



Indian Air Force Modernization Plan of 2020: Challenges for Regional Air Forces

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ABSTRACT

Given the sweeping impact of today's technology, air power has unquestionably taken a position of dominance in changing the very nature of warfare. Hence, any nation that aspires to enhance its influence beyond its frontiers; ought to have a strong and a viable Air Force. Desirous to play a more dominant role in global affairs, Indian leadership in year 2000, drew an ambitious plan envisaging India to be recognized in the community of developed nations by 2020. Consequently, the Indian Air Force (IAF) defined its vision for 2020 and under the proposed plan, IAF plans to raise its inventory of fighter combat squadrons to 50 to 55 from the existing figures of 39.5. IAF also plans to acquire more advanced fighters, sophisticated defense systems and smart long-range weapons. The proposed plan includes acquisition of more advanced fighters, sophisticated defense systems and smart long-range weapons, for which IAF would require huge funding over the next decade. However, besides exorbitant spending, IAF would also need the support of a modern aerospace industry and research and development establishment to sustain it. IAF plans to accomplish these objectives by 2020. The doctrinal changes and the developmental plans of the IAF are viewed with great suspicion by its neighbors and arch rivals; PLAAF and PAF. The stage seems set to witness a rapid induction of hi tech weapon systems and equipment in the South Asian region during the decade or so alongside improving in the fields of respective strategic capabilities.

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Introduction

1. India is the second most populous country with the world's second largest army, fourth largest air force and fifth largest naval force. "The country has a land frontier of 15,200km, a coastline of 7,516.6 km and an exclusive economic zone of 2.2 million sq km, as well as island territories, vital offshore installations and airspace to defend. The armed forces, therefore, have to be kept prepared and well equipped to repel any external threat."¹ Already accepted as a regional military power, India can move into the great power league but only if it treads carefully². However, India has boundary disputes with both, China and Pakistan and has fought wars over them. According to Shirivastau, "China wishes to keep India strictly confined to its periphery in South Asia, whereas Pakistan has kept India militarily embroiled and economically burdened".³ Hence, India perceives that both of them, individually or jointly, continue to pose a military threat to her territorial integrity thereby causing restraint on her desire to become a truly global player.

2. Indian Air Force (IAF), which since its inception, had been tailored to play a purely supportive tactical role to the army, decided to suitably augment and develop itself to make the maximum impact on the military posturing in future. IAF has managed to convince the leadership of the country that the current scenario necessitated a strategic reach to safeguard its national interests and play a strategic role to dominate the skies over the Indian Ocean.⁴ Consequently, a number of Committees were set up to workout the modalities, timelines and requirements to meet this daunting task. Like other services and departments, IAF also defined its vision for 2020, in the wake of the 'Arun Singh Task

¹ Vijay Goel and Himanshu Pimpalkhute, "Indian defence sector offers investment opportunities", INDIA Singhanian & Co LLP, February 2008.

² Veenu Snadhu, "Military Power is not Enough", Hindustan Times, New Delhi, October 2, 2006.

³ VK Shirivastau, "Indian Air Force in the Years Ahead: An Army View", Strategic Analysis, November 2001 (Vol.XXV No 8).

⁴ SP Tayagi, "India to Protect Interests Beyond Border", Dawn, Islamabad, August 24, 2006.

Force on Management of Defense'.⁵ Under the proposed plan, IAF plans to raise its inventory of fighter combat squadrons to 50-55 from the existing figures of 39.5. IAF plans to acquire more advanced fighters, sophisticated defense systems and smart long-range weapons to cater for its strategic needs. In order to project itself beyond its borders, IAF rightly laid emphasis on the acquisition of force multipliers and improvements in C4I structures, concurrently modernizing its air defense and communication networks.

3. IAF' ambitions to become a truly regional force cannot be verified without looking at the force structures of at least two of its rivals i e Peoples Liberation Army Air Force (PLAAF) and Pakistan Air Force (PAF) against whom IAF has had active engagements in the past. Therefore, while the study is aimed at analyzing the IAF' preparations and ambitions to become a dominant regional force, it would briefly analyze the force structures of PLAAF and PAF in corresponding periods before making a meaningful conclusion about the IAF' claim.

IAF : A Historical Review

7. Royal Indian Air Force (RIAF) was established on 8 October 1932 with the prime responsibility of conducting air-based warfare and securing Indian airspace. The first flight of No 1 Squadron was formed with Wapiti aircraft at Drigh Road Karachi on 1 April, 1933.⁶ During the inter-war period, RIAF went through a phase of steady expansion and number of combat squadrons increased to nine, with a primary role of 'Army Cooperation'.⁷ IAF played a crucial role in moving Indian troops into Srinagar when Indian government decided to support the Maharaja of Kashmir. This was the first IAF operation in the regional context and the airlift in October 1948 saved not just Srinagar but two-thirds of Jammu and Kashmir for India.⁸

8. During Sino-India war of 1962, IAF only took part to counter-attack the Chinese raids and to supply troops fighting near the border. General Kaul, the Army Commander in NEFA later confessed, "lastly, we made great mistake in not employing our Air Force in a close support role during these operations".⁹ Whereas, during the Indo-Pakistani War of

⁵ AY Tipnis., Air Chief Marshall, "Indian Air Force-2020: Perspective Planning-An Essential Requirement", India Defense Review, New Delhi.

⁶ AS Bhal, "Air power in 21st Century", India Defense Review, Jul-Sep 2006: Vol. 21 (3), p. 41.

⁷ Ibid.

⁸ Ibid.

⁹ AK Tiwary, Air Vice Marshal, "No Use of Combat Air Power in 1962", India Defense Review, Jul-Sep 2006: Vol. 21 (3), p. 97.

