Report of Working Group on Civil Aviation Sector

National Transport Development Policy Committee

June 2012

Ministry of Civil Aviation, Government of India

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2 Introduction

2.1 Background

2.1.1 A High Level Committee under the Chairmanship of Shri Rakesh Mohan was constituted by the Cabinet Secretariat, Government of India vide its order dated 11th Feb. 2010, referred to as the National Transport Development Policy Committee (NTDPC). The thrust of the Terms of Reference (See Annex I) of the Committee broadly include assessment of transport requirement of the economy for the next two decades and to recommend a comprehensive and sustainable policy for meeting the transport requirements keeping in view a number of relevant factors.

2.1.2 NTDPC in turn set up Working Groups for various transport and related sectors under the Chairmanship of Secretaries of respective Ministries/Departments. Working Group on Civil Aviation for NTDPC is chaired by Secretary Ministry of Civil Aviation (MoCA) with the Economic Advisor of MoCA as its Member Secretary. The working group on civil aviation was required to inter alia determine the role of air transport in meeting the transport requirements of the economy over the next two decades, estimate the growth in air traffic by 2020 and 2030, assess the investment requirements to achieve the air transport traffic growth projected and suggest policy revisions in the context of development of air transport and the objective of enhancing access and affordability etc.

2.1.3 The Working Group constituted six sub groups to look into specific areas in a focused manner so as to enable the Working Group on Civil Aviation to take a comprehensive view of the issues in the right perspective. Subsequently, when the draft report was submitted to NDTPC, it was desired by the Chairman that the forecast of air traffic needed to be made for the period upto 2031-32 with plan period wise projections. Also it was further desired that all the requirements of capacity and investments needed to meet the growth in requirements in capacity to be made upto the period 2031-32 with plan wise projections. Accordingly, the forecast exercise was undertaken with these requirements of the NTDPC in mind. This report is a culmination of meetings, presentations and discussions with various stakeholders at different fora.

2.1.4 Also, areas concerning NTDPC from the Civil Aviation perspective were discussed at length at all meetings of Civil Aviation Economic Advisory Council (CAEAC)[1] set up by MoCA. The report has been prepared after detailed internal discussions with officials at various levels and keeping in mind the developments taking place in the aviation industry. A detailed questionnaire (See Annex II) had been sent to all the Civil Aviation Departments of State Govts. to elicit views on various aspects of Civil Aviation like assessment of growth potential in terms of air transport services in their respective states, policies governing the same, existence of independent Ministry to handle aviation issues etc.

2.1.5 The Questionnaire was responded by atleast 15 major states. The issues concerning NTDPC with respect to Civil Aviation were also discussed at a Conference of the State Aviation Secretaries under the chairmanship of the Secretary, Ministry of Civil Aviation was held on 1st June 2011 at Vigyan Bhawan in which almost all states participated. The various viewpoints emerged during consultation have been taken into consideration while preparing the report. To the extent possible, latest available data has been used in the preparation of the Report.

2.1.6 The Report has been organized into ten chapters. Chapter 2 gives a brief introduction of the formulation and functioning of the Working Group on Civil Aviation. Chapter 3 gives an account of the role of air transport and a brief snapshot of the Indian Civil Aviation sector. Chapter 4 discusses the performance in the passenger and cargo traffic carried in India both scheduled and non-scheduled and lists down the key drivers for the Indian Aviation market. Chapter 5 gives an account of the expected passenger and cargo traffic in the next two decades. Chapter 6 reviews the performance of the airport sector. Investment requirements and related issues are discussed in Chapter 7. Subsequently in chapter 8 the five key challenges affecting the sector have been discussed in detail viz. viability, air connectivity, land requirement, safety and human resources development. Other Opportunities in Civil Aviation sector like Aerospace have been discussed in Chapter 9. Chapter 10 gives an account of the current nature of grievances and the initiatives that have been undertaken towards Consumer Protection. Chapter 11 discusses at length the statistical system for civil aviation at DGCA and AAI and the deficiencies in them. Chapter 12 gives an account of all the major recommendations of the Working Group.

[1] CAEAC was set by MoCA wide order dated 9th December 2010 to ensure sustainable inclusive growth and passenger facilitation.

3 Role of Air Transport in the Economy

3.1 Role of Air Transport

3.1.1 In an increasingly globalised economy, air transport is a vital element of the country's transport infrastructure. The impact of civil aviation as a sector on the general economic activity has been studied systematically and documented for some of the Western developed countries. By itself, the Civil Aviation Sector contributes significantly to the process of development by generating employment opportunities directly and indirectly besides facilitating enhancement of productivity and efficiency in the movement of goods and services. Civil Aviation is a key infrastructure sector that facilitates the growth of business, trade and tourism, with significant multiplier effects across the economy.

3.1.2 Doubtlessly, air transport has contributed to the rapid growth in India's international trade in recent decades by offering a reliable and faster mode of transport services to move products and personnel across long distances. Therefore, sustaining a viable aviation industry is vital if the economy is to reap the full benefits of the future growth in foreign trade and investment. Industries that rely most heavily on air transport for their international freight shipments include high growth sectors such as pharmaceuticals, office equipment and electronic equipment sectors besides those that have high value to weight products.

3.1.3 Thus, it has been observed that high growth sectors in emerging markets are heavily dependent on the services of the aviation industry. Increased air connectivity enables manufacturing enterprises to exploit the speed and reliability of air transport to ship components across firms that are based in different and distant locations thereby minimizing the inventory cost. Countries with higher connectivity in general are stated to be more successful at attracting Foreign Direct Investment. Role of air transport is crucial for the development of Tourism industry. Tourism makes a large and growing contribution to the Indian economy.

3.1.4 The Tourism Satellite Account developed for India for the year 2002-03 confirms tourism as one of the largest sectors in the economy. Tourism value added accounts for 2.78 percent of the GDP in terms the direct contribution; when indirect effects are also accounted for, the share of tourism in the GDP is 5.83 percent.

Role of Air Transport in the Economy[2]

3.1.5 In absolute terms, tourism related jobs are estimated to be in the region of about 21 million. [2] Employment in the Indian tourism industry is dependent on the aviation industry since 90% of foreign visitors out of 5.11 Million arrived by air in the year 2009.[3] Global evidences suggest that in U.S.A. civil aviation activity within the overall economy was responsible for generating 12 million jobs, USD 1.3 trillion in total economic activity and 5.6 percent of GDP in 2009.[4] In UK, the contribution of aviation sector to its GDP is said to be to the tune of £53.3 billion (3.8%) to its GDP.[5] The most important contribution aviation makes to the economy is through its catalytic impact on the performance of other industries and as a facilitator of their growth.[6]

3.1.6 Recent research by Oxford Economics reveals that the direct contribution of aviation sector in India to its GDP is 0.5% for the year 2009. If the Catalytic impact of Civil Aviation is included, the contribution to GDP is 1.5%. Total number persons employed in Civil Aviation sector is estimated to be 1.5 Million and if we include the catalytic impact then it is 10 million persons. Globally for every $ 100 of output produced and every 100 jobs generated by air transport in the economy trigger additional demand of approximately $325 worth of output and 610 jobs in other industries.[7] During the year 2010-11, air transport carried 54 Million domestic passengers and 37 Million International passengers besides transporting 1.7 Million Metric tonnes of domestic and international cargo. Air transport is crucial for the distribution of high value to weight products and also for goods that are to be transported speedily.

3.1.7 Civil Aviation sector makes a substantial contribution to public finances. These include, the Service tax paid by air passengers, corporation tax paid by airline companies, airport operators and other ground support service enterprises, MRO firms and income tax paid by their respective employees, besides the revenue collected through taxes on fuel and equipments.

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[2] Tourism Satellite Account for India, Ministry of Tourism, Govt.of India/NCAER,2006

[3] Indian Tourism Statistics 2009,Govt. of India, Ministry of Tourism

[4] "The Economic Impact of Civil Aviation on the US Economy" FAA, Air Transport Organisation,December,2009

[5] Economic Benefits from Air Transport in the UK, Oxford Economics,2011

[6] The contribution of the Aviation industry to the UK economy, Oxford Economic Forecasting,1999

[7] Economic Contribution of Civil Aviation -Ripples of Prosperity, ICAO

3.1.8 Thus, the economic foot-print of the Civil Aviation sector which reflects the value addition and the direct and indirect employment created by activities of the sector appear to be much deeper and wider in terms of its multiplier effect.

3.2 Snapshot of the Indian Civil Aviation Sector

3.2.1 The size of a particular industry in a given year is assessed by the total income generated by enterprises in that industry and the employment generated by the said industry. These are generally reckoned to be the key parameters to evaluate the relative importance of a sector in an economy. It is with this objective, an attempt has been made to estimate the size of the civil aviation sector in India based on available information as given in Table 1. From the table it is evident that scheduled airlines in India contribute to over 50% of the gross income of the Civil Aviation sector in India.

3.2.2 While income of the scheduled carriers operating in India does include income from their global operations, income of the international airlines having operations in India is not part of the income shown under scheduled air lines, which according to industry sources would be in the region of about Rs.20,000 crores for 2010-11. If this is taken into account then the size of airline industry alone would exceed Rs.60,000 crores.

Table 1: Estimated Gross revenue earned by sub-sectors of Indian Civil Aviation sector

Sub-Sectors	Gross ncome (Rs. Crores)
[8] Airlines	
Scheduled	43,352
Non-Scheduled	1,528
Total	44,880
Airports	
AAI	5,734
Private	3,805
Total	9,539
Maintenance Repair and Overhaul (MRO)	4,000
Air cargo and Express Industry	19,000
Ground handling	2,000
Aviation Academies	325
Total	79,744

Source: Respective Annual reports, Industry Sources; Analysis: MoCA

[8] *Note: Air India Limited data pertains to 2011-12. Jet Airways, Kingfisher Airlines, Spice Jet, Indigo data was for 2010-11.. AAI data is of 2011-12 and private airport data pertains to 2010-11.

Role of Air Transport in the Economy

3.2.3 It is evident from the table 1 that contribution of Airline industry to the total sector revenue is over 50%. Since, the airlines are the largest contributor to the sector in terms of revenue, their viability is of paramount importance for the growth of the sector.

4 Indian Aviation Market

4.1 Performance of Scheduled Passenger Traffic in India

4.1.1 In the last two decades, the fastest growth in overall air traffic in India was witnessed during 2004-05 to 2010-11 at the rate of 16.5% with domestic traffic clocking a CAGR of 18.5% and International traffic at 14%. This growth is much higher than the growth witnessed during the period 1995-96 to 2003-04. Also, it is evident that the domestic traffic grew more than three times and the international traffic to and from India more than doubled in the last 7 years.

4.1.2 Performance of domestic air traffic evaluated for a longer time frame of twenty years (from 1990-91 to 2010-11) suggests that it grew at an annual average rate of 10.4%. During the same period, international passenger traffic grew at 9.4% and total passenger traffic at 9.9%.

Table 2: Passenger Traffic Carried by Scheduled Carriers

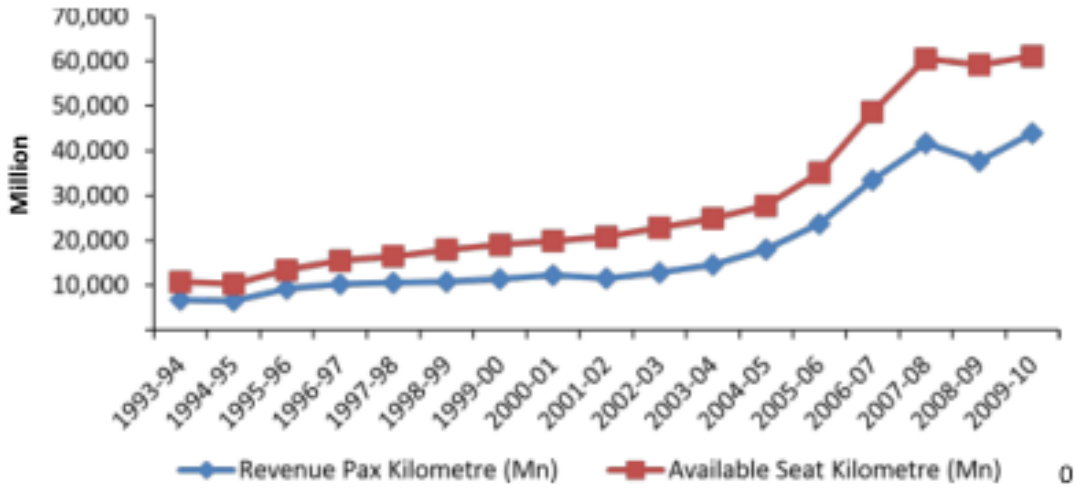
Year	Passenger Carried (in millions)		
	Domestic	**International**	**Total**
1990-91	7.5	6.3	13.8
1995-96	12.2	9.4	21.6
2003-04	15.7	14.6	30.3
2010-11	53.9	37.9	91.8
Compounded Annual Growth Rate (%)			
(1990-91 to 2010-11)	10.4	9.4	9.9
(1995-96 to 2003-04)	3.2	5.7	4.3
(2004-05 to 2010-11)	18.5	14	16.5
(1995-96 to 2010-11)	10.4	9.7	10.1

Source: DGCA, AAI; Analysis: MoCA

4.2 Available Seat Kilometer[8] & Revenue Passenger Kilometer [9]

4.2.1 Available Seat Kilometer (ASK) refers to available capacity deployed by scheduled carriers on all its routes whereas Revenue Passenger Kilometer (RPK) performed refers to number of seats for which the carrier has earned revenue, in relation to the distance travelled. ASK is normally the supply side parameter used to assess the capacity growth in the market whereas RPK is the demand side parameter used to assess the revenue generated by airlines from passenger traffic.

Graph 1: Revenue Passenger Kilometer Performed and Available Seat Kilometer in scheduled domestic carriers



Source: DGCA; Analysis: MoCA

4.2.2 Graph 1 indicates that capacity in the domestic market has been growing steadily. Both ASK and RPK moved in tandem over most of the period under study 1993-94 to 2009-10. Capacity deployment by carriers being ahead of demand is understandable but the gap between the two had been increasing widely since 2005-06 indicating excess capacity in relation to growth of demand.

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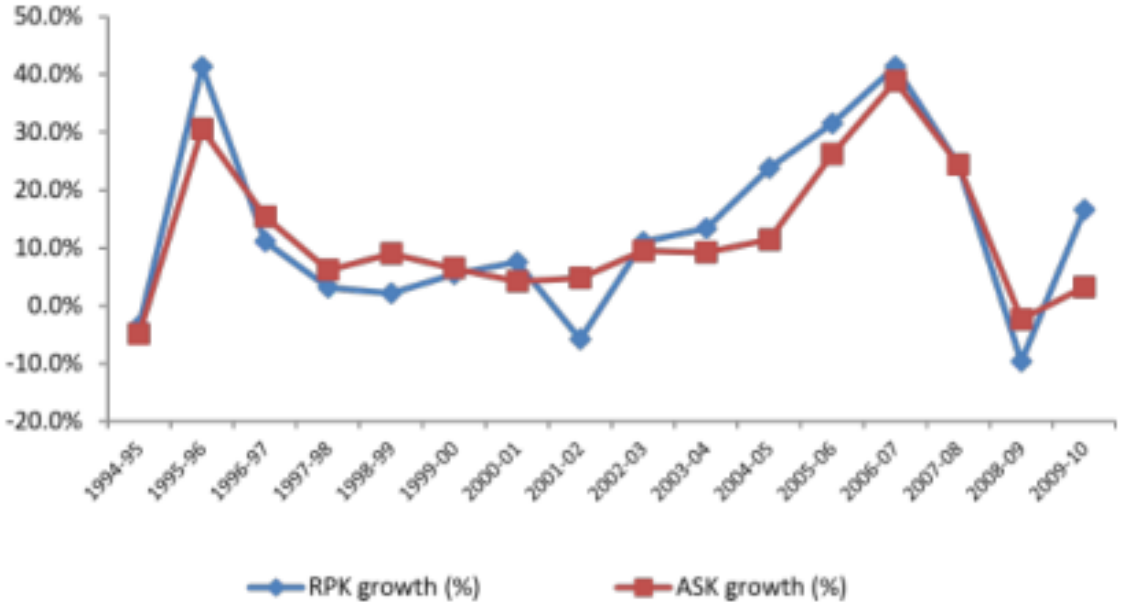
[8] Available Seat Kilometer (ASK) stands for the sum of the product obtained by multiplying the total number of seats that are available in each flight by the flight stage distance.

[9] Revenue Passenger Kilometer is calculated as the sum of the product obtained by multiplying the number of revenue passengers carried on each flight stage by the stage distance, which gives the number of kilometers travelled by all passengers.

4.2.3 The Year on Year (Y-o-Y) growth rate in Graph 2 also reflects the same trend as shown in Graph 1 that suggests that both ASK and RPK move in tandem barring some years where they have diverged for a while like in 2001-02. The analysis in terms of CAGR has been given in Table 3.

Graph 2: Year-on-Year Growth rates in RPK & ASK (%)



Source: DGCA; Analysis: MoCA

Table 3: RPK and ASK of Scheduled domestic carriers in India

Year	RPK (Million)	ASK (Million)
1993-94	6779	10,821
1999-00	11,420	19,089
2004-05	18,030	27,790
2009-10	43,959	61,091
	CAGR (%)	
1993-94 to 2009-10	12.4	11.4
1993-94 to 2004-05	9.3	9.0
2004-05 to 2009-10	19.5	17.1

Source: DGCA; Analysis: MoCA

4.2.4 Growth rate in capacity as measured by ASK and the traffic as measured by RPK was maximum during the period from 2004-05 to 2009-10 a trend which was seen from the perspective of passenger growth also. Average annual growth rate of RPK for Scheduled Carriers in India is higher than that of ASK for different periods it was calculated (shown in Table3). For instance, while the RPK grew at 19.5% during 2004-05 to 2009-10, the ASK grew only by 17.1% indicating the increasing levels of Passenger Load Factor in domestic aviation market. Passenger Load Factor which stood at 65% in 2004-05 had increased to 72% in 200910. Seat capacity deployment started increasing from 2005-2006 onwards when new private airlines entered the domestic passenger traffic market in India.

4.2.5 The commercial aviation industry has been supported by the liberalization which allows airlines to open more routes, add more frequencies and experiment with new business models. Indian aviation market suffered a period of declining traffic during 2008- 2009. Although this down turn was largely the result of the global economic meltdown, difficulties were compounded by influx of new Capacity.[10] It is well known that Capacity deployment is not amenable to short term adjustment in the airline industry. From Table 3 it is evident that although CAGR of RPK in the three time periods considered has been higher than ASK, it is found to be insufficient to catch up with the absolute level of ASK indicating periodic bouts of glut of supply in the market given the high degree of sensitivity of passenger traffic to over all global and domestic economic activity.

4.3 Review of performance of International passenger Traffic

4.3.1 Underperformance of International passenger traffic as compared to domestic traffic over the last twenty years stands established in earlier part of analysis of this section. In what follows, certain other aspects of the International traffic performance are discussed with evidence. Contrary to popular belief, share of Indian Carriers in International market has actually increased since the liberalization of market after years of stagnation in a protected

[10] Current Market Outlook 2011-2030, Boeing

environment. Trend observed with respect to International Passengers carried by scheduled carriers to and from India is given in Table 4.

4.3.2 Scheduled Carriers of India have made some gains in total international passenger traffic from/ to India during the last 20 years. For instance, International traffic handled by Indian Carriers increased from 31.7% in 1990-91 to 34.6% in 2009-10.

Table 4: Market share of International Passengers Carried by Scheduled Domestic Carriers from India & Foreign Carriers (%)

Year	Scheduled Carriers India	Foreign Carriers
1990-91	31.7	68.3
1994-95	29.3	70.7
2004-05	28.9	71.1
2009-10	34.6	65.4

Source: DGCA; Analysis: MoCA

4.3.3 However, given the vibrant domestic air traffic market and the Indian economy being one of the most attractive investment destinations of the world, Indian Carriers could not make substantial inroads into the international market for air traffic. The low level of utilization of international traffic rights by Indian Carriers, restrictions on entry of Indian Carriers to operate on International routes and certain inherent cost disadvantages are often cited as reasons for slow growth in the market share of International Passenger traffic market for Indian Carriers.

4.3.4 Another aspect of International traffic to and from India pertains to trend in foreign tourist arrivals in India. Table 5 traces the trends in Foreign Tourist Arrivals (FTAs) in India and some other countries since 1995. It is pertinent to note that FTAs in India is almost stagnant during the latter half the previous decade signifying the fact that inbound tourism potential that exists for India in its cultural diversity and a vast array of attractions have not been tapped at all during the last few years. The stagnant inbound tourism is also attributed to protectionist market access policy regime.[11]

[11] CAPA perspective on India's Bilateral Air Services Strategy, Center for Asia Pacific Aviation, June, 2011

Table 5: Trend of Foreign Tourist Arrivals during the period 1995-2010

Years	China	Singapore	Indonesia	India	Brazil	Vietnam
1995	20.0	6.1	4.3	2.1	2.0	1.4
1996	22.8	6.1	5.0	2.3	2.7	1.6
1997	23.8	5.9	5.2	2.4	2.9	1.7
1998	25.1	5.1	4.6	2.4	4.8	1.5
1999	27.1	5.6	4.7	2.5	5.1	1.8
2000	31.2	6.1	5.1	2.7	5.3	2.1
2001	33.2	5.9	5.2	2.5	4.8	2.3
2002	36.8	5.9	5.0	2.4	3.8	2.6
2003	33.0	4.7	4.5	2.7	4.1	2.4
2004	41.8	6.6	5.3	3.5	4.8	2.9
2005	46.8	7.1	5.0	3.9	5.4	3.5
2006	49.9	7.6	4.9	4.5	5.0	3.6
2007	54.7	8.0	5.5	5.1	5.0	4.2
2008	53.1	7.8	6.2	5.4	5.1	4.3
2009	50.9	7.5	6.3	5.2	4.8	3.8
2010	Not Available	9.2	Not Available	5.6	5.2	5.1

Source: World Bank[12], Analysis: MoCA

4.3.5 FTAs in countries like Indonesia, Singapore and China are much higher than FTAs in India. Particularly it is to be noted that FTAs in India is about one-tenth of that in China. In order that India's FTAs is increased, it is essential that the concerned Ministries and Departments like

[12] *http://search.worldbank.org*

Ministry of Civil Aviation, Ministry of Tourism, Ministry of Culture and State governments work in tandem.

4.3.6 Therefore, enhancement of international air traffic to and from India could come from both the sides. A substantial reform in the market access arena could perhaps change the situation. For instance entry of India based low cost carriers between India and Middle East and between India and South East Asian countries could boost international traffic as services in this region have become more convenient and less expensive at a time when disposable incomes of people in India are on the rise.

4.3.7 Pattern of Inbound and Outbound International Traffic

4.3.7.1 The share of Inbound & Outbound passengers has approximately been in the same proportion viz. 50% each. However, experience in the last seven years show that the Inbound passenger traffic is growing at a faster rate as may be seen in Table 6.

Table 6: Outbound & Inbound passengers (Millions)[13]

Year	Outbound (Embarked)	Inbound (Disembarked)
1995-96	5.4	5.2
2003-04	8.1	7.6
2010-11	18.7	18.3
Compounded Annual Growth Rate (%)		
(1995-96 to 2010-11)	8.60%	8.80%
(1995-96 to 2003-04)	5.10%	4.90%
(2003-04 to 2010-11)	12.70%	13.40%

Source: DGCA

[13] Table 6 does not include transshipment passengers

4.4 General Aviation

4.4.1 General Aviation is an emerging air traffic mode of importance in recent times. Broadly, this segment comprises of:

(a) Non-scheduled operations of Tour Operators on a point to point basis within the country.

(b) Non-scheduled operations of Tour Operators on a point to point basis to and from a domestic territory of a country to a foreign country and vice versa.

(c) Other Charter Operations

(d) Business Jets

(e) Helicopter Services.

(f) Non-scheduled operations of scheduled operators[14] (g) Balloons and others.

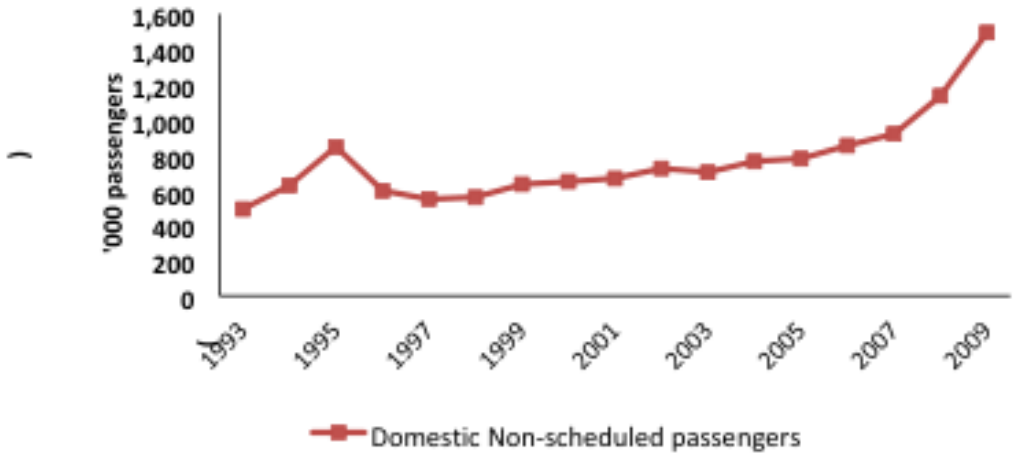
4.4.2 The overall coverage of data is fragmented in nature as the sector itself is in its state of infancy. Data availability restricts us to consider only passengers carried in the domestic segment by Other Charter Operations, Business Jets, Helicopter Services, Balloons as mentioned above, together they will be referred to as Non-Scheduled Operators (NSOPs) in this section.

4.4.3 India has witnessed a significant growth in the number of non-scheduled airline operators with total number of operators having crossed 200 in 2011 from 36 operators in 2000. The present ownership pattern indicates a fragmented sector with majority of the players owning less than 4 aircrafts. As per DGCA, the General Aviation (GA) fleet in India comprises around 800 small aircrafts and 300 helicopters. Around 20% of this fleet size is expected to be more than 25 years old and may not be operational. Industry sources indicate that revenues of the General Aviation industry in India are expected to grow to more than Rs 1,100 crores by end of 2016-

[14] Non-scheduled operations of scheduled operators refer to the operations which are performed without a published time-table. These are services, which are not on a regular basis

2017 growing at an impressive annual rate of 15%. The fleet of business jets has expanded from around 55 in 2007 to around 120 in 2010.[15]

Graph 3: Domestic Non-Scheduled Passenger Traffic Carried by NSOPs ('000)



Source: DGCA; Analysis: MoCA

Graph 3 shows the non-scheduled passenger traffic carried in the domestic segment. The graph clearly reflects the rising traffic in the domestic segment and the consequent potential to tap it even more in future.

Table 7: Domestic Passenger Traffic Carried by NSOPs (Million)

Year	Domestic Passengers Carried
1993-94	0.5
2003-04	0.7
2009-10	1.5
	CAGR (%)
(1993-94 to 2003-04)	3.3
(2004-05 to 2009-10)	14.4
(1993-94 to 2009-10)	7.2

[15] Report of Working Group on Civil Aviation for formulation of 12th Five year plan, MoCA GoI, 2011

Source: DGCA; Analysis: MoCA

4.4.4 Also, Table 7 gives an account of the CAGR witnessed in this segment. It is observed that during the period from 1993-94 to 2009-10, number of passengers carried by NSOPs grew by 14.4% during 2004-05 to 2009-10 which is much higher than the long term average annual growth rate of 7.2%. The passenger traffic clocked 1.5 million in this mode during 2009-10.

4.5 Drivers of Non-Scheduled Passenger Traffic/ General Aviation

- A study by *Deloitte Center for Financial Services (August 2011)*, forecasts that the number of millionaire households in India will grow from 2.86 lakh to 6.94 lakh between 2011 and 2020, a growth rate of 143 per cent. The $5-30 million income group is likely to see the biggest growth of 161 per cent, followed by the $1-5 million group at 142 per cent and the over $30 million group at 115 per cent.
- According to CAPA, in 2009-10 major share of general aviation traffic originated from Mumbai followed by Delhi[16] indicating the current skewed growth experienced by India. As this growth spreads across instead of being islands of prosperity to Tier 2 and Tier 3 cities, the demand for NSOPs will increase significantly.
- The Rotary Wing Society of India has identified growth areas for domestic helicopter industry to include, emergency medical services, airborne law enforcement, energy restoration (repair of damaged electricity towers), aerial photography, relief and rescue operations, electronic news gathering, agricultural activities like spraying etc and commercial services within and between cities.[17]

4.6 Performance of Air Cargo traffic in India

India's impressive growth in international and domestic trade over past few years has augured well for the air-cargo industry in India. Air Cargo in India received its initial impetus from the 1986 permission, wherein air taxi operators were allowed to provide on-demand services primarily to boost tourism on major routes. Subsequently, the 'Air Cargo Open Sky Policy' was adopted in 1990

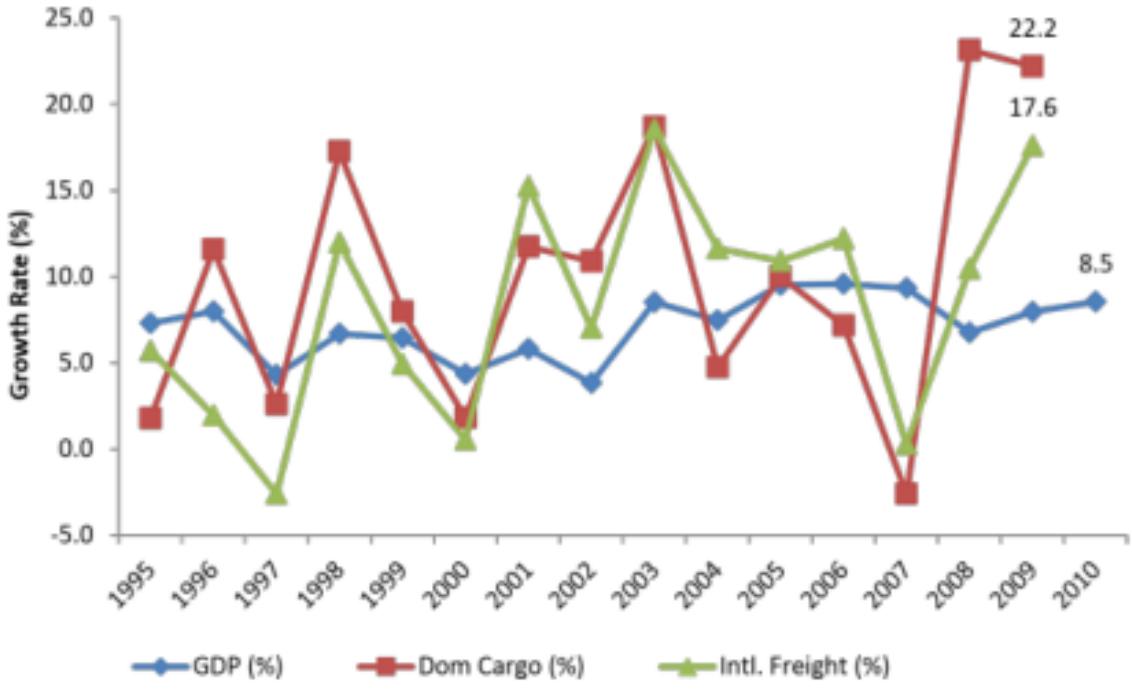
[16] Centre for Asia Pacific Aviation, India business & General Aviation Report 2011: The Next Growth Wave in Indian Aviation; CAPA Market Research and Analysis Unit.
[17] Ibid.

initially for 3 years and further extended in 1992 on a permanent basis, where any airline whether Domestic or Foreign carriers which met specified operational and safety requirements, were allowed to operate scheduled and non-scheduled cargo services to/from any airports in India wherever customs facilities are available. In addition, regulatory regime over cargo rates for major export commodities was abolished so that carriers are free to set their own rates.[18]

4.6.1 Growth in Air Cargo volume and GDP are highly correlated

4.6.1.1 Air Cargo growth rates in general are seen to be highly susceptible to the fluctuations in the GDP growth rates of India (See Graph 4) more so in the international Cargo segment. In fact the slowdown in cargo seems to be preceding the slowdown of the economic growth in many cases.

Graph 4: Trends in GDP& Air Cargo growth rates (%)



Source: DGCA; Analysis: MoCA

4.6.1.2 Data on cargo traffic carried by scheduled carriers both international and domestic has been

[18] http://www.icao.int/icao/en/atb/ecp/casestudies/india_en.pdf

tabulated in Table 8. Cargo is the sum of freight and mail. DGCA has been documenting the Domestic Cargo data as a sum total of Freight and Mail; however, it has started documenting the data on Mail carried by scheduled International Carriers only recently.

Table8: Cargo Traffic Carried by Scheduled Carriers

Year	Cargo Carried (in '000 MT)[19]		
	International	**Domestic[20]**	**Total**
1990-91	231	97	328
1995-96	348	113	461
2003-04	617	227	844
2010-11	1244	476	1720
	CAGR (%)		
(1995-96 to 2003-04)	7.4	9.1	7.8
(2004-05 to 2010-11)	9.1	8.9	9
(1995-96 to 2010-11)	8.9	10	9.2
(1990-91 to 2010-11)	8.8	8.3	8.6

Source: DGCA; Analysis: MoCA

4.6.2 Highlights of Air Cargo Traffic performance in India

- Last twenty years has witnessed annual average growth rate of 8.6% which is about 1% lower than the passenger growth discussed earlier
- Long term growth rates for International and domestic cargo are more or less the same

[19] MT refers to Metric Tonnes
[20] Cargo carried is different form Cargo handled which would be double the volume of Cargo carried

- Recent trends suggest that domestic air cargo is growing at a faster rate than International cargo to and from India
- Share of Delhi airport has declined from 30% of total International Air cargo in 2003-04 to 26% in 2010-11. Similarly, Mumbai has also witnessed a decline of its share from 36% to 31% during the same period.
- On the contrary, Chennai (17% to 20%) and Bangalore (7% to 9%) have gained in market share of International Air Cargo during the last 7 years.

4.6.3 Dedicated Domestic freight operations

4.6.3.1 Dedicated freight operations refer to the cargo carried by aircrafts solely meant for freight carriage. Table 9 gives the proportion of domestic cargo carried as belly cargo & in freighter air craft. Over the period 1999 to 2009 (for which the data is available) the proportion of belly cargo to the total cargo carried has been declining and stood at 82.8% in 2009-10 from a level of 88.7% in 2000-01; and that of freighter cargo operations has been increasing.

4.6.3.2 Emergence of Time-Definite-Delivery in domestic express delivery service is the main driver of growth in this segment. The cargo capacity in Passenger aircrafts as part of belly capacity is around 13 to 15 MT; baggage space does not exceed 2 to 3 MT whereas small jet freighter aircrafts have a capacity of 10 to 30 tons, mid-size freighter aircrafts have a capacity of 30 to 80 tons and large freighter aircrafts have a capacity of greater than 80 tons[21].

Table 9: Proportion of domestic cargo carried as belly cargo & in freighter aircraft (%)[22]

Year	Sch. belly cargo (%)	Sch. cargo operator (dedicated) (%)
2000-01	88.7	11.3
2004-05	85.8	14.1
2009-10	82.8	17.1

Note: Sch. refers to Scheduled Source: DGCA; Analysis: MoCA

4.6.3.3 Over the next 20 years as mentioned earlier, small jet freighter demand is likely to increase

[21] Airbus Global Market Forecast, 2009-2029

[22] The total of proportion of scheduled belly cargo & cargo operator does not add up to 100, the remaining proportion accounts to the cargo carried by non-scheduled operators.

due to growth in express industry and also just-in time manufacturing will ensure that dedicated cargo operations will surge.

4.6.4 Further analysis of International Freight Carried

4.6.4.1 The trend observed in the international freight carried segment reflecting the market share of domestic and international scheduled carriers to and from India is in Table 10. It is observed that the Scheduled carriers from India have consistently lost out to its international counterpart with its share having declined from 37% in 1990 to 16% in 2009.

Table 10: Proportion of cargo carried by Indian & Foreign carriers (%)

Year	Domestic Carriers	Foreign Carriers
1990-91	36.9	63.1
1994-95	26.7	73.4
2004-05	13.6	86.4
2009-10	16.1	83.9

Source: DGCA; Analysis: MoCA

4.6.4.2 The main reason for this dismal performance is attributed to the fact that after the launch of Air Cargo Open Sky policy in 1990, Air India was the only major airline, which used its older aircrafts as freighter aircrafts. No other Indian carrier was in a position to provide dedicated freighter service and transshipment facility and this vacuum was filled by foreign carriers, which saw an untapped market's growth potential and hence, made aggressive forays into it. These foreign carriers enjoyed advantages of economies of scale and scope mainly because of their operations globe over and their linkages with retail firms across the world. Also, these carriers because of their inherent advantages are able to offer discounts, which could not be matched by others.

4.6.4.3 Inbound Cargo and Out bound cargo witnessed a CAGR of 9.8% and 7.2% respectively during the period 1995-2010. In absolute terms in 2010-11, Inbound Cargo stood at 661 thousand metric tonnes whereas Outbound Cargo stood at 842 thousand metric tonnes indicating that the outbound cargo or export by air has been greater than the inbound cargo or import by air in absolute terms. However, the inbound cargo by air has been growing at a faster rate than outbound cargo by air over this period of time.

Table 11: Proportion of India's Inbound & Outbound Cargo traffic (in '000 Metric Tonnes)

Year	Outbound (Load)	Inbound (Unload)	Total
1995-96	296	163	458
2003-04	435	266	701
2010-11	842	661	1,504
Compounded Annual Growth Rate (%)			
(1995-96 to 2010-11)	7.2%	9.8%	8.2%
(1995-96 to 2003-04)	5.0%	6.3%	5.5%
(2003-04 to 2010-11)	9.9%	13.9%	11.5%

Source: AAI Annual Review of Traffic 2010-11, Analysis: MoCA

4.7 Key Drivers of growth of Indian aviation market

4.7.1 Rising domestic Gross Domestic Product (GDP)

Growth rate of the economy has been steadily rising. For instance, in the period 1990-91 to 2003-04, the CAGR of India's GDP works out to 5.7% which then rose to 8.6% during 2004-05 to 2010-11. The growing economic activity resulted in greater business travel[23] by professionals and greater leisure travel by individuals.

4.7.2 Expanding middle-income group

These income groups drive the consumption pattern in India and are primarily concentrated in urban areas. NCAER analysis reveals that the middle income group population in 2010 stood at 160 million individuals i.e. 13.3% of the total population, which is expected to rise to 547 million in 2025 (i.e. 37.2% of the total population)[24]

4.7.3 Demographic dividend

62% of the population is in the working age group of 15-60 years and this proportion is set to increase in future indicating a larger employee base, greater business travel and greater economic activity.[26]

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[23] www.capaindia.com

[24] http://www.deccanherald.com/content/135240/indias-middle-class-population-touch.html

[26] Maheu A., Long Term forecasting for India, Airbus Strategy Department, Airbus, 2011. [27] http://www.urbanindia.nic.in/what%27snew/Strategic_Plan_draft_new.pdf.pdf

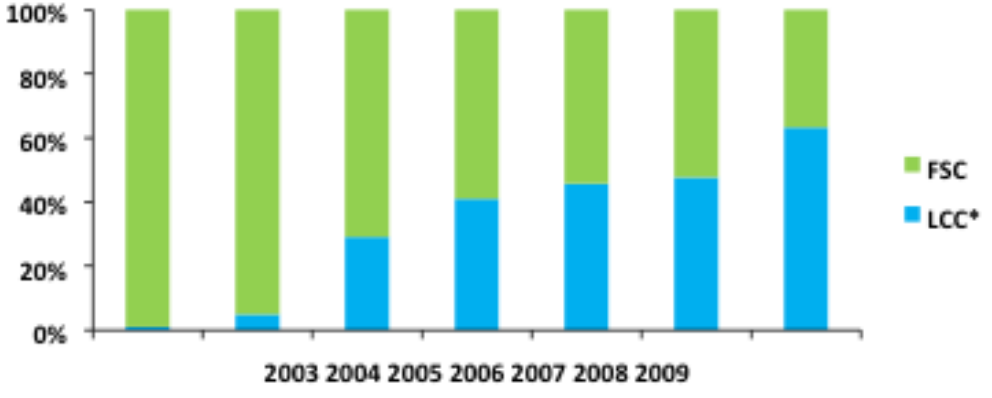
4.7.4 Rising urban population

Mckinsey Global Institute's projections state that India's urban population will be 590 million by 2030 i.e. about 40 percent of the total population of India. The number of million plus cities will increase to 68 by 2030 of which 13 cities will have more than 4 million and six cities will have more than 10 million persons.[27]

4.7.5 Significant market developments

Low Cost Carrier (LCC) model which made air travel affordable for common man got established firmly in the domestic market since 2004. This stimulated the pent up demand for air travel. LCCs along with the LCC brand of Full Service Carriers (FSCs) constituted 63.3% of the market share in 2009. The domestic traffic is rapidly shifting towards the LCC model. Market sources suggest that this has crossed 67% during 2011-12. Also, the LCCs are reported to have displayed strong operational performance immediately after the recovery witnessed in 2010. This leads us to believe that Low Cost Operations in a price sensitive market like India appear to be a more sustainable business model (See Graph 5).

Graph 5: Changing Business model[28]



Source: Spicejet Annual Report 2009-10

4.7.6 Investments in Airport and related infrastructure

Opening up of the airport infrastructure to private sector participation fuelled the growth of the air traffic in India. Total investment made by private airport operators in the last five years was to the tune of Rs 30,000 crores spread across Greenfield development of Hyderabad and Bengaluru international airports and modernization of Delhi and Mumbai international airports[29]. Airports Authority of India (AAI) continued its unparalleled role in creating air connectivity across the

nation, incurring an expenditure[30] of around Rs 12,500 crores during the 11th Plan period. Rapidly expanding air transport network aided by massive investments in the airport infrastructure could be cited as one of the key reasons for the surge in air passenger traffic in India.

4.7.7 Growing tourism

In line with the trend observed in growth of India's GDP, the tourism sector has displayed stellar performance during the last decade. During the period from 2001 to 2010, the average annual growth rate of foreign tourist arrivals in to India and Indian National departures from India grew by 9.2% and 11.5% respectively. Domestic tourism was not to be left behind. Domestic Tourist

[28] *LCC traffic share includes low fare brand of FSC as well.
[29] Source: Association of Private Airport Operators (APAO) [30]
Source: AAI

Visits within India stood at 740.2 Million for the year 2010.[25] In fact the average annual growth rate of Domestic Tourist visits within India for the decade ending 2010 is estimated to be 13.5%. The number of foreign tourist arrivals in India stood at 5.6 Million in the year 2010 as against 3.46 Million in 2004 and 2.54 Million in 2001. Similarly, the number of Indian National departures from India stood at 12.1 Million in 2010 as against 6.21 Million in 2004 and 4.56 Million in 2001.

4.7.8 Thrust on Remote area Connectivity

In areas with difficult terrain, air transport offers the fastest mode of connectivity to remote and inaccessible regions. Given the thrust of the Government of India to enhance connectivity in remote and inaccessible regions of the country and concerted efforts of some State governments in this respect, there is a strong likelihood of demand emanating from these areas in future.

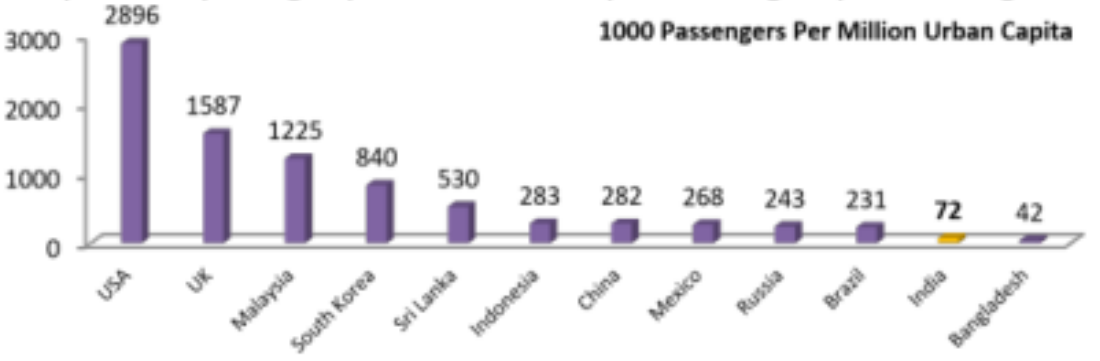
4.7.9 Untapped market potential

The air traffic density can be measured by linking Urban Per capita income with air passengers. Taking 1000 passengers per Million Urban Capita[26], a recent study has arrived at a comparative picture. Air traffic density in India using this measure is very low at 72 as compared to China (282), which is 4 times higher; Brazil (231), which is 3 times higher; Malaysia (1225) is 17 times higher,

[25] http://tourism.gov.in/writereaddata/CMSPagePicture/file/marketresearch/New/2010.pdf
[26] Achieving the Trillion Dollar Dream: Background Paper, India Infrastructure Summit 2011; FICCI

U.S.A. (2896) is 40 times higher and Sri Lanka (530), which is 7 times higher as exhibited in Graph 6. This indicates the untapped market potential given the projected burgeoning young population and rising disposable income levels in future.

Graph 6: 1000 passengers per Million Urban Capita reflecting the potential for growth[27]



Source: World Bank, McKinsey

4.7.10 **Global integration of businesses**

Greater economic activity and the consequent greater integration of businesses globally would mean greater business travelers across national boundaries. Also, the growing trend of outbound Mergers and Acquisitions (M & A) i.e. Indian firms acquiring International firms in order to capture markets and resources abroad, where the M & A transaction value for the year 2010 touched almost $ 50 billion[28] and is set to grow further in future implies greater business related travel.

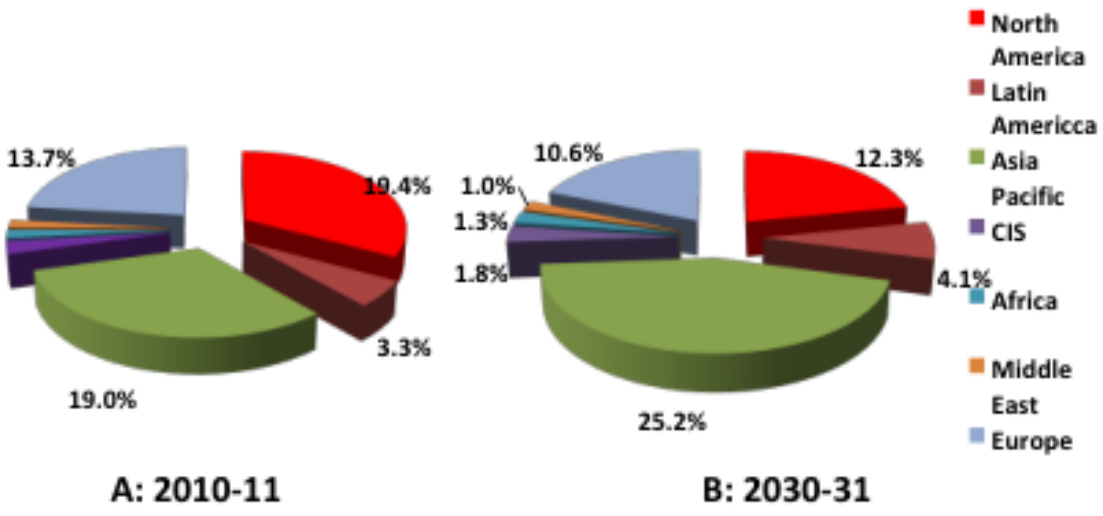
4.7.11 **Shift in traffic**

Global air traffic is seen shifting to Asia Pacific region during the last few years. This is on account of the slowdown in Europe and North America. Within the Asia Pacific region China and India are the two fastest growing economies and they are becoming the epicenter of supply and distribution. Global air traffic Forecasts for 2030 in this context also point to that direction. Charts below are self explanatory. Traffic share of Asia- Pacific in the global traffic are likely to move up and on the contrary traffic share of North America and Europe are set to decline correspondingly (See Graph 7).

[27] Traffic data pertains to 2010 for India and for other markets it is for 2008-09

[28] http://economictimes.indiatimes.com/features/business/2011-will-be-an-even-bigger-draw-for-masexperts/articleshow/7294892.cms

Graph 7: Continent wise share in Global RPK in 2010-11 and 2030-31



1.0% 1.0%

1.6%

Source: Airbus Global Market Forecast 2011-2030; Analysis: MoCA

4.7.12 International Market Access

4.7.12.1 Open Sky Agreements between nations forge greater competition in the International air travel segment. Increasingly it is recognized that Nation States need to evolve viable mechanism by which they all stand to achieve trade gains and efficiency in international market access in as far as Air traffic rights are concerned. That is yet to happen. Five Indian Carriers out of six have now started international operations. It is therefore expected that such reforms in market access arrangements as and when it happens will potentially enhance traffic to and from India.

Further, deregulation of the international air traffic markets would enable the LCCs to capitalize the opportunities of newer markets first and enhance growth of international traffic.

