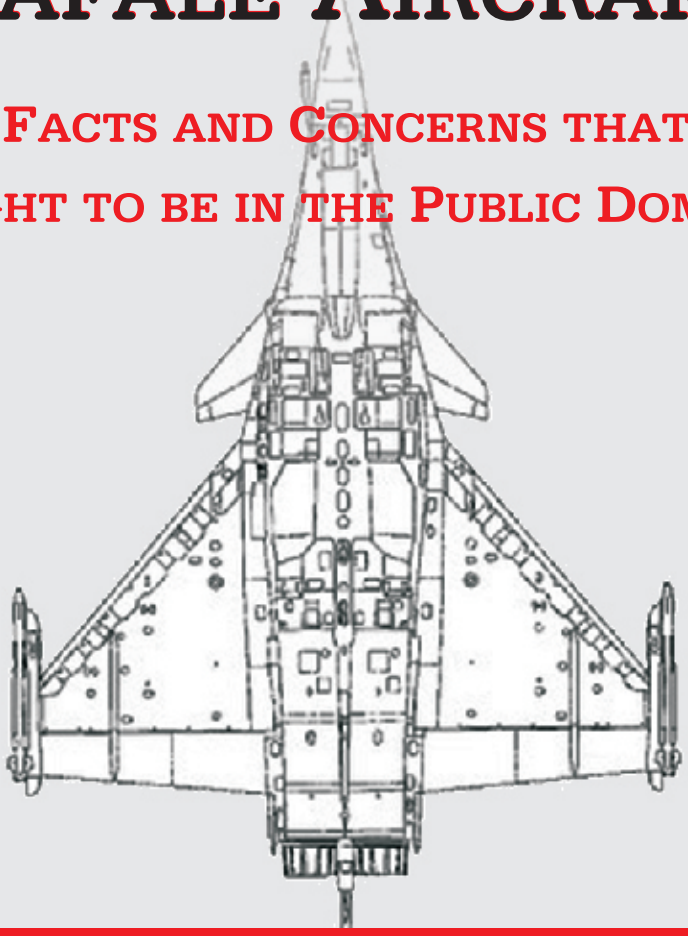
IDSA Occasional Paper No. 52

The Acquisition of Rafale Aircraft

Facts and Concerns that Ought to be in the Public Domain



Vinay Kaushal

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INSTITUTE FOR DEFENCE
STUDIES & ANALYSES
रक्षा अध्ययन एवं विश्लेषण संस्थान

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The Acquisition of Rafale Aircraft: Facts and Concerns that ought to be in the Public Domain

Introduction

Cinema in India began to influence politics from the mid-1950s onwards. This legacy of cinema in state politics has been very dominant in Tamil Nadu; this trend saw the emergence of NTR in Andhra politics; other regional centres have also had film industry personalities influencing the politics of the region. However, what has influenced national level politics the most is mainstream Hindi cinema's obsession with the box office formula. Mainstream Indian politics has learnt to adopt the ballot box formula from this. The formula of alleged kickbacks led to the ruling party losing the 1989 Lok Sabha elections. The major difference between the film industry and the approach of political parties is that, in the film industry, a producer who invests his money runs a financial risk which is based on the success or failure of the film at the box office. In politics, it is the challenger who uses the sail boat approach. The opposition party/ies rig the sails of alleged misdeeds of the ruling dispensation in defence acquisition deals. If the sail catches the wind, and is vigorously pursued to keep it in the public eye, this may gain and retain traction till election time. This formula became a success the first time it was used in the case of the Bofors gun. There were serious implications of this formula for national level politics, among which the major collateral damage was that, for the next thirty years, the Indian Army could not acquire a single artillery gun.

As India undergoes the Lok Sabha (Indian Parliament) elections of 2019, the acquisition of the Rafale aircraft has been in the forefront of the news and parliament debates; it has even reached the apex (Supreme Court) court. Unfortunately, truth becomes the first casualty in the many acrimonious discussions/election campaigns that surround us. In the

absence of any authentic credible information in the public domain, it is political debates and the exchange of charges and counter charges that tend to create public perception. It is, therefore, essential that those who were associated with this programme and possess some factual knowledge, share the same in the public domain so that the citizens of this country are also able to comprehend the facts, and then take a balanced view of their own. The attempt to write this essay is to share the facts as the author knows them until a certain point in time — that is, until the author was associated with the process — and to highlight some issues that are a cause of concern but have not been highlighted so far.

The Facts as I Know Them

IAF Modernisation Plan

The MiG-21 series of aircraft was acquired through direct import, and a large number were manufactured under license in India and were inducted into the Indian Air Force (IAF) between 1966 and 1987. A majority of these aircraft were expected to be phased out in the 1990s, thereby resulting in a significant fall in the combat levels of the IAF. Aircraft have a Total Technical Life (TTL) which is defined in hours. They also have a defined calendar life which is defined in years. Because of their role, combat aircraft undergo tremendous stress and, therefore, their TTL both in calendar years and number of hours is short. Against this backdrop, the indigenous design and development of Light Combat Aircraft (LCA) was sanctioned (1983), and the Government established (June 1984) the Aeronautical Development Agency (ADA) in Bangalore as a dedicated institution for the management of the LCA project. The IAF issued the Air Staff Requirement (ASR) in October 1985, with a projected requirement of 220 Light Combat Aircraft (200 Fighters + 20 Trainers) to be inducted by 1994.

The IAF had bet big on the success of the LCA programme, but uncertainty and delays cast their shadow on its planned acquisition process. No large acquisition programme could be thought of post the launch of the LCA. Life extension studies were requested for, and conducted by Russian designers (OEM of the MiG aircraft) to extend the life of the existing fleet to the extent possible. Mid-life Upgrade (to enhance the potency of the aircraft to current standards) of the existing combat fleet

was commenced, with the MIG 21 (Type 75), the last of the series produced in India, and a contract for the upgrade of 125 aircraft was signed — the design phase and two aircraft being upgraded in Russia, and the series upgrade of 123 by HAL in India. A similar approach was used to upgrade the MiG 29 and the Mirage 2000 fleet (both currently in progress). HAL (which had license produced MiG 27 and Jaguar aircraft) benefited from this learning, and the upgrade of these aircraft (though not as comprehensive) was designed and carried out by HAL. To make up for the dwindling number on account of the phasing out of existing aircraft on expiry of TTL, the IAF adopted a 'More of the Same Approach'. What this meant was that the IAF acquired a limited number of an aircraft type already in service in its fleet as that enabled the existing eco system to make them immediately operational. This ('More of the Same') approach was followed to acquire 17 Twin Seater and 20 Strike Jaguar aircraft from HAL. An additional number of MiG 29 and Mirage 2000 aircraft were bought from OEM. With the phasing out of the ageing Canberra fleet, there was a void in the capability to carry out offensive bomber operations deep into enemy territory. Meanwhile, developments in combat aircraft technology resulted in the graduation from role specific (ground attack, air defence, and interdiction, etc.), to multi role combat air craft — that is, having the capability to be used for both Air to Air and Air to Ground roles. They were broadly divided into three categories: light, medium, and heavy. A general criteria for classification is the maximum take-off weight (MTOW), Light <= 15000 kg, Medium <= 25000 kg and Heavy > 25000 kg, or generally greater than 30000 kg.