1965, in spite of an overwhelming superiority in numbers and airfield infrastructure, IAF remained reactive and was outclassed by the PAF within the first few days of the war. As Dixit put it, “during the course of the conflict, the PAF enjoyed qualitative superiority over the IAF as most of the jets in IAF's fleet were of post World War II vintage. Despite this, the IAF was able to prevent the PAF from gaining air superiority over conflict zones.”¹⁰ However, after the War, IAF went through an intense phase of modernization and consolidation by inducting Soviet MiG-21 and Sukhoi Su-7 fighters which proved effective during the 1971 War against Pakistan.¹¹

9. Since the mid-1990s, IAF has changed gears and emerged as a very potent strike force with high-tech aircraft and weapons which aim to project its power beyond the Indian borders. As Air Chief Marshal Tyagi stated that, “The redrawn strategic boundaries of resurgent India could extend from Gulf to the Straits of Malacca and from Central Asian Republics to the Indian Ocean. The enlarged strategic dimensions necessitate not only a radical change in our strategic thinking but also accentuates the role of Aerospace Power in the new security arena”.¹² During the Kargil conflict, IAF played a pivotal role in India’s counter-offensive against Mujahedeen positions. Although, IAF lost two fighters and an attack helicopter to the air defense weapons but it quickly changed its posture and resorted to the use of Precision Guided Munitions (PGMs) from standoff ranges which allowed them to stay well outside the envelope of Pakistan Army’s air defense weapon systems.¹³ Kargil marks the watershed in the mindset of IAF leadership; from being a purely tactical support element to a more dominant and decisive force in the changed nature of warfare.¹⁴

IAF Today

10. IAF today is the fourth largest air force in the world. It is among the world’s top ten countries in terms of defense expenditure and third-largest importer of defense hardware. IAF is focusing on the procurement of long range, lethal and precision guided munitions,

¹⁰ JN Dixit, “India-Pakistan in War and Peace”, Routledge, 2002 (ec.wikipedia.org/wiki/Indian-Air-Force, 20 Aug 2011).

¹¹ Pushpindar Singh Chopra's "A Whale of a Fighter", 1983 reproduced in *Bharat Rakshak*. Retrieved on 5 Jul 2010.

¹² SP Tyagi, Air Chief Marshal, Aerospace Power”, Indian Defense Review: Jan-Mar 2007 Vol. 22 (1), p.38.

¹³ R Chattopadhyay, “The Indian Air Force: Flying into the 21st Century”, *Bharat Rakshak Monitor* Volume 3 (1) July-August, 2000.

¹⁴ SP Tyagi, Air Chief Marshal, Op.Cit., p.40.

reconnaissance, surveillance and target acquisition system. India's military spending amount to roughly over 2% of GDP and its military budget is expected to grow by 7% annually over the next five years with military hardware and software' bills are expected to be over £15bn by 2012.¹⁵ In the process of its modernization effort since the late 1990s, size of the IAF has decreased during this period because of the retirement of older aircraft and IAF's current strength has dropped to an all-time low of some 29 combat squadrons against the authorized level of 39.5¹⁶. However, IAF still has over 800 combat aircraft with a balanced mix of offensive and defensive capability, having the potential for undertaking entire spectrum of air operations. The Sukhoi Su-30MKI is the mainstay of IAF with multiple role capability. The IAF has ordered for a total of 272 Su-30MKIs¹⁷ of which 159 are in service as of June 2011.¹⁸ Whereas IAF's dedicated air superiority fighters are the MiG 29s, some 69 are currently being upgraded to the MiG-29UPG standard.¹⁹ The Dassault Mirage 2000, is the IAF's primary multirole fighter of which 51 are in service.²⁰ The older Fleet of MiG 21 nearly 200 in numbers of which 121 have been upgraded to Bison standard are likely to remain in service till 2017. Whereas older version is planned to be phased out by 2013.²¹ The Ground Attack and Close Support Fleet is mainly comprised of Jaguar and the MiG-27 aircraft. The IAF currently operates 139 Jaguars²² and over 100 MiG-27s.²³

11. The IAF currently operates different types of transport aircraft for different roles. The IL 76 acquired in mid eighties is mainly used for military transport roles such as strategic or heavy lift.²⁴ However, these are to be replaced by C-17 Globemaster IIIs, the first of which has test landed on Gaggal Airport, North India on June, 2010.²⁵

12. The AN 32 is mainly used as medium transport aircraft as well as in bombing roles and para-dropping operations. The IAF currently operates 105 An-32s, all of which are

¹⁵ Vijay Goel and Himanshu Pimpalkhute., Op. Cit.

¹⁶ Ashley J. Tellis, "Dogfight", Carnegie Endowment for Peace 2011, p. 1.

¹⁷ Josy Joseph, (26 June 2010), The Times of India, Retrieved 3 August 2010.

¹⁸ *The Times Of India*. 4 July 2010. Retrieved 9 July 2010. "Fifty Sukhois initially came from Russia between 2002 and 2005. HAL's deliveries began in 2004-2005, and so far 74 Sukhois have been rolled out from the Nasik Division."

¹⁹ Anton Denisov (5 February 2011). "Russia tests upgraded MiG-29 fighter for IAF". en.rian.ru. Retrieved 9 February 2011.

²⁰ "India to Sign Mirage 2000 Fighter Upgrade Deal". airforce-technology.com. 4 March 2010.

²¹ Antony, "Indian Air Force phasing out MiG-21s", The Economic Times, 19 April 2010.

²² "HAL To Tie-Up With BAE Systems For Jaguar Upgrade", India Defence Online, 30 November 2009. Retrieved 20 Aug 2011.

²³ "MiG-27 crashes into field, 1 killed". The Times of India. 25 July 2010. Retrieved 20 Aug 2011.

²⁴ "Ilyushin Il-76MD [Candid-Gajraj]". Bharat Rakshak, Retrieved 10 July 2010.

²⁵ Rahul Bedi, "IAF completes C-17 test-flight", IHS Janes, 5 July 2010, Retrieved on 20 Aug 2011.

being upgraded.²⁶ IAF also operates a variety of helicopters for medium utility and attack roles. The Mi-8 is being replaced by Mi-17 and IAF has ordered 80 Mi-17V-5s with some 59 additional helicopters to follow soon.²⁷ The Mi-26 serves as a heavy lift helicopter whereas Mi-35 is mainly used as an attack helicopter. The IAF currently operates 4 and 15 of these two types for multiple tasks.²⁸

13. Since India aspired to play a more dominant role in the region, the induction of force-multipliers became a priority of the IAF. It has successfully inducted six IL-78s as Air-to-Air refuellers and modified some of its Jaguars, SU-30s, Mirages and Sea Harrier for the purpose. Induction of force multipliers like Airborne Warning And Control System (AWACS) has given IAF much needed ability to monitor entire flying activity over the skies of Indian Ocean while aerial refueling capability helps enhance the radius of action of the combat fleet.²⁹ IAF has also diversified its surveillance and reconnaissance (recce) methods and it has acquired a large number of Searcher-1, 2 and Heron UAVs from Israel to enhance its near real time recce / surveillance capability.³⁰ The IAI Harpy serves as an Unmanned Combat Aerial Vehicle (UCAV) which is designed to attack radar systems whereas more advanced Harop have also been ordered.³¹

IAF's Modernization Plan for 2020

14. In the nuclearised region, Indians do not see true surprise attacks by Pakistan and China and only "limited" conflicts are being anticipated in which the role of the IAF has become even more critical. In such scenarios, IAF would be expected to accomplish three objectives; firstly, successful completion of all the assigned tasks, secondly, neutralize whatever the adversary does, and lastly, be able to effectively support all the other armed services.³² "Implementing such a strategy successfully requires the IAF to maintain significant quantitative and qualitative superiority against Pakistan writ large and sufficient

²⁶ "IAF An-32 planes in Ukraine for upgrades", www.rediff.com, 21 March 2010. Retrieved 20 July 2010.

