

## Civil Aviation Offsets – for Building a Robust Civil Aircraft Industry

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### ABSTRACT

*In India the efforts to use the concept of leveraging offsets for growth of aerospace sector gained active interest in the early nineties with drive by some Sector leaders. 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. Their procurements at that time were banking upon Counter Trade through export of commodities or other unrelated products. The consistent efforts led to acceptance of offsets by the Ministry of Civil Aviation (MOCA), though even then it largely remained as Counter Trade. As of now, there is no laid down Policy on Civil Aviation offsets. The opportunity for leveraging Offsets for growth of Indian Civil Aerospace is great because of huge ramp up in commercial aviation being witnessed and being forecast for the long term future. Private Airlines have plans for large aircraft purchases and the Government is driving rapid modernization and creation of new Airports. This massive purchasing power can yield offsets leverage of USD 75 billion, an opportunity India should not miss. The Indian stake holders, the Private airlines, and the Government have to seize it with joint focussed agenda, the way countries like Brazil, China, Japan, South Korea, Israel have done. Further research into the factors that have hindered the percolation of offsets in the civil sector would be useful to guide the Policy direction for this segment.*

**Keywords:** Commercial Airliners, Civil Offsets, OEMs, Airport Modernization, Private Airlines.

### INTRODUCTION:

India entered commercial aviation league in 1932 when Tata Airlines made first airmail flight on 15<sup>th</sup> October 1932 from Karachi to Bombay. Tata Airline was made a Public Limited company Air India, after World War II on 29 July 1946.

In 1991, the Open Skies Policy of the Government of India saw, in addition to the national carrier Air India (AI) and Indian Airlines (IA), emergence of many private airlines, of which only Jet Airways and Sahara survived. The second wave came with successful experiment of Capt. Gopinath in 2003 with Air Deccan as a no-frill airline. This led to entry of other Low Cost Carriers (LCC). After many market course corrections and consolidations, now the full service airlines are Air India, Jet Airways and Vistara, while LCC airlines are Indigo, Spice Jet, Go Air, and Air Asia,.

For domestic and international trunk routes, the airlines in India have primary choice between Airbus and Boeing. For the regional segment, the aircraft are from ATR and Bombardier.

In the civil airliner purchases, role of offsets is not very visible. By comparison, offsets for defence aircraft are more structured and are becoming instrumental in obtaining benefits like technology, higher level of industrial

capability, infrastructure, skill enhancement, investments and employment, for the buyer country, with adoption by 130 countries (Mathew 2009, Sunder 2009).

In India, with the efforts of domain leaders in the nineties, Offsets concept was accepted by the Ministry of Civil Aviation (MOCA), with implementation through the State Trading Corporation (STC).

Indian civil aviation sector is growing rapidly. Given the large airliner requirements, it has yet to fully leverage the potential of offsets in this segment. The country had introduced a formal Offset Policy for defence procurements in 2005 in the Defence Procurement Policy (DPP 2005), which later added civil aerospace products to the eligible list in 2011.

Countries like Brazil, China, Israel, Japan, South Korea have judiciously used offsets to get aircraft manufacturers to locate assembly lines, build maintenance support infrastructure and nurture Design & Development capabilities for creating strong commercial aircraft industry.

### **OBJECTIVE OF THE PAPER:**

Objective of this study is to trace how the offsets concept for civil aircraft purchases has evolved in India and to analyse the implementation of offsets as well as study further steps needed. The attempt is to assess if there is adequate justification for India to make use of Civil Offsets to fuel growth of commercial aerospace and aviation sectors.

### **METHODOLOGY:**

Secondary research through literature; Policy documents of the Government of India; Annual Reports of Airlines; Press Releases by concerned Ministries, foreign aircraft manufacturers and their websites; and Offsets Policies of other countries, have been studied to understand various aspects. Case Studies have been also been done for specific aspects to gain understanding of the ground situations.