The first major acquisition programme post the LCA was the signing of a contract for 40 +10 Su 30 aircraft from Russia in 1996. The SU 30 comes in to the category of a heavy multi role aircraft, and would fill the void of the Canberra phase out. This was followed by an Inter Government Agreement (IGA) in 2000 to license manufacture 140 SU 30 MKI in India at HAL (under the 'More of the Same Approach'). Two additional orders had to be placed later for 40 Su-30 MKI, and additional 42 SU-30 MKI following the same 'More of the Same Approach' to make up the dwindling numbers. The impending acquisition of the LCA and the signing of the SU 30 left a void in the medium multi role capability. The IAF had three and two squadrons of the MiG 29 and the Mirage 2000 category,

respectively. The impending phase out of MiG-21 aircraft — which was the main stay of the IAF and which the LCA was to replace — and the failure of the LCA programme to meet any deadline made the IAF follow a 'More of the Same Approach', and take a decision to acquire additional medium multi role aircraft. With the SU 30 MKI meeting the heavy multi role category, and the light multi role category to be filled by LCA, the void was in the medium multi role capability. In its inventory, the IAF had two medium multiple role aircraft at that time, the MiG 29 and the Mirage 2000. Thus, the option was either to acquire more of the same of both, or more of the same of one of the two. To make the choice as objective as possible, the actual cost of operation and ownership of these two types of aircraft had to be examined so that the right choice was made. A preliminary exercise was undertaken based on the cost of operation of the aircraft as it emerged from the sqn costing system, and after an objective assessment based on the 'cost of ownership criteria', the decision to go in for additional 126 Mirage aircraft to supplement the existing Mirage fleet was taken. Since the IAF already had a specific no of Mirage aircraft available, the number of 126 was based on supplementing the existing number. Thus, initially, the programme was for 126 Mirage aircraft. The Parliament Standing Committee on Defence was apprised by the IAF, 'that a formal proposal for acquisition of a few squadron of Mirage-2000-5 in the 10th and 11th Plan has been submitted to the Ministry of Defence'.[1,2]

The primary reason why the cost of ownership of Mirage aircraft is lesser than that of MiG 29, despite the fact that the acquisition price of the Mirage was higher than the MiG 29, was on account of:

(a) The MiG 29 is a twin engine aircraft, and the total technical life of the engine is 2000 hours (*the series 3 engines manufactured by HAL post 2006*

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1 Para 22 of the Seventh Report Standing Committee on Defence (1999–2000) (Thirteenth Lok Sabha) Ministry of Defence Modernisation of the Indian Air Force presented to the Lok Sabha on 18 December, 2000

2 MoD ID OM No 2689/US/D Air I) 2000, dated 28 August 2001, referred to in the 14th report of the 13th Lok Sabha

IGA, the earlier series engine, the original fit on the aircraft, had a TTL of 1500 hours). This means that, after every 2000 hours, you need two engines for that aircraft and, if the IAF has to exploit this for 6000 hours, it would need 4 additional engines per aircraft as well as maintain an adequate float of spare engines. The Lok Sabha was informed that,

> To meet the future requirement of replacement engines for the MiG-29 fleet, an Inter-Governmental Agreement (IGA) has been signed between the Government of India and the Government of the Russian Federation for license manufacture of RD-33 Series-III engines at Hindustan Aeronautics Limited (HAL). RD-33 Series-III engine is the latest version of RD-33 engine, and has higher Total Technical Life (TTL) and time Between Overhauls (TBO). HAL signed a general contract with the Russian side for Transfer of Technology (ToT) for license manufacture of these engines at HAL.[3]

In 2006,[4] a contract was concluded for Russia to supply 20 RD-33 engines from early 2007 under a US$ 25 million deal, and for HAL to license-build a further 120 engines (the current price of an engine ex HAL is Rs. 20 Crores approximately) under a follow-on deal worth some US$ 250 million for supporting the existing fleet. It will need a follow on order to produce additional engines to support the fleet for its TTL.

(b) The Time between Overhaul (TBO) of its engines is 1000 hrs *(earlier engines 750 hours)*, and a lot of engines have to be withdrawn prematurely because of snags and sent for repair/intermediate overhaul (IOH).

(c) The fuel consumption rate of MiG 29 per hour of flying was substantially higher than the Mirage (the difference is about 800 litres per hour).

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[3] Lok Sabha unstarred question no 1448, answered on 8 March 2007

[4] HAL to build jet fighter engines 20 September 2006, at https://www.thehindu.com/todays-paper/tp-national/hal-to-build-jet-fighter-engines/article3078134.ece

(d) The serviceability rate of this aircraft was substantially lower; hence the number of hours that were flown by an aircraft in a year was much less than the number of hours flown by the Mirage 2000.

Table 1

	Total Procured	Upgrade contract nos	SOW	% of aircraft lost over total procured	Total Number of Hours flown by the fleet since induction	SOW rate per 10000 hours	Utilisation Rate in Hours per annum
					The actual data may be used by the system for its internal reference		
Mirage 2000	59	51	8	13.6			
MiG 29	80	62	18	22.5			

The Table above uses data in the public domain, and the actual numbers may be filled/updated by those in the system to check the validity of sub para (d) above.

Dassault was planning to close down their production line of the Mirage 2000; but they were willing to relocate the plant and machinery to India for license production of this aircraft. The IAF's proposal for the acquisition of 126 Mirage 2000–5 was returned by the MoD, stating that while the "Acceptance of Necessity' is accorded for 126 medium multi role aircraft, the IAF proposal would result in the procurement of the nominated product on a single vendor basis, and the procurement needs to be on a competitive basis.

Life Cycle Costing/Cost of Ownership

The author's first exposure to the concept of life cycle cost was in 1992 when he was posted as Directing Staff (DS) to start/revive the Advance Acconts Faculty at the Air Force Administrative College (AFAC) in Coimbatore. Two senior DS from the College of Defence Management (CDM) had come for a lecture, and the subject on which they chose to

address the participants was life cycle cost. It was incidental that, after this tenure, the author got posted to the Directorate of Financial Planning at Air HQ. IAF is the only service which has a Sub Directorate of Cost Analysis under Financial Planning. IAF has had a system of costing in place for some decades now, and the activities covered are listed below.

(a) Cost of operations of each type of aircraft wherein we determine the cost of the per hour flying of each type of aircraft in operation with the IAF.

(b) Costing of training institutions where we determine the cost per training week at each of the training establishments.

(c) Costing of base repair depots to determine the overhaul cost of primary products at these depots.

The system has gradually been maturing. The IAF has also had a pricing policy in place for the supplies and services rendered by HAL. This policy too has evolved over a period of time and, in 1995–96, a transformational change was brought in this policy. As a policy document, its uniqueness lies in its laying down broad principles, and requires an intense interaction between HAL & Air HQ's. Post these detailed interaction, Division specific Government letters incorporating standard conditions as also division specific parameters of yield, efficiency, and rejection rate, etc. were issued approving the price of each product produced, repaired, and overhauled at HAL. This was the base year price. An escalation formula was provided to escalate both labour and material cost, and a review of the base year price after 5 years was mandated. For the first time, this enabled both HAL and the IAF to know the cost of the products, both in the manufacturing programme and in the repair and overhaul programmes. This is popularly called the Fixed Price Quotation policy (FPQ policy). This provided for a time-bound 5 year task placement on HAL (firm for the next year, and forecast for the next 4 years). This brought about discipline and a much higher satisfaction level. This policy brought a qualitative change in the costing of the operating cost of aircraft, as factors hitherto unknown became visible and began to be used.

Difference between Life Cycle Cost (LCC) and Cost of Ownership (COO)

At a conceptual level, the LCC and the COO are the same as they require that the cost of purchase and the cost of its operation and maintenance be captured. Whether in text books published today or the BIS standard for LCC (issued in early 1950's), the example given to explain them is that of a water pump: you add the purchase price, value the rated power consumption for prescribed hours of usage, and compare all the options in this simple matrix. This example used is of a standalone product. Military platforms are not stand alone; they need role equipment, sensors, weapons, and man power to operate them. They also need an elaborate eco system to support them, and maintain them through a long exploitable life. They also require an elaborate process to decommission and dispose them. Any defence service wanting to buy a weapon or platform would not be buying a standard product from the showroom (for example, each variant of a car model has some unique features) but would like to customise it with sensors, weapons, etc. depending upon its deployment strategy, communication secrecy and commonality with other weapons and platforms already in its capability basket to have synergy: that is, the same platform for example, the Mirage 2000 in use by two or more countries would each have a different combination of sensors, communication equipment, role equipment, and weapons. One needs the details of all these costs, both in terms of capital investment of buying each of these supporting systems and revenue expenditure for maintenance. Thus, a complex and hugely expensive platform, like a combat aircraft which requires Ground Support Equipment (GSE), Ground Handling Equipment (GHE), weapons, and repair overhaul infrastructure. The number of reserve systems required to maintain a targeted level of serviceability are dependent on the TTL and TBO of each system and subsystems which would be unique, fuel consumption, turnaround time after each sortie and schedule of routine preventive maintenance and the manpower requirement. With these many variables, it is not LCC but, the Cost of Ownership needed for all these requirements.