²⁷ Gulshan Luthra and Air Marshal Ashok Goel (Retd), "Russia continues to dominate Indian military aviation", *India Strategic*, Aug 2010.

²⁸ "Mil Mi-25 / Mi-35 (Hind) Akbar", *Bharat Rakshak*, Retrieved 20 July 2010.

²⁹ BK Panday, Air Marshal., "IAF Meeting The Challenges", *Indian Defence Review: Oct-Dec 2005, Vol. 20 (4)*, p.64

³⁰ "Searcher Mk II Delivered To India", israeli-weapons.com. Retrieved 22 Apr. 2009.

³¹ Rajat Pandit, "Air Force Hunts for Combat Drones", *Times of India*: 5 July 2010.

³² Ashley J. Tellis, *Op. Cit.*, p-11.

dissuasive power—flowing from the possession of both technical and operational edge against China in the likely theaters of operation”.³³

15. IAF’s drive to modernize itself gained momentum and support from the outcome of Kargil conflict. IAF leadership was able to prove the efficacy of air power during the conflict in which the air operations kept on developing with the passage of time. Hence, the recommendations by Kargil review committee laid the foundations for the IAF to get the largest chunk from the 15-year Defense spending plan i.e. around \$ 30 billion for the desired inductions and upgrades.³⁴ Consistent economic growth and the political will to dominate the region, IAF’s march to achieve its ambitions is continuing with full support from the government and this massive upgrade and modernization plan would involve investments to tune of over \$ 100 billion in the region over the next three decades.³⁵

Aircraft And Weapon Systems

16. IAF has planned to increase the total number of its “air dominance combat jets” SU 30MKI order to a sizeable 272; the biggest aircraft deal with Russia since the MiG 21 deal with Soviet Union in 1968.³⁶ IAF is already pursuing the upgrade of its fleet of Soviet-vintage Mig 29 fighters and IL 76 airlifters with the Russians, while the Indian Navy has asked for 45 naval versions MiG 29K.³⁷

17. The Light Combat Aircraft (LCA) being built indigenously in India is primarily intended to replace the aging fleet of IAF’s Mig-21s. IAF has a projected requirement of 220 LCA which would be a small, lightweight, supersonic, multi-role, single-seat fighter designed to function as a frontline, multi-mission tactical aircraft. Delay in the induction of LCA and phasing out schedule of Mig-21s has forced IAF to induct 126-200 fighter aircraft to cater for the depleting inventory.³⁸ IAF has put up the qualifying requirements of its future Medium Multi Role Combat Aircraft (MMRCA) to manufacturers of Gripen, Rafale, Mig-35, Eurofighter and F-16/18. IAF leadership has been evaluating these

³³ Ibid.

³⁴ Raghuvanshi Vivek, "India Charts 15 years \$ 95 Billion Path", Deccan Herald, 02 May 2000, Defense News. 25 May 2001.

³⁵ BK Panday, Air Marshal., “US Aerospace Industry and Aero India 2011” Indian Defence Review: Jan-Mar 2011, Vol. 26 (1), p.29.

³⁶ Gulshan Luthra and Air Marshal Ashok Goel (Retd), Op. Cit.

³⁷ Ibid.

³⁸ Hindustan Times., April 26, 2006.

options for a decade now but the evaluation and decision process has been extremely slow. India is also a partner in the development of Multi-role Transport Aircraft (MTA) and Russia's Fifth Generation Fighter Aircraft (FGFA), which it is committed to support financially and then buy as and when they are developed and operational.³⁹

Prospective IAF Force Structure: 2020

Role	Air Craft	Number	Sqns
Air Superiority	Su-30MKI	280 ~15	
	MiG-29	50 ~3	
Air Combat	MMRCA Mirage 2000	50 ~3	
	MMRCA Selectee	126/200 ~7/11	
Air Combat	Light Tejas	125 ~7	
	Strike Jaguar	110 ~6	
Total		741/815 ~41/45	

Alternative IAF Force Structures: 2020

Role	A/Craft	No	Sqns	
Air Superiority	Su-30MKI	280/~15	330/~18	280/~15
Air Combat	MMRCA Selectee	250-325/~14-18	375/~21	425/~24
	Strike Jaguar	110/~6	110/~6	110/~6
Total		640-715/~35-40	815/~45	815/~45

Force Multipliers

18. Until the early 1990s, the IAF remained a largely tactical force in its outlook. The prevailing view was that in case of a war with Pakistan, all major targets could be reached without the need for in-flight refuelling whereas any conflict with China would also remain largely localized, again putting all targets within easy range of its aircraft. However, nuclearization and an expansion in the size of the IAF forced a reconsideration of this view and the induction of force multipliers became a priority of the IAF. It has, since 1996, successfully inducted IL-78s as Air-to-Air refuellers and modified some of its Jaguars, SU-30s, Mirages and Sea Harrier for the purpose. All IAF aircraft, including medium lift helicopters will have in-flight refuelling capability and the strategic aircraft assets would be augmented. The IL-78 tanker-transport force has endowed the IAF with incredible force multiplier capability even as the IL-76-mounted Phalcon AEW & C system will provide

³⁹ Gulshan Luthra and Air Marshal Ashok Goel (Retd), Op. Cit.

unprecedented long range target acquisition and identification, allowing operations to simultaneously perform a wide range of air land battle management functions.⁴⁰

19. IAF' quest for force multipliers has made significant inroads into EW and Reconnaissance as well. IAF has rather extensive Electronic Intelligence (ELINT) gathering and reconnaissance assets available on its inventory. The bulk of the ELINT aircraft (B-707, An-32, and B-737) are operated under the auspices of the Aviation Research Center (ARC) and photographic reconnaissance assets are operated directly by the IAF. The recent introduction of high altitude Unmanned Aerial Vehicles (UAVs) gave the IAF its first significant experience with near real time reconnaissance capability. It is expected that in the next 5-7 years the defense forces will deploy dedicated satellites to enhance their intelligence gathering capabilities.

