पोस्ट ऑपरेशन विश्लेषण रिपोर्ट

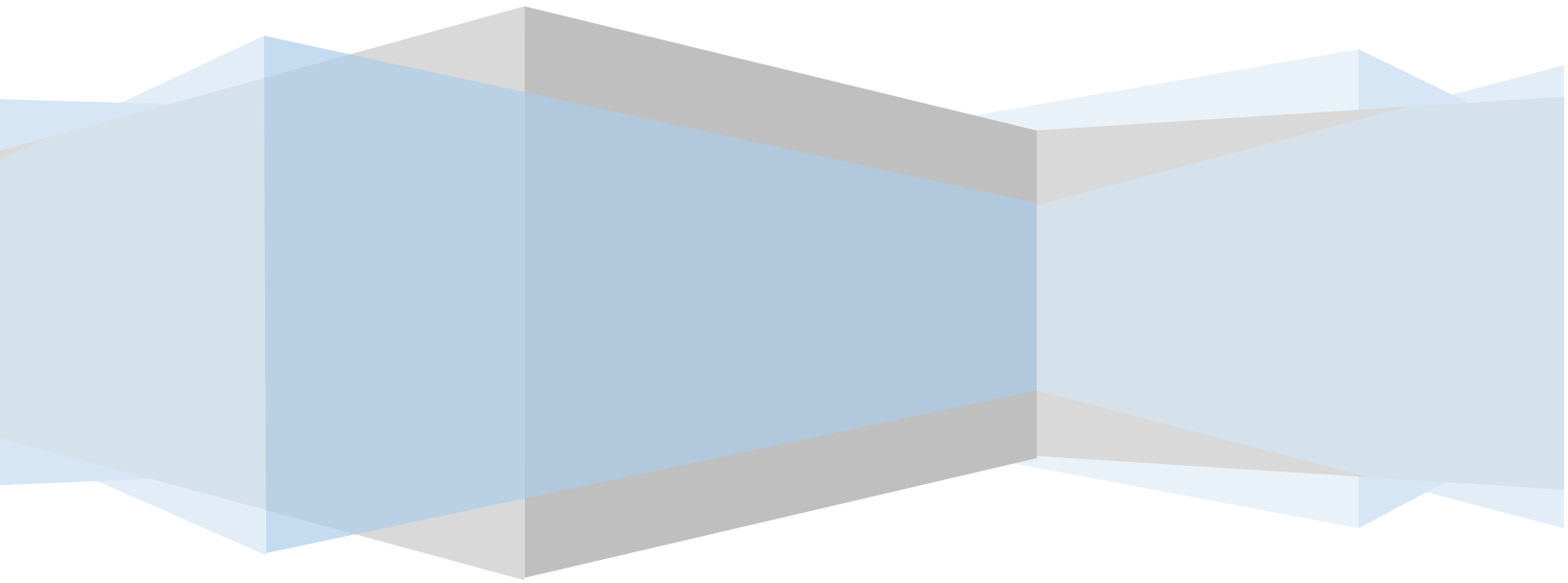
दिसंबर, 2025

सेंट्रल कमांड सेंटर, सी ए टी एफ एम, दिल्ली

POST OPERATIONS ANALYSIS REPORT

December, 2025

CENTRAL COMMAND CENTER, C-ATFM, DELHI



अंतर्वस्तु/Contents

List of Figures

A. कार्यकारी सारांश/Executive Summary

Average Domestic air traffic (31 days) has recorded a decrease of 2.31% whereas the average international air traffic has increased by 6.23 % in the month of December 2025 as compared to November '25.

On average, the Indian Airports in the ATFCM area saw 4932 IFR flights per day in the month of December 2025. The peak days were on 01st December 2025 (5197 IFR flights). Wednesday's were the busiest days throughout this month with an average of 5020 IFR flights per day.

Total Forty Eight (48) ATFM measures were applied this month during periods of congestion at Chennai, Delhi and Mumbai Airport.

