International Journal of Trade & Commerce-IIARTC
January-June 2018, Volume 7, No. 1 pp. 19-42

UGC Approved Journal No. 48636
COSMOS (Germany) JIF: 5.135; ISRA JIF: 4.816; NAAS Rating 3.55; ISI JIF: 3.721

Evolution of Defence Offsets in India and Impact on Aerospace Industry

Naresh Kumar Palta[a*], C.G. Krishnadas Nair[b]

[a]*Deptt. of Management Studies, Jain University, Bengaluru, India*
Email Id: naresh.palta@jainuniversity.ac.in, paltank1@gmail.com
[b]*Indian Institute of Aerospace Engineering & Management, Jain University, Bengaluru, India*

Abstract

Multiple factors influence needs of defence hardware, including aircraft. Nations have utilized offsets to enhance domestic capabilities and these have become a recognized instrument by 130 countries. Many European nations have obtained 75 to 100 % offsets. Need for India to fully leverage offsets cannot be overstated. Indications are that military hardware requirement could be more than $ 200 billion till 2027. Offsets have taken time to get accepted in India, but with efforts by Aeronautical Society of India, Hindustan Aeronautics Ltd. and Society for Indian Aerospace Technologies and Industries (SIATI), offsets are now key in defence procurements.

This study traces evolution of offsets in India and examines impact on aerospace industry. Many private companies that entered Aerospace after economic liberalisation have grown leveraging domestic projects and international sub- sourcing. These have also leveraged offsets due to the credibility created. A good number of companies entered aerospace after introduction of Offsets and have acquired offsets work to grow in technology and products. But numbers of successful companies is small. Joint Ventures by foreign OEMs is another success of Offsets.

A domain Survey has brought out perceptions that Offsets have not fulfilled goal of growth. This is a pointer. Long term focus has to be on integration and platform build by requiring vendors to set up factories in India and also asking vendors to partner Indigenous programmes for energizing Make-in-India to build skills, infrastructure and investments. The Government needs to review the gaps in the policy and processes hampering rapid fulfillment of accrued offsets of $11 billion, by addressing concerns of stake- holders, and incentivize them.

Key Words: *Aerospace industry, Defence Offsets, DPP, IOPs, Offsets, Make-in-India.*

Disclaimer: *The views presented in this paper are the personal views of the authors and do not in any manner present the views of the organisations of their affiliations.*

PAPER/ARTICLE INFO
RECEIVED ON: 02/01/2018
ACCEPTED ON: 03/02/2018

Reference to this paper should be made as follows:

Naresh Kumar Palta, C.G. Krishnadas Nair (2018), "Evolution of Defence Offsets in India and Impact on Aerospace Industry", *Int. J. of Trade and Commerce-IIARTC,* Vol. 7, No. 1, pp. 19-42

a. **Corresponding Author is a research scholar.*
b. *Prof. IIAEM, Bengaluru; Honorary President, Society of Indian Aerospace Technologies and Industries (SIATI); & Chancellor, Jain University, Bengaluru, India.*

1. INTRODUCTION

The dynamics of procurement of military hardware by a country, more so the airborne platforms, are influenced by a multiplicity of factors. These encompass geo-political equations, economics, global scenario, etc. Offsets have become an integral part of these procurements. Offsets now have gained increasing acceptance worldwide, with 130 countries following this concept[1, 2]. This is a huge jump from just 15 countries in the seventies[3] and 20 countries even by the nineties[1].

In India too in the aerospace and defence sectors, offsets attract considerable attention. The interest is because of the huge purchases needed by the Indian defence services. In fact, the offsets related to purchase of commercial airliners are not receiving the same amount of visibility, although the quantum of purchase is equally substantial.

The efforts for bringing in the concept of Offsets gained active interest in India in the early nineties when Aeronautical Society of India (AeSI) and Hindustan Aeronautics Limited (HAL) commenced to emphasize the value of leveraging offsets for growth of aerospace sector. The focus initially was on the commercial airliner procurement which was growing due to fleet expansion by the public sector carriers Air India and Indian Airlines, as also due to opening of skies to Private airlines in India. The procurements of Govt. airlines at that time were banking upon Counter Trade, which was export of commodities or other unrelated products. The efforts of AeSI and HAL were supplemented later by the newly formed Society for Indian Aerospace Technologies and Industries (SIATI).These consistent efforts led to introduction of offsets by the Ministry of Civil Aviation (MOCA) for aircraft purchases by the two PSU airlines.

However, in respect of defence procurements, with consistent efforts of HAL, AeSI and SIATI, the Ministry of Defence (MOD) constituted a Committee for a detailed study and based on its recommendations introduced an Offset Policy in 2006, not only for military aircraft purchases, but for all defence equipment.

India is today among top countries with the highest spend on defence forces and is one of the major importers of military hardware[4]. It is understood that India's Long-Term Integrated Perspective Plan (LTIP P) for 2012-2027 may involve purchase of military equipment worth more than 200 billion USD over the next 10 years. A CII-KPMG study[5] in 2010 had assessed that import of military equipment from overseas was of the order of 70 percent. This situation has not changed substantially, which makes India very attractive to military hardware OEM suppliers and hence the opportunity for expanding the defence equipment manufacturing base, exports and creating employment through 'offsets' against the imports must be fully utilised.

In the views of Ungaro[6], Research Fellow, IAI, Italy, defence offsets are increasingly attaining significance in terms of economics as well as political impact. According to the Twelfth Report to the US Congress on "Offsets in Defense Trade" by the U.S. Department of Commerce, Bureau of Industry and Security, countries in Europe have made very high leverage of Offsets, compared to other regions, with the proportion as much as 100 percent or more. It states that 22 countries used offsets between 80 to 117% of the purchase price. Majority are from Europe, with Austria topping at 172%. Outside Europe only Philippines (100%) and South Africa (112%) are in this range. This data is for the period 1993 to 2006.[7]

2. OBJECTIVE OF THIS PAPER

Not much of the historical perspective of evolution of Offsets concepts in India is available in literature. For any work on a Policy subject and hence for work on offsets too, it is essential to have clarity on how the subject has evolved over the years. Objective of this study is to create a reference document to understand how the Offsets concept has evolved in India and the necessity

for an Offsets Policy was established leading to incorporation in the Defence acquisitions, how different constituents perceive the utility of offsets and effectiveness of the Policy, and to assess impact on Aerospace sector.

3. INDIAN AEROSPACE INDUSTRY

Aircraft industry in India started in 1940 when visionary industrialist Shri Walchand Hirachand created Hindustan Aircraft Ltd. with the support of the then Maharaja of the State of Mysore and in collaboration with Inter-Continental Corporation, USA to assemble and manufacture aircraft in India.

The first aircraft, a Harlow PC-5A trainer, flew on 29 July 1941 and the aircraft industry of pre-independence India was born. After producing a few Harlow Trainers, Curtiss Hawk and Vultee Bombers the Company was taken over in Sept 1943 by the then British Govt. of India and was used for maintenance of aircraft for the World War II[8].

After India became independent, the new Govt. followed a policy of meeting the military aircraft requirements of the armed forces through 3 streams viz., imports, licence production and indigenous design and development for the development of indigenous industry. HAL grew through licenced production as well as indigenous Design & Development. Over the years HAL produced a number of aircraft under licence as well as indigenously designed. Latest in the series of indigenous Design & Development are the highly acclaimed Dhruv Advanced Light Helicopter, as well as Tejas Light Combat Aircraft, Light Combat Helicopter (LCH) and Light Utility Helicopter (LUH).

Following the establishment of the Society for Indian Aerospace Technologies and Industries (SIATI) in 1991, a large number of private sector industries mainly small and medium started manufacture of components and systems for the Indian aircraft and space projects. Many of these SMEs have become R&D and innovation partners with HAL, ISRO and DRDO and developed capability and manufactured components/ structures and equipment for aircraft and engines produced under licence as well as those designed and developed in India. Participation of large private sector industries was minimal on account of low volumes of production and poor economies of scale. This was the scenario before the introduction of offsets in 2006.