20. As regards to Airborne Early Warning (AEW) capability, IAF had been desperately trying to induct an AEW and Control aircraft into its fleet since early 1990s.⁴¹ The Russian A-50 AEW & C can pick up to 100 targets simultaneously and has a detection range of 230 km against a fighter size target. The Israeli Phalcon AEW System has coverage of 333 km and can deal with 500 targets in track while scan mode. IAF plans to induct three Phalcon based AWACS from Israel by 2007-09⁴² whereas indigenous AEW programme has been revived and maiden flight of the first aircraft is planned in 2011.

Training

21. IAF' modernization plan poses a great challenge to its leadership to suitably deploy, adapt and sustain force levels, required to operate the sophisticated systems being inducted within such a short span of time and over such a vast area. The state of the art aircraft, smart weapon systems, complex sensors, space-based surveillance and reconnaissance systems, a network centric environment; all needs to be supported by an equally advanced and sophisticated training environment.⁴³ The computer-based training systems, elaborate simulation devices for all disciplines, automated distance learning and evaluation systems, need to be placed in the loop now and not only for the officer cadre but at all levels of operators and leaders.⁴⁴

⁴⁰ Hindustan Times, April 26, 2006.

⁴¹ Ibid.

⁴² "Israel offers Indian Phalcon AEW" VAYU-Aerospace Review, III/2001, p. 12.

⁴³ BK.Panday Air Marshal., 'Meeting the Challenges: IAF 2020'. Indian Defense Review, Oct-Dec 2005: Vol. 20 (4), p.65.

⁴⁴ Ibid., p.65.

22. As regards to aircrew training, IAF offers a very rigorous schedule for its pilots. However, this is one issue that IAF leadership has not been able to resolve despite numerous studies and the proposals. Indian Defense Minister in July 2006 had accepted in the Parliament that IAF is short of 683 pilots which is nearly 24%.⁴⁵ The problem is particularly acute at the advanced fighter training level because the MiG Operational Flying Training Unit's (MOFTU) aircraft are now over 30 years old and in very poor state of repair.⁴⁶ The IAF has been trying for years to purchase suitable Advanced Jet Trainers (AJTs) to ease the transition to high performance aircraft. IAF has now acquired 66 Hawk Advance Jet Trainers which is considered inadequate.⁴⁷ The current fleet of Hindustan Aeronautics Limited (HAL) built HPT-32 type trainers have already been grounded since 2009 following a series of crashes.⁴⁸

Space Programmes

23. Another dimension that the IAF is aspiring for is the 'space'. As Bhal writes that, "space is not only a natural extension of the third dimension but a continuum of the air medium".⁴⁹ It has already formed an Aerospace Group which would lay the foundation for the Aerospace Command.⁵⁰ According to Pandey, "While the concept of using space-based lethal weapon systems may yet lie in the realms of imagination, considerable progress has been made in the regime of communication and surveillance by space-based platforms using optical, radar and IR sensors".⁵¹ However, Indians do have an ambitious plan send a man on moon by 2020.⁵²

24. IAF is presently faced with a challenging task of transforming itself into a 'Space Power', because there are a number of organizations in the country which are dealing with matters related to space. Defense Imagery Processing and Analysis Centre (DIPAC) controls Indian Satellite-based image acquisition and operationalises only with the

⁴⁵ Jasjit Singh, Air Commodore., "IAF Flying into the Future", Indian Defence Review: Oct-Dec 2007, Vol. 22 (4), p.17

⁴⁶ Chattopadhyay.R, Op.Cit.

⁴⁷ Jasjit Singh, Air Commodore, Op. Cit., P. 18.

⁴⁸ "Basic Trainer Competition: Significant offset opportunity foe Indian Players", Aerospace & Defence India, March 2011.

⁴⁹ AS Bhal., Op. Cit, p. 41.

⁵⁰ SP Tyagi, Air Chief Marshal, "Aerospace Power", Indian Defense Review: Jan- Mar 2007, Vol. 22 (1), p.41.

⁵¹ BK Panday. Air Marshal (Retd), "IAF Meeting the Challenges", Indian Defense Review: Oct- Dec 2005, Vol. 20 (4), p.64.

⁵² BK Panday. Air Marshal (Retd), "Space: the emerging battleground", Indian Defense Review: Jul- Sep 2010, Vol. 25 (3), p.23.

Intelligence, Surveillance and Reconnaissance (ISR) function. Whereas the other space applications such as Navigation, Communication, Search & Rescue, Early Warning, Space Control and Ballistic Missile Defense (BMD) need to be integrated with airpower to significantly enhance its potency.⁵³ Newly formed Aerospace Group is tasked to interact with other departments and organizations dealing with space to enhance IAF's overall combat potential and now it would be the responsibility of this large network of organizations to help IAF in its endeavor to become a truly an Aerospace Power.⁵⁴

The Doctrinal Shift

25. Indian leadership has aptly outlined its national objectives that India should emerge as an eminent power in Asia by 2020. In fact, India has everything that any great nation has had at any point in time in the history; manpower, knowledge, natural resources and above all its secular ideology which is acceptable to the western world. According to Bharat Vema also, "India is suitably placed and conveniently located, geographically, culturally and otherwise to play this role effectively."⁵⁵

26. In pursuance of its national objectives, "IAF is presently undergoing historical changes. From being subcontinental force, it is transforming itself to have continental reach and effect."⁵⁶ IAF formulated its first ever Air Power Doctrine (APD) in 1995, which caters for the changing nature of air warfare and the challenges of operating under nuclear environment. The former IAF chief, Air Chief Marshal S K Kaul, who was the architect of the airpower doctrine and purchase of Su-30 aircraft, had visualized "a total of up to 34 combat squadrons by the year 2005 of which one-third should be multirole in performance."⁵⁷

27. The details of India's Airpower Doctrine have been published in *Jane's International Defence Review 1997*. According to the *IDR*, APD lays emphasis on the following fundamental issues: -

- a. Offensive operations priority has been upgraded and the need to achieve maximum performance from limited sources has been emphasized.