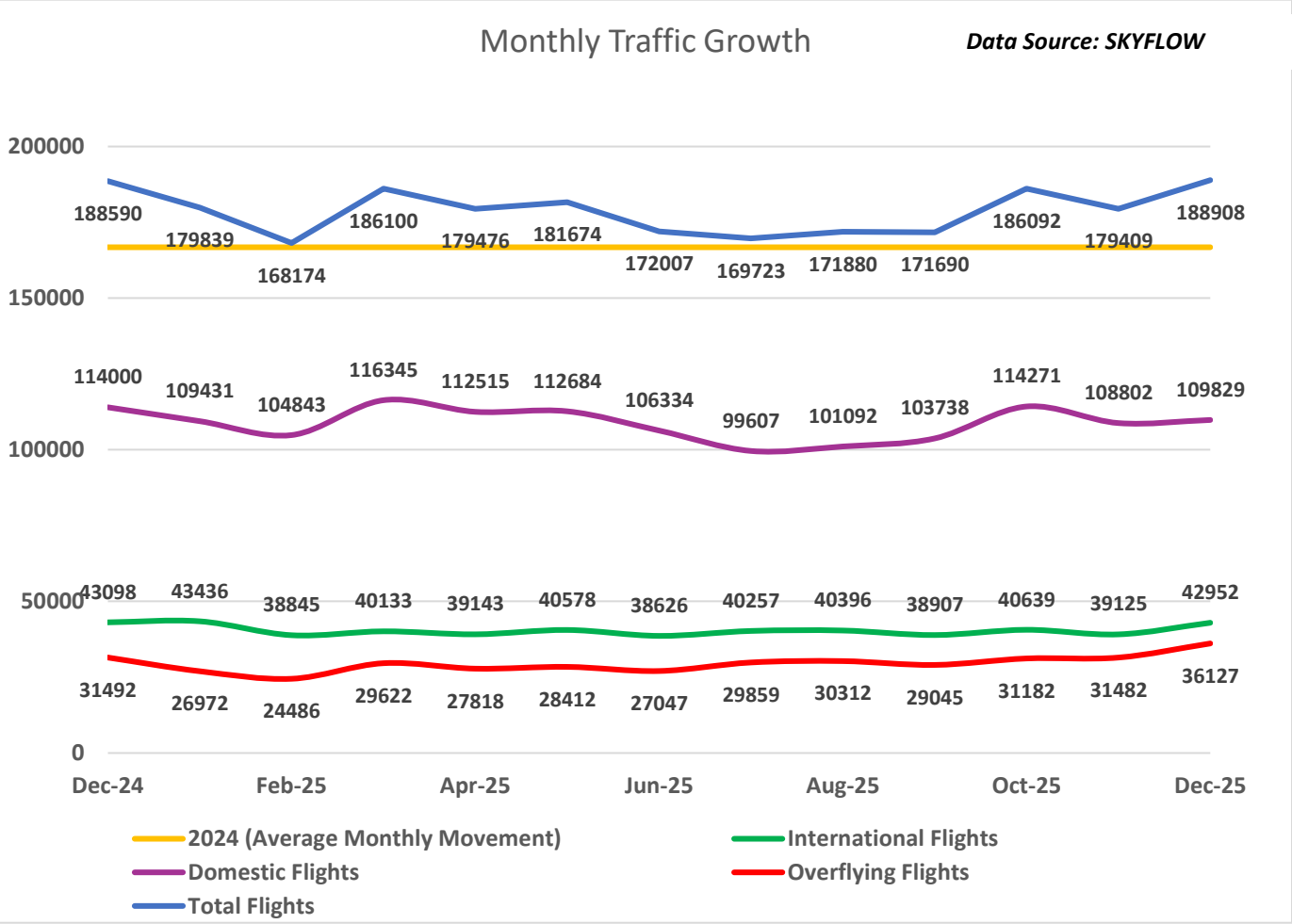


Figure 1: Monthly Traffic Growth

The graph above depicts the Domestic, International and Overflying Air traffic in Indian ATFCM Area during the last 13 months (Dec'24 to Dec'25).

B. यातायात विश्लेषण/Traffic Analysis

I. भारत के प्रमुख हवाई अड्डों पर हवाई यातायात गतिविधि /Air Traffic Movement at Major Airports in India

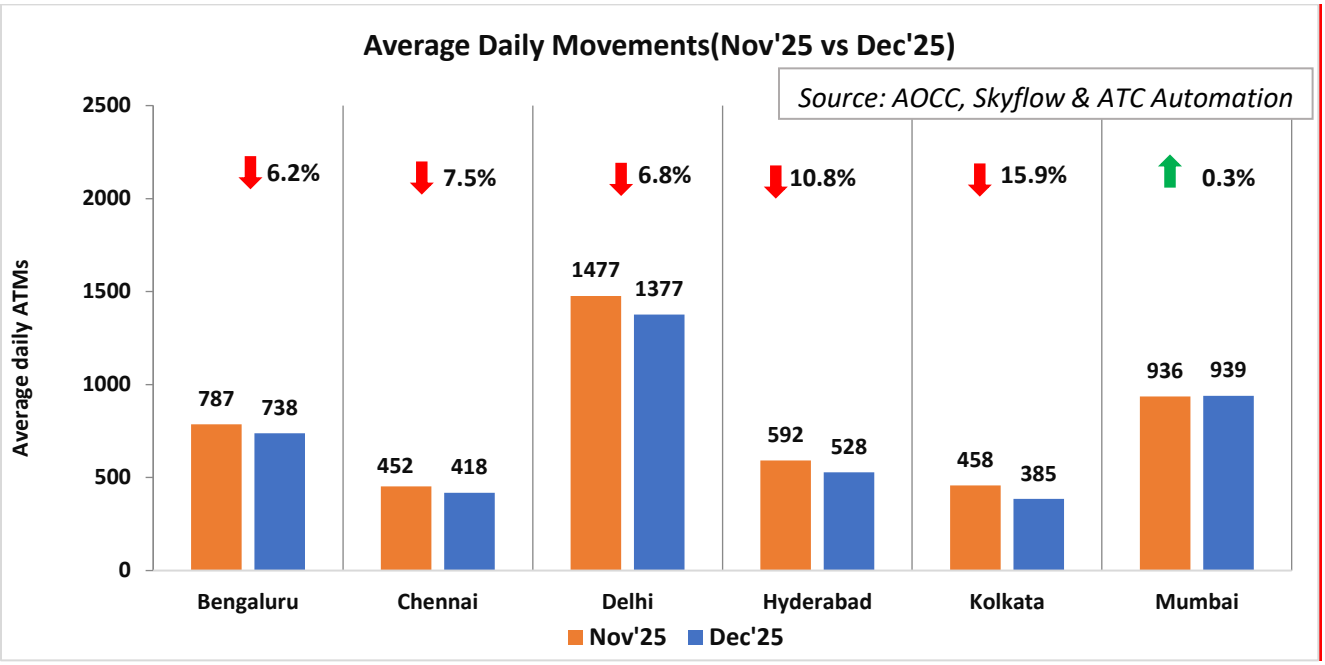


Figure 2: Average Daily Movements (Nov'25 vs Dec'25)

The above chart depicts the percentage change in average daily ATMs at six major Airports in December 2025 as compared to the previous month November 2025.

Airports\Year	Avg. Daily ATMs (YoY) for six major airports				
	Dec'21	Dec'22	Dec'23	Dec'24	**Dec'25**
Bengaluru	566	656	699	744	738
Chennai	342	350	387	461	418
Delhi	1247	1287	1287	1355	1377
Hyderabad	388	444	491	571	528
Kolkata	382	385	394	415	385
Mumbai	765	887	958	974	939

Air Traffic Movement for each day in December 2025 is plotted for Delhi, Mumbai, Bengaluru and Hyderabad Airport along with the percentage change w.r.t. Avg. Daily Movements for the same month.