4. EVOLUTION OF OFFSETS POLICY IN INDIA

In India introduction of Offsets has a short history in relation to several other countries, however, a 'Counter- Trade' was in practice in several of its commercial aircraft imports, which were managed by the Ministry of Commerce (MOC) through the Govt. owned State Trading Corporation of India (STC). Counter Trade is an organized version of 'barter trade'. The stipulation makes it mandatory for the seller to buy from the buyer country goods and services as a specified proportion of the sale value. For example, a seller of aircraft or defence equipment can fulfill the counter trade obligations by importing agricultural produce, leather goods, jewellary, artifacts, etc., totally unrelated to the equipment or technology sold. Thus, Counter Trade is considered to contribute towards incremental exports, to improve the export- import balance of trade in favour of the buyer. But, the expectation of incremental exports is based on the assumption that the commodities involved would otherwise not get exported[3] and this hypothesis was not true.

A Buy- Back Clause was introduced by the MOD in some of the military aircraft and engines produced under licence. For example in the Jaguar project, for which licence production contract was signed in 1979, Adour engine licence production contract in 1981 and Dornier DO-228 project licence production contract in 1986, it was in the form of Buy-Back purchase of HAL manufactured components and spare parts by the OEMs from the licence programmes. It was only partially successful because the capacity created was for the Indian requirement. On the other side Jaguar production had stopped in the UK and hence requirement was only for spares. Therefore quantity off-take was very minimal.[9] In this situation, as an alternate to Buy-Back, HAL and MOD had negotiated to obtain know-how of technology for other projects. One example was repair/ overhaul of Industrial Gas Turbine from an OEM, which became one of the most profitable Divisions of HAL.

In the early nineties a move for introducing a policy for 'Offset' requirement for military and commercial aircraft purchase was led by the Aeronautical Society of India (AeSI) Hindustan Aeronautics Ltd. (HAL) and Society of Indian Aerospace Technology and Industries(SIATI).On 11th Dec 1992, the second author while delivering the Dr. V.M. Ghatge Memorial Lecture at the AeSI, Bangalore, had emphasized the need for an Offset Policy to compel the international aerospace giants to tie up with Indian industries for sub-contract work. He also stressed that the members of AeSI should evolve a national policy for development of Aircraft industry in the country[10]**.** Following this, Dr. APJ Abdul Kalam, President of the AeSI, in 1994 got a Policy Paper prepared, by a Committee of Prof. AK Rao of Indian Institute of Science, Dr. CG Krishnadas Nair (President–elect of AeSI) and Dr. Kota Harinarayan, member AeSI Executive, and this was submitted with recommendation for introducing offsets in military and commercial aircraft purchase and also to establish a National Aeronautical Commission.[10] The projections were that up to 2010 purchases needed would be Rs. 350 billion for military aircraft and Rs.621 billion for commercial aircraft/ helicopters.[11] This Report was presented to the Prime Minister and was pursued subsequently by the successive AeSI Presidents.

HAL leadership (including the second author, who was the then Managing Director, and Mr. SN Sachindaran, Director Corporate Planning) took up the desirability of introduction of Offsets for commercial airliner purchases, in place of 'Counter Trade', with the Ministry of Civil Aviation, through the Department of Defence Production. HAL made several presentations with calculations on how the cost of aircraft will not increase in the case of Offsets, but does so in the case of Counter Trade. It was analysed that costs of knowledge workers, design and development and also labour & supervision for manufacture are much lower in India as compared to Europe and USA. It was demonstrated that the cost of sourcing of manufacture, design services etc. to India, including costs for logistics and management, would be significantly lesser. Tender documents of many countries, including China, Philippines, Singapore, Australia and Canada, which had insisted on 'Offsets', were shown in support to justify the necessity of including the offsets for aircraft purchases by India. Rather the Counter Trade increases costs because the OEMs would add the commission to be paid to the agencies who will import commodities on their behalf.

However, there was still strong criticism that HAL was trying to get more export work by introduction of offsets, instead HAL and other PSUs should win business from abroad through competitiveness. HAL argued that PSUs can be competitive, which had been proven by the

winning of the Airbus A-320 Doors contract on the basis of global bidding in 1989 purely on cost competitiveness, although there was no offset clause. Later another contract was won from Boeing for B-757 Emergency Exit Doors of B-757 and for Tornado Structural Assemblies from BAE Systems in 1994. HAL also stressed that offsets will not only help PSUs but also private sector including large number of SMEs and provide for the growth of Aerospace industry in India. (After several years it is now visible that the benefit of 'Offset' is accruing to both the Private Sector and the DPSUs.)

After so much of prolonged efforts, with the support of the Planning Commission, the Ministry of Civil Aviation (MOCA) provided for the offset clause in addition to the Counter Trade, to be monitored by the STC. MOD was still a long way from introducing offset clause in military purchases. Therefore, HAL, AeSI and SIATI continued their efforts to convince the MOD. They argued that the objectives of offsets could include technology transfer to upgrade domestic industry, investments by the OEM Supplier in India for infrastructural growth, export opportunity, job creation, skill development & training, developing competencies/ capacity indigenously in specific areas. In the case of Offset the seller is required to import goods and services in the same category, apart from other requirements imposed by the buyer as indicated above. A seller of aircraft or defence equipment would, therefore, be required to import aircraft or defense equipment / components and services related to these or a similar category. The offsets, thus, help to stimulate growth in the particular sector in chosen aspects.

With all these efforts and clarifications and continued push, MOD started considering very seriously introduction of Offset Policy not only for military aircraft but for all Defence procurements. In July 2004 the MOD formed a Committee with Dr. Vijay L. Kelkar as Chairman and Mr. NR Mohanty, then Chairman of HAL, as one of the members, to 'Examine and recommend changes in the acquisition procedures'. The other members of this high level Committee were from the Defence Forces, DPSUs, Private Sector, GOI officials, Industry Associations and Academia. The Committee recommended an Offset Clause for contracts valued at Rs. 3000 million and above.[12]As a result Offset requirements were introduced for the first time in 2005 in the Defence Procurement Procedure (DPP) [13]. It stipulated 30% offset for contracts valued at Rs.3000 million and above.

5. FURTHER IMPROVEMENTS IN OFFSETS POLICY

Interactions between MOD, industries and industry bodies continued to take up policy issues which needed to be addressed. In later years the first author supported these efforts more directly as the Co-Chairman of the Offsets Committee of SIATI. Apart from the regular communications, direct interactions with the Govt. officials were also maintained. To obtain inputs from industry, several approaches were used like dedicated workshops, Round Table discussions with OEMs and IOPs, Presentations and Panel discussions in industry forums/ Seminars, one-to-one exchanges with the thought leaders, and direct correspondence. As one example, on 7 Feb 2011 a Round Table was conducted with representatives of foreign OEMs, Indian Industry and Consultancy organizations. It provided valuable inputs with specific recommendations. As a consequence of strong advocacy from SIATI[15,16] and other stake holders like industry bodies, academia, think-tanks, etc., coupled with consultative processes used by the MOD, several revisions with improvements have been made in DPP and Offset Conditions.[17] Key improvements to the offsets policy in successive revisions to DPP are listed at Tables 1to 4.

Table 1: Improvements in Offset Policy from DPP 2005, 2006 to DPP 2008

	DPP 2005, 2006	DPP 2008
i	Offset banking: No provision for Banking of offset credit.	Procedure introduced for banking of offsets credit.
ii	Listing of defense products: No list of defence products was prescribed for discharge of offset obligations.	A list of products and services eligible for discharge of offsets obligations was introduced.

Table 2: Improvements in Offset Policy from DPP 2008 to DPP 2011

	DPP 2008	DPP 2011
i	A list of defence products and services eligible for discharge of offsets obligations was introduced.	Civil Aerospace products were added.
ii	From DPP 2006 onwards eligibility for discharge of offsets was limited to "Indian defence industries" i.e. DPSUs, OFBs and any 'private defence industry' manufacturing under industrial license.	The limitation of eligibility only to "Indian defense industries" was removed by extending to "Indian enterprises" i.e. DPSUs, OFBs, private and 'public sector enterprises'.
iii	Since DPP 2006 Offset obligations were co-terminus with the period of the main contract.	Period extended by two years from the date of main procurement contract.
iv	In DPP 2006, Defence Offset Facilitation Agency (DOFA) was formed to act as a single window agency to oversee and assist in implementation of offsets policy. This continued in 2008 too.	Defence Offset Management Wing (DOMW) replaced DOFA, having more powers and functions viz. formulation of defence offset guidelines, post-defence offsets contract management, working in collaboration with the Acquisition Wing for smooth implementation of offset guidelines.