⁵³ AS Bhal., Op. Cit, p. 47.

⁵⁴ BK Panday. Air Marshal (Retd.),Op.Cit., p.65.

⁵⁵ Bharat Verma, Capt (Retd.), 'The Indian Fault Line', Indian Defense Review, volume 20 (3), p.3.

⁵⁶ AS Bhal., Op.Cit., p.42.

⁵⁷ SK Kaul, Air Chief Marshal quoted in "India's First Air Power Doctrine Takes Shape" Jane's IDR 1997, Retrieved on 21Aug 2011.

b. The concept of air defense has been replaced by strategic or deterrent air defense. In fact, deterrent air defense implies that, after absorbing the enemy's initial air effort, the IAF should be able to maintain a higher relative strength as conflict progresses.⁵⁸

c. Emphasis on the acquisition of force multipliers such as AWACS, mid-air refueling, and electronic warfare, to maximize impact of the existing force.

e. Space will be treated on an equal footing with air, land and sea in India's future defense strategy; core competencies of "space power" would include intelligence, surveillance, reconnaissance, battle management and weapon guidance.⁵⁹

Analysis of APD

28. APD is reflective of the changed mindset of the IAF leadership. It manifests IAF' transition from tactical to the strategic realm. A critical analysis of some of its fundamentals indicates: -

a. **Priority of Offensive Operations over Defensive Operations.** This is the most fundamental change in IAF's strategy. The offensive punch that the IAF had been acquiring in the form of SU-30 MKI, Mir-2000, Jaguar and Mig-27, complemented with AWACS and Air to Air refuellers has given it the requisite wherewithal to swiftly change gears from being a tactical support force to a more dynamic strategic strike force. However, the depleted force level does pose a challenge for IAF at the moment.

b. **Shift towards Space.** IAF' claim to be an Aerospace Power is to be viewed with its intent to use the space for military gains. Its increasing collaboration with other space research organizations to acquire knowledge about space-based applications must acknowledge. Air Chief Marshall Shashi Tyagi, the former IAF Chief also stated that, "we are an aerospace power having trans-oceanic reach and we have started training a core group of people for the aerospace command."⁶⁰ This transition from airpower to aerospace power would provide IAF the much needed potency and accuracy and the outcome could be a strong strategic

⁵⁸ "IAF Prepares for Star Wars era", www.rediff.com/news/aug/25/1997.

⁵⁹ Ibid.

⁶⁰ Shashi Tyagi, Air Chief Marshall quoted in 'The News', Islamabad on January 29, 2007.

deterrence.⁶¹ Tyagi claims that, “Aerospace Power will be the primary tool for projecting power beyond the shores of the country. So far the Navy has been showing the flag and will continue to do so, however, the IAF is now in a position to share this role.”⁶² IAF ambitions of using space for military means aside, its leadership is well aware that China is on its way to becoming a genuine aerospace power, rather than being merely an air force with high performance aircraft. The race for the optimum use of space is going to cost heavily to both, China and India. US interest and support for India in this regard can have serious consequences for the region.

c. **Point Defense versus Strategic Air Defense.** IAF plans to do away with the strategy of point defense, it had followed for decades because it is no longer in concert with its offensive designs. IAF would not sit back to fight the next war on its territory as is evident from its force composition for the future. However, a two-front scenario, though less likely, would certainly pose serious challenges for IAF leadership in accomplishment of its objectives because PLAAF has strategy of Knocking down the door.

d. **Greater Emphasis on Force Multipliers.** IAF leadership has been extremely careful in selecting its inventory. It now stands as a balanced force comprising medium to long range strike aircraft (SU-30 MKI, Mir-2000, Jaguars and Mig-27), potent air combat aircraft (SU-30 MKI, Mig-29), augmented by state of the art AWACS and air to air refuelers. Since, IAF is aspiring to achieve strategic reach to influence events in the region⁶³ it would have to make serious effort to enhance the capability of its force multipliers by adding their numbers and potential. At present, “IAF transport fleet is inadequate to meet strategic airlift requirements.....and IAF needs more Flight Reuelling Aircraft (FRA) and airborne early warning systems to cover all contingencies.”⁶⁴

IAF’ capabilities and claims to be a regional force by 2020 cannot be analyzed in isolation. Now that its leadership has made the claims to play a more dominant role in the

⁶¹ AS Bhal., Op.Cit., p.48.

⁶² SP Tyagi, Air Chief Marshal (Retd), “Aerospace Power”, Indian defense Review: Jan-Mar 2007 Vol. 22 (1), p.40.

⁶³ SP Tyagi, Air Chief Marshal (Retd), Op. Cit., p.40.

⁶⁴ KB Menon, Air Commodore (Retd), ‘Modernisation of India’s Military Aviation, Indian defense Review: Jan-Mar 2007 Vol. 22 (1), p.50.

region, it is necessary to briefly examine at least two its potential adversaries with whom IAF has had active engagements in the past; PLAAF and PAF.

29. 'Air Dominance' will be the key mantra in ensuring success during the new century and this must be maintained by a new generation of combat aircraft, incorporating critical technologies including Active Electronically Scanned Array (AESA) radar, advanced mission computers and displays, helmet-mounted cueing systems, integrated defense electronics counter-measures and multifunctional information distribution systems.⁶⁵ This shift in the mindset; tactical support element to a more proactive and a dominant strike force is what the IAF leadership is vying to achieve by 2020.

Peoples Liberation Army Air Force (PLAAF)

30. The People's Liberation Army Air Force (PLAAF) is the aviation branch of the People's Liberation Army, the military of the People's Republic of China. In 2010, the PLAAF had approximately 330,000 personnel and 2,500+ aircraft, of which 1,617 were combat aircraft; the PLAAF was the largest air force in Asia, and the third largest in the world behind the United States Air Force and the Russian Air Force.⁶⁶ The PLAAF is undergoing major transition from being an air defense force to more advanced force with state of the art equipment and capabilities. PLAAF modernization plans are motivated from the doctrinal concepts of achieving greater offensive capabilities to through high-tech multirole platforms.⁶⁷ PLAAF equipment modernization is showing the following trends:

- a. A new interest in modern training aircraft and simulators.
- b. Great emphasis on obtaining large numbers of multi-role combat aircraft.
- c. Acquisition of new types of anti-air and ground attack munitions.
- d. Greater emphasis on support platforms: tankers, EW and ELINT.
- e. Indications of an interest in increasing air transport assets.
- f. Indications that airborne troop are to be increased and given strategic offensive missions.

