraft, one of the stellar success stories of indigenous design, development and production is LCA Tejas. Given the indigenous nature of the platform, future variants, like Mark IA and Mark II, Twin Engine Deck Based Fighter (TEDBF) and the fifth-generation Advanced Multi-role Combat Aircraft (AMCA), are under various stages of planning, design and production.²⁶ However, many of these platforms have only 50–60 per cent domestic components and several components, including the engine, continue to be of foreign origin.

In retrospect, the Indian defence industrial base, especially in the aerospace sector, had been one of the most vibrant ones in a Third World country. In 1940, India's first aeronautics company, Hindustan Aircraft Limited, was established in the private sector by Seth Walchand Hirachand and was nationalised in 1951.²⁷ From its foundation to the present, the Hindustan Aeronautics Limited (HAL), as it is presently called, has achieved tremendous growth. The company has been a key supplier of the country's aerial platforms. It has been engaged in manufacturing different kinds of aircraft under licenced manufacturing, such as Dakota, Gnat, MiG-21, Jaguar and more recently, Sukhoi 30. Apart from licenced manufacturing, the HAL has demonstrated its capability to design, develop and manufacture military aircraft indigenously, from fixed wing to rotary wing and from basic trainer to full-fledged multi-role combat aircraft, such as HF-24 *Marut*. So far, the company has designed and developed dozens of aircraft and manufactured 14 types of aircraft and eight types of aero engines under licence. In all, the HAL has produced 3,500 aircraft and 3,600 aero engines and has overhauled around 8,500 aircraft and around 28,000 aero-engines.²⁸

Considering India's socio-economic conditions and scientific and industrial strength post Independence, the country adopted a model to develop its aircraft industry under which it would be able to develop the indigenous capability of aircraft production without compensating the operational preparedness and requirements of its armed forces. This framework was flexible enough to also source aircraft from the international market as and when needed.

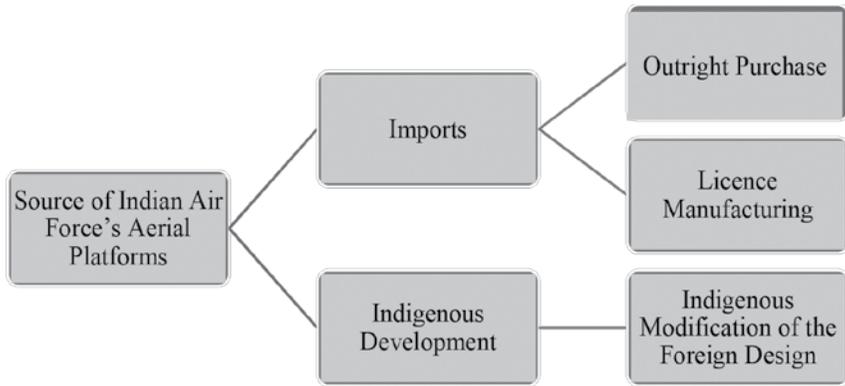


Figure 3 Sources of IAF Military Platforms

Source: Figure prepared by authors from 'Preface', in S.N. Misra, *Impact of Defence Offsets on Military Industry Capability and Self-Reliance: The Road Ahead*, KW Publishers, New Delhi, 2012.

Under this framework, priority was given to enhancing the capability of the domestic industry to undertake the designing, developing and manufacturing of aircraft in India. Simultaneously, imports were also chosen to maintain the combat readiness of the Indian forces. The imports were divided into two categories. First, the outright purchase of the aircraft in fly-away condition from the international market. Second, purchasing aircraft from the international market with the clause of licence manufacturing or assembling of the aircraft in India under transfer of technology. The rationale for outright purchase was to meet the immediate requirements of the forces, whereas licenced manufacturing was intended to offer hands-on experience to the Indian industry and train the human resources in handling high-end aerospace technology.

Indeed, licenced manufacturing has contributed to developing aerospace-related infrastructure and human resources in India. Despite this, its convergence in developing in-house R&D and production capability of the Indian aerospace sector seems negligible. Except for a few notable, successful indigenous aircraft programmes which have reached induction, most of the remaining air assets and platforms are import based.