4.7.12.2 India's impressive growth in international and domestic trade over past few years has augured well for the air-cargo industry in India. The entry of leading private air-cargo companies has brought in a wave of increasing automation, mechanization and process improvement initiatives at major air-cargo terminals in the country. Such investments in air-cargo handling at key airports such as Delhi, Mumbai, Bangalore, Hyderabad, etc. are expected to yield higher air-cargo throughput and improved service levels. The current share of air-cargo compared to other modes of cargo-transportation is fairly low in India. The potential for air-cargo growth in India can be gauged from the fact that some of the global airports such as Hong Kong, Dubai and Incheon (Seoul) handle more cargo volume than all Indian airports put together. Transshipment at Indian airports is currently negligible. Major bottlenecks are absence of dedicated transshipment infrastructure at airports and lack of clarity on the trans-shipment Customs procedures.

5 Air Traffic Forecast for Indian Aviation[29]

5.1 Significance of Air traffic forecast

5.1.1 Investment decisions of enterprises are generally guided by the industry-wide forecasts. Entrepreneurs on the airport infrastructure side need this guidance for planning their investment as these are long gestation projects. Air line industry looks up to air traffic forecast for preparation of fleet acquisition plan and capacity deployment planning. For instance, unplanned and unbridled growth in capacity deployment by airline industry can potentially lead to market distortions in the form of excess capacity. Similarly, a number of industries engaged in the provision of ancillary aviation services like ground handling services, Cargo handlers, MRO service providers, aircraft manufacturers and training academies in the aviation sector are all dependent on forecast of air traffic, which is the core business around which every other activity revolves.

5.1.2 Development of Human Resources by establishing education and training activities to cater to the needs of the industry is a case in point as it involves a huge time lag in making available trained and skilled personnel for the industry. Non availability of skilled personnel in the relevant categories would not only impact the efficiency but also raises the employee cost to the airline and air port industry. Planners and policy makers are interested in forecasting air traffic to review the developments in the sector and to understand the likely future growth of the sector for over all transport planning for the country and its implications for safety and security as well. The capital-intensive nature of the Aviation industry necessitates that the airline companies are more cost effective in their operations and undertake efficient and effective planning.

5.1.3 This would require appropriate Air Traffic forecast which would give the probable picture of the growth scenario to investors both current and potential. Thus, decisions like up-gradation of the existing terminals, building of new terminals, development of green field airports, installation/replacement of terminal & CNS/ATS equipments, fleet expansion and man power

[29] The Group acknowledges the contribution made by Mr..D.P.Singh of AAI, Dr.S.Bhide and Dr.Parida of NCAER in the forecasting exercise

planning etc. require a clear and accurate idea about the future business prospects in the industry.

5.1.4 Effective air traffic forecast viz., passengers and cargo help in taking strategic decisions and efficient resource allocation.

5.2 Methodology and Assumptions of Air Traffic Forecast

5.2.1 The most commonly used technique to forecast demand is regression analysis. It establishes relationship between dependent and independent variables over historical data. The relationship so identified is assumed to continue into future. Based on projections of independent variable like economic growth the forecasts for demand are obtained. In this report, econometric models based on univariate (single independent variable) time series regression analysis have been used to forecast unconstrained revenue passenger growth, cargo traffic and aircraft movement for the period 2011-12 to 2031-32. Log-linear econometric model has been used, where the coefficients of the independent variables reflect the elasticity of the dependent variable with respect to the independent variable. Time series datasets that have been used pertain to financial year data.

5.2.2 While domestic GDP is the explanatory variable for forecasting domestic passenger growth, world GDP is the explanatory variable used to forecast international passenger traffic to and from India. To forecast domestic cargo and international freight traffic, domestic GDP has been used as an explanatory variable. Selection of variables is decided based on the degree of correlation observed between variables.

5.2.3 The data points used are 1990-91 to 2010-11 pertaining to financial year. The domestic passenger traffic/domestic cargo traffic in this section unless otherwise mentioned relates to passenger/carried[30] by Scheduled Carriers from India and similarly the cargo carried by domestic carriers. As far as the airlines are concerned it is the passenger carried which is a relevant parameter for them as their load factor is based only on passenger carried. Similar is the case with International passenger/carried. Aircraft Movement has also been forecasted for

[30] Carriers are concerned with Revenue Passengers Carried, which means the number of passengers carried by the airline on which the airline has earned revenue.

both scheduled domestic and international carriers using domestic GDP. This has implications for safety assessment that is required to be done.

5.2.4 AAI datasets on air passenger and cargo traffic are available from the year 1995-96 onwards. For our analysis DGCA datasets have been taken as they are available for a longer time horizon i.e. from the year 1990-91 onwards till 2010-11. Thus, DGCA datasets from the year 1990-91 have been taken for forecasting purposes as it is also considered to be normal period for time-series analysis. Also, DGCA separately records the data on scheduled and non-scheduled passenger and cargo traffic whereas AAI records air passenger traffic for both the segments jointly.

5.2.5 Hence, DGCA data has been used to forecast scheduled and non scheduled passenger traffic separately. The availability of DGCA data in context of non-scheduled air traffic is for the period 1993-94 to 2009-10. Cargo data includes both freight and mail data. With respect to forecasting International cargo, DGCA data so used pertains to the period 1990-91 to 2001011, however, it includes only International Freight data as the documentation of data with respect to International Mail has been started since 2010 January only. This would not amount to under coverage of data as International Mail data constitutes only 0.5% to 1% of the Total International Cargo.

5.2.6 With respect to forecasting scheduled Aircraft Movement, AAI data is used for the period of 1995-96 to 2010-11 as data on scheduled international aircraft departure is not available with DGCA. The forecasts have been carried out only for scheduled aircrafts as the data exhibited weak relationship between non-scheduled aircraft movement and GDP in both domestic and international segment.

5.2.7 The time series data on domestic real GDP at factor cost used for forecasts is sourced from Economic Survey 2011-12, Government of India. For the purpose of forecast, the Indian GDP growth rate is assumed to range from 8.5% in the near term to 6% in the long term on an average as the expected scenario in the period 2011-12 to 2031-32. Time series data on International GDP or world GDP (at constant US$ at 2000 prices) for the period 1990-91 to 2010-11 to forecast international passenger traffic and aircraft movement has been taken from WDI (World Development Indicators, World Bank) website. The International GDP growth rate

assumed is 3.25% in the near term and 3% in the long term as the likely scenario keeping in line with the IMF expected GDP growth rates.

5.2.8 The econometric model to compute elasticity for scheduled international passenger traffic with respect to world GDP has been run on various data combinations and in all the cases it was observed that international passenger traffic is highly sensitive to global GDP to the tune of 3.1.This means that a small change in world GDP will bring about a sharp change in international passenger traffic i.e. passenger traffic is highly sensitive to any change in world GDP. Elasticity of domestic passenger to domestic GDP is 1.5. This is much lower than the income elasticity seen in the case of International passenger traffic signifying that there could be other factors at work such as the affordable price levels for air travel prevailing in the domestic market during the last few years.

5.3 GDP Elasticities by other agencies

5.3.1 GDP elasticities arrived at by various studies at different points of time have been compiled by ICAO[31] and are given in Table 12. GDP elasticity derived for Domestic passenger forecast for India is very much within the range observed for various countries.

Table 12: Estimates of Income and Price Elasticities of Passenger Demand by ICAO

Study	Traffic Variable	Income-type variable	GDP elasticity
Mexican airline study	Domestic	GDP less oil exports	2.4
Australian international travel	Leisure, Australians	Income per capita	2.4
	Leisure, visitors	Income per capita	2.5
Boston/Logan Airport	Domestic	Regional Income per capita	1.5
	International	Regional Income per capita	1.7
European airports	Short-haul leisure	Consumption	2.3
	Long-haul leisure	Consumption	2
Canadian airline study	Domestic, non-business	Income per capita	1.4
	International	Income per capita	1.4
ICAO global study	World scheduled	GDP	1.8

[31] ICAO Document 8991, AT/722/2; Manual on Air Traffic Forecasting; Second Edition-1985, Page 38

ICAO Asia/Pacific Study	International scheduled		
	Low-income states	GDP	1.3
	Medium-income states	GDP	1.7
	High-income states	GDP	1.5
ICAO Latin American study	International scheduled		
	South America	GDP	1.9
	Central America	GDP	1.7

Source: ICAO; Analysis: MoCA

5.3.2 The forecasting exercise has been carried out using various econometric models, for different time-lines and using data from different sources viz. DGCA, AAI. It was observed that the model for forecasting Passenger and Cargo carried that fits best is the one for the period 1990-91 to 2010-11, to reflect relationship between GDP and air traffic.

5.3.3 Estimates from the time series modelling exercise have been adjusted for autocorrelation. The income elasticities so obtained is assumed to hold good for the period for which traffic demand has been forecasted. However, the model and the stability of the relationship so obtained is subject to impact from other factors like structural changes (change in composition of traffic), behavioural shifts in response to external shifts etc. Thus, factors other than real economic output like historical airfare have a bearing on air traffic; however, they have not been included as systematic aggregated data required for such an analysis is unavailable.

5.4 Air Traffic Forecast for Indian Aviation

5.4.1 Results of Air Passenger Traffic Forecasts

5.4.1.1 Domestic air traffic that would be carried by Scheduled Carriers in India in 2020-2021 is set to cross 159 Million Passengers as against 54 Million in 2010-11 suggesting a growth of approximately three times the present traffic in ten years. In fact Domestic Passengers carried grew 3.9 times during the previous decade i.e. 2000-01 to 2010-11. International passengers to and from India by 2020-21 will be 92 Million implying a growth of about 2.4 times the traffic of 38 Million in 2010-11.

5.4.1.2 The decade 2000-01 to 2010-11 witnessed a growth of 2.7 times in international segment. Forecast for 2031-32 suggests that domestic air passengers to be carried in India will be 448

Million. For the same year international passengers will be 237 Million (excluding transshipment passengers). GDP elasticity of 1.5 in case of domestic passengers and global income elasticity of 3.1 in case of international passengers is applied to derive the numbers for domestic and international segments of air traffic. Domestic passenger traffic is relatively less sensitive to domestic GDP as compared to international passenger traffic to global GDP. Table 13 gives an over view of the Traffic Forecast results.

5.4.1.3 A sensitivity analysis has been undertaken; the results for the same are given in Annex III. The forecast numbers that have been used in this report pertain to the Base Case scenario. (For details on econometric model see Annex III)

Table 13: Forecast of Air Passenger Traffic (Carried)[32]

Five Year Plan	Domestic (Millions)	International (Millions)*	Total (Millions)
12th Plan (2016-17)	102.4	69.4	171.8
13th Plan (2021-22)	177.8	104.9	282.7
14th Plan (2026-27)	291.3	160.8	452.1
15th Plan (2031-32)	447.7	248.8	696.4
CAGR (%)			
12th Plan (2016-17)	11.7	10.1	11.1
13th Plan (2021-22)	11.7	8.6	10.5
14th Plan (2026-27)	10.4	8.9	9.8
15th Plan (2031-32)	9	9.1	9
2010-11 to 2020-21	11.4	9.5	10.7
2010-11 to 2031-32	10.6	9.3	10.1

Note: Resultant CAGR refers to Compounded Annual growth rates for the period from 2010-11 to the terminal years for which forecast is made

**International passengers include transshipment passengers as well. Source: DGCA, MoCA Estimates*

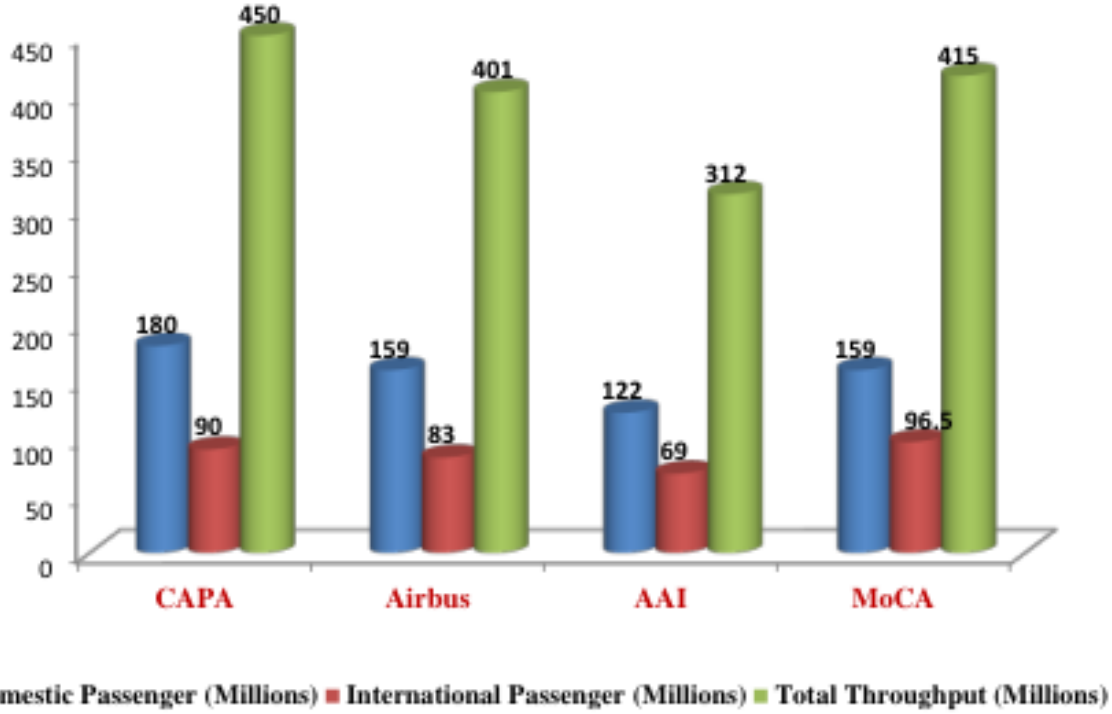
5.4.2 Comparison of results with forecast made by other agencies

5.4.2.1 Overall air traffic is set to grow at an annual average growth rate of 10.1% in the next two decades. Over the period from 2010-11 to 2020-21 the rate of growth will be 10.7%. Domestic traffic growth will be higher at 11.4% than International traffic to and from India at 9.5% for the

[32] In respect of Scheduled Carriers

next 20 years. This pattern is consistent with the long term trends noticed in India for the last 20 years i.e.1990-91 to 2010-11. Air Bus[33] Forecast made for India arrived at a growth rate of 9.8% for twenty years from 2009-2029 in respect of domestic revenue passengers which is also closer to the annual average growth rate for the period covering 2010-2030 in this exercise. CAPA[34] has forecast that 180 Million domestic and 90 Million International passengers will be there for India by 2020 (See Graph 8) which is again very close to the results shown in Table 13.

Graph 8: Comparison of Passenger Traffic Forecasts for 2020-21 across agencies[35]



Source: CAPA, Airbus, AAI, MoCA Estimates Note: MoCA's Total throughput also includes 5% Transshipment passengers

5.4.2.2 Forecasts obtained from our econometric modeling exercise are in line with the forecasts obtained by independent agencies like CAPA where the estimates correspond to the most likely scenario as exhibited in Graph 8. According to MoCA estimates, the domestic passenger carried

[33] Air bus presentation made to the Sub-Group

[34] CAPA India Aviation Outlook 2011, Center for Asia Pacific Aviation

[35] AAI estimates pertain to 2019-20. AAI forecasts have been carried out using data for a shorter period 199596 to 2010-11

would be 159 million, international passenger carried would be 96.5 million and total throughput would stand at 415 million by the year 2020-21.

5.4.2.3 Similarly, forecasts of independent agencies have been compared with those of MoCA estimates in Graph 9 for the year 2031-32. It states that the domestic passenger traffic will push the overall passenger traffic in comparison to the international passenger traffic to and from India.

Graph 9: Comparison of Passenger Traffic Forecasts for 2031-32 across agencies[36]

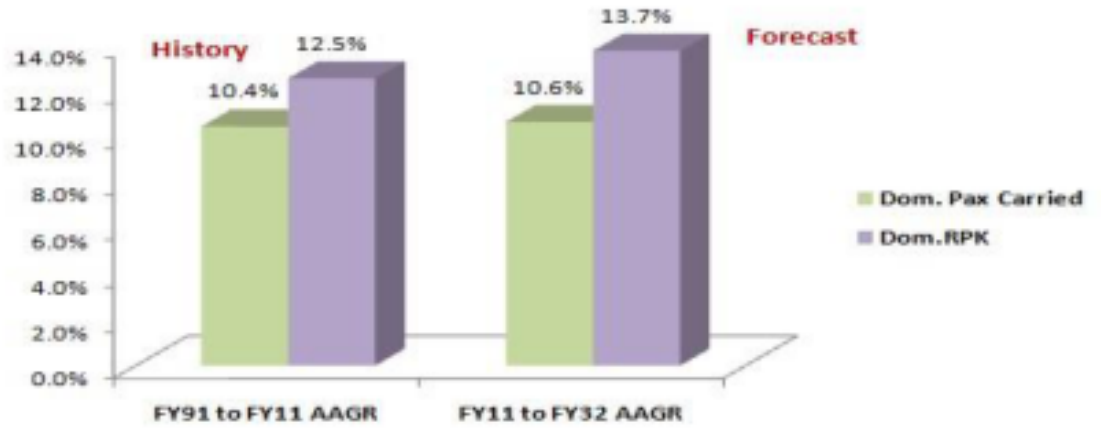
Source: Airbus, AAI, MoCA Estimates
Note: MoCA estimates include transshipment passengers as well.

5.4.3 Estimates using Revenue Passenger Kilometer (RPK)

5.4.3.1 A comparison can be made between Passenger Carried and Revenue Passenger Kilometer (RPK) in terms of their respective growth rates (as shown in Graph 10) reflecting the pattern of growth in air passenger traffic.

[36] AAI estimates pertain to 2029-30

Graph 10: Comparison of RPK and Domestic Air Passenger (Carried) growth rates[37]



Source: MoCA Estimates

5.4.3.2 Average annual growth rate of domestic passenger carried historically in the last 20 years has been 10.4% and is expected to grow at 10.6% in the next 20 years according to MoCA estimates. On the other hand, domestic RPK grew at an annual average growth rate of 12.5% in the last 20 years and is expected to grow at 13.7% in the next 20 years.

5.4.3.3 It is evident that domestic RPK has grown in the past and is expected to grow at a faster rate in future in comparison to domestic passenger carried indicating that passenger traffic growth alone will not reflect the actual utilization of air transport during a phase when market is growing. Newer areas of growth in context of air traffic have emerged in the last 20 years and in the next 20 years newer regions are expected to emerge.

5.4.3.4 With newer destination pairs being added aggressively by airlines especially in Tier II and Tier III markets, faster growth in domestic passenger carried due to affordability of air transport, rising personal disposable income and growing urban young middle income population will push up the growth rate in domestic RPK. Over the long haul, air travel will increasingly be the preferred mode of transport without the prospect of intermodal substitution. Such a comparison for international passenger traffic could not be carried out due to non-availability of RPK for international passengers.

[37] AAGR refers to Average Annual Growth rate

5.4.4 Results of Air Cargo Traffic Forecasts

5.4.4.1 Using econometric modeling, the domestic and international cargo traffic is forecasted as given in Table 14 keeping domestic GDP as an explanatory variable. For the forecast of air cargo traffic from 2011-12 to 2031-32, GDP growth rate assumptions are the same as the ones used for passenger forecast discussed earlier. Elasticity coefficients obtained from the econometric exercise are 1.39 for domestic cargo and 1.37 for international cargo. A sensitivity analysis has been undertaken; the results for the same are given in Annex III. The forecast numbers that have been used in this report pertain to the Base Case scenario. (For details on econometric model see Annex III)

Table 14: Forecasted Cargo Traffic Carried[38]

Five Year Plan (FYP)	Domestic (MMT)	International (MMT)	Total (MMT)
12th Plan (2016-17)	0.9	2.6	3.5
13th Plan (2021-22)	1.6	4.7	6.2
14th Plan (2026-27)	2.5	7.8	10.3
15th Plan (2031-32)	3.7	12.2	15.9
	CAGR (%)		
12th Plan (2016-17)	11.8	13.4	12.9
13th Plan (2021-22)	11.3	12.6	12.3
14th Plan (2026-27)	9.9	10.9	10.7
15th Plan (2031-32)	8.4	9.4	9.2
2010-11 to 2020-21	11.4	12.9	12.5
2010-11 to 2031-32	10.4	11.7	11.3

Source: DGCA, MoCA Estimates Note: International freight Carried includes transshipment cargo as well

5.4.4.2 Domestic cargo, international freight and total cargo traffic are set to grow at a CAGR of approximately 10-11% till the period 2031-32. Higher domestic cargo traffic is also indicative of the general health of the economy. Higher cargo volume indicates greater final consumption,

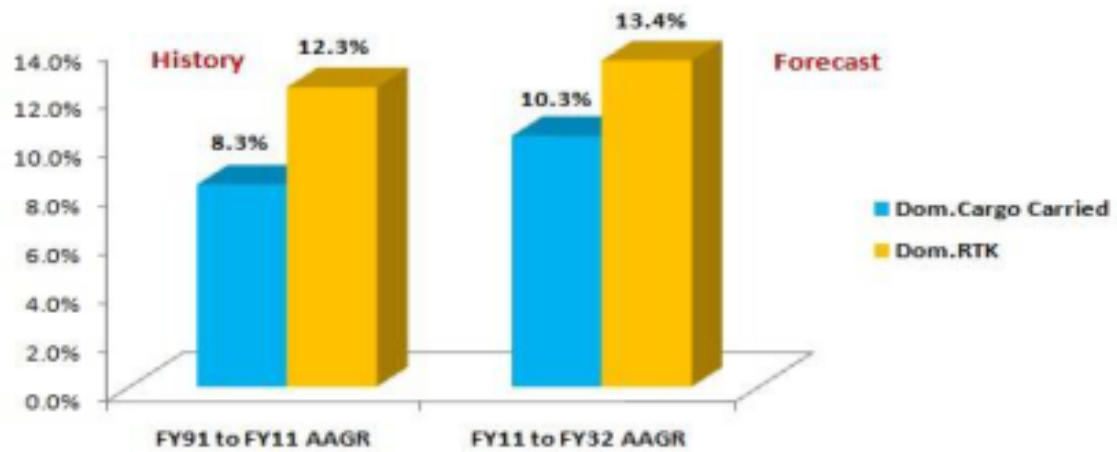
[38] In respect of Scheduled carriers

better performance of domestic manufacturing and services sector. By 2031-32, domestic cargo traffic might witness over two and half times the traffic of 2020 while the international cargo traffic will also witness over two times the traffic of 2020-21.

5.4.5 Estimates using Revenue Ton Kilometer (RTK)

5.4.5.1 Cargo Carried (counter part of passenger carried) and Revenue Ton Kilometer in terms of their respective growth rates (as shown in Graph 3) reflect the pattern of growth in air cargo traffic. Domestic cargo carried grew at an average annual growth rate of 8.3% in the last 20 years and is expected to grow at 11% in the next 20 years till 2031-32; whereas domestic RTK grew at 12% in the last 20 years and is expected to grow at 14% in the next 20 years (See Graph 11).

Graph 11: Comparison of growth rates of Cargo Carried and RTK forecast (%)

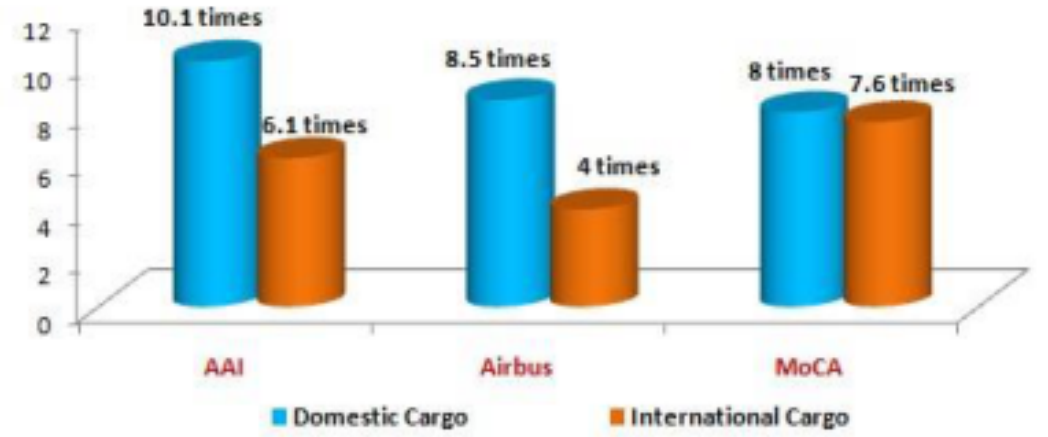


Source: MoCA Estimates

5.4.6 Comparison of results with forecast made by other agencies

5.4.6.1 Comparison between forecasts obtained by MoCA and other independent agencies as exhibited in Graph 12 suggests that MoCA estimates on Cargo forecast are in line with other such forecasts. It is expected that domestic cargo will grow by 8 times during the period 200910 to 2031-32 from its level of 2009-10 whereas international cargo will grow by 7.6 times.

Graph 12: Cargo forecast for the 20 year period 2011-12 to 2031-32



Source: Airbus Global Market Forecast 2010-2029, AAI, MoCA Estimates

5.4.6.2 While the domestic cargo growth projections of MoCA are lower than the forecast of AAI, it is almost the same as that of Airbus. When it comes to International air cargo, MoCA estimates are closer to AAI but higher than that of the estimates arrived at by Air Bus. Boeing, another air craft manufacturer has observed in their latest forecast exercise that during the next 20 years, approximately half of the world's air traffic growth will be driven by travel to, from, or within the Asia Pacific region. Fueled by development of the region's national economies and the increasing accessibility of air transport services, traffic within the region will grow faster than traffic to and from the region.[39]

[39] Current Market Outlook 2011-2030, Boeing

5.4.7 Drivers of Cargo Traffic

- Just-in-time manufacturing coupled with global outsourcing business model pushing demand for Air cargo. Faster movement of raw materials, components, parts and spares help firms in maintaining lower inventories.
- Growth of passenger fleets would provide ample belly capacity for cargo movement both in the domestic and international segment. According to *Airbus Global Market Forecast (20102029)*, in December 2010 the passenger fleet in service stood at 322 (passenger aircraft with over 100 seats) which is expected to go up by three times by 2029 and the aircraft order in the books which stood at 280 is expected to go up by 23 times by 2029.
- Express industry is certain to grow many folds in future as they provide end to end solutions, which are fast, reliable, on demand, integrated and door to door and can be tracked and controlled throughout the journey. They also handle customs clearance and duty and tax payments for the industry.[40] Also, according to *Airbus Global Market Forecast (2011)*[41], the Indian express industry is expected to demand 110 small jet freighter aircraft (which can carry a payload of 10 to 30 tons) by 2029, which is 15.4% of the global small jet freighter aircraft demand.
- GDP growth of China and India are forecast to grow at an average of 7-9% over the next 5 years and thus China and India could be at the epicenter of supply / redistribution
- Sources of optimism arise out of the fact that Free Trade Agreement concluded by India with south-east Asian countries like Japan, Malaysia and South Korea and the Likely India-EU FTA are expected to give a big boost to improve trade between these regions
- Govt. of India's goal is to double exports from $225 Billion to $450 Billion by 2014 and the National Manufacturing Policy 2011 aims to enhance share of manufacturing in GDP to 25% by 2020 from current level of 15%

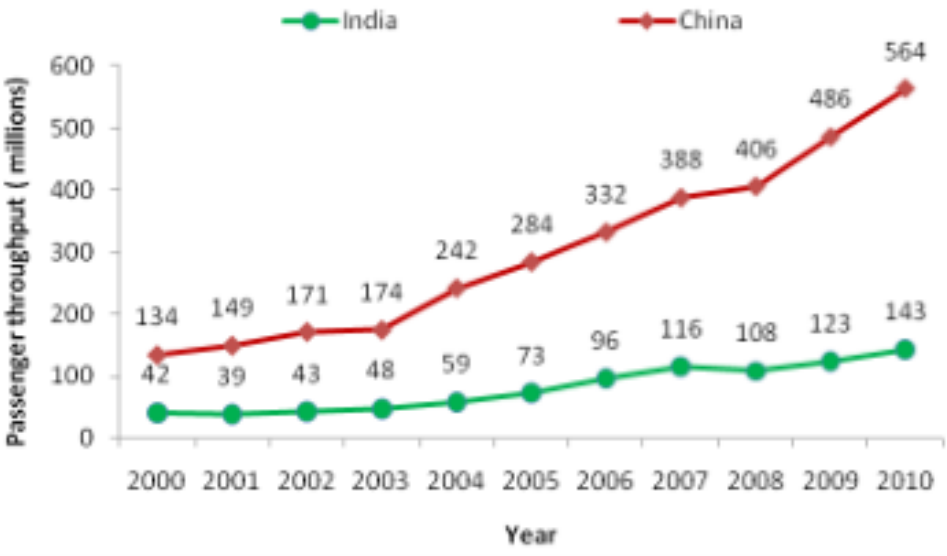
[40] Express Industry Council of India
[41] Airbus Global Market Forecast 2010-2029; Air Cargo long term forecasting : India Air Cargo Workshop; 2011

5.5 How realistic are the results of forecasts?

5.5.1 Reasons for optimism in the domestic segment have already been explained in detail in paragraphs elsewhere in this chapter. Similarly, international passenger traffic is forecast to grow at 9.3% during 2010-11 to 2020-21 and by 9.1% during 2010-11 to 2031-32. This as stated earlier is also consistent with long term historical growth rate of 9.7%. Compare the domestic passenger throughput in 2010 in China which stood at 564 million[42] (see graph 13).

Present forecast for India suggests that India will reach this level of China only by 2023-24.

Graph 13 : Comparison of Passenger throughput at Indian and Chinese airports



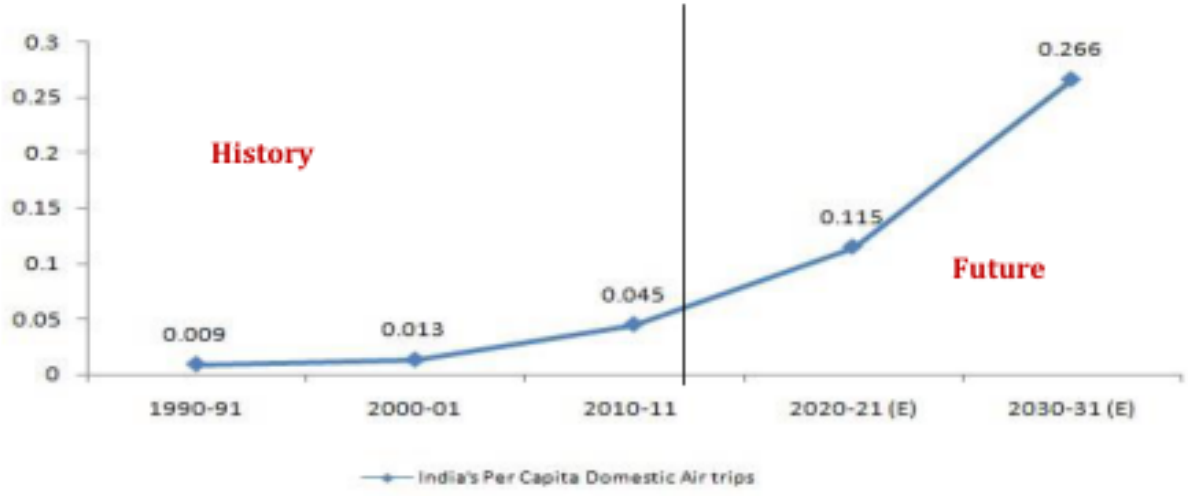
Source: CAPA

5.5.2 Assuming that India achieves the growth forecast that is being discussed here, still the per capita domestic trips for India will be only 0.115 in 2020-21 and 0.266 in 2030-31 from the current level of 0.04Per capita domestic air trips (see graph 14) . These ratios are much lower, when compared with other nations where in at present China's domestic per capita air trip stands at 0.15, Brazil's 0.25, and Malaysia's 0.54. The Indian per capita trips have been estimated assuming population forecasts of Population Reference Bureau, which expects India's population to touch 1.38 billion in 2020-21 and 1.55 billion in 2030-31.

Graph 14: India's Per Capita Domestic Air Trips[43]

[42] CAPA

[43] E refers to Estimate



Source: MoCA Analysis

5.5.3 Assuming that India achieves the forecasted level of domestic passenger volume by 2030-31, in terms of Per capita domestic air trips, it would still be marginally higher than Brazil's but lower than Malaysia's existing level.

5.6 Results of Traffic forecasts for General Aviation

5.6.1.1 Table 15 gives an account of the most likely scenario for the expected Non-Scheduled Passenger Traffic that is expected to be carried in the domestic segment for the period 201112 to 2030-31. For forecasting the Domestic Non-Scheduled Passenger Traffic, the Indian GDP has been used as an explanatory variable, where its growth rate assumption ranges from 8.5% in the near term to 6.5% in the long term on an average. A sensitivity analysis has been undertaken; the results for the same are given in Annex III. The forecast numbers that have been used in this report pertain to the Base Case scenario. (For details on econometric model see Annex III)

Table 15: Forecast of Non-Scheduled Domestic Passenger Traffic (Carried)

Five Year Plan	Domestic (Millions)	CAGR (%)
12th Plan (2016-17)	2.5	7.5
13th Plan (2021-22)	3.5	6.9
14th Plan (2026-27)	4.6	5.9
15th Plan (2031-32)	5.8	4.9

2010-11 to 2020-21	-	7.2
2010-11 to 2031-32	-	6.6

Source: DGCA; Analysis: MoCA

5.6.2 By the year 2020-21, the domestic Non-Scheduled Passenger segment is expected to witness 3.2 million passengers with a CAGR of 7.2% from the year 2010-11. Today business jets are no longer seen as a luxury but as a tool for enhancing productivity. Tourism is another key growth driver for general aviation in India. The helicopter market in India is equally promising, with growing requirements in tourism, mining, corporate travel, air ambulance, homeland security etc. In the next 20 year period i.e. by 2031-32 the domestic NonScheduled passenger segment is expected to witness 4 million passengers at a CAGR of 6.6% from the year 2010-11.

6 Review of Airport Sector Performance

6.1 Brief Overview

6.1.1 The Indian Airport sector has been one of the most dynamic spheres of investment in the last 7 years among infrastructure sectors. This sector witnessed a shift from being completely government owned sector to a PPP framework during this time. Due to airports' inherent nature of being highly capital intensive, it increasingly became difficult over the period for the government to bring forth the necessary investment for large scale modernization and expansion of airport infrastructure. Therefore, private participation was encouraged with the implementation of PPP policy framework.

6.1.2 Airport Authority of India controls 125 airports in the country of which 84 are operational. In addition to these, there are 6 Joint Venture (JV) airports under the PPP framework and these are: Mumbai, Delhi, Hyderabad, Benguluru, Nagpur and Cochin airports. Further, there are 8 airports, which are either completely privately owned or owned by State Governments and these are: airports in Jamshedpur, Latur, Lengpui, Mundra, Nanded, Baramati, Puttaparthy and Vidyanagar

6.2 Passenger throughput at Indian Airports

6.2.1 Passenger throughput at Indian airports during 2010-2011 is placed at 144 million (See Table 16). Of which 106 Million or 74% were domestic passengers and the rest constituted International passengers. The percentage of Domestic passengers to the total passenger throughput at Indian Airports has gone up from 68% in 2004-05 to 74% in 2010-11 implying faster growth of domestic as compared to international passenger throughput. This trend is also reflected in the growth analysis using CAGR. [44]. In terms of CAGR, the maximum growth has been witnessed in the domestic segment in the last 6 years growing at 18% approximately (approx.) followed by the growth in International segment at 12% approx.

6.2.2 As discussed elsewhere in this report, International Passenger traffic is also a function of a number of factors the most important of which is the policy of granting traffic rights under the Bilateral agreements on a reciprocal basis.

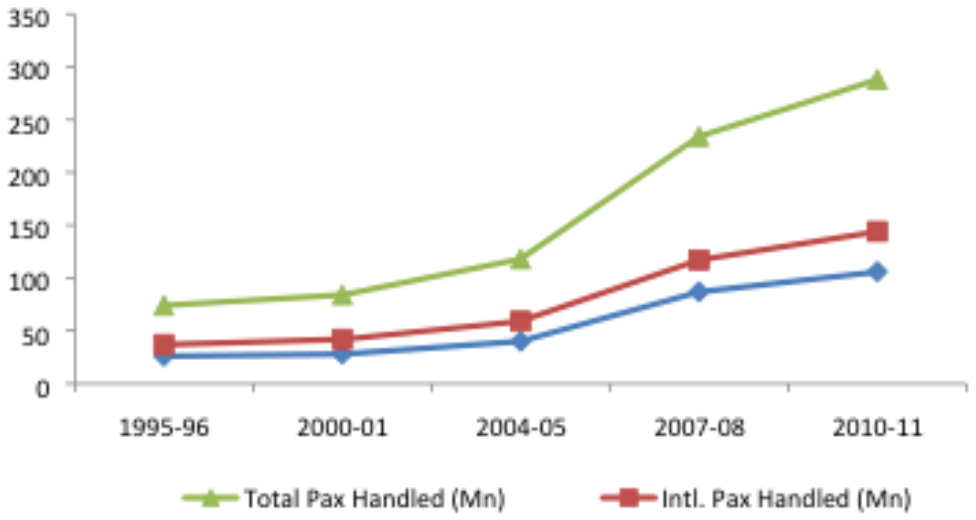
[44] AAI was set up in 1995-96, hence, data collection has been undertaken from that year only.

Table 16: Passenger throughput at Indian Airports (Millions)

Year	Passenger Handled (in Millions)		
	Domestic	**International**	Total
1995-96	26	11	**37**
2004-05	40	19	**59**
2010-11	106	38	**144**
	CAGR (%)[45]		
(1995-96 to 2004-05)	4.9	6.3	**5.3**
(2004-05 to 2010-11)	17.6	12.2	**16**
(1995-96 to 2010-11)	**9.8**	**8.6**	**9.5**

Source: AAI; Analysis: MoCA

Graph 15: Passenger throughput at Indian Airports over last 15 years (Millions)



[45] CAGR refers to Compounded Annual Growth Rate

Source: AAI; Analysis: MoCA

6.2.3 As is evident from Graph 15, the points of inflexion are clearly coinciding with the policy initiatives undertaken by the Government in regard to airport infrastructure, modernization and expansion of existing airports.

6.3 Cargo throughput at Indian Airports

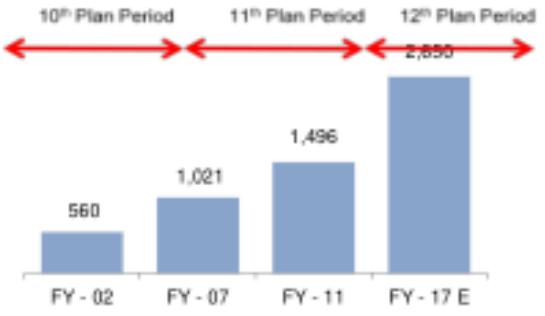
6.3.1 Cargo throughput at Indian Airports during 2010-11 is placed at 2.34 Million Metric Tonnes. India's impressive growth in international and domestic trade over past few years has augured well for the air-cargo industry in India. Economic activity as measured by its GDP has been the prime driver for the air cargo traffic growth in India. Indian government adopted "Open Sky" policy in early 1990s, under which Indian or foreign carriers were allowed to operate scheduled and non-scheduled cargo services to/from any airport in India.

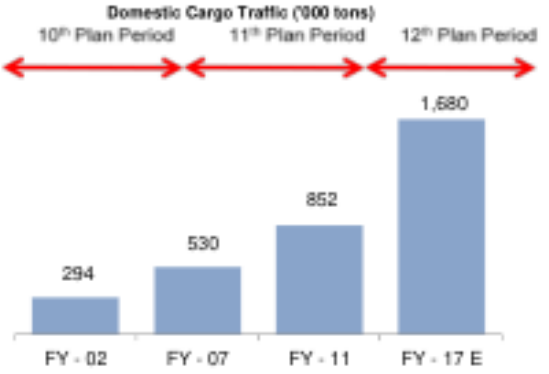
6.3.2 The period since the adoption of open skies policy, has seen a strong growth in international air cargo traffic, which increased from about 0.68 MT in 1996 to 2.33MT in 2011 [46]. The increase in cargo traffic can be attributed to a sizeable growth in scheduled services operated by Indian and foreign airlines. Total freight traffic handled by Indian airports increased at a CAGR of ~ 11 % in last five years to reach 2.33 MMTPA[47] by 2011. Domestic cargo, buoyed by increasing domestic trade, has grown at a faster pace of 11.6 %, as compared to international cargo at 10.3 %.

Graph 16: Cargo throughput for all Indian Airports ('000 Metric Tonnes)

[46] Source: AAI

[47] MMTPA refers to Million Metric Tonne Per Annum





Source: Report of Working Group on Civil Aviation for formulation of 12th Five Year Plan (2012-17)

Review of Airport Sector Performance

In terms of CAGR as evident from Table 17, in the entire period 1995-96 to 2010-11 the domestic cargo throughput at Indian airports grew by approximately 10%, international cargo throughput grew at 8.2% and total cargo grew at approximately 9%.

Table 17: Cargo throughput at Indian Airports

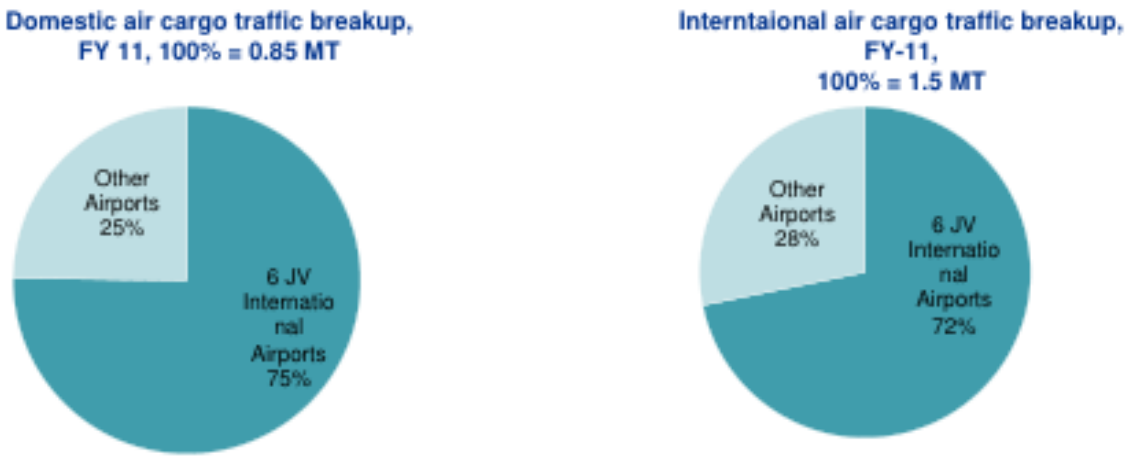
Year	Cargo Handled (in '000 Metric Tonnes)		
	Domestic	International	Total
1995-96	222	458	680
2004-05	490	831	1321
2010-11	888	1504	2391
	CAGR (%)[48]		
(1995-96 to 2004-05)	9.2	6.8	7.7
(2004-05 to 2010-11)	10.4	10.4	10.4
(1995-96 to 2010-11)	9.7	8.2	8.7

Source: AAI; Analysis: MoCA

6.3.3 International cargo, which accounts for two-thirds of the total cargo handled, is mainly concentrated at metro airports of Mumbai, Delhi, Chennai, Bangalore and Hyderabad. Delhi and Mumbai airports alone handle around 50 % of India's total domestic and international cargo.

[48] CAGR refers to Compounded Annual Growth Rate

Graph 17: Domestic air cargo (MT) handled by metro and non-non metro airports



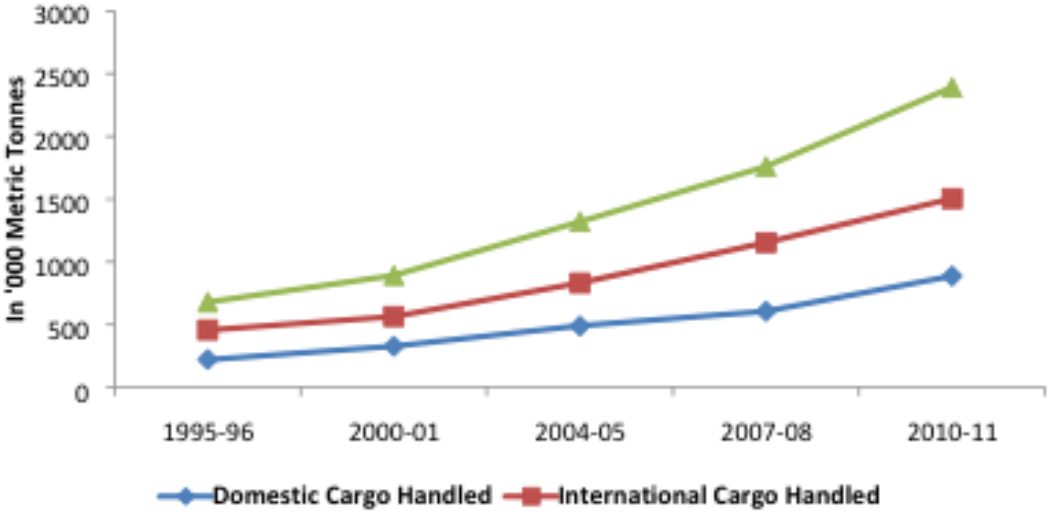
Source: AAI, Report of Working Group on Civil Aviation for formulation of 12th Five Year Plan (2012-17)

However infrastructure woes and regulatory hurdles have limited the latent growth potential of the Indian air cargo industry.

6.3.4 The average weight load factor of air cargo during the last 5 years was around 62%, reflecting significant unused capacity. Air cargo has also not been able to grow at the same pace as some of the other transport modes, primarily marine-cargo segment. The five year CAGR of air-cargo at ~11 % is lower than the growth rate of India's overall exports and imports which grew by around 15% and 18% over the same period. The air cargo sector has tremendous room to make further headway.

6.3.5 The current share of air-cargo compared to other modes of cargo-transportation is still low in India. The air cargo volume of all Indian airports put together is less than that handled by individual airports like Hong Kong, Memphis, Shanghai, Incheon, Anchorage and Paris. This bears testimony to the significant opportunity that lies ahead, if the cargo sector gets its infrastructure, processes and policies in place.

Graph 18: Trends in Cargo throughput at Indian Airports



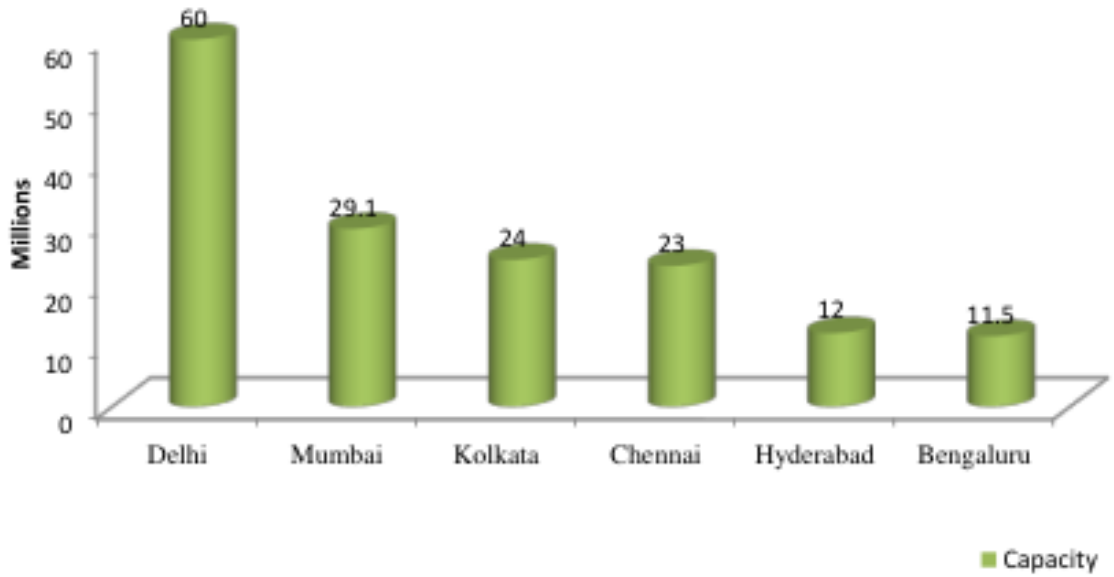
Source: AAI; Analysis: MoCA

6.4 Capacity at Indian Airports

6.4.1 Major airports have been defined as those airports which have or are designed to have annual passenger throughput in excess of one and a half million or any other airport as the Central Government, may by notification specify as such[49]. There are 15 Major Airports in India namely Delhi, Mumbai, Chennai, Bengaluru, Kolkata, Hyderabad, Cochin, Ahmadabad, Goa, Trivandrum, Guwahati, Jaipur, Calicut, Lucknow and Pune. Some of them located in metropolitan cities are referred to as metro airports namely Delhi, Mumbai, Hyderabad, Bengaluru, Chennai and Kolkata.

6.4.2 These 6 airports have the capacity to handle 78.6% of the total Indian passenger traffic handling capacity created in Indian airports. Out of these, Delhi, Mumbai, Hyderabad and Bengaluru are JV airports whereas Chennai and Kolkata are AAI airports. The capacity of these airports as on date has been exhibited in decreasing order in Graph 18. The data for all the other Major airports has been given in Table 19 later.