⁶⁵ Aerospace and Defense Review: V-2006.

⁶⁶ en.wikipedia.org., Retrieved on 21 Aug 011.

⁶⁷ Jiang Zemin, Former President's remarks noted in Ken Allen, "PLA Air Force Modernization and Operations," in Susan M. Puska ed., *People's Liberation Army After Next*, Carlisle PA: U.S. Army War College and the American Enterprise Institute, 2000, pp. 189-190.

- g. A build-up in air defense forces to provide greater support for offensive operations.⁶⁸

31. Equipped with variety of Russian and indigenously produced aircraft and munitions, PLAAF is operating a range of modern aircraft, precision-guided munitions, force multipliers, and modernized C4ISR capabilities which makes the PLAAF capable of carrying out traditional missions such as air defense and support for ground forces, alongside offensive strikes against ground and naval targets beyond China's borders.

32. The PLAAF inventory is a large mix of third and fourth-generation fighters and fighter-bombers, including 800-1,000 J-7 and J-8II fighters, 76 Russian-built Su-27 fighters, 95-116 Chinese-assembled J-11 fighters, 76 Russian Su-30MKK multirole fighters, and some 60-80 Chinese indigenous J-10 multirole fighters.⁶⁹ Like other air forces of the region, PLAAF also embarked upon an extensive modernization programme in early 1990s. First advanced aircraft on PLAAF inventory was Su-27s followed by the development of various fourth-generation aircraft, including the J-10 and the JF-17 in collaboration with Pakistan.

PLAAF in 2020

33. Being a big country and with bigger objectives, PLAAF has concentrated on the acquisitions of force multipliers such as long-range transport aircraft and refueling tankers to improve its airlift and enhance its reach. Concurrently, China is pursuing the production of a four-engine turboprop transport aircraft of the C-130-class to reduce dependence on Russian systems. Also, PLAAF is making efforts in developing a number of support aircraft to enhance the effectiveness of its combat aircraft. These support aircraft include tankers, AEW and AWACS, electronic warfare and intelligence gathering aircraft etc. With the induction of advanced aircraft and equipment, PLAAF moved swiftly to train its pilot and related technicians. Simulator systems were built to give near real-time hands-on training.

Force Structure

ESTIMATES FOR KNOWN PLAAF

⁶⁸ Richard Fisher Jr., "PLAAF Equipment Trends", www.strategycenter.net/research., 30 Oct 2001.

⁶⁹ Ibid.

MULTI-ROLE COMBAT AIRCRAFT	
	2010-2020
Sukhoi Su-30MKK	200
Chengdu J-10	500
Xian JH-7	200
Shenyang J-8IIC/H	100
Sukhoi Su-27/J-11	100
“XXJ” or J-12	50
Estimated Total	1150

34. PLAAF plans to build its future inventory around large quantities of air defense fighters Chengdu J-10, Shenyang J-11 and JH-7A precision strike fighter, whereas, Su-30MKK would be entrusted with multirole tasking over large distances. The new Chinese J-20 with stealth features is currently undergoing testing and is likely to be operational by 2017.⁷⁰ PLAAF is expected to have enlarged its inventory of modern aircraft to around 1700 aircraft by 2020 the new look PLAAF would have around 500 Su-27/30s and 500 F-10s, 100 FC-1/JF-17 as well as a small number of fifth-generation stealth fighters. The plan indicates that PLAAF would more number of 4th generation aircraft than the entire IAF's inventory. According to Ashley, "PLAAF's improvements will place the IAF at a disadvantage. In numerical terms alone, the IAF has to confront two adversaries, Pakistan and China."⁷¹

Pakistan Air Force (PAF)

35. Royal Pakistan Air Force (RPAF) was established soon after the partition of the subcontinent on August, 1947. Limited infrastructure of the British era existed on this side of the divide which remained active to fight against the local tribesmen of the tribal belt in the North West of the country. RPAF made a humble beginning with much lesser of its share of aircraft and equipment handed over by the outgoing servicemen of the British Empire. The prefix Royal was removed on 23 March, 1956 and since then it is called Pakistan Air Force (PAF). PAF has since its inception fought active wars as well as seen several periods of high tension with India. PAF was always seen performing well against

⁷⁰ www.sinodefence.com., Retrieved on 18 Aug 2011.

⁷¹ Ashley J. Tellis., Op. Cit., p.18.

its three times larger opponent; IAF. Not only did PAF face IAF regularly, it confronted the Soviets as well during its invasion of Afghanistan during the 1980s.

36. PAF has been regarded as a highly professional force by its opponents as well as its allies.⁷² Pakistan, by virtue of being part of the western allies in the cold war era and afterwards as well, PAF has had the opportunity to operate state of the art aircraft and equipment of the times including US systems like F-86s, F-104s, and F-16s. However, soon after the Soviets left Afghanistan, tough economic and military sanctions were imposed by the US due to which Pakistan military in general and PAF in particular lost out on to any new acquisitions, upgrades and refurbishments of the aging equipment and hence the entire decade of the 1990s was consumed in maintaining and training on the relatively older equipment. It was only after 9/11 that the US developed interest in the region and Pakistan was once again requested for support assistance for the US and NATO operations in Afghanistan and hence the flow of money and machines resumed.

PAF in 2020

37. Restricted on the numbers, PAF have always relied on the acquisitions of technologically sophisticated aircraft and equipment. "PAF today is well on its way toward incorporating significant qualitative improvements. The current PAF force structure consists of some 22 combat squadrons in comparison to the IAF's 29. The IAF's combat force today totals 630 aircraft, which, in comparison to Pakistan's 380-odd fighters, yields a force ratio of 1.6:1, clearly a far cry from the almost 3:1 superiority that the IAF enjoyed in the early 1980s."⁷³ Presently, PAF is maintaining a fleet of nearly 350 combat aircraft comprised of US F-16s, French Mirages, different versions Chinese F-7s etc. PAF is an active partner with its Chinese counterparts in the development of its future mainstay; JF-17 Thunder aircraft.