### **REVIEW OF LITERATURE:**

The secondary study through Literature covered Reports and Documents of various stakeholders, web-sites of Government agencies and aircraft manufacturers, Sector Reports, Press Releases, Media reports & News items. One does not come across specific research on civil offsets for India, much less information made available in public domain. A summary of Literature study is as follows:

Archives of United Press International have an item dated July 31, 1987 pertaining to rollout of first DC-9 commercial aircraft built at the Joint Venture of McDonnell Douglas Corp. (McD), USA and Shanghai Aircraft Industrial Corp., China. The JV was set up in 1985 as a part of airliner sales deal worth USD 500- 600 million. This was first of 25 airliners to be built by this JV. McD (later merged with Boeing) was to transfer technology and to procure Chinese goods worth 30% of cost of each aircraft (UPI Archives1987).

Mowery (1999) has examined differences in defence offsets & civil offsets and also pros and cons of offering offsets from the aircraft sellers' perspective. While it is difficult to analytically find the exact impact of offsets on sale of airliners, he concludes that without any offsets at all, sales to other countries are highly unlikely. The study identifies three factors determining commercial sourcing by OEMs as availability of superior skills for technological processes, market entry/ retention and spread of risks through buyer country governments who want to build their aerospace industry.

"US- China Economic and Security Review Commission" in its Report to the US Congress in 2005 had highlighted that China has fully exploited its purchase of commercial aircraft for obtaining offset advantage to get transfer of a portion of aircraft production, along with necessary technology and knowhow. China has gainfully used the strong competition in airliner market to build its own aerospace and aviation infrastructure. (U.S.-China Review Commission, 2005).

A Ministry of Commerce & Industry Press Release of 19 Sept 2006 states that the Government of India had appointed STC as a nodal agency to monitor implementation of off-set/counter trade obligations against purchase of aircraft by Indian Airlines and Air India. Also that STC had already entered into a high value agreement with Airbus for this purpose and agreement was under negotiation with Boeing. (PIB 2006). Interestingly this Press release was primarily to announce the high profit generated by STC in 2005-06, the information on Offsets was incidental as one of the activities of STC.

Indian Ministry of Civil Aviation (MOCA) every year releases Outcome Budget which covers various policies, plans, programmes and performance. For this study, the Outcome Budget for the financial year 2006-07 is relevant (MOCA 2006). It states that the value of offsets against the AI purchase of 68 Boeing aircraft, signed

on 31 Dec. 2005, is approximately USD 2 billion (Rs. 9 billion) at 30%, for net project cost of approx. USD 7.69 billion (Rs. 346.150 billion). In the document, there is no mention of offsets for the purchase of 43 Airbus aircraft by IA, signed on 20 Feb 2006 at Rs. 98.880 billion. This would have given Offsets of USD 0.66 billion (Rs. 29.66 billion) at 30%. The total opportunity thus was USD 2.66 billion.

International Association of Machinists and Aerospace Workers (IAM), USA has been projecting to the US Government how China has gained lead in Aerospace growth. In its Testimonies before “US-China Economic and Security Review Commission”, it has presented how China has highly leveraged Offsets for its aircraft purchases to acquire knowledge and technology. According to Owen E. Herrnstadt, IAM Director, China has used the competition in the airliner market to get transfer of production from both Airbus and Boeing for manufacturing their airliners in China. An example is Airbus announcement that they would establish an Assembly Line similar to those in Europe. (Herrnstadt 2008).

FAA (2008) had reported in 2008 that major aircraft builders vie for big orders by offering a country’s industry to manufacture major portions of their airliner. Such deals can be multi-billion dollar. It cites case of sale of Boeing 747s to Air China, which required that part of aircraft products should be built in China.

Bose (2009) advises that apart from offsets of 30% in Defence Procurements in India, for other purchases too the Indian Government expects offsets in major deals. She notes that some time these offsets can be converted into counter trade, which provides more flexibility to Sellers. The difference in offsets and counter purchase in the Indian context is that offsets imply investment in related avenues, whereas Counter Trade is for exports from India. Even if offsets or counter trade are not specifically asked for, these can tilt the bid in the favour of a company offering offsets. In the case of purchase of 45 Airbus aircraft by India for \$2.2 billion, Airbus had offered 40% offsets through establishing Pilot Training Centre, support setting up of modern MRO facility and giving knowhow.