Table 3: Improvements in Offset Policy from DPP 2011 to "Revised guidelines 2012" & DPP 2013

	DPP 2011	Revised guidelines 2012, & DPP 2013
i	Broad guidelines introduced in 2006 under the title "Procedure for Implementing Offsets' Provisions" continued up to DPP 2011	The Offsets conditions were modified to give more details of various applicable processes and conditions, under the new title of "Defence Offset Guidelines".
ii	MSMEs were treated at par with large enterprises.	In the discharge of offset obligations a multiplier of 1.50 has been allowed for Micro, Small and Medium Enterprises as IOPs.
iii	Up to DPP 2011 Offset sourcing had to be done only by OEMs directly.	Offset sourcing extended toTier-1 sub-vendors of OEMs.
iv	No Indirect Offsets	Indirect Offsets as Investment in equipment through non-equity route was introduced.
v	Modality of selection of IOP by OEMs was not laid down since 2006.	OEM/vendor/Tier-I given freedom to select IOP, provided the IOP complied with DIPP guidelines/licensing requirements.

In May 2015, the MOD constituted a 10 member Expert Committee, headed by Mr. Dhirendra Singh, former Home Secretary, for suggesting improvements to the DPP, including Offsets and to make recommendations for Make in India. The Committee had invited domain stake holders to give their views and recommendations, along with interactions to understand perspectives. On behalf of SIATI the authors played an active role to provide practical and radical inputs. Some of the important improvements in the DPP released in March 2016 are at Table 4.

Table 4: Improvements in Offset Policy from DPP 2013 to DPP 2016[17]

	DPP 2013	DPP 2016
i	Limited flexibility to change IOPs was given in 2013.	More flexibility for change of IOPs and change of products, and simplification of process.
ii	Selection criterion was only commercially L1 bid. There was no weightage for technology	Introduction of L1 / T1 categorization of bids, in place of L1 criterion alone, to provide weightage for better technology.
iii	Services were put in abeyance in 2013 for eligibility as offsets.	Services under the heads MRO, life extension, R&D have been reinstated. Engineering services and software development has been reinstated with a cap. Services under Quality and Training are still in abeyance.

6. IMPROVEMENTS IN SOME KEY OFFSET RELATED POLICIES

In addition to the Offset Policy, there are other policies and regulations which directly impact the governing of Offsets. These are issued primarily by the Ministry of Commerce, Dept. of Industrial Policy & Promotion (DIPP) in coordination with other Ministries. Four important cases are presented below:

i. **Industrial Licence for Defence Production (IL-DP)[17]:** The Dept. of Industrial Policy and Promotion (DIPP), Ministry of Commerce, GOI, had stipulated that manufacture of items for aerospace and defence required Industrial Licence for Defence Production (IL-DP). The procedure for IL-DP was quite cumbersome and very time consuming. This retarded the process of participation by IOPs and became a deterrent for new participants. Various measures were instituted in 2016 to simplify the Licencing, like reduction in processing time and waiver for requirement of IL-DP in many cases.

ii. **Munitions List (Categories of defence products for which IL-DP is necessary)[17]:** In April 2012, DIPP had issued a Munitions List to define categories of defence products for which the Industrial Licence was necessary. This list covered a very large range of items, many of which were not of any critical significance as Defence Products. Through Press Note No. 3 dated 26 June 2014[18] the requirement for IL-DP was reduced with applicability to a simplified Munitions list.

iii. **Foreign Direct Investment[17]:** To be eligible as an IOP for Offsets, an Indian company could not take Foreign Direct Investment (FDI) of more than 26%. Foreign OEMs were reluctant for

Joint Ventures with this low participation. Recommendation to increase FDI limit to 49%, was incorporated in the FDI Policy[19] modified in 2016 to make the partnerships attractive to foreign companies. After this new FDI limit 12 new JVs have been formed for Aerospace alone.

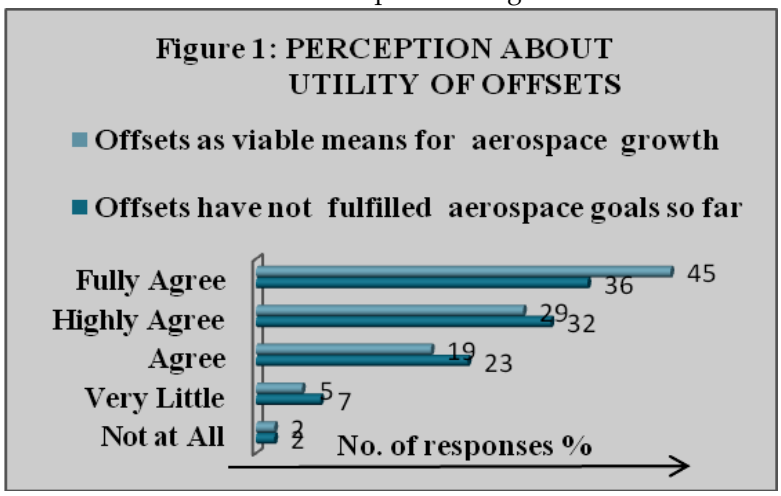
iv. **Threshold for MSME Classification for 1.5 Multiplier for Offsets:** As per the MSME Act 2006, the upper limit for MSME classification was Rs. 100 million investment in plant and machinery/equipment. A large number of enterprises were, therefore, not eligible for offset work under the 1.5 multiplier incentive.[16,17] In February 2018, the Cabinet has approved change in the basis for classification from 'investment in plant & machinery' to 'annual turnover', with the upper limit for Medium enterprises at Rs 2500 million. This would bring larger number of companies in SME segment and should facilitate OEMs to place offset work with them.

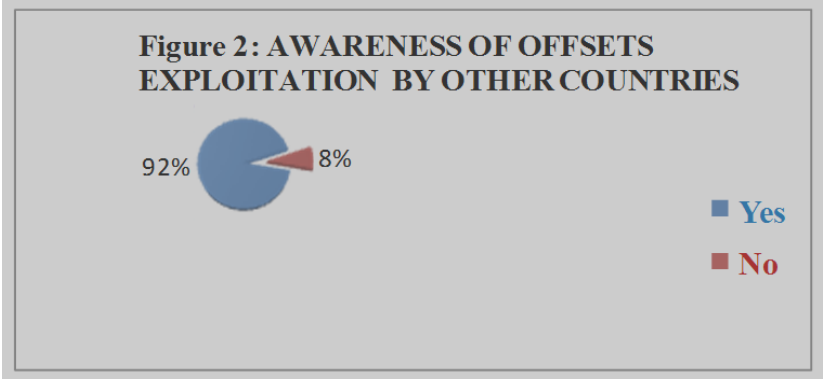
7. SURVEY FOR ASSESSMENT OF STAKE HOLDER PERCEPTIONS

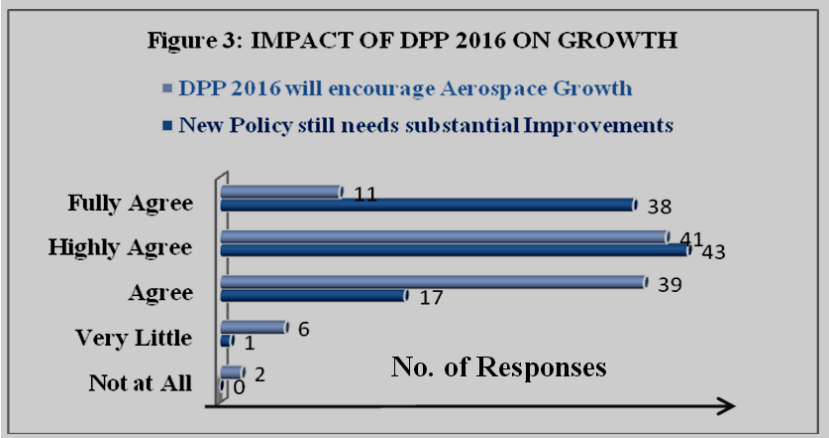
In order to understand how various domains take-holders perceived the offsets concept, a survey was carried out from August 2016 to July 2017. The Sampling Plan chosen was Purposive or Judgmental Sampling, because the Offsets are a highly specialised field and organizations have very limited number of specialists. In various constituents like Pvt. Sector, DPSUs, Foreign OEMs, Professional bodies, Think Tanks and Govt. organisations, 201potential contacts were identified. The Survey was done using an online template containing a large number of Statements seeking objective ranking of opinions on a Likert Scale of 1 to 5 for most cases. The Survey yielded 100 responses (50% of population). The results pertaining to following 6 Statements, used as parameters relevant directly to this paper, are presented:

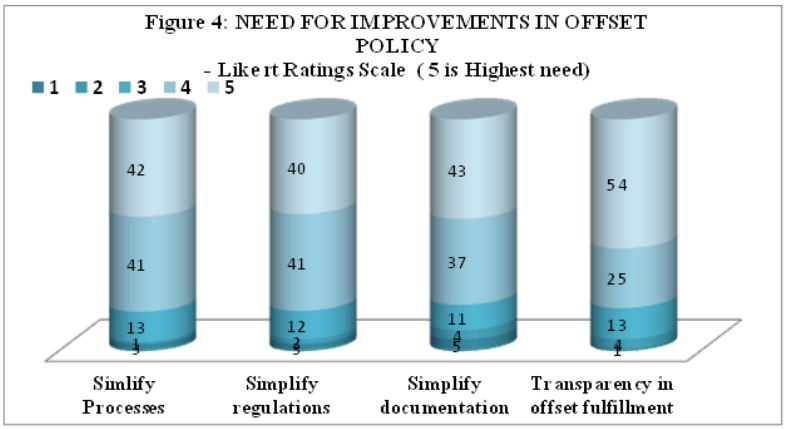
- Offsets are considered a viable means to support growth of aerospace industry in India.
- Indian experience so far is that Offsets have not served well to fulfill goals of aerospace growth.
- Many countries have made use of Offsets.
- The Offset Policy with recent modifications in DPP 2016 will encourage growth of aerospace.
- The new Policy still requires substantial improvements.
- The improvements required in the Offset Policy are in respect of :
  i. Simplification of processes.
  ii. Simplification of restrictive regulations for productive action.
  iii. Simplification of documentation
  iv. Transparency of information in public domain on status of fulfillment of offsets.

The responses to these Statements have been depicted in Figure 1 to 4.









The perceptions seen from this data are summarised below, with brief comments:

- Offsets as viable means for growth of Aerospace have been considered by 93% (45+29+19%) respondents.
- However, 91% (36+ 32+ 23%) consider that offsets have not fulfilled goal of aerospace growth. This may be due to lack of public awareness of the achievements.
- Majority respondents (92%) are aware of exploitation of offsets by other countries. This signifies very high level of awareness in the domain, leading to a logical conclusion that India too should do likewise.
- Those who consider that changes in Offsets Policy in DPP 2016 will encourage Aerospace growth clocked 92%. This is an endorsement of improvements introduced.
- But 99% feel that substantial improvements are still required, which indicates there is room for further policy changes.
- More than 90% respondents have vouched for improvements in terms of simplification of processes, restrictive regulations, documentation; and Transparency of information on status of offset fulfillment. This could imply that respondents have experienced these difficulties.

8. IMPACT ANALYSIS

An analysis of impact of offsets on the Indian Aerospace Industry has been done by examining the fulfillment of the Objectives of the Policy. The Objectives have been defined in DPP 2013[13] as follows:

"The key objective of the Defence Offset Policy is to leverage the capital acquisitions to develop Indian defence industry by (i) fostering development of internationally competitive enterprises, (ii) augmenting capacity for Research, Design and Development related to defence products and services and (iii) encouraging development of synergistic sectors like civil aerospace and internal security."[20]

In addition, on the lines similar to many countries, perceived objectives in India were as below:

- Get additional exports of defence goods from India.
- Growth of technology through export opportunities.
- Growth of Indian Defence Industry, including Aeronautical industry covering PSUs,
- Private sector, SMEs through R&D and Strategic Alliances.
- Creating employment

Analysis has been done for these objectives under 7 sub-heads as follows:

i. **Offset Arisings & Extent of Realization:** Stake-holders have been requesting transparency in sharing information on offset arisings and performance. But data has not been made available on MOD website. However, in a written reply given by the Minister of State for Defence in the Lok-Sabha on 06 May 2016 some information was released (Press Information Bureau (PIB) Release dated 06 May 2016 by the MOD titled "Offsets Obligations for Defence Contracts")[21]. The data is summarised at Table 5, showing commitments of $6.13 Bn up to December 2015. Further, according to data presented by DOMW recently at the FICCI Seminar on Defence Offsets at Defexpo, Thiruvendanthai on 11th April 2018, the Offset arisings up to 2017 are appx. $11.20 billion. DOMW also informed that:
   - Most of the offsets work is low end technology.
   - Often expenses on consultants hired for offshore/ onshore activities for offsets have been projected as offset discharge.
   - The award of Offsets is limited to small number of IOPs; 51% offsets have been allocated to only 15 IOPs, out of 52.

The data at Table 5 shows 80% fulfillment till December 2015. The Govt. has recovered penalities for non-performance, which should act as a deterrent. On the other hand, as per the latest DOMW data, offset discharge up to 2017 is $ 2.21 Billion, out of $ 3.04 Billion committed, a 72.5% performance.

Table 5: Status of Offsets, dated 06 May 2016

		Value in USD ($)
1	Total Offsets accrued (To discharge by 2022) as on Dec 2015	6.13 Billion approx.
2	Offsets to be discharged by Dec 2015	2.23 Billion
3	Actual Discharge, subject to audit verification	1.78 Billion
4	Penalities recovered for non-performance	Euro 2.07Mn + $ 80500

ii. Industry Growth in Terms of Technology & Products[22 to 32]

a. **Status before Offsets:** After economic liberalisation in the nineties, while many sectors saw extensive involvement of Private Industry, the Aerospace remained largely with the PSUs, other Govt. agencies and their sub-sources. Some enterprises did start working for domestic programmes of HAL and DRDO, many of whom have become innovation and R&D partners for domestic programmes. One of the examples is Dynamatic Technologies Ltd. (DTL), which acquired orders from HAL for SU30 structural assemblies in 2004, followed by Lakshya Pilotless Target Aircraft (PTA). Another company Tocol Machine Tools started manufacture of SU30 structural parts/ sub-assemblies for HAL in 2003. It was acquired in 2009 by Alpha Design Technologies. One more example is Tata Advanced Materials Ltd. (TAML), which undertook composites products for land systems and missiles for MOD and DRDO from 1992, entered aerospace in 2008 with HAL's Advanced Light Helicopter –Dhruv & Light Combat Helicopter (LCH) and also ISRO programmes. Establishing infrastructure and capabilities as cost effective manufacturers of aerospace structures for Indian projects gave them a head start, because of which the OEMs considered them as good Indian Offset

Partners (IOPs). As a manufacturer in high precision, 45 years old Maini Precision Products Ltd. started as a sub-tier for Safran Aircraft Engines (erstwhile Snecma), France for commercial aircraft engine components in 2005, without the offsets condition. It has gradually established in the build-to print segment for the global market for different verticals of aerospace manufacture. It has subsequently leveraged offset opportunities too. Others to join the sector were Taneja Aerospace & Aviation Ltd (started with aircraft production of business aircraft under Licence in 1991), Quest Global/ Aequs, Godrej, L&T and Titan, as detailed in Table 6A.

b. Status after Offsets: The introduction of Defence Offsets changed industry interest in the aerospace and defence sectors. Industrial enterprises which were in other sectors, but did not enter aerospace because of low volumes, were stimulated by offsets. Both large companies and SMEs have begun investments in the Sector. Table 6 Blists some leading private sector entrants.

In addition to Table 6A and 6B, there are many other active enterprises in aerospace manufacture like Centum Electronics, CIM Tools, Data Patterns, HICAL, Max Aerospace, Rosell Techsys, Sansera, SASMOS HET Technologies, Sikka Interplant, SLN Industries, Varman Aviation, VEM Technologies, etc. Some of these companies too have established themselves in the global supply chain.