38. Aware of IAF' effort of becoming a regional force by 2020, successive PAF leaderships have launched its own modernization plan under Armed forces Development Plans; AFDP-2019. Under the proposed plan, PAF has been acquiring the force multipliers in the form of AEW and AWACS aircraft from Sweden and China respectively, and IL-78 aerial refuelers. PAF also has acquired Block 52 F-16s equipped with

⁷² Meinhaj Hussain, "Analysis of the PAF Vs IAF- Air Combat Over the Subcontinent", www.grandstrategy.com/2009/01/, Retrieved on 18 Aug 2011.

⁷³ Ashley J Tellis., Op. Cit., p.12.

AMRAAM⁷⁴ and also undertaking Mid-Life Upgrades of its older version of F-16s alongside inductions of JF-17s. PAF has also been concentrating on the procurements of ground-based radars, and surface to air and air to air weapons.

39. Training of its air and ground crew has been a priority for the PAF to successfully and smoothly induct the modern weapon systems. For the purpose, PAF has procured simulators and modernized its training institutions and firing ranges with state of the art simulation systems. PAF is training hard to fulfill its assigned mission which reads, "To provide in synergy with other services, the most efficient, assured and cost effective aerial defense of Pakistan".⁷⁵ Analysis of PAF mission reveals that meaningful joint operations with effective air defense are the primary objectives of its leadership. PAF does not have aggressive designs but to ensure the assured aerial defense of Pakistan, it would have to undertake counter offensive operations for which it would need multirole aircraft supported by force multipliers.

40. PAF plans to build its future force structure around its own coproduced fighter JF-17. PAF is expected to have at least 10-12 squadrons with a total fleet of 250-275 aircraft. These JF-17s would be equipped with advanced sensors and air-to-air weaponry. Also, these aircraft would be fitted with aerial refueling probes to enhance the loiter time. This large fleet of JF-17 would be led by multi-role advanced fleet of around 100 F-16s armed with wide ranging capabilities of carrying AMRAAMs, EW suits and variety of ground attack weapons. The exact number of these aircraft would be largely dependent on Pak-US relations during the next ten years.⁷⁶ PAF is also evaluating Chinese FC-20 aircraft and if funds become available, it may induct at least 36-40 aircraft anytime between 2015-2017.⁷⁷

41. As regards to acquisitions of force multipliers, PAF would have inducted four each SAAB AEW platforms, Chinese ZDK-03 AWACS⁷⁸ and IL-78 Tankers by 2012. Likewise, most of its radars, EW aircraft and weapons including AMRAAMs would be in place by 2012. Therefore, it can be concluded that PAF has moved swiftly to bridge the gap

⁷⁴ Robert Hewson, "Pakistan Joins AMRAAM Club in Biggest-Ever Buy," *Jane's Defense Weekly*, vol. 44, no. 4, January 24, 2007, p.14.

⁷⁵ www.paf.gov.pk, Retrieved on 23 Aug 2011.

⁷⁶ Shalini Chawla, "Modernization of the Pakistan Air Force," *Air Power Journal*, vol. 3, no. 2, Summer 2008 and "Procurement, Pakistan," *Jane's Sentinel Security Assessment*, November 25, 2010.

⁷⁷ <http://www.globalsecurity.org/military/world/pakistan/air-force-equipment.htm>, Retrieved on 23 Aug 2011.

⁷⁸ Leithen Francis, "Pakistan to get Chinese AEW&C aircraft this year," *Flight International*, August 5, 2010, available at <http://www.flightglobal.com/articles/2010/05/07/341584/pakistan-to-get-chinese-aewc-aircraft-this-year.html>.

caused by the lost decade. However, PAF today is faced with a daunting task of meeting the future challenges posed by the IAF. PAF does not have the resources to match the numbers nor has a free hand to acquire the state of the art technology as has the IAF. US support hinges on the “do more” mantra and therefore, it is necessary that PAF reviews its developmental strategy and diversify its acquisitions. However, if it is denied the technology or it cannot afford to acquire it, then it is time to refocus toward more reliable and time tested partners in arms; China. Air power is technology intensive and Chinese equipment may not be able to fulfill all its requirements but in the end numbers will matter and reliability of sustainable development would have to be given due consideration. And, Chinese efforts towards the acquisition of modern technology should not be underrated and lead could be taken from PLAAF force structure.

Analysis of IAF Capability and its implications for the Region

42. The critical analysis of APD reveals the IAF’ intention of changing from being a tactical air force to a strategic air force. It also indicates the vision and the resolve of the leadership to swiftly but smoothly transform its force to meet the future challenges. According to Lord Trenchard, “strategic capability of a military force revolves around the aspects of ‘Mass’, ‘Reach’ and ‘Vision’.”⁷⁹ Therefore, it is necessary to analyze the future capability of the IAF according to the above stated attributes so as to determine its implications for the region.

a. **Mass.** For an air force to be rated as a strategic air force, it is necessary that it is able to create strategic effects on its own on its adversary. IAF’s intended inventory reflects its effort for both; quantity and quality. IAF is not only planning the requisite high tech combat aircraft, weapons and missiles for the purpose but also has adequate support elements such as Phalcon AEW, Electronic Support Measures (ESM) and Unmanned Aerial Vehicles (UAVs) etc. However, the study of the force structures of other regional players reflects that IAF’s projected strength has been overrated. Considering the claimed areas of interest for India, “its strategic neighborhood extends from the Malacca Strait to the Persian Gulf”,⁸⁰ IAF numbers could only impress the PAF. Inordinate delays in the development of LCA and indecision on the selection of MMRCA has led to the sharp reduction in IAF’s

⁷⁹ Lord Trenchard quoted in article ‘Air Power imbalance and Strategic Instability in south Asia’, published in “Military Air Power”, Hand Book of NDC for 2006-07.