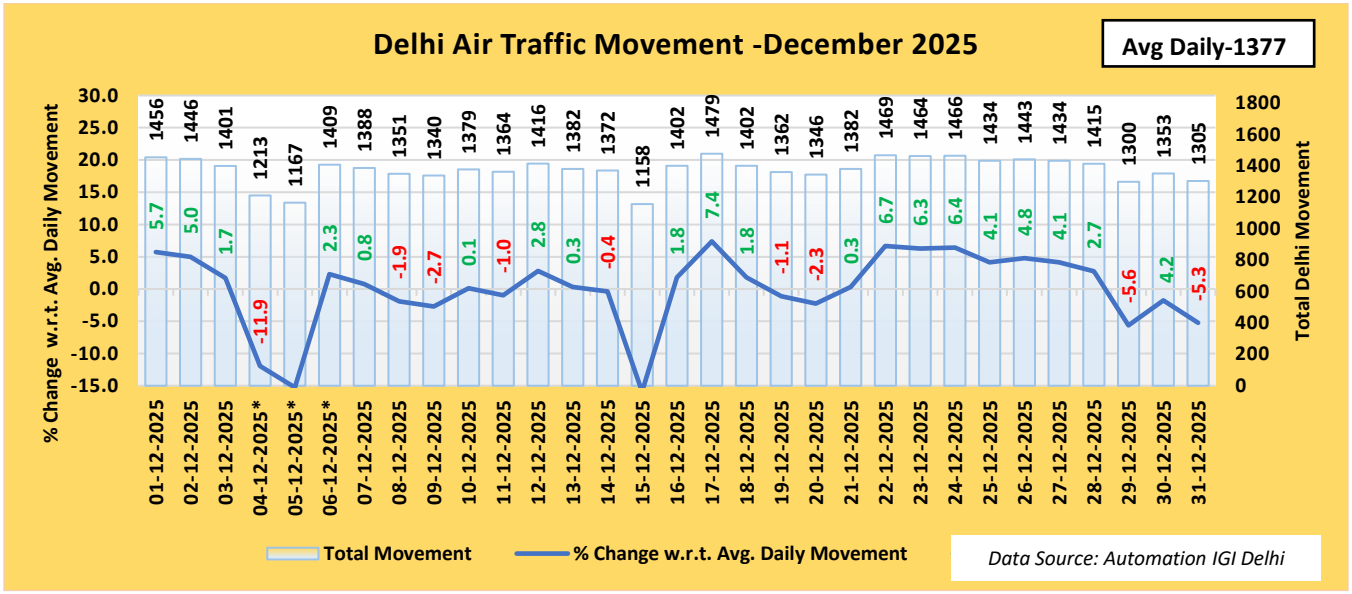


Figure 3: Air Traffic Movement for Delhi –Dec'25

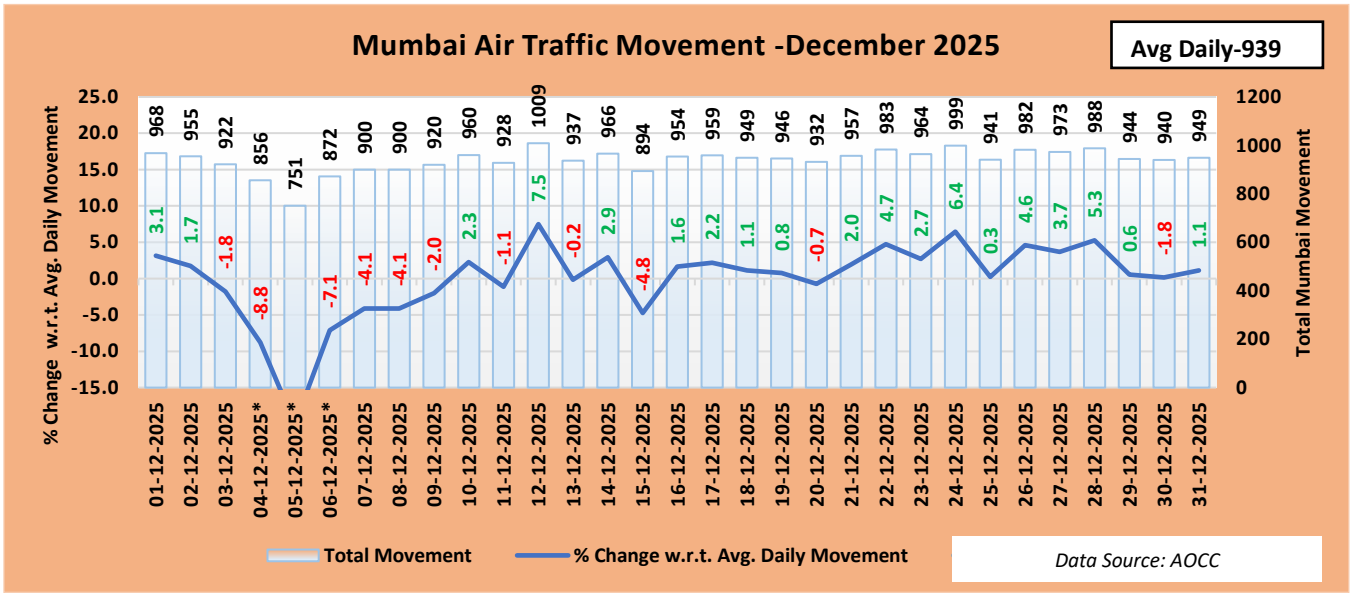


Figure 4: Air Traffic Movement for Mumbai – Dec'25

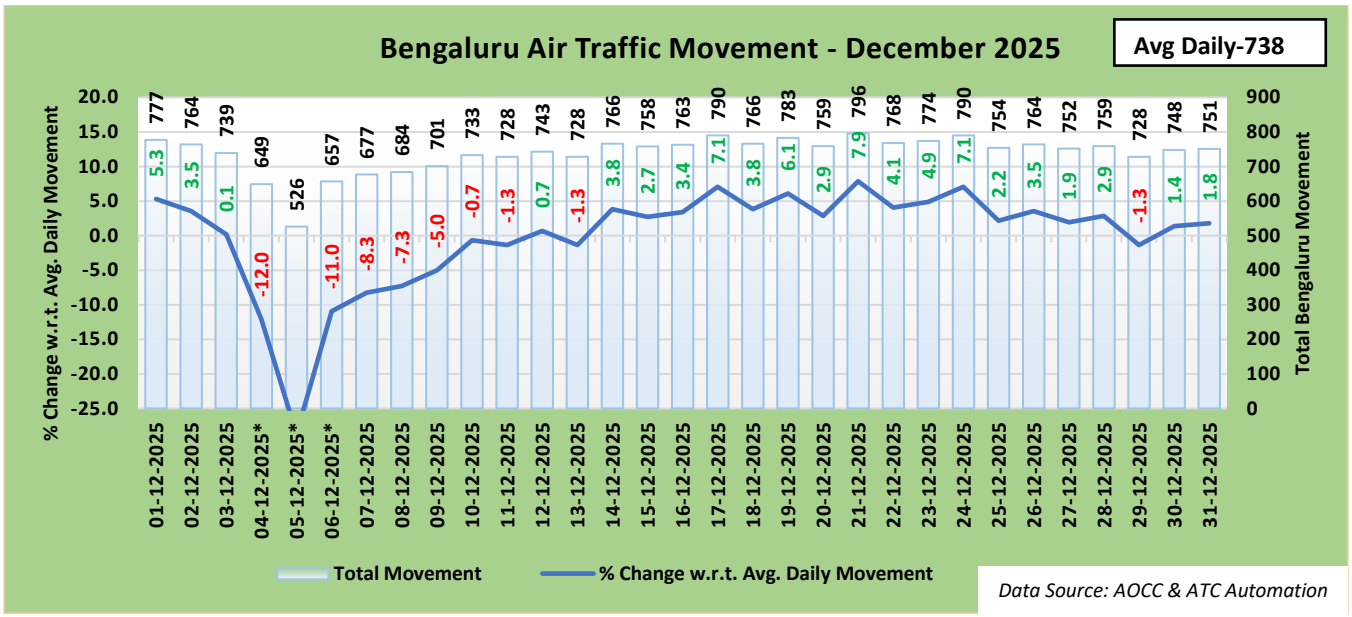


Figure 5: Air Traffic Movement for Bengaluru – Dec'25

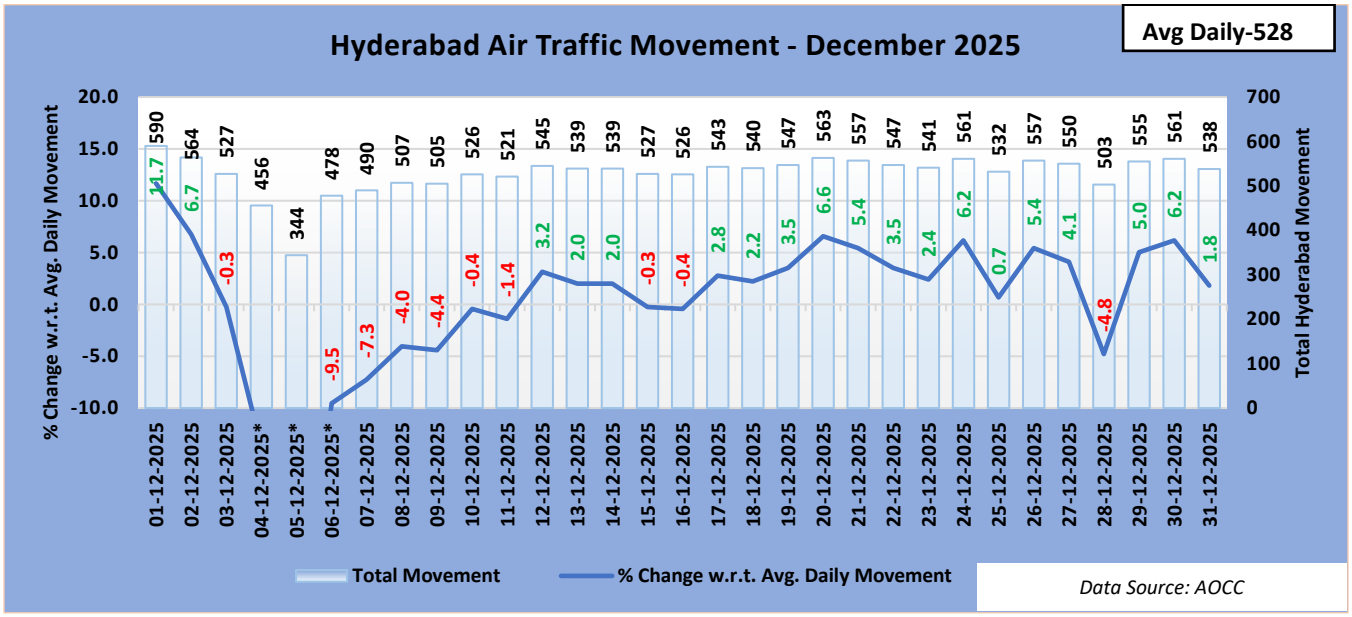


Figure 6: Air Traffic Movement for Hyderabad – Dec'25

It can be concluded from the above charts that the ATM at Delhi, Mumbai, Bengaluru and Hyderabad exceeds the average daily movement for 20 days, 19 days, 21 days and 19 days respectively in the month of December 2025.

**Note: Due operational constraints faced by a major airlines.*

II. एटीएम की वार्षिक व मासिक तुलना/Comparison of total ATMs (YoY) and Monthwise

The total Air traffic movement(ATMs) including Passenger and other flights such as Cargo flights, International scheduled, International non-scheduled, Domestic scheduled, Domestic non-scheduled, Air taxi & commercial business flights at six major Indian Airports namely Delhi, Mumbai, Bengaluru, Hyderabad, Kolkata and Chennai is plotted for the month of December for two consecutive years 2024 and 2025 respectively. Air Traffic movement is also plotted Airline wise for the last six months for the major Scheduled Operators.