Graph 19: Existing Metro Airport Capacity in terms of Passenger Throughput[50]



[49] Aiport Economic Regulatory Authority of India Act, 2008

[50] Total refers to the total passenger handling capacity of the mentioned 6 airports

Source: AAI, respective JV airports; Analysis: MoCA

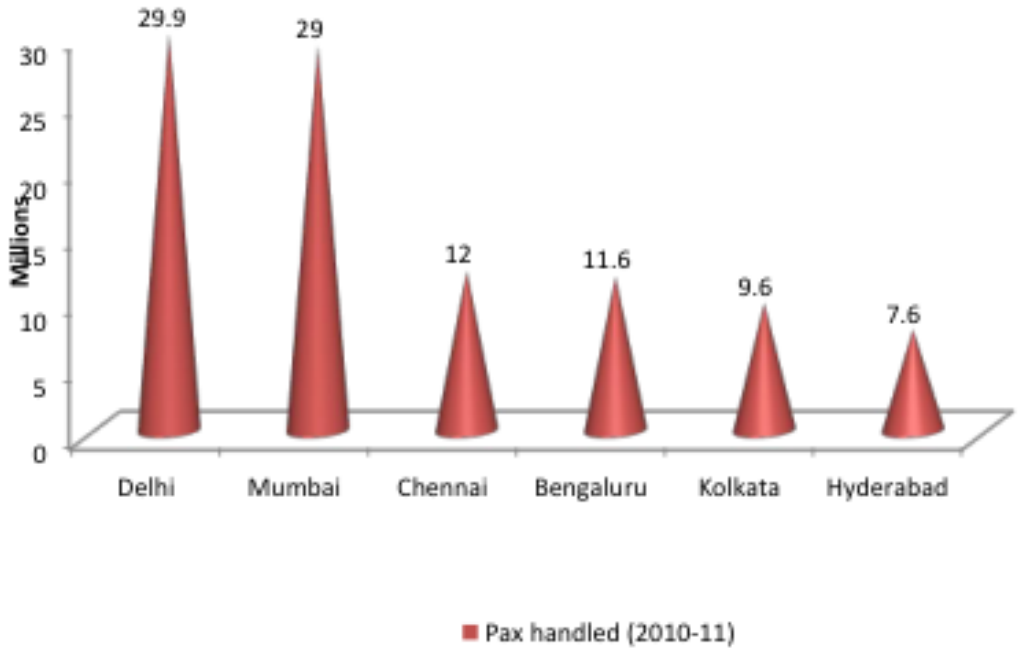
6.4.3 Graph 19 indicates that out of all the metro airports, Delhi has the highest capacity to handle passengers amounting to 60 million passengers per annum, followed by Mumbai, Kolkata, Chennai, Hyderabad and Bengaluru in that order. Cumulatively, all these 6 metro airports have 78.6% of the total passenger handling capacity in India, the rest being with non-metro airports. The total capacity of all these 6 metro airports is 160 million passengers. The passenger handling capacity at all the 15 major airports taken together is 180 million passengers which is approximately 89% of the total capacity to handle passengers at all Indian airports. Total capacity to handle passengers at all Indian airports stood at 210 million passengers in 2010-11.

6.5 Passenger throughput at the Metro Airports

6.5.1 The actual passenger handled at metro airports in 2010-11 can be seen from Graph 19. The graph shows that the passengers handled are the highest at Delhi airport followed by Mumbai, Chennai, Bengaluru, Kolkata and Hyderabad. This amounts to 70% of the total passenger handled at Indian airports. Also, amongst Metro airports, bulk of the passenger traffic is on the Delhi-Mumbai route i.e. approximately 41% of the total passenger traffic across all Indian airports and 59% of the total Metro airports traffic.

6.5.2 Graph 19 is also a reflection of the fact that non-Metro Airports in Tier II and Tier III cities constituting the remaining 30% of the passenger traffic are an untapped future market potential in terms of high passenger traffic growth. The total passenger handled at these airports in 2010-11 stood at 100 million passengers (70% of the total traffic handled at all Indian airports cumulatively). The traffic handled at all the major airports (15) taken together stood at 124 million passengers constituting 86% of the total passenger traffic handled by all Indian airports taken together. Total number of passenger throughput at all Indian airports taken together was 143 million passengers.

Graph 20: Passenger throughput at Metro Airports



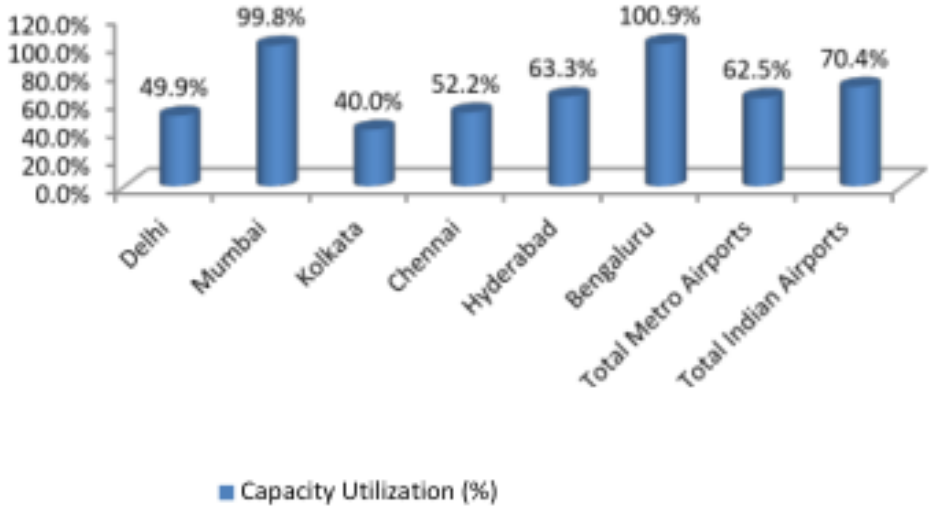
Source: AAI, respective JV airports; Analysis: MoCA

6.6 Terminal Capacity Utilization at Metro Airports

6.6.1 Terminal capacity utilization at the above mentioned major airports is exhibited in Graph 21, which has been calculated by dividing the passenger handled in a year by the capacity of the particular airport. Graph 20 shows that at Delhi airport capacity utilization has been 50% approximately, indicating that the additional capacity at Terminal 3, whose operations commenced in 2010-11 is yet to be fully utilized. The capacity utilization at Chennai and Hyderabad airports is above 50% as the passenger traffic is high and additional capacity for handling passengers is at various stages of deployment or planning.

6.6.2 However, capacity utilization at Mumbai and Bengaluru airport is 100% and 101% respectively, which means that the existing capacity is under tremendous stress and the passenger traffic to be handled is much beyond its capacity.

Graph 21: Terminal Capacity Utilization in the Indian Airport sector



Source: AAI, respective JV airports; Analysis: MoCA

6.6.3 Also, the terminal capacity utilization for all Metro airports stood at 62.5% and for all Indian airports at 70.4% reflecting that there is still potential for passenger traffic growth at the non-metro airports for effective capacity utilization. The following Table 18 gives a list of all major airport terminal capacity, passenger traffic handled and capacity utilization for the year 2010-11.

Table 18: Annual terminal capacity and Passenger throughput in 2010-11 at all Major Airports

S. No.	Major airports	Annual Capacity (million)	Passenger traffic handled (million)	Capacity utilization (%)
1	Mumbai	29.07	29	100%
2	Delhi	60	29.94	50%
3	Chennai	23	12.05	52%
4	Bangalore	11.5	11.59	101%
5	Kolkata	24.1	9.63	40%
6	Hyderabad	12	7.60	63%
7	Cochin	5	4.34	87%
8	Ahmedabad	4.02	4.04	101%
9	Goa	3.23	3.08	95%
10	Trivandrum	1.79	2.53	141%
11	Guwahati	1.15	1.93	168%
12	Jaipur	1.16	1.66	143%

13	**Calicut**	1.85	2.06	111%
14	**Lucknow**	1.21	1.58	130%
15	**Pune**	1.12	2.81	251%

Source: AAI; Analysis: MoCA

6.7 Non-Metro Airports

6.7.1 AAI undertook up gradation and modernization of 35 non-metro airports in India at an estimated expenditure of Rs 4,500 crores. Of these 35 airports, 26 have already been developed while remaining is likely to be completed by end of financial year 2011-12[51]. These non-metro airports are important from the point of enhancing regional connectivity and development of regional hubs. Some of them are major tourist destinations and business hubs as well.

6.8 Greenfield Airports

6.8.1 The Govt. of India has accorded in principle approval for 15 Greenfield airports which are at various stages of development, while several others are under due consideration. These airports are expected to improve connectivity with underserved and unserved regions of India and air in propelling development in Tier 2 and tier 3 cities. In order to enhance regional air connectivity in the Northeast, AAI has almost completed the construction of a Greenfield airport at Pakyong (Sikkim) at an estimated cost of Rs. 309 crores while two other airports Cheithu (Nagaland) and Itanagar (Arunachal Pradesh) are at various stages of development. The other Greenfield airports are given in Table 19.

6.8.2 The Greenfield airports are mostly being set up via PPP route wherein a Joint Venture is established between private promoters and State Govt. promoted company or State govt. or AAI.

Table 19: List of approved Greenfield Airports

Airport	Airport
Navi Mumbai, Sindhudurg , Shirdi (Maharashtra)	Mopa (Goa)
Kushinagar (Uttar Pradesh)	Dabra (Madhya Pradesh)
Kannur (Kerala)	Paladi Ram Singhpur, Saras (Rajasthan)

[51] Report of the Working group on Civil Aviation for formulating of 12th Five Year Plan (2012-17), Ministry of Civil Aviation, Govt. of India

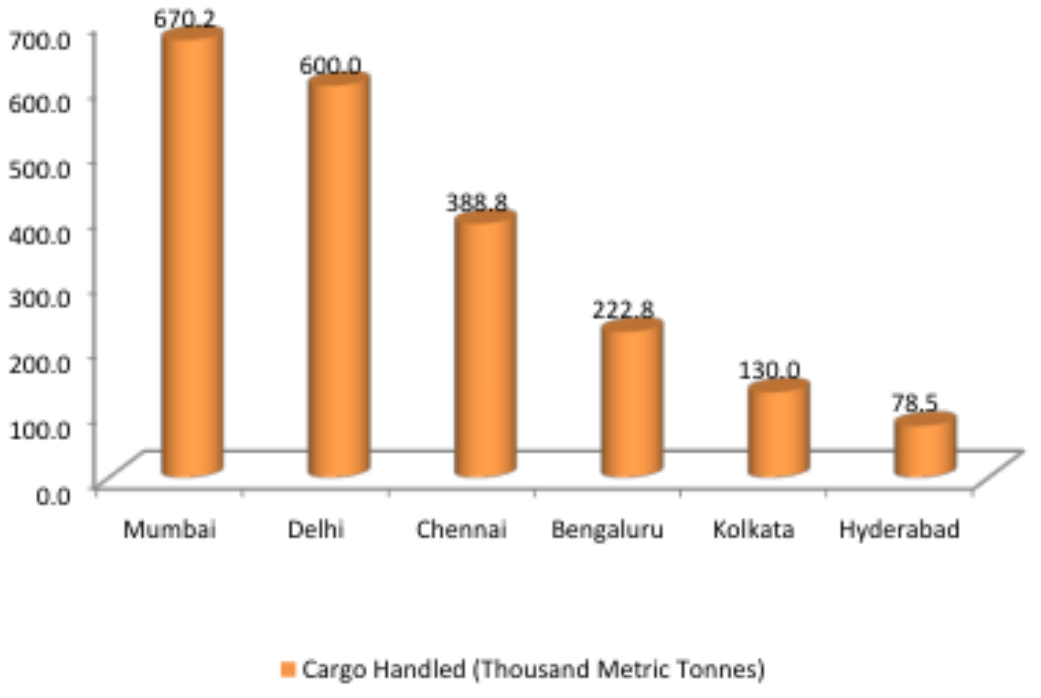
Bijapaur,Simoga, Hassan, Gulbarga (Karnataka)	Karaikal (Puducherry)
Durgapur Aerotropolis (West Bengal)	Ludhiana Aerotropolis (Punjab)

Source: MoCA

6.9 Cargo throughput analysis for Metro Airports

6.9.1 The cargo handled at the 6 metro airports for the year 2010-11 stood at 2.1 Million Metric Tonnes. This was 89% of the total cargo handled at all the airports in India taken together.

Graph 22: Cargo throughput across 6 Metro Airports



Source: AAI; Analysis: MoCA

6.10 Air Traffic Forecast in terms of throughput-An analysis

6.10.1 For purposes of Investment what is of significance is Passenger throughput handled at the airports and not revenue passenger carried by respective airlines, which has been discussed earlier in the report. Passenger handled at the airport is roughly twice the revenue passenger

carried by airlines in case of domestic passengers and in case of international passengers, 5% adjustment is made to the international revenue passenger carried figures in respect of transshipment passengers.

6.10.2 In order to arrive at the capacity requirement and investment requirement at airports, it is imperative to arrive at the forecasts of passenger and cargo through put. Table 20 gives an account of the passenger that is expected to be handled at Indian airports in the next 20 years using econometric analysis.

Table 20: Forecast of Passenger throughput at Indian airports in the next 20 years

Five Year Plan	Domestic (Millions)	International (Millions)*	Total (Millions)
12th Plan (2016-17)	204.8	69.4	274.1
13th Plan (2021-22)	355.5	104.9	460.4
14th Plan (2026-27)	582.7	160.8	743.5
15th Plan (2031-32)	895.3	248.8	1144.1
CAGR (%)			
12th Plan (2016-17)	11.7	10.1	11.3
13th Plan (2021-22)	11.7	8.6	10.9
14th Plan (2026-27)	10.4	8.9	10.1
15th Plan (2031-32)	9	9.1	9
2010-11 to 2020-21	11.4	9.5	11
2010-11 to 2031-32	10.6	9.3	10.3

Source: MoCA Estimates

Note: Plan data reflects data of the terminal year of that particular five year plan. International passenger includes transshipment passenger as well

6.10.3 It is expected that by 2020-21 the total passenger handled will increase 3.3 times at a CAGR of 11.4% and by 2031-32 it is expected to increase more than 8.3 times at a CAGR of 10.6% from 2010-11 levels. Over the period the highest growth is expected to be witnessed in the domestic passenger throughput segment as compared to the international segment largely on account of untapped market potential.

6.10.4 Table 21 gives an account of the cargo that is expected to be handled at the Indian airports. From the table we can see that the total cargo handled by 2020-21 will increase by approximately 3 times at a CAGR of 12.5% and by 2030-31 it will increase by approximately 7.9 times at a CAGR of 11.2% from 2010-11 levels.

Table 21: Forecast of Cargo throughput at Indian airports in the next 20 years

Five Year Plan	Domestic (MMT)	International (MMT)*	Total (MMT)
12th Plan (2016-17)	1.8	2.6	4.4
13th Plan (2021-22)	3.1	4.7	7.8
14th Plan (2026-27)	5	7.8	12.8
15th Plan (2031-32)	7.5	12.2	19.7
		CAGR (%)	
12th Plan (2016-17)	11.8	13.4	12.9
13th Plan (2021-22)	11.3	12.6	12.3
14th Plan (2026-27)	9.9	10.9	10.7
15th Plan (2031-32)	8.4	9.4	9.2
2010-11 to 2020-21	11.4	12.9	12.5
2010-11 to 2031-32	10.3	11.5	11.2

Source: MoCA Estimates Note: Plan data reflects data of the terminal year of that particular five year plan. International cargo includes transshipment cargo as well

7 Investment requirements and related issues

7.1 Overview

7.1.1 Assessing the Investment requirements for creating capacity to meet the expected growth in demand for passenger and cargo traffic in the Indian aviation market is the next step in the analysis. Significant and continuous investment is required to be made in the Civil Aviation sector to ensure that the growth in air traffic is managed safely and efficiently. It may be recalled that the basic rationale of opening up of certain sectors to competition has been to cater to the enormous size of investments required for a growing economy and the need to bring in cutting edge technology and the associated best practices of the industry.

7.1.2 This position continues to hold good even today in view of the phenomenal growth in the air traffic being witnessed and more so for meeting the future requirements for the next decade and thereafter. Going forward, air traffic growth will be strong and sustained which will in turn drive the investment requirements for air port infrastructure, including Air Navigation Services related infrastructure, air line industry, general aviation, training academies, MRO, Ground handling, building capacity in the regulatory bodies etc.

7.1.3 By 2020, Indian Aviation market will reach third position in the Global Ranking in terms of size of the Industry next only to USA and China. Aviation infrastructure needs to be developed to facilitate unconstrained growth of the aviation market. Not only the investment requirements have to address the existing capacity constraints in various airports but also should address requirements in the context of growth scenario forecast for the next decade and thereafter.

7.2 Airport Infrastructure

7.2.1 Until recently, development, maintenance and ownership of air port facilities in the country was vested with the Airports Authority of India. With the opening up of the airport sector for private participation, six airports are under the PPP model and these are Hyderabad, Bangalore Delhi, Mumbai, Cochin and Nagpur. Currently, 60% of air traffic is handled by airports under PPP mode and the rest by AAI airports.

7.2.2 Therefore any discussion on investment requirements for airport infrastructure should take in to account the position in respect of both AAI and JV airports from the point of view of ownership.

Another important component of the airport relates to air side infrastructure which includes runways, taxiways and apron. In all the airports of the country, AAI continues to provide Air Navigation Services which includes Communication, Navigation, and surveillance and air traffic management services. Signs of capacity shortages have already reemerged in four out of five metro airports in the country.

7.2.3 Cargo growth presently being witnessed will necessitate investment in specialized cargo terminal and equipments. Investments in Cargo terminals and other infrastructure required for carrying out cargo operations in the airports are considered quite important. Also, there is a pressing need to augment Off-Airport cargo processing facilities on the lines of Container Freight Stations/ICD so that congestion and delays in cargo terminals at airports can be reduced. Air cargo terminals attached to the airports could at the best be a transit point if availability of space is an issue. Congestion and delays in air cargo terminals in some of the major metro airports have become chronic. India's image as a reliable supplier in international markets is crucially dependent upon the performance levels of air cargo terminals in the country. Investments need to be made for up gradation/expansion of capacity and modernization of processes/systems to cater to the growing requirements. This needs immediate and effective intervention.

7.2.4 It is pertinent to note that by the financial year ending 2012 beginning from 2007, Private Airport Operators would have invested about US $ 7 billion including third party investment towards infrastructure for providing ancillary aviation services. Budgetary support from Government for investment in development of airports in remote areas and regions which need special consideration from socio economic and connectivity point of view for AAI will be part of the requirements for investment.

7.2.5 Regional airport development to cater to the emerging air traffic in Tier II and Tier III Towns may initially require budgetary support during the initial period of its operations and until such time the operations become viable. Even at present, there are only 12-13 airports of AAI that are making profit with current level of operations.

7.2.6 Thus, growth in the passenger and cargo traffic requires significant investments in terms of construction of new airports, expansion and modernization of existing airports, improvement

in connecting infrastructure (road, metro, sea link, etc.) and better airspace management. Estimates received from AAI and the industry indicate that the Indian airports would require an investment of about Rs 67,500 crores during the 12th Plan of which around Rs 50,000 crores is likely to be contributed by the private sector.

7.3 Assessment of Airport Capacity requirement by 2031-32

7.3.1 Indian airports witnessed an unprecedented surge in air passenger traffic, during last seven years. At present, 60% of passenger traffic is handled at six joint venture airports, which are under PPP model. Conversion of forecasted air traffic into capacity requirements is the first step. In order to arrive at the incremental capacity addition, a buffer of 20%, 15%, 10% & 10 % have been taken into consideration for 12th, 13th, 14th and 15th plan periods respectively to accommodate any unexpected surge in traffic. Further, the incremental traffic has been segregated in to Greenfield and 'other than Greenfield airport' to arrive at the investment estimates for both categories separately. Growth pattern of capacity in the past and other expected market developments guided such estimation.

7.3.2 During 2010-11, percentage share of passenger traffic handled at two Greenfield airports[52] was 14% of 143 MPPA collectively handled at Indian airports. However, Greenfield airports accounts for only 10% of *total capacity available* at Indian airports. Bengaluru airport had alone handled 11.5 MPPA during 2010-11, which has a capacity of 11 MPPA indicating that the available capacity has saturated. Development work of phase II has already started, which is likely to result in creation of additional 5 MPPA capacity by 2017.

7.3.3 Hyderabad airport also has plans to expand existing capacity of 12 MPPA to 40 MPPA in a phased manner. Based on such significant market developments, it is projected that, percentage share of passenger handled at Greenfield airports out of total, would indeed increase in future and by 2020 - 21 it is projected to reach up to 20%.

[52] Bengaluru and Hyderabad

Table 22: Forecasted passenger traffic apportioned among Greenfield and other than Greenfield airports (MPPA)

Plan Period	Greenfield	Other than Greenfield	Total
12th Plan (12-17)	38	236	274
13th Plan (17-22)	92	368	460
14th Plan(22-27)	149	594	743
15th Plan (27-32)	229	915	1,144

Source: MoCA Analysis

7.3.4 From Table 22 it is evident that, out of 1144 MPPA forecasted by 2031-32[53], 229 MPPA would be handled at Greenfield airports, which translates into 20 % of forecasted passenger traffic.

7.3.5 Introduction of Greenfield Airport Policy by Govt. of India, helped in attracting a large amount of investment from private sector under PPP route. This contributed to almost 70% of total investment of Rs.45, 000 crores made in airport development in the country during the last 5 years. It has been estimated that cost of creating one MPPA capacity in terms of Greenfield airports ranges from Rs. 275 - 300 crores at 2011 prices.

7.3.6 It is also opined by industry sources that Brownfield airports may entail higher amount of investment than Greenfield airports and suggestion from AAI was to consider Rs. 375 crores of investment at current market price for creating one MPPA capacity in Brownfield airport. One factor for high cost in Brownfield airport could be attributed to the fact that additional capacity has to be created at existing location / site without causing disruption to airport operations. Midcourse correction of design and development on account of changes in traffic forecast also results in higher outlays.

7.3.7 Delays on account of these reasons invariably result in delay in development work, which further escalates the cost of execution. However, it can also be argued that, Greenfield airports development involves acquisition of land. And in the current context where land acquisition is becoming complex there is an element of uncertainty which has a premium attached to it.

[53] Forecast of traffic throughput at airports is based on the forecast of revenue traffic discussed in earlier section.

7.3.8 After considering various relevant factors, cost of creating one MPPA capacity has been taken as Rs. 365 crores for Brownfield airport at 2011 prices. In order to arrive at the required capacity addition, buffer capacity (assumed at different levels as discussed earlier) has been taken into consideration for any unexpected surge in traffic.

Table 23: Total investment required in airport infrastructure development by 2031-32(Rs. Crores)

Plan Period	Incremental passenger handling Capacity (Millions)			Investment required (Rs. Crores)		
	Greenfield	Other than Greenfield	Total	Greenfield	Other than Greenfield	Total
12th Plan [54] (12-17)	18	101	119	4,925	37,044	41,969
13th Plan (17-22)	43	171	214	11,765	62,459	74,223
14th Plan (22-27)	62	249	311	17,122	90,900	108,021
15th Plan (27-32)	88	353	441	24,261	128,801	153,062
Total	211	875	1,086	58,072	319,203	377,275

Source: MoCA Analysis

7.3.9 Total investment of Rs. 3, 77,275 crores has been estimated for airport infrastructure development work by 2031-32. This investment would result in creation of additional passenger capacity of 1086 MPPA, out of which 211 MPPA will come up in Greenfield airports alone. This additional capacity will help in catering to the forecasted passenger traffic of 1144 MPPA by 2031-32 in a seamless and safe manner. Investment requirements discussed here does not include investments by third party for Cargo/ city side and CNS and ATM. There is a need for seamless coordination with other state agencies to develop ground support and logistics to provide surface connectivity. Appropriate access through road connectivity is essential part of airport infrastructure.

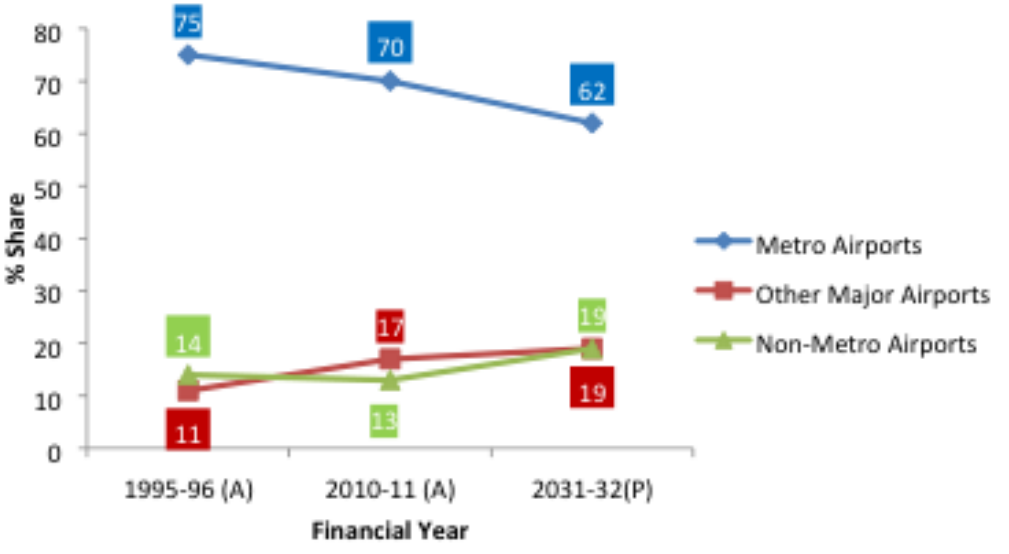
[54] Note: During the 12th Plan 17,500 crores invested is expected to come from AAI. Roughly 16,000 crores would be invested in airport development projects such as Navi Mumbai, Kannur International airport, Greenfield Airport Ahmadabad, Shirdi etc. Projected investment does not include the cost of land.

7.3.10 Delays in building road connectivity to New Bangalore airport for example resulted in negative implications for the facility during the initial stages. There is therefore a need for effective coordination between road development agencies both at the center and in the states, besides coordination with the Railway authorities to enable seamless intermodal connectivity for passengers and cargo to and from the airports.

7.4 Metro, other major and non-metro airports share in passenger throughput

7.4.1 Further analysis is undertaken to understand the pattern of dispersal of air traffic from Metro airports to Major Airports/ Non-Metro airports. Share of metro airports in total passenger throughput at Indian airports was about 70% during 2010-11. However, a shift in passenger traffic albeit a gradual one has been observed from metro to other major[55] & non-metro airports. (See Graph 23)

Graph 23: Trend in passenger throughput among metro, other major and non-metro airports[56]



Note :(A) refers to Actual and (P) refers to Projected

Source: AAI; Analysis: MoCA

7.4.2 The percentage share of traffic handled by Metro airports has declined from 75% in 1995-96 to 70% in 2010-11. Non-Metro airports have also witnessed decline in traffic by about 1% during same period. On the contrary, total passenger traffic handled at Other Major Airports has

[55] airport exceeding passenger throughput of 1.5 million passengers per annum falls under major airport category.

[56] Numbers represent percentage share and "A" Denotes actual and "P" denotes Projected

increased by about 6% during the same period. The dispersal of passenger traffic from metro to other major is expected to continue.

7.4.3 **Factors determining such dispersal of air traffic** include

(i) Increasing congestion at metro airports

(ii) improved airport infrastructure at other major airports

(iii) Penetration of low cost carriers in to Tier II & Tier III cities

7.4.4 At present, all of the trunk routes are highly competitive. Therefore, carriers particularly Low Cost is looking for new markets beyond metros. In some of the metros, congestion is already visible and therefore discussion on development of another airport in the same city has already started. Navi Mumbai Green field Airport proposal is a case in point. Limited availability of space will be a serious constraint for expansion of existing airports in future and land availability for additional Green field airports will also be a question mark in Metros.

7.4.5 Recent trends in capacity deployment by domestic airlines suggest the preference for adopting Hub - Spoke model within the country connecting large number of Tier 2 and 3 cities with metro and major airports. However, in future airlines are expected to evolve an innovative network planning model, where regional hubs would have to be developed to increase regional connectivity. This will not only increase intra connectivity within the state but will also promote inter-connectivity among the neighboring states.

7.4.6 The expected growth in tier II and tier III cities will be consistent with the objective of setting up Low Cost Airports in these cities. Low cost airports would in likelihood have all facilities required for safe and secure airport operations provided at a fraction of the cost of establishing the conventional airports. It would be interesting to know how much a regional airport would cost to develop.

7.4.7 Recently a Greenfield airport has been developed in Gulbarga, Karnataka at a cost of Rs. 187

crores which is likely to commence operations from June, 2012[57]. Table 24 provides cost breakup of a regional airport with a runway of 2600x45m, which can handle narrow body aircraft such as A320/ B737.

Table 24: Bottom-up estimates of Cost structure of a Regional Airport

	Cost (Rs. Crores)	% age of total cost
Airside	111	63
City Side	26	15
Terminal Building	16	9
Facilitation Equipment / Services	22	13
Total	176	100

Source: Analysis MoCA

7.4.8 To proceed further, it will be useful to apportion the forecasted traffic throughput growth for the next two decades among the Metro, Other Major and Non-Metro airports based on market developments, future plans of airport developers etc.

Table 25: Forecasted passenger throughput traffic apportioned among metro, other major and non-metro airports

Plan Period	Airports (MPPA)			
	Metro	Other Major	Non-Metro	Total
12th Plan (12-17)	181	47	47	274
13th Plan (17-22)	294	83	83	460
14th Plan (22-27)	476	134	134	743
15th Plan (27-32)	709	217	217	1,144

Source: MoCA Analysis

7.4.9 The expected surge in upcoming air passenger throughput will have to be catered to by Greenfield airports (Existing and upcoming Greenfield airports) and rest through expansion and modernization of airports other than Greenfield. Government of India (GoI) has already given in-principle approval for development of 15 Greenfield airports which are likely to come up during this decade itself.

[57] Regional Airport Holding international

7.4.10 Signs of development of Greenfield airports are already visible. As on date, five airports in the State of Karnataka are being developed and are likely to be operational in a span of two - three years. Similarly, State of Maharashtra is developing a Greenfield Airport at Shirdi, with the help of Maharashtra Airport Development Company, which is also planning to develop three more airports in Maharashtra. In addition to this, five airports[58] in Maharashtra are being developed by a private company, which has entered into a 95 years of lease agreement with the state government. Airports authority of India is also developing a Greenfield airport in Pakyong, Sikkim.

7.4.11 If the objective is to create greater number of viable airports, then the policy framework must encourage and incentivize re-distribution of traffic beyond the top 10 airports. Coupled with a policy to promote regional airlines in the country, this approach could potentially benefit interior areas from participating in the growth process. Also, the development strategy for Green filed airports in non-metro areas should be have modular approach of expansion depending upon the traffic growth instead of building mega airports with huge capacity at one go.

7.5 Air Navigation Services (ANS)

7.5.1 The need to build seamless air space with augmented capacity whilst addressing challenges of implementing a safety culture, and Civil-Military cooperation will require significant and continuous investment. Air Space and Air Traffic Management infrastructure assumes critical importance in the context of the Indian Air Transport sector moving to the next growth phase. This is more and beyond physical infrastructure. Broadly, it involves deployment of equipments relating to CNS (Communication Navigation and Surveillance) and Air Traffic Management Systems. Technology being a dynamic variable, the equipment and systems of the air navigation services and the underlying technology has to match with the progress in airborne technology.

[58] Yavatmal, Nanded, Latur, Osmanabad and Baramati has been transferred to Reliance Airport Developer Pvt. Ltd

7.5.2 This is a dynamic process. Therefore there is a need for constant up gradation of the systems and the equipments that are the part of Air Navigation Services. Presently air navigation services in India are provided by Airport Authority of India.

7.5.3 Air Traffic Forecast for India suggests that the traffic both passenger and cargo by the scheduled operators and by the non scheduled operators covering general aviation and helicopters are likely to witness strong and sustained growth in the next decades to come.

7.5.4 Therefore air craft movements are also likely to grow in the future at a faster rate than that was witnessed in the past. The likely emergence of regional airlines to cater to air transport needs of Tier II and Tier III Towns and the growth of Low Cost Carriers as an important set of player in the market will no doubt hasten the pace of growth of aircraft movements. Besides this, there will be an impact of increasing over flight services on account of growth of aviation market in the neighboring region of Middle East and rest of Asia that are also growing fast.

7.5.5 AAI is gearing up to meet the challenges of rapid growth in aircraft movement. The Indian air navigation system master plan includes significant investment in modernization of airport infrastructure, up gradation of Communication Navigation Surveillance (CNS), Air Traffic Managements and Meteorological Equipment, Enhancing Manpower and Training Infrastructure and harmonization with global initiatives and regional air navigation plans. India's GPS aided GEO augmented Navigation system known as GAGAN Developed by AAI with the support of ISRO is likely to be rolled out by 2013.

7.5.6 In order to build up the required infrastructure for air navigation services in the country, significant investment is required to be made by AAI in technology, training and in augmenting skilled manpower including adequate number of air traffic controllers (ATC). Industry sources suggest that the investment required for ANS alone would be not less than US $ 7 billion for the next 5 – 6 years. Presently, there is a shortage of Air Traffic Controllers. Unless concerted efforts are taken to develop and retain adequate number of skilled manpower, sustaining the air traffic growth without having safety implications will be daunting task. Corporatization of air navigation services is expected to pave the way for raising resources towards funding the ANS infrastructure.

7.5.7 MoCA has constituted a committee for formulating the next generation ANS master plan to enhance capacity and safety levels in the face of higher air traffic movements in future. The ANS infrastructure would move towards greater integration and automation with implementation of state-of-the-art technologies.

7.5.8 The system would include a centralized Air Traffic Flow Management with networked VHF and Radars capable of providing dynamic sectors, which permits alignment with traffic pattern. Existing software and hardware infrastructure would be upgraded or replaced.

7.5.9 Table 26 provides an estimate of the investments for different five year plans in ANS infrastructure:

Table 26: Investment in ANS infrastructure services by 2031-32

Plan Period	Investment required (Rs. Crores)
12th Plan	4,400
13th Plan	1,325
14th Plan	3,400
15th Plan	5,000

Source: AAI

7.6 Airlines

7.6.1 Investments in airline industry would be primarily in the form of air craft acquisition and in training of man power. Based on the air traffic forecast, it is estimated that commercial fleet size is expected to reach 1000 from 400 today by 2020, and one thousand General aviation aircraft by 2020 including fleet renewal. Estimated investment requirement for the General aviation aircraft alone is of the order of $4 Billion.[59]

7.6.2 Anticipating significant growth in traffic, most Indian carriers have placed orders to augment their aircraft fleet. Airlines in India are expected to add around 370 aircrafts worth Rs 150,000 crores to their fleet by FY-17[6061]. As per latest estimates 1019 aircraft would be inducted by scheduled passenger airlines by 2030, which translates in to an investment requirement of Rs. 707, 000 crores at 2011 prices. Fleet size of general aviation aircraft and helicopters is forecasted to expand roughly by 2,000 in the next ten years. Study of matured aviation markets like USA suggests that general aviation plays a significant role in the expansion and growth of scheduled commercial market. Therefore it is important to note that India's future aviation growth in scheduled commercial aircraft partially depends upon the growth of general aviation sector.

7.6.3 Fleet expansion requires airlines to explore multiple funding options including capital markets, long-term borrowings and leasing etc. Two Indian carriers have already expressed their plans to raise Rs 2,500 crores each through Initial Public Offers by FY-12.

Table 27: Investment requirements for induction of Aircraft in India by 2030

Type of Aircraft	Expected number of Aircraft	Value US $ (Billions)	Value in Rs Crores
Scheduled Passenger Aircraft (> = 100 seats)	1,019	141	707,000
Helicopters*[67]	750	3	15,000
General Aviation #	1,225	10	47,500
Total	2,994	154	769,500

Source: Airbus Global market Forecast, Pawan Hans Helicopter CAPA Indian Aviation Vision 2020

[59] White Paper on Information technology for Indian Aviation, CAPA-SITA,

[60] *Report of Working Group on Civil Aviation for formulation of 12th Five Year Plan (2012-17)*

[61] * & # Pertains to 2020

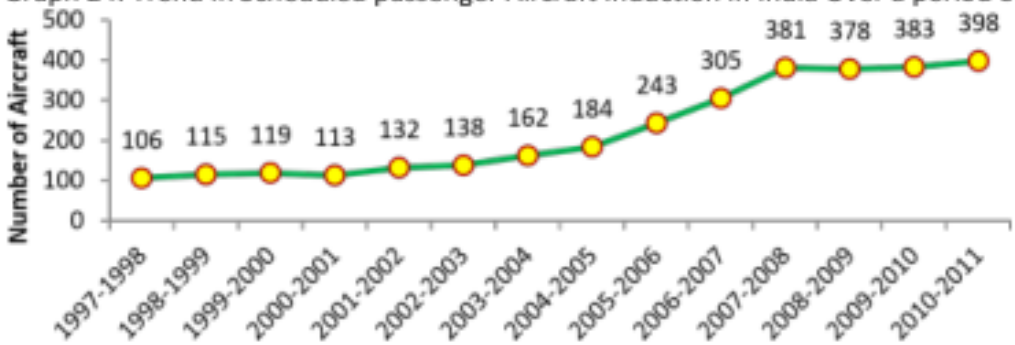
7.6.4 Multiple methods such as direct lending, operational lease, finance lease, sale-and-lease-back etc are being adopted by airlines for financing aircraft acquisitions. Of late, sales and lease back method has become popular as it allows airlines to optimize their cash flow.

7.7 Trend of Aircraft induction and pattern of aircraft ownership

7.7.1 The compounded annual growth rate of aircraft induction in India between years 1997-98 to 2010-11 was 10.7 % and 13.7 % from2004-05 to 2010-11. A steep rise can be observed (see graph 24) in aircraft induction in years during 2005-06 to 2007-08. The average year on year growth rate of aircraft induction during this period stood at 21.5%. The high rate of aircraft induction during the period could be attributed to rising demand for air travel on account of GDP growth rate of India (Average growth rate GDP was 9.5 % during the same period) and introduction of LCC in Indian skies.

7.7.2 Air travel worldwide witnessed diminished demand during 2007-08 on account of global financial crises and high crude oil prices. India was no exception to it and was badly affected and Indian carriers adopted different strategy to survive with the unprecedented situation. A fall in induction of aircraft could be observed in Graph: 24 during the same time period.

Graph 24: Trend in Scheduled passenger Aircraft Induction in India Over a period of time



Source: DGCA

7.7.3 Cyclicality of air travel demand makes it vulnerable for demand- supply mis-match. Aircraft once inducted on account of forecasted passenger traffic growth becomes liability for airlines during lean demand period.

Table 28: Aircraft ownership pattern for Full Service Carriers in India -2010

Airline	Leased	Owned	Total
Air India Limited	29	94	123
Jet Airways	58	33	91
Jet Lite	23	0	23
Kingfisher Airlines	63	3	66
Total	150	130	280

Source: World Air Transport Statistics- 2010, IATA

7.7.4 There are various methods of inducting aircraft viz. direct purchase, finance leasing, operating lease etc. with various degrees of benefits/ liability attached to each of the modes of acquisition. Table28 represents the pattern of ownership for three Full Service Carriers in India for year 2010. While Air India chose to follow the direct purchase model, Kingfisher adopted the model of Lease for inducting aircraft for operations. Legacy factors also play a major role in such decisions.. In the case of LCCs, the popular modes of air craft induction in India is leasing and not direct purchase which is evident from Table 28.

Table 29: Pattern of aircraft ownership by LCC during 2010-11

Airlines	Leased	Owned	Total
Indigo	33	5	38
Go Airlines	10	0	10
Spice Jet	27	0	27
Jet Lite*[62]	23	0	23

Source: CAPA; *World Air Transport Statistics- 2010, IATA*

7.7.1 During financial year 2010-11 LCC accounted for nearly 70% of domestic passenger traffic market share. The leased mode of aircraft induction is said to offer airlines the flexibility of rationalizing capacity with demand in the short to medium term and keep a check on average aircraft age. However, some industry analysts are of the view that this is not likely to be a

[62] *Data pertains to 2010

sustainable model in the long run. Therefore, it is difficult to predict the likely model that may be relevant for Indian market in future.

7.8 General Aviation

7.8.1 The General Aviation (GA) market in India is expected to grow at 10% per annum to cross Rs 1,600 Crores by FY-17. Industry sources indicate that around 300 business jets, 300 small aircrafts and 250 helicopters are expected to be added in the current GA fleet by FY-17. A total investment of more than Rs 20,000 crores in General Aviation is expected during the next five years alone. Today business jets are no longer seen as a luxury but as a tool for enhancing productivity. Tourism is another key growth driver for general aviation in India. The helicopter market in India is equally promising, with growing requirements in tourism, mining, corporate travel, air ambulance, homeland security etc.

7.8.2 Development of heliports: Development of heliports is important to support the growth of general aviation in India, especially in areas that cannot have runways for financial or terrainrelated challenges. There is a need to consider developing a PPP policy for development of heliports. There is also a need to develop standardized route operating procedures for helicopters.Support infrastructure: It is important to develop the supporting infrastructure at airports in Tier 2/3 cities including night-landing facilities, enhancement of passenger amenities and state support in statutory services (like security) to boost the GA industry. GA facilities at metro airports need an upgrade in terms of separate terminal, parking space, etc.

7.8.3 Upgradation of non-operational air-strips: Non-operational air strips need to be upgraded in places of economic significance such as ports, mining areas, tourist places and industrial clusters. These need to be done at the lowest possible cost without compromising on safety. The air-strip may attract a small number of GA flights initially and if it has a strong business case, it may ultimately lead to full scale operations in future, with significant benefits to the local economy.

7.8.4 Regulatory framework for equitable treatment to GA operators: With the current traffic load of scheduled flights at metro airports, GA aircrafts, at times, get a lower priority compared to

scheduled operators. Delays in takeoff and landing clearances may defeat the purpose of investments in GA aircrafts. A joint review committee should be formed by MoCA and DGCA with representation from non-scheduled and GA operators to review the existing regulatory and operational framework.

7.9 Maintenance, Repair and Overhaul (MRO)

7.9.1 Indian MRO industry is expected to triple[63] in size from Rs 2,250 crores in 2010 to Rs 7,000 crores by 2020. However, this future size may still be small compared to the present MRO industry size of other countries such as UAE (Rs 8,000 crores per annum) and China (Rs 10,000 crores per annum). India has the potential to be an MRO hub due to the growing aircraft fleet, location advantage and availability of talent. Given the growth of Indian aviation, it is logical to encourage MRO infrastructure to support the growth in the sector. Moreover, low cost carriers would also prefer servicing of aircrafts locally to save cost and time in a highly competitive market.

The following **key enablers** would be imperative for India to become a preferred MRO hub:

7.9.1.1 **Elimination of discriminatory taxation policy for domestic MRO players:** Due to discriminatory tax policy, Indian MRO players have to suffer an additional tax burden of nearly 40% over foreign MROs. These are in terms of import duties, VAT and service tax. This has led to Indian carriers taking their aircrafts, at a high cost, to other MRO locations like Dubai, Singapore, Malaysia etc, since it still works out to be more cost-effective than in India. It therefore appears that our taxation policy has actually created business for our competing countries. The resultant tax revenues in India from MRO are a fraction of what could have been. There is a need for an urgent review and reversal of this anomalous taxation policy.

7.9.1.2 **Abolition of import duties for spare parts:** Due to high import duties, (not applicable to foreign MROs) local MROs are not able to maintain an inventory of key spare parts. This at times leads to aircrafts being grounded for longer periods. Abolition or reduction of import duties for spare parts will cut short the timelines for servicing the aircrafts.

[63] Source: Ascend database

7.9.1.3 **Impetus on MRO joint ventures**: The government needs to incentivize airlines to set up their dedicated MRO hubs in India through three-way joint ventures with MRO service providers and airport companies. This assures sustained business for the venture as well as cost advantage for the airlines.

7.9.1.4 **Streamlining of licensing and security clearance procedures:** According to private players receiving approvals for an MRO establishment is extremely challenging. Currently the license is given out as a ground handler instead of an MRO player which suggests that no distinction is made between these two very distinct services.

7.9.2 In case of urgent repairs of a grounded aircraft, that may require foreign specialists to be flown in at short notice, the amount of time taken for getting security clearance for such experts is highly time consuming. This renders them ineffective since the opportunity cost of a grounded aircraft is extremely high. There is an urgent need to streamline clearance procedure so that there is a logical balance between business exigencies and security considerations.

7.10 Ground Handling

7.10.1 Ground handling market is expected to double[64] from present Rs 2,000 crores to Rs 3,900 crores in the next five years alone. Aggregate investment of around $ 5 Billion will be required in developing world class ground handling, cargo, logistic facilities including highoutput distribution centers at major airports. A number of global ground-handling players have aggressive expansion plans in India. Future infrastructure development in this space will be largely driven by technology. Among the technologies that are expected to have a significant impact on the Indian aviation sector is Passenger self service solution, RadioFrequency Identification (RFID) technology, Common Use Terminal equipment, Unit Load Device (ULD) Scanners for cargo handling, and Internet and mobile technologies. This would, however,

[64] Source: Report of Working Group on Civil Aviation for formulation of 12th Five Year Plan (2012-17), Financial Express

depend significantly on supportive fiscal policies and requisite airport infrastructure development.

7.10.2 Ministry of Civil Aviation brought in a ground handling policy for 6 metro airports limiting the number of ground handling agencies therein in order to facilitate consolidation and promote efficiency. This has been contested by airlines. The matter is currently sub-judice in the Hon'ble Supreme Court.

7.10.3 Mechanization and modern ground handling processes would be the key to ensuring efficiency. There should be proper monitoring mechanism to oversee and enforce service level agreements between airlines and ground handling agencies, between custodians/airport operators and ground handling agencies.

7.11 Issues Relating to Investment in Airport Infrastructure

7.11.1 Airport infrastructure is a capital intensive investment with significant risk attached to it. In addition, the venture is associated with long payback period. Private promoters continue to bring in very low equity and thus the debt to equity ratio is extremely high (80:20). Such a debt equity structure translates into fixed cash outflow in the form of huge interests and repayments. High interest rate regime prevalent in the country is also adding to their woes. Short term debts costs as high as 18% per annum and the long term interest rate is about 1214%. This results into long payback period to equity investors.

7.11.2 Private operators have represented seeking access to long term funds at fixed rate of interest for reducing the uncertainty arising out of a floating interest regime. Unlike most of the airports globally, there is a revenue sharing model with which the Indian airports under PPP model operate. Brown field airports like DIAL and MIAL under the PPP model have a revenue sharing agreement with AAI wherein 46% and 38.7% of their revenue respectively are shared. In mature markets, non-aeronautical revenue constitute larger portion of the total revenue for the airport operators unlike the situation in India. Some JV airports in India of late do show a significant improvement in the share of non-aero to their total revenue which is yet to be emulated by the AAI.

7.12 PPP Mode of Airport development-Learning Outcomes

7.12.1 Rapid growth in the air traffic since 2004 exerted pressure on the capacity at major airports in the country leading to congestion, delay and poor customer experience. Available airport infrastructure was grossly inadequate particularly in metro and major cities to cater to the upsurge in aircraft movement and passenger traffic. To bridge the gap between capacity available and demand, Ministry of Civil Aviation's Airport Infrastructure Policy recognized the need for private sector participation encouraging enterprise in creation, operation and management of airports through induction of private capital and management skills.

7.12.2 The objective was to create an investment climate to facilitate time bound creation of worldclass infrastructure to cater to the growing demand for air traffic. Investment in aviation sector in 11th Plan was projected to the tune of Rs.36,150 crores which was beyond the internal resources of AAI and the Government. Therefore, private investment was encouraged under Air port Infrastructure Policy. Various financial models were adopted for development of airport infrastructure. PPP model involved significant flow of private loans from banks and financial institutions with promoters' equity.

7.12.3 Viability gap was sought to be bridged by levy of UDF /ADF. Greenfield Airports were developed in cities of Hyderabad and Bangalore. Existing Brownfield Airports at Delhi and Mumbai are successful examples of PPP Model. In what follows, the learning outcomes of this model of development are discussed.

7.12.4 It is doubtless that timely creation of world-class airport infrastructure was achieved. Terminal 3 was completed in a record period of 37 months. Since finance came from the private promoters, it did not burden the Government / Public Exchequer. Higher User Satisfaction for passengers and better utilization of the assets with focus on non-aeronautical revenue generation, better coordination with local bodies/state agencies for improvements in connectivity to road / metro etc., improvement in cargo infrastructure were some of the key benefits.

7.12.5 The model has also provided impetus to the need for overall improvement in the delivery mechanism of AAI in a competitive scenario from private operators. The entry of leading

private air-cargo companies has brought in a wave of increasing automation, mechanization and process improvement initiatives at major air-cargo terminals in the country. Such investments in air-cargo handling at key airports such as Delhi, Mumbai, Bangalore, Hyderabad, etc. are expected to yield higher air-cargo throughput and improved service levels. On the other hand, there are some areas which need attention for further refinement of the model and these are discussed in the following paragraphs.

7.12.6 Contracts under PPP particularly were awarded without regulatory mechanism in place. Issues arising out of agreements already made prior to the birth of regulator had to be resolved by AERA which could potentially cause uncertainty in the system. Mid-course correction requiring revision in design and planned capacity was reported to have been necessitated due to unprecedented upswing in the air traffic.