As per the STC Website (2017), in line with the purchase agreements of Air India and Indian Airlines with Boeing, Airbus, GE, CFM International for supply of 111 aircrafts/ engines, STC had entered into agreements with these for monitoring of ‘offset obligations/ counter trade’ programme. This implies that there was also an element of Counter trade apart from offsets in these agreements. No specific data about quantum of obligation / commitment, offsets performed, balance offsets and timelines has been made public.

Nair (2014) has studied exploitation of opportunities out of purchase of commercial aircraft by many countries to successfully build their aerospace industries. Japan has made it mandatory for the vendors to buy aircraft structures, equipment and assemblies from Japanese industry. Kawasaki, Mitsubishi and Fuji have reaped the benefits of offsets and are now major suppliers of fuselage and other structures for almost all Boeing commercial airliners and many Airbus aircraft too. Korean Aircraft Industry, a Joint Venture of Hyundai, Daewoo and Samsung, formed in 1999, through offsets is successful as a Tier 1 for Boeing and have also built many helicopters and military aircraft.

In 2016, the MOCA had released first National Civil Aviation Policy (NCAP 2016) with focus on Aviation Sector. The objective of this Policy is to support complete activity-stream holistically, encompassing general aviation, cargo, MRO, aerospace manufacture, and skilling. According to Section 21 “Aeronautical Make in India”, the Ministry would act as nodal agency to develop aerospace manufacture and industrial infrastructure for civil sector and incentivise OEMs for establishment of aircraft assembly plants in India. It does not specify offsets for commercial aircraft, but states that MOCA will work with MOD so that manufacture for civil aviation is considered for defence offsets, which has already been incorporated in 2011. The government will provide fiscal and monetary incentives.

According to assessment by Kakkar (2018), the exponential growth in civil aviation is complemented by the government’s plans for new airports and upgrade of existing airports under the initiative announced in 2018 Budget in February as NABH (Nextgen Airports for Bharat) Nirman ( which translates as Build Up for Sky). He emphasizes on the need for rapid growth of civil aviation in India, coupled with insufficiency of matching airport infrastructure, which is hampering economic growth and delivery that many regions are capable of. The government is actively working to give speed to investments and buildup of infrastructure.

## **EVOLUTION OF OFFSETS CONCEPT IN INDIA:**

Introduction of Offsets in India is recent compared to several other countries, although Counter Trade was used in some commercial aircraft imports managed by the Ministry of Civil Aviation (MOCA) through the State Trading Corporation of India Limited (STC). The initiative for adopting Offsets for civil aircraft purchases was spear-headed by the Aeronautical Society of India (AeSI), Hindustan Aeronautics Ltd. (HAL) and Society of Indian Aerospace Technologies and Industries (SIATI) in the beginning of nineties. At that time, unlike other

countries, India did not have an offset policy. The result of these efforts was that the Ministry finally agreed for inclusion of Offsets for aircraft imports by the national carriers and coordination of Offsets by STC. (Palta & Nair 2018).

Regarding Civil Offsets, a Sept 2006 Press Release by the Ministry of Commerce & Industry announced that STC was appointed nodal agency for the Offset / Counter Trade obligations against purchase of 111 aircraft by Air India (AI) and Indian Airlines (IA) (PIB 2006). From the Outcome Budget for 2006-07, it is deduced that the Offset opportunity was of USD 2.66 billion, but no data has been made public on implementation or performance of offset fulfillment, even after 12 years.

On the other side, for defence aircraft, these efforts culminated in introduction of Offset in 2005 for all defence procurements including military aircraft, at 30% for contracts of Rs. 3 billion and above. Later in 2016 revision of DPP, the limit was increased to Rs.20 billion and above.

The National Civil Aviation Policy-2016 has indicated focus on Civil Aviation Sector for supporting the complete value chain of aviation and aerospace related activities. But unlike other successful countries it has not enunciated any specific steps to leverage civil aircraft and equipment purchases through offsets.