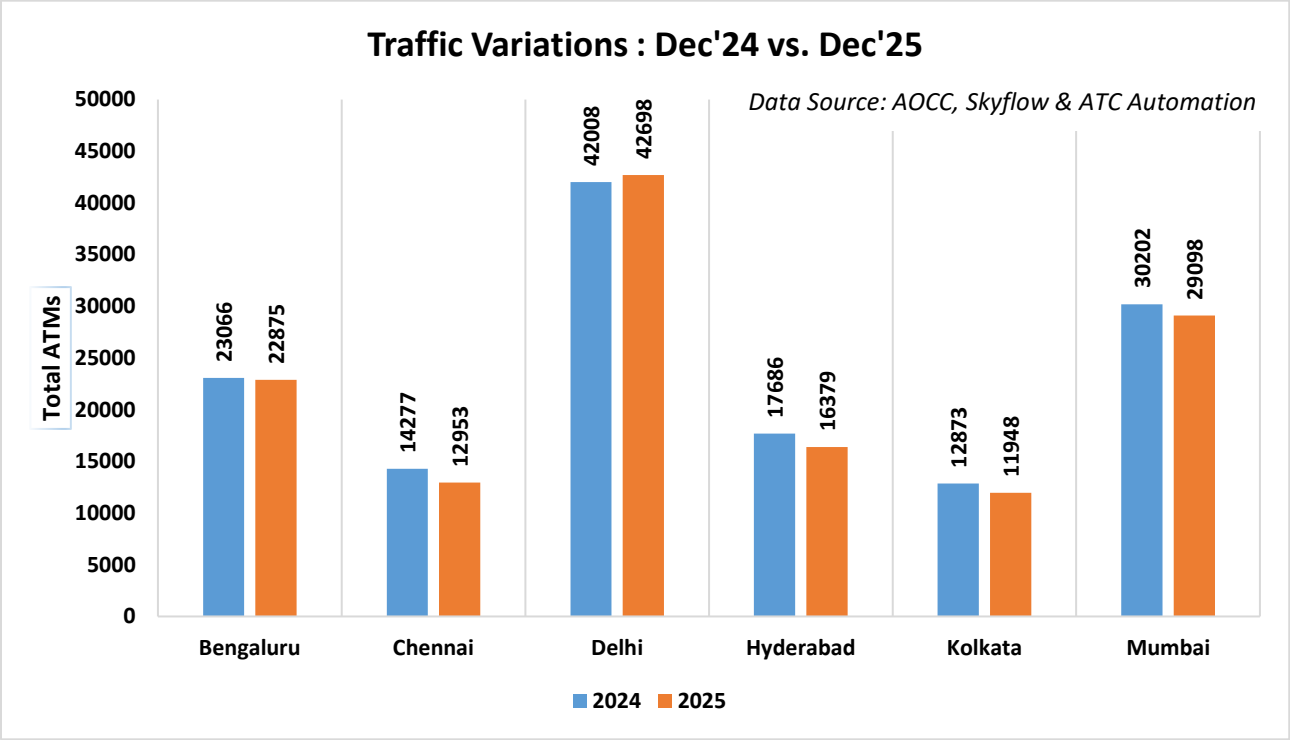


Figure 7: Traffic Variation (YoY)

III. उड़ान संचालन - एयरलाइन अनुसार/Flight Operations – Airlinewise

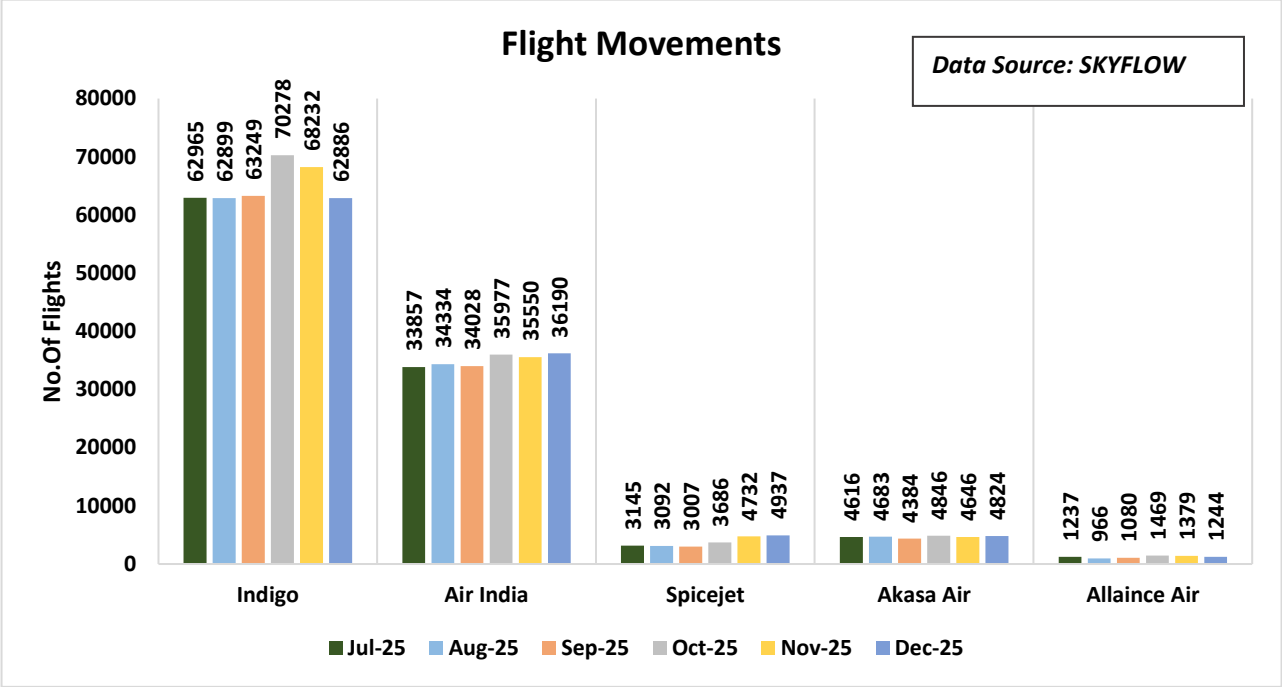


Figure 8: Flight Movements –Airlinewise

Inference:

1. Akasa Air and Spicejet airlines have recorded an increase whereas Indigo, Air India and Alliance has recorded a decrease in the monthly average(31 days) Flight movement in Dec'25 as compared to Nov'25.

C. सी.एटीएफएम पोस्ट ऑपरेशन - सीडीएम विश्लेषण

ATFM Post Operations – CDM Analysis

I. परिचय/Introduction

Analysis Period **1st – 31st December 25**

Back Ground During the above mentioned period**, Nine (09)** ATFM measures were applied **for Chennai Airport, Nine (09)** ATFM measures were applied **for Delhi Airport, Thirty (30)** ATFM measures were applied **for Mumbai Airport** due to the following reasons as illustrated in the bar chart below:–