The example of the comparison between the MiG 29 and the Mirage 2000 illustrates the folly of considering only a single dimension such as the acquisition cost. Use the COO philosophy to provide the cost of acquisition

of the platform, systems, and weapons, and to exploit and sustain a level of readiness, is the best to compare and select the L-1 bidder primarily because the 'life' policy followed by Russian, European, and US OEMs varies widely. The IAF has sufficient expertise available to understand the system. Using the acquisition cost parameter for the fleet would heavily bias the procurement towards a vendor who could strip the product to the minimum, and disregard features which cannot be evaluated, such as serviceability and availability in the fleet's future operations. Normally, the acquisition cost forms 20–25 per cent of the overall LCC of the aircraft, and the cost of operation, maintenance, and overhaul is about 75–80 per cent and, thus, significantly higher than the cost of acquisition.

Best Example of Cooperation

While we often get to hear the military and the bureaucracy being at logger heads, the MMRCA programme was a complete exception from that norm. While it was the IAF's endeavour for having learnt a lesson from the past to tread a new path unchartered in the country, it was natural on the part of the bureaucracy (which is inherently conservative) to raise questions. Questions were raised by the Advisor (Cost), MoD (Fin), FA (Acquisition) and DG (Acquisition). These questions were taken in a positive light by the IAF, and wherever these questions identified some weaknesses in the proposal, the same were taken in the right spirit and the proposal was modified. The then rules of the Government only recognised the identification of L1 based on the acquisition price, and this proposal was at complete variance from that. It was no surprise that, in a meeting in Aug 2006, the Defence Acquisition Council (DAC) did not approve the proposal to adopt the cost of ownership (to determine the L1) on the grounds that this system needs to mature before adopting the same. The infectious enthusiasm of the IAF to pursue this resulted in the then Defence Secretary and the then DG (Acquisition) to invest their personal goodwill and, in a rarest of rare exceptions, the Central Vigilance Commission (CVC) granted an opportunity to the IAF to present and justify its chosen approach. Both these officers took the IAF team to the CVC, and the CVC, the two members, and all the senior officers of the Commission attended the presentation. It was a most heartening moment for the IAF team when, at the end of the presentation and a brief question answer session, the Commission appreciated the chosen approach of the IAF.

Thereafter, the FA (Acq) and the AS, JS, and AM (LS) visited the Defence Acquisition University(DAU) and General Accounting Office (GAO) in Washington DC to seek clarity on the cost of ownership model and its appropriateness for deciding on the best bid. The proposal was examined again and, based on their inputs post this visit they — as well as Advisor cost — raised some observations which were also addressed by the IAF.

The best three suggestions to make the RFP more comprehensive and complete came from no other person than the Secretary Def (Fin). He had had a five year tenure as Additional FA, and was looking after both the revenue and the capital procurements of the IAF. It is during his tenure that the first ever upgrade programme (MiG 21 Type 75 Programme) was contracted, the HAL pricing policy was revised, and the initial Su 30 contract was concluded. He went through the RFP with a fine tooth comb and, after one week of thorough study, he came for a meeting to Air HQ, and asked for a clarification based on the copious notes that he had made.

While most issues needed amplifications and corrections, the following three suggestions that he came up with were readily acknowledged by the IAF team for having been missed out; they were happily accepted as they captured dimensions to make the RFP more comprehensive.

(a) The Secretary Defence (Finance) pointed out that one of the challenges faced in the past at the time of aircraft induction was the attempt to mate the existing weapons in the IAF inventory with the new platform. Since this can only be done by the platform design team, this exercise takes time (hence the platform is not immediately operational), and the designer can demand a price, and the IAF has no other option. He suggested that the IAF identify the output specifications of the type of weapon (and ask the vendor to supply the same in the quantities that the IAF specifies) that are compatible with the platform so that it is immediately operational on induction. He also suggested that the details of the total technical life of the weapon, the life extension procedure, and its cost be asked for.

(b) While a Mean Time between Failure (MTBF) linked warranty was part of the RFP, he suggested that the IAF asks the vendor to produce documentary evidence in support of the declared MTBF figure based

on its actually achieved MTBF figure of the platform from all the countries where it has been deployed.

(c) It has been a standard practice and a requirement of the DPP that an Engineering Support Package (ESP) for five year support, along with the necessary publication be included as part of the RFP. This package is to provide for maintenance by IAF technicians after the specified warranty period, during its exploitation. This period enables the IAF to establish consumption patterns based on platform exploitation in India, and draw up scales of holding spares and the requirement of reserve floats of rotables. For this purpose, the general concept of repair and maintenance of equipment followed by the IAF is given in the RFP. He suggested that the IAF must also include and ask the vendor to quote for a Performance Based Logistic (PBL) package which should be valid for a period of five years, and must guarantee a serviceability of 75 per cent. Both the proposal of ESP and PBL could be examined later once the financial bids were opened, and the IAF may evaluate the relative merits and demerits, both from serviceability as well as the cost angle, and decide to choose the PBL or the ESP.

Request for Proposal (RFP)

There was a fair amount of time gap between the decision to procure on a competitive basis and the finalisation and issue of the RFP. Visits by prospective vendors to make presentations about their platform capabilities and suggestions on 'how to work out LCC' were a regular feature. However, one visit stands outs. A US delegation headed by a three star General accompanied by a large team (the Indian side was out numbered 1:3) visited Air HQs. They gave a long discourse on US government procedures as well as the congressional approvals and waivers required for the supply of front line technology and platforms. They emphasised that there was a need for the IAF to decide from amongst the platform on offer from the US OEMs so that they could initiate the process of seeking the due approvals required as per their regulatory processes in to action. After giving them a patient hearing, the then Deputy Chief of Air Staff (DCAS) (who was heading the small Indian team) requested the US General to accompany him to his office. There was a pregnant silence for about 2 to 3 minutes in the conference hall before they returned. Then, the

DCAS in a very polite and dignified manner informed all those present that he had taken the General to his room as it has a good view of Vijay Chowk. He said that he showed the General the Parliament house building and told him that it represents the collective will of 120 crore Indians. The mandate of that house is that the 126 MMRCA will be procured on a competitive basis, and all those who wish to compete need to get their requisite approvals on time before the RFP is issued. The Indian team walked out a few inches taller and swollen with pride than when they had entered.

Immediately after their departure, the following provision was included in the draft RFP.

> In some countries, the Government regulations may not permit certain equipment(s) to be exported by the vendor as a Direct Commercial Sale, and that such an export with respect to that equipment(s) be conducted on government to government basis. In such cases the government may offer the composite commercial proposal, which may have elements of equipment being provided by the Government and those being provided by an OEM. The government commercial quote will be firm and fixed and valid for at least 24 months. No revision will be permitted. Should such a quote be L1, the Government of India will enter into a suitable contract, to be determined at that stage.

Unique features of this RFP

The DPP has a prescribed standard RFP format/template. This RFP was an 'out of the box' one and 360 degree version while maintaining the principles and the spirit of the DPP. Some of the major variations with reference to the then prevalent DPP 2006 were:

- The selection of the L1 bidder on the basis of COO and not the procurement price.
- The RFP was ahead of its times:
  i) When it was initially drafted, there was 'No Offset' policy, yet the draft RFP provided for '50% Off Sets'. Even when the Offset

policy got promulgated and provided for 30% 'Off sets', the RFP retained 50% off sets as initially proposed.

ii) It encouraged participation of the private industry.

- The RFP stated that, HAL was designated as the lead production agency for the airframe, aero-engine, assembly of aircraft and system integrator. Production of the other systems and sub systems of the aircraft could be by any Indian defence industry (defined as Defence Public Sector Undertakings (DPSUs), Ordnance Factory Board (OFB), and any private defence industry manufacturing defence products or components under an industrial license granted for such manufacture. It would include Raksha Udyog Ratnas (RUR), when appointed.

- The inclusion of weapons package with defined output performance criteria.

- Determination of reserve requirements by vendor based on a formula taking MTBF into reckoning

- Validation of MTBF data with the actual MTBF achieved in the countries where the aircraft has been exploited.