**AIRLINES AND AIRCRAFT/EQUIPMENT FOR CIVIL AVIATION:**

India launched Open Skies Policy for commercial aviation in 1991, which saw emergence of private airlines. In 2003, Capt. Gopinath pioneered the no-frills airlines concept in India through Air Deccan. Subsequently Indigo Airlines, Go Air and Spice Jet followed as Low Cost Carriers (LCC). Since then this sector has undergone upheavals and consolidation. Presently there are nine airlines whose combined current fleet is 583 aircraft, according to the DGCA List of Aircraft Operator Certificate (DGCA 2018) on 01 May 2018, as given in Table 1.

**Table 1: Airlines Fleet Size- India**

		<b>Air India</b>	<b>Indigo</b>	<b>Jet Airways</b>	<b>Spice Jet</b>	<b>Go Air</b>	<b>Air Asia</b>	<b>Vistara</b>	<b>Tru Jet</b>	<b>Zoom Air</b>	<b>Total</b>
No. of aircraft	Wide Body	49		18							67
	Single Aisle	105	154	83	34	32	17	20			445
	Regional Aircraft	16	6	18	23				5	3	71
	<b>Total</b>	<b>170</b>	<b>160</b>	<b>119</b>	<b>57</b>	<b>32</b>	<b>17</b>	<b>20</b>	<b>5</b>	<b>3</b>	<b>583</b>

**Case Study 1:**

Study was done to analyse the future of Civil Aviation in India with reference to present status. Current airlines fleet consists of Airbus, Boeing, ATR and Bombardier aircraft. Towards further aviation growth Airbus has forecast 1750 airliners for India in 20 years (from 2017 to 2036) at \$255 billion (Airbus 2018 a). Boeing forecast is 2100 planes valued at \$ 290 billion (Boeing 2017), with a caution in March 2018 that infrastructural limitations of Indian airports would impact this forecast (PTI 2018). Analysis of plans of various airlines reveals that already 998 aircraft are on order worth approx. \$ 101 billion, as detailed in Table 2. This data has been collected from media announcements by the airlines and aircraft manufacturers for declaring aircraft purchases. Indications are that another 150 aircraft would be ordered in 2018. This substantiates the trend of market forecasts.

In respect of infrastructure, under the NABH Nirman plan announced by the Government of India in the Budget 2018-19, the Airport Authority of India (AAI) will build 100 new airports in next 10 years (Kakkar 2018). Projection by AAI for next 5 years is investment of Rs 1000 billion in airport infrastructure and upgrade as announced by Mr. Jayant Sinha, Minister of Civil Aviation. Major new airports planned are Jewar- Greater Noida, Mumbai, Pune, Goa, Dholera- Gujarat and Bhogapuram- Andhra Pradesh. Also planned is early operationalization of 56 new airports under UDAN scheme (Ude Desh Ka Aam Naagrik), meaning “air travel for common citizen”. Over 15 years, investments for airport development would go up to Rs. 5000 to 6000 billion (ET 2018). These investments will involve massive procurement of equipment for Airports, Airside and Air Navigation System, notwithstanding investments in aircraft purchases.

The foregoing data brings out that India is in a strong position for exponential growth of Civil Aviation, supported by specific plans by the Airlines and the Government.

**Table 2: Airliner Orders- India**

Sl. No		Aircraft Type	Order Value \$/Bn	Aircraft on Order	Received	Balance order value	Remarks
1	Air India	A320 Neo	0.33	3		0.33	Estimated price #
		B 737	3.00	3		3.00	
		B 787-800		6			
2	Indigo	A 320	15.60	180	23	13.60	
		A 320	26.55	250		26.55	
		ATR72	1.30	50	6	1.14	
3	Jet Air	B 737 Max	5.00	75	0	5.00	
		B 737 Max	8.80	75		8.80	
		A 330	1.25	5		1.25	
		B 787	2.65	10		2.65	Estimated price #
4	Spice Jet	B 737 Max	22.00	155		22.00	
		B 787		50			
		Q 400	1.70	50		1.70	
5	GO Air	A 320 NEO	7.20	72		7.20	Rs 324000 Million converted at 1\$=Rs 45
			7.73	72		7.73	
6	Air Asia		-	-	-	-	
7	Vistara		-	-	-	-	
	<b>TOTAL</b>			<b>1027</b>	<b>29</b>	<b>100.95</b>	