Tables 6A and 6B also list the Offset Programmes in which these companies are involved, covering a range of manufacturing technologies and products like parts and sub-assemblies for structures, engines, aircraft systems, electrical systems, avionics; MRO; and Tooling. But some of these have yet to benefit from offset opportunities. The technology areas of these companies are at Table 6 C.

Table 6A: Leading Pvt. Sector Aerospace Entrants- Before Offsets

	Company	Status Before Offsets	Status After Offset in 2006
1	Alpha Tocol Engg Services Pvt. Ltd.	Tocol Machine Tools started in 1972 for precision mfgr. for HAL. Sheet Metal and Structural Assemblies for HAL started in 2003 with SU 30 aircraft.	Acquired by Alpha Design Technologies in 2009. Offsets: limited work. Non- Offset: Structural sub-assys. for IJT trainer and Airbus Doors components from HAL.
2	Dynamatic Technologies Limited	Got SU30 MKI work from HAL in 2004 followed by Lakshaya PTA.	Offsets: Airbus A 320 & A330 Flap Track Beams, Cargo Ramp & Aft Pylon – Boeing Chinook, Structures assys- Bell 405 Helicopter, Boeing P8 Cabinets. Non- Offset: IJT structures, SU30 Structures, LCA Front Fuselage.
3	Godrej Aerospace	Created Aerospace Division in 2004.	Engine components for Safran (Leap Engine), Rolls Royce, and GE Aviation. Parts for Aircraft Accessories for Eaton, Rafael and Honeywell.

4	Larsen & Toubro Defence & Aerospace	Created Aerospace Division in 2001. Avionics, EW systems, Missiles, UAVs and Composites.	Offsets: Avionics, Missiles. Non- Offset: LCA Wings.
5	Maini Precision Products Ltd-Aerospace Division	Moved into aerospace in 2005. Commercial aero engine parts. Grew into machining for aircraft Systems and Structures for exports and HAL.	Offsets: Multiple commercial aircraft programmes. Non- Offset: Commercial aircraft components.
6	QuEst Global/ Aequs Aerospace	Aerospace Engg. Services in 1997. Entered Aerospace in 2006. Renamed Aequs in 2014.	Airbus- Titanium parts; Parts for Boeing, Safran, Dassault, SABCA, UTAS, Eaton, Honeywell, SAAB, Magellan and GKN aerospace.
7	Tata Advanced Materials Ltd. (TAML)	Started with ISRO, MOD, DRDO in 1992 and later for HAL programmes in Composites in 2008.	Offsets: Leading Edge Panels and Structures for the A350XWB, APU Door Fairings. Components for IAI, UTAS, Spirit Aerospace, GKN Aerospace, Boeing, Sikorsky, Pratt & Whitney. Non- Offset: Fuselage and Empennage components for LCA.
8	Taneja Aerospace & Aviation Ltd. (TAAL)	In 1991 started licence mfgr. of Business aircraft. Structures assys., parts and retro mods for HAL aircraft.	Offsets: limited work. Non-Offset: Sub-source work and aircraft modifications for HAL.
9	Titan Co., Precision Engg Division	Started in Precision Machined components & sub-assemblies in 2005.	Offsets: Thales, UTAS, Pratt & Whitney, Microtecnica, Rolls Royce, Liebherr Aerospace, Eaton. Non-Offset: HAL
10	Samtel Avionics	Part of four decade old Samtel group. Airborne electro optic systems and Electronic Warfare systems. JV with HAL in 2006 for Multi -Function Displays for SU 30. Standby systems and mission computers for airborne platforms.	Offsets: Display Systems for Civil aircraft, Upgrade of Mirage Avionics. Non Offsets: MFDs, Airborne electro optic systems and Electronic Warfare systems for HAL and defence services.
11	Tata Power SED	Development of state-of-the-art Electronic Systems for MoD, Armed Forces, DPSUs and DRDO	Non Offsets: Missile/ Rocket launchers, EW and Air Defence systems, Radio, Radar and Navigation Systems.

Table 6B: Leading Pvt. Sector Aerospace Entrants -After Offsets

	Company	Status After Offset in 2006	Product Category
1	Bharat Forge	Started work in Aerospace & Defence in 2007. Offsets: Safran engine and Rolls Royce Trent parts. Titanium Forged Flap tracks of B-737, Forgings for 737 Max and 777X, Missile parts for Rafael. Non- Offset: LCA forgings	Aerospace & Defence forgings and components.
2	Mahindra Aerospace	Established in 2008. Offsets: Airbus, Airbus Helicopters, Boeing, GE Aviation, Triumph, Strata- UAE, Dassault Aviation, Magellan Aerospace, Premium Aerotec, Non-Offset: Aircraft mfgr, components for Saab & HAL.	Utility aircraft manufacture and Structural parts and assys.
3	Reliance Defence	Established in 2015.	Plans to manufacture aircraft & modules for offsets.
4	TAL Manufacturing Solutions Ltd. (TAL)	Set up in 2008 as sub-tier for Boeing -787 Composites Floor Beams. Now undertakes A 320 Structure parts. Machining, Welding, assemblies, Aero Tooling, GSE/ GHE.	Metallics and Composites structures.
5	Tata Advanced Systems Ltd. (TASL)	Established in 2007. Lockheed Martin C130-J Empennage, Sikorsky S-92 Helicopter Cabins, Pilatus PC12 Green Airframe, Apache Fuselage Structure, Refueling Pod for A330 MRTT.	Aircraft structures and Engine components.
6	Wipro Infrastructure Engg Group	Established in May 2011.	Hydraulic Actuators, Structures machined parts. Composites structures parts and assemblies.

Table 6C: Technology Segments of Indian Enterprises

	Technology Segments	Companies	Platforms / Products
1	Aero Structures	TASL, DTL, TAL, TAML, VEM Technologies, L&T Aerospace, Alpha Tocol, TAAL, Wipro Infrastructure.	- Utility aircraft manufacture, Structural parts and assys. - Airbus A 320 & A 330 Flap Tracks assemblies; Boeing 787 Floor Beams, A350 XWB Composites Structures. - Structures for Boeing Chinook, Apache and P8A; Lockheed martin C 130J; Dassault Falcon Jets. - Fuselage for Sikorsky S 92 helicopters; - Pilatus PC 12 green aircraft. - LCA Wings, Empennage and Fuselage Sections, SU 30 Structures and MRO, Lakshya PTA.
2	Aircraft Systems	Wipro Infrastructure.	- Hydraulic actuators for aircraft platforms. - Components/ sub-assemblies for Eaton, Parker, Honeywell, Raphael, Elbit.
3	Components/ Sub-assemblies	Mahindra Aerospace, L&T, Godrej, Aequs, Titan Co., Maini Precision, Sansera, CIM Tools.	Variety of components and sub-assemblies for Structures, Engines, Aircraft Systems like - Airbus and Boeing airliners - Engines: CFM-56, GE 90, LEAP, RR Trent, V2500, Pratt & Whitney GTF. - Saab & HAL - Rafael Missile
4	Avionics & Electrical Systems	BEL, Centrum Electronics, ECIL, Data Patterns, Hical, L&T, Rosell Techsys, SLN Industries, SASMOS HET Technologies, Samtel Avionics, Tata Power SED.	-IFF Systems, Radio Communication systems for Boeing P8 - Harness assemblies for airliners -Electrical panel assemblies for the Boeing F-18 Super Hornet and F-15 Eagle. - Display Systems for Civil aircraft -EW/Radar/ Radio/ Navigation systems for Indigenous programmes.
5	Castings & Forgings	Bharat Forge, Maini Precision.	LCA Forgings, Boeing- Titanium Forged Flap tracks of 737, Forgings for

			737 Max, Titanium forgings of 777X Titanium forgings for Leap Engines, Other forgings for multiple Civil and Military aircraft programmes.
6	Ground Support Equipment/ MHE	TAL, MPP	Boeing C-17, Boeing P8.

iii. Reduction in Defence Imports: It can be inferred that net imports for Defence procurements would get reduced by the value of offset obligations of $ 11.20 billion(offset discharge up to Dec 2017 was $2.21 billion).The offset discharge in many cases is not for the platform purchased and in some cases is for Commercial aircraft products. Hence for the purchased defence platforms value content from India would be that much lower. This does have a bearing on the rate of progress in defence manufacture.

iv. Increase in Defence Exports: For 2016-17 Defence exports from India were Rs. 14952 million, according to MOD website. As per Defence Proac Biz News, in 2012-13 Defence exports were Rs. 7631.9 Mn. This is a growth of 96% in 5 years. The items listed by MOD in 2016-17 mostly constitute indigenously developed defence products to countries which are not candidates for export of defence hardware to India. The countries are Italy, Maldives, Sri Lanka, Russia, France, Nepal, Mauritius, Sri Lanka, Israel, Egypt, UAE, Bhutan, Ethiopia, Saudi Arabia, Philippines, Poland, Spain and Chile, etc. Out of these only Italy, Russia, France and Israelare suppliers of military hardware. The products are Personal Protective items, Offshore Patrol Vessels, ALH Helicopter, SU-30 Avionics, Bharati Radio, Coastal Surveillance Systems, Kavach Mod II Launcher, FCS, Spares for Radar, Electronic System and Light Engineering Mechanical Parts, etc. Since the exports include major platforms like Helicopters, Naval Vessels and Electronic Equipment, the contribution of these would be substantial as compared to offsets Parts.