- Normally, the provision of training only for the IAF Aircrew and Ground crew is provided; but, for the first time, this RFP provided for training to Indian Industry Personnel as well as Indian Airworthiness and Quality Assurance Engineers.

- It provided for Aircraft System Maintenance Simulators, Engine Maintenance System Simulators, and a Navigation and Attack System Maintenance Simulator at one main operating base, as well as modern computer based ground training aids for the training of pilots, engineers, and technicians at each base to be set up by the OEM. The OEM was to provide all technical assistance and information required on aircraft performance, the flight model, and other aspects of the simulator, and would be responsible for the quality, performance, and qualification of the simulators produced. The Supplier would need to sign a Memorandum of Understanding (MOU) with the Government of India to set up the building and simulator for the MMRCA as a turnkey project.

- HAL was requested to draft the RFP provisions for ToT that would ensure that the indigenous content of production with respect to the total product cost in India would be up to 90 per cent.

- The vendors were required to submit a Preliminary Project Report (PPR) (along with the Technical Proposal) indicating the methodology that they would follow to meet the required delivery schedules for the aircraft to be produced in India under license.

Once the DAC cleared the IAF proposal for a cost of ownership based RFP, a committee of four members — two from MoD -FM (Air) and Advisor Cost and two from IAF) (including the author) — was set up to go through the RFP with a fine tooth comb before the RFP was issued. At the only meeting of the committee, while the MoD members had no points, the other IAF member suggested that some weightage be given to a twin engine aircraft. When asked to elaborate, the member stated that he as a fighter pilot felt safer in a twin engine aircraft. The issue was discussed, and the following emerged:

- The ASR and technical specifications have been drawn up by test pilots, vetted and approved all through the internal process by all those including the then CAS who were fighter pilots (and most of them test pilots).

- The JSF-35 under development is a single Engine aircraft.

- The comparative empirical data of the Jaguar, MiG 29 (both twin engine), and the Mirage 2000 (single engine) may not validate this apprehension.

He was convinced and withdrew his observation, illustrating once again the professional approach and the team effort of MoD and Air HQs to draft a comprehensive RFP.

Technical Evaluation, Including Flight Trials

The author left the IAF on deputation in the last week of August 2007, and has no first-hand knowledge of facts after this. The author was part of the team that organised the first International Seminar on Defence Acquisition at the IDSA in July 2011, and all contenders for the MMRCA

(who attended this seminar in full strength)[5] were full of praise for the manner in which the flight evaluation trials were conducted. In a competitive environment, all the six contenders would have put forward their best bids. When only two European aircraft cleared the technical evaluation, there were no protests. Similarly, when the L1 was declared in January 2012, there was no protest. Given the dwindling order books of military aircraft manufacturers, no manufacturer would have missed an opportunity to lodge a bid protest[6] had there been even an iota of ground to do so. The reason for this is the 'Test Pilot' and 'Flight test Engineer' breed of IAF.

The Aircraft and Systems Testing Establishment (ASTE) has been a part of the IAF since 1948. It started as an Aircraft Testing Unit (ATU) to accept and test aircrafts. The establishment was renamed ASTE when it relocated to the Indian aviation hub Bangalore in 1972. The Air Force Test Pilots School (AFTPS) became a part of ASTE in 1973. It trains flight test crew to meet the requirements of the Indian Air Force, the other two services, and some other non-military organisations involved with aviation. Test Pilots and Flight Test Engineers are trained by AFTPS to work as a cohesive flight test team. Rakesh Sharma, the first Indian to go in to space,

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5 General (Retd.) Gerhard W Back, former Chief of German Air Force and Senior Adviser to MoD, Germany General (Retd.) Sir Kevin O'Donoghue, former head, DE&S, MoD, UK
Lt Gen (Armaments) Alain COSTES, DGA, France
Erwin Obermeier, Senior Consultant, CASSIDIAN
Michael Christie, Senior Vice President, Military Air & Information, BAE systems, UK
Thomas Linkenback, Vice President, CASSIDIAN
Maj Gen (Armaments) Daniel Argenson, DGA, France
V. M. Komardin, Deputy General, Rosoboronexport, Russia

6 EADS/Northrop Grumman KC-45 (based on the Airbus A330 MRTT) bid for the 179 KC X aerial refuelling tankers programme for the USAF, and was selected in a competitive bid. Boeing filed a bid protest, which was upheld.[7] In the Indian programme of the basic trainer, South Korean protested to the Ministry of Defence (see https://www.flightglobal.com/news/articles/india-pilatus-trainer-announcement-delayed-by-protests-367518/), and the CCS approval was delayed till the protest had been examined.

was a product of this establishment, as was Rajiv Kothiyal who was selected by the ASTE and given preparatory training before being sent to USAF Test Pilots School. He did the prototype testing regime for the LCA, and flew the first flight of LCA on 04 Jan 2001. Rajiv Kothiyal was bestowed the Iven C Kincheloe award (the first man to walk on moon, Neil Armstrong, was also a recipient of the award in 1970) at Los Angeles, California by the Society of Experimental Test Pilots (SETP) for the 'Best Professional Achievement in Flight Testing 'in 2001 for his contribution to the successful first flight of the LCA'.

The establishment continues to maintain high standards, and is regularly tasked by the IAF and Certification Centre for State-of-the-Art Military Airborne Platforms and Stores (CEMILAC) for testing individual systems for their airworthiness, evaluations of modifications, etc. Reports of ASTE are relied upon by the CEMILAC and the IAF. Flight trials for the evaluation for the acquisition programme are also carried out by the ASTE. Their technical validation, and the flight evaluation by the ASTE of all competitive bids in the MMRCA programme won all round appreciation, and this was made evident when participants at the International Seminar on Defence Acquisition were unanimous in their praise for the professional manner in which the flight trial evaluation was carried out by the team.

Post passing out from AFPTS, test pilots and test engineers are either retained as instructors or posted on deputation to HAL to test fly for HAL aircraft manufactured and overhauled by it. They also continue with their operational career requirements of doing the Flight Commander and Squadron Commander Tenure etc. These test crew fill most positions in the plans branch of the IAF and, by the time they reach Air HQs, they have the professional knowledge and the requisite leadership experience in an operational environment. It is here that they draft the Air Staff Requirements (ASR) for the aircraft proposed to be acquired for the IAF. Given the time it takes for programmes to fructify, it is fairly common for an officer who has drafted and finalised the ASR for an acquisition to be sitting as Assistant Chief of Air Staff(ACAS) Plans/Projects, or even as Deputy Chief of Air Staff. The two test pilots who worked on the RFP for MMRCA are two star officers today, and one of them assisted the Honourable Supreme Court in Writ Petition (Criminal) No. 225/2018 on 14 Nov 2018, providing details when it was considering the case.

Why only 2 Squadrons (Sqns)

All through the period from January 2012 to the joint statement in April 2015, the Indian Parliament was informed (in replies to parliament questions) that some issues needed to be resolved. What these issues were, was matter of speculation till an affidavit was filed in the Supreme Court. As reported, 'HAL and Dassault could not resolve the issues relating to the manufacture of the 108 aircraft in India for over three years. The affidavit claimed that the man hours required to produce the aircraft by HAL in India would be 2.7 times higher than the man hours required by the French side to produce the same.'[7] If the MoD had been in a position (financially) to sign the contract, it ought to have asked for a review of HAL's estimates, and made it revise the same. Dassault would have had to comply 'for the love of money'. What was preventing the taking of the initiative was the staring reality of the availability of adequate funding for the 126 MMRCA programme.

12th Five Year Defence Plan and Beyond

Although defence expenditure in the planning era was classified as Non-Plan expenditure, yet being one of the major heads of expenditure, it had to be reckoned with while estimating resources available to the Planning Commission for Plan schemes. In the approach paper to the 12th Plan, the Planning Commission, stated: 'Defence expenditure is projected to fall from 1.83 per cent of GDP in the base year to 1.56 per cent of GDP in the final year.'[8] The period for the 12th five year plan was 2012–13 to 2016–17; the actual defence expenditure as a percentage of GDP followed the trend, and if the actual percentage was marginally higher, it was because against the target growth for GDP of 8 per cent, the growth rate achieved

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7 See, https://economictimes.indiatimes.com/news/defence/rafale-deal-as-per-procedure-centre-tells-supreme-court/articleshow/66599638.cms

8 *Faster, Sustainable and More Inclusive Growth: An Approach to the Twelfth Five Year Plan (2012–17)*, Planning Commission, Government of India, October 2011, available at http://planningcommission.gov.in/plans/planrel/12appdrft/appraoch_12plan.pdf .

was 6.9 per cent (Provisional),[9] and the absolute figure on account of increasing demand on the defence revenue expenditure and the 'committed liabilities' of stage payments of the already signed contracts could not be lowered any further.