7.12.7 Operationally speaking, difficulties have been reported in performance monitoring in respect of soft performance dimensions. As the governance system matures with implementation of several projects under PPP model, it is hoped that, further refinements could be made to the design of PPP model for obtaining robust results.

7.13 FDI Policy for Airline Industry

7.13.1 It may be recalled that basic rationale of opening up of certain sectors to competition including participation of foreign investments has been to cater to the enormous size of investments required for a growing economy and the need to bring in cutting edge technology and the associated best practices of the industry. There is a view that Airline industry qualifies in all these respects listed above and therefore the need to facilitate larger capital inflow from abroad into the country.

7.13.2 Foreign investment is not just a source of equity investment for developing economies, it also brings with it considerable benefits viz: technology transfer, management know-how, and access to international markets. The mechanism of the relationship has been through inflow of investment funds, infrastructure and technology transfers, enhancement of human capital, improvement in the quality of the factors of production, faster growth of output and employment, increased productive efficiency, consumer benefits and access to global markets.

7.13.3 Presently, strategic investment by airlines registered overseas is not permitted to invest in Indian companies in the airline business. Relaxation of Ownership & Control rules governing airline sector is expected to result in significant benefits in terms of financing costs especially at a time when the industry has launched itself in the path of higher trajectory of growth. More importantly, costs of financing can become cheaper for the Airlines if there is a freedom to access financial resources wherever it is cheaper rather than having to source it from home market which may be higher, thus adding to their financial woes.

7.13.4 It is noteworthy that during the initial phases of growth in a Capital intensive industry such as this, the CAPEX to Sales ratio will be very high, leaving very little scope for meeting the working capital requirements. The rapidly changing air transport environment dictated by the global economic fortunes is forcing airlines to seek structural adjustments in order to survive. Developments in the early 1990s, including the bankruptcies and mergers of airlines with heavy debt burdens, have prompted a re-examination of the limits placed on foreign capital.

7.13.5 Investment by foreign airlines offers an alternative to the borrowing that has undermined the financial health of some airlines.[65] Therefore this should result in lower cost of capital to airline industry particularly in developing country where the cost of capital is much higher. It is relevant to note that in countries like USA, which has large, flexible and matured capital markets, the need to access overseas capital may be less critical as compared to emerging markets. Therefore, comparison of India with those countries is misplaced. Other sectors in the country including the sensitive sectors have long before witnessed relaxations of ownership regulations in India.

7.13.6 It has been seen from the experience of other sectors in the Indian Economy that a policy of liberalization results in acceleration of economic growth. Given the high cost debt environment prevailing in the country on account of structural issues, it would be difficult if not impossible to raise these resources at relatively on easy terms.

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[65] Chia-Jui HSU and Yu-Chun CHANG, "The influence of Airline Ownership Rules on Aviation policies and Carrier's Strategies", Proceedings of the Eastern Asia Society for Transportation Studies, Vol. 5, pp. 557 - 569, 2005

7.13.7 It was reported by CAPA in July 2010 that the three large airline groups in India have a combined debt of approximately USD 13.5 Billion with an annual interest burden of over USD 1Billion. For the financial year 2011-12, it is estimated that this would touch $20 Billion for the entire airline industry. And they will require capital raising of a further USD 10-12 billion over the next 2-3 years to finance scheduled air craft deliveries. Because of the low equity base, raising additional capital by these enterprises will be a challenging task.[66]

7.13.8 External Commercial Borrowings (ECB) could become an important source of funds for the industries in India particularly to Airline industry which are adversely affected by high cost of loans in India. Relaxation of restrictions on ECB to Indian industries should provide the much needed relief to them. This measure would be of very high relevance at this juncture when cost of debt is prohibitively high in India. Terms and conditions for accessing ECB should be reasonable without imposing stringent norms during the difficult times such as the current period.

[66] CAPA India Aviation 2010: Mid-Year Outlook 2010

8 Key Challenges and Policy Enablers

8.1 Key Challenge I-Viability of the Sector

8.1.1 Viability of the Airline Industry

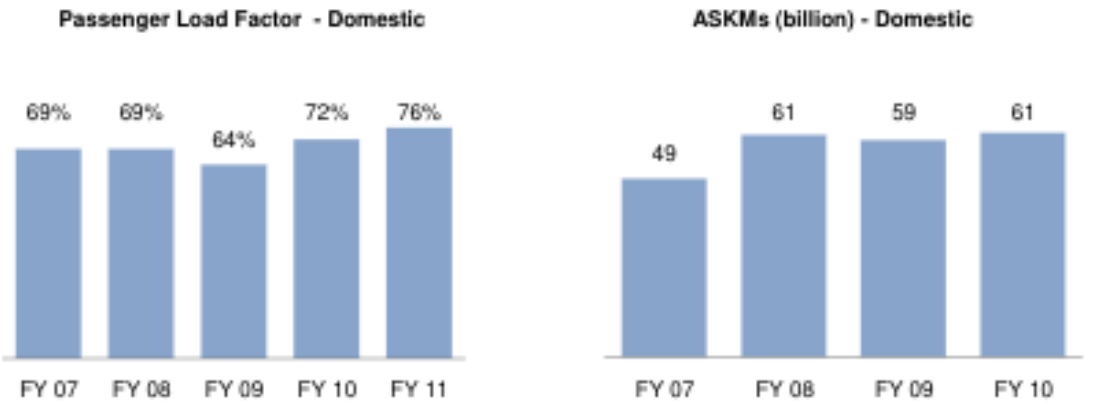
8.1.1.1 Viability of Airline Industry is central to entire sector and crucial for sustaining growth. The decade 2000-2010 witnessed a profitless growth phase of the air lines industry. FY 2010-2011 witnessed revival of strong market growth resulting in profitability for some domestic carriers. However, the revival was short-lived. The airline landscape in India has transformed radically in recent years. In 2003, there were just 4 carriers – Air India, Indian Airlines, Jet Airways and Air Sahara, all operating full service models. The private carriers in those days were limited to operating domestic routes only. In 2011, there are 6 air carriers operating 11 different brands, as

- Air India + Alliance Air + Air India Express
- Jet Airways + Jet Konnect + JetLite
- Kingfisher Airlines + Kingfisher Red
- IndiGo
- Spice Jet
- Go Air

8.1.1.2 Indian carriers catered to 54 million domestic passengers during FY 2011. International traffic to and from India was 38 million passengers during the same period. The traffic growth has resulted in increased capacity of domestic carriers in the form of Available Seat Kilometers (ASKM) at around 8% along with capacity utilization with average passenger load factor having crossed the 75% mark by 2011. To cater to the growing demand during the last five years or so, the domestic carriers more than doubled their fleet size[67] from around 200 to 430.

[67] Source: Report of Working Group on Civil Aviation for formulation of 12th Five Year Plan (2012-17), data from airlines, annual reports, Aviation Center of Excellence

Graph 25: Passenger Load Factor and ASKMs for domestic operations of Indian carriers



Source: Report of Working Group on Civil Aviation for 12th Five year plan

8.1.1.3 The 11th Plan period saw an increasing trend among domestic carriers to embrace the Low Cost Carrier (LCC) model. Total market share of LCCs including the low cost arm of Full Service Carriers has crossed 70% suggesting a significant shift in the business model of airline industry in India. Despite the phenomenal growth in traffic, most Indian carriers are reeling under losses. During the three year period between 1 Apr 2007 and 31 Mar 2010, Indian carriers incurred an accumulated operational loss[68] in excess of Rs 26,000 crores, of which three large airlines accounted for nearly Rs 23,000 crores.[69]

8.1.1.4 To manage the next growth phase safely and efficiently, significant and continuous investment will be required for providing efficient and reliable services for movement of goods and services by air. The future of India's aviation growth is critically linked to the health of the airline industry. The rapidly changing air transport environment dictated by the global economic fortunes is forcing airlines to seek structural adjustments in order to survive.

8.1.1.5 One of the major challenges of the air traffic industry in India is the high and growing debt

[68] Sources: Report of Working Group on Civil Aviation for formulation of 12th Five Year Plan (2012-17), news articles, annual reports of airlines

[69] Report of Working Group on Civil Aviation for formulation of 12th Five year Plan, Ministry of Civil Aviation,GoI

burden of the carriers. Airline Industry in India suffers from huge debt burden – close to US $ 20 billion (estimated for 2011-12).

8.1.1.6 Half of this debt is aircraft related and the rest for working capital loans / payments to airport operators and fuel companies. Three airline groups account for a large proportion of this debt and they need to raise capital to boost equity and liquidity.

8.1.1.7 FDI Policy does not permit foreign airlines investment there by denying access to potential sources of capital and expertise. While there are number of structural factors that are responsible for this phenomenon, the operating cost environment is adversely impacting the financials of the airline sector. One of the key cost drivers for the airline industry which is the pivotal segment of the entire civil aviation sector is the price and taxes payable for aviation turbine fuel (ATF) by the scheduled domestic carriers in India.

8.1.2 Aviation Turbine Fuel pricing regime

8.1.2.1 Cost of ATF (40-50% of their total operating cost) is a formidable challenge for the financial health of airlines. The estimated annual fuel bill for the industry is around $3.4 Billion based on 2010 rates[70].

8.1.2.2 Pricing regime for ATF in India does not appear to be an outcome of a competitive market although theoretically it is outside Administrative pricing mechanism and there are more than three players (Oil Marketing Companies) in the market. Representations received from the stakeholders suggest that the market for ATF is not sufficiently competitive to ensure that prices have some cost orientation. Neither the pricing regime for ATF is transparent; Buyers i.e. air line industry and associations representing them have often represented against opaque nature of pricing regime that prevails in the market for ATF.

8.1.2.3 The 3 Oil marketing companies in the public sector having refinery capacity and access to Essential Facilities inside and outside the airport dominate the market; Between October 2010 and March 2011, the Indian Oil Marketing companies raised the price of aviation fuel 12 times. Prices of

[70] Bombay Chamber of Commerce and Industry- Submissions to MoCA dated 13th December,2011

Crude derivative such as ATF are sometimes seen to be moving contrary to the price of crude and in some instances moving contrary to other dominant derivative like petrol. ATF Prices prevalent in major airports would suggest that the prices are almost uniform for all the three Oil marketing companies in the Public Sector.

8.1.2.4 Following dismantling of 'Administered Price Mechanism' (APM), prices of ATF in India are said to be based on the "International Import Parity Prices", and are directly linked to the benchmark of Platt's publication of ATF prices ; That means it is not related to the actual cost of refining ATF in India which is a middle distilled crude derivative. ATF prices for domestic operations thus also include Ocean Freight charges, insurance, notional Customs Duty and other charges; On top of this, Oil Companies' marketing margin; and throughput and other services charges paid to the Airport operators and service providers related to the fuel complex in the airport premises.

8.1.2.5 As a result of all these factors and other tax related issues (see discussion in succeeding paragraphs) ATF prices in India are unduly higher than international bench marks resulting in a tremendous financial burden on Indian Carriers. ATF prices in India are nearly 60% costlier than competing hubs like Dubai, Singapore and Kuala Lumpur (See Table 30).

Table 30: Global comparison of ATF prices per kilolitre

Location	Price/kilolitre (USD) [71]
India	1400
Singapore	825
Bangkok	880
Kuala Lumpur	810
Dubai	840

Source: Report of Working Group on Civil Aviation for 12th Five year plan

8.1.3 Fiscal regime governing Aviation Turbine Fuel (ATF)

8.1.3.1 Aviation sector in India face many taxes on the inputs to production – fuel, aircraft leases,

[71] These numbers are as of May – Aug 2011

airport charges, air passenger tickets, air navigation service charges, maintenance costs, fuel throughput fees, into-plane fuel fees, and other items subject to service taxes. These fees and taxes on inputs are either not present in other matured aviation markets, or are much lower there. The Indian air transportation industry is thus laden with very high costs and larger operating losses than their other counterparts globally.

8.1.3.2 ATF is subjected to a multitude of cascading taxes by different government entities. While fixing the price of ATF at the refinery, the following components are said to be included. However, feedback from industry suggests that such a detailed break-up of the price for ATF is not provided by Oil Marketing Companies to the airlines.

- Notional Customs duty 5%
- Central Excise duty 8.25%
- Service tax on services rendered in the airport complex by Fixed based operations such as fuel complex, into plane refueling etc at 10.3%. These services include service rendered by Fuel complex operator, Into-plane refueller etc.
- VAT levied by most States in India 25% to 30%
- Octroi/ Entry tax 2% to 4% in some major states
- Service tax on tankers (not owned by OMCs) used for transportation of fuel

8.1.3.3 Despite being an input fuel (similar to coal and gas), it is subjected to VAT. VAT on ATF in most of the states ranges from 20% to 30%. Generally, the central excise duty paid on any input in manufacture is set off against service tax paid on output as per the Service Tax principles laid down by CBEC. However, this facility of set off is not made applicable in the case of ATF although the air travel is also subjected to service tax. A number of representations received from airlines in India suggest that the rates of value added tax on ATF is high and that severely affects the financial viability of their operations.

8.1.3.4 There is no doubt that the current regime of aviation fuel taxation regime adversely impacts the financial performance of Indian air carriers particularly in the domestic sector. If aviation fuel taxes are disproportionately higher without any basis, then it retards the industry development vis-à-vis the overall growth in the economy and limits its potential contribution to

economic well being. Multiple and higher levies on ATF will impact the operating cost environment of air lines. 15 % Rupee depreciation is the most recent development that is also hitting the carriers. Cost of fuel, Insurance and freight, MRO expenses, and lease rentals are all calculated in dollar terms.

8.1.3.5 A study was carried out by Center for Asia Pacific Aviation (CAPA) assessing the sensitivities of the potential impact of higher average oil prices in April 2011. Up to US$95-100/barrel, other things remaining constant, only LCC might make modest profits but will continue to perform better than full service carriers. However, above US$ 110 the entire industry starts to be impacted since at these levels the fare differentiation between them becomes less significant.

8.1.3.6 Therefore, it is suggested that the ATF prices as well as the state level levies/surcharges on ATF should be rationalized to minimize the cascading effect of tax regime so that the operating cost environment of the airlines is conducive for providing affordable air services to the common man in the country. Facility of setting off central excise duty paid on ATF as against the service tax paid should be extended to airline industry. Besides being equitable, this would provide some relief to the industry.

8.1.3.7 Other changes in the existing tax regime governing ATF that have been suggested by the industry are: One, include ATF in the unified Goods and Service Tax or in the alternative, accord ATF the status of "declared good" that carries lower and uniform tax. Second, switch over to levy of specific rate of duty instead of ad valorem duty structure because when fuel prices go up, the aviation industry in India gets doubly hit because the same rate of VAT applied on a higher and increasing value means higher amount of tax out go.

8.1.3.8 It is also important that the Oil Marketing Companies are mandated to ensure transparency in the fixation of ATF prices as a very large proportion of ATF supplies are from the few PSU Oil Marketing companies. Prices of ATF at each airport are uniformly the same for all the three OMCs in the public sector. This is suggestive of the fact that the market for ATF in the country suffers from lack of effective competition. Pricing regime for ATF as it exists is opaque and needs to be made more transparent.

8.1.4 Tax regime governing third party MRO[72]

8.1.4.1 India's growth in Civil Aviation during the past decade would have provided an excellent and a unique opportunity to develop the nascent Aviation MRO industry in India. Development of the MRO (Maintenance Repair and Overhaul) industry would have leveraged and developed both the skilled human resource expertise in India, as also laid the foundation of advancements in the aerospace sector. As per industry estimates, the Indian Commercial Aviation MRO market which is currently valued at around $ 800 million is expected to reach $ 1.06 billion by 2015 and $ 2.5 billion in 2020.

8.1.4.2 Airlines need line-maintenance and major maintenance for their aircraft; engine maintenance; and maintenance for airframe components, accessories & repairs. The MRO industry in India suffers from lack of adequate number of credible third-party MRO facilities. While captive MRO operations of existing airlines provide the basic infrastructure and expertise for development of the MRO industry, there is also a need for third-party maintenance & overhaul to support the requirements of the domestic airlines.

8.1.4.3 Airlines in India currently outsource major checks and aircraft servicing to MRO hubs like Singapore, Malaysia and Dubai. It is only minor checks which are handled in house. To emerge as an MRO hub for the region, there are regulatory and infrastructural limitations that need to be addressed. There is also a need to ensure uniformity in tax structure and tax incidence on varying trade practices. High taxes tend to more than offset India's advantages in terms of low labour costs. Indiscriminate taxes undermine operating viability and greatly reduce the advantages of efficiency necessary to develop a world class industry.

8.1.4.4 The high tax regime in India is considered as a major deterrent for growth of the MRO industry. This makes aircraft servicing about 40% to 50% more expensive in India than competing destinations in the region, like Singapore, Dubai, Colombo, among others. Servicing an aircraft in India entails service tax of 10.36% (there is no such service tax overseas).Importing spares involves customs duties of over 24%; 12.5% VAT; and 4% Octroi.

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[72] As it existed on 2010-11

8.1.4.5 Some of these taxes are only applicable to third party MROs and not to air lines conducting their own maintenance.[73] This amounts to forcing a business model on the sector through fiscal instruments with attendant consequences for distortions in the system. There is a perception that taxation of air transportation constitutes a tax on a luxury good and is thus justified. This is largely misplaced since with deregulation and growth of air services, air transport is as much a mode of transportation for the common man as the Railways. Today over 70% of the domestic air travel market in India is on low-cost-carriers undertaken by a budget conscious traveler. Inappropriate taxes, either in terms of their magnitude or their form, can seriously distort the market for air transportation services.

8.1.4.6 Because the demand for airline products is often derived from the final demands for goods and services, as well as from the desire for individuals to travel, distortions to ticket prices have the potential of adversely affecting output. In particular, they penalize those industries most reliant on high-speed, scheduled transport – industries generally having the greatest potential to contribute to productivity and national output.

8.1.4.7 In summary, taxation of air transportation sector as a whole is disproportionately high which retards the industry's development vis-à-vis the overall growth in the economy, and limits its potential economic contribution. To fully reap the economic benefits of air transportation, airlines must be treated as economic assets rather than as convenient source of taxation. Air travel should not be treated as a luxury good, but as a necessary and normal service consumed by all strata of society including common people and should be taxed accordingly.

8.1.4.8 It is well known that passenger demand is very sensitive to the price of air tickets. Typically, a 10% rise in price will reduce demand for domestic air traffic travel by about 12% as per the price elasticity of demand calculations. High Tax regime on aviation in general and on ATF will reduce the wider economic benefits available from aviation, resulting in a negative impact on economic growth and overall government revenue bases.

[73] Union Budget 2012-13 had proposed concessions on taxes/duties on certain items in this regard

8.1.5 Route Disbursal Guidelines

8.1.5.1 It is now established that RDG already casts a burden on the commercial health of airlines in India.[74] Quite a few distortions arise out of its implementation. These are discussed separately elsewhere in the report. Naresh Chandra Committee is of the view that for maintaining essential air services on routes that are strategically important but are commercially unviable, the government should provide explicit subsidy support, preferably through direct budgetary transfers or the imposition of a sector-specific cess or a combination of both in a transparent manner. (Discussed in detail in later section)

8.1.6 Operating economic environment of Airline industry – a global comparison

8.1.6.1 Before we step into the analysis of Operating economic environment of Airline industry it may be useful to keep in mind an overview of characteristic features of demand for airline services.

8.1.6.2 Demand for airline services is said to fluctuate constantly owing to the changing nature of the determinants of demand for airline services. Airline industry faces a phenomenon of cyclicality which refers to long term trend of peaks & troughs as the prospects of the airline industry is highly correlated with national and global economy.

8.1.6.3 Seasonality is another major characteristic of demand for airline service industry. Seasonality is more of a short term phenomenon unlike cyclicality. The most common form of peaking is seasonality where demand increases during summer months and then decline during winter months.

8.1.6.4 Perishable nature of the demand is an important characteristic for demand for airline services like any other service. Unlike the manufacturing industry which can keep its goods produced in inventory for sale on any future day, the airline industry faces the prospects of loosing revenue on any empty seat the moment the plane leaves the gate. Thus airlines are said to be perpetually facing the possibility of a good proportion of their seats going unsold due to the nature of the demand and the structure of their operations.[75] On the contrary, supply of airline services is

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[74] Rohit Nandan Committee report on Remote area air connectivity, MoCA,2011

[75] Bijan Vasigh et al, "Introduction to Air Transport Economics" Ashgate, USA 2008

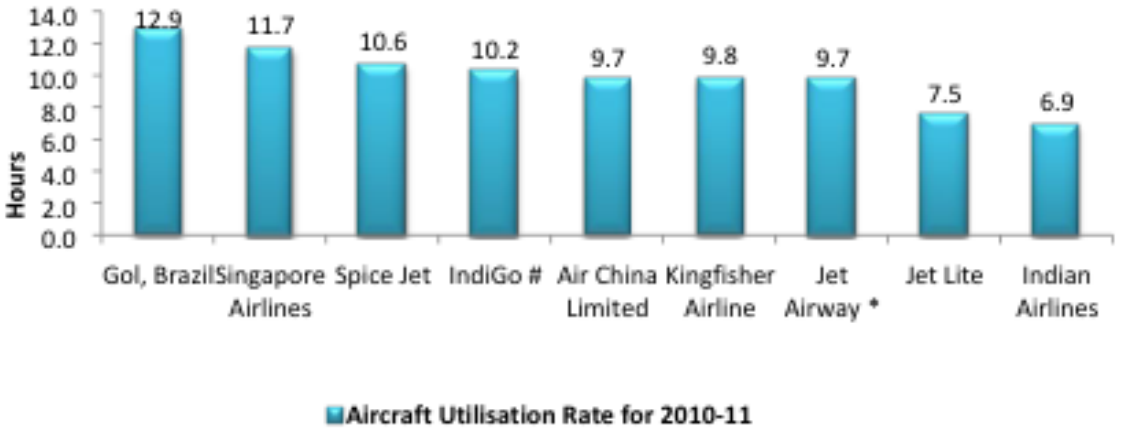
fairly rigid and thus it is not possible to adjust supply to match the fluctuating demand for its services particularly in the short run.

8.1.6.5 The challenge for the carriers is to match the demand and supply for air line services and more so in a competitive market. It is in this backdrop, operating economics of some of the Indian Carriers are compared with that of select Carriers overseas. For purpose of analysis, Air India, Jet Airways, Kingfisher Airlines, Spice Jet[76] are compared with few foreign airlines[83] viz. Singapore Airline, British Airways, Emirates, Gol Brazil and Air China limited.

8.1.6.5.1 **Aircraft Utilization**

8.1.6.5.1.1 One of the key factors in the operating environment for airline industry pertains to aircraft utilization. In the context of a growing market such as India, this analysis could lead us to certain conclusions about the efficiency of carriers in capacity planning and rational deployment to maximize revenue which is crucial. As discussed earlier there is no scope for flexibility in capacity adjustment in the short run in the airline industry. (See Graph 26)

Graph 26: Aircraft Utilization Rates (Block - hours per day of aircraft)



*Note: * Data pertaining to year 2009-10, # Data pertaining to year 2009-10*

Source: DGCA for Indian Carriers, Annual report of respective airlines for foreign airlines

8.1.6.5.1.2 Higher aircraft utilization helps in reducing overall operating cost and in rationalizing

[76] Data availability in public domain is one of the factors in selection of these airlines for comparison

[83] For the analysis foreign airlines has been selected randomly.

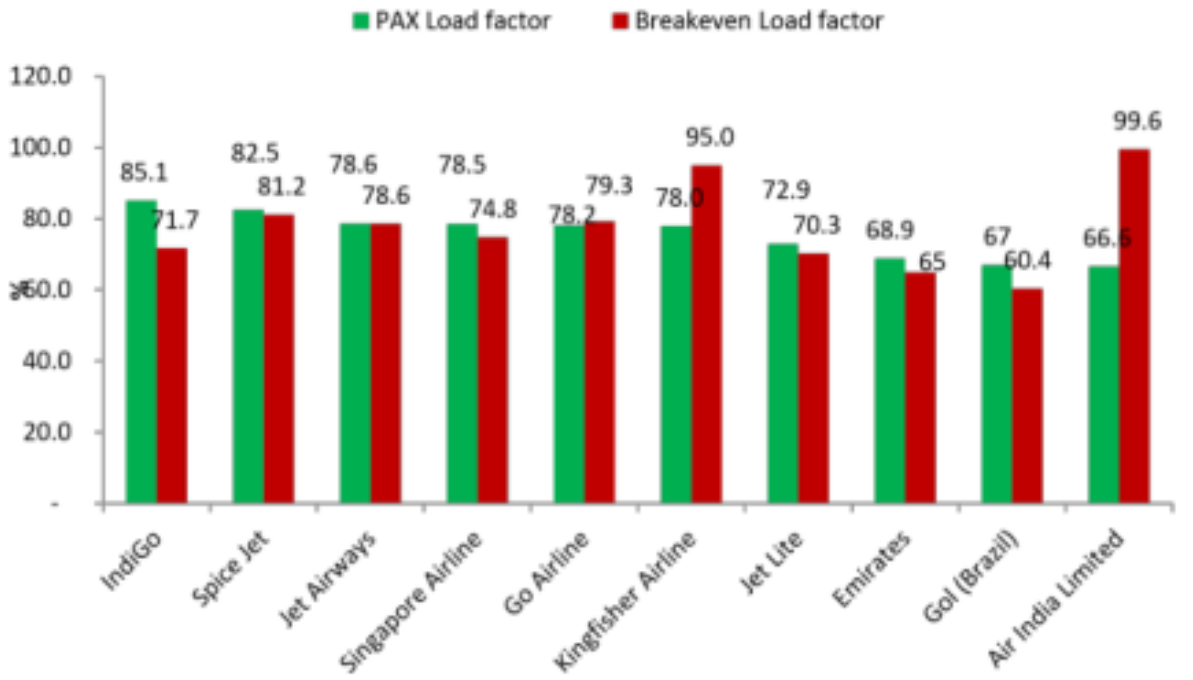
capacity induction. Among Indian Carriers, low cost airlines such as spice jet and IndiGo are better placed than Full service Carriers i.e. Jet airways and kingfisher airlines in utilizing aircrafts.

8.1.6.5.1.3 Aircraft utilization rate should be higher enough to maximize the yield and minimize the cost. Indian Airlines is having the lowest rate of utilization among the Carriers selected for comparison; its rate of utilization is almost half of the utilization record of GOI Brazil and way behind even some of the Indian Carriers like Spice Jet., Indigo and Jet airways.

8.1.6.5.2 **PLF and Breakeven Load factor**

8.1.6.5.2.1 To go forward, it will be useful to compare the two output parameters i.e. passenger load factor and breakeven load factor for the airlines under study. A higher passenger load factor implies that an airline was successful in selling more number of available seats. However, higher passenger load factor does not always result in to operating profit. Any addition to the PLF beyond the Break Even is a net addition to the operating profit margins of the airline enterprises.

Graph 27: Comparison of Passenger Load factor and Break Even Load factor (%)[77]



Source: DGCA, Annual Reports of respective Airlines, Analysis MoCA

Note: In case of Emirates the load factor mentioned does not mean passenger load factor rather it is overall load factor. Above data pertains to 2010-11 except for Go Air and Jet Lite (2009-10)

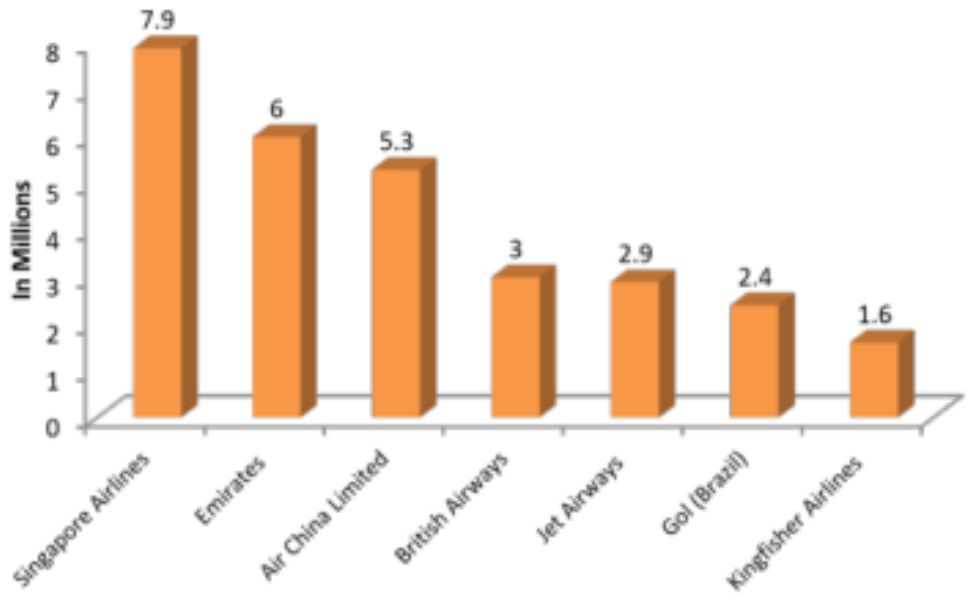
8.1.6.5.2.2 When Passenger load factor is higher than Break Even load factor, the airline in question starts making profits. Evidently, most of the LCCs in India were operating at Passenger load factor higher than that of the Breakeven load factor during 2010-11. Among the Full Service Carriers, Air India and King fisher airlines have witnessed Breakeven load factor much higher than the passenger load factor suggesting huge losses. On the contrary, Full service carriers such as Emirates and Singapore Airlines have reported Passenger load factors higher than Break Even load factors. In the analysis that follows, factors behind the operating economic environment of these and other airlines are analyzed.

[77] *Formula to calculate Breakeven load factor is ((Total operating expenses/ASK)/(Total operating revenues/ RPM)), DGCA data is used for all Indian carriers*

8.1.6.5.3 **ASK and RPK per Employee**

8.1.6.5.3.1 ASK per employee is another key indicator of efficiency both in terms of capacity planning/deployment and utilization of work force. Scheduled Carriers in India like Jet airways and King Fisher are in the bottom end of the metric, where as Singapore airlines, Emirates and Air China are at the top end of the metric.

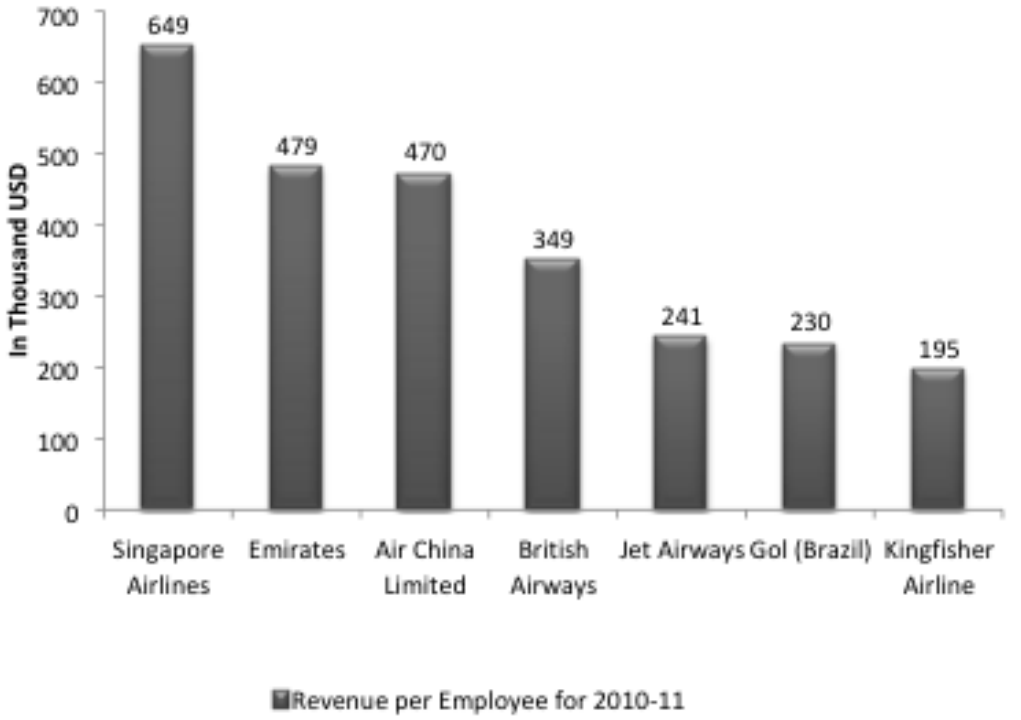
Graph 28: Comparison between Global major airlines & Indian carriers in terms of ASK per employee



Source: Annual reports of respective airlines; Analysis: MoCA

8.1.6.5.3.2 Singapore airline tops the chart followed by Emirates and two Indian airlines lagging behind. Higher ratio of above mentioned factor implies that an airline had produced more seats per employee than other, which increases revenue earned per employee and reduce unit cost at same time. The chart given below provides revenue per employee and validates the above argument (See Graph 29).

Graph 29: Comparison between Airlines in India & abroad in terms of Revenue per Employee

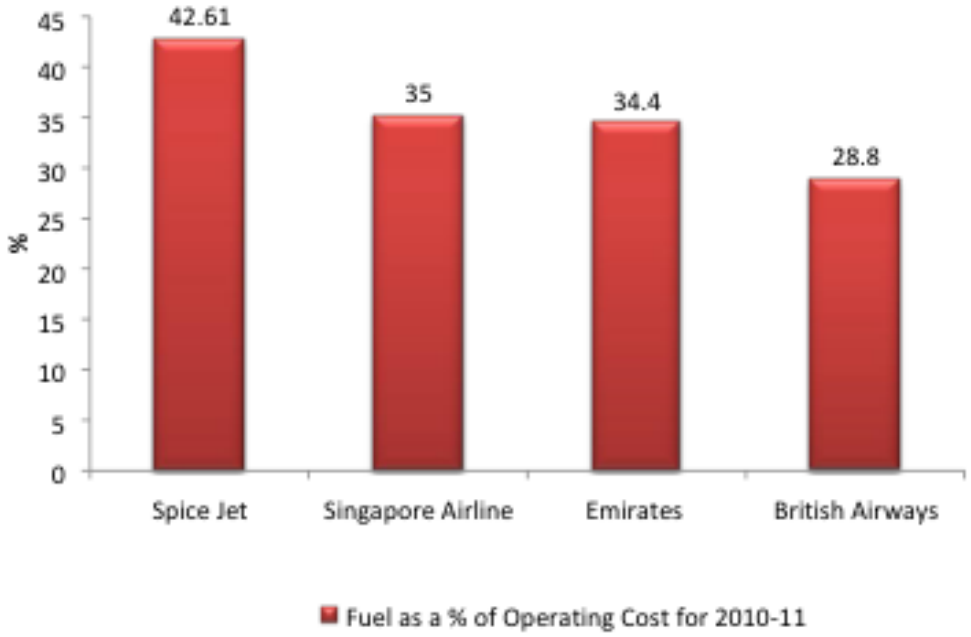


Source: Annual reports of respective Airlines

8.1.6.5.4 **Fuel Cost as % of operating cost**

8.1.6.5.4.1 Aviation turbine fuel (ATF) is the driving component of operating cost of any airline. In general, it accounts for 40% to 50% of total operating cost of any domestic airline in India. Subsequent to dollar appreciation vis-à-vis, post March 2011, this ratio has gone up even higher.

Graph 30: Fuel Cost as % of operating cost across Major Airlines



Source: Annual report of respective airlines

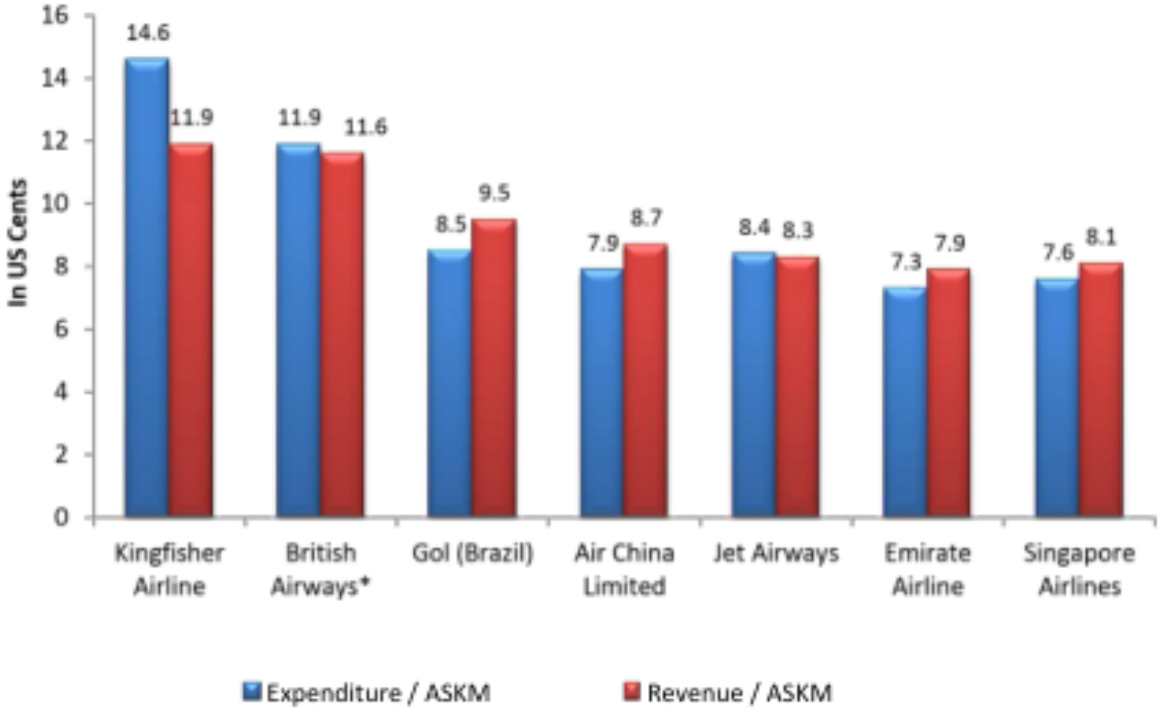
8.1.6.5.4.2 Spice jet airline leads the above chart, which depicts cost of ATF as percentage of total operating cost for airlines under study. The higher percentage of ATF as part of cost for Indian airline could be attributed to the fact that ATF prices in India are much higher as compared to the prices abroad. Table 30 validates the argument, which clearly shows that ATF prices were almost 60% higher in India as compared to neighboring aviation hubs.

8.1.6.5.5 **Financial performance**

8.1.6.5.5.1 To precede further, comparison of expenditure and revenue per available seat kilometer (ASK) [78]is presented in Graph 31.

[78] An ASK is the measure of capacity produced by an airline and is defined as number of seats available for sale multiplied by the kilometers flown. Revenue Passenger Kilometers (RPK) is defined as number of revenue passengers carried multiplied by the kilometers flown.

Graph 31: Comparison of Financial Performance between Indian & key global airlines



*Note: * Data pertains to financial year 2009-10. For Gol and Air China limited data pertains to calendar year 2010 and for all other airline it is for financial year 2010-11 Source: Annual reports of respective Airlines*

8.1.6.5.5.2 Analysis of the Revenue/ASKM and Expenditure/ASKM gives an idea of the profitability of airlines at an operational level. Of the airlines that have been taken up for analysis, GOl Brazil, Air China, Emirates Airline and Singapore Airlines have fared better than others including King Fisher, British Airways and Jet Airways. In fact, performance of these airlines in terms of other parameters taken up is reflected in the financial performance depicted here.

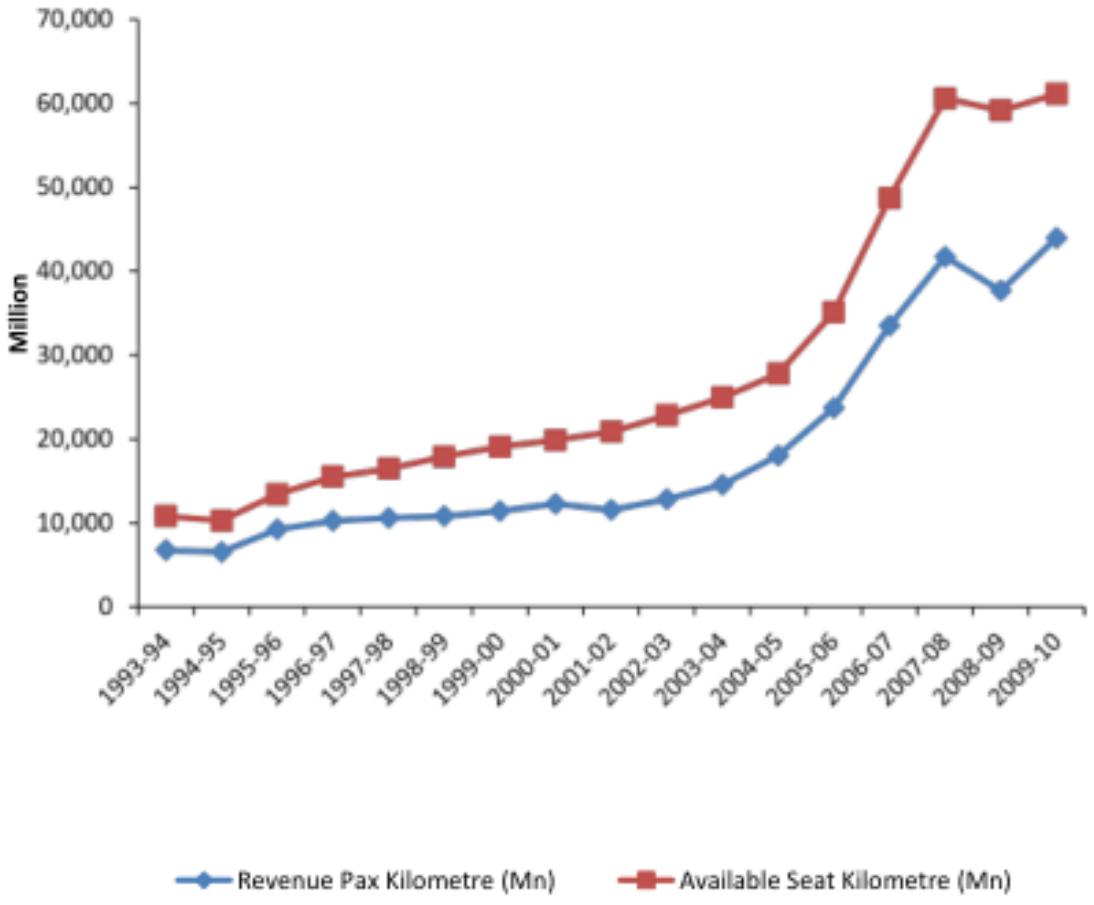
8.1.6.5.5.3 Year 2010-11 for the Indian Carriers was in fact a year of recovery in terms of traffic growth from the down turn experienced by them in the previous year. That does not appear to have reflected in the financial performance at an operating level. This raises the fundamental question of viability of operations of the airlines in India. Of late financial performance is deteriorating for every airline in India. Viability of operations for them is big question before the Industry today.

8.1.6.5.5.4 What has caused the situation to deteriorate? Continuous increase in the ATF prices, fast

depreciating rupee value vis-a-vis US Dollar have pushed up the cost on the one hand and on the other hand, yield has declined over a period of time when the traffic is growing overall.

8.1.6.5.5.5 At the enterprise level each Carrier is seen to be focusing on enhancing their respective market shares in the domestic operations. Pricing strategies adopted by them in the year 2011 is a testimony to the inference that market share growth is the prime motivation at the cost of profitability. Further, it is also seen from the angle of capacity deployment that profitability has been severely impacted because the system has excess capacity and the gap between ASK and RPK is widening. (See Graph 32)

Graph 32: Trend in RPK Performed and ASK for scheduled domestic carriers



Source: DGCA

8.1.6.5.5.6 Airlines need to be rational in capacity augmentation and in evolving a pricing strategy which helps them achieve viable operations in the country. Airlines could deploy capacity on virgin routes which may be viable as all trunk routes are extremely competitive.

8.1.6.5.5.7 Productivity analysis made and discussed earlier suggests that Indian Carriers need to improve the productivity performance at operational level to cut costs and improve efficiency. Dollar denomination of majority of cost component which aggravates the difficulties for airlines is one of the major causes for concern.

8.1.7 State of Competition in Airlines Industry in India

8.1.7.1 Evolution of the Airline Industry in India

8.1.7.1.1 The incorporation of the Air Corporation Act in 1953[79] led to the nationalisation of the airline industry in India resulting in the establishment of two air corporations viz, Air India International and Indian Airlines Corporation and the assets of all the existing air companies were transferred to these two organizations. The Act prohibited any person, other than the corporations or their associates to operate any scheduled air transport services from, to or across India. This in effect gave monopoly powers to Indian Airlines and Air India on air transport in India.

8.1.7.1.2 In 1986, private airlines were allowed to operate charter and non-scheduled services under the Air Taxi Scheme which meant, inter-alia that they could not publish time schedules, or issue tickets to passengers. This was introduced to boost tourism, augment domestic air services and boosted the much needed competition in the existing monopoly market. A host of private players commenced operations as air taxi operators including Air Sahara, Damania Airways, East-West Airlines, Jet airways, Modiluft and NEPC Airlines.

8.1.7.1.3 With effect from 1st March 1994, the Air Corporation Act was repealed and the air transport sector in India was opened to private players subject to the fulfilment of statutory requirements for operation of scheduled services. While six operators were granted license only Jet and Air Sahara were able to start their services.

8.1.7.1.4 In 1997, steps were taken to further remove the barriers to entry and exit from the sector. There was now only a pre-entry scrutiny of applications to verify the financial soundness, maintenance, security and safety aspects of operations and human resources development

[79] Competition Issues in the Air Transport Sector in India; ASCI research and consultancy; http://www.cci.gov.in/images/media/completed/transport_20090421133744.pdf

proposed to be undertaken by the applicant. The choice of the aircraft type and size was also left to the operator. By 1997, only 4 operators that started operations following the deregulation continued to operate namely Jet airways, Air Sahara, Jagson and Modiluft.

8.1.7.2 **Entry of Low Cost Carriers**

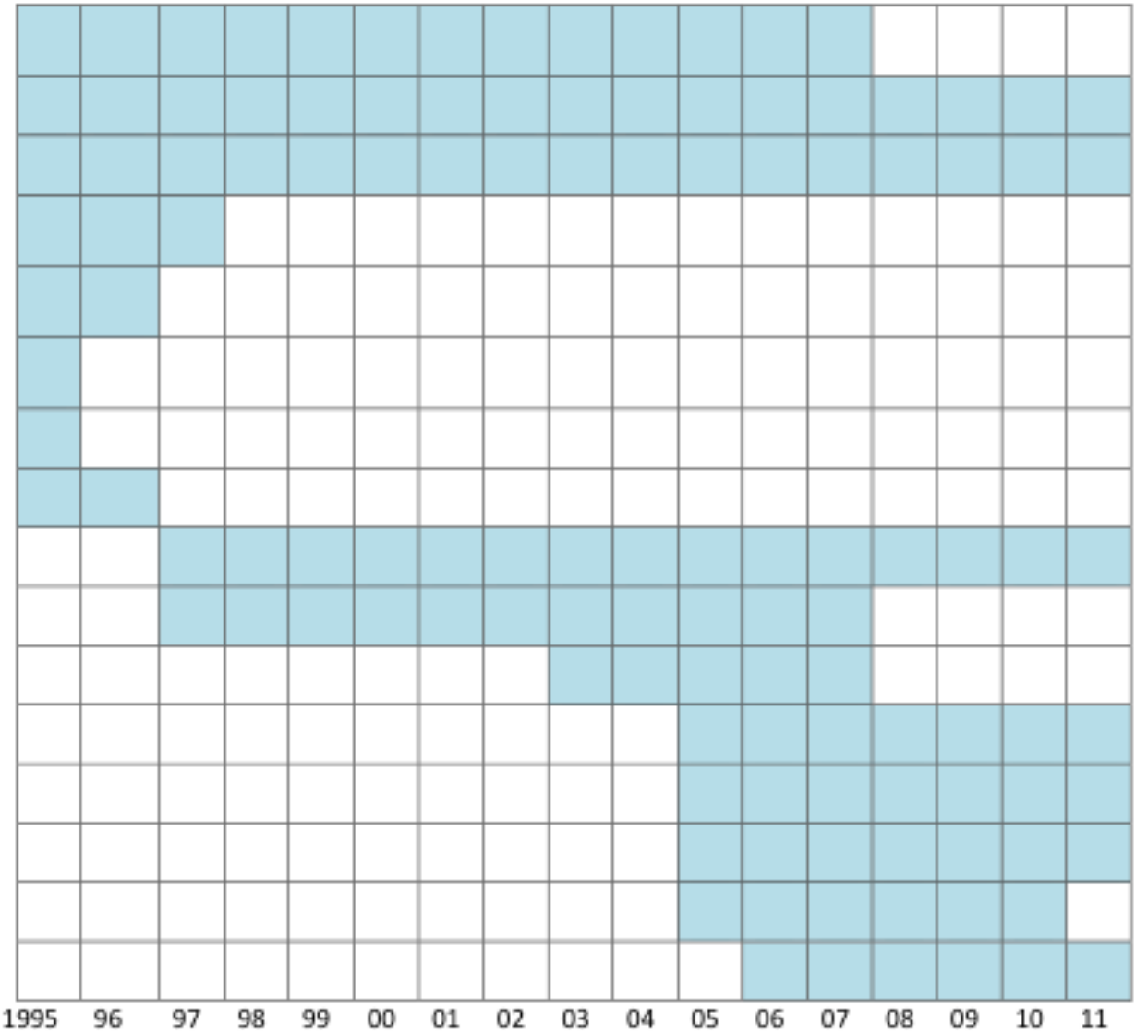
8.1.7.2.1 The year 2003-04 is a watershed year in the history of civil aviation in India marked by the entry of low cost carriers. In August 2003, India witnessed the advent of its first low cost carrier (no frills) Air Deccan, to enter the domestic aviation industry bringing in competition to the existing highly concentrated airline industry with players like Indian Airlines, Air Sahara and Jet Airways. This changed the competitive landscape of the industry. Since then, many other Low Cost Carriers (LCC) have entered the market. In 2005-06, Kingfisher, a full service carrier and 3 LCCs namely Go Air, Paramount and Spice Jet began their operations. Another LCC, Indigo Airlines, entered the market in 2006-07. The entry of LCC or 'no-frill' model into the airline market changed the landscape of competition in the market significantly and air travel became gradually more affordable resulting in rapid growth in passenger traffic. This model brought with it newer pricing strategy such as Advance Purchase Fare that resulted in discounted fares, promotional offers and introduction of flights to newer destinations.