On the other hand, the Offset discharge upto Dec 2017, from 2007 onwards, is $ 2.21 Bn (approx. Rs.143.65 Bn). On an average this is Rs. 14365 Mn per annum, almost the same as defence exports last year, though one-to-one comparison is not valid, since the Offset discharge includes both defence and civil exports. In addition, it would also include other discharge avenues like FDI in JVs, 'Investment in Kind in terms of equipment', multiplier of 1.5 for SMEs, multiplier of 1.1 for TOT to IOPs, Equipment and/or TOT to Govt. institutions, and Technology Acquisition by DRDO.

Due to non-availability of break-up of above elements, quantum of additional defence exports cannot be established. However, it cannot be ignored that work for defence platforms would not accrue to India without Offsets, because of controls. Many other countries also vie for such work through respective Offset stipulations. Some major military aircraft projects for which IOPs are manufacturing are Lockheed Martin C-130J; Boeing P8, Chinook & Apache Helicopters; and missile systems.

v. Partnerships through Joint Ventures: Apart from Indian entities in the Sector, a number of joint ventures have been formed or announced by overseas and Indian partners after introduction of offsets, although many have not been set up for Offsets. These are listed at Annexure I.

The formation of 23JVs post offset clause, indicates that the OEMs are now interested in investing in India. Almost half of these were created from 2016 onwards, after the FDI (Foreign Direct Investment) Policy was revised in 2016 to allow 49% share for foreign partners, which has catalyzed the partnerships. In these JVs the OEMs would have a stake in the performance and results of the Venture, which would lead to investment in developing technology, imparting knowledge and bring in adequate business to make the Venture viable.

vi. **100% Subsidiaries of foreign aerospace OEMs:** Prior to Offsets some foreign companies had set up 100% owned Engineering centres in India, as given at paragraph vii below. But after 2006, five aerospace OEMs, listed at Annexure II, have created 100% subsidiaries other than in Engg. These are more to leverage good availability of technical man-power and to also utilize for offsets through Civil Aerospace Products & Services. Three have set up manufacturing units and another three are training centres.

vii. **Engineering Centres of foreign aerospace OEMs:** In addition to above mentioned 100% entities, OEMs/ Sub-tiers have established own Engg. Centres too, because Engineering Services are eligible for offsets. These centres help to leverage easy availability of technical man-power. Out of 9 such Centres listed at Annexure III, five were set up after Offsets clause, which indicates that offsets have not made a significant impact in this case. All these Centres are for Engineering Services. Offsets so far have not triggered any aerospace R&D activity in India in private sector.

9. ASSESSMENT OF IMPACT OF OFFSETS

i. Offset Arisings & Extent Of Realization

- Offset discharge performance has declined to 72.5% by Dec 2017, against 80% up to 2015. The penalities recovered from the OEMs for default are expected to be a deterrent, but the trend does not confirm that.
- Recently Boeing had announced that its sourcing from India stands at $ 1 Billion annually, and Airbus has stated it was more than $ 550 million. With additional sourcing by other OEMs/ Tier1's, this presents an opportunity for Indian industry to leverage.
- DOMW has stated that most of the offsets work is low end technology and allocation is not spread out, with 51% of the offsets awarded to only 15 IOPs, out of the 52 of them. According to presentations by OEMs in industry forums, a good portion of offset discharge is through Services, particularly IT/ Engineering Services.

ii. Industry Growth : Pre & Post Offsets

Case Study: To assess the extent of impact of offsets, cases of four companies from Table 6A & 6B have been considered as below:

a. **Dynamatic Technology Ltd. (DTL):** DTL entered aerospace as a sub-tier to HAL with SU30 programme in 2004. It has achieved a balance of civil aircraft structural work, offset packages as well as domestic projects like SU30 and Pilotless Target Aircraft Lakshaya(PTA). Their head start helped the candidature for offset packages taking them to higher level of structural assemblies, eventually leading to award of LCA Front Fuselage structure. As a global single source for A320 and A330 Flap Track assemblies, DTL has also fulfilled the objective of the Offset Policy of development in synergetic sector of Civil aerospace at international competiveness.

DTL has built up infrastructure and capabilities by enhancing engagement in the domestic programmes. Other platforms for export are Boeing P8 and Chinook; Lockheed Martin C130-J. The products are Structural Assemblies and Instrumentation Cabinets.

b. **Alpha Tocol Engg. Services Pvt. Ltd.:** This Company started about the same time as DTL, but has not kept pace. While it has grown in capabilities and infrastructure, using it to acquire more domestic work for structural assemblies from HAL for SU30 and LCA programmes culminating in award of Rear Fuselage structure for LCA by HAL. It has yet to attract reasonable Offsets work.

c. **Maini Precision Products Ltd. - Aerospace Division (MPP)**: MPP started as a build- to-print supplier for Commercial engines in 2005 in the pre Offset period in global competition. It has progressively moved from fuel system components to acquire a long-term contract for manufacture of Nozzle Guide Vanes of LP Turbine of LEAP engine, a first in India in private sector. It has also diversified into machined components/ sub-assemblies for Aircraft Systems and Structures like Structural parts for Marshall Aerospace, UK; Landing Gear parts for Safran Landing Systems; Aircraft Systems Components for Eaton, Parker, Honeywell and Woodward. MPP signifies enterprises that have leveraged their core competencies to successfully compete in the international civil aerospace segment in the pre-offset period and has gone on also to leverage offsets to add to its growth and technology progression.

d. **Tata Advanced Systems Ltd. (TASL) & TAL:** Of the companies to enter Aerospace after Offsets clause, Tata group companies TASL and Aerospace Business of TAL Manufacturing Solutions Ltd (TAL) have made good progress and are presently on many Offset programmes involving major Structures. TASL has launched manufacturing JVs with Sikorsky, Lockheed Martin, Boeing and GE Aviation. On the other hand TAL has taken sub-contracting for civil aerospace in composites and metallic structures, starting with Composites Floor Beams for Boeing. These companies have methodically created infrastructure, invested in skill development to address the sourcing needs of OEMs. The product range includes Lockheed Martin C130-J Empennage, Sikorsky S-92 Helicopter Cabins, Pilatus PC12 Green Airframe, Apache Structures and Composites Floor Beams for Boeing 787.

Growth in Products & Technology: As seen from the Case examples and at Table 6C, many entrants before Offsets have used the head-start to leverage offsets like DTL, TAML, Godrej, L&T, MPP, and Titan. Others like Alpha- Tocol and TAAL have not benefitted as much. On the other hand, entrants after offsets, like TASL, TAL, Mahindra Aerospace, Bharat Forge and Wipro Infrastructure have established presence through Offsets and in some cases through international business too.

Different companies have established in segments of technology and products. The growth has benefitted from domestic programmes and the offsets have brought support from OEMs in terms of knowledge transfer, improvement in processes, skilling, quality control and cost control. However, there is a gap between expectations and achievement, but aerospace growth takes time.