Table 2

Defence Expenditure as % share of GDP				
Year	As a % of GDP as per 12th Plan approach paper	Defence Expenditure	GDP	As a % of GDP
2011–12	1.9	170913	8736329	1.960
2012–13	1.83	181776	9944013	1.830
2013–14	1.76	203499	11233522	1.810
2014–15	1.69	218694	12467959	1.750
2015–16	1.62	225895	13771874	1.640
2016–17	1.56	251781	15362388	1.639
2017–18		276574	17095005	1.618
2018-19 (RE)		285423	18840731	1.515
2019-20 (BE)		305296	21007439	1.453

Sources: Defence Expenditure up to 2017-18 as per Reserve Bank of India (RBI), 'Table 96: Major Heads of Expenditure of the Central Government', available at https://rbi.org.in/Scripts/PublicationsView.aspx?id=18561 accessed on 31 Jan 2019 and Union Budget, 2019–20

GDP figures up to 2017–18 are as per Press note on first revised estimates of national income, consumption expenditure, saving and capital formation for 2017–18 dated 31 January 2019 and GDP figures for 2018–19 and 2019–20 are as per Union Budget 2019–20 (Interim).

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[9] V.K. Kaushal, 'The Need for a Mid-Term Review of the 13th Defence Five Year Plan', at https://idsa.in/idsacomments/mid-term-review-13th-defence-five-year-plan-vkaushal-140818

The Defence Revenue and Capital expenditure percentage share of the Total Revenue and Capital expenditure of the Central Government has also been reducing, as may be seen from Table 3 and 4 below.

Table 3

Year	Defence, Interest and subsidies as a % of Total Revenue expenditure of the Central Govt.	Defence Revenue Expenditure as a % of Total Revenue expenditure of the Central Govt.	Interest payment as a % of Total Revenue expenditure of the Central Govt.	Subsidies as a % of Total Revenue expenditure of the Central Govt.
04-05	56.56	11.41	33.03	12.13
05-06	51.97	10.97	30.19	10.82
06-07	50.34	10.04	29.20	11.10
07-08	49.82	9.12	28.77	11.93
08-09	49.79	9.23	24.21	16.34
09-10	48.82	9.94	23.37	15.50
10-11	48.00	8.85	22.49	16.66
11-12	51.85	8.99	23.84	19.02
12-13	54.81	8.95	25.18	20.67
13-14	54.91	9.07	27.28	18.56
14-15	54.36	9.33	27.43	17.60
15-16	55.39	9.49	28.72	17.17
16-17	52.11	9.78	28.43	13.89
17-18	50.18	9.29	27.30	13.58
18-19	49.37	8.81	26.88	13.67

Source: hand Book of statistics of Indian Economy: Table 96 : Major Heads of Expenditure of the Central Government https://rbi.org.in/Scripts/PublicationsView.aspx?id=18561(Except 04–05 as per Accounts at a Glance 2004–05 issued by CGA, MoF GOI

Table 4

Year	Capital Expenditure as a % of Total central Govt Expenditure	Loans & advances as a % of Total Capital Expenditure	Capital outlay as a % of Total Capital Expenditure	Defence Capital Expenditure as a % of the Capital Outlay
04-05	22.77	64.22	35.81	**78.82**
05-06	13.12	17.08	82.92	**58.77**
06-07	11.79	12.39	87.61	**56.14**
07-08	16.59	9.56	90.44	**35.03**
08-09	10.20	15.65	84.35	**53.80**
09-10	11.00	13.89	86.11	**52.68**
10-11	13.08	15.95	84.05	**47.15**
11-12	12.16	13.08	86.92	**49.26**
12-13	11.83	12.47	87.53	**48.27**
13-14	12.03	10.23	89.77	**46.96**
14-15	11.82	14.86	85.14	**48.90**
15-16	14.13	10.41	89.59	**35.27**
16-17	14.41	12.93	87.07	**34.86**
17-18	12.33	8.39	91.61	**34.53**
18-19	12.30	7.24	92.76	**33.73**

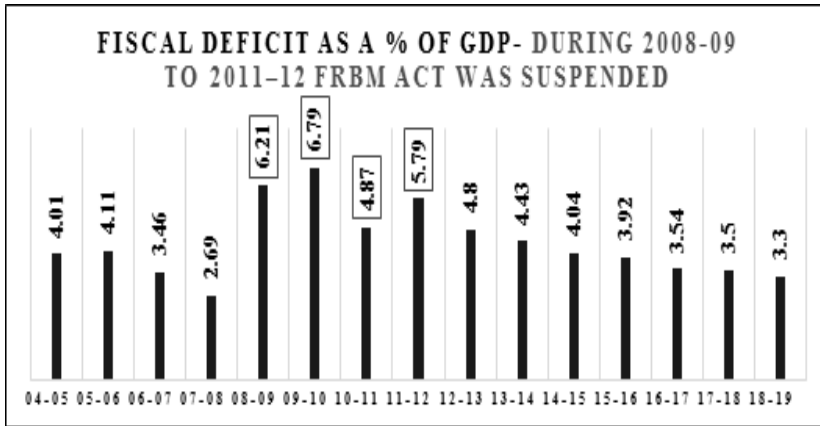
Source: hand Book of statistics of Indian Economy: Table 96: Major Heads of Expenditure of the Central Government https://rbi.org.in/Scripts/PublicationsView.aspx?id=18561(Except 04–05 as per Accounts at a Glance 2004–05 issued by CGA, MoF GOI

The hands of the governments were tied down because of the FRBM Act. The FRBM Act mandated reduction in the two ratios: that is, revenue deficit and fiscal deficit as a percentage of GDP. The target was to wipe out the revenue deficit, and bring down the fiscal deficit to three per cent by 2007–08, which was later deferred to 2008–09. However, given the

international financial crisis of 2008, the deadline for the implementation of the targets in the Act was suspended. Initially, the revival of fiscal prudence was expected in 2010–11, but it was further delayed to 2012–13.

Graph 1

Fiscal deficit targets achieved during the FRBM Period



Source: Annual Accounts at a Glance issued by CGA, MoF, GOI and MTEF 2018 placed in Parliament on 07 Aug 2018

The Table below gives defence capital expenditure as a percentage of total government capital expenditure as also the share of defence expenditure (without including defence pensions and with defence pension included) as a percentage of the total government expenditure. The signing of the contract for 36 Rafale aircraft itself has led to DPSUs not getting the stage payment due for the committed liabilities for the ongoing schemes.[10] There have also been newspaper reports quoting the MES

[10] Tweet from its official twitter handle, at https://www.ibtimes.co.in/amid-reports-cash-crunch-hal-clarifies-it-secures-rs-962-crore-overdraft-789471

Contractors Builders Association of India (BAI) stating that infrastructure work has been halted due to paucity of funds. The reports specifically mention that the work on the construction of hangars to house the two squadrons of Rafale aircraft to be inducted has also come to a standstill.[11] Infrastructure to support modern weapons and platforms is as important as the platforms themselves. It has to be remembered that, at the time of the induction of Mirage 2000 aircraft in 1985, instead of building new modern hangars, some existing hangars were refurbished due to financial constraints. In an unfortunate incident in June 1989, the roof of one of these hangars collapsed, damaging 8 Mirage 2000 aircraft.[12] Fortunately, these aircraft were retrieved and made serviceable; but it must be remembered that the cost of repair to 8 Mirage 2000 aircraft was probably more than the cost of constructing a hangar. Given the fiscal constraints, the defence capital acquisition has been under stress for want of funds. There was no way that contractual payment for the 126 MMRCA programme could have been met if the contract was signed. A tough choice had to be, and was made to reduce the requirement to 2 Squadrons to meet the capability gaps, acquire a potent weapon platform, and exploit the potential and flexibility of Air Power that it would bring to bear on the adversary. It is not the first time that only 2 Squadrons of a type of aircraft were inducted— even in the case of Mirage 2000 and MiG 29 initially, only two squadrons each were inducted. I doubt if there was any other option.