8.1.7.2.2 The co-existence of full service carriers (FSC) and low cost carriers (LCC) has also given the consumer a wide choice of service in the market. However, this period also witnessed major corporate restructuring with three significant mergers taking place in 2007-08 between Air India and Indian airlines; Kingfisher and Air Deccan; and Jet Airways and Air Sahara. The growing LCC market share in the period 2007-2011 eventually forced the FSCs to take note of the changing dynamics of the Indian domestic Airline industry. The FSCs subsequently introduced their own low cost model. In 2011-12 it has been observed that the combined market share of all the LCCs including the low cost arm of the FSC is approximately 70%.

8.1.7.3 **Changes in the Airline Market and its Structure**

8.1.7.3.1 The dynamism in the domestic Airline industry in India marked by entry of market players, competition among players, consolidation and exit of players in the last two decades as explained before can be diagrammatically shown as a grid given in Table 31. The Table shows the number of airlines that entered and exited the market in the period 1995-96 to 2011-12.

Table 31: Dynamism in Airline market: entry & exit of different Airlines in India



Indian Airlines

Jet Airways

Air India Archna Airways

Damania Airways

East West Airlines

Modiluft NEPC

Alliance Air **Air Sahara**

Air Deccan Kingfisher

SpiceJet Go Air

Paramount Indigo

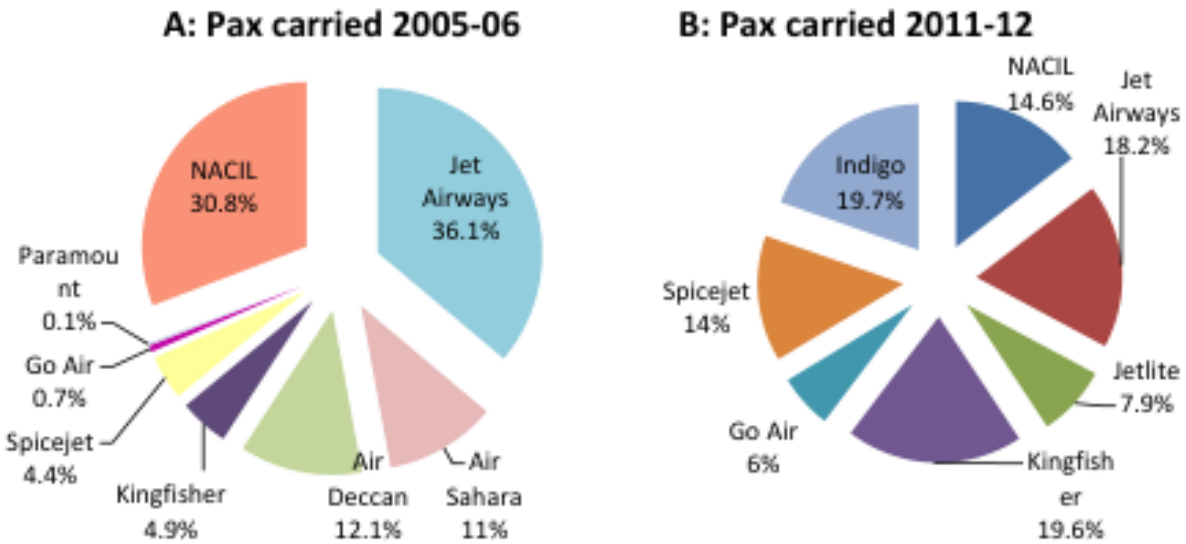
Source: DGCA; Analysis: MoCA

Note: The blue colour in shows the years in which the particular airline was in operation

8.1.7.3.2 The figure shows that the number of Carriers was the highest in the years 2006 and 2007 during the entire period under study i.e. 1995-96 to 2011-12. However, the form of competition that existed was not commercially sustainable resulting in consolidation in the industry.

8.1.7.3.3 Graph 33 reflects the change in market share of airlines between 2005-06 and 2011-12 (September 2011) in terms of the passenger carried by the respective carriers on domestic routes.

Graph 33: Change in market share of airlines between 2005-06 & 2011-12[80]



Source: DGCA; Analysis: MoCA

[80] Data for 2011-12 pertains to April to September 2011-2012 data.

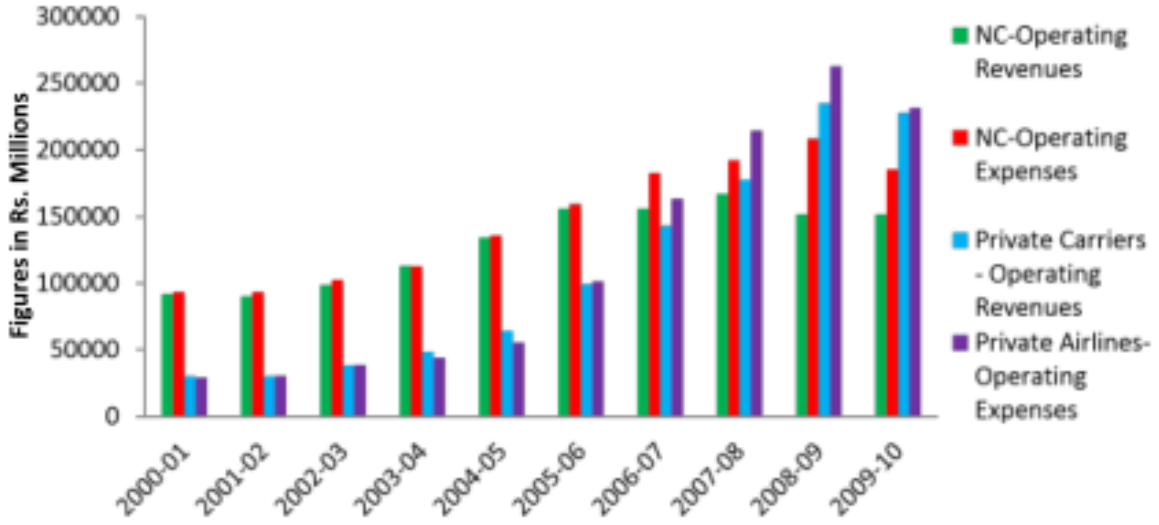
8.1.7.3.4 Graph 33 part A shows that in 2005-06 the largest market share was with Jet Airways i.e. 36.1% in terms of domestic passenger carried, followed by the Air India group[88] (or NACIL) at 30.8%, Air Deccan at 12.1%, Sahara Airlines at 11%, Kingfisher at 4.9%, Spicjet at 4.4%, Go Air at 0.7% and Paramount Airways at 0.1% in the decreasing order of market share. As against this in Part B of Graph 1, we observe that there has been exit of airlines, entry of airlines and consolidation in the industry. In the interim period untill 2011-12, Paramount Airways stopped their operations, there was a merger between 3 sets of carriers mentioned before and entry of another LCC Indigo airlines in 2006-07.

8.1.7.3.5 In this period, a dramatic shift had been observed from FSC to LCC as the share of FSC has declined and the major share of the market now rests with LCCs. Therefore, the largest market share in 2011-12 was with Jet Airways (consolidated with Jet Lite) i.e 26.1% and Jet Airways standalone stood at 18.2% rest with JetLite. Indigo is now the second largest Scheduled domestic Carrier with 19.7% market share. As of now no airline group in India has a market share greater than 26% in domestic market as compared to 2005-06 when two major Carriers had a market share higher than 30% indicating that the market has become much more competitive over these years.

8.1.7.4 **Operational Performance of National Carrier**

8.1.7.4.1 Keeping in mind the above market developments, the transition from a monopoly market of national carrier to a situation of competition from 4 / 5 rivals has not been very smooth. The national carrier viz. Air India group of airlines[89] as evident from Graph 34 has not been able to absorb the shocks of competitive play of market forces. During the period from 2000-01 to 2005-06 the National Carrier was able to limit its operating losses or breakeven in the face of low competition, but with the entry of 4 airlines in 2005-06 and the significant increase in competition, the operating losses of the National Carrier have only increased over the period. Although the combined operating losses of private airlines have also increased over a period of time, on the whole it has been minimised in recent times. It reiterates the fact that national carrier was caught off-guard to brace the competition reflecting its inefficiency in operations. (See Graph 34)

Graph 34: Comparison between National Carrier & Pvt. Airlines in terms of operating performance



Source: DGCA Note: NC-National carrier, which includes Air India, AI Express, Indian Airlines, Alliance Air Private Airlines include scheduled domestic private airlines operating in respective years

[88] The Air India group includes passenger carried by Air India, Indian Airlines, Air India Express and Alliance Air
[89] Air India, AI Express, Indian Airlines, Alliance Air

8.1.7.5 Extent of Competition in the Airline industry

8.1.7.5.1 **Herfindahl Hirschman Index (HHI)** is an indicator used to assess the amount of competition among firms (in our case carriers) in the industry. HHI is defined as the sum of the squares of the market shares within the industry. Any increase in the index indicates a decrease in competition and an increase in market power, whereas any decrease indicates the opposite. As calculated, in the domestic segment of Indian Airline industry, the HHI for 2005-06 stood at 2568 whereas HHI for 2011-12 stood at 1611.

8.1.7.5.2 This decline in HHI indicates a shift from a highly concentrated market scenario in 2005-06, (when despite having 8 market players) to a moderately concentrated market in 2011-12 where there are only 6 carriers operating 11 different brands i.e. 3 FSCs Air India, Jet Airways, Kingfisher, their respective low cost arms Alliance Air & Air India Express, Jet Konnect and JetLite and Kingfisher Red and 3 LCCs namely Go Air, Spice Jet and Indigo.

8.1.7.6 Barriers to entry

8.1.7.6.1 Cost of entry into the civil aviation sector is naturally high due to lack of availability of slots,

high cost of aircraft acquisition and continually increasing operating cost owing to high prices of ATF and VAT on the same. These factors act as a constant deterrent for potential entry of market players. Civil Aviation Requirement mandates that for, a domestic carrier to enter into International operations, the Carrier shall lease or purchase at least 20 aircrafts and have at least five years domestic scheduled transport experience. Such stringent fleet, equity and experience requirements deter entry and thereby reduce consumer choice of international passenger air carriers.

8.1.7.6.2 For example, from 2004 to 2010 the Indian government raised capacity entitlements for international carriers four-fold; however, Indian carriers were unable to take advantage of this increase, as they did not possess enough aircrafts as mandated by CAR. Furthermore, the policy allows foreign airlines into India as long as they abide by Indian safety regulations and are licensed by their home country. In effect, this policy creates a two-tier competitive environment for international carriers - foreign and Indian - putting Indian domestic carriers that want to provide international services at a disadvantage[81]

[81] Nathan Economic Consulting, India 2011

8.1.7.7 **Slot allocation policy –Is it another barrier to entry?**

8.1.7.7.1 Slot allocated to a particular carrier is the entitlement to use the runway capacity at a particular airport on a specific date at a specific time. At a particular point of time it is limited in supply (similar to the allotment of spectrum in the telecommunication industry) and hence needs to be judiciously allotted to ensure that carriers deploy their capacity in the most efficient manner.

8.1.7.8 **Existing Regulation of Slots & framework of its allocation**

8.1.7.8.1 Allocation of slots in India is carried out by AAI & DGCA in accordance with the IATA Worldwide Slot Guidelines (WSG)[82]. As per IATA principles of slot allocation Part 7.1.1 Sections e and f, an incumbent airline is entitled to retain a group of slots based on historic precedence, if the slots in question have been allocated by the slot coordinator to a passenger air carrier and have been utilized at least 80% of the time in the preceding season[83].

8.1.7.8.2 Furthermore, Section g of Part 7.1.1. states that slots may not be withdrawn from an existing carrier in order to accommodate new entrants. From the pool of available slots, new entrants have access to only 50% of the slots[84]. This is termed as grandfather type of allocation of slots. In accordance with IATA guidelines, in cases of airline merger and acquisition (M & A) AAI applies 'the use it or lose it' rule which allows a merged entity to retain access to all infrastructure, including slots, controlled by the respective airlines prior to the merger. International evidences on slot allocation suggest that while the United Kingdom and European Union recognize and apply IATA slot allocation guidelines, the United States does not, due to anti-trust reasons[94].

8.1.7.9 **Effect on Competition**

8.1.7.9.1 The Slot allocation rules create an artificial barrier to entry for new entrants by limiting the

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[82] http://80.168.119.219/UserFiles/File/w-slot-g.pdf

[83] As per IATA regulation, in a year, there are two seasons of 6 months each for slot utilization-summer season and winter season. This guideline is abided in India. (Source: Procedure Manual Directorate of Regulations & Information, Government of India Office of the Director General of Civil Aviation, p 10)

[84] Slots used less than 80% of the times in a season – winter or summer - are categorized as underutilized. [94] http://www.slottrade.aero/library/IEA%20A%20Market%20In%20Airport%20Slots.pdf

number of free slots available to them. This is mainly because of the existence of grandfather rule, which enable existing carriers to withhold prime slots at airports on prime routes, thus, aiding incumbent airlines in garnering substantial market share and deterring any potential entry to the market.

8.1.7.9.2 Also, the entry barrier exists in the market in case of slot allocation due to first mover advantage with the incumbent carriers over potential entrants as the existing prime slots are with the incumbent ones. Underutilized slots only get freed up every six months. Furthermore, slots that are utilized 80% or more during an assignment season by a carrier are controlled by the same carrier the following season. Slots that meet utilization requirements tend to bring high revenue and as a result of the 'grandfather' rule are not available to new carriers, thus limiting the new carriers' ability to compete on lucrative routes.

8.1.7.9.3 Another competition impeding slot allocation procedure takes place at the time of M & A of India's domestic airlines application[85]. In case of a possible M & A amongst incumbent carriers, all the pre-merger slots of both merging companies will be allotted to the newly merged carrier. Since the number of slots controlled by a carrier is positively correlated with the market power it enjoys the merged carrier can potentially capture a greater share of the aviation market giving it an unfair competitive advantage at the expense of other incumbent carriers and potential new entrants. This form of consolidation has often been witnessed in the airline industry in India. Therefore, airline mergers create an artificial scarcity of slots and thus restrict competition. If the merged airline fails to utilize individual slots, they are returned to the unallocated slot pool. Underutilized slots tend to be at odd times and not peak hours.

8.1.7.10 **Slot Trading**

8.1.7.10.1 Trading of slots among carriers is allowed as per IATA guidelines, provided that the member country creates regulations guiding such activities. However, this activity is not legal within the Indian regulatory framework. Slot distribution and assignments in India, while guided by the IATA are managed by separate agencies including the DGCA, AAI, Bureau of Civil Aviation Security, all of which coordinate with individual airports. Regulatory overlap exists; as a result it is difficult to distill a clear and uniform slot allocation policy. Global experiences suggest that there is a preference for slot trading as it promotes efficiency in operations and can maximize utilization of available slots. U.K., U.S.A. and EU allow slot trading with financial incentives.

[85] Kacker, Mukesh —Competition and Regulatory Deficit in Civil Aviation Sector in India‖ CIRC <http://www.oecd.org/dataoecd/8/56/44934012.pdf>

While slot trading is not the perfect solution, allowing such trading creates a market-based structure within which carriers can seek to obtain access to the prime slots. However, slot trading with financial incentives sometimes leads to instances of hoarding, since it has been seen there exists a positive correlation between the number of slots a carrier controls at a particular airport and that carrier's market power in that route. However, allowing a limited supply of slots to be traded can create more efficient outcomes than government assignment and reviewing of slots every six months.

8.1.7.10.2 Revising the current system of slot allocation will help put airlines on more equal footing when competing for slots, and create a framework of predictable and efficient slot allocation outcomes. While no perfect government or market-based solution for an efficient slot allocation system exists, introducing a variety of market mechanisms into the process has yielded more efficient results in the United States, United Kingdom and the European Union. Towards this end it would be appropriate if the entire question of slot allocation is revisited and based on a consultation process, a transparent policy framed.

8.1.7.11 Key Enablers

8.1.7.11.1 Need for Economic Regulation of Air Transport Industry

8.1.7.11.2 Certain market developments concerning pricing behaviour of Scheduled Carriers in India point to the need for some form of pricing regulation. For instance during the year 2010, there were allegations of excessive pricing by airlines in India particularly during festive/holiday seasons, during periods of strike by employees of airlines. Evidence available indicates that spot prices on the day of departure in certain routes were as high as seven to eight times the APEX prices prevalent for the same flight few weeks ago.

8.1.7.11.3 There were numerous passenger complaints on account of excessive pricing of airfares at the time of peak festive season (Diwali/Christmas/New Year's), due to pilot strikes at few airlines, which gave undue advantage to other airlines to meet the excess demand. DGCA then came out with a direction to Carriers to become more transparent in the disclosure of air fares in advance to public. Interestingly, after about a year later, there were allegations of below cost pricing against a Full Service Carrier. It is in this context, the need for economic regulation particularly regulation of pricing of Air travels services in India has been raised by a dominant section of the industry in order to ensure the viability of the industry and to protect the long term interest of the consumers.

8.1.7.11.4 Price regulation need not necessarily mean fixing of prices. Nevertheless, the regulatory framework governing airline prices could be used to test the pricing practices that may arise in the market from time to time against the principles of economic regulation such as Nonpredatory, Non-discriminatory, Fair and reasonable prices for air travelers and transparency in pricing. The legal framework for introducing economic regulation of airline industry is discussed in the paragraphs that follow.

8.1.7.12 The Aircraft Act 1934

8.1.7.12.1 The Aircraft Act 1934 governs the functioning of the Air Transport sector in India. Section 4 of the Act empowers Central govt. to make rules to implement ICAO Convention 1944 including any Annex thereto relating to international standards and recommended practice as amended from time to time. Section 5 of the Act empowers the central govt. to make rules that may provide for inter-alia the regulation of air transport services, the economic regulation of civil aviation and air transport services including the approval, disapproval or revision of tariff of operators of air transport services where tariff includes fares, rates, valuation charges and other charges for air transport of passengers or goods, the rules, regulations, practices or

services affecting such fares, terms and conditions of commissions payable to passenger or cargo sales agents.

8.1.7.13 Rule 135 under Aircraft Rules 1937

8.1.7.13.1 Section 4 of the Rules state that, where the Director General of DGCA is satisfied that any transport undertakings has established excessive or predatory tariff under Sub Rule 1 or has indulged in oligopolistic practice he may issue directions to such air transport undertaking. Along with the above Section 5 state that every direction issued under sub Rule 4 shall be complied with by such air transport undertaking.

8.1.7.14 Safeguard against Anti Competitive Practices

8.1.7.14.1 In order to foster competition in the Airline industry certain airline practices may be regarded as possible **unfair anticompetitive practices** which merit closer examination:

- Charging fares on routes at levels which are in aggregate insufficient to cover cost of providing services to which they relate or in other words charging below their respective marginal cost. This is a practice at times carried out by airlines to undercut a relatively inefficient competitor in the market or act as a deterrent to the potential entry of players with the objective to remove competition by undertaking short run losses.
- Addition of excessive capacity or frequent service. The excess deployment of capacity without scientific planning will force the airlines to drop fares in order to ensure greater utilization of their aircraft. This can be anti competitive as an incumbent airline can push a new entrant out of the market by lowering fares in the short term, which won't be sufficient for the entrant to sustain the competition.
- The practices can have a serious negative economic effect to the viability of another airline.
- The practices reflect an apparent intent or have probable effect of crippling, excluding or driving another airline from the market and
- The practices can indicate an abuse of dominant position on a particular route
- Provision of State aids/subsidies which confer benefits on National Air Carriers but are not available to competitors in the same market may distort trade in International Air Service and may constitute unfair competitive practices.

- Even in special cases States should take transparent and effective measures accompanied by clear criteria and methodology to ensure that aids/subsidies do not adversely impact on competition in the market place

8.1.7.14.2 Thus, Economic Regulation is considered essential to ensure the healthy growth of the civil aviation sector. Capacity regulation is the ultimate tool with the regulator to ensure a viable, sustainable and a competitive market to protect the long term interest of end users. Scientific method of forecast of air traffic on city-pair wise is the starting point.

8.1.7.14.3 Based on such forecasts of traffic, capacity deployment by airlines to meet the projected demand should be regulated. Capacity regulation should also ensure that the relevant market is sufficiently competitive and at the same time operations are viable for all the Carriers. Thus, the exercise of Capacity Regulation should also define Significant Market Power (SMP) in the relevant market. Mergers and Acquisitions (M & A) in the airline industry should be closely monitored with a view to ensure that market power of the merged entity does not become dominant enough to constrain competition in the market.

8.1.7.14.4 Each and every proposal for Mergers or acquisitions shall be evaluated by the Ministry of Civil Aviation from the point of view of potential impact on the state of competition of the proposed mergers/acquisitions. Such guidelines of M&A shall also not come in the way of a genuine exit for a firm which could not survive due unviable operating environment.

Economic Regulation thus shall encompass a well thought out exit policy to unviable players.

8.1.7.14.5 **Exit policy** is relevant because a) operations are becoming unviable for airlines. Even in a matured market like the US the airline industry is at crossroads. Nearly three decades since deregulation – and after multiple cycles of financial successes and failures – the industry remains fragile. Since 2002, five of the seven network carriers in U.S.A. have filed for bankruptcy protection[86]. In India too, despite a robust growth of air travel market, airline enterprises are reported to be incurring losses b) Post merger, access to natural resources like Slots need to be reallocated among Carriers. In the absence of a policy on this, it is likely that the merged entity has the right to use slots in a significantly disproportionate manner to influence the market outcome.

[86] http://web.mit.edu/airlinedata/www/AboutUs.html

8.1.7.14.6 **International market access** shall form part of economic regulation. Presently, market access issues are addressed on a bilateral basis without a firm and a structured framework in an adhoc manner. Available evidence suggests that the Scheduled Carriers from India are able to utilize only about 23% of total allocations. International carriers utilize about 38% of the total. Apart from the traffic rights that may be mutually decided by the contracting states, economic regulation in this space has to address issues relating to establishment of international air transport fares, and rates that should be fair, transparent, and that shall promote satisfactory development of air services.[87]

8.2 Key Challenge II- Air Connectivity in North-Eastern Region and Other remote areas

8.2.1 Overview

8.2.1.1 North-East Region (NER) of India comprises of eight states viz. Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and Sikkim. Most of the places in the NorthEastern states are inaccessible due to inadequate road/rail facilities. Only viable means of transportation in the region is by air. At present, air services are available to/from 11 airports in the North-Eastern Region.

8.2.1.2 During the last five years from 2006-2011 (till date), total number of flights operated on domestic network vis-à-vis flights in North-Eastern Region, Jammu & Kashmir Region, Andaman & Nicobar Island and Lakshadweep Island are indicated in Table32.

[87] Policy and Guidance material on Economic Regulation of International Air Transport, ICAO Doc 9587, 2008

Table 32: Domestic flights operated per week in North East Region and other remote areas

Flight Details	Flights/week					
	2006	**2007**	**2008**	**2009**	**2010**	**2011**
Total on Domestic Network	8724	10624	11048	11063	11315	12107
North-Eastern Region	259	285	298	286	347	370
Jammu & Kashmir	104	116	110	113	120	179
Andaman & Nicobar Island	24	42	42	35	40	42
Lakshadweep Island	06	13	10	07	13	10

Source: MoCA

8.2.1.3 It is evident from Table 32 that connectivity to NER, J&K, A&N islands and Lakshadweep has grown at 43%, 72%, 75% and 67% respectively which are higher than the growth in Total Domestic Network at 39% in the period between 2006 and 2011.

8.2.1.4 Over a period of time, the air connectivity in the North-Eastern Region has grown from 290 flights per week in Summer Schedule 2007 to 370 flights per week in Summer Schedule 2011. Out of these 370 flights per week, a total of 113 flights per week are being operated by ATR42/72 type of aircraft for intra North-Eastern region connectivity. Airline-wise details of the flights are given in Table 33 suggesting that traffic to NER and intra-NER is shared by all the Scheduled Domestic operators.

Table 33: Number of flights per week operated by Indian Carriers in the North eastern region and other remote areas across two schedules

Airline	Flights/Week								
	SS 07	WS07	SS08	WS08	SS09	WS09	SS10	WS10	SS11
NACIL (I)	39	41	40	40	41	42	42	60	60
Alliance Air	72	73	74	68	68	64	64	71	71
Jet Airways	38	38	34	37	37	37	37	37	48
JetLite	14	14	28	28	28	28	28	28	38
Air Deccan	68	61	62	62	73	45	45	51	45
Kingfisher	27	24	20	21					
Spicejet	7	7	7	7	14	14	21	35	42
IndiGo	25	27	28	35	41	42	49	58	59
Go Air	-	-	-	-	7	7	7	7	7

Paramount		-	-	-	7		-	-
TOTAL	- 290	285	293	298	316	7 286	293	- 347	370

Note: SS:summer schedule;WS: Winter Schedule

Source: MoCA

8.2.1.5 In addition to scheduled air services, non-scheduled air services are being provided by North East Shuttle (a non-scheduled operator) with small aircraft. Pawan Hans Helicopters Ltd is also providing helicopters services in Arunachal Pradesh, Meghalaya, Tripura and Sikkim with subsidy from Govt. for carriage of passengers, emergency/medical evacuation, VIP transportation and Tourism. Global Vectra a private Helicopter operator also operates passenger services in Arunachal Pradesh. It is also encouraging to note that few States have started taking pro-active measures to promote air connectivity in their areas which includes development of airports, promotion of flying schools etc. States have started realizing that reduction in operations costs of airlines is the only way they can be attracted to fly to "thin routes".

8.2.2 Route Dispersal Guidelines

8.2.2.1 In accordance with the Route Dispersal Guidelines, all routes were divided into three categories viz. Category I, II and III. The route network existing at the time of formulation of route dispersal guidelines was evaluated based on capacity deployment on routes in terms of ASK deployed. Route categorization was based on traditionally surplus generating routes (Category I), loss making routes (Category II) and the remaining routes (Category III). The Category I routes were largely inter-metro routes and generated surplus that cross-subsidized losses largely on Category II routes which served regions of difficult terrain and destinations in remote areas. Implementation of Route dispersal guidelines aimed at ensuring that all players in the liberalized era would deploy capacity to destinations in remote areas and would participate equitably in providing air transportation to remote areas.

8.2.2.2 Following 12 inter-metro routes connecting metropolitan cities directly out of all routes were categorized as Category I routes given in Table 34.

Table 34: Category I routes: Inter-metro routes connecting metropolitan cities

Mumbai-Bangaluru	Mumbai-Hyderabad	Kolkata-Delhi	Delhi-Bangaluru
Mumbai-Kolkata	Mumbai-Chennai	Kolkata-Bangaluru	Delhi-Chennai
Mumbai-Delhi	Mumbai-Trivandrum	Kolkata-Chennai	Delhi-Hyderabad

Source: MoCA

8.2.2.3 Category II routes included routes connecting airports in North-Eastern region, Jammu and Kashmir, Andaman & Nicobar and Lakshadweep. Category III routes were routes other than those included in Category I and Category II. The guidelines also mandated a category within Category II, referred to as Category IIA or intra Category II, which consisted of routes exclusively within the North-Eastern region, Jammu & Kashmir, Andaman & Nicobar and Lakshadweep.

8.2.2.4 The historical data of ASK deployed in these route categories was compiled for almost 10 years to arrive at the percentages specified in the Route dispersal guidelines. It was obligatory on the part of scheduled airlines to deploy on Category II, IIA and III routes, a specified percentage of capacity deployed in Category I routes as per the following:

i) On Category II routes, at least 10% of the capacity deployed on routes in Category I. ii) On Category IIA routes, at least 10% of the capacity deployed on routes in Category II. iii) On Category III routes, at least 50% of the capacity deployed on routes in Category I.

8.2.2.5 The Route Dispersal Guidelines also mandated that for rendering the prescribed minimum service on routes in Category II and III, an operator may at his option provide the service either by aircraft in his fleet or with aircraft in any other operator's fleet on mutually agreed terms with the prior approval. To promote tourism, the Ministry of Civil Aviation declared operations on Cochin-Agatti-Cochin route as Category IIA in Jun 2006.

8.2.3 Issues of Concern

- Despite some degree of success of Route Dispersal Guidelines in ensuring air connectivity to North-Eastern Region, Jammu & Kashmir and other places, it is a fact that air connectivity has largely been confined to very few airports in these regions.
- The air connectivity is largely concentrated on routes connecting state capitals.
- Air connectivity has not increased proportionately on routes connecting Island airports.

8.2.3.1 Although all the scheduled domestic airlines are complying with mandatory capacity deployment requirements contained in Route Dispersal Guidelines, however, some parts of the country still remain unconnected by air services or partly connected. A closer scrutiny of the RDG reveals that RDG in itself offers only a partial solution to the issue of regional connectivity. The tendency has been that even in Category II and Category III routes, Airlines are said to prefer

to resort to cherry-picking or cream skimming and adopt only those routes which are comparatively more promising or lucrative while leaving the unviable sectors unserved or underserved.

8.2.3.2 The RDG being a matter of internal cross-subsidization between financially viable and un-economical routes for airlines, it does not appear to be sustainable to continue this in the long run given the nature and extent of remote and inaccessible areas in the country to be covered and the financial crisis the airline industry is facing. There is a strong view emerging in this sphere that in order to achieve the social objectives prescribed under the RDG, innovative mechanism needs to be evolved to achieve maximum impact. Under these circumstances, it is felt that there is a need to revisit the Naresh Chandra Committee Report that recommended Essential Air Services Fund (EASF).

8.2.3.3 The relevant portions of the Naresh Chandra Committee Report in this regard are reproduced below: As regards maintaining essential air services on routes that are strategically important but are commercially unviable, the government should provide explicit subsidy support, preferably through direct budgetary transfers or the imposition of a sector-specific cess or a combination of both. In addition, such support should be allocated through a transparent process of minimum subsidy bidding.

8.2.3.4 Here it is noteworthy that competitive tendering of subsidy for maintaining essential air services is a well-established practice in several countries, as it allows such routes to survive but on the basis of fair competition and at the lowest cost possible to the tax payer. For instance, the Remote Areas Subsidy Scheme (RASS) in Australia and the Essential Services (EAS) Programme in the U.S. are broadly based on minimum subsidy bidding."

8.2.3.5 The current arrangement for ensuring essential air services is not satisfactory. Review of route dispersal guidelines could at the best is a short term solution. A sustainable and durable solution in the long run could be found only in direct intervention. Development of small low cost 'no-frill' airports and regional airlines to be encouraged through providing direct subsidies in a transparent manner both for airport operator and for the carrier.

8.2.3.6 Suggestions have come to set up at least one heliport in each district headquarters as Helicopter Service is assuming important role in specific operations like disaster management emergency medical services, law enforcement and training purposes, etc. A framework of analysis is

required to be developed for deciding a set of parameters to evaluate proposals for locating airports in the country.

8.2.4 Airport Infrastructure in NER

8.2.4.1 There are 22 Airports and civil enclaves in the NER. Amongst these there are seven fully operational AAI airports in NER i.e. Agartala, Barapani (shilling), Dibrugarh, Dimapur, Guwahati, Imphal and Lilabari. In addition, there are four civil enclaves at IAF Airports in Jorhat, Bagdogra, Silchar and Tejpur which cater to scheduled civil flights.

A. Operational Airports

There are seven fully operational AAI Airports in NER i.e. Agartala, Barapani (Shillong), Dibrugarh, Dimapur, Guwahati, Imphal and Lilabari. In addition, there are four civil enclaves at IAF Airports in Jorhat, Bagdogra, Silchar and Tejpur which cater to scheduled civil flights.

B. Hub at Guwahati, Agartala, Imphal and Dibrugarh

As advised by the Ministry of DoNER, AAI has plans to develop Guwahati as a inter-regional hub and Dibrugarh, Imphal and Agartala as intra-regional hub. In this connection, AAI has already planned to construct three aircraft Maintenance Hangars at Guwahati and one each at Dibrugarh, Imphal and Agartala in order to facilitate early morning and late night air connectivity to and from the region.

C. Status of Non-operational Airports i. Daparizo Airport-

As a part of PM package for North-East Daparizo Airport in Arunachal Pradesh Shall be developed by AAI for 20 seater aircraft operations in Phase-I and for ATR-72 Operations in Phase-II Master Plan has been finalized and cost estimates for Phase-I development is being prepared.

ii. Tezu Airport-

Teju airport in Arunachal Pradesh is being developed by AAI with the financial grant of Rs. 79 Crores from MoDoNER, Govt of India as a part of PM package. The existing airport alongwith additional 108 acres of land has been handed over to AAI by the Arunachal Govt. Work for construction of boundary wall has already been taken up. Other major works shall be taken up as soon as already sought environmental clearance is obtained from MoEF.

iii. Ziro, Along and Passighat Airport-

Ziro, Along and Passighat in Arunachal Pradesh will also be developed as a part of PM package by IAF with civil enclave area as identified by Defence to be developed by AAI.

iv. Rupsi Airport-

It has been decided that Rupsi Airport in Assam be handed over to IAF by AAI, earmarking land to develop civil enclave by AAI. BTC has agreed to the proposal of development of Rupsi airport in lieu of new Greenfield airport in Kokrajhar provided proper road connectivity is ensured between Kokrajhar and Rupsi by the State Govt.

v. **Kamalpur-**

This place in Tripura belongs to AAI and can be developed for ATR-72 type of aircraft operations subject to availability of additional 50.5 acres of land already projected to the State Govt. State govt. is yet to respond in this matter.

vi. **Kailashahar, Aizwal and Khowai Airports-**

There is no proposal to develop Kailashahar, Aizwal and Khowai Airports.

D. Greenfield Airports in NE Region

i. **Pakyong (near Gangtok), Sikkim** – AAI is already constructing a Greenfield airport in all modern amenities for ATR 72 type of aircraft operations. The site is 33 Kms. South-West of Gangtok. PDC is June, 2012.

ii. **Itanagar (Arunachal Pradesh)** – A Greenfield airport to cater for AB-321type of aircraft operations has been proposed, initially, a site in Banderdeva was identified and a feasibility study was carried out. Preliminary cost of the project is Rs.812 crores. Likely completion cost is Rs. 989 crores. However, it was found to involve huge costs due to enormous earth cutting and deforestation required to enable further development. A preliminary study carried out by AAI at an alternate site both from technical as well as execution point of view with cost reduction. This new proposal prepared for further guidance in Feb.2011.

iii. **Chietu ,Kohima (Nagaland)** – A Greenfield airport to cater for ATR-72 type of aircraft in fair weather conditions has been proposed.

8.2.5 **Air connectivity to remote and inaccessible areas- suggestions from State Governments**

8.2.5.1 To a question posed to the state Governments as to what in their opinion was the best method

of providing air connectivity to remote and inaccessible areas in their states and policy measures that they would like to suggest for achieving the same, the state governments have given detailed suggestions based on their need, topography of the region and feasibility etc. Generally, this issue is considered quite important by almost all the states who have responded to the questionnaire. Quite a few states particularly from the NER have highlighted the need for urgent action in providing air connectivity in that region.

8.2.5.2 Some of the other states have offered to consider concessions in the matter of providing exemption from the taxes/levies to promote air connectivity in their states. States like MP and Rajasthan have offered even to share the burden by reducing the taxes applicable for fuel etc. Introduction of STOL (Short Take off and Landing) Aircraft Operations, plying light weight aircraft with multiple engines and by developing the infrastructure of the existing airports that are now non-operational are some of the important suggestions received.

8.2.5.3 Use of modern helicopters that integrates into local transportation system and introduction of low cost airliners were also considered as means of achieving air connectivity to remote areas in the state by some respondents. Detailed replies received form select states are reproduced below.

A. North-Eastern States

i. Assam:

- The pristine beauty of Assam and the entire North Eastern region holds great treasure. Assam and the entire NER is one of the most picturesque destinations or in other words it can be remarked as a traveler's delight where nature is in its virgin best with diverse range of flora and fauna in abundance. But the sorry state to this is that it is not as developed as it should have been and the reason behind this is the inaccessibility to some remote areas where civil aviation sector can do a lot.
- The best method of achieving air connectivity to these places can be done by creating heliport or aerodrome – Some of the picturesque places in Assam where there is an urgent need of a heliport or an aerodrome is listed below –

i) Majuli – Call it a living archaeological museum, a biodiversity hotspot or a geographical marvel – Majuli is more than the world's largest inhabitated river island in the expansive river Brahmaputra – it is the cultural soul of Assam.

ii) Haflong – Hill Station Haflong will be promoted for Eco-Adventure Tourism and establishing a helipad will be part of the project.

iii) Dibru-Saikhowa – The picturesque location at Dibru – Saikhowa is a feast to the eyes. It is a home to the regions only feral horses and it houses the largest salix swamp in the North-East.

iv) Dihing – Patkai – Dihing-Patkai is primarily a rainforest with white winged woodduck, hoolock, gibbon and many other rare species.

 Plying of helicopter is a costly affair and it is not affordable for all sections of people and thus it will not serve the main purpose. Instead of this we can ply light weight aircraft with multiple engines as Assam and the entire North East has a hilly terrain to its topography. By developing the infrastructure of the existing airport of the region that are now non-operational – The places need a heliport as far as tourism is concerned but there are also some other non operational airports like the Rupsi in Dhubri which need urgent up gradation and some operational Civil Enclaves at Tezpur, Silchar and Jorhat whose infrastructure is in a very diliapated state and needs development urgently subject to accessibility to this places via other mode of transport.

ii. Manipur:

It is proposed that helicopter services may be introduced in the State initially in the following routes mentioned considering likelihood of availability of passengers who would be willing to avail the services at these places:

(i) Imphal – Tamenglong – Jiribam – Tamenglong – Imphal (Thrice a week) (ii) Imphal – Moreh – Imphal (Daily basis).

a. Availability of Helipads with facility for passengers amenities and security :

(i) Imphal At Imphal Airport (Tulihal).

(ii) Tamenglong: At 11 AR Helipade, Tamenglong HQ.

(iii) Jiribam: At Jiribam High School Compound, Jiribam.

(iv) Moreh: At 31 AR Helipad, Moreh.

b. As the State Government is in a position to provide facilities like designated helipads, passengers amenities and security, the proposal for introduction of Helicopter Services in the routes indicated above may be conceived by the Working Group of NEC and may list up as one of the priority projects of the State of Manipur in the Air connectivity sector and to provide viability gap in the 12th Plan. Helicopters or regional aircraft or other low cost airport are feasible in the state.

iii. Mizoram:

Introduction of Helicopter's Services is considered vital in view of the Topographical feature of Mizoram and lack of reliable surface transport system. Besides providing Passenger Service, the Helicopter Service could usefully facilitate casualty evacuation and provision of emergency services in the event of natural calamity which are frequent. *Introduction of STOL (Short Take off and Landing) Aircraft Operation:* Taking into account the Topographical feature of Mizorams, it is considered that STOL aircraft can be effectively utilized to provide the needed air connectivity in Mizoram.

It is very difficult to locate suitable site for construction of major Domestic airports, however, there are places where short Runways and associated facilities can be constructed for STOL aircraft operation at number of places. Action is in hand to construct Greenfield airports for operation of this type of aircraft having 15-20 passenger capacity. One suitable site selected is located at the outskirts of Lungiei the District Headquarter known as KAWMZAWL.

iv. Sikkim:

The airport at Pakyong, East Sikkim is under construction and to connect the District and Sub-divisions, the Sikkim Govt. has decided to have a network of Helipads to provide better connectivity by Heliservice. A small air strip may also be constructed in other districts and hence a combination of aircraft and helicopter services can only provide a better connectivity in the state of Sikkim.

B. Other States

i. Andhra Pradesh:

There are many places which are of historic, religious, tourist importance and industrial locations which cannot be reached in the shortest duration of time. Hence the modern helicopter is one of the most versatile transportation vehicles and has the capability of providing a wide

variety of important services to any community that integrates this aircraft into local transportation system. In addition to the above low cost airliners is also the best method of achieving air connectivity to remote areas in the state.

ii. Himachal Pradesh:

The State has a Network of three airports namely Shimla, Kangra and Kullu and 57 operational helipads. Work on 12 new helipads is also in progress at present. These airports are only accessible by national level flights. Best method of achieving air connectivity to remote and inaccessible area in the State is helicoptering Services.

iii. Jharkand:

To connect the remote and inaccessible areas in the state of Jharkhand from capital Ranchi through Civil Aviation, the following policy measures could be taken on priority:

1. Through State owned Aircraft like Barron B-55, Zilin 143L from operational Airfield of State to Capital Ranchi.
2. Through Helicopter (on hire basis) to remote and inaccessible places and those places which are out of availability of operational Airfield.
3. The best prospects of air connectivity can also be set by air taxi link from different cities to capital either promotion on public private partnership or allow to totally private based operations.

Five low cost Government owned Airports (Palamu, Giridih, Dhanband, Dumka and Deoghar) are feasible in the state. As such, two private low cost Airports (Jamshedpur and Bakora) are governed and operated by TISCO and SAIL respectively.

iv. Rajasthan:

Most of the State Governments have their own airstrips and Helipads in various districts. Small operators can be invited to commence their air services to such remote and inaccessible areas by providing them concession or exemption from paying taxes on fuel and landing/parking charges or providing land on concessional/normal rates. The State of Rajasthan with its 24 airstrips has achieved air connectivity to remote and inaccessible areas. In the past 5 years, the State has spent more than Rs.200 crores in maintaining these airfields. The length of Air fields is being increased at some places and at other Air fields width is being increased. There should be a policy to

promote import and use of new type of smaller aircraft which could land in these small & short remote strips. Also, the centre can provide relief/Aid to maintain these airstrips. **v. Uttar Pradesh:** The best method of achieving air connectivity to remote and inaccessible areas in the State through Civil Aviation is to promote regional airlines which may connect such areas from big business centers like Central and state capitals and commercial centers like Kanpur. Central Government should launch incentive schemes to attract such airlines to connect new sectors. In the State of Uttar Pradesh, Lucknow and Varanasi have airports of Airports Authority of India and at Agra, Allahabad and Gorakhpur, there are civil enclaves of Airports Authority of India.

We would like that in the first phase, Lucknow, Agra, Allhabad, Gorakhpur and Varanasi are connected to each other by air link. Other Air force Air Stations in the State are at Bareilly, Hindon (Ghaziabad) and Sarsawa (Saharanpur). At Meerut, Aligarh, Amhat (Sultanpur), Myorpur (Sonbhandra), Faizabad, Kasya (kushinagar), Palia (Kheri), Shrawasti Akbarpur (Ambedkar Nagar), Farrukhabad, Saifai (Etawah), Moradabafd, Chitrakoot, Azamgarh and Andhau (Ghazipur), the state Government has its own airstrips. These airstrips can be used for starting regional airlines. Helicopter and the regional airlines would make a feasible mix proposition in the State.

vi. Chattisgarh:

The State Government claims to have taken certain initiatives to operate commercial domestic air services to connect seven districts of the state with the capital, but the said services could not be operated as yet. Besides, narrow air strips are being widened and action is being taken to obtain all government airport licenses. The plan to have ATC tower in 4 districts this year, has also been undertaken and provision has been made this year in the budget for this purpose.

vii. Kerala:

In Kerala, owing to its unique geography including coastal land, backwaters mountain ranges and hilly regions, Helicopter services, sea planes and amphibian services are feasible for providing intra state connectivity in the first phase and regional airport for 40-50 seater planes in the second phase. The existing road transport infrastructure in the state is saturated. Development is dense and the roads are congested. Widening of roads involve large scale displacements, demolitions and rehabilitation which results in public protests and agitations.

8.2.6 Key enablers

8.2.6.1 Essential Air Services Fund- a mechanism to enhance remote area connectivity

8.2.6.1.1 A number of suggestions have emerged during the consultation process that the Ministry initiated in this regard. Some of them are realistic and should merit serious consideration. Based on the inputs received from various quarters and based on the recommendations of different committees appointed by MoCA from time to time, certain suggestions have been found to be of immediate relevance. While they need to be analyzed from the point of view for implementation, one recommendation of Naresh Chandra committee that was subsequently reiterated by Rohit Nandan Committee relates to direct intervention by the Government for ensuring connectivity in remote and inaccessible areas through a market based mechanism. The scheme proposed for adoption is discussed in details in succeeding paragraphs.

8.2.6.1.2 Air Connectivity to regional, remote and inaccessible areas is crucially dependent upon availability of infrastructure and viability of air traffic operations. Air services to some regional, remote or peripheral destinations may not be commercially viable, mainly due to a very low traffic volume, and therefore they would not be provided by the commercially conscious airline enterprises. The current arrangement for ensuring essential air services to the remote and inaccessible areas of the country through the mandate of Route Dispersal Guidelines is not satisfactory. Feedback received from the states suggests that connectivity to many parts of their states continue to be underserved or unserved.

8.2.6.1.3 World over, it is not uncommon to come across direct intervention mechanisms evolved by the Governments to provide essential Air Connectivity to underserved and unserved regions. Existing EAS schemes, most of which are applied to domestic air services, have in common, a number of features: they are aimed at linking small communities with larger ones; involve support for the operation of services or routes, the support generally comes from central budgetary allocations; the mechanism involves a transparent public competitive tender or application process for carrier selection; the provision of subsidies, the concession or licence granted is contractual and time-limited; and, the regulatory elements may cover frequency, capacity, levels and conditions of air fares, and standard of service.

8.2.6.1.4 In order to further encourage provision of air transport services on such un-economical but essential routes it would be desirable to consider providing explicit subsidy support from Essential Air Service Fund (EASF), to be established in this behalf, through a transparent

process of minimum subsidy bidding. This would enable such subsidy to go to the most efficient carrier at the lowest cost to the public and may also lead to development of the region as a result of the enhanced connectivity. A transparent mechanism will identify uneconomic routes, decide minimum capacity requirements and oversee the bidding process.

8.2.6.1.5 EASF could also be utilized for the development of low cost regional airports as well as those that are owned either by the AAI or by the State Governments. It may even be considered for JVs or Private Airports which are publicly used. The EASF may also be made available for development of Heliports. About one-third of EASF could be ear-marked for providing critical viability gap funding to regional airports in under-served/un-served areas. This would include setting up of ATC services.

8.2.6.1.6 Such a scheme if well conceived and implemented could have the potential of achieving the objective of providing remote area connectivity without burdening the Carriers and without any other market distorting impact.

8.2.6.1.7 This Working Group suggests establishment of a non-lapsable exclusive fund to provide explicit and direct subsidies to airlines (SOPs/RSOPs/Non-Scheduled operators) to make up for viability gaps on these routes for the airlines and for airports to be set up in the identified areas. Work relating to the process of stakeholder consultation in this regard has already begun. Detailed policy guidelines would be evolved after due consultations with the stakeholders. This fund may either be termed as EASF as envisioned by Naresh Chandra Committee or Regional Air Connectivity Fund (RACF) to reflect its purpose and character. While budgetary support would be required for this purpose, the Ministry could consider augmenting the fund through a cess on domestic passengers chargeable through the ticket by airlines and deposit in the EASF/RCF on the pattern of current PSF.

8.3 Key Challenge III-Land Requirement for Airport Development

8.3.1 Overview

8.3.1.1 Land requirement for airport development is completely different from the requirements of other transport sectors like Road and Rail; in that sense, airport development does not require a long stretch of a narrow strip of land. What is required is huge piece of land at one place. Land selection is extremely important for airport development considering the requirements of ICAO

which have to be fulfilled and safety of airport operation, which is of paramount importance in aviation.

8.3.1.2 Further, the area required for air port development at any point of time has to be decided based on current and on future requirements. This involves scientific forecast of air traffic based on sound economic criteria and proven statistical methods. Future growth of air transport services is likely to witness significant dispersal of traffic beyond metro airports. Any delay in completion of airport project due to land related issues would not only affect the project cost but also increase the payback period and can potentially make project unviable.

8.3.1.3 Airport projects are capital intensive and have long gestation period. In order to develop a Greenfield airport, land has to be provided by the respective state government which may sometime necessitate land acquisition from respective land owners residing in the vicinity of airport. Country needs to have a strong and predictable regulatory frame work in place for land acquisition so as to meet both the objectives of protecting the fair and reasonable rights of land owners and to meet the requirement of development of airports to provide connectivity and through that maximize economic gains to the hinterland.

8.3.2 Role of States in development of new airports and expansion/modernization of existing airports

8.3.2.1 This section summarizes replies of the states to three inter-related questions on the issue of development of new airports and modernization of existing airports and the role of the State Governments in the endeavor.