Inorganic growth is essential for desired exponential development, not achievable by organic growth. OEMs should be asked to set-up factories in India for specific platforms and equipment, as has been done by countries like China. The industry has to move from the largely build-to-print format to build-to spec. and involve at design stage as partners in OEMs' programmes to progress faster in technology, even if it is on risk-sharing. On the other hand, to strengthen Make-

in-India, the OEM involvement is necessary as partners in indigenous programmes. The entire effort should have focus on Design, Development and Manufacture for India and for global market. The Offset Policy has to become an instrument for Make in India.

iii. **Reduction in Defence Imports:** Not defence imports are compensated only in terms of value of offset discharge. But per se the reduction in defence imports would happen only when such platforms are produced in India.

iv. **Increase in Defence Exports:** Due to control for military platforms, such work is not sourced without a driver like offsets. Indian companies have starting getting business on platforms like P8A, Chinook, Apache, of Boeing; C-130Jof Lockheed Martin; and missile programmes; which is a direct increase in defence exports. Exact additionality of exports from offsets, cannot be established in the absence of year-wise break-up and proportion of various avenues for discharge.

MOD data shows that increase in Defence exports in last 5 years is largely from indigenous products/ platforms, signifying success of indigenous efforts. Offsets have yet to make substantial contribution, large portion of which is from Engineering and IT.

v. **OEM Involvement through FDI in JVs:** Offsets have resulted in 23 Joint Ventures, of which 12 were after enhancement of FDI limit to 49% from 2016 onwards. These JVs are expected to result in financial commitment and involvement in upgrading skills, know-how and wider market opportunities.

vi. **OEM Involvement through 100% Subsidiaries:** In aerospace manufacture there are three 100% entities, the Moog Controls unit is there since 1990 and that of UTAS set up in 2007 was not for offsets. Optimum costs and skilled manpower are the prime drivers for these entities. Other three 100% subsidiaries are Training Centres.

vii. **Research & Development:** No R&D activity in the private sector has resulted from Offsets. OEMs have only created a few Engg Services Centres.

viii. **Civil Aircraft Parts:** One of the Objectives of Offsets is "development of synergic sectors like civil aircraft parts". Civil platforms listed in Table 6 C are indicative of leveraging by Indian industry.

ix. The SME segment has not benefitted from the Offsets. A recent demonstration was at the Seminar on Aerospace & Defence Manufacture (ADMS 2017) organized by Aeromag Asia and SIATI at Bengaluru in Aug 2017. Out of 45 SME companies that participated in the Exhibition, only a couple of them confirmed having received offset work.

x. Industry interactions have also brought out the following:

a) Present offset Banking rules are not practical and have not encouraged any sourcing through Offset Banking.

b) The limitation of offset discharge only to OEMs and Tier1's, that too in proportion to share on a platform, has deprived India of good technology opportunities. Many Group companies of OEMs, Subsidiaries/Associates and Lower Tiers do not have a share in the purchased platform, but have niche technologies and are interested in partnering and sourcing to India. Presently they are not eligible for offset discharge.

c) Requirement of physical shipment of offsets products, even when required to be used in India, are causing avoidable costs and time.

d) Reversal of Licencing process and bringing all products under Arms Act in 2017 has caused set back to the new enterprises and expansions.

10. CONCLUSIONS

- The Domain Survey brings out that a large percentage of respondents consider Offsets as a viable means, but that the goal of aerospace growth has not been fulfilled. From the Impact Analysis it emerges that this perception could be because of lack of information on the achievements. There is high awareness that other countries have benefitted. Majority opine that the DPP 2016 will encourage growth with some additional improvements.
- A large number of companies have joined the sector and many have positioned successfully in different product and technology verticals. While domestic projects from HAL, DRDO and ISRO enabled a good foundation, Offsets helped through OEM support by knowledge sharing, skill building, best practices for processes and quality/cost control. A few which joined global supply chain directly before offsets, also have benefitted from Offsets. Many of the entrants after offsets too have used the leverage to grow. The attained levels are good spring board for further growth, although the number of such enterprises remains small.
- Offsets, supported by higher FDI limit of 49%, have also attracted OEMs to form Joint Ventures in India. New 23 JVs after offsets demonstrate interest of OEMs in bringing investment, knowledge, skills and business opportunities.
- Increasing sourcing of Civil aircraft parts from India for global supplies by Airbus, Boeing, Safran, GE Aviation, Rolls Royce, etc. has established international competitiveness of Indian enterprises, true even for military components. The Civil aircraft programmes at Table 6C also demonstrate growth of this synergetic sector. Evidently, India has made progress.
- Defence exports in 5 years upto 2016-17 have grown by 96%. These consist of indigenous products and defence Offset products. Offset discharge data made public by MOD recently does not give break up between exports and other discharge avenues. At the minimum to the extent of orders for military components, Offsets have added to exports, as these would not be awarded otherwise.
- The declining trend in Offset fulfillment between 2015 and 2017 to 72% fulfillment could be due to either the OEMs not placing adequate work on IOPs or the IOPs are not able to deliver on time. This has to be assessed for conclusion and for remedial measures.
- SMEs have not benefitted much from Offsets. The multiplier of 1.5 for offsets through SMEs did not yield results, since many enterprises were not eligible due to low classification limits. Revision in Feb 2018 has changed the criteria to turnover of Rs 2500 million, in place of investment limit of Rs. 100 million. This would enable OEMs to source from SMEs.

11. RECOMMENDATIONS

- It is recommended that a multiplier incentive be introduced for the areas where more industries are required to participate like manufacture in specific technologies or processes.
- MRO is an activity where processes and technologies deployed are similar to manufacture, hence it should be classified as manufacturing activity, instead of as Services.
- For rapid development through inorganic growth, OEMs should be asked to set-up plants in India for specific platforms and equipment. Indian enterprises should graduate to build-to-spec. and involve at design stage as partners in OEM programmes, which may require risk-

sharing. For fast-pacing indigenous programmes, OEMs should be involved as partners to strengthen Make-in-India.

- Govt. should bring transparency and create shared values by providing information on progress and achievement of Offsets, with updates on DOMW web-site every 6 months.
- The industry interactions brought out some key policy shortcomings, for which recommendations are as below:

a) **Waiver from Physical Shipment:** Physical export should be waived off for equipment/ products to be used directly in India with the purchased platform. This would eliminate non value-add two-way shipment that increases cost and delivery time.

b) **Offset Discharge limited to Tier 1's:** OEMs should be empowered to choose their overseas partners to perform Offset obligations. In many cases niche technologies are not with the OEMs, but with their group companies, subsidiaries, associates and lower tiers.

c) **Offset Banking:** It is recommended to simplify the Offset Banking by allowing any foreign company, whether an OEM or a sub-tier, to open an offset banking account, and be permitted to award offset work to Indian industry. The Banked offsets should be permitted for use on any project, without time limitation.

d) **Industrial Licence for Defence Production:** IL-DP for basic product categories should be withdrawn as was before 2017. In 2014 the Licencing processes was simplified and a Munitions List notified, which only required IL-DP. Revised Industrial Licence norms introduced in 2017, which cover every category under Arms Licence, are a big impediment.