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[11] `Shaurya Gurung, *Ecomomic Times*, 29 January 2019. The shortage of funds has slowed down the progress of work on hangers at the two stations meant to host the to be inducted Rafale Squadrons

[12] See, http://articles.latimes.com/1989-06-02/news/mn-1193_1_damage-collapses-hangar, and p. 123 of *Vayu Shakti Aerospace and Defence Review*, IV, 2015

Defence Revenue and Capital expenditure as a Percentage of Total Govt expenditure, without and with Defence Pensions

Table 5

Head	Actual Expenditure as Per Accounts at a Glance of CGA MoF					Budget 2019-20		
Defence Expenditure	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19(RE)	2019-20(BE)
Revenue	111277	124374	136807	145936	165410	186129	191431	201902
Capital	70499	79125	81887	79958	86371	90445	93992	103394
Total	181776	203499	218694	225894	251781	276574	285423	305296
Total expenditure of GOI								
Revenue	1243513	1371772	1466992	1537761	1692986	1878835	2140612	2447907
Capital	166858	187675	196681	253022	286282	263140	316623	336293
Total	1410371	1559447	1663673	1790783	1979268	2141975	2457235	2784200
Defence Capital Expenditure as a % of the total Govt capital Expenditure	42.25	42.16	41.63	31.6	30.17	34.37	29.69	30.75
Defence Expenditure as a % of the total Govt Expenditure	12.89	13.05	13.15	12.61	12.72	12.91	11.62	10.97
Defence Pension	43368	45500	60450	60238	87826	92000	106775	112080
Defence Pension as a % of govt expenditure	3.07	2.92	3.63	3.36	4.44	4.30	4.35	4.03
Total	**15.96**	**15.97**	**16.78**	**15.98**	**17.16**	**17.21**	**15.96**	**14.99**

Price Comparison

As is often said, when comparing, one should not compare apples with oranges. The price of same product over a period of time does not remain constant, and undergoes changes. These changes in the case of weapon platforms/aircraft are not just restricted to inflation but are also dependent on technology. For example, the Air Force signed a contract with HAL for 20 LCA in year 2006, and the price was around Rs 110 Crores. The Air Force placed a second order again for 20 LCA (the contract was signed in 2010), and the price for this was about Rs. 200 Crores. In response to a request for a proposal for 83 Tejas Mark1A fighter jets issued by the IAF in December 2017, HAL has quoted a price of Rs. 463 Crores in April 2018,[13] and the MoD has set up a committee under chairmanship of Principal Advisor (Cost) to examine HAL's price proposal.

In the case of the MMRCA programme, the RFP had stipulated that the vendor is to quote a price, and to provide indices based escalation formula valid for 40 years. The formula was to indicate the source and authority for the issue of indices. An annual cap on the limit of the escalation was also to be provided. The RFP for MMRCA was issued in August 2007, and the bids were to be submitted by March 2008. The RFP also required that the prices should be firm and fixed, and be valid for 24 months from the date of submission of offers. Hence, the prices quoted were to be firm till March 2010. DPP 2006 provided that, when bids are received in different currencies/combination of currencies, the cash outflow may be brought to a common denomination in rupees by adopting a base exchange rate as on the day of opening of price bids. The conversion of foreign currency bids into rupees was to be done by taking into account the selling rate of the Parliament Street Branch of State Bank of India, New Delhi on the date of the opening of the price bids. The commercial bids were opened on 4th November 2011,[14] and the L1 was declared by

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[13] See Sushant Singh, at https://indianexpress.com/article/india/defence-ministry-sets-up-committee-to-check-hals-high-bill-for-tejas-jet-5234903, *Indian Express*, 27 June 2018

[14] Rajya Sabha, Unstarred Question No.978, answered on 5 March 2018

the Committee in January 2012. The MMRCA RFP required the vendor to quote for 18 Fly away aircraft, and a specific weapon package (including Ground Handling Equipment (GHE) and Ground Support Equipment (GSE)) as also for other deliverables. Hence the price in Indian Rupees was determined on 4 November 2011, and the RBI reference exchange rate on that day was Rs 67.7910.[15] The IGA was signed between the governments of India and France on 23 September 2016. Even if the same Euro price was to be converted to Indian Rupees, the price would vary as the rate for the Euro on 23 September 2016 was Rs 74.670 (an escalation of 10.15 per cent over 2011 rates). In addition, the price would need to be escalated to bring it to the delivery level by applying the annual escalation formula already quoted in the commercial proposal in response to the RFP, or as claimed by the government that the annual escalation cap has been reduced from 3.9 per cent in the RFP to 3.5 per cent in the IGA, if the indices based escalation rate was higher.

In addition to the above two factors, there are other logical reasons that would result in a change in price.

As per the RFP, 18 flyaway aircraft (comprising 12 single seat and six twin seat aircraft) were to be delivered, along with the requisite support, maintenance, and test equipment. The quantity of initial requirement of weapons, to be delivered along with the direct flyaway, was also specified with reference to each of the output-based capability category specified in the RFP. It would be simplistic to convert the quoted price of 18 Flyway aircraft, along with the weapon and support equipment, into 36 aircraft price by multiplying it with 2 for the following reasons.

- The deliverables for 1 sqn was meant to support the sqn operations at one base immediately on induction. The decision to have 2 operational sqns and fully exploit the flexible nature of air power potential of this platform would require that GSE, GHE, and the weapons required for this potent platform be placed at some other bases also on all three fronts. This would enable the operational deployment of the required

[15] See, https://www.rbi.org.in/scripts/referenceratearchive.aspx

number of this platform at any of these predetermined bases as and when required as the GSE, GHE, and weapons would already be available at that base. The aircraft would fly to these bases, and the ground crew, spare packs, and other equipment would move to the location by a transport aircraft so that they are operational from such locations in an hour(s) time. This would need additional quantities of GSE, GHE, and weapons, and that would also add to the cost when procuring two sqns, and the factor of two will not do justice.

- In addition to the deliverables with 18 Fly away aircraft, there were a large number of other deliverables — for example, training facilities, simulators, etc. to name just a few. These deliverables would not reduce by a factor of 36/126, or be a multiple of 2 if we take deliverables with one flyaway squadron.

- While specifying the weapons, the RFP had put output based specifications, and it was left for the vendor to choose and supply a weapon matching the specifications that were prescribed. Since the RFP was issued in 2007, the weapon specifications that were identified were as per those available at that point in time. Just to give an example, subsequent to the issue of RFP, the MBDA — which is a partner in this programme — has developed a new BVR called the Meteor. It is an active radar, guided beyond-visual-range air-to-air missile (BVRAAM). It offers a multi-shot capability against long range manoeuvring targets in a heavy electronic countermeasures (ECM) environment, with a range in excess of 100 kilometres. It is stated to have three to six times the kinematic performance of current air-air missiles of its type. It achieved the IOC in 2016. This BVR has been selected by NATO countries as a weapon of preference, and the process of its integration with the F35 is in progress. The IAF ought to have asked for the replacement of the BVR that was initially offered by this new class of BVRAAM. Not only would the numbers have changed (as shown above), but there would have been a substantial price difference between the price of the previous BVR and this BVRAAM. This could also be the case in respect of some other weapons/sensors development which have matured in the intervening period of 10 years and are now available, and may have been sought by the IAF in place of the ones offered earlier.

It is a mystery for nobody that, since the financial crisis of 2007, defence spending has had a continuous tendency to slow down in European countries even as the cost of equipment has been increasing. The reason for this evolution is well known: more electronics; more integrated systems on board; more capabilities on the same aircraft; the rapid evolution of technologies; quick changes in the nature of threat; and the technology to counter this. Thus, the issue of price is complex in this particular case, and any speculation in this regard without the facts would be speculative.