8.3.2.2 The three inter-related questions cover issues such as the best mechanism for land acquisition, area development and city side development of airports, the best method of resource mobilization towards this and the role of State Governments. Their suggestions are reproduced in the following paragraphs:

i. **Assam:**

- The project Land acquisition cost should be built into the state plan budget. In consultation with the District Administration, availability of land can be traced and as per rules laid in the law of the state and in consultation with concerned entity to which the land in question belongs, we can expedite land acquisition in a region. For any development/ up gradation of existing airports and for development of new Airports and for developments of new airports the following points need to be kept in mind –

  - Concept of 'Sustainable Development' should be followed in acquisition of land for development
  - It should not create any ecological imbalance to the floras and faunas of the region.
  - To take the people around in confidence.
  - Proper compensation.
  - Proper rehabilitation programme-if required.

- In this regard working committee should be set up with members from both the public and the Civil Aviation sector to monitor the progress.
- On the issue of area development and city side development, the land can be provided by state Government with development left to Government of India. Area around an airport can be developed to a great extent. Some of them are –

  - By Building star category hotels in the vicinity of the airport.
  - Amusement Park – ➢ Culture Centre –.
  - Malls with all the modern amenities.
  - Quality eating hubs.

ii. Andhra Pradesh

- Land can be acquired through the provisions of Land Acquisition Act. The State Govt. can facilitate acquiring land and the cost may be borne by developer initially and later adjusted against the lease rentals to be paid by the developers. The best method of raising resources for development of new airports is to encourage PPP model. It is also desirable to arrange for Viability Gap Fund to make the projects more viable and realistic.

iii. Himachal Pradesh

- The state Governments has been acquiring land for the development/ up gradation of existing airports and other associated infrastructure. The Government has paid a huge amount for the payment of land compensation awarded by various courts from time to time. The State Government would also acquire land for the development of any new airport also in future with prior consent of majority of landowners and having proper rehabilitation and re settlement plan for them.
- However, keeping in view the ill finance health of the State Government, it is desirable that MoCA, GoI should take up this initiative on priority basis. We have made available the land to the Airports Authority of India (AAI) free of cost free from all encumbrances for the development of existing three airports. But keeping in view the large amount of enhanced land compensation being awarded by various courts, it has been decided that all such lands will be transferred to the AAI immediately and the AAI will also be impleaded as party in the courts in such cases in future so that the burden of the State exchequer on account of enhanced land compensation could be lessened.
- The State Government has decided to extend all holistic supports and other basic infrastructure such as water, electricity, use of existing network of airports and helipads (57 Nos.) and facilitating clearances required from other government/non government agencies for area development around the airport.

iv. Jharkand

- The land acquisition and requisition process could be processed out as per tenth report of law commission of India, relevant State rehabilitation policy and in particular to State of Jharkhand the Chotanagpur Tenancy Act. In the case of defense land acquisition, the constituted action committee must assign and nominate the relevant responsible officer

from Army, Defense estate officer and also a member from Ministry of Defence, Govt. Of India on availability to resolve the acquisition/requisition issue properly and as per the "Defense of India Act, 1939" as well to ensure the development/up gradation of existing airports.

- In the matter of area development and city side development of the airport the state Government should posses and strictly maintain following points:

  a) In the city side, the high rise trees which are hindrances during landing and takeoff of aircraft must be removed from approach side.
  b) There should not be presence any of meat shops in city side nearer to airports which can attract vulture, falcon and other avian in sky which could be a hazard for air safety.
  c) There should be stoppage of further construction of high rise buildings and high rise apartments in outskirts funnel of airports in city side and relevant Govt. norms must be tightened and followed strictly.

v. Rajasthan

- Land acquisition for construction of new airports and development/up gradation of existing airports need to be streamlined and the issue of compensation of land is very important. The compensation should be given at par of market value. Land acquisition/up gradation at existing airports/new airports should be planned well in advance. It has to be done with the consultation of land revenue authorities; compensation be paid at the market rates. The burden of compensation should not be entirely of State Government. It could be 50% each for both State Govt. and AAI. Work for development of new airports and up gradation and modernization of existing airports may be given on Public Private Partnership (PPP) basis for raising resources. The Private partnership ensures optimum economic growth and utilization of airport and ancillary assets.
- On the area development and city side development, state Government has to make a specific policy to ascertain the future requirements of airports as a whole and to earmark the land required for the construction of airports to avoid encroachments around the area. Also, State Government has to make requisite plans to develop City side area to connect the airport with Cities. The State Government should regulate the development of the airport area in a well planned manner ensuring-

a) No high-rise building permitted near airports.

b) Restriction on unplanned housing.

c) Leaving of green belts in the near vicinity.

d) Restriction on housing/markets/mails/population spots in the vicinity of the airports.

e) Prohibition of slaughter houses.

vi. Chhattisgarh

- The main difficulty in the development of an airport is to acquire land as it is in the proximity of forest land. In view of the future demand, the land nearby airport/air strip should be earmarked for its extension. The policy of National Airports Authority is that it develops only those air strips where it gets the land free of cost. Government land can be given free of cost by the State Government but for the land acquired from farmers, the compensation for the land should be given by the National Airports Authority. For this, provision in the budget of NAA is essential.

vii. Uttar Pradesh

- The best mechanism of the land acquisition is to purchase the land through direct negotiation with the land owners. The State Government through concerned District Magistrate can help in the process of negotiation.
- The best method of raising resources for development of new airports and up gradation and modernization of existing airports shall be through Public Private Partnership model linked with area development and city side development. For these purposes, nonaviation revenue needs to be tapped so as to fill in the viability gap.
- Area development and city side development of airports is a major non aviation revenue source for the aviation industry. This non-aviation revenue sources should be tapped for the benefit of aviation in the country. State may help in area development where as city side development should be left to airport developer to subsidies the cost of development of the airports.

viii. Nagaland

- The State Government can take up the responsibility of acquiring the land on payment of compensation by the agencies responsible for developing the airport.

ix. Sikkim

- The best mechanism would be to make the State a partner in the project for all logistics and legal support without any financial involvement on the part of the State. The State Govt. must be involved in all decision making process to facilitate the process in this respect.
- Regarding area development and city side development, the State should play important role as ultimately the airport will serve the state and hence a proper coordination between the state and central Government on Civil Aviation matter is very important.

x. Kerala

- In the development/modernization of airports, PPP model would be a very viable and practical model wherein Government also should have an active stake and control especially in policy matters, so that no excesses are committed which may lead to burdens on the passengers or on the citizens. In the private Greenfield airports, Kerala has adopted a private participate model wherein NRIs and people of the state (who would be the potential users of the airport) have been permitted stake in the form of equity shares, which gives a greater participation & involvement and prevents any undue exploitation by a single agency or a group. Maximum participation should be permitted, but management should be highly skilled and experienced multidisciplinary airport professionals.

xi. Mizoram

- In our view, the best method of raising resources for development of new airports and up gradation and modernization of existing airport could be increase in the PSF (Passengers Service Fee) and generous provision of reasonable Developmental Fund from the various sources under the Central Government, for example: Ministry of Civil Aviation, NEC, Ministry of DONER etc.

xii. Manipur

- The suggestion for raising resources for airport development and modernization is to raise parking fees/entry fees/leasing of floor areas for running cafeteria, shopping malls, coffee

bars, gift stalls & other amenities/facilities which may deemed fit and encouragement of Private Public Partnership (PPP) model.

8.3.3 Key Enablers

8.3.3.1 Summary of suggestions from State Governments

From the general tenor of reply to the question relating to land acquisition, it appears that many of them apprehend litigations in the process of land acquisition and therefore they expect the air port developer to share the responsibility for land acquisition. There is a strongly felt need for a common policy by the Government of India for land acquisition in respect of air port development among other purposes given the controversies that it has generated in the recent past and the apprehensions expressed by the stakeholders. On the question of the preferred method of raising resources for development of new airports and expansion/modernization of existing airports, generally the states are of the view that PPP model is appropriate for the purpose. However some states in the NER have suggested Government funding and raising resources through non-aeronautical sources. Very useful suggestions have been received in the matter of area development and city side development of airports particularly with reference to certain regulations to be enforced with regard to real estate developments in the vicinity of airport. In general, State governments are not averse to facilitate the development of area around airports. These may be kept in view while considering the Greenfield development of airport and also in expansion of capacity of existing airports in the country.

8.4 Key Challenge IV- Safety and Security in Civil Aviation

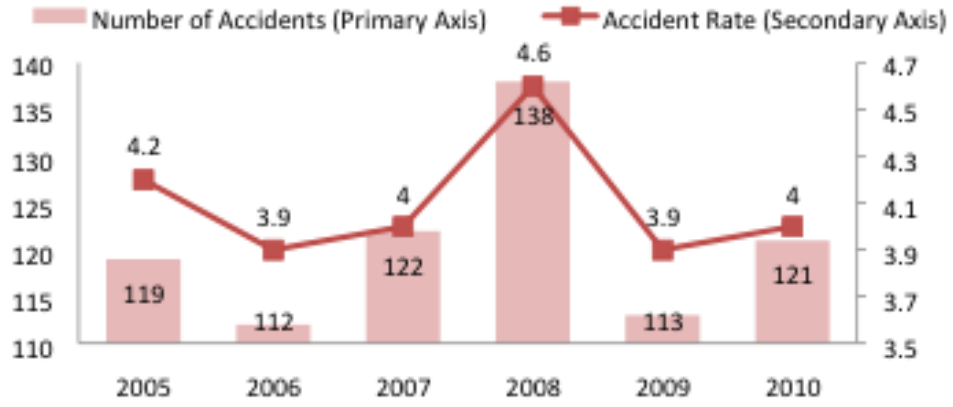
8.4.1 Overview

8.4.1.1 Safety is of paramount importance in air transportation. The safety levels that global air transport enjoys today represent an achievement built on the determination and efforts of the entire aviation community. Over the past decade, the aviation community has witnessed a fundamental shift in its approach to safety. ICAO and partnering stakeholders have been developing and implementing pragmatic, risk-based approaches to address emerging global safety issues and to better focus the Organization's support to States with more pronounced

safety challenges. Worldwide scheduled traffic volume experienced a year-over-year increase of 4.5 per cent in 2010, setting a new record of more than 30.5 million departures. By 2030, that number is expected to reach more than 52 million annually.

8.4.1.2 Following Graph 33 shows the accident records of scheduled commercial flights of 191 contracting states of ICAO for a period of five years from 2005-2010. Data pertains to scheduled commercial operations that involve the transportation of passengers, cargo and mail for remuneration or hire. Graph 35 shows the trends in accident rate since 2005 to 2010 per million departures (scheduled commercial flights).

Graph 35: Trends in global aviation accidents 2005-2010



ICAO studies the accident rate based on scheduled commercial air traffic with a Maximum Take-off Weight (MTOW) above 2250 kg

Source: ICAO, State of global Safety, 2011

8.4.1.3 Globally, the number of accidents attributed to scheduled commercial flights increased in 2010 to 121, compared to 113 in 2009. This resulted in an accident rate of 4.0 per million departures, a marginal increase compared to the accident rate of 3.9 per million departures in 2009. To further analyze the state of aviation safety, the accident data for scheduled commercial air transport is broken down according to United Nations regions. Table35 provides insight into the state of aviation safety in different regions in the context of global outcomes.

Table 35: Region-wise aviation accident statistics: 2010

Region	Traffic	Accidents	
		Number	Rate
Africa	1,013063	17	16.8

Asia	7,629,403	24	3.1
Europe	7,263,218	24	3.3
Latin America & Caribbean	2,976,375	16	5.4
North America	10,624,134	35	3.3
Oceania	1,050,120	5	4.8
World	30,556,513	121	4

Source: Source: ICAO, State of global Safety

8.4.1.4 Asian region which ranks second in terms of share in global air traffic has seen the lowest accident rate. While Africa has the lowest percentage of global traffic volume, it has the highest accident rate. Based on an analysis of accident data covering the 2005– 2010 time period, ICAO has identified 3 high-risk accident occurrence categories and these are:

- Runway safety related events
- Loss of control in-flight
- Controlled flight into terrain

8.4.1.5 Runway safety related events include: Abnormal Runway Contact, Bird strike, Ground Collision, Ground Handling, Runway Excursion, Runway Incursion, Loss of Control on Ground, Collision with obstacle(s), Undershoot / Overshoot, Aerodrome.

8.4.2 Aircraft movements in India and its safety record

8.4.2.1 The Aircraft Movement reflects the number of landing and take-off of aircraft at an airport in a particular period. The significance of Aircraft Movement arises from its direct link with passenger and cargo traffic. As passenger and cargo traffic is expected to grow significantly up till 2030, the aircraft movement is also projected to grow along with the same. This surge in aircraft movement will require state-of-the art airport infrastructure in the form of better runways/ taxiways/ CNS/ATM facilities[88]and efficient airspace management.

[88] CNS refers to Communication Navigation and Surveillance; ATM refers to Air Traffic Management

Table 36: Aircraft Movement of Scheduled Carriers

Year	Aircraft Movement (in '000s)		
	International	Domestic	Total
1995-96	86	281	367
2003-04	126	460	586
2010-11	288	1042	1330
	CAGR (%)		
(1995-96 to 2003-04)	4.9	6.4	6
(2004-05 to 2010-11)	11.1	12.5	12.2
(1995-96 to 2010-11)	8.4	9.1	9

Source: DGCA; Analysis: MoCA

8.4.2.2 From Table 36, it is evident that post 2004-05, which is considered as the watershed year of Indian aviation, aircraft movement grew at a CAGR of 12.2% overall.

8.4.2.3 The forecasts given in Table 37 will assist in making appropriate assessment for planning the technological up gradation, in creating and strengthening other safety regulatory framework that would be required to manage the surge in aircraft movement.

Table 37: Forecasted Aircraft Movement of Scheduled Carriers

Five Year Plans	Domestic (Millions)	International (Millions)	Total (Millions)
12th Plan (2016-17)	2.3	0.6	2.9
13th Plan (2021-22)	4.3	1.0	5.3
14th Plan (2026-27)	7.3	1.7	9
15th Plan (2031-32)	11.5	2.8	14.3
	CAGR (%)		
12th Plan (2016-17)	13.3%	14.3%	14.1%
13th Plan (2021-22)	10.8%	13.3%	12.8%
14th Plan (2026-27)	10.9%	11.4%	11.3%
15th Plan (2031-32)	11.0%	9.6%	9.9%
2010-11 to 2020-21	12.0%	13.7%	13.3%
2010-11 to 2031-32	11.4%	12.1%	12.0%

Source: DGCA; Analysis: MoCA

Note: The data for the respective plans pertains to the data of the final year of the Five Year Plan

8.4.2.4 Results of forecast of aircraft movement of scheduled Carriers in India indicate that there will be fourteen million aircraft movements in India by 2031-32 as against 1.33 million in 2011.. In addition to that there will also be a surge in the movement of aircrafts including helicopters on the General aviation side too. Now the challenge is to sustain the growth rate at one hand and keep the check on safety issues on other hand.

8.4.2.5 As per the DGCA data India had witnessed only four accidents in scheduled commercial air transport over a period from 2000-2010. Adopting the same definition and parameters as seen in ICAO analysis for depicting the trend in Global aviation accident rates, the Indian safety record in this respect is given in the Table 38.

Table38: Classification of Accidents (Powered Aircraft) by nature of flight

Year	Nature of flight	
	Airline operations[89]	**Non-Scheduled Operations[90]**
2000	01	Nil
2001	Nil	04
2002	Nil	03
2003	Nil	06
2004	Nil	02

[89] **Airline Operation:** The operation include all scheduled, non-scheduled and non-revenue flying by Air India, Air India Express, Indian Airlines, Alliance Air, Jet Airways, Jetlite, MDLR, Kingfisher, Go Air, Spicejet, Paramount and Indigo.

[90] **Non-Scheduled Operations:** The operation includes all non-scheduled ferry; non-revenue, charter and test flying by other operators holding non-scheduled operators permit and engaged primarily in such operations.

2005	Nil	03
2006	Nil	01
2007	01	01
2008	Nil	02
2009	01	Not Available
2010	01	Not Available

Source: DGCA

8.4.2.6 After a period of six years with no accidents, Scheduled commercial operations in India witnessed three accidents in last four year period from 2007-2010 of which one was fatal, which caused a huge loss of human lives. Twenty two accidents were reported to have occurred on account of the Non-scheduled operations during the last ten years.

8.4.2.7 Exemplary actions should be taken to change the mindset of aviation personnel to ensure the safety practices and adherence to laid down procedure/process. This would help in ensuring safety for future on one hand and in determination of responsibility of respective authorities on the other hand. There should be a safety analysis team constantly working / monitoring on such issues to draw learning from past mistake so that same is not repeated in the future and which can suggest some proactive steps to achieve low accident rate.

8.4.3 Safety issues in Civil Aviation

8.4.3.1 Interaction with stakeholders revealed varied safety concerns and possible solutions. These have been summarized in the following paragraphs.

8.4.4 Need to review regulatory framework

8.4.4.1 Though regulatory framework is amended from time to time to suit immediate needs and to meet safety norms, the basic regulatory structure remains archaic. Stakeholders indicated that DGCA broadly conforms to ICAO norms, but lacks in detailed regulatory framework which is essential for safe operations. While model regulations based on US and European regulations are available, the same have not been adopted by DGCA due to lack of in-house resources to undertake a complete review.

8.4.4.2 In a study recently carried out by ICAO, it has been recommended that a review and revision of

the complete aviation regulation should be undertaken to bring it at par with international standards. DGCA is pursuing the recommendation. Bringing the legislation (i.e. of Civil Aviation Authority) of an international standard will enhance the knowledge levels, skills and overall competence of various categories of personnel including flight crew. In addition, clearly defined operations regulations will remove anomalies and duplications in existing regulations, thus ensuring compliance in a uniform manner, and enable the airlines to evolve methods of meeting high safety standards.

8.4.5 Need for a strong regulatory regime

8.4.5.1 The effectiveness of DGCA has been affected by shortage of experienced manpower to oversee fast growing aviation activities in the country. Safety oversight, regular audits and monitoring of operations of stake-holders is one of the primary responsibilities of DGCA. It is not possible to carry out meaningful audits, surveillance of a large number of airlines, nonscheduled operators, training institutes for pilots and engineers, maintenance organizations, airport service providers without the adequately trained staff.

8.4.5.2 In addition DGCA has to discharge its responsibilities of compliance with ICAO standards, approve organizations, license personnel, certify organizations, aircraft, communication systems etc. Investigation into incidents and accidents and learning from the outcome of such investigation by implementation of the ensuing recommendations etc cast huge responsibilities on the regulator. The responsibilities of DGCA are enormous and beyond the comprehension of those who are not familiar with its working.

8.4.5.3 DGCA has been crippled by the absence of the required minimum manpower, which was reduced to half over the years due to officers retiring and the organization not being able to recruit. Though 429 professional positions were created/ revived on 1 May 2009, no regular recruitments could be made and DGCA had to make do with temporary personnel recruited on short term basis. It is clear that as a normal government subordinate office, speedy recruitments are not possible. In order to strengthen the DGCA with powers to recruit and train the regulation professionals, ICAO has recommended transformation of DGCA into a Civil Aviation Authority (CAA) with necessary autonomy.

8.4.6 Development of infrastructure

8.4.6.1 With the increase in aviation activity, the ground and air space congestion at the airport is a

major safety concern. The simultaneous use of runways requires parallel runways. Providing additional airports with parallel runways and adequate parking areas for all categories of aircraft is a huge challenge.

8.4.6.2 With the rate of increase in traffic, the congestion at Delhi and Mumbai airport is expected to worsen. This will result in increase in flight time and operational costs. The reducing separation between aircraft approaching the airports, and holding patterns of aircraft while awaiting their turns for lining-up for landing imposes tremendous stress on air traffic controllers and pilots. Notwithstanding extra fuel burns, the operation has a very high risk factor.

8.4.6.3 It is seen that most busy international cities have more than one airport. General Aviation does not appear to be a priority issue for private airport operators. At Mumbai, since immediate expansion of the existing airport is not possible, an additional airport with parallel runways emerges as a safety requirement. Serious work in this regard should start immediately. Similarly, heliports should be planned and constructed to ease some pressure on busy airports.

8.4.7 Infrastructure for Ground and Air navigation

8.4.7.1 The introduction of space based navigation system and use of satellites for navigation is on the cards. However, certification and implementation of the system and use of this facility in a safe manner is a matter of concern. With the expertise in the field being limited, DGCA has created an ANS Directorate to meet the task. However, help from external agency will be needed for certification to facilitate commissioning of the system. Up gradation of ILS landing system is also considered on priority. There are several airports affected by fog and low visibility conditions and low visibility procedures are required to be implemented which include installation of aids and training of pilots.

8.4.8 Training Facilities

8.4.8.1 Training facilities for various categories of aviation personal have not yet reached to a satisfactory level. While airlines are able to meet their requirements for technical training within the country, operational/ flying training for many airlines is carried out abroad. Establishment of additional Simulator training organization both for flying and maintenance training will help airlines to carry out meaningful skill tests within the country. Presently, relaxed FDI norms have not succeeded in attracting installation of simulators for airline aircraft. It may be necessary to

mandate installing simulators for training of pilots and engineers if the fleet size of an airline exceeds say 20 aircraft of a type. The last decade has seen serious efforts by private stakeholders to set up simulators at Bangalore. Similar efforts are needed at other places.

8.4.8.2 Many institutes have come up in private sector which train pilots, engineers, ground staff, cabin crew, and aviation management. Though pilot and engineers' training is approved by DGCA, there is a need to bring all these under one umbrella of a university or deemed university to give the aviation courses a recognition and respect they deserve. This will attract good students into aviation and help students to take up employment outside the narrow aviation field.

8.4.9 Enforcement Actions

8.4.9.1 For meaningful enforcement action, the published regulations should be explicit, clear and unambiguous. The enforcement personnel should be trained in objective interpretation of regulations.

8.4.9.2 An appellate mechanism outside DGCA, preferably in the Ministry of Civil Aviation, should be available to operators to ensure fair enforcement of regulations. The regulator's action for enforcement of laws and regulations requires a legal process of filing an FIR in each case. Though provisions of fine and imprisonment have been made, these are seldom used due to lengthy legal process involved, and in absence of an aviation regulation. For instant enforcement action a system of summary fine should be introduced, as is provided for in other means of transport (railways, metro etc.) in India and in many other countries.

8.4.10 Need for adequate maintenance facilities

8.4.10.1 For proper maintenance of aircraft, adequate facilities are needed which include trained personnel, tools, equipment, spares, consumables and proper working conditions. Increased requirement for maintenance of aircraft would need additional hangar spaces, engine run-up areas, maintenance personnel duty limitation periods and rest facilities etc. If not catered to, the excessive working hours may cause maintenance errors which may lead to a hazardous situation.

8.4.10.2 To address the issue effectively, MRO zones can be created with working environments which are conducive to proper maintenance. In addition, dedicated areas at select aerodromes should be identified for offering to MROs to start new ventures. Particular effort is also needed to encourage component overhaul facilities, which is almost non-existent at present. Such activity attracts 100 percent FDI and need not be located at airports.

8.4.10.3 To encourage MROs, fiscal reforms are needed, as there are bottlenecks of customs duties on spares, consumables and clearance procedures which at times delay the availability of spares for replacement in operating aircraft similar reforms were introduced by the Government in IT sector.

8.4.11 **Modern Operating Procedures**

8.4.11.1 With the advancement in technology, aircrafts are produced with capacity to perform highly automated flights. These include low visibility operations, instrument approaches, performance based navigation etc. It is essential that Indian pilots develop an expertise in performing these operations in a safe manner. The airlines have their respective training departments which provide such training. These procedures emphasize extensive use of simulators capable of appropriately training pilots. DGCA and AAI should invest in development of modern operating procedures and enforce adoption by airlines.

8.4.11.2 In the General Aviation (GA) (non-scheduled) sector, this aspect of flight training is not adequately addressed. The GA sector needs to be organized to introduce manufacturers' recommended training profiles, to ensure that GA pilots are as proficient in handling modern aircraft as the airline pilots. Presently, many operators resort to actual aircraft proficiency checks which are not desirable as emergencies cannot be simulated in such exercises. The use of simulators during skill tests and practice in emergencies should be made mandatory. A formal GA division needs to be created in the regulators organization to addressed GA issues.

8.4.12 **Key Enablers**

8.4.12.1 A comprehensive audit of DGCA was carried out by ICAO in 2006 as part of ICAO's universal safety oversight programme. There were 70 observations made highlighting the need for strong DGCA organization capable of discharging its functions. The critical areas analyzed including

technical manpower, training of personnel, legislation, oversight capability and resolution of safety issues etc.

8.4.12.2 Areas found to be deficient included adequate technical guidance for DGCA inspectors, hiring and retaining technical personnel in DGCA, establishment of an on-going surveillance programme of air operators and resolution of identified safety issues. In the last few years DGCA has taken adequate action and most of the findings and audit observations have been resolved. However, in the light of recent increase in aviation activity and the anticipated growth, DGCAs infrastructure will need to be upgraded and the organization modernized to meet the challenges of growth.

8.4.12.3 The infrastructure development includes proper working environment. Ever since the bifurcation of DGCA and creation of Airports Authority, the residual DGCA has remained stagnant in terms of manpower, equipment, office accommodation and new developmental projects. Construction of adequate office accommodation will provide good working environment. Many DGCA offices have been working from congested and ill maintained buildings. Construction of modern offices for Head quarters and regional offices will improve the efficiency and image.

8.4.12.4 Though availability of qualified human resources and their training continues to be a challenging task, DGCA has endeavored to establish and institutionalize systemic reforms. Establishment of a training academy is a step towards ensuring that all officers receive proper induction training, recurrent training and training on special subjects to improve their skills. Dedicated staff for the training academy has already been sanctioned. As a joint venture with AAI, the training academy will ensure world class capability to enhance the skills of inspectors in various fields.

8.4.12.5 An ambitious scheme has been proposed to introduce IT systems in DGCA. Though airlines have introduced modern computer based maintenance and operational techniques, DGCA is yet to introduce similar working procedures. A comprehensive computerization plan has been proposed. This will revolutionize the working and record keeping. A database of Pilots' qualifications, tests, medical records, engineers' qualifications, air traffic controllers and other licensed personnel is essentially needed to replace the paper records held so far. Also, there is an urgent need to computerize the examination process by introducing on-line and ondemand

examination system which will utilize a computerized question data bank, and eliminate any likely chances of unfair means in the examination process.

8.4.12.6 DGCA needs to be restructured and strengthened with modernized processes and skills before it is subsumed into the Civil Aviation Authority that is on the anvil. The Plan includes schemes to procure equipment for medical tests for defence medical establishments, which is an ongoing scheme. The Plan provides for modernizing its accident investigation capability, by providing necessary tools. An Accident Investigation division independent of DGCA has already been established in the Ministry of Civil Aviation.

8.4.12.7 Adequate provision has also been made in the 12th Five year plan to institute studies with the help of ICAO and other international safety agencies. This scheme will help introduce modern international concepts in managing the safety issues, regulatory reforms needed, and augmenting work in specialized areas such as general aviation, helicopter operations, seaplane operations, maintenance and repair organizations, future navigation systems etc. In a dynamic organization such studies will bring reforms in procedures on a continued basis.

8.4.13 **Security aspects in Civil Aviation**

8.4.13.1 The increase in traffic is going to cause a heavy pressure on airports and security infrastructure. Indian airports have been designed and approved by BCAS with a specific carrying capacity in the Security Hold Area. This is likely to explode in the years to come, leading to heavy rushes and demand for better facilitation. An additional dimension of increased traffic would be a democratization of passenger profile. Social classes, who have been excluded from Civil Aviation benefits, would use aviation as a preferred mode of transport.

8.4.13.2 The present largely middle class and urban clientele of airlines would expand to cover sub-urban and rural passengers as well, which might have little appreciation for patience with security regulations. As the cities are likely to grow, airports are bound to get surrounded by human habitation, which would bring airports boundaries very close to unforeseen threats. The proximity of habitation close to airports will involve the possibility of use of weapons like MANPADS etc., which would need to be carefully monitored.

8.4.13.3 Privatization of airports would also radically alter structure and line of command. The present

dependence on largely indigenous Airports level Committees for formulation of Crisis Management Plans and their implementation would need to be reviewed. There is an increasing trend of Chief Executive Officers of many private operators being foreigners. This trend is likely to accelerate in the years to come. The issue of assigning security functions to entities headed by foreigners would need to be addressed.

8.4.13.4 As the need for airport expansion becomes pressing, there would be an increased need of acquisition of additional land which will create law and order situations and result in location of airports in hostile environment. This would also be the case in new airports.

8.4.13.5 With an increasing demand of world-class infrastructure airports would have facilities like transit hotels which will not only overlook the air-side but also have issues of ingress and egress of users/employees. A clear-cut protocol would be needed to be developed to regulate the security threats arising of such facilities. Dangers inherent in the transport of Cargo and combo flights have been repeatedly experienced by nations across the world. The recent case of an attempt to smuggle explosives in computer printers in Yemen is indicative of the dangers inherent in this. As Cargo grows in the country, it would be necessary to address this matter effectively.

8.4.13.6 The development of new airports would generally take place at distances away from towns due to non-availability of land. This would necessitate use of multi-modal modes of transport to take passengers to the airport and bring them to the city. Metro connectivity to modern airports would increase with a period of time and as in Delhi some part of the Metro tunnel might be under the Terminals. The possibility of sabotage in such cases would be a continued source of threat. Over the next 2 decades threats to civil aviation security are likely to come from following sources:-

(i) Terrorists

(ii) Cyber Terrorists/Hackers

(iii) Criminals

(iv) Psychopaths

(v) Disgruntled employees seeking revenge or motivated by the desire for embarrassing their airlines.

(vi) Industrial unrest

(vii) Insurgents

(viii) Politically motivated groups like Maoists etc.,

(ix) Hostile local population due to issues of pollution due to emissions and sounds as well as due to forcible acquisition of land

8.4.13.7 Due to privatization of airports and heavy encroachments involved, it would be natural for an airport operator to optimally commercialize space management to earn maximum revenues. The number of concessionaires in such airports is bound to increase and their commercial interests are likely to clash with security concerns. As airports expand large number of workforce would be required to maintain services as well as to do repair work on a continuous basis. The likelihood of such workmen who might be drawn from the local floating population entering into Terminals and Air-side area would be huge, leading to security problems.

8.4.13.8 The AAI already has plans to undertake city-side development of 24 airports in the next few years. This exercise will expand to other airports as well over a period of time. This would bring a large number of non-passengers to airports and hence cause an additional strain on security system.

8.4.13.9 Given the precedent of Glasgow explosion, all sensitive airports would need to have City-side Policing. The current situation of airports being Policed by CISF and State Police lead to wide variations in quality of enforcement of security procedures. State Police tends to work in liberal politico-administrative environment leading to concessions to officials and political personages. This can cause a chink in the security amour. Given the nature of aviation duties, a distinct and dedicated aviation security force on the lines of Railway Protection Force needs to be set up. This would contribute to specialized skills being developed within the organization without attrition through transfers.

8.4.13.10 The development of airports would require that the designs must strictly adhere to security norms. The BCAS would need to develop specialized technical know-how in this area to discharge this function successfully.

8.4.13.11 The BCAS being severely under-staffed is unable to discharge many of its functions effectively. The changing face of aviation would require a varied range of skills within the organization to enable pragmatic regulatory oversight. It should possess expertise in airport planning, Information Technology, Legal, Human Resource Management and Intelligence capabilities to fulfill the emergent challenges. A restructuring of the BCAS would have to be

undertaken at an early date. The Regulator would have to develop as a vigilant facilitator to meet the emerging security challenges of the industry.

8.4.13.12 Cargo security would be one of the most important factors in aviation security in the years to come. Technology in this area like RFID should be adopted at a faster rate. The CISF/ASF would need additional powers to handle situations arising within airport premises, like competence to handle issues of theft and unruly behaviour by passengers. A separate legislation may be required to enlarge its jurisdiction on the pattern of Railway Protection Force. Identifying and prescribing specifications for security equipments at airports and aircrafts is specialized task.

8.4.13.13 India would need to develop aviation specific R&D and laboratory facilities on the pattern of America to address emerging threats. A close relationship with existing Research facilities in the country like the DRDO would need to be forged. Advanced Imaging technologies would have to be deployed to enable foolproof screening of passengers. This would have social and cultural reactions which would need to be handled.

8.4.13.14 India must increasingly involve itself actively with development of non-intrusive technologies to balance its security needs and cultural sensitivities of its population. Radiological and Biological threats have to be factored in Indian security system. There is an immediate need to equip all airports with Radiological and Harmful, Sensitive Detection equipments. As larger number of people travel and the number of unknown passengers multiplies, there would be a need to integrate Passenger Information System with Unique Identity Number System being developed by Government of India and its further integration with the records of the State Crime Records Bureau (SCRB) and National Crime Records Bureau (NCRB). This would enable identification of passengers with criminal record and handling them more effectively.

8.4.13.15 In order to reduce possibilities of visitors or passengers straying into restricted areas, it would be worthwhile to consider introduction of Radio Frequency Identity based Boarding Passes and Entry Tickets. In order to prevent recurrence of Moscow type suicide attempts in visitors areas, a system of random checking of passengers and visitors into Terminals may be undertaken. It is proposed that 18 hyper-sensitive and international airports would have screening mechanisms in place outside Terminals by December 2011.

8.4.13.16 However, this facility should be extended to all airports to restrict undesirable elements

from entering into the Terminals. Airport Entry Passes may be sparingly issued to restrict entry of too many people inside Terminals and Air-side. Protocol Passes should be gradually phased out. Profiling through interviews and Behaviour Detection Techniques need to be developed in airport security personnel to identify abnormal behaviour and suspects in a pro-active manner. The capabilities of the security forces at airports would have to be substantially augmented to attain this objective.

8.4.13.17 In order to meet the challenges discussed above, a huge trained personnel/human resource would be required. The current facilities of training security personnel, screeners and crew, are limited. The whole training system needs to be urgently reviewed not only to expand capacity but also to improve quality of training. As General Aviation thrives, a large number of private operators as well as private airports are likely to develop. At present, there are hardly any guidelines to supervise the security aspect of these operations. Detailed SOPs and AVSEC Orders would need to be issued to plug these shortcomings. In order to regulate entry of inimical airlines into the country through the designated process it would be useful to revisit the entire process of bilateral agreements with insistence of stricter norms of security vetting.

8.5 Key Challenge V- Human Resource Development

8.5.1 Key trends and forecast

8.5.1.1 The upside potential for growth of the Civil Aviation sector in India is huge. India is likely to be the fastest growing aviation market in the world in the next decade. Forecasts of air traffic discussed in earlier sections of this report suggest a robust growth of the sector. When translated into fleet requirement, this works out to about 1000 commercial fleet as against the current level of about 400 with the scheduled commercial airlines and a total of 681 operational general aviation aircraft including 250 helicopters and 108 business jets[91].in the country.

8.5.1.2 The real challenge is to manage the phenomenal growth of air traffic with safety. Safety should be of paramount importance. Closely related to safety in Civil Aviation is skill augmentation in its entire dimension. The task ahead would be of identifying the different categories of personnel required whether technical, managerial, pilots & cabin crew, trainers etc to meet the needs of airport development & operations (both green & brown field either at AAI or PPP airports), ANS/ATM facilities, and airline operations.

8.5.1.3 With emerging sectors like MRO in near run and aerospace in longer run, which are expected to grow in size, the need for technical personnel will surge even further. The implementation of stringent standards to cope up with the growing air traffic is crucially dependent upon the 'skills and competency' of the work force. A skilled and competent workforce is essential to create a safe and efficient aviation industry. Without this India cannot join the ranks of the leading aviation nations. A vibrant, world class education and training sector is therefore essential to meet the rising demand for skilled workforce at all levels.

8.5.1.4 Indian aviation not only needs to recruit and train people in unprecedented numbers, but it faces increased competition on multiple fronts. India is not the only country experiencing rapid growth. Countries in the Middle East, China and the rest of Asia are in fact looking to recruit aviation personnel in this region to cater to the requirements of growth in their markets.

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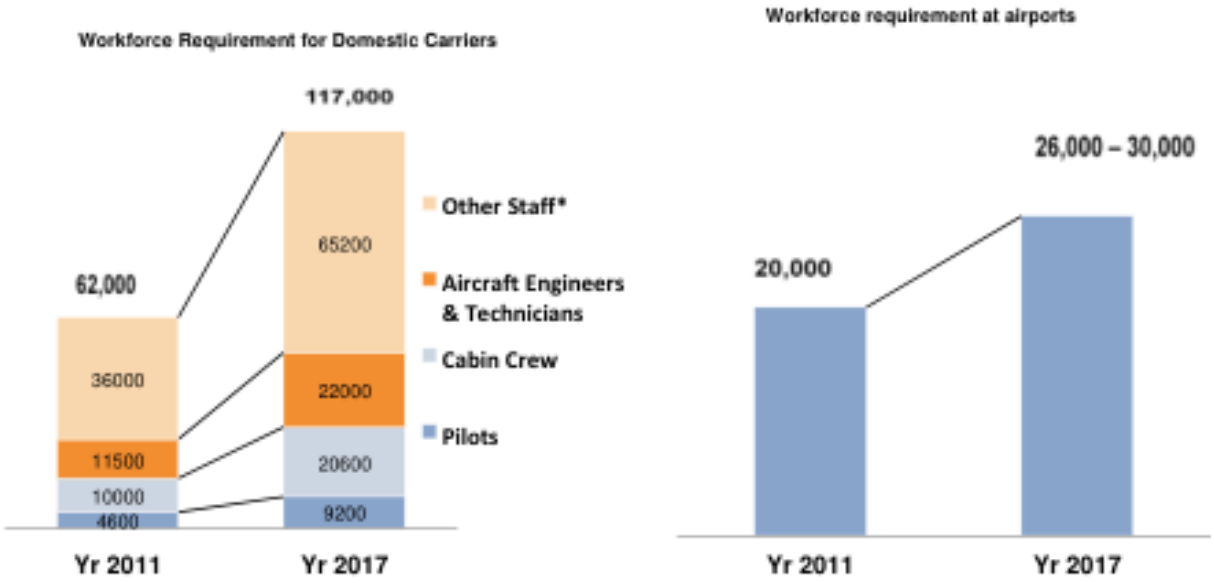
[91] India Business & General Aviation report 2011; CAPA Research & Market Analysis Unit

8.5.1.5 About 30-40% of the workers at some Gulf carriers and aviation operators are drawn from India. Therefore, demand for aviation personnel is a global phenomenon with Boeing estimating need for 1 million pilots and engineers over the next 20 years.

8.5.1.6 Meanwhile, ICAO forecasts that all regions expect North America are expected to face a shortage of pilots over the next 20 years based on current training capacity. The situation is most acute in Asia Pacific.

8.5.1.7 According to the Report of Working Group on Civil Aviation for formulation of 12th Five Year Plan (2012-17) the total manpower requirement of Indian carriers is estimated to rise from 62,000 in FY-2011 to 117,000 by FY-2017. This includes the number of pilots, cabin crew, aircrafts engineers and technicians (MRO), ground handling staff, cargo handling staff, administrative and sales staff. Similar analysis performed for projecting manpower requirements at Indian airports. Employee per million passenger ratio for large airports (Delhi, Mumbai, Chennai, Kolkata, Bengaluru and Hyderabad) was found to be around 65 whereas for remaining airports this ratio was around 200. Based on the projected passenger traffic and assuming the employee per million passenger ratio to become leaner for smaller airports as modernization and other efficiency improvement initiatives are undertaken, the manpower requirement (including ANS) for the airports is estimated to increase from current 20,000 to 26,000-30,000 by FY 2017. (See Graph 36)

Graph 36: Manpower requirements estimates for Indian aviation sector



8.5.1.8 Another independent Forecast suggests that Airport employees, Air Traffic Controllers, Ground Handlers, Catering Staff, Retail and Security Staff are estimated to triple from 90,000 at present to 270,000 within ten years.[92] India has approximately 1900 Air Traffic Controllers compared to a sanctioned strength of 2200. There is a need to increase the capacity of current training facilities to keep pace with growth as well as to provide recurrent training to existing controllers.

8.5.1.9 It is estimated that an additional 2500 to 3000 ATCs will be required over the next five years. Further, the existing ATCs would also require upgraded training as at present AAI is making significant investment in modernizing equipments and operations under the future Indian Navigation System Master Plan. AAI is working with ISRO on developing GAGAN, which is a Satellite Based Navigation system and would be functional by 2013. This will change the concept of controlling air space in to managing of air space for which the necessary manpower needs to be developed with proper training.

8.5.1.10 Barring a few, it is said that the quality of flying schools in India is not satisfactory. Airlines and Type Training Organizations report serious concerns with quality of output. In the absence of sufficient high quality pilots available from within the country, India continues to hire Foreign Pilots.

8.5.1.11 Indian has the potential to be an Aerospace Hub. Huge investment is expected to be made in the Aerospace Engineering Sector. Aircraft and Original equipments manufacturer are of the view that shortage of skill is an impediment to growth. Similarly, requirement of maintenance engineers by Airlines and MROs is another major area of concern. Aircraft Maintenance Engineers play an important role in the upkeep and service availability of aircraft. As the size of the industry grows, airlines will need to employ adequate number of AMEs to perform the required maintenance and inspection of the aircraft. Industry sources suggest that the graduates of the Aviation Maintenance Engineers Training Institutes have limited employability.

8.5.1.12 Skill shortage is even more serious in general Aviation impacting its development and safety. Quality Training Institutions, Quality Instructions and Quality Instructors are an essential

[92] CAPA report on Skill deficit in Indian Aviation

prerequisite to the growth of a strong and safe General Aviation Sector. Note that the General Aviation Fleet Forecast made by Independent agencies suggest that the size of the fleet would be about 2500 aircrafts and around 900 helicopters in the next 10 years .

8.5.1.13 The demand for skilled personnel in the Civil Aviation Sector is a global phenomenon. Therefore, the Indian Aviation and Training Sector needs to keep an eye on the opportunity that is emerging in this space, wherein India could be a low cost high quality education and training hub for the World. The opportunity cost of not investing in human capital required for Civil Aviation sector at this juncture would result in, reduced growth, increased cost of operations, compromise on safety and missed opportunities.

8.5.1.14 The following Government Training Institutes in India are engaged in the provision of Education and Training Services in the Civil Aviation Sector:

i) IGRUA ii)

NIAMAR

iii) Civil Aviation Training College ,Allahabad and Hyderabad airport

8.5.1.15 Besides the above Institutions, there are number of private institutions offering in disciplines relating to various facets of Civil Aviation sector. Currently there are 42 functional pilot training institutes (of which only 17 are operational) and 77 AME training institutes along with a large number of Airhostess training institutes. Despite the existence of such private institutions in India that provide Aviation Education and Training, there is consensus that the number of programmes offered, the depth of course content and the infrastructure facilities available with them are not sufficient to meet the needs of the industry. Also, the quality of a substantial number of them is not up to the standard that is expected of them.

8.5.1.16 There is no flying training institute for training civil helicopter pilots in the country. The focus of the institutes so far has been in conducting the programmes to meet the immediate needs of the industry.

8.5.1.17 There is also a near total absence of credible institutions undertaking serious research or providing research facilities in the field of Civil Aviation. Therefore, higher education and extensive research in frontiers of technology, and science that is fundamental to long term interest of the sector is of vital importance. Establishing strong research base in Civil Aviation to

prepare the skill base to meet the global competition and to emerge as a leading air transport service provider in the world is of paramount importance.

8.5.1.18 In addition to that, it is found that there is a near absence of qualitative and duly recognized formal Educational programmes; leading to award of Diploma/Degree/Post Graduate Degree in the field of civil Aviation in the country. As a result of this, all major as well as minor agencies/organizations in the sector have to mostly recruit generalists and invest considerable resources in post recruitment training. One solution to the problem could be to set up National Aviation University to cater the growing educational and training requirements of the Civil Aviation Sector.

8.5.1.19 Launching of certificate/diploma/ degree programmes in various streams of Civil Aviation by the such University will not only meet the ever growing requirement of professionally qualified personnel but will also create a strong base with a pool of scientific and technical manpower in the Civil Aviation Sector so that India can potentially become an Aviation Education Hub for many countries in the region. Existing Technical Institutions are not considered adequate and appropriate for meeting the growing and diverse needs of manpower in the Aviation Sector for the following reasons:

8.5.1.20 The categories of core personnel required include Pilots, Airtaffic Controllers, Cabin Crew, Airport Staff, Ground handling Staff, Aviation Meteorological Service Personnel, besides expertise with respect to Aviation Medicine, Aviation Law, Aeronautical Engineering, Airport Architecture, Aviation Regulatory Affairs including Airworthiness, Accident Investigation , Aviation Maintenance Science, Aeronautical Science ,Aerospace Engineering Applied Meteorology, Air Traffic Management Aviation Business Administration Aviation Environmental Science, Professional Aeronautics, Safety Science, Technical Management - Logistics & Supply Chain, Technical Management - Occupational Safety & Health.

8.5.1.21 Scientific Development of skills and expertise presupposes a holistic development of the entire educational and training base within the country which requires focused initiatives to be taken on a mission mode. Obviously this cannot be left to few individual institutes/colleges. Some of the above subjects may not require a full-fledged degree programme and these can be conveniently offered as short duration non-degree programme. Quite a few courses would be of a interdisciplinary nature requiring expertise cutting across disciplines. Factually speaking on

most of the subjects/ discipline listed above, there is no institutes/College in India that offers these subjects/ courses.

8.5.1.22 Huge investment is expected to be made in the Aircraft Maintenance Repair and Overhaul. As far as the existing institutions that provide education and training in these sphere, there is consensus that the number of programmes offered, the depth of course content and infrastructure facilities available with them are not sufficient to meet the needs of the industry. Also the quality of a substantial number of them is not upto the standard. There is a near absence of duly recognized quality formal educational programmes leading to award of diploma, degree, and post graduate degree in the field of Civil Aviation in the country.

8.5.1.23 The proposed National Aviation University will not only meet the ever growing requirement of professionally qualified personnel but will also create a strong base with a pool of scientific and technical manpower in the civil aviation sector so that India can potentially become an Aviation Education hub in the region. There are examples of Universities such as Embry Riddle Aeronautical University (USA), Crane Field Aeronautical University (UK), State University of Civil Aviation (Russia), National Aviation University (Kiev, Ukraine). Some of these universities are state owned.

8.5.1.24 Needless to mention that aviation safety is of paramount importance and skill augmentation is closely related to aviation safety. The implementation of stringent standards to cope up with the growing air traffic is crucially dependent upon the skills and competency of the work force. A skilled and competent work force is therefore essential to create a safe and efficient aviation industry.

8.5.2 **Key enablers:**

8.5.2.1 Ministry of Civil Aviation needs to give a fresh impetus to the whole issue of Aviation Education and Training in the country. First and foremost, the initiative taken by them to set up National Aviation University should be followed up with full administrative and financial support. A separate Division in the Ministry with a full contingent of staff and officers devoted exclusively for Aviation Education and Training with appropriate budgetary support is the need of the hour.

8.5.2.2 Secondly, the standards of curriculum and examination systems for various categories of

personnel in the aviation sector should be completely overhauled with modernized systems of examination and evaluation. Thirdly, the systems of accreditation of various training institutes of the aviation sector in the country by the regulator need to reviewed and restructured to ensure that the most modern systems are available with the training institutes along with adequate infrastructure for imparting training to all categories of personnel.

8.5.2.3 Midcareer training to personnel who are already employed in the industry should be the next area of priority. Training of trainers should be the priority in all organizations under the Civil Aviation sector and adequate funds shall be made available for this purpose.

8.5.2.4 Training and capacity building of ATCOs should be an immediate priority. Partnership options with international ATC training institutes should be explored to enhance capacity of ATC. The enhanced capacity can also help ATC earn additional revenue in the long run by training foreign ATCOs and providing consultancy services to global ATC service providers. It is appropriate to consider the option of allowing private players to set up ATCO training facilities, subject to adequate supervision by AAI. This may be started in a PPP mode first and thereafter be made fully open to private sector in the long run.

8.5.2.5 Addressing the shortage of aircraft engineers, technicians and cabin crew. There are 77 DGCA approved Aircraft Maintenance Engineer (AME) institutes producing around 5,000 engineers every year. AMEs and Technicians need to undergo a minimum one year experience on the heavy aircrafts and pass the DGCA examination to get type-rated license. Cabin crew strength has increased from around 4,000 in FY 2002 to around 10,000 in FY 2009.

8.5.2.6 The requirement would increase significantly as the fleet sizes of Indian and global carriers expand in the near future. More number of institutes offering courses related to aerospace engineering and cabin crew need to be opened. Global collaborations for R&D, aircraft component manufacturing and assembly should be encouraged. Options of collaborating with the Indian Air Force to build capacity should be explored.

8.5.2.7 Building MRO Training institutes: Although India enjoys a significant cost advantage; it has a shortage of qualified MRO personnel who can carry out complicated repairs on the latest aircrafts and components. There is a strong case for establishing MRO training institutes to help develop capability of certified MRO engineers.

9 Other Opportunities

9.1 Development of Aerospace industry

9.1.1 Matters relating to aero space are within the scope of subjects allotted to Ministry of Civil Aviation as per Allocation Business Rules. Considering the growth prospects of Air Traffic in the country, the potential for large scale acquisition of aircrafts by the carriers in India, and the competitive advantages arising out of growing pool of scientific and technical manpower in the country it is felt necessary to consider initiating activities towards development of aero space industry for Civil Aircrafts.