# The estimates are based on list prices of manufacturers (ATW 2017).

**ASSESSMENT OF NECESSITY FOR CIVIL OFFSETS:**

The wide spread adoption of offsets for defence purchases is a clear sign of their success in enabling the Buyer countries to achieve desired goals. Mowery (1999) has expressed that sales to other countries may not happen without offer of offsets. Another view from Bose (2009) is that although offsets may not always be demanded as part of civil aircraft purchase, offer by an aircraft manufacturer enhances chances of winning.

In Indian Civil Aviation, there is no formal Policy for Offsets so far. For private airlines fleet of 413 aircraft, there was no mechanism to take advantage of offsets for such large aircraft purchases.

**Case Study 2:**

The only documented case of civil offsets is the last purchases of 111 aircraft by AI and IA in 2006. These purchases at approx. USD 9.89 billion would amount to offset opportunity of at least USD 2.66 billion, as given at Table 3. Most of this data has been obtained from indirect sources, except that from Outcome Budget 2006-07. There is no public information on the performance of these offsets from the Government. The piecemeal information available for this Case Study is indicative that the Civil Offsets activities in India are fragmented. There is need to develop transparency and substantial interaction with industry stake holders for formulating a Policy.

**Table 3: Aircraft Purchase By AI & IA – 2006**

	OEM	No. of aircraft	Airlines	Contract Value USD / Bn	Date	Value of Offset USD/ Bn
1	Airbus	43	IA	2.2 Bn (Rs.98.88Bn <sup>^</sup> )	Jan 06	Not declared (Estimated \$0.66 Bn)
2	Boeing	68	AI	7.69 Bn <sup>#</sup> (Rs.346.15 Bn <sup>^</sup> )	Dec 05	2 Bn*
3	GE					
4	CFM					
	<b>TOTAL</b>	<b>111</b>		<b>\$ 9.89 Bn (Rs. 445.03 Bn)</b>		

\* IIFL 2018. As per Outcome Budget 2006 - 07, this is \$ 2 billion in total (MOCA 2006).

# Converted at Rs.45 = 1 USD.

<sup>^</sup> MOCA 2006

**National Civil Aviation Policy:**

The National Civil Aviation Policy 2016 has not laid down specific measures for developing commercial aerospace related manufacturing and its eco-system in India. The intent is to use the Defence Offset policy, but not to constructively leverage the massive spending for Commercial Airliners and Airports. There is a need for a precise offsets policy that lays down goals, road map, timelines and enabling rules/ processes, to utilize the civil aircraft and airport equipment buying power.

**Current & Future Procurement of Civil Aircraft and Airport Infrastructure:**

The current airliner Order booking of around \$ 101 billion (Table 2) and Airbus / Boeing forecasts of \$ 250 billion or more till the year 2036 point to offset opportunity well worth \$ 75 billion at 30%. This must be harnessed for creating a robust civil aerospace industry, a life-time opportunity which India cannot afford to miss.

India has a successful history of development of military aircraft and helicopters through HAL, DRDO and support industries/organizations. This is being enlarged and strengthened through the Defence Offsets to fill up gaps. Countries like Indonesia, Brazil and China, which started aerospace activity much after India, have successfully developed passenger aircraft, but India has not even made a meaningful beginning.

The huge airliner purchases planned are complemented by the Government’s plans for new airports and upgrade of existing airports under the initiatives of NABH Nirman and UDAN to aid growth visions of airlines. The massive investments of Rs. 5000 to 6000 billion in 15 years also have high offset potential.