Notwithstanding the points brought out above, in their audit report 'The Union Government (Defence Services) Air Force(Report No. 3 of 2019', the C and AG has done a comparison of the prices, and the deliverables quoted for 18 flyaway aircraft, and multiplied by a factor of 2 to arrive at 36 aircraft, and escalated from the base year as per the negotiated escalation rate, and concluded as against the Aligned Price as estimated by them, the contract was concluded for a price — that is, 2.86 per cent lower than their Aligned Price. An issue brief, 'MMRCA Mess and the Need for Professionalism in the Defence Acquisition Process' by the author is available at https://idsa.in/issuebrief/mmrca-professionalism-in-def-acq-vkaushal-220219. However, some issues relevant to this paper and the understanding of the C and AG as seen in the report will be discussed briefly in the end.

Are 36 Aircraft Enough to Sustain Two Squadrons over 40 Years?

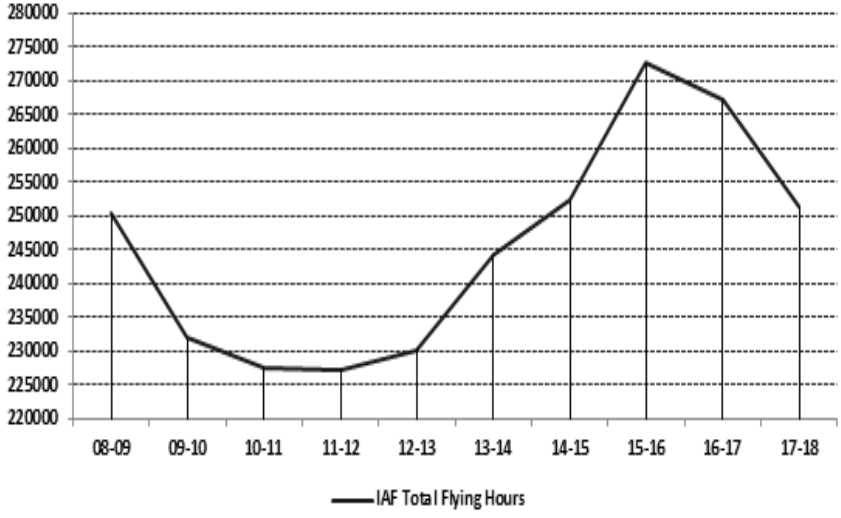
A question that ought to have been raised by knowledgeable people is: are 36 aircraft enough to sustain two squadrons over 40 years? The answer is NO. Aircraft accidents are a reality, and if one has to sustain 2 Squadrons, then one cannot just acquire the standard number of aircraft per squadron. The standard procedure is that, as per a Government policy revised periodically, one has to buy an additional number to cater for Strike off & Wastage (SOW), and also cater for 'Maintenance Reserve' (MR) as per the rate provided. Assuming that the Performance Based Logistics (PBL), which provides for maintenance of 75 percentage serviceability initially signed for five years is continued and therefore MR would not be required, one would still need aircraft to cater for SOW. Assuming that the present government approved SOW rates are high, one has to adopt a rate as close to the best achieved in the world to cater for a conservative SOW. The IAF accident rate as available in the public domain is tabulated below.

Table 6

IAF: Annual Accident Rate per 10000 hours		
Financial Year	IAF Total Flying Hours	Accident rate per 10000 hrs
08-09	250306	0.39
09-10	232003	0.6
10-11	227480	0.53
11-12	227322	0.57
12-13	230200	0.22
13-14	244253	0.29
14-15	252288	0.4
15-16	272628	0.22
16-17	267110	0.37
17-18	251405	0.24

Source: PIB Press Release dated 31 Dec 2018, Year End Review – 2018 Ministry of Defence

Graph 2



2015–16 recorded one of the lowest accident rates of 0.22 in the history of the IAF.[16]

The number of flying hours flown has steadily increased 2011–12 onwards, primarily because of the induction of MI 17 IV V-5, C-130J Super Hercules, and the Boeing C-17 Globemaster, both because of the numbers and the fact that their authorised utilisation rate is much higher than combat aircraft.

The above annual accident rates are across the IAF, and include the hours flown by Transport and Helicopter fleets. Their (transport & helicopter) aircraft size allows for redundancies; they have a multi-crew environment, and they also log higher utilisation hours per month. The accident rate in these categories influences the average, and the accident rate in combat aircraft as a category would be higher. If we adopt the least accident rate which has been achieved by a combat aircraft in the world's largest Air Force, the requirement would be as tabulated below.

Table 7

Number of Aircraft required to maintain 2 Squadrons for 40 years		
	Single seat	Twin seat
	24	12
Expected utilisation per month	12.5	12.5
Life in years	40	40
Number of Hours to be flown (RFP specifies 6000 hours over 40 years)	144000	72000
Strike Off Wastage Rate per 10000 hours (SOW rate)	0.236	0.236
(to be rounded off to next whole no)	3.3984	1.6992
Number of Aircraft required	28	14

[16] Para 66 (e) of the 29th report of Standing Committee on Defence (16-17) (Sixteenth Lok Sabha)

Table 8

Comparison of USAF Class A Mishap Rates per 100000 hrs

1980–2000		1991–2000	
Fighters	2.55		3.1
Rate per 10000 hrs	.255		.31

Source: CRS Report for Congress Military Aviation Safety Updated November 25, 2003

Table 9

Aircraft accident rate USAF by Type*		
	Per 100000 hours	Per 10000 hours
F -15	2.36	0.236
F-22	5.49	0.549
F/A -18	2.84	0.284
F-16	3.45	0.345

Source: https://www.popularmechanics.com/military/aviation/a27470/f-35-passes-100000-hour-mark-with-no-crashes/

C&AG audit report, 'Union Government (Defence Services) Air Force (Report No. 3 of 2019)

Articles 148–151 of the Indian Constitution define the position, duties, responsibilities, and the reports to be submitted. The Comptroller and Auditor-General's (Duties, Powers and Conditions of Service) Act, 1971 further amplifies these, and Section 18 of this Act requires that in the performance of his duties C and AG has the authority to ask for any accounts, books, papers, and any other documents relevant to the transaction which he is to audit be provided, and to put such questions or make such observations as he may consider necessary, to the person in charge of the office, and to call for such information as he may require for the preparation of any account or report which it is his duty to prepare. This provides the strength, and the reports of C and AG are rich in factual details that are otherwise not accessible. This does not mean that there cannot be — or should not be — a difference of opinion between the

contents of the report and the opinion of the executive. Differences are a sign of a healthy democracy, and are more likely on matters technical and complex like this acquisition programme. An important observation has been made in the above report and certain facts have been included; but the implication of these has been missed in the report are briefly provided below.

- **While discussing Field Evaluation Trials (FET) and the Staff Evaluation Report (SER), the report mentions that two aircraft were cleared based on their presentation in the laboratory as to how they proposed to meet the shortcomings with respect to certain ASQRs.**

The RFP stated a schedule, and all the vendors were provided to field the desired units of aircraft and weapon systems in India for Field Evaluation in varying climatic, altitude, and terrain conditions. The staff evaluation was carried out thereafter, which gave out the compliance of the demonstrated performance of the equipment vis-à-vis the requirements. The compliance was determined only on the basis of the parameters specified in the RFP. Chapter 1, Page 16 Para 38 of DPP 2006 provides that, 'Where field evaluation is not feasible, there may be a possibility of conducting evaluation through computer simulation'. Hence, if for some aspects the two vendors were permitted to demonstrate their plans to meet the short comings in a laboratory it was as per the prescribed procedure.

- **Four aircraft were rejected in field trials as they could not meet the ASQR parameters of 'Growth Potential' and 'Design Maturity'.**

As shown above, all competing qualified aircraft were tested as per the prescribed test schedule in varying climate conditions. The IAF will, as a matter of routine, utilize its combat aircraft, and the aircraft will need mid-life upgrades as the IAF has done in the case the MiG -21, the MiG-27, the Jaguar, the MiG-29, and the Mirage-2000. It is this experience upon which the RFP reference to 'Growth Potential' is based for the following items.

(a) The aircraft's airframe and engines should have adequate growth potential.

(b) The engine should be modular, and have adequate growth potential.

(c) Bus (This is a management system that coordinates all the power from the source to each recipient system); loading should be low and it should permit 25 per cent future growth potential.