ANNEXURE I: Aerospace Joint Ventures with Foreign Companies

	Company Name	JV Partners	Year of creation
1	BAeHAL Software Pvt. Ltd	HAL- BAE Systems	1993
2	Indo Russian Aviation Ltd	HAL- Russian Cos.	1994
3	Hella Systems Pvt Ltd	Tata- Elta	2004
4	Snecma HAL Aerospace Pvt. Ltd.	HAL, Snecma-France	2005
5	HAL Edgewood Technologies Pvt Ltd.	HAL- Edgewood	2007
6	HALBIT Avionics Ltd.	HAL- ELBIT-Merlin Hawk	2007
7	Pranita Gardner	Gardener, UK- Parinita	2008
8	Aerospace Processing India Pvt Ltd	QuEst Global, Magellan-UK	2009
9	Tata Sikorsky Aerospace Ltd Hyderabad	TASL, Sikorsky- USA	2011
10	Samtel Thales Avionics Ltd.	Samtel Electronics, Thales	2011
11	Tata Lockheed Martin Aerostructures Ltd. Hyderabad	TASL& Lockheed Martin	2012
12	Kinco Kaman Composites- India Pvt. Ltd.	Kineco-India, Kaman -USA	2012
13	Aerostructures Assemblies India Pvt Ltd	Aequs, Saab	2013
14	International Aerospace Manufacturing Private Limited (IAMPL)	HAL, Rolls Royce	2013
15	Mahindra Telephonics	Mahindra, Telephonics-USA	2015
16	Tata Boeing Aerospace Limited (TBAL)	TASL, Boeing Defence	2016
17	Safran HE- HAL MRO JV, Goa	HAL, Safran HE	2016
18	HAL- Russian Helicopters	HAL, Russian Helicopters, Rosoboronexport	2016

19	*	Kalyani Group, SAAB	2016
20	*	Mahindra, Airbus, Helicopters	2017
21	Dassault Reliance Aerospace. Ltd, Nagpur	Reliance Defence, Dassault Aviation	2017
22	*	Adani Group , SAAB	2017
23	*	Reliance Defence, Thales	2017
24	*	Reliance Defence, Daher -France	2017
25	L&T MBDA Missile Systems	L&T, MBDA- France	2017
26	Tata GE Centre of Excellence for Engine Components	TASL, GE -Aviation	2018
27	*	TASL - IAI	2018

Note: *Names of these JV names have not been declared, pending approvals of companies.

ANNEXURE II: 100% SUBSIDIARIES OF FOREIGN AEROSPACE OEMs

	Company	Activity	Year of creation
1	Moog India	Design &Manufacture	1990
2	UTAS India	Manufacture	2007
3	Airbus Training Centre, Bangalore	Training	2007
4	CFM International India Hyderabad	Training	2010
5	Multi Modal Facility, GE India, Pune	Manufacture	2013
6	Pratt & Whitney Training Centre, Hyderabad	Training	2015

ANNEXURE III: ENGG. CENTRES OF FOREIGN AEROSPACE OEMs

	Company	Year of creation, Before Offset Clause	Year of creation, After Offset Clause
1	Honeywell Technology Solutions Ltd.	1994	
2	GE's John F Welch Technology Centre, Bangalore	2000	
3	Safran Engg. Services India, Bangalore	2001	
4	Eaton India Engg. Centre, Pune	2003	
5	Airbus Engg Centre, Bangalore		2009
6	Boeing India Engg &Tech Centre, Bangalore		2009
7	Bombardier India Engg Centre, Bangalore		2011
8	GKN Aerospace, Bangalore		2013
9	Rolls Royce Engg Centre, Bangalore		2015

REFERENCES

[1]. **Behera, Laxman K. (2015),** Defence Offsets- International Best Practices and Lessons for India, IDSA Monograph Series No. 45,Institute for Defence Studies and Analyses, New Delhi, June.

[2]. **Department of Commerce, USA,** 'India Country Commercial Guide: India – Defense', The International Trade Administration (ITA), US Dept. of Commerce, 27 July 2017. https://www.export.gov/article?id=India-Defense Accessed 21 Oct 17.

[3]. **Department of Commerce, USA,** 'Offsets in Defense Trade', U.S. Department of Commerce, Bureau of Industry and Security, Office of Strategic Industries and Economic Security, Twelfth Report to Congress, Dec. 2007, Page 14.

[4]. DPP (Defence Procurement Procedure) – 2002, 2005, 2006, 2008, 2011, 2013, 2016, Ministry of Defence, Govt. of India, New Delhi.

[5]. **DPP (Defence Procurement Procedure) (2011)**-' revised guidelines- 2012, Revision of Defence Offset Guidelines, Appendix D', Ministry of Defence, Govt. of India, New Delhi,1st August 2012.

[6]. **Kalam, Abdul APJ. (1994),** National Aeronautical Policy- recommendations to the GOI', *Aeronautical Society of India*, 9 Dec.

[7]. **KPMG-CII, (2010),** Opportunities in the Indian Defence Sector- An overview', New Delhi.

[8]. **Mathew, Thomas, (2009),** Essential Elements of India's Defence Offset Policy - A Critique', *Journal of Defence Studies,* Volume 1, Issue 3, January, available at

[9]. **Nair, Krishnadas CG. (1992),** A tribute to Indian Aeronautics: India's Aeronautical Industry', *Dr VM Ghatge Memorial Lecture delivered at AeSI*, Bangalore, 11th Dec., Pg 52.

[10]. **Nair, Krishnadas CG. (2015),** Make in India: Recommendations for the Aerospace & Defence Sector', *Aeromag Asia*, May- June, Vol. IX, Issue 3.

[11]. **Nair, Krishnadas CG., (2011),** 'Genesis of Offset', *In Souvenir, Regional Civil Aviation Centerary Celebration*, Bangalore, 19 Sept.

[12]. **Palta, Naresh, (2014),** Policy Issues impacting Offset implementation in India', *Aeromag Asia*, Mar-Apr issue, Bangalore.

[13]. **PIB,' Kelkar Committee submits report on defence acquisition' (2005),** Ministry of Defence, Press Information Bureau, New Delhi, 05 April.

[14]. **Singh, Pushpinder, (2001),** Diamonds in the Sky- Story of HAL 1941-2001', Society of Aerospace Studies, New Delhi, Pg. 30, 32.

[15]. **Sunder, S. (2009),** 'Implementation of Offset Policy in Defence Contracts- Indian Army Perspective', *Journal of Defence Studies,* Volume 1, Issue 3, January, available at http://www.idsa.in/jds/3_1_2009_ImplementationofOffsetPolicyinDefenceContracts_SSunder, Accessed on 22 July 2017.

[16]. **Ungaro, Alessandro R., (2013),** Trends In The Defence Offsets Market'. *IstitutoAffariInternazionali (IAI) – Rome, SIPRI 17th Annual International Conference on Economics and Security (ICES)*, Stockholm, 14-15 June.

[17]. **Palta, Naresh (2016),** Offsets: Genesis and SIATI Efforts', *Aeromag Asia on SIATI @ 25,* December Issue, Bengaluru.

[18]. **Press Note No. 3 (2014),** List of Defence requiring Industrial Licence' Dept. of Industrial Promotion & Policy, Ministry of Commerce, Govt. of India, New Delhi, 26 June.

[19]. **Press Note No. 5,** Review of FDI Policy for various Sectors', Dept. of Industrial Promotion & Policy, Ministry of Commerce, Govt. of India, New Delhi.

[20]. **MOD, (2015),** Key Objectives of the Offset Policy', Defence Offset Management Wing, Accessed on 17 Feb.

[21]. **PIB, (2016),** Offset Obligations for Defence Contracts', Press Information Bureau, Government of India, Ministry of Defence, 06 May, Available at http://pib.nic.in/newsite/PrintRelease.aspx?relid=144966, Accessed on 19 Sept 17.

[22]. **Shankar, Col. (2016),** Bright Vision In Sight – Alpha Design Technologies', Aeromag Asia, Available athttp://www.aeromag.in/articlesingle.php?article=1, Accessed on 25 Sept. 2017
[23]. DTL,'Audited Consolidated Financial Results for the Quarter and Year ended 31 Mar. 16'.
[24]. **KseniaKondratieva. (2017),** L&T consolidated profit up 29% in March quarter; announces 1:2 bonus', *The Hindu Business Line*, May 29, Available at http://www.thehindubusinessline.com/companies/lt-consolidated-profit-up-29-in-march-quarter-announces-12-bonus/article9715390.ece., Accessed on 05 Oct 17.
[25]. **Charlie, Adith, (2014),** Aequs to spend $100 million on expansion in India, overseas', *The Hindu Business Line,* Nov 2, Available at http://www.thehindubusinessline.com/companies/aequs-to-spend-100-million-on-expansion-in-india-overseas/article6557774.ece., Accessed on 25 Sept 17.
[26]. **ICRA- TAML, ICRA Rationale Report on TAML FY (2016).** Available at
[27]. **TAAL Results March (2017)**, Available at
[28]. **Titan Company Performance, Segment Revenues- Others, (FY2016-17),** Available at
[29]. Bharat Forge, 56th Annual Report 2016-17.
[30]. Mahindra-Subsidiary-2016-Part-02-For-web, Annual report 2015-16.
[31]. T*al Manufacturing Solutions Limited, Annual Report 2016-17.*
[32]. TASL, Annual Report 2014-15.