9.1.2 Although manufacture of aircraft and components in private sector is allowed, private industry has not taken up development programmes due to the long gestation period and perception of significant risk. As a result, nothing concrete has been achieved in this sphere. China would be coming out with a commercial civilian aircraft in the next 3-4 years.

9.1.3 Further, independent traffic forecasts suggest that by 2020 or so, the number of aircraft required in the Indian market would exceed one thousand. Most of the requirements would be in the narrow body segment to cater to the needs of Tier II and Tier III towns. Also India could capture the pie of Aerospace outsourcing due to significant cost advantages. Skilled labour cost is 60% cheaper than USA & Europe.

9.1.4 Foreign aircraft manufacturers view India's demand potential as an opportunity to outsource manufacturing work, partly due to offset requirements, but mostly to derive cost benefits. Global aerospace majors are facing a shortage of engineering talent. India has a large talent pool. Therefore, it is high time that efforts are initiated to take up Aerospace development programmes in the country for meeting the needs of Civilian aircraft. At present, almost entire range of aeronautical products, components, raw material is imported.

9.1.5 Indian Aeronautical Industry should be able to produce a small/mid-sized aircraft using indigenous resources, to provide connectivity to all parts of the country thereby generating employment, industry and prosperity to the people. The vision can be realized by providing

low cost air travel from low cost airport terminals to the remote areas, cities of business interests, tourism etc.

9.1.6 This would require low cost aircraft in substantial number and if produced indigenously will give substantial boost to Indian aeronautical industry. It is considered necessary that a road map of the progress path be prepared with small steps and a focus on goal. A question may arise as to why such manufacturing activity has not happened till now. Mainly, the scale of production required to achieve competitiveness is arising only now because of the exponential growth rate of air traffic. Given the vibrant growth of air traffic in other countries in Asia-Pacific region coupled with successful achievement of Bilateral Safety Agreement with USA, there is now an enormous potential to develop aerospace technologies.

9.1.7 The aircraft development organization may outsource development of components, appliances, equipment, hardware, materials etc. to private enterprises, who have R&D capability. There are many organizations in India who are producing world class automotive components, and technological prowess exists in these companies, including CSIR, IITs and other engineering colleges.

9.1.8 Development of Back-end Capabilities and Technologies

9.1.8.1 Private industrial manufacturers may be awarded product development programs. Work needs to be done in the development of technologies. Some examples may include Development of Aluminum alloy, sheets, bar-stock, extrusions, forgings etc.

9.1.8.2 Organizations will be encouraged to develop aircraft quality materials meeting the established specifications, for domestic consumption and for export. Tyre manufacturing capability should be developed as there is already adequate consumption with the airlines presently. Testing capabilities need to be added to the manufacturing facilities. Since high quality technical knowhow is involved, International JVs will be encouraged by providing help in allotment of land for factory, and other tax benefits which will attract foreign manufacturers to have JVs. Cabin refurbishing materials, seats, meal trays, window panes, lights, floor beams, carpets, plastic moulded cabin panels etc can be manufactured easily as these are non-critical items. Electric wires and cables of different ratings and development of appliances to ITSO standards can be undertaken by the industry with the assistance of DGCA. In short, there is an enormous potential for indigenization and manufacture of aeronautical products in India.

10 Consumer Protection

10.1 Overview

10.1.1 Passenger traffic forecast for India as discussed earlier in this report suggests that by the year 2020, the domestic passengers to be carried by Scheduled Carriers in India would be about 164 million and in the international segment it is expected to touch 92 million passengers. With an expected surge in air passenger traffic, it is likely that grievances of passengers are also set to rise given the past record. Therefore it is imperative that airlines, airports and other agencies take proactive steps and improve upon their services and provide for an effective grievance redressal mechanism. The high rate of growth in traffic is expected to have implications on the mechanism for redressal of grievances and there is an urgent need to ensure that the redressal of grievances takes place in a timely and cost effective manner.

10.1.2 Complaints from airline passengers, associations in aviation representing passengers, consumer groups, cargo facility users at the airport were studied by a group of officers in the MoCA.

10.2 Nature of Consumer Grievances

10.2.1 The consumer grievances that have been studied pertain to service deficiency on part of the airline or the airport or ground handling service provider, wherein either tangible loss has been caused to the consumer by way of missing baggage, pilferage, lack of proper infrastructure or intangible loss has been caused to the consumer by way of psychological pain, trauma that the consumer had to go through in his/her entire air travel experience.

10.2.2 It was observed that not all passengers lodged their complaints and even if they wished to do so either there was not any clearly defined procedure notified or airline personnel to assist them in doing the same. It was also observed that there was no authority to ensure that complaints are indeed being resolved.

10.2.3 Many complaints are usually related to flight delays/cancellation and other attendant problems. Since a number of agencies are jointly responsible for On-Time Performance of flights, it is difficult to generally pin point the responsibility to any one agency whenever flight schedules

are disrupted. In such cases, causes of delay need to be ascertained by an independent third party.

10.2.4 Therefore, this is one area which will remain a significant source of complaints leading to disputes.The instances of missing baggage, pilferage and replacement of articles are visibly higher from even the small sample of consumer grievances that have been obtained from various stakeholders. Passengers complained of missing gold, cash and electronic equipment, among other things from their checked-in baggage.

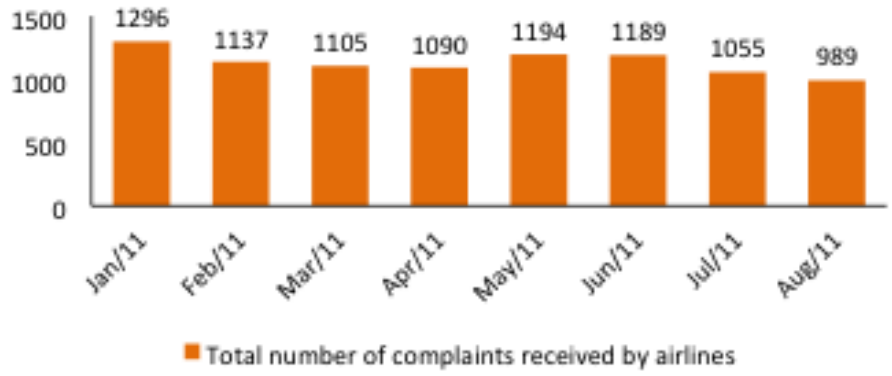
10.2.5 The complainant often resorts to complaining to the airlines or the airports, for the use of whose services he had paid for, however, the parties most often declined to, compensate them for the same. At many airports; airlines have outsourced their ground handling tasks to ground handling agencies. Hence, the loss if any caused to the passenger could be due to the negligence on part of officials of the ground handling agency.

10.2.6 In such cases, the vicarious liability rests with the airlines. It is the responsibility of the airlines, airports, ground handling agencies to provide full-proof security to the passenger and to his/her baggage by way of installation of CCTVs at vantage points, close supervision by security staff etc. In the event of any loss, the parties involved should be held liable for the security lapse. However, feedback received in this regard suggests that passenger go through several channels of many agencies to get relief.

10.2.7 The growing grievance amongst passengers concerning staff misbehavior, indifferent attitude is an area of serious concern. In many cases it is observed that consumers do face the brunt of unacceptable behaviour on part of the airline/airport/ground handling agent's official, which leaves much to be desired from the perspective of service delivery. International passengers are often influenced by the global best practices of service delivery and therefore, their expectations about delivery of services, grievance redressal systems etc are of a standard that needs to be met by service providers in the sector. This can be a difficult area in terms of grievance redressal by way of compensation by the respective agencies, which may lead to large scope for disputes.

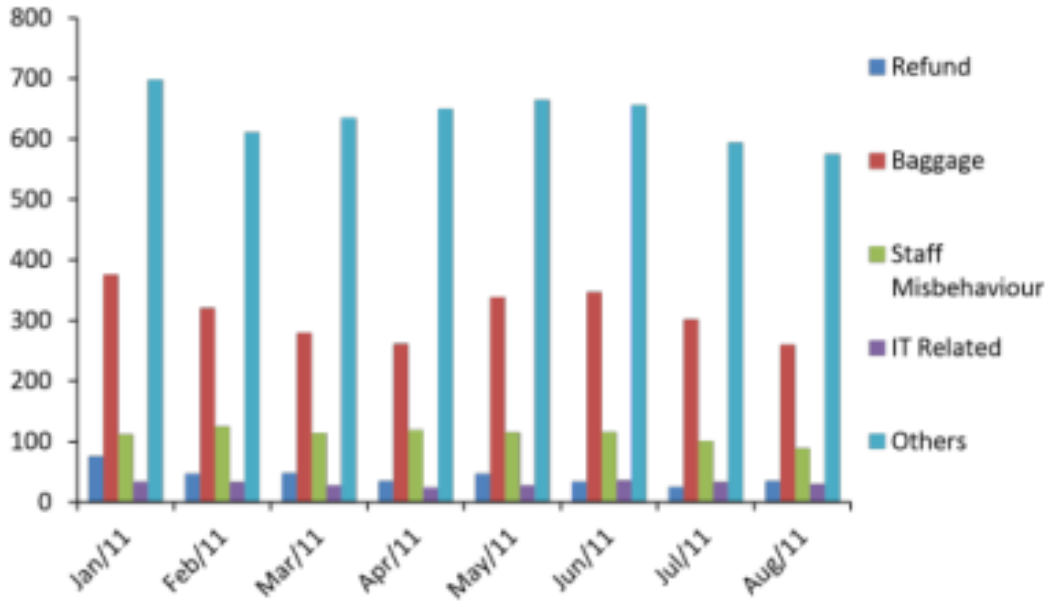
10.2.8 Graph 37 and 38 shows the total number of complaints to scheduled airlines and the nature of the same.

Graph 37: Total complaints pertaining to Scheduled Airlines for the period January to August 2011



Source: DGCA

Graph 38: Nature of complaints received by Scheduled Airlines during January to August 2011



*Note: *Others refer to complaints related to in-flight services, delays, immigration, security etc.*
Source: DGCA

10.2.9 However, it is a generally held view that not all affected passengers choose to lodge complaints. With the number of complaints being on the rise it is evident that service delivery has been found to be deficient in many respects.

10.3 Some of the initiatives towards Consumer protection in Civil Aviation Sector

10.3.1 DGCA from time to time has issued Civil Aviation Requirements (CAR) in order to safeguard passenger interests. Some of the significant ones aimed at protecting the interests of the consumers have been mentioned below:

- CAR rules under Section 3 Series M, Part II (May 2008) defined the refund policies that need to be adopted by airlines. This clearly indicates the time frame and the amount of refund to be given to the passenger. Some of the requirements state that in case payment made via credit card refund needs to be made within seven days of the cancellation to the account of the credit card holder. In case of cash transactions refund to be made immediately.
- CAR rules under Section 3 Series M, Part III (July 2010) governs the transparency issues regarding display of information pertaining to tickets for air travel via Computer Reservation System/Global Distribution System.
- CAR rules under Section 3 Series M, Part IV (August 2010) governs facilities to be provided to passengers by airlines due to denied boarding, cancellation of flights and delays in flights. Also CAR rules under Section 3 Series M, Part IV (August 2010) mandates that all airlines shall appoint a nodal officer and Appellate Authority to settle passenger grievances in a stipulated time frame. Airlines shall display the details of the same on their respective websites. The internal grievance mechanism of airlines shall be transparent with a provision of on line complaint handling. All complaints registered shall be issued a unique reference number. The airlines shall regularly submit data on the same to DGCA on a monthly basis before the tenth of the next month.

10.3.2 However, despite the issue of these CARs it does not solve the issue of rising number of disputes arising out of consumer grievances from air passengers. Hence, there is a need for an effective outlet to ensure the settlement of disputes. The objective should be to ensure the long term interest of the end user. Service sectors that have direct interface with the retail consumers are likely to generate a large number of consumer disputes arising out of deficiency in service provision. Accordingly, sectors like banking, insurance, and electricity have established ombudsmen for dispute settlement in service provision.

11 Civil Aviation Statistical System-Data Deficiencies and Recommendations for Improvement

11.1 Overview

11.1.1 Civil Aviation sector has many similarities with road and rail transport sector, yet there are certain features of air transport, which are particularly unique to it. These features place air transport on a different footing and necessitate evolving different methodologies for measuring the performance and growth of the sector. Some of the features specific to Civil Aviation Sector are:

a. Bi-sectoral nature of Air Transport Services:

(i) Domestic traffic

(ii) International traffic.

- Domestic traffic: Point of embarkation & disembarkation within the country.
- International traffic: Out of the two points, viz. embarkation and disembarkation one lies outside the country.

b. Involvement of large number of Foreign Carriers: Involvement of large number of foreign carriers along with national carriers in transportation of passengers & freight.

c. Scheduled and Non-scheduled Services:

(i) Scheduled Service: Any flight with a scheduled timetable.

(ii) Non-Scheduled: Any revenue flight and charter other than 'scheduled service' flights

11.2 Civil Aviation Statistics

11.2.1 Civil aviation statistics indicate the development of the air transport sector with regard to infrastructure, aircraft, traffic and transport, accidents and environmental effects. Statistical database on International Air Transport was incorporated under the statutory provisions (Articles 54, 55 and 67) of the Chicago Convention (1944) on International Civil Aviation to

foresee the need for the countries to have reliable and complete data. Since then the aviation statistical database system continued to evolve in collection, processing and analyzing the key performance pertaining to airlines, airport and air navigation system (ANS) for an efficient, safe and secure development and growth of civil aviation industry[93].

11.2.2 The Economic Analysis and Policy Section of ICAO is responsible for collection, compilation and analysis of data pertaining to global civil aviation. ICAO has prescribed a number of reporting forms and the contracting states are required to provide data pertaining to them. The forms prescribed for collection of statistics by ICAO and their periodicity for submission is given in Table 39. Out of the various forms mentioned, forms A, AS, B, C, D and EF pertain to data on air carriers; forms I and J relate to airport statistics and forms K and L are related to Air Navigation Services (ANS)[94].

Data Deficiencies and Recommendations for Improvement

Table 39: ICAO Prescribed Forms for Collection of Civil Aviation Statistics

Form	Subject	Frequency

[93] http://www.icao.int/icao/en/assembl/a37/wp/wp170_en.pdf
[94] http://mospi.nic.in/Mospi_New/upload/18_cocso_Agenda_3_Final_19jan11.pdf

A	Traffic- Commercial Air Carriers	Monthly/Quarterly/Annual
AS	Summary Forms (Traffic)	Annual
B	On-Flight Origin and Destination (Scheduled Services (Rev.)- International operations	Quarterly
C	Traffic by Flight Stage (Scheduled Services (Rev.)- International operations	Annual
D	Fleet & Personnel- Commercial Air Carriers	Annual
EF	Financial Data- Commercial Air Carriers	Annual
G	Aircraft Accident	Annual
H	Civil Aircraft on Register	Annual
I	Airport Traffic	Quarterly
J	Airport Financial Data	Annual
K	En-route Facility Financial Data	Annual
L	En-route Facility Traffic Statistics	Annual

Source: Economic Analysis and Policy Section; ICAO

11.2.3 An account of the various aviation parameters for which data is collected by the Economic Analysis and Policy section of ICAO under each Form mentioned above is given in Table 40.

Table40: Aviation parameters included in each Form

Form	Aviation Parameters
A	A/c km. Flown A/c hours A/c departures Passengers carried ASKM (Available Seats per Kilometre) RPKM (Revenue Passenger per Kilometre) Passenger load factor Freight carried ATKM (Available Ton per Kilometre) RTKM (Revenue Ton per Kilometre) Weight Load Factor
B	City Pair- wise revenue traffic Passengers carried, Freight carried Mail
C	Station- wise traffic data on no. of fights/type of A/c Capacity Available Revenue Traffic Carried
D	Fleet Statistics No of Aircrafts Size of Aircrafts Utilization of Aircrafts Personnel Statistics Category-wise No. of Personnel Annual Expenditure on each category
EF	Profit & Loss Statement Revenue Expenditure Operating Results Balance Sheet Assets & Liabilities
G	Accidents involving A/c with M T O weight of 5700 kgs & over. Accidents involving A/c with M T O weight less than 5700 kgs.
H	Summary of all Aircraft on register No. of Large Aircraft by Type
I	Airport traffic Data No. of A/c movements No. of Passengers Embarked /Disembarked Freight Loaded/Unloaded Mail Loaded/Unloaded
J	Airport financial Data Income Expenses Investments

K	En-route Facility Financial Data
L	En-route Facility Traffic Data

Source: Economic Analysis and Policy Section; ICAO Data Deficiencies and Recommendations for Improvement

11.3 Sources of Data Collection

The two major organizations maintaining data on civil aviation in India are Directorate General of Civil Aviation (DGCA) and the Airports Authority of India (AAI).

11.3.1 Data Collected by Directorate General of Civil Aviation (DGCA)

The Directorate General of Civil Aviation under the Ministry of Civil Aviation is the principal regulatory body in the field of civil aviation. The Statistics Division of the Air Transport Directorate in DGCA is responsible for maintaining data on aviation parameters.

Schedule XI of the Aircraft Rules, 1937 lays down that every person to whom a permit has been granted by DGCA under the Schedule, shall submit to the DGCA the following:

1. Monthly returns regarding the operations of the permitted air transport services.
2. Annual returns showing the financial results of the services or operations during each calendar year.

In compliance with the Air Craft rules, National Carriers, private operators both scheduled and non-scheduled, Foreign Airlines and airports managed by AAI provide data pertaining to their operations to DGCA[95].

11.3.1.1 Airline operations

The data from scheduled domestic airlines is collected as per ICAO forms A, AS, B, C, D and EF. In addition to this, data is also collected on on-time performance and average rate of flight cancellations from the scheduled domestic airlines on a monthly basis.

With respect to international airlines, data on flights operated, number of passengers and amount of freight carried is collected from each airline on a monthly basis. The data on passenger and freight traffic; airline wise, city-pair wise and country wise is published annually.

[95] http://www.icao.int/icao/en/assembl/a37/wp/wp170_en.pdf

11.3.1.2 Non-Scheduled Operations

The Non-scheduled operators (NSOPs) play an important role in inclusive economic development by promoting tourism and increasing connectivity to hitherto inaccessible regions of India. They also provide timely air linkage facilities to business travelers who are usually hard pressed for time. In times of distress arising out of natural calamities or accidents, NSOPs provide timely relief and emergency services. Thus, in light of their positive contribution to national development, huge unmet demand and immense untapped market potential, India actually witnessed a steady growth in the number of NSOPs as given in Annex-I The number of non-scheduled operators has been steadily growing and has increased from 36 operators in 2000 to 127 in 2010. A summary of NSOP traffic statistics for the year 2009-10 has been given in Table 41.

Table41: Traffic Data of Non-Scheduled Operators in India 2009-10

	Hours Flown	Flights Operated	Passengers Carried
Aircraft	36821	30940	123659
Helicopters including Pawan Hans	45987	99462	494700
Balloons	358	385	2912

Source: DGCA

11.3.1.3 Passenger and Freight traffic

As per DGCA, air passenger traffic in India has surpassed 141 million during 2010-11 from a level of 26.22 million during 1990-91 resulting in more than fivefold increase over two decades. Similarly, aircraft movements have already crossed 10 lakhs during 2010-11 from 2.28 lakhs in 1990-91 resulting in more than 4.5 fold increase during the same period. Also, freight movement has witnessed a 5 fold increase over the last two decades. Annex-VII give more details on the aircraft movement, separately for domestic and international the passenger and freight traffic respectively.

11.3.1.4 Data Collection Process in DGCA

Data is collected every month from each airport on the aircraft movement, passengers embarked and disembarked and freight & mail loaded and unloaded. Data is also forwarded by AAI to ICAO in their Form I. Besides, Airport Financial Data, data on Air Navigation Services and

En-route Services is also collected as per forms J, K and L of ICAO from AAI by DGCA and forwarded to ICAO. The volume of data managed by the Statistical Division of DGCA can be gauged from the fact that about 3600 returns are received every year[96]. The details of the various returns are given in Table42.

[96] http://www.icao.int/icao/en/assembl/a37/wp/wp170_en.pdf

Table42: Periodicity of Returns Received from the Carriers

S.No	Form Type	Classification
1	A	Traffic Data
2	B	Origin-Destination
3	C	Traffic by Flight Stage (Only International Operations)
4	D	Fleet & Personnel
5	EF	Financial Data
6	H	Civil Aircraft on Register
7	I	Airport Traffic (International Airport)
8	I	Airport Traffic (Domestic Airport)
9	J, K & L	Airport Financial data, Air navigation services, En-route services by AAI
10	I-S	Airport Summary
11	Foreign Airlines	Monthly returns
12	NSOP (Form A)	Monthly returns
13	NSOP (Form B)	Annual Returns

Source: Statistics Division; DGCA

11.3.2 **Data on Airline safety**

Besides the Statistics Division of DGCA, other Directorates viz., Air Safety and Air Worthiness maintain data on accidents and Civil Aircraft Register respectively.

The Directorate of Air Safety maintains data on each accident, date, time and location of the accident, type of aircraft, damage to aircraft, persons on board and injury index and the causes of the accident. The data on accidents is maintained according to the nature of flight viz. airline operation, Non-scheduled operation, aerial work, flying training, private and business purpose and for each scheduled domestic operators separately. The data maintained in this format is brought out annually in the Report titled "Civil Aviation Aircraft Accident Summary".

The Directorate of Air Worthiness maintains an Aircraft Register with details like registration number, type and other details of the aircraft, date of registration or de-registration, details of

owner/operator etc. This data is then compiled in Form H of ICAO and is forwarded to them annually by the Statistics Division of DGCA.

The Directorate of Training and Licensing maintains data on number of licenses issued categorywise.

11.3.3 Data Collected by Airports Authority of India (AAI)

11.3.3.1 At AAI, the Department of Corporate Planning and Management Services (CP&MS) is responsible for collection, compilation, analysis and publication of air traffic data in respect of aircraft movements, passengers and cargo handled at various Indian Airports. The data is collected in respect of the following parameters[97]:

1. Aircraft movements
    - International
        - Scheduled
        - Non-Scheduled
    - Domestic
        - Scheduled
        - Non-Scheduled
2. Passenger movement
    - International
        - Embarking
        - Disembarking
        - Transit/ transfer
    - Domestic
        - Embarking
        - Disembarking
3. Cargo

[97] http://www.aai.aero/departments/corpotrain.jsp

- International ○ Loaded ○ Unloaded
- Domestic ○ Loaded ○ Unloaded

4. Mail

- International ○ Loaded ○ Unloaded
- Domestic ○ Loaded ○ Unloaded

11.3.3.2 In addition to this, Department of CP&MS of AAI conducts surveys[98] like normative planning surveys, airport benchmarking surveys, capacity assessment studies at passenger as well as cargo terminals, customer satisfaction Surveys, opinion Surveys in order to assess:

1. The peak hour and annual capacity of existing terminal buildings (Passengers and Cargo terminals)
2. Traffic potential of green field airports
3. Customer satisfaction and opinion about service levels received

11.3.3.3 The daily flight wise data with respect to aircraft movement is collected from Air Traffic Controller (ATC) records. The corresponding data on flight wise passengers, cargo and mail is collected from the respective airlines or handling agents. This data, which is collected, is then collated to prepare airline wise summary statistics, and daily statistics on aircraft, passengers, cargo and mail. The Air Navigation System (ANS) is controlled by the ATC, who has the primary responsibility of managing en-route facility services.

11.3.3.4 The Air Traffic Management (ATM) Unit of AAI maintains the data on over flying traffic. It also collects radar data on international and over-flying traffic from 12 airports currently. Data is also collected on various parameters like date & time of departure, flight identification, type of

[98] http://www.aai.aero/departments/corpotrain.jsp

aircraft, destination, flying level in 100 ft, exit point from India and the time of exit. The aircraft data collected through radar is stored for 30 days only, after which it is deleted from the system.

11.4 Data Dissemination

11.4.1 The data collected and compiled by DGCA and AAI is widely disseminated through publications in both printed and electronic format. The various publications brought out are given in Table 43.

Table 43: Publications as per periodicity by various authorities

Sl. No.	Document	Periodicity	Authority
1	India Air Transport Statistics	Annual	DGCA
2	Civil Aviation Aircraft Accident Summary	Annual	DGCA
3	Traffic Reporter	Monthly	AAI
4	Review of Traffic	Quarterly	AAI
5	Review of Traffic at Indian Airports	Annual	AAI

Source: DGCA, AAI

11.4.2 The reports published by DGCA are uploaded on the website of DGCA i.e. https://www.dgca.gov.in/digigov-portal/ The reports on Air Transport Statistics are available from the year 1997-98 while the reports on Aircraft Accident are available from 1990. Besides this, the monthly statistics collected as per ICAO Form A and quarterly report on international traffic submitted by Indian as well as foreign carriers is also uploaded on this website. Similarly Air Traffic Statistics as published by AAI is uploaded on the website of AAI i.e. www.aai.aero.[99]

11.5 Data Deficiencies and Recommendations for improvement

11.5.1 As mentioned above, the traffic data is being collected from Indian Carriers, scheduled private domestic operators, foreign airlines, non-scheduled operators and airports on various

parameters. While traffic statistics are being submitted on time by the Indian carriers, there is a huge time lag in submission of their financial data, data on fleet and on personnel.

11.5.2 With respect to foreign airlines, non-scheduled operators and airports, although more than 80% of them forward their data on traffic statistics on time, there is still considerable time lag in respect of the remaining others with some even submitting their data after 7-8 months. In the absence of data from all the operators, immediate data dissemination becomes difficult.

11.5.3 In order to avoid delay in collection of traffic data, all airlines should be mandated to submit their data through internet. Also, the daily data on cargo and mail can be collected from apron control via internet, as and when flight operations are over, so that individual airport data can be finalized without much loss of time. The DGCA and Department of CP&MS of AAI need to be strengthened by augmenting the personnel engaged in collection of data and by gradually shifting towards storing data in E-format.

11.5.4 Unsystematic collection and irregular publishing of the following aviation data

a) Over-flying traffic data is essential in order to forecast air space congestion. Scientific collection and analysis of such vital data could help the authorities in planning for timely investment in the appropriate air side infrastructure. Also, the ANS Directorate should be suitably strengthened and trained in order to collect, compile and publish the overflying traffic data on a regular basis.

b) The freight data submitted to DGCA by carriers needs to be bifurcated into freight carried by dedicated cargo operator, freight carried by scheduled passenger carriers (as part of belly cargo), and freight carried by Non- scheduled operators if any. This at present is being published in case of domestic carriers, however, the same practice needs to be adopted in case of foreign carriers as well in order to make future research and analysis more robust.

c) An ad hoc procedure is being followed at present at DGCA with respect to publishing data on International Cargo, wherein only International Freight is being published as International Cargo and International Mail data is not being recorded. Although Mail data is a very small proportion to that of the total International Cargo data, however, no record of the same would indicate under-estimation of the cargo data, which will have other implications on cargo forecasting.

d) The data on Non- Scheduled Operators (NSOP) whether passenger or cargo traffic in the domestic segment is currently being published in an inconsistent manner by DGCA, wherein the data on helicopters, balloons, private aircraft operators, etc is part of NSOP data. However, the non-scheduled operations of domestic Tour operators are not being included at present and are being published separately. This tour operator data ideally should be collected from all tourist areas within India to & from where such operations take place, however, at present this data is being collected only for 4-5 tourist places with major tourist destinations not being part of the list. This amounts to underestimation of the data on passengers carried by these NSOPs. The need is to expand the coverage of the data on non-scheduled operations of Tour operators to all the tourist destinations. Also, with respect to data on tour operations in the international segment only data on operations by domestic operators is being published and that by international operators is going unrecorded again amounting to underestimation.

e) The city pair-wise data on domestic traffic is not provided by all the public carriers and the ones that do furnish are not following a uniform format. This data is actually very important for region-wise forecasting and route planning.

f) Human resource development in the civil aviation sector assumes importance in the context of unprecedented growth witnessed in the sector. The Airlines and Airport operations are dependent on a large number of activities that are directly and indirectly related to the core operations i.e. air travel by passengers and cargo movement. The long supply chain in this sector subsumes large number of activities which are growing to cater to the needs of the core operations of aviation industry. However, despite the urgent need of skilled and semi-skilled manpower, currently there is no systematic and comprehensive planning that is being undertaken for human resource development for the aviation sector resulting in a clear mismatch between supply and demand for skilled and semi-skilled manpower and distortions in the market.

g) Skill development needs to take place in an organized manner to ensure that the aviation industry grows in a sustainable manner. This is possible if a comprehensive data base on manpower deployed in every activity directly or indirectly related to the core operations both in private and public sector is maintained. DGCA does collect data on personnel from the scheduled domestic carriers and Non-scheduled operators but this data is largely incomplete. Manpower data in the context of aviation industry should include data from

airport operators, airline operators, cargo community including Civil Aviation Statistical System

freight forwarders, custom house agents at the air cargo complex, other logistic operators, and from regulatory authorities, viz., DGCA, BCAS, Immigration, Customs, and Security (CISF) etc. The collection of data on technical manpower viz., data on pilots, aircraft engineers, cabin crew, Air Traffic Controllers will aid in forecasting and planning future manpower requirement. There is an urgent need to collect statistics on key environmental indicators like data on CO_2 emissions by airlines and air craft operations on a regular basis. This exercise would prove to be highly useful in indentifying the environmental risk of aviation.

h) In April 2011[100], DGCA notified all airlines and non-scheduled operators to submit statistics on fuel consumption by airlines in order to monitor fuel consumption on monthly basis. This is in line with the ICAO mandate to lower fuel emissions by aviation sector. The data will be collected on the total fuel used during flights, fuel consumed by the auxiliary power unit while the aircraft is stationary and fuel dumped during a flight, for each flight separately. This process needs to be continued and outcome reviewed from time to time.

i) The existing system does not provide for processing and dissemination of financial data of airlines and airport operators, which needs improvement. Availability of financial data of carriers and airport operators would go a long way in providing the basis for investment analysis for the industry as a whole. Global experience shows that regulators facilitate access to such information to both current and potential investors.

11.5.5 At present, the data furnished by airline operators is being processed without crossverification. There is an urgent need to verify the raw data furnished by the carriers or operators as instances for the same set of parameters. In 2009, DGCA set up an Expert Committee, which recommended periodic audit of the information provided by carriers to ensure that data provided to the regulator is error free. Further, to improve the quality of data, MIS personnel

[100] http://articles.timesofindia.indiatimes.com/2011-04-09/mumbai/29400088_1_dgca-fuel-flights

with the airlines and airports, responsible for submission of data, need to be trained about the data requirements. Terminology used in the prescribed formats for data collection should be clearly defined without any ambiguity. DGCA may have to organize periodic training for MIS personnel of the carriers on this subject regularly.

11.5.6 In the NAS published by Central Statistical Organization, Ministry of Statistics and Programme Implementation, Government of India, data on air transport includes only the contribution of scheduled air carriers. However, apart from scheduled air carriers, data on activities of civil aviation should include data on non-scheduled air traffic, General Aviation, Airport services, Air Navigation Services, civil aviation manufacturing, Aviation Training, MRO, Ground Handling service, Cargo Handling service to name a few major activities. This indicates that there has been gross under estimation in NAS in the context of aviation sector and a consequent under-estimation of GDP. Thus, the pressing need is to modify the present system of compilation of National Accounts Statistics in order to reflect the wider area of economic activities pertaining to the aviation sector. Also, the System of Satellite Accounting for Civil Aviation sector should be introduced especially in cases where direct data collection is not possible.

11.5.7 Forecasting any sector is necessary for planning and policy making. In India, the model to forecast air traffic is yet to be developed. At present, forecasts are being done by ICAO, IATA, ACI, and aircraft manufacturers like Airbus, Boeing etc; however, these estimates are made at the global or at the most regional level. A country specific forecasting model needs to be developed for regular forecast of air travel passengers both domestic and international and forecast of domestic and international freight potential. This exercise should be jointly undertaken by regulators of the sector both AERA and DGCA.

11.5.8 There is an urgent need to publish data on capacity and passengers carried by type of aircraft, which assumes importance particularly in the context of penetration of air transport services in tier-II and tier-III towns, where the type and capacity of aircrafts is likely to be different from that of trunk routes.

11.5.9 With the current rising economic growth, surging disposable income of the middle class and growing population, air traffic is set to grow several times in India and major proportion of this growth is expected to take place in Tier-II and Tier III towns. MoCA should commission periodic survey of passengers travelling by air for market analysis. These surveys could also indicate hidden anti-competitive market and/or anti-consumer practices as well.

12 Recommendations of the Working Group

12.1.1 Domestic air traffic that would be carried by Scheduled Carriers in India in 2020-21 is set to cross 164 Million Passengers as against 54 Million in 2010-11 suggesting a growth of three times the present traffic in ten years. International passengers to and from India by 2020-21 will be 92 Million implying a growth of about 2.4 times the traffic of 38 Million in 2010-11. Forecast for 2030-31 reveals that domestic air passengers to be carried in India will be 438 Million and that of international passengers will be 217 Million.

12.1.2 India's domestic and international cargo traffic (Carried) from and to India is projected to reach a level of 3.6 and 8.2 Million Metric Tonnes per annum by 2030-31 respectively from the level of 0.5 and 1.2 MMT per annum in 2010-11.

12.1.3 Thus going forward, air traffic growth will be strong and sustained which will in turn drive the investment requirements for air port infrastructure, including Air Navigation Services related infrastructure, air line industry, general aviation, training academies, MRO, Ground handling, building capacity in the regulatory bodies etc

12.1.4 Aviation infrastructure needs to be developed to facilitate unconstrained growth of the aviation market. Not only the investment requirements have to address the existing capacity constraints in various airports but also should address requirements in the context of growth scenario forecast for the next decade and thereafter.

12.1.5 Total investment of Rs. 3, 77,275 crores has been estimated for airport infrastructure development work by 2031-32. This investment would result in creation of additional passenger capacity of 1086 MPPA. This additional capacity will help in catering to the forecasted passenger traffic of 1144 MPPA by 2031-32 in a seamless and safe manner.

12.1.6 Airports cannot be built in isolation. There is a need for seamless coordination with other state agencies to develop ground support and logistics to provide surface connectivity. Appropriate access through road connectivity is essential part of airport infrastructure. There is therefore a need for effective coordination between road development agencies both at the center and in the states, besides coordination with the Railway authorities to enable seamless intermodal connectivity for passengers and cargo to and from the airports.

12.1.7 If the objective is to create greater number of viable airports, then the policy framework must encourage and incentivize re-distribution of traffic beyond the top 10 airports. Coupled with a policy to promote regional airlines in the country, this approach could potentially benefit interior areas from participating in the growth process.

12.1.8 Air Space and Air Traffic Management infrastructure assumes critical importance in the context of the Indian Air Transport sector moving to the next growth phase. Technology being a dynamic variable, the equipment and systems of the air navigation services and the underlying technology has to match with the progress in airborne technology. Therefore there is a need for constant up gradation of the systems and the equipments that are the part of Air Navigation Services.

12.1.9 The helicopter market in India is quite promising, with growing requirements in tourism, mining, corporate travel, air ambulance, homeland security etc Development of heliports is important to support the growth of general aviation in India, especially in areas that cannot have runways on account of financial or terrain-related challenges. There is a need to consider developing a PPP policy for development of heliports. There is also a need to develop standardized route operating procedures for helicopters.

12.1.10 The air cargo volume of all Indian airports put together is less than that handled by individual airports like Hong Kong, Memphis, Shanghai, Incheon, Anchorage and Paris. This bears testimony to the significant opportunity that lies ahead, if the cargo sector gets its infrastructure, processes and policies in place. India's image as a reliable supplier in international markets is crucially dependent upon the performance levels of air cargo terminals in the country. Investments in Cargo terminals and other infrastructure required for carrying out cargo operations in the airports are considered quite important.

12.1.11 Also, there is a pressing need to augment Off-Airport cargo processing facilities on the lines of Container Freight Stations/ICD for maritime cargo so that congestion and delays in cargo terminals at airports can be reduced. Air cargo terminals attached to the airports could at the best be a transit point if availability of space is an issue.

12.1.12 Review of PPP model of development of airport infrastructure suggests that the policy enabled timely creation of world-class airport infrastructure. Since finance came from the private promoters, it did not burden the Government / Public Exchequer. Higher User Satisfaction for

passengers and better utilization of the assets with focus on non-aeronautical revenue generation, better coordination with local bodies/state agencies for improvements in connectivity to road / metro etc., improvement in cargo infrastructure were some of the key benefits. As the governance system matures with implementation of several projects under PPP model, it is hoped that, further refinements could be made to the design of PPP model for obtaining robust results.

12.1.13 Viability of Airline Industry is central to entire sector and crucial for sustaining growth. The future of India's aviation growth is critically linked to the health of the airline industry.

Despite the phenomenal growth in traffic, most Indian carriers are reeling under losses. During the three year period between 1 Apr 2007 and 31 Mar 2010, Indian carriers incurred an accumulated operational loss in excess of Rs 26,000 crores, of which three large airlines accounted for nearly Rs 23,000 crore.

12.1.14 One of the major challenges of the air line industry in India is the high and growing debt burden of the carriers. Airline Industry in India suffers from huge debt burden – close to US $ 20 billion (estimated for 2011-12).

12.1.15 Foreign investments has always been resorted to cater to the enormous size of investments required for a growing economy and the need to bring in cutting edge technology and the associated best practices of the industry. Airline industry qualifies in all these respects listed above and therefore the need to facilitate larger capital inflow from abroad into the country. Foreign investment is not just a source of equity investment for developing economies, it also brings with it considerable benefits viz: technology transfer, management know-how, and access to international markets.

12.1.16 The mechanism of the relationship has been through inflow of investment funds, infrastructure and technology transfers, enhancement of human capital, improvement in the quality of the factors of production, faster growth of output and employment, increased productive efficiency, consumer benefits and access to global markets.

12.1.17 Relaxation of Ownership & Control rules governing airline sector is expected to result in significant benefits in terms of financing costs especially at a time when the industry has launched itself in the path of higher trajectory of growth.

12.1.18 External Commercial Borrowings could become an important source of funds for the industries in India particularly to Airline industry which are adversely affected by high cost of loans in India. Relaxation of restrictions on ECB to Indian industries should provide the much needed relief to them. This measure would be of very high relevance at this juncture when cost of debt is prohibitively high in India.

12.1.19 Cost of Aviation Turbine Fuel (40-50% of their total operating cost) is a formidable challenge for the financial health of airlines. ATF prices in India are unduly higher than international bench marks resulting in a tremendous financial burden on Indian Carriers. ATF price in India is nearly 60% costlier than competing hubs like Dubai, Singapore and Kuala Lumpur. Pricing regime for ATF in India does not appear to be an outcome of a competitive market although theoretically it is outside Administrative pricing mechanism and there are more than three players (Oil Marketing Companies) in the market. Market for ATF is not sufficiently competitive to ensure that prices have some cost orientation. The pricing regime for ATF is not transparent.

12.1.20 ATF is subjected to a multitude of cascading taxes by different government entities. VAT on ATF in most of the states ranges from 20% to 30%. There is no doubt that the current regime of aviation fuel taxation regime adversely impacts the financial performance of Indian air carriers particularly in the domestic sector. If aviation fuel taxes are disproportionately higher without any basis, then it retards the industry development vis-à-vis the overall growth in the economy and limits its potential contribution to economic well being.

12.1.21 Cost of fuel, Insurance and freight, MRO expenses, and lease rentals are all calculated in dollar terms. 18 % Rupee depreciation is the most recent development that is also hitting the carriers. It is recommended that the ATF prices as well as the state level levies/surcharges on ATF should be rationalized to minimize the cascading effect of tax regime so that the operating environment of the airline industry becomes viable. Facility of setting off central excise duty paid on ATF against Service tax receipts should be extended to airline industry. Besides being equitable, this would provide some relief to the industry. Pricing regime for ATF as it exists is opaque and needs to be made more transparent.

12.1.22 MRO industry in India suffers from lack of adequate number of credible third-party MRO facilities. To emerge as an MRO hub for the region, there are regulatory and infrastructural limitations that need to be addressed. The high tax regime in India is considered as a major

deterrent for growth of the MRO industry. This makes aircraft servicing about 40% to 50% more expensive in India than competing destinations in the region, like Singapore, Dubai, Colombo, among others.

12.1.23 In summary, taxation of air transportation sector as a whole is disproportionately high which retards the industry's development vis-à-vis the overall growth in the economy, and limits its potential economic contribution. To fully reap the economic benefits of air transportation, airlines must be treated as economic assets rather than as convenient source of taxation.

12.1.24 Continuous increase in the ATF prices, fast depreciating rupee value vis-a-vis US Dollar have pushed up the cost on the one hand and on the other hand, yield has declined over a period of time when the traffic is growing overall. Pricing strategies adopted by them in the year 2011 is a testimony to the inference that market share growth is the prime motivation of the airlines at the cost of profitability.

12.1.25 Airlines need to be rational in capacity augmentation and in evolving a pricing strategy which helps them achieve viable operations in the country. Productivity analysis suggests that Indian Carriers need to improve the productivity performance at operational level to cut costs and improve efficiency.

12.1.26 Economic Regulation is considered essential to ensure the healthy growth of the civil aviation sector. Certain market developments concerning pricing behaviour of Scheduled Carriers in India point to the need for some form of pricing regulation. Price regulation need not necessarily mean fixing of prices. Nevertheless, the regulatory framework governing airline prices could be used to test the pricing practices that may arise in the market from time to time against the principles of economic regulation such as Non-predatory, Nondiscriminatory, Fair and reasonable prices for air travelers and transparency in pricing.

12.1.27 Mergers and Acquisitions (M & A) in the airline industry should be closely monitored with a view to ensure that market power of the merged entity does not become dominant enough to constrain competition in the market. Each and every proposal for Mergers or Acquisitions shall be evaluated by the Ministry of Civil Aviation from the point of view of potential impact on the state of competition of the proposed mergers/acquisitions. Economic Regulation shall also encompass a well thought out exit policy to unviable players. International market access issues shall also form part of economic regulation.

12.1.28 The current arrangement for ensuring essential air services is not satisfactory. The air connectivity is largely concentrated on routes connecting state capitals. Air connectivity has not increased proportionately on routes connecting Island airports. It is established that Route Disbursal Guidelines created in 1990s meant for ensuring minimum air connectivity to certain remote and inaccessible regions in the country casts a burden on the commercial health of airlines in India. Quite a few distortions arise out of its implementation. The RDG being a matter of internal cross-subsidization between financially viable and un-economical routes for airlines, it does not appear to be sustainable to continue this in the long run given the nature and extent of remote and inaccessible areas in the country to be covered and the financial crisis the airline industry is facing.

12.1.29 There is a need to revisit the Naresh Chandra Committee Report that recommended Essential Air Services Fund (EASF) to achieve the social objectives of ensuring minimum air connectivity to remote and inaccessible areas of the country. This Working Group suggests establishment of a non-lapsable exclusive fund to provide explicit and direct subsidies to airlines (SOPs/RSOPs/Non-Scheduled operators) to make up for viability gaps on these routes for the airlines and for airports to be set up in the identified areas.

12.1.30 For development of Greenfield airport, land has to be provided by the respective state government which may sometime necessitate land acquisition from respective land owners residing in the vicinity of airport. Country needs to have a strong and predictable regulatory frame work in place for land acquisition so as to meet both the objectives of protecting the fair and reasonable rights of land owners and to meet the requirement of development of airports to provide connectivity and through that maximize economic gains to the hinterland.

12.1.31 On the question of the preferred method of raising resources for development of new airports and expansion/modernization of existing airports, generally the states are of the view that PPP model is appropriate for the purpose.

12.1.32 Safety is of paramount importance in air transportation. Results of forecast of aircraft movement of scheduled Carriers in India indicate that there will be fourteen million aircraft movements in India by 2030-31. In addition to that there will also be a surge in the movement of aircrafts including helicopters on the General aviation side too. Now the challenge is to sustain the growth rate on the one hand and keep a check on safety issues on other. Though

regulatory framework is amended from time to time to suit immediate needs and to meet safety norms, the basic regulatory structure remains archaic.

12.1.33 A review and revision of the complete aviation regulation should be undertaken to bring it at par with international standards. In order to strengthen the DGCA with powers to recruit and train the regulatory professionals, transformation of DGCA into a Civil Aviation Authority (CAA) with necessary autonomy is considered essential. However, DGCA needs to be restructured and strengthened with modernized processes and skills before it is subsumed into the Civil Aviation Authority that is on the anvil.

12.1.34 For meaningful enforcement action, the published regulations should be explicit, clear and unambiguous. The enforcement personnel should be trained in objective interpretation of regulations. DGCA and AAI should invest in development of modern operating procedures and enforce adoption by airlines. There is an urgent need to computerize the examination process by introducing on-line and on-demand examination system which will utilize a computerized question data bank, and eliminate any likely chances of unfair means in the examination process.

12.1.35 The increase in traffic is going to cause a heavy pressure on airports and security infrastructure. Indian airports have been designed and approved by BCAS with a specific carrying capacity in the Security Hold Area.

12.1.36 The issue of assigning security functions to entities headed by foreigners would need to be addressed. All sensitive airports would need to have City-side Policing. The current situation of airports being policed by CISF and State Police leads to wide variations in quality of enforcement of security procedures. Given the nature of aviation duties, a distinct and dedicated aviation security force on the lines of Railway Protection Force needs to be set up.

12.1.37 The development of airports would require that the designs must strictly adhere to security norms. The BCAS would need to develop specialized technical know-how in this area to discharge this function successfully. A restructuring of the BCAS would have to be undertaken at an early date. The Regulator would have to develop as a vigilant facilitator to enable the full burgeoning of the industry.

12.1.38 As larger number of people travel and the number of unknown passengers multiplies, there would be a need to integrate Passenger Information System with Unique Identity Number System being developed by Government of India and its further integration with the records of the State Crime Records Bureau (SCRB) and National Crime Records Bureau (NCRB).

12.1.39 Airport Entry Passes may be sparingly issued to restrict entry of too many people inside Terminals and Air-side. Protocol Passes should be gradually phased out.

12.1.40 Closely related to safety in Civil Aviation is skill augmentation in its entire dimension. Despite the existence of private institutions in India that provide Aviation Education and Training, there is consensus that the number of programmes offered, the depth of course content and the infrastructure facilities available with them are not sufficient to meet the needs of the industry. There is no flying training institute for training civil helicopter pilots in the country. There is also a near total absence of credible institutions undertaking serious research or providing research facilities in the field of Civil Aviation. Therefore, higher education and extensive research in frontiers of technology, and science that is fundamental to long term interest of the sector is of vital importance.

12.1.41 It is found that there is a near absence of qualitative and duly recognized formal Educational programmes leading to award of Diploma/Degree/Post Graduate Degree in the field of civil Aviation in the country. One solution to the problem could be to set up National Aviation University to cater the growing educational and training requirements of the Civil Aviation Sector. Launching of certificate/diploma/ degree programmes in various streams of Civil Aviation by the such University will not only meet the ever growing requirement of professionally qualified personnel but will also create a strong base with a pool of scientific and technical manpower in the Civil Aviation Sector so that India can potentially become an Aviation Education Hub for many countries in the region. Ministry of Civil Aviation needs to give a fresh impetus to the whole issue of Aviation Education and Training in the country.

12.1.42 The standards of curriculum and examination systems for various categories of personnel in the aviation sector should be completely overhauled with modernized systems of examination and evaluation. The systems of accreditation of various training institutes of the aviation sector in the country by the regulator need to reviewed and restructured to ensure that the most

modern systems are available with the training institutes along with adequate infrastructure for imparting training to all categories of personnel.

12.1.43 Training and capacity building of ATCOs should be an immediate priority. Partnership options with international ATC training institutes should be explored to enhance capacity of ATC. The enhanced capacity can also help ATC earn additional revenue in the long run by training foreign ATCOs and providing consultancy services to global ATC service providers. Options of collaborating with the Indian Air Force to build capacity should be explored.

12.1.44 Despite the Civil Aviation Requirements mandating norms for maintenance of certain minimum standards for safeguarding consumer interest, there is evidence to say number of disputes arising out of consumer grievances from air passengers is on the rise. Hence, there is a need for an effective outlet to ensure the settlement of disputes. The objective should be to ensure the long term interest of the end users.

12.1.45 At present, data furnished by airline operators is being processed without cross-verification. There is an urgent need to verify the raw data furnished by the carriers to DGCA and those collected by Air port Authority of India. DGCA may have to organize periodic training for MIS personnel of the carriers on this subject regularly.

12.1.46 The existing system does not provide for processing and dissemination of financial data of airlines and airport operators, which needs improvement. Availability of financial data of carriers and airport operators would go a long way in providing the basis for investment analysis for the industry as a whole. Global experience shows that regulators facilitate access to such information to both current and potential investors.

12.1.47 Forecasts of air traffic are necessary for planning and policy making. In India, the model to forecast air traffic is yet to be developed. A country specific forecasting model needs to be developed for regular forecast of air travel passengers both domestic and international and forecast of domestic and international freight potential. This exercise should be jointly undertaken by regulators of the sector both AERA and DGCA.

12.1.48 There has been gross under estimation in National Accounts Statistics in the context of aviation sector and a consequent under-estimation of GDP. Thus, the pressing need is to modify the present system of compilation of National Accounts Statistics in order to reflect the wider area

of economic activities pertaining to the aviation sector. Also, the System of Satellite Accounting for Civil Aviation sector should be introduced especially in cases where direct data collection is not possible.