⁸⁰ KB Menon, Op.Cit., p. 50.

numbers and it is not expected that the authorized level of 39 Combat squadron would be reached before 2017 that too if the MMRCA deal is concluded now. VK Bhatia has shown his reservations about the timeline of MMRCA, “while assurances from various quarters that the MMRCA would be in service by 2014 might appear somewhat unrealistic, it is imperative that the deal is finalized expeditiously.”⁸¹ This ground reality was accepted by the Indian Defense Minister who stated that, “the IAF’s fighter fleet would not reach a combat strength of 42 squadrons any time before the end of India’s 13th Plan in 2022.”⁸² So the much needed strength of 45 Squadron Air Force to play a dominant role in the region, if that was correctly envisaged by successive IAF leaderships, is not in sight by 2020.

b. **Reach.** To defend and intervene around the expanded frontiers; Straits of Malacca to Central Asia and the Gulf covering the Indian Ocean Rim (IOR), IAF needs to be prepared for rapid strategic intervention and power projection to “safeguard and promote national interest”.⁸³ However, China being the dominant economic and military power would certainly challenge India’s influence in the IOR⁸⁴ and therefore, IAF may have to directly confront a much larger PLAAF in the process. In fact, most analysts are still busy in defining India’s dominant role in the region. Some believe that, ‘the elephant and dragon may still dance together.’⁸⁵ Yet, IAF leadership continues to see and prepare against China because the disputes over the boundaries have not been resolved. As Tyagi insists that, “we now have the capability by way of hardware.....the transition from the tactical to strategic and progressively graduate from ‘continental strategy’ to ‘regional strategy’ and then on to ‘global strategy. We need to look beyond our boundaries beyond J&K and China.”⁸⁶ Although the nuclear neighbors are not expected to engage themselves militarily, thanks mainly to economic necessity, as Indian Prime Minister stated, “There is enough space in the world to accommodate the growth of

⁸¹ V. K. Bhatia, Air Marshal (Retired), “In Progress,” *SP’s Aviation*, issue 7, 2010, p.17.

⁸² “India Air Force Targets 42 Squadrons Strength by 2022,” India Defense, available at <http://www.india-defence.com/reports/4230>.

⁸³ BK Pandey., Op.Cit., p. 61.

⁸⁴ KB Menon, Op.Cit., p. 50.

⁸⁵ Ajay Singh, “India’s Role in the New World Order”, *Indian defense Review*: Jan-Mar 2011 Vol. 26 (1), p.178.

⁸⁶ SP Tyagi, Air Chief Marshal (Retd), Op. Cit., p. 40.

both India and China".⁸⁷ Despite efforts to avoid military conflict with China, IAF continues to prepare itself for a limited; due to nuclear factor, two-front war scenario. Its acquisitions of multirole aircraft and force multipliers can at best be worrisome to PAF and not the PLAAF. IAF certainly has necessary wherewithal to go deep into Pakistan's territory and strike at places of its choosing with fairly high degree of survivability. However, it would surely be met with stiff resistance by the PAF; looking at its force structure and the mission. IAF may have enhanced its reach in the region but its objectives can only be achieved if these are not in direct conflict with China and Pakistan because both, together or independently would not let IAF a free hand in the region.

c. **Vision.** IAF has acquired the capability to look deep into Pakistan's territory through AEW, UAVs and space based satellite systems. In fact, not only the surveillance and reconnaissance but IAF is planning for a space based defense systems also. Therefore, IAF has the capability to create strategic effects against its relatively weaker adversaries.

Conclusion

43. The impact of RMA technologies on the nature of warfare poses challenging demands on the future air power to be innovative and ubiquitous. The future wars would see an increasingly decisive and frequent employment of air power due to its coercive and deterrent capability through selective use of long range precision strike, strategic surveillance and other RMA technologies. Air Superiority or air dominance will remain the main mission of air power, although UAVs, UCAVs, satellites, and Cruise Missiles may be increasingly employed to reinforce the manned aircraft and the missile. IAF is therefore preparing itself to meet not only the challenges of the future but to become a dominant force in the region by 2020. But to transform this dream into a reality, firstly, it would require a concerted effort in R&D and indigenous design and development and more importantly the capacity to produce modern aircraft and equipment in the country. Indian Defense establishments are working hard to overcome the difficulties faced in projects like LCA, however they are determined to support as well as sustain the effort. Secondly, it would have faced a very strong and a potent force; PLAAF which is well underway to achieve the same with more men and machines. Therefore, it is expected that India would

⁸⁷ Dr Manmohan singh quoted by Ajay Singh, Op.Cit., p.178.

tread carefully in pursuit of its interests vis a vis China so as to avoid any active engagement of its military, particularly IAF vs PLAAF.

44. PAF, well aware that it can neither match the numbers nor the resources that the IAF has at its disposal, has embarked upon a modest modernization plan to put up a befitting response against any aggression by the arch rival. PAF is concentrating hard on training, knowledge, self reliance, joint planning and quality equipment to cater for the deficiency in numbers. PAF is certainly concerned about IAF's modernization plan and is changing gears to remain abreast the evolving scenario. However, looking at the shopping list of the two adversaries for the next 15 years, it can be concluded that the IAF would be a force to reckon with but it would not be in a position to overwhelm the PAF and challenge its viability in a limited or sectoral conflict; envisaged in nuclear environment. However, in order to ensure its viability in a more prolonged engagement, PAF would have to make an effort to increase the strength of its high-tech combat aircraft to improve the force ratio because at some stage the numbers will also matter. Nuclear factor alone cannot guarantee peace and security to Pakistan until the Kashmir dispute is resolved. Therefore, Pakistan would have to invest heavily in the PAF because air power is likely to play a major role in any future conflict of any scale.

45. IAF's preparation to become a regional power by 2020 seems inadequate. The delays in operationalisation of LCA and decision on MMRCA are expected to have caused serious dent on its desire. Moreover, IAF would certainly be faced with serious challenges from much bigger and stronger PLAAF. On the other side, IAF would have to overcome a determined opponent, PAF, which would leave no stone unturned to deny IAF the much needed air supremacy that it would aspire for.

Biographic Note

47. Air Commodore Zia ul Haque Shamsi was commissioned in the GD (P) branch of the PAF in 1981. He is a qualified Flying Instructor and a graduate of prestigious Combat Commanders' School, Sargodha. He has qualified National Defence Courses from Australia, South Africa and Pakistan along with Air War Course as well as Masters in Defence and Strategic Studies degree from Quaid i Azam University, Islamabad. He also holds a degree of MBA in General Management. During his career, he has served on various Command and Staff appointments in the field as well as at the Air Headquarters. Most notables include the command of a Fighter Squadron, Fighter Wing and a Training Base. His Staff appointments include Assistant Chiefs of Air Staff (Works) and (Personnel- Airmen/ Civilians). He has been on the Faculty of Command and Staff College, Quetta. He is currently a Faculty Member at the AFW College, NDU and also doing Ph D in 'Nuclear Politics'.

Air Cdre Shamsi is a recipient of Sitara-e-Imtiaz and Tamgha-i-Imtiaz (Military).



<http://www.defence.gov.au/adcc/publications/publications.html>