**Capability for Civil production:**

**Case Study 3:**

Palta & Nair (2018) have demonstrated that inclusion of Civil Aircraft Parts for Defence Offsets has helped existing players and has encouraged new entrants to take up civil aerospace manufacture, resulting in good growth. Many of these are now manufacturing components, structures, systems etc. for civil aircraft. From the data of Palta & Nair (2018), status of Indian industry in different Civil Aerospace Technology verticals has been collated at Table 4, which is a Case Study of capabilities developed in India. This confirms that the foundation is strong and there are sufficient capabilities to handle civil production.

**Table 4: Civil Aerospace Technology Verticals of Indian Industry**

	<b>Verticals</b>	<b>Enterprises</b>	<b>Products</b>
<b>1</b>	<b>Airframe</b>	Hindustan Aeronautics Ltd. (HAL) , BEML Ltd., Dynamatic Technologies, Tata Advanced Materials Ltd. Tata Advanced Systems Ltd. TAL Manufacturing Solutions Ltd. VEM Technologies, Larsen & Toubro, Alpha Tocol Engg. Ltd. Taneja Aviation & Aerospace Ltd. Wipro Infrastructure.	i. Airbus A 320 & A 330 Flap Tracks assemblies; Boeing 787 Floor Beams, A350 XWB Composites Structures. ii. Fuselage for Sikorsky S 92 helicopters. iii. Pilatus PC 12 green aircraft. iv. Utility aircraft manufacture, Structural parts and assemblies.
<b>2</b>	<b>Aircraft Systems</b>	HAL, Bharat Electronics Ltd. (BEL), Wipro Infrastructure, Sikka Interplant	Hydraulic actuators for aircraft platforms. Components/ sub-assemblies for Eaton, Parker, Honeywell.
<b>3</b>	<b>Components/ Sub-assemblies</b>	Maini Precision Products Ltd., Titan Co., Aequs, Sansera, CIM Tools, Mahindra Aerospace, Godrej Aerospace, Larsen & Toubro.	Variety of components and sub-assemblies for Structures, Engines, Aircraft Systems like Airbus and Boeing airliners Engines: CFM-56, GE 90, LEAP, Rolls Royce Trent, V2500, Pratt & Whitney GTF.
<b>4</b>	<b>Avionics &amp; Electrical Systems</b>	HAL, BEL, Electronics Corp. of India Ltd., Data Patterns, SLN Industries, Rosell Techsys, Centrum Electronics, Hical Technologies, SASMOS HET Technologies, Samtel Avionics.	- Harness assemblies for airliners - Avionics - Display systems for civil aircraft.

	Verticals	Enterprises	Products
5	Castings & Forgings	HAL Bharat Forge Maini Precision Products Ltd.	- 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 aircraft programmes.

Apart from these, Defence Offsets, supplemented by higher FDI limit of 49%, have also catalyzed formation of 23 Joint Ventures by OEMs (Palta & Nair 2018), signifying their interest to invest, transfer knowledge and to bring global business for keeping the Ventures viable. Many of these JVs too are doing manufacture for commercial aircraft.

Airbus sourcing from India has reached more than half a billion USD in 2017 (Airbus 2018 a), while Boeing has quadrupled sourcing in the past two years to more than \$1 billion (The Hindu 2018). Other OEMs like Safran, GE Aviation, Rolls Royce, Lockheed Martin etc. too are looking at India as a cost effective source. The increasing sourcing by foreign companies, largely for commercial aircraft parts, confirms Indian industry’s global competitiveness. Well before serious offset discussions started in India, winning of Airbus Passenger Doors of A320/ A321 aircraft by HAL, in stiff global competition, had well established the Indian cost advantage.

The Case Study confirms that a good foundation for civil aircraft manufacture is thus well established, with good contribution from defence offsets.

**Perceptions & Realities:**

One of the perceptions is that Offsets increase the cost of aircraft, because sourcing from Buyer country has additional cost for a vendor. Consequently private airlines consider that the offsets will impact their ability to get better prices.