List of Tables in Annex

Annex- I

No. 3/1/2010-Tpt.
GOVERNMENT OF INDIA
Planning Commission
National Transport Development Policy Committee (NTDPC)

Capital Court, Olof Palme Marg
Munirka, New Delhi-110067
Dated: 19th July, 2010

Subject: Working Group on Civil Aviation for the National Transport Development Policy Committee (NTDPC).

It has been decided by the National Transport Development Policy Committee (NTDPC) to constitute a Working Group on Civil Aviation Sector. The Composition and Terms of references of the Working Group are as under:

1. Composition

1	Secretary, Ministry of Civil Aviation- Chairman
2	Shri K.L. Thapar, Member, NTDPC
3	Shri Cyrus Guzder, Member, NTDPC
4	Member Secretary/ Co-ordinator, NTDPC
5	Managing Director, National Aviation Company of India Limited
6	Director General, Civil Aviation
7	Chairman, Airports Authority of India
8	Dr. Shashanka Bhide, Senior Fellow, National Council for Applied Economic Research (NCAER), New Delhi.
9	Shri Rakesh Gangwal, Former Chairman and CEO, US
10	Capt. G.R. Gopinath, CMD, Deccan 360.
11	Shri Sanat Kaul, Chairman, International Foundation for Aviation and Aerospace Development.
12	Shri Sanjay Reddy, MD, GVK, Mumbai & Bengaluru International Airports.
13	Representative of financial sector (nominated by Secretary, Department of Financial Services)
14	Shri U.G. Krishna, GM, ECTI, Wipro Limited.
15	Joint Secretary, Ministry of Civil Aviation- Convenor

2. Terms of Reference

1. Determine the role of air transport in meeting transport requirements of the economy over the next two decades, keeping in view the need to
   a. Conserve energy and protect the environment,
   b. Promote development of remote and inaccessible areas,
   c. Promote safety and sustain future quality of life,
   d. Create an optimal intermodal mix.

2. Estimate the growth in air traffic by 2020 and 2030 in terms of both passengers and freight by:

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Annex- I

a. Total volume of traffic, domestic and international.
b. Domestic origin – destination pairs.

3. Consistent with the above, assess the current and the required capacity in future, of civil aviation sector
   a. Aircraft fleet
   b. Infrastructure in terms of
      i. On the ground, including airport terminals, runway capacity, apron – parking space, access to terminal buildings etc.
      ii. Airspace and air traffic control.
      iii. Creation of additional/greenfield airport infrastructure and its role in promoting regional development.

4. In light of the above,
   a. Assess the investment required to achieve the projected air transport traffic growth.
   b. Identify sources of funding and assess fund requirements from budgetary, non-budgetary and private sources for different areas in air transport.
   c. Identify areas for PPP and the requirement of private and public funding in these areas.
   d. Examine the existing PPP policy framework and policy initiatives including the regulatory and institutional.

5. Assess the full costs of air transport, including the costs of externalities, and suggest appropriate pricing regimes, both direct and indirect, including institutional arrangements for rational pricing.

6. Estimate the energy requirements necessary for air transport infrastructure and suggest measures to put air transport sector on a sustainable low carbon path and promote energy efficiency, emission reduction and environment protection.

7. Review the impact of ongoing developments of international air transport in the world and India and suggest changes in policy for India in following areas:

   a. Licensing of airlines for scheduled, non-scheduled and cargo services.
   b. Safety, security, economic and environmental issues, keeping in view the recommendations of ICAO, international practices and the conditions in India.
   c. Taxation policy affecting various sub-sectors of civil aviation, including taxes on aviation turbine fuel.

8. Assess the current industry structure, including the role played by public and private sector and suggest policies to promote adequate competition in air transport with the objective of enhancing access and affordability.

9. Assess the availability of human resources for the air transport sector and suggest measures for skill development and institutional capacity building for various stakeholders.

10. Measures for promotion of research and development and technology upgradation in air transport, including institutional development.

11. Identify data deficiencies in air transport and suggest measures for improving, maintaining and updating the database, including institutional measures.

3. Additional guidance for the Working Group

1. The Group may get special studies carried out by experts.

2. The Group may visit such places and consult such stakeholders, key users and experts as may be considered necessary for its work.

3. The Group may examine the laws, rules and regulations pertaining to air transport in connection with the TOR above and suggest legal, organizational, institutional and procedural reforms as necessary.

4. The Chairman may co-opt up to two additional members.

5. The expenditure on studies commissioned by the Working Group would be borne by the Ministry of Civil Aviation.

6. The Working Group shall submit its report within nine months.

7. The non-official members of the Working Group will be paid TA/DA in accordance with the guidelines of NTDPC. The official Members will be paid TA/DA as per their entitlement by concerned Ministry/Departments where they are working.

(B.N. Puri)
Member Secretary (NTDPC)

Copy to

1. Chairman, NTDPC
2. All the Members of the Working Group

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Annex-II

Questionnaire for obtaining views / facts on various aspects from State Governments with respect to Civil Aviation Sector

1. How significant is the Civil Aviation sector for the growth of the economy of the state in terms of its Gross State Domestic Product and employment?

2. What is your assessment of growth potential in value of air Transport Services in the state in the next 10-years?
    - Freight (international and domestic separately)
    - Passenger (international and domestic separately)
    - Services within the state for freight and passenger traffic if they are not covered above

3. Does your Government have a policy for addressing various issues connected with the Civil Aviation?

4. Is there any independent department/Ministry to handle matters connected with Civil Aviation in your state? If not what is the administrative unit at the State level to handle such matters?

5. What are the various policy measures that your State Governments have offered to attract investment in Civil Aviation sector?

6. Please suggest the best method of achieving air connectivity to remote and inaccessible areas in the state through Civil Aviation? What are the policy measures that you would like to suggest for achieving this objective?
    - Is helicopter or regional aircraft or other low cost airport feasible in the state?

7. What are your views on inter air port distances within a state in the matter of location of air port and what is the basis of that view?

8. What role would you like to suggest for the State Government in the matter of area development and City side development of airports?

9. What is the best mechanism that you can suggest to expedite land acquisition for development /up gradation of existing airports and for development of new airports? What role would the State Government like to play in this regard?

10. What is your policy in respect of creating Mass Transit links between cities and any new/green field airport sites that are either under Planning or under implementation?

11. What in your view could be the best method of raising resources for development of new airports and up gradation and modernization of existing airports?

12. What in your view are factors that would be congenial for attracting investment to your state in the following sub-sectors of Civil Aviation: Justify your viewpoint with evidence.
    - Maintenance, Repair and Overhaul (MRO)
    - Hubs for Ground handling services
    - Manufacture of parts, accessories, Components for passenger air craft
    - Manufacture of Civilian air crafts
    - Development of Human Resources in various fields that are directly or indirectly connected with Civil Aviation sector

13. In which of the above sub-sectors, would you like Private participation and suggest the recommended framework eg. Public Private Participation

14. What is the existing tax rate, surcharges on Aviation Turbine Fuel in your state? Is there any scope for reducing these rates in future? If so by when?

15. Are there any other levies, Taxes that affects Civil Aviation in the State?

16. Have you conducted any study relating to the development of civil Aviation sector in the state?

Annex-III

Air Traffic Forecast

A. Methodology and Data Source

In this section, we provide the methodology followed, the sources of data used in arriving at forecasted passenger and cargo traffic estimates of likely traffic over the long term. The methodology for the analysis is given below:

- The present analysis focuses on calculation of elasticity of passenger traffic with respect to the level of economic activity, i.e. real GDP both scheduled and non-scheduled. The elasticity is also referred as 'income elasticity of passenger traffic' although it can be only a crude estimate of income elasticity. Similarly, it also focuses on income elasticity of cargo traffic and elasticity of scheduled aircraft movement for both domestic and international segment.
- Econometric models have been used for estimating the elasticities and forecasting of air traffic from 2011-12 to 2031-32.
- Estimation of income elasticity for air passenger traffic (domestic and international separately) with respect to (w.r.t.) domestic and world GDP respectively has been carried out using time series data for the period 1990-2010, which has been used for forecasting. Similarly, the estimation of income elasticity for both domestic and international cargo traffic has been carried out with respect to domestic GDP using time series data for the period 1990-2010. The estimation of income elasticity of domestic and international scheduled aircraft movement has been carried out with respect to domestic GDP and world GDP respectively using time series data for the period 1995-2010. In the non-scheduled passenger segment the time series data used is for the period 1993-2009. The time series data pertains to financial year data. DGCA is the source of all the datasets on passenger and cargo traffic whereas AAI is the source for the data on aircraft movement. In Annex 3, a comparison between datasets of DGCA and AAI has been done.
- The estimates from the time series results modelling have been adjusted for autocorrelation.
- Time series data on domestic real GDP at factor cost from 1990-91 to 2010-11 has been taken from Economic Survey 2011-12. This variable has been used as an explanatory variable for explaining air

traffic in the domestic passenger segment (both scheduled and non-scheduled), domestic and international cargo segment and in domestic aircraft movement in the econometric model.

- For time series analysis of international passenger traffic and international aircraft movement, we have used international GDP or world GDP (at constant US$ 2000) as proxy variable for estimating income elasticity. The data on world GDP from 1990 to 2010 has been taken from the WDI (World Bank) website.
- The computed elasticity for scheduled domestic passenger traffic w.r.t. domestic GDP is 1.5 using the data point from 1990-91 to 2010-11 and the same elasticity has been used for future projection of domestic traffic. The elasticity implies that a one per cent increase of domestic GDP would lead to 1.5 per cent increase of domestic traffic.
- The computed elasticity for scheduled international passenger traffic w.r.t. world GDP is 3.1 using the data from 1990-91 to 2010-11. The model has been run on various data combinations etc. and in all the cases it was observed that international passenger traffic is highly sensitive to global GDP. This means that a small change in world GDP will bring about a sharp change in international passenger traffic.
- The computed elasticity for non-scheduled domestic passenger traffic w.r.t. domestic GDP is 0.74 using the data point from 1993-94 to 2009-10. The same exercise has not been carried out in the international segment as the data for the same isn't available.
- The computed elasticity for domestic cargo traffic w.r.t. domestic GDP is 1.38 using the data point from 1990-2010 and the same elasticity has been used for future projection. The elasticity for international cargo traffic w.r.t. domestic GDP is 1.38 using the data point from 1990-2010.
- In the case of International Cargo, DGCA had been maintaining records only pertaining to International Freight, which amounted to partial coverage of data; however, the documentation of data with respect to International Mail has been started since 2010 January.
- The computed elasticity for scheduled domestic aircraft movement traffic w.r.t. domestic GDP is 1.56 using the data point from 1995-96 to 2010-11.
- The computed elasticity for scheduled international aircraft movement traffic w.r.t. world GDP is 3.55 using the data point from 1995-96 to 2010-11. The same exercise has not been carried out in the non-scheduled segment as the data exhibited weak relationship with GDP in both domestic and international segment.

B. Model used and Estimated Elasticities

The econometric model that has been used and the elasticities so obtained have been summarized in **Tables 1, 2, 3 and 4**. The elasticities are the estimated □ coefficient in the log-linear model: **Log y = □ + □ log x + u**

Where y is the traffic variable, x is the economic activity variable (GDP) and u is the random error term, □ is the intercept. In case of passenger traffic, □ measures the income elasticity with respect to GDP and in case of cargo movement it measures the elasticity with respect to domestic GDP. (See Table 1)

Table 1: Income Elasticity (□) of passenger & cargo traffic in India w.r.t India's GDP[101]

Traffic Category	Period under study	Intercept (□)	Elasticity (□)	R^2
Sch. Domestic Pax	1990-91 to 2010-11	-22.65	1.50	96.5%
Sch. International Pax	1990-91 to 2010-11	-50.423	3.07	99.1%
Non-Sch. Domestic Pax	1993-94 to 2010-11	-5.957	0.737	72%
Domestic Cargo	1990-91 to 2010-11	-11.442	1.385	93.3%
International Freight	1990-91 to 2010-11	-10.225	1.375	98.8%
Sch. Domestic Aircraft Movement	1995-96 to 2010-11	-13.585	1.556	98.9%
Sch. International Aircraft Movement	1995-96 to 2010-11	-49.665	3.545	98.9%

Source: DGCA, AAI

C. Projections of Air Passenger, Cargo Traffic & Aircraft Movement

[101] Sch. refers to Scheduled and Non-Sch. refers to Non-scheduled

Forecast based on Time series data

For the projection of air passenger traffic from 2011-12 to 2031-32, the Indian GDP growth rate assumption ranges from 8.5% in the near term to 6% in the long term on an average and in case of International GDP growth rate it ranges from 3.25% in the near term to 3% in the long term.

The results of domestic and international passenger, cargo traffic and scheduled aircraft movement forecast from 2011-12 to 2031-32 based on our GDP growth rate assumptions and GDP elasticities are given in the following Tables along with their corresponding sensitivity analysis pertaining to expected high case and low case in the period 2011-2031.

Table 2: Sensitivity Analysis of forecasted Domestic Passenger Traffic Handled (in millions)[102]

Year	Low Case	Base Case	High Case
2011	106.0	117.8	129.6
2012	117.0	130.0	143.0
2013	130.9	145.4	159.9
2014	146.5	162.8	179.1
2015	164.3	182.5	200.8
2016	184.3	204.8	225.2
2017	205.5	228.4	251.2
2018	229.4	254.9	280.4
2019	256.2	284.7	313.1
2020	286.3	318.1	349.9
2021	320.0	355.5	391.1
2022	353.0	392.3	431.5
2023	389.6	432.9	476.2
2024	430.1	477.8	525.6
2025	474.8	527.6	580.4
2026	524.4	582.7	640.9
2027	571.3	634.8	698.3

[102] The sensitivity analysis is a 10% range both on the higher and the lower side of the base case as obtained from the modelling exercise.

2028	622.5	691.7	760.8
2029	678.3	753.7	829.1
2030	739.3	821.4	903.6
2031	805.8	895.3	984.9

Table 3: Sensitivity Analysis of forecasted International Passenger Traffic Handled (in millions)[103]

Year	Low Case	Base Case	High Case
2011	38.5	42.8	47.1
2012	41.7	46.3	51.0
2013	45.7	50.8	55.9
2014	50.6	56.2	61.8
2015	56.1	62.4	68.6
2016	62.5	69.4	76.3
2017	67.7	75.3	82.8
2018	73.5	81.7	89.9
2019	79.9	88.7	97.6
2020	86.8	96.5	106.1
2021	94.4	104.9	115.4
2022	102.7	114.1	125.6
2023	111.8	124.3	136.7
2024	121.8	135.4	148.9
2025	132.7	147.5	162.2
2026	144.7	160.8	176.9
2027	157.8	175.3	192.9
2028	172.2	191.3	210.4

[103] Including Transshipment

2029	187.9	208.7	229.6
2030	205.1	227.9	250.6
2031	223.9	248.8	273.7

Table 4: Sensitivity Analysis of forecasted Non-scheduled Domestic Passenger Traffic Carried (in millions)

Year	Low Case	Base Case	High Case
2010	1.5	1.6	1.8
2011	1.5	1.7	1.9
2012	1.7	1.8	2.0
2013	1.8	2.0	2.2
2014	1.9	2.1	2.3
2015	2.1	2.3	2.5
2016	2.2	2.5	2.7
2017	2.4	2.6	2.9
2018	2.5	2.8	3.1
2019	2.7	3.0	3.3
2020	2.9	3.2	3.6
2021	3.1	3.5	3.8
2022	3.3	3.7	4.0
2023	3.5	3.9	4.3
2024	3.7	4.1	4.5
2025	3.9	4.3	4.8
2026	4.1	4.6	5.0
2027	4.3	4.8	5.3

2028	4.5	5.1	5.6
2029	4.8	5.3	5.8
2030	5.0	5.6	6.1
2031	5.3	5.8	6.4

Table 5: Sensitivity Analysis of forecasted Domestic Cargo Traffic Handled (in MMT)

Year	Low Case	Base Case	High Case
2011	0.9	1.0	1.1
2012	1.0	1.2	1.3
2013	1.2	1.3	1.4
2014	1.3	1.5	1.6
2015	1.5	1.6	1.8
2016	1.6	1.8	2.0
2017	1.8	2.0	2.2
2018	2.0	2.3	2.5
2019	2.3	2.5	2.8
2020	2.5	2.8	3.1
2021	2.8	3.1	3.4
2022	3.1	3.4	3.8
2023	3.4	3.8	4.1
2024	3.7	4.1	4.5
2025	4.1	4.5	5.0

2026	4.5	5.0	5.5
2027	4.9	5.4	6.0
2028	5.3	5.9	6.5
2029	5.7	6.4	7.0
2030	6.2	6.9	7.6
2031	6.7	7.5	8.2

Table 6: Sensitivity Analysis of forecasted International Freight Traffic handled by Scheduled Carriers (in MMT)[104]

Year	Low Case	Base Case	High Case
2011	1.24	1.37	1.51
2012	1.37	1.53	1.68
2013	1.55	1.72	1.89
2014	1.74	1.94	2.13
2015	2.06	2.29	2.52
2016	2.32	2.57	2.83
2017	2.59	2.87	3.16
2018	2.89	3.21	3.53
2019	3.22	3.58	3.93
2020	3.76	4.18	4.59
2021	4.19	4.66	5.12
2022	4.61	5.12	5.63

[104] Including transshipment

2023	5.07	5.63	6.19
2024	5.57	6.19	6.81
2025	6.40	7.12	7.83
2026	7.04	7.82	8.60
2027	7.63	8.48	9.33
2028	8.28	9.20	10.12
2029	8.98	9.98	10.98
2030	10.16	11.29	12.42
2031	11.02	12.24	13.47

Note: The above table includes data on transshipment cargo.

Table 7: Sensitivity Analysis of forecasted Domestic Aircraft Movement Traffic of Scheduled Carriers (in millions)

Year	Low Case	Base Case	High Case
2011	1.1	1.2	1.3
2012	1.2	1.3	1.5
2013	1.4	1.5	1.7
2014	1.6	1.7	1.9
2015	1.8	2.0	2.2

2016	2.1	2.3	2.5
2017	2.3	2.6	2.8
2018	2.6	2.9	3.2
2019	3.0	3.3	3.7
2020	3.4	3.8	4.1
2021	3.8	4.3	4.7
2022	4.3	4.7	5.2
2023	4.8	5.3	5.8
2024	5.3	5.9	6.5
2025	5.9	6.5	7.2
2026	6.6	7.3	8.0
2027	7.2	8.0	8.8
2028	7.9	8.8	9.6
2029	8.6	9.6	10.6
2030	9.5	10.5	11.6
2031	10.4	11.5	12.7

Table 8: Sensitivity Analysis of forecasted International Aircraft Movement Traffic of Scheduled Carriers (in millions)

Year	Low Case	Base Case	High Case
2011	0.3	0.3	0.3
2012	0.3	0.4	0.4
2013	0.4	0.4	0.4
2014	0.4	0.5	0.5

2015	0.5	0.5	0.6
2016	0.5	0.6	0.7
2017	0.6	0.7	0.7
2018	0.7	0.7	0.8
2019	0.7	0.8	0.9
2020	0.8	0.9	1.0
2021	0.9	1.0	1.1
2022	1.0	1.1	1.2
2023	1.1	1.2	1.3
2024	1.2	1.4	1.5
2025	1.4	1.5	1.7
2026	1.5	1.7	1.8
2027	1.7	1.8	2.0
2028	1.8	2.1	2.3
2029	2.0	2.3	2.5
2030	2.3	2.5	2.8
2031	2.5	2.8	3.1

Annex IV

Comparison of DGCA and AAI datasets

The time series datasets that have been used for the modeling exercise and the forecasts so arrived at has been given in this Annex. The datasets obtained from DGCA have been used for the same. Forecasts were carried out using both DGCA & AAI datasets; however, the results obtained from the exercise using DGCA datasets have been finally adopted for the following reasons:

- AAI datasets are available from the year 1995-96 onwards as it was the year in which it was set up, however, DGCA datasets are available from the year 1980-81 onwards. For our analysis DGCA datasets have been taken from the year 1990-91 onwards.
- The Civil Aviation sector started witnessing some meaningful growth from 1990-91 onwards, however, post 1994-95 the sector has been witnessing significant growth. Thus, DGCA datasets from the year 1990-91 have been taken for forecasting purposes indicating a little longer period for timeseries analysis.
- Also, AAI datasets provide traffic data jointly for both scheduled and non-scheduled; however, DGCA datasets are available in segregated manner.

The DGCA datasets have been compared with those of AAI mainly to reflect the divergence if any between the two datasets. The datasets of DGCA and AAI differ mainly because of certain reasons, namely:

- DGCA data is the data recorded by the govt.'s regulatory body, Directorate General of Civil Aviation (DGCA) and AAI data is the data recorded by govt. owned airport operator, Airport Authority of India (AAI).
- DGCA separately records the data on scheduled and non-scheduled passenger and cargo traffic. On the other hand, AAI records passenger and cargo traffic for both the segments jointly.
- The domestic passenger and cargo data as reported by DGCA is the traffic carried data while the one reported by AAI is traffic handled data. Traffic Carried indicates the revenue traffic carried by various carriers whereas traffic handled implies the traffic handled at the Indian airports.

  In case of AAI traffic handled data, the passenger or cargo is recorded at the airports twice once at the stage of embarkation and the other at the stage of disembarkation. Also, due to this procedure, AAI data is able to record transit passengers very clearly, however, because there is no increase in revenue due to transit passengers, DGCA data cannot capture the same. Similarly, in the case of

International traffic, AAI records the transit passengers clearly but the same is not reflected in DGCA data separately.

- The traffic carried data reflects the increase in revenue traffic whereas the traffic handled data is significant for airport capacity and safety assessment. For purposes of our analysis in this section, we have used DGCA data in case of passenger and cargo traffic.
- With respect to data on Aircraft Movement, DGCA reports the same as aircraft departures and only for domestic carriers. However, AAI reports data on Aircraft Movement for both scheduled and nonscheduled segments with respect to domestic and international routes and hence, we have used AAI data for purposes of our analysis.
- Also, considering data is being recorded by two separate bodies, minor divergence is bound to exist.

The datasets are as follows:

a. Time series dataset on domestic passenger traffic.

Table 9: Time series dataset on domestic passengers by DGCA & AAI

	DGCA data	AAI data			
Year	Domestic Passenger carried (Mn)	Domestic Passenger handled	Domestic Passenger handled (Mn)/2	Difference (DGCA-AAI data)	% of Difference over DGCA data
1990	7.5	-	-	-	-
1991	8.9	-	-	-	-
1992	7.9	-	-	-	-
1993	9.9	-	-	-	-
1994	11.1	-	-	-	-
1995	12.2	25563998	12.8	-0.6	-4.9%
1996	11.7	24276108	12.1	-0.4	-3.7%
1997	11.5	23848833	11.9	-0.4	-3.3%
1998	12.0	24072631	12.0	0.0	-0.1%
1999	12.7	25741521	12.9	-0.2	-1.3%
2000	13.7	28017568	14.0	-0.3	-2.2%
2001	12.9	26358627	13.2	-0.3	-2.5%
2002	14.0	28897525	14.4	-0.5	-3.6%
2003	15.7	32138162	16.1	-0.4	-2.5%
2004	19.4	39859343	19.9	-0.5	-2.5%
2005	25.2	50974218	25.5	-0.3	-1.1%
2006	35.8	70624999	35.3	0.5	1.3%
2007	44.4	87067597	43.5	0.9	1.9%
2008	39.5	77294731	38.6	0.8	2.1%
2009	45.3	89387504	44.7	0.6	1.4%
2010	53.9	105522726	52.8	1.1	2.1%

Note: The DGCA dataset that has been used to forecast as given in the section above pertains to only scheduled passengers. However, AAI does not record its data separately as scheduled and nonscheduled. The DGCA time series data that has been used to forecast non-scheduled passenger traffic in the domestic

segment is given in Table 2 of this Annex 3. The AAI datasets begin from 1995 as that was the year in which it was set up.

b. Time series dataset on international passenger traffic.

Table 10: Time series dataset on International passengers by DGCA & AAI

	DGCA data	AAI data			
Year	**International Passenger carried (Mn)**	**International Passenger handled**	**Internationalhandled Passenger (Mn)**	**Diff (DGCAAAI data)**	**% of Difference over DGCA data**
1990	6.3	-	-	-	-
1991	6.8	-	-	-	-
1992	7.3	-	-	-	-
1993	7.7	-	-	-	-
1994	8.2	-	-	-	-
1995	9.4	11449756	11.4	-2.0	-21.7%
1996	10.1	12223660	12.2	-2.1	-20.8%
1997	10.7	12782769	12.8	-2.1	-20.0%
1998	11.0	12916788	12.9	-1.9	-17.3%
1999	11.5	13293027	13.3	-1.8	-16.1%
2000	12.3	14009052	14.0	-1.7	-14.1%
2001	11.9	13624712	13.6	-1.7	-14.4%
2002	13.2	14825799	14.8	-1.7	-12.7%
2003	14.6	16641449	16.6	-2.0	-13.8%
2004	17.3	19424457	19.4	-2.2	-12.5%

2005	20.2	22367399	22.4	-2.2	-10.9%
2006	23.4	25778027	25.8	-2.4	-10.3%
2007	27.2	29818150	29.8	-2.6	-9.7%
2008	28.9	31584001	31.6	-2.7	-9.2%
2009	32.1	34367929	34.4	-2.3	-7.1%
2010	33.5	37907547	37.9	-4.4	-13.1%

Note: As mentioned above, DGCA data pertains to only scheduled passenger traffic. Unlike DGCA, AAI does not record its data on international segment as passenger carried by domestic and foreign carriers separately and thus records it jointly. The International Passenger data as given by AAI separately mentions the number of passengers embarked, disembarked and transit passengers.

c. Time series dataset on non-scheduled passenger traffic. In this no comparison has been undertaken with AAI data, as AAI does not separately declare data on scheduled and nonscheduled passengers.

Table 11: Non-Scheduled Passengers Carried by Domestic Operators by DGCA

Year	Domestic NSOP ('000s)
1993	492.7
1994	626.8
1995	845.5
1996	596.9
1997	550
1998	559.6
1999	633.9
2000	648.8
2001	665.8
2002	723.3
2003	701.4
2004	762.7
2005	778.5
2006	852.7

2007	919.2
2008	1134.5
2009	1493.4

Source: DGCA

d. Time series dataset on domestic cargo traffic.

Table 12: Time series dataset on Domestic Cargo by DGCA & AAI

	DGCA data	AAI data (including mail)			
Year	**Domestic Cargo Carried ('000 tonnes)**	**Domestic Cargo Handled (tonnes)**	**Domestic Cargo Handled ('000 tonnes)/2**	**Diff (DGCAAAI data)**	**% of Difference over DGCA data**
1990	97.2	-	-	-	-
1991	101.8	-	-	-	-
1992	92.8	-	-	-	-
1993	90.6	-	-	-	-
1994	96.8	-	-	-	-
1995	113.1	222043	111.0	2.1	1.8%
1996	120.9	225994	113.0	7.9	6.5%
1997	125.1	252158	126.1	-0.9	-0.7%
1998	136.7	258708	129.4	7.3	5.4%
1999	178.6	303350	151.7	26.9	15.1%
2000	187.9	327509	163.8	24.1	12.8%
2001	185.3	333458	166.7	18.6	10.0%
2002	206.9	372554	186.3	20.6	10.0%
2003	226.5	413182	206.6	19.9	8.8%

2004	285.3	490434	245.2	40.1	14.1%
2005	299.2	513639	256.8	42.4	14.2%
2006	321.3	565016	282.5	38.8	12.1%
2007	368.1	605539	302.8	65.3	17.7%
2008	340.8	589717	294.9	45.9	13.5%
2009	395.8	726324	363.2	32.6	8.2%
2010	475.5	887507	443.8	31.7	6.7%

Note: Both DGCA and AAI dataset on domestic cargo include freight and mail data. However, the DGCA dataset above includes only cargo carried by scheduled carriers whereas the AAI dataset includes data carried by scheduled as well as non-scheduled carriers.

e. Time series dataset on international cargo traffic.

Table 13: Time series dataset on International Cargo by DGCA & AAI

	DGCA data	AAI data (including Mail)				AAI data (excluding Mail)		
Year	Intl. Freight ('000 tonnes)	Intl.Cargo (tonnes)	Intl. Cargo ('000 tonnes)	Diff (DGCAAAI data)	% of Difference over DGCA data	Intl. Freight ('000 tonnes)	Diff (DGCAAAI data)	% of Difference over DGCA data
1990	230.8	-	-	-	-	-	-	-
1991	216.8	-	-	-	-	-	-	-
1992	217.8	-	-	-	-	-	-	-
1993	246.6	-	-	-	-	-	-	-
1994	303.9	-	-	-	-	-	-	-
1995	348.3	458211	458.2	-109.9	-31.6%	452.9	-104.6	-30.0%
1996	414.5	484340	484.3	-69.9	-16.9%	479.1	-64.6	-15.6%

1997	430.6	493835	493.8	-63.2	-14.7%	488.2	-57.6	-13.4%
1998	413.2	481000	481.0	-67.8	-16.4%	474.7	-61.4	-14.9%
1999	454.3	538641	538.6	-84.4	-18.6%	531.8	-77.6	-17.1%
2000	509.4	565161	565.2	-55.7	-10.9%	557.8	-48.4	-9.5%
2001	497.8	568226	568.2	-70.5	-14.2%	560.2	-62.5	-12.5%
2002	555.0	654829	654.8	-99.8	-18.0%	646.1	-91.1	-16.4%
2003	616.7	700810	700.8	-84.1	-13.6%	693.2	-76.5	-12.4%
2004	739.5	830993	831.0	-91.5	-12.4%	823.6	-84.2	-11.4%
2005	814.9	927586	927.6	-112.7	-13.8%	920.1	-105.3	-12.9%
2006	927.0	1028790	1028.8	-101.7	-11.0%	1021.3	-94.2	-10.2%
2007	1025.0	1154441	1154.4	-129.4	-12.6%	1146.7	-121.7	-11.9%
2008	1072.5	1157549	1157.5	-85.1	-7.9%	1149.9	-77.5	-7.2%
2009	1139.1	1278673	1278.7	-139.6	-12.3%	1270.7	-131.6	-11.6%
2010	1243.9	1503719	1503.7	-259.9	-20.9%	1496.2	-252.4	-20.3%

Note: In case of International cargo, DGCA has been recording data only pertaining to Freight carried by Scheduled carriers. However, it has started documenting the mail data only since 2010 January onwards. The AAI dataset includes both Freight as well as Mail carried by all carriers. Thus, in Table 4 an attempt has been made to compare the DGCA dataset with AAI Freight data as well to check if lack of Mail data makes a big difference.

f. Time series dataset on Domestic Aircraft Movement

Table 14: Time series dataset on Sch. Domestic Aircraft Movement by AAI & DGCA

	DGCA data		AAI data				
Year	**Sch. Dom. Aircraft Departure**		**Sch. Domestic Aircraft Movement**		**Aircraft Movement/2**	**Diff.(DGCA-AAI)**	**% of Difference over DGCA data**
1994	132509		-		-	-	-

1995	138189	281051	140525.5	-2337	-2%
1996	125358	289745	144872.5	-19515	-16%
1997	133240	290301	145150.5	-11911	-9%
1998	144640	294760	147380	-2740	-2%
1999	161393	326951	163475.5	-2083	-1%
2000	173935	345300	172650	1285	1%
2001	183479	362393	181196.5	2283	1%
2002	203477	404508	202254	1223	1%
2003	234246	460301	230150.5	4096	2%
2004	265889	513393	256696.5	9193	3%
2005	315825	609092	304546	11279	4%
2006	420666	819150	409575	11091	3%
2007	520731	1008519	504259.5	16472	3%
2008	509567	981290	490645	18922	4%
2009	512923	994218	497109	15814	3%
2010	-	1042037	-	-	-

g. Time series dataset on Domestic Aircraft Movement

Table 15: Time series dataset on Sch. International Aircraft Movement by AAI

Year	Sch. International Aircraft Movement
1995	86057
1996	88261
1997	89058

1998	91776
1999	91748
2000	96007
2001	101150
2002	108486
2003	125760
2004	153462
2005	179360
2006	206153
2007	238458
2008	261230
2009	273315
2010	288375

Source: AAI

Annex V

Definitions used by DGCA and AAI

I. The **definitions that have been used by DGCA** have been given below:

a) Aircraft Departure: The number of take-offs of aircraft. For statistical uses, departures are equal to the number of landings made or flight stages flown.

b) Aircraft Movement: An aircraft take-off or landing at an airport. For airport traffic purposes one arrival and one departure is counted as two movements.

c) **Domestic Scheduled airline:** An airline, which operates any scheduled service within the boundaries of the state where the airline is registered but which does not operate scheduled international services.

d) **Freight (or mail) tones carried (performed):** The number of tones of freight carried is obtained by counting each tone of freight on a particular flight (with one flight number) once only and not repeatedly on each individual stage of that flight. The only exception to this is for freight flown on both the international and domestic stages of the same flight, which is considered in computation both as domestic and an international shipment or dispatch. The same principle should be used in calculating mail tones carried.

e) **International non-scheduled operator:** An operator offering international service to the public on a non-scheduled basis only. Such an operator may also offer domestic services on a nonscheduled basis only.

f) **International scheduled airline:** An airline, which operates any scheduled international air transport service regardless of the proportion of international service offered as compared with all other kinds of services offered.

g) **Mail:** Dispatches of correspondence and other objects tendered by and intended delivery to postal administration.

h) **Non-scheduled air transport operator:** For statistical purposes an operator is non- scheduled air transport operator if it offers air transport service to the public on a non-scheduled basis only.

i) **Passenger-kilometers performed:** A passenger kilometer is performed when a passenger is carried one kilometer. Passenger kilometer is calculated as the sum of the products obtained by multiplying the number of revenue passengers carried on each flight stage by the stage distance. The resultant figure is equal to the number of kilometers travelled by all passengers.

j) **Passenger load factor:** Passenger-kilometers performed expressed as a percentage of seat kilometers available. Similarly is the concept weight load factor.

II. The **definitions that have been used by AAI** have been given below:

a) Aircraft Movement

In Aircraft Movements, landing and take-off of an aircraft are counted separately i.e. one landing and one take-off is counted as two movements.

i. **International:** All movements of Indian or Foreign Aircraft whose origin or destination airport is located outside the Indian Territory.

ii. **Domestic:** All movements of Indian aircraft whose origin or destination airports are located within the Indian Territory.

iii. **Scheduled:** Aircraft Movements scheduled and performed for remuneration according to a published time-table or so regular or frequent as to constitute as recognizable systematic series, which are open to use by members of the public and extra revenue flights occasioned by overflow traffic from scheduled flights.

iv. **Non-Scheduled:** Aircraft Movements chartered and special other than those reported under scheduled flights performed for remuneration on an irregular basis including empty flights.

v. **Others:** Aircraft Movements other than scheduled and non-scheduled including movements for crop dusting, aerial photography, flood relief, pilot training, movements of military aircraft etc.

b) **Passengers**

A passenger is a person occupying separate seat on a one-way trip. An infant-in arm is not considered a passenger for statistical purposes.

i. **Scheduled:** Passengers carried by aircraft & helicopter on a scheduled flight.

ii. **Non- Scheduled:** Passengers carried by aircraft & helicopter on a non- scheduled flight.

iii. **International:** Passengers with a flight coupon indicating that the airports at which they arrived or departed are not in the same country.

iv. **Domestic:** Passengers with a flight coupon indicating that the airports at which they arrived or departed are in the same country.

v. **Embarked:** Under this category are included those passengers whose air journey begins at the reporting airport or disembarked passengers who continue their air journey in a different aircraft.

vi. **Disembarked:** Under this category are included those passengers whose air journey terminates at the reporting airport or the passengers who continue their air journey in a different aircraft.

vii. **Direct Transit:** Passengers stopping temporarily at the designated airport and departing on the aircraft which they arrived, or in another aircraft having the same flight number as the one on which they arrived (passengers in direct transit usually have only one flight coupon for the two stages of the trip on which they are in direct transit) They are counted only once.

viii. **Transfer Passenger:** Passengers flying into and out of an airport on different aircraft or on the same aircraft bearing different flight numbers, and whose main purpose for using the airport was to affect a transfer.

ix. **Terminating Passengers:** Passengers starting or ending their trip at the designated airport.

x. **Terminal Passengers:** Total of terminating and terminal passengers.

c) Freight & Mail

i. **Freight:** It consists of employed or actually air lifted goods, newspapers, diplomatic bags, parcel post and express parcel carried by aircraft on commercial flights (scheduled and nonscheduled). Passenger's regular or excess baggage and trucked freight are excluded from Freight.

ii. **Mail:** It consists of all closed bags delivered by the Postal Administration whatever their contents may be.

iii. **Loaded and Unloaded:** These terms as applied to freight and mail have meanings similar to 'embarked' and 'disembarked' above.

iv. **Cargo:** Cargo is the total of Freight and Mail.

Note: Airports are concerned with airport throughput which is technically the total passengers handled at the airports. However, on the other hand, Carriers are concerned with Revenue Passengers Carried, which means the number of passengers carried by the airline on which the airline has earned revenue.

Annex VI

Other Datasets

Other datasets that have been used in the Report have been given in this Annex. **Table 16: Market Share of LCC & FSCs**

Year	LCC*[105]	FSC
2003	1.0%	99.0%
2004	5.0%	95.0%
2005	29.1%	70.9%
2006	41.0%	59.0%
2007	45.7%	54.3%
2008	47.7%	52.3%
2009	63.3%	36.7%

Source: Spicejet Annual Report 2009-10

[105] *LCC traffic share includes low fare brand of FSC as well.

Table 17: Domestic Cargo distribution into Belly cargo, Freighter Cargo carried by scheduled carriers and into cargo carried by Non-scheduled operators.

Year	Scheduled airlines belly cargo (tonnes)	Freighter cargo operations (tonnes)	Total Cargo (tonnes)*
1999-00	1,58,879 (88.9%)	19,689 (11.0%)	1,78,764
2000-01	1,66,668 (88.7%)	21,190 (11.3%)	1,87,976
2001-02	1,60,556 (86.5%)	24,782 (13.4%)	1,85,627
2002-03	1,79,585 (86.6%)	27,302 (13.2%)	2,07,393
2003-04	1,97,490 (87.1%)	29,015 (12.8%)	2,26,650
2004-05	2,45,151 (85.8%)	40,153 (14.1%)	2,85,706
2005-06	2,56,481 (85.6%)	42,752 (14.3%)	2,99,526
2006-07	2,66,421 (82.8%)	54,918 (17.1%)	3,21,757
2007-08	3,02,565 (82.1%)	65,490 (17.8%)	3,68,415
2008-09	2,77,608 (81.2%)	63,160 (18.5%)	3,41,763
2009-10	3,27,904 (82.8%)	67,856 (17.1%)	3,95,863

Source: DGCA

Note: Total Cargo is inclusive of cargo carried by Non-scheduled operators as well which is an insignificant proportion of the total.

Table 18: Domestic Passenger & Weight Load Factor (%)

Year	Passenger Load Factor (%)	Weight Load Factor (%)
1993-94	62.6	57.1
1994-95	63.6	57.5
1995-96	68.8	61.4
1996-97	66.3	59.9
1997-98	64.4	58.7
1998-99	60.7	55.9
1999-00	59.8	55.9
2000-01	61.7	57.5
2001-02	55.5	52.2
2002-03	56.3	53.5
2003-04	58.4	57.5
2004-05	64.9	63.9
2005-06	67.6	67.1
2006-07	68.8	67.1
2007-08	68.9	65.7
2008-09	63.7	59.6
2009-10	72.0	65.6

Source: DGCA

Table 19: Non-Scheduled Operator's traffic in the domestic passenger segment

Year	Domestic ('000)
1993	492.7
1994	626.8
1995	845.5
1996	596.9
1997	550.0
1998	559.6
1999	633.9
2000	648.8
2001	665.8
2002	723.3
2003	701.4
2004	762.7
2005	778.5
2006	852.7
2007	919.2
2008	1134.5
2009	1493.4

Source: DGCA

Table 20: Outbound & Inbound Passenger & Freight traffic in the International segment

Year	Passengers (Million)		Freight ('000 MT)	
	Outbound Passengers (Million)	Inbound Passengers (Million)	Outbound Freight ('000 MT)	Inbound Freight ('000 MT)
1990-91	3.1	3.2	65.4	165.4
1991-92	3.2	3.6	54.7	162.2
1992-93	3.5	3.9	52.5	165.3
1993-94	3.7	4	67.1	179.5
1994-95	4	4.2	99.4	204.5
1995-96	4.6	4.8	119.7	228.6
1996-97	5	5.2	134.3	280.2
1997-98	5.2	5.5	138.2	292.4
1998-99	5.4	5.6	138.1	275.2
1999-00	5.7	5.8	152.5	301.8
2000-01	6	6.3	174.2	335.2
2001-02	5.8	6.1	174.4	323.4
2002-03	6.4	6.8	190.4	364.6
2003-04	7	7.6	225.9	390.8
2004-05	8.4	8.9	282.9	456.6
2005-06	9.7	10.4	328.7	486.1
2006-07	11.3	12.1	397.3	529.7
2007-08	13.1	14	467	558

2008-09	14.1	14.8	464.2	608.2
2009-10	15.7	16.4	474.3	664.8

Source: DGCA

Table 21: Market share of Domestic & Foreign operators in the international passenger & freight segment (%)

	Passengers		Freight	
	Operator		Operator	
Year	Domestic	Foreign	Domestic	Foreign
1990	31.7%	68.3%	36.9%	63.1%
1991	30.9%	69.1%	31.0%	69.0%
1992	30.1%	69.9%	27.2%	72.8%
1993	28.6%	71.4%	26.9%	73.1%
1994	29.3%	70.7%	26.7%	73.4%
1995	30.9%	70.2%	26.3%	73.7%
1996	30.7%	69.3%	19.5%	80.5%
1997	30.8%	69.2%	19.4%	80.6%
1998	30.0%	70.0%	20.3%	79.7%
1999	30.4%	69.6%	19.2%	80.8%
2000	29.3%	70.7%	17.5%	82.5%
2001	29.4%	71.4%	17.3%	82.7%
2002	30.3%	69.7%	16.7%	83.3%
2003	29.5%	71.2%	14.3%	85.7%
2004	28.9%	71.1%	13.6%	86.4%
2005	30.2%	69.3%	12.1%	87.9%
2006	30.8%	69.2%	12.2%	87.8%

2007	32.0%	68.0%	12.7%	87.3%
2008	33.2%	67.1%	14.4%	85.6%
2009	34.6%	65.4%	16.1%	83.9%

Source: DGCA

Table 22: Non-scheduled operators & the total number of aircrafts with them

Year	Operators	Total number of Aircrafts with NonScheduled Operators permit holders
1990	3	6
1991	4	8
1992	7	20
1993	11	27
1994	17	42
1995	27	60
1996	28	48
1997	32	39
1998	39	79
1999	20	54
2000	36	106
2001	37	107
2002	40	117
2003	33	129
2004	38	151
2005	44	156
2006	56	183

2007	66	229
2008	99	272
2009	122	327
2010	127	370

Source: DGCA

Note: *Since 1997-98 Air Taxi Operators have been re-designated as Non-Scheduled Operators* **Annex-VII**

Table 23: Growth of Non - Scheduled Operators since 1990

Sl. No.	Year	Operators	Total number of Aircrafts with NonScheduled Operators permit holders
1	1990	3	6
2	1991	4	8
3	1992	7	20
4	1993	11	27
5	1994	17	42
6	1995	27	60
7	1996	28	48
8	1997	32	39
9	1998	39	79
10	1999	20	54
11	2000	36	106
12	2001	37	107
13	2002	40	117
14	2003	33	129
15	2004	38	151
16	2005	44	156

17	2006	56	183
18	2007	66	229
19	2008	99	272
20	2009	122	327
21	2010	127	370

Source: DGCA

Note: Since 1997-98 Air Taxi Operators have been rechristened as Non-Scheduled Operators

Table 24: Time Series Data on Domestic Traffic carried by Indian Carriers for Last 20 years

Sl. No.	Year	Passengers ('000)	Cargo (Tonne)
1	1990-91	7,912	97,279
2	1991-92	8,919	1,01,814
3	1992-93	8,205	92,782
4	1993-94	9,938	90,591
5	1994-95	11,057	96,837
6	1995-96	12,188	1,13,114
7	1996-97	11,700	1,20,901
8	1997-98	11,545	1,25,141
9	1998-99	12,025	1,36,688
10	1999-00	12,711	1,78,764
11	2000-01	13,712	1,87,976
12	2001-02	12,854	1,85,627
13	2002-03	13,951	2,07,393
14	2003-04	15,677	2,26,650

15	2004-05	19,445	2,85,705
16	2005-06	25,205	2,99,526
17	2006-07	35,793	3,21,757
18	2007-08	44,384	3,68,415
19	2008-09	39,467	3,41,763
20	2009-10	45,337	3,95,864

Source: DGCA

Table 25: Annual Growth of Scheduled International Traffic to & from India by Foreign Airlines & Indian Carriers for last 20 years

Year	Operator	Passengers (Million)			Freight (Kilo tonne)		
		To	From	Total	To	From	Total
1990-91	Indian	1.0	1.0	2.0	29.9	55.3	85.2
	Foreign	2.1	2.2	4.3	35.5	110.1	145.6
	Total	3.1	3.2	6.3	65.4	165.4	230.8
1991-92	Indian	1.0	1.1	2.1	21.1	46.2	67.3
	Foreign	2.2	2.5	4.7	33.6	116.0	149.6
	Total	3.2	3.6	6.8	54.7	162.2	216.8
1992-93	Indian	1.0	1.2	2.2	18.4	40.8	59.2
	Foreign	2.4	2.7	5.1	34.1	124.5	158.6
	Total	3.5	3.9	7.3	52.5	165.3	217.8
1993-94	Indian	1.0	1.2	2.2	22.1	44.2	66.3
	Foreign	2.7	2.8	5.5	45.0	135.3	180.2
	Total	3.7	4.0	7.7	67.1	179.5	246.6
1994-95	Indian	1.2	1.2	2.4	32.2	48.8	81.0
	Foreign	2.8	2.9	5.8	67.2	155.7	223.0
	Total	4.0	4.2	8.2	99.4	204.5	303.9
1995-96	Indian	1.4	1.5	2.9	36.7	54.8	91.5
	Foreign	3.2	3.4	6.6	82.9	173.8	256.7
	Total	4.6	4.8	9.4	119.7	228.6	348.3

1996-97	Indian	1.5	1.6	3.1	28.9	51.8	80.7
	Foreign	3.4	3.6	7.0	105.3	228.4	333.8
	Total	5.0	5.2	10.1	134.3	280.2	414.5
1997-98	Indian	1.6	1.7	3.3	29.4	54.2	83.6
	Foreign	3.6	3.8	7.4	108.8	238.2	347.0
	Total	5.2	5.5	10.7	138.2	292.4	430.6
1998-99	Indian	1.6	1.7	3.3	28.0	55.8	83.9
	Foreign	3.8	3.9	7.7	110.0	219.3	329.4
	Total	5.4	5.6	11.0	138.1	275.2	413.2
1999-00	Indian	1.7	1.8	3.5	27.0	60.4	87.4
	Foreign	4.0	4.0	8.0	125.5	241.4	366.9
	Total	5.7	5.8	11.5	152.5	301.8	454.3
2000-01	Indian	1.8	1.8	3.6	28.8	60.6	89.3
	Foreign	4.3	4.4	8.7	145.4	274.7	420.1
	Total	6.0	6.3	12.3	174.2	335.2	509.4
2001-02	Indian	1.7	1.8	3.5	26.6	59.5	86.1
	Foreign	4.1	4.3	8.5	147.8	263.9	411.7
	Total	5.8	6.1	11.9	174.4	323.4	497.8
2002-03	Indian	1.9	2.0	4.0	27.9	65.0	92.9
	Foreign	4.5	4.7	9.2	162.5	299.6	462.1
	Total	6.4	6.8	13.2	190.4	364.6	555.0
2003-04	Indian	2.0	2.2	4.3	28.5	59.6	88.1
	Foreign	5.0	5.3	10.4	197.4	331.2	528.7
	Total	7.0	7.6	14.6	225.9	390.8	616.7
2004-05	Indian	2.4	2.6	5.0	33.5	67.4	100.9
	Foreign	6.0	6.3	12.3	249.4	389.2	638.6
	Total	8.4	8.9	17.3	282.9	456.6	739.5
2005-06	Indian	2.9	3.2	6.1	34.9	63.9	98.7
	Foreign	6.8	7.2	14.0	293.9	422.3	716.1
	Total	9.7	10.4	20.2	328.7	486.1	814.9
2006-07	Indian	3.5	3.7	7.2	41.2	71.8	113.0
	Foreign	7.8	8.4	16.2	356.1	457.9	814.0
	Total	11.3	12.1	23.4	397.3	529.7	927.0

2007-08	Indian	4.2	4.5	8.7	50.4	79.3	129.8
	Foreign	8.9	9.6	18.5	416.6	478.7	895.3
	Total	13.1	14.0	27.2	467.0	558.0	1,025.0
2008-09	Indian	4.7	4.9	9.6	60.1	94.1	154.1
	Foreign	9.4	9.9	19.4	404.2	514.2	918.3
	Total	14.1	14.8	28.9	464.2	608.2	1,072.5
2009-10	Indian	5.5	5.6	11.1	70.0	112.9	182.9
	Foreign	10.2	10.8	21.0	404.3	551.9	956.2
	Total	15.7	16.4	32.1	474.3	664.8	1,139.1

Source: Monthly Traffic Statistics submitted by all Indian & Foreign carriers to DGCA