(d) The aircraft's software and computers should have the potential for future growth.

(e) The software and computers of simulators aids for training should have the potential for future growth.

(f) The radar should have adequate growth potential.

Two of the four contenders in this have stated the following in the recent past.

(a) In the earlier MMRCA tender, Russia had fielded a tweaked version of MiG-29SMT under the MiG-35 label, which was not shortlisted for various reasons, including it was not serially produced and not inducted by the Russian Air Force.[17] Its manufacturers — who are now contenders for 110 combat aircraft — say that they are offering a 'completely new aircraft' with an upgraded radar and '50 per cent more combat potential'.[18]

(b) The F-21 (a variant of F-16 contender for 110 aircraft) notably has a big dorsal spine that has only appeared previously operationally on advanced two-seat F-16 derivatives. This addition can accommodate avionics, communications equipment, countermeasures systems, and more.[19]

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17 http://www.indiastrategic.in/2018/08/26/mmrca-tender-russia-picks-hal-as-strategic-partner-bullish-about-mig-35-prospects/

18 https://economictimes.indiatimes.com/news/defence/make-in-india-jet-deal-mig-to-partner-with-hal-says-will-be-most-cost-effective/articleshow/65491038.cms

19 http://thedrive.com/the-war-zone/26575/lockheed-martin-deletes-claim-that-its-rebranded-f-21-could-be-a-path-to-indian-f-35s article by Joseph Trevithick Feb 20, 2019 and http://www.defencenews.in/article/Lockheed-Martin-Deletes-Claim-That-Its-Rebranded-F-21-Could-Be-A-Path-To-Indian-F-35s-583239

The C and AG report perception that the FET & SER were subjective is not well founded.

Benchmarking

Para 51 of DPP 2006 provides that,

> In multi-vendor cases, on opening of commercial offers, once L1 vendor is identified the contract should be concluded with him and there would be no need for any further price negotiations. However, negotiations can be held in exceptional circumstances where valid logical reasons exist and such negotiations should be held only with L1. In case of procurement of new equipment on single vendor/ resultant single vendor basis, CNC should establish a benchmark and reasonableness of price in an internal meeting before opening the commercial offer. Once the commercial offers are opened and the price of the vendor is found to be within the benchmark fixed, in the internal meeting, there should be no need to carry out any further price negotiations.

Since in the instant case, it was a competitive bidding and there was more than one vendor even post opening of commercial quotes in Nov 2011, there was no need for benchmarking. As per the C and AG report, in April 2011 the MoD setup a Benchmarking Committee to estimate the benchmark price against which the price Bids of the vendors were to be evaluated. The report at Para 6(i) states, 'At the time of Bench Marking in June 2011, HAL had stated that the French man-hours had to be converted to Indian man hours by multiplying M/s DAs quoted man hours by factor of 2.7.' The report fails to highlight that 'Benchmarking' was initiated by the MoD when it was not called for, and HAL's assertion of the factor of 2.7 for which they quoted no basis, stalled the negotiations.[20]

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[20] https://economictimes.indiatimes.com/news/defence/rafale-deal-as-per-procedure-centre-tells-supreme-court/articleshow/66599638.cms

Detailed Project Report (DPR)

The L1 vendor was declared in January 2012. The RFP provided that the L1 vendor would be required to submit a DPR giving a detailed methodology the vendor would follow to license manufacture the aircraft in India. In the DPR the production of airframe, engine, accessories and integration were to be covered in separate chapter. A chapter was to identify the agencies for Transfer of Technology (ToT) and manufacturing. This would have required intensive interaction between OEM and the selected Indian companies led by HAL. The report is curiously silent on the subject.

Working in Silos

As with the other government organizations, the C and AG office also works in silos, and fails to connect some obvious dots. There are independent Principal Directors under C and AG who undertake audit work for the Navy, the Coast Guard as well as the Indian Air Force. In Report no. 9 (2018) for the Navy and Coast Guard, one of the projects covered is the 'Induction of Long Range Maritime Anti-Submarine Warfare aircraft', wherein the CNC has extrapolated the product support cost quoted by a vendor for two years on a pro-rata basis for another 18 years, assumed the product support cost of the second vendor as nil, and declared this vendor as L1. The CNC in the MMRCA case has made similar errors as is evident in the audit report. Another thing common in both the cases is that the same individual chaired both the CNC's.

Baby Shoots of Trend

In the years preceding the current decade, the term 'Arms Dealers' was a common phrase associated with any form of defence acquisition in India. The MoD has made conscious efforts to reduce their ability to exercise influence. It may be a coincidence or a fact that there has been a trend to head hunt the rare breed of exceptionally capable professionals to lead defence ventures in India. One example illustrates this. A successful country head of an major aviation company — in whose 4 year tenure contracts for P8I and C17 were signed — moved over in April 2011 to join a new venture that aspired to be associated in the MMRCA programme as a JV partner (An MOU with M/S Dassault in 2012), then moved over three years later in 2014 to a US based company that was into Electromagnetic

Aircraft Launch System (EMALS) and Drones and, in the beginning of 2018, moved back to India to spearhead the manufacture of a combat aircraft in India. Interestingly the person whom he replaced in his latest appointment was a former air force officer who, out of his 21 years of service (including one and half year of training), had eleven years of an uninterrupted tenure in the MoD. This person has moved to head a company which has a JV with Dassault which has been in the eye of the storm.

Conclusion

Today, political parties are fighting to create public perceptions, and they lay down their own rules of engagement. The Press enjoys freedom, and it is their job is to extensively cover current issues. The factual details brought out in the C and AG audit report of this programme are not accessible to the public because C and AG audit reports are not hosted on any website. The election schedule for general elections for the Indian Parliament have been announced, and till the last phase (which ends in the 3rd week of May 2019), this issue will be a part of the political debate. A review petition is also being heard in the Honourable Supreme Court. Till all facts are available, the public may find it difficult to segregate facts and speculation. This essay is an attempt to provide some facts and some logical opinions for the public, and also identify the gaps in the information available thus far.

The importance of Air Power has been decisive in deciding the outcomes of conflicts since the Gulf war. Closer home, its potency has been established in February 2019 to raise the cost of the asymmetrical war fare being practiced by our western neighbours. The IAF, as is known, is well short of its authorised number of combat squadrons. Irrespective of how the events pan out, they are bound to cast a shadow on the IAF's programme to acquire 110 combat aircraft for the following reasons.

- The bureaucracy (both civilian & in uniform) will be extremely conservative.

- As per the C and AGs report, the MoD has acknowledged the shortcomings of the LCC model, and has decided to withhold the LCC model in future procurements RFP till the shortcomings are addressed. Given our situation, the age old L1 methodology is ill

equipped to address the acquisition of a complex combat aircraft. It needs to be borne in mind that this potent platform is to be exploited over 40 years, and about 80 per cent of the costs will be incurred during the exploitation phase, hence any selection based on the single parameter of initial acquisition cost would not be wise.

- Financial constraints are likely to continue to constrain capability building. The geo-politics of our region (South Asia and surrounds) is of such a complexity that, despite the good intentions of all, major conflicts have erupted; border skirmishes and cross- border terrorism continue. India has two priorities: first, to improve the quality of life of a vast majority of its population, and provide them the basics of education, good hygiene and health care, if we have to reap the fruits of demographic dividend; secondly, to keep its borders, shores, and skies inviolate. The latter requires military might. Both these priorities are not mutually exclusive, and demand resources. Given this, some innovative funding model would need to be thought of for military capability building till the economic, structural, and taxation reforms result in better tax compliance and the much needed revenue begins to accrue to fulfil both these priorities.

The acrimonious debate in the public space on the acquisition of Rafale aircraft has been primarily focused on a few issues. The debate does not inform the public about the long, arduous and complex nature of the programme and the joint effort invested in it. The uniqueness of this programme is also not in the public domain. It does not specifically inform the lay person as to the rationale for restricting the numbers to two squadrons, and carries on oblivious of the collateral effect it may have on future acquisition programmes. It also does not notice some emerging signs and, most importantly, does not ask the question: "Are 36 aircraft enough to sustain two squadrons over 40 years?"

This paper seeks to share with an interested and informed readership the background facts of the Rafale acquisition programme and answer the abovementioned questions.

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