- In actual effect, because of global competitiveness of Indian industry, even after adding cost of logistics and management of sourcing, it works out more economical for aircraft suppliers. Cost pressures on all OEMs are high, both for civil and military aircraft programmes. They are flocking to India for its cost competitiveness, skill base and also huge market it offers in commercial airliners and defence procurements. If Indian costs were high, this sourcing would not have happened. Offsets would, therefore, not add cost, but rather reduce it.
- Another view against offsets is that aircraft purchases involve private money of the airlines and should not be dictated by the Government for Offsets. Most of the airlines get funding from Banks/ Financial Institutions, which primarily is taxpayers’ money. Hence the basic right of choice has to be with the Government.

**Case Study 4:**

To analyse this aspect, data on share holding pattern of three airlines Spice Jet, Indigo and Jet Airways was studied to assess the distribution between Promoters’ share, Public Holding, Pledged shares and Borrowings. It can be seen from the details at Table 5 that there is substantial public funding for these airlines in varying proportions. The main driver for decision on leveraging offsets, therefore, has to be national and sector interest, the ultimate provider of funds being the Tax Payers.

**Table 5 : Holding Pattern of Private Airlines**

Sl. No.	Company	Share Holding			Pledged	Borrowings Rs Mn
		Promoters	Public	Total		
1	Spice Jet	361,173,124	238,277,059	599,450,183	146,086,009	o
		60.25%	39.75%		40.45%	
2	Indigo	310,438,237	49,918,307	360,356,544	24,214,182	23,957
		86.15%	13.85%		7.8%	
3	Jet Airways	57,934,665	<b>55,662,287</b>	113,593,383	57,934,665	65000
		51%	49%		100%	

**Success of other nations:**

Many countries have gainfully used their purchasing power to obtain technology or major aerospace projects through Offsets. China, Japan and South Korea have successfully used offsets for getting the OEMs to establish manufacturing facilities in their countries and have created capability for development, manufacture and maintenance of civil aircraft supported by the Sellers. The respective Governments have driven the Offsets as a national goal and the execution has been done by the private and public industry. Some examples are:

- In 2008 Airbus had set up assembly line for A-320 in Tianjin, China (Airbus 2018b). Much earlier in 1987 McDonnell Douglas, merged with Boeing in 1997, had set up assembly line for MD-92 airliner at Shanghai, China.
- In Japan, through offsets, Kawasaki, Mitsubishi and Fuji have become major suppliers of fuselages etc. for most of the Boeing programmes and for many Airbus aircraft as well (Nair 2014).
- Korean Aircraft Industry, a Joint Venture of Korean companies formed in 1999, leveraging offsets is a flourishing Boeing Tier 1, apart from building a number of military aircraft and helicopters (Nair 2014).
- Israel has used both civil and military offsets to obtain technology to enhance its capabilities. The integrated policy applies to government as well as private procurements.

**Potential:**

From the foregoing assessment, avenues for channelizing the potential of the offsets can be covered under following categories:

- With the capability base created, logically India should now act to produce major modules of aircraft, engines and systems, progressively moving to complete aircraft. This can be achieved by setting up Assembly Lines in India by the OEMs for the purchased aircraft or sub-modules. Such assembly line transfer would not cause extra cost, because firstly this investment would be accounted as offset discharge, two the Vendor would be able to use sales as offsets and thirdly would also get returns from the profitability of such a venture at low cost location.
- At present AI has its own MRO Centres for aircraft and engines, but most private airlines send aircraft abroad for major servicing incurring high expenses. The business value of MRO for airlines in India is Rs 50 billion, of which 90% goes to neighbouring countries like Sri Lanka, Singapore, Malaysia, UAE etc. (NCAP 2016). One of the Offsets avenues can be that OEMs are asked to set up MRO for the airlines in India, and also for the Asia Pacific region. The Airlines can be partners in these projects.
- Localization of spares manufacture will reduce cost, which in turn the aircraft manufacturers can be expected to share with the airlines.
- With a bigger industrial base for civil aircraft manufacture, the skillset spectrum also would get enlarged. This can help cross fertilization of skills between civil aircraft manufacturing and the aviation sectors.