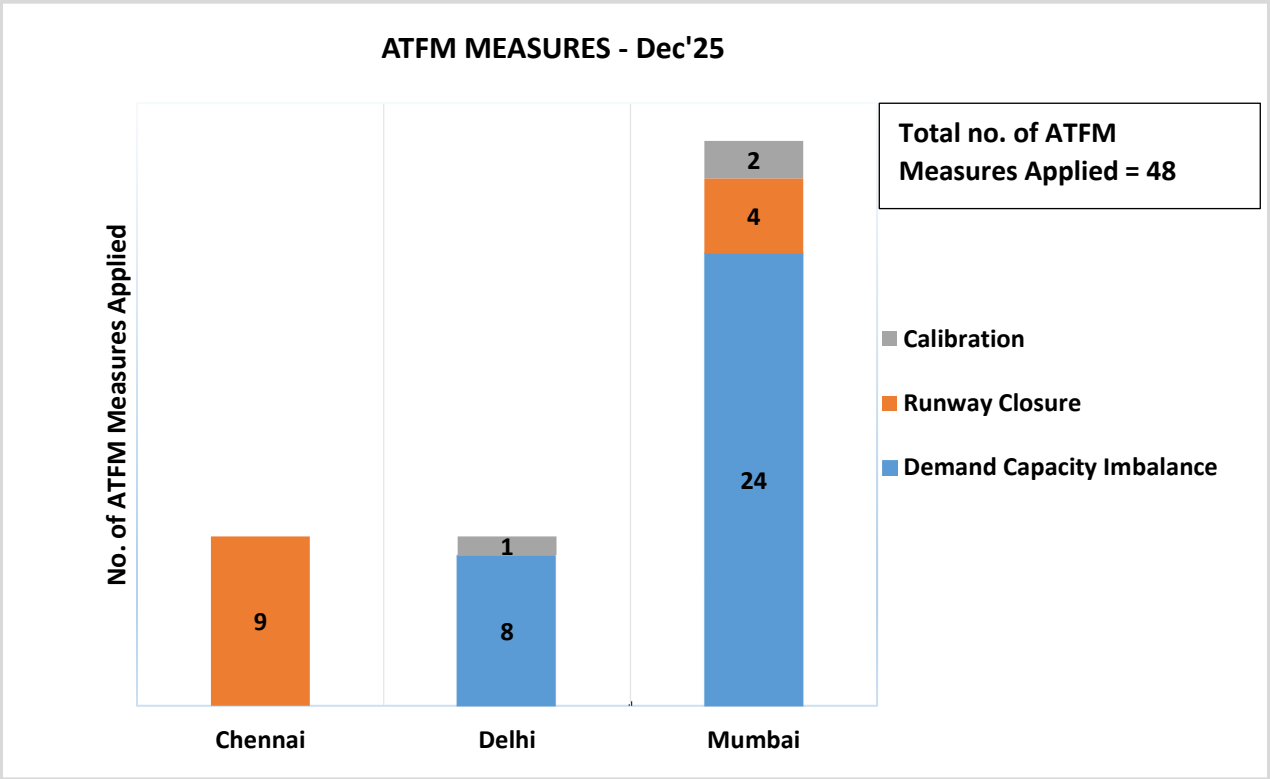


Figure 9: ATFM Measures –Dec'25

II. एटीएफएम मेजर्स का अवलोकन/ATFM Measures Overview

Constrained Airport	Chennai	Delhi	Mumbai
Number of ATFM measures applied	9	9	30
Average ATFM Ground delay(in min) due to measures*	28.7	18.5	26.2
Maximum ATFM Ground delay(in min) due to measures	61	46	194
% Compliance	98.5	96.6	98.4

Note: * $Average\ ATFM\ Delay = \frac{Total\ ATFM\ Delay}{Total\ Domestic\ Arrivals}$

Total Arrivals	3449
Total International Arrivals(exempted)	778
Total affected flights in scenario (Domestic Arrivals)	2671
Total Domestic Arrivals with zero ATFM delay	170
Total Domestic Arrivals with ATFM delay	2501

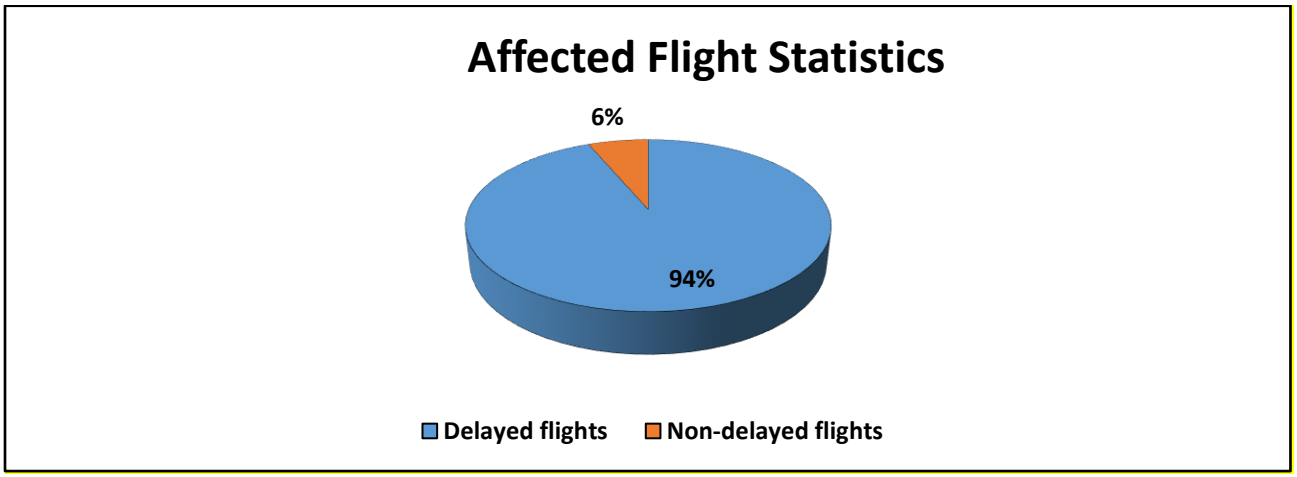


Figure 10: Affected Flight Statistics –Dec'25

III. समग्र अनुपालन/Overall Compliance

Total arrivals	3449
Domestic arrivals	2671
Flights with complete data (ATOT)	2643
Flights with incomplete data	9
Flights Not Operated	19
Compliant*	2587
Non-Compliant	56

*Total No. of Revised CTOTs issued = 1116 (Compliance calculation for flights which were issued revised CTOT is w.r.t. new CTOT issued)