Civil Aviation

In the civil aviation sector too, import dependence is very evident as there have been no successes among various domestic efforts, like Saras, to develop

civilian passenger aircraft. According to the International Air Transport Association (IATA), the Indian civil aviation industry will be the third-largest aviation industry in the world by 2024.²⁹ Despite such a vibrant civil aviation industry, India has not yet succeeded in developing a civil aircraft. The National Aerospace Laboratories (NAL) had come up with SARAS project to develop a 19-seater regional transport aircraft. Presently, the Mark II variant is in the developmental phase.³⁰ The lack of an indigenous passenger aircraft in the civilian sector has meant that all the orders placed by the Indian airliners in the recent past have been to foreign suppliers. In February 2023, Tata Group's Indian Airlines placed an order for around 470 new aircraft from Boeing and Airbus.³¹ According to a report, this deal is valued at \$80–\$100 billion.³² Similarly, Indigo Airlines is also looking to buy around 500 new aircraft from Airbus.³³

A FEW POLICY PRESCRIPTIONS

In terms of policy prescriptions, this article would like to focus on four key elements which will contribute to the re-conceptualisation of the concept of air power and make it more inclusive by bringing in the country's capability and capacity to design and manufacture aircraft, critical components, like engines, sensors and materials, and related capabilities into the understanding of the concept of air power.

Greater Synergy among Stakeholders

First, in order to move ahead with the objective of increasing self-reliance in aircraft design, development and manufacturing in the country, it is essential to ensure that there is greater synergy among all the stakeholders, such as design and developing agencies, production agencies/industry and related organisations, end users (services) and the policymakers (political and bureaucratic).

Unfortunately, in India, this synergy has often been neglected, especially in the case of aircraft development, with LCA Tejas programme being a good example of the same. Conversely, the Indian Navy has had more successes when it comes to inducting indigenous platforms as it works very closely with the various stakeholders, including the industry and the policymakers. In addition, the Indian Navy has an in-house design bureau to design the naval platforms indigenously. To synergise the link between the shipyards and the naval Defence Public Sector Undertakings (DPSUs), all major shipbuilding companies have retired naval officers in middle and higher management

positions. This has, in turn, immensely contributed to ship designing and production capability, as well as better coordination and synergy between the Naval Headquarters and these organisations.³⁴

Similarly, in the case of indigenous development of defence aerial platforms, Air Force officers should be attached on long-term deputation to the HAL, the NAL and the Aeronautical Development Agency (ADA). Given the long gestation times of these projects, such secondments would ensure that there is a direct synergistic link between the Air Headquarters and the developing and production agencies, which is very essential in the initial design and development phase of the project.

Need for Adopting an Incremental Approach for Higher Degree of Self-reliance

The second policy prescription would be with regards to the development of indigenous aircraft. As developing indigenous aircraft from scratch is a time-consuming process, the adoption of an incremental approach would be the most viable option to attain self-reliance in aircraft production. Under this approach, the platform gets inducted with limited numbers and limited capabilities and would continue to receive incremental software and hardware upgrades during its life based on inputs received from the end user service.

For instance, South Korea is planning to induct its indigenously developed KF-21 Boramae fighter jet in two phases. In the first phase, the Republic of Korea Air Force (ROKAF) will induct 40 aircraft with limited air-to-air capability and in the second phase, it will induct 80 aircraft with air-to-air and air-to-ground capability. Further, *Aviation Week* reported that in Block 3 variant, it will become fully stealth aircraft, comparable with contemporary fifth-generation stealth aircraft.³⁵ Likewise, in India's LCA programme, the first batch of initial operational clearance (IOC) and final operational clearance (FOC) standard aircraft were inducted with limited capabilities. This approach is the most viable option for a country like India so that it can develop capability in technically challenging domains with longer timelines, without related delays in induction of the aircraft into the service.