**CONCLUSIONS:****Lack of Civil Offset Policy:**

India does not have a structured policy for civil offsets to leverage procurement of Commercial Aircraft or Aviation equipment, except one time appointment of STC in 2006. Afterwards no information has been disseminated on offset fulfillment. India has missed a potential opportunity of close to \$ 12 billion offsets for private airlines for purchase of 416 aircraft, at current value. A well laid down Policy would have benefitted India substantially for buildup of civil aerospace industry.

**Capabilities & Potential:**

The aerospace industry has created good infrastructure and skills for reasonable capability in technology and products towards larger civil aerospace projects. Many Joint Ventures catalyzed by defence offsets affirm OEM participation in investment, skilling, technology, business development and long term partnership. In recent years, some aerospace OEMs have been working with Indian companies to develop several sources for Civil Aerospace, aiding in growth.

**Future Opportunities:**

Almost 1000 airliners already ordered, coupled with forecasts up to 2036, have offset potential of approx. \$ 75 billion, which demands urgency for a comprehensive Civil Offset Policy.



### **Offsets for Purchase by Private Airlines:**

It is demonstrated by data that substantial contribution to the private airlines is from public money. In addition, to facilitate growth of aviation, AAI has planned 100 new airports, operationalization of 56 regional airports and upgrade of a number of regional airports. This would be largely through public money. Particularly improvement in infrastructure for regional connectivity will mean import of more aircraft suitable for regional routes. It is logical that the purchases by the private airlines are also leveraged for growth of industry, creation of employment and to increase exports through civil offsets.

The costs of the aircraft would get reduced with offsets to India, even after adding costs of logistics and management, because of international competitiveness of Indian industry. Offsets would be an added motivation to OEMs, to use Indian resources to meet their own cost pressures.

Many countries have taken advantage of Civil Offsets to get Assembly Lines and to develop their own platforms/ products. Considering the exponential growth trend of commercial aviation, there is a great opportunity for India to consider a similar strategy.

### **RECOMMENDATIONS:**

A detailed Offsets Policy, covering both public and private sectors, must be formulated for import of civil aircraft/ helicopters and equipment for the Airports & Air Navigation. The focus should be on the entire civil aviation industry for growth of technology; creation of capabilities for Research, Design and Development; creation of aircraft production facilities for Indian and global market; and access to global markets for aviation products from India.

Civil Offsets should be used not only to further speed up growth through core manufacturing, but to incentivize industry to engage in design partnership with OEMs to accelerate technology progression.

As a direct benefit for the private airlines, setting up MRO facilities should be one of the Offset avenues, creating an opportunity for the Airlines to partner and also to reduce cost of Major Servicing.

Aircraft suppliers should be asked to set up Assembly Line in India to manufacture a major portion of the aircraft purchased, for example a Wing Section or a Fuselage Section or an Engine Module to start with. There are 110 Regional aircraft on order; these should be leveraged to set up an Assembly Line for Regional aircraft in India.

Use the potential of Civil Offsets to benefit not only aerospace manufacture, Design & Development, but also the Aviation Sector. Foreign aircraft manufacturers as well as vendors for equipment for airports/ airfields, Air Navigation, and Airport Builders should be taken as partners for indigenous programmes like Regional Transport Aircraft, development of new Airports, Airport/ Air Navigation Systems etc. towards Make in India.

The private airlines should be mandated to form a Consortium or a Special Purpose Vehicle (SPV) for the Consolidation and Management of Offsets to translate the Policy Guidelines for creation of specific capabilities in manufacturing/ testing/ MRO/ D&D/ spares logistics.

Regulations and processes in the Civil Offset Policy must be framed to ensure that the agility of the decision making in private airlines is not affected through over-control. The policy should specify the results required in terms of technology, infrastructure and products, but should empower Airlines and Vendors to work out the modalities. This policy framework should be prepared with the active participation of these airlines.

There is potential for further research into the factors that have impeded exploitation of offsets for building up civil aerospace, while so many countries have benefitted hugely to create their own civil aviation and aerospace infrastructure.

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