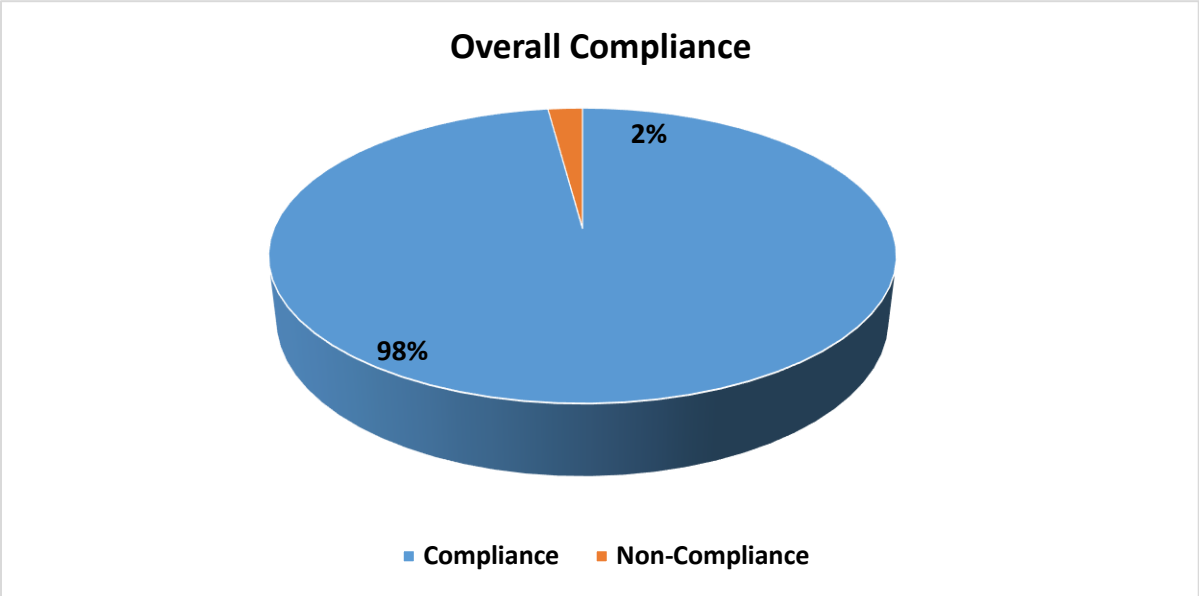


***Figure 11*: Overall Compliance – Dec'25**

NOTE: Flights with required data (i.e. ATOT) are only considered for compliance measurement.

Out of the total domestic arrivals with complete data in the CDM scenario, 98% arrivals are CTOT compliant for the month of December 2025.

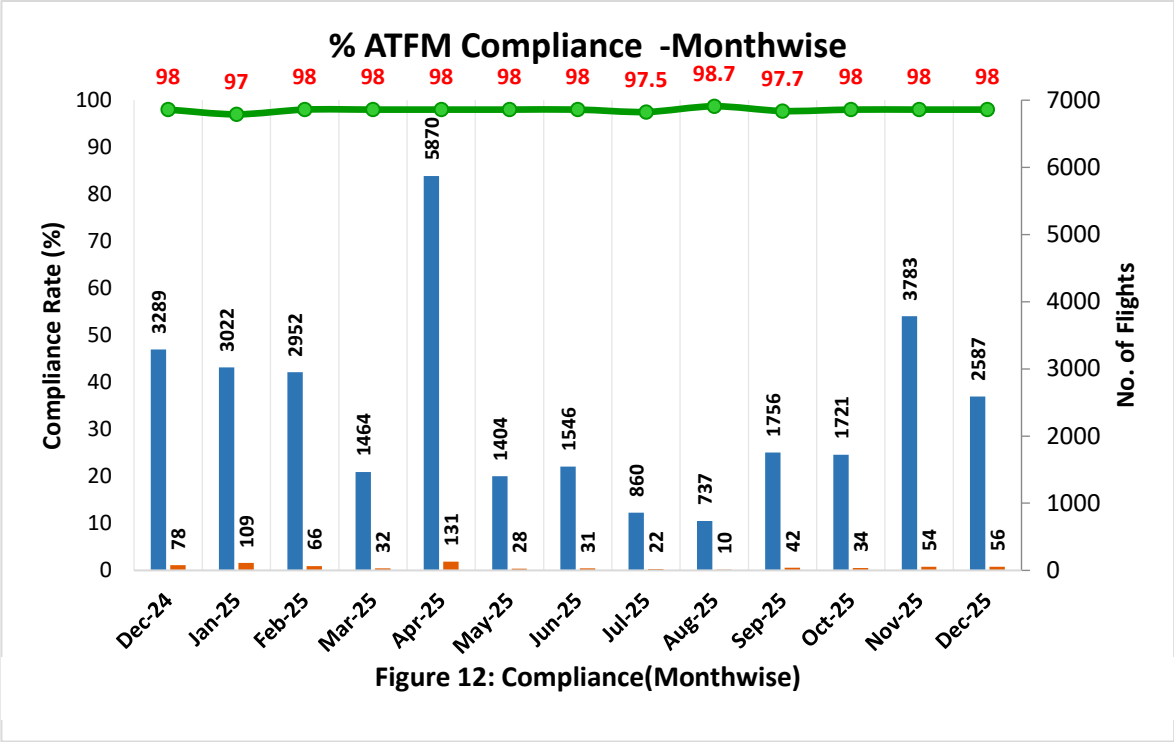


Figure 12: Compliance(Monthwise)

Inference

1. Out of the total arrivals captured(3449 flights) during the CDM scenario for the constrained Airports, 77.4% of flights i.e. domestic arrivals(2671 flights) were candidates for ground delay(participating).
2. Out of these Domestic Arrivals(2671), 93.6% (2501 flights) are assigned ATFM ground delay.
3. Out of the total arrivals captured(3449 flights) to the constrained Airport during the ATFM scenario, 72.5% of flights(2501 flights) were assigned ATFM Ground Delay.

IV. सीटीओटी अनुपालन दर -एयरपोर्टवाइज/CTOT Compliance rate – Airportwise

MUMBAI FIR (98%)*	Compliant	Non Compliant	% Compliant
Ahmedabad	96	0	100%
Amravati	1	0	100%
Aurangabad	14	0	100%
Mumbai	72	7	91%
Bhuj	4	2	67%
Vadodara	15	0	100%
Bhopal	21	0	100%
Bhavnagar	0	1	0%
Diu	6	0	100%
Hirasar, rajkot	27	0	100%
Indore	43	1	98%
Jabalpur	14	0	100%
Jalgaon	5	0	100%
Jamnagar	24	0	100%
Kandla	4	0	100%
Kolhapur	4	0	100%
Mundra	1	0	100%
Nagpur	34	0	100%
Nasik	3	0	100%
Pune	19	0	100%
Porbandar	2	0	100%
Shirdi	5	0	100%
Solapur	5	0	100%
Surat	7	0	100%
Udaipur	48	0	100%
KOLKATA FIR (98%)*	Compliant	Non Compliant	% Compliant
Prayagraj	13	1	93%
Agartala	4	0	100%
Ayodhya	15	1	94%
Siliguri	59	0	100%
Varanasi	61	1	98%
Bhubaneswar	51	0	100%