Need for a Comprehensive Self-reliance Model

The third policy prescription is the need for a 'comprehensive self-reliance model'. According to Air Commodore Jasjit Singh, under this model, the country can attain a higher degree of self-reliance in aircraft production without compromising the operational preparedness of the air force. The model adopts the following framework to develop comprehensive air

power. First, utmost priority should be given to indigenous design and development of aircraft, such as LCA Mark I, IA, II and AMCA. Second, licenced manufacturing of imported aircraft, such as 114 Multi-role Fighter Aircraft (MRFA), should be carried out by the domestic private industry in collaboration with foreign original equipment manufacturers (OEMs) under the Make in India initiative or Strategic Partnership Model. Through this, the private sector will get a level playing field in defence aerospace manufacturing that will ultimately lead to a competitive Indian aircraft industry. The last priority will be given to outright purchase of aircraft from the international market to meet the immediate requirement of the IAF, such as the acquisition of 36 Rafale in 2015.³⁶

Taking into consideration India's current defence industrial strength and its limitations, this model seems most feasible to bolster the country's air power capability. It allows indigenisation along with giving space for import, both in terms of ready-to-fly platforms or a few key systems/components, to maintain the technological edge with adversaries both in terms of quantity and quality. Subsequently, once the industry becomes fully capable, complete focus can be given to the acquisition of indigenously designed, developed and produced aircraft.

Need to Increase the Involvement of the Private Players in Defence Manufacturing

Indian defence and aerospace industry has historically been dominated by public sector entities, such as DPSUs, Ordnance Factories and Defence Research and Development Organisation (DRDO). In May 2001, the government formally introduced domestic private industry into defence production following the Kargil Review Committee recommendations.³⁷ Though the public sector has remained dominant, the private sector players have begun playing an increasingly important role over time. However, this has largely been as a supplier of spares and components, rather than as a prime vendor or OEMs. To strengthen and promote the role of domestic private industry in defence production, the government has introduced important policy initiatives, such as Make in India and Strategic Partnership Model.

Despite these initiatives, the involvement of the private industry in defence manufacturing remains a bridge too far. For instance, in the aerospace sector, except for the production of the M/s Airbus Defence and Space-made C-295 tactical transport aircraft by Tata Strategic System Limited, no other major project has been assigned to the private sector.³⁸ The proposed acquisition of 111 Naval Utility Helicopters for the Indian Navy remains

a missed opportunity wherein the private sector could have been involved in developing rotary-wing aircraft under the Strategic Partnership Model.³⁹ However, under the third negative arms import list released in 2022, the import of utility-class helicopters has been banned, which precludes the possibility of manufacture of these choppers by the private sector.⁴⁰

Another initiative which could be considered by the government would be to allow the private sector to manufacture indigenous rotary-wing platforms, such as LCH, LUH and ALH. Such a step, taken in partnership with the HAL, would greatly contribute towards strengthening India's self-reliance, and also strengthen the private industry in defence manufacturing sector. The ongoing acquisition process for 114 MRFA is an excellent opportunity to harness the potential of the domestic private industry in the aerospace domain. Another positive development is the proposed collaborations between major global OEMs, like Lockheed Martin, Boeing and SAAB group, and Indian private defence companies to manufacture fixed-wing fighter aircraft in India.⁴¹

The production of LCA Tejas has already created a robust aerospace supply ecosystem of 500–600 domestic micro, small and medium enterprises, which are capable of manufacturing spares and other minor components. In addition, the LCA programme has also created domestic capability in the private sector to manufacture major components of the aircraft, such as front, middle and rear fuselage, wings and surface controls.⁴² Additionally, Indian industries are part of the global aerospace supply chain, wherein they supply critical components, sub-assemblies and structures for both civil and military applications. This domestic expertise in the private sector can be harnessed for India's future indigenous aerospace programmes, like LCA Mark II, TEDBF and AMCA.

CONCLUSION

The central question that the article addresses is whether there is a need to re-conceptualise and essentially widen the concept of air power. If yes, what should such a wider and more broad-based understanding of the concept include? The article argues that the modern understanding of the concept of air power is largely drawn from classical air power theorists, who largely have emphasised bean-counting of aerial platforms, like fixed- or rotary-wing aircraft, and how these assets will assert the country's will on the adversary to achieve a desired outcome in warfare.

However, if such aerial assets are largely of foreign origin, does it not limit the country's strategic autonomy given its dependence on foreign suppliers,

especially during periods of conflict? Thus, the article argues that the concept of air power should be more inclusive and factor in the country's capability and capacity to design, develop and manufacture civilian and military aircraft, as well as critical components, like engines, sensors and materials. Such an effort will be more wholesome and provide a more comprehensive and real picture of the country's actual potential as an air power.

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