Bilaspur	1	0	100%
Kolkata	129	2	98%
Chakeri	8	1	89%
Durgapur	13	0	100%
Darbhanga	21	3	88%
Deoghar	3	0	100%
Gorakhpur	26	0	100%
Guwahati	45	1	98%
Gaya	5	1	83%
Hollongi	4	0	100%
Imphal	8	0	100%
Jharsuguda	7	0	100%
Jorhat	1	1	50%
Khajuraho	4	0	100%
Aizawl	4	1	80%
Dibrugarh	6	0	100%
Dimapur	2	0	100%
Patna	53	1	98%
Purnea	2	0	100%
Ranchi	33	0	100%
Raipur	30	0	100%
DELHI FIR (97%)*	Compliant	Non Compliant	% Compliant
Agra	2	0	100%
Amritsar	24	2	92%
Adampur	5	0	100%
Bikaner	2	0	100%
Bhuntar	1	0	100%
Bathinda	1	0	100%
Bareilly	2	0	100%
Chandigarh	40	1	98%
Dehradun	28	1	97%
Delhi	305	9	97%
Hindon	5	0	100%
Kangra	6	0	100%
Gwalior	9	0	100%
Jodhpur	22	2	92%
Jaipur	64	1	98%
Jaisalmer	12	1	92%

Jammu	17	2	89%
Leh	10	0	100%
Lucknow	43	0	100%
Pithoragarh	1	0	100%
Pantnagar	3	1	75%
Srinagar	30	1	97%
CHENNAI FIR (99%)*	Compliant	Non Compliant	% Compliant
Hal Bangalore	8	2	80%
Baldota Koppal, karnataka	1	0	100%
Bangalore	204	0	100%
Belgaum	2	0	100%
Bidar	0	1	0%
Vijayawada	21	0	100%
Coimbatore	45	1	98%
Kochi	74	0	100%
Calicut	8	0	100%
MOPA Goa	54	0	100%
Goa	88	2	98%
Hubli	1	0	100%
Shamsabad, Hyderabad	112	1	99%
Begumpet Hyderabad	1	0	100%
Vijaynagar	1	0	100%
Kannur	2	0	100%
Madurai	25	0	100%
Mangalore	20	0	100%
Chennai	119	0	100%
Nanded	1	0	100%
Port Blair	30	0	100%
Rajahmundry	9	0	100%
Salem	1	0	100%
Tuticorin	9	0	100%
Tirupati	8	0	100%
Tiruchirappally	3	0	100%
Thiruvananthapuram	22	0	100%
Visakhapatnam	4	2	67%

**FIR wise compliance rate (decimals rounded off to nearest integer value).*

Note: The above list contains only those airports which had flights to the Constrained Airport and are affected by ATFM measures.
Airports with % compliance less than the average compliance(98%) for the month are highlighted in red.

V. सीटीओटी अनुपालन दर- एयरलाइनवाइज़/CTOT Compliance rate – Airlinewise

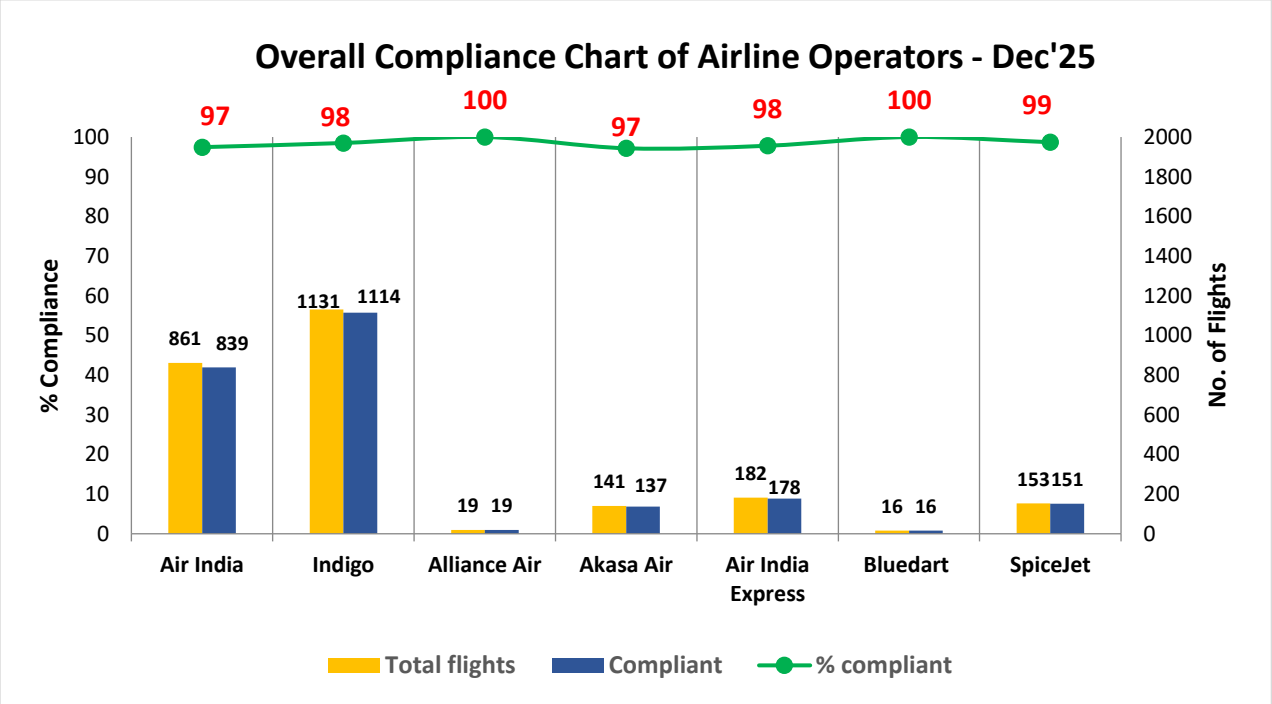


Figure 13: Airline wise Compliance –Dec'25

Inference

1. Chennai region record the highest compliance of 99% whereas Delhi region has the lowest percentage compliance of 97%.
2. Indigo, Alliance Air, Air India Express, Spicejet and Blue Dart have a CTOT compliance higher than or equal to the average recorded compliance for the month of December'25.

VI. गैर-अनुपालन का कारण/Reason For Non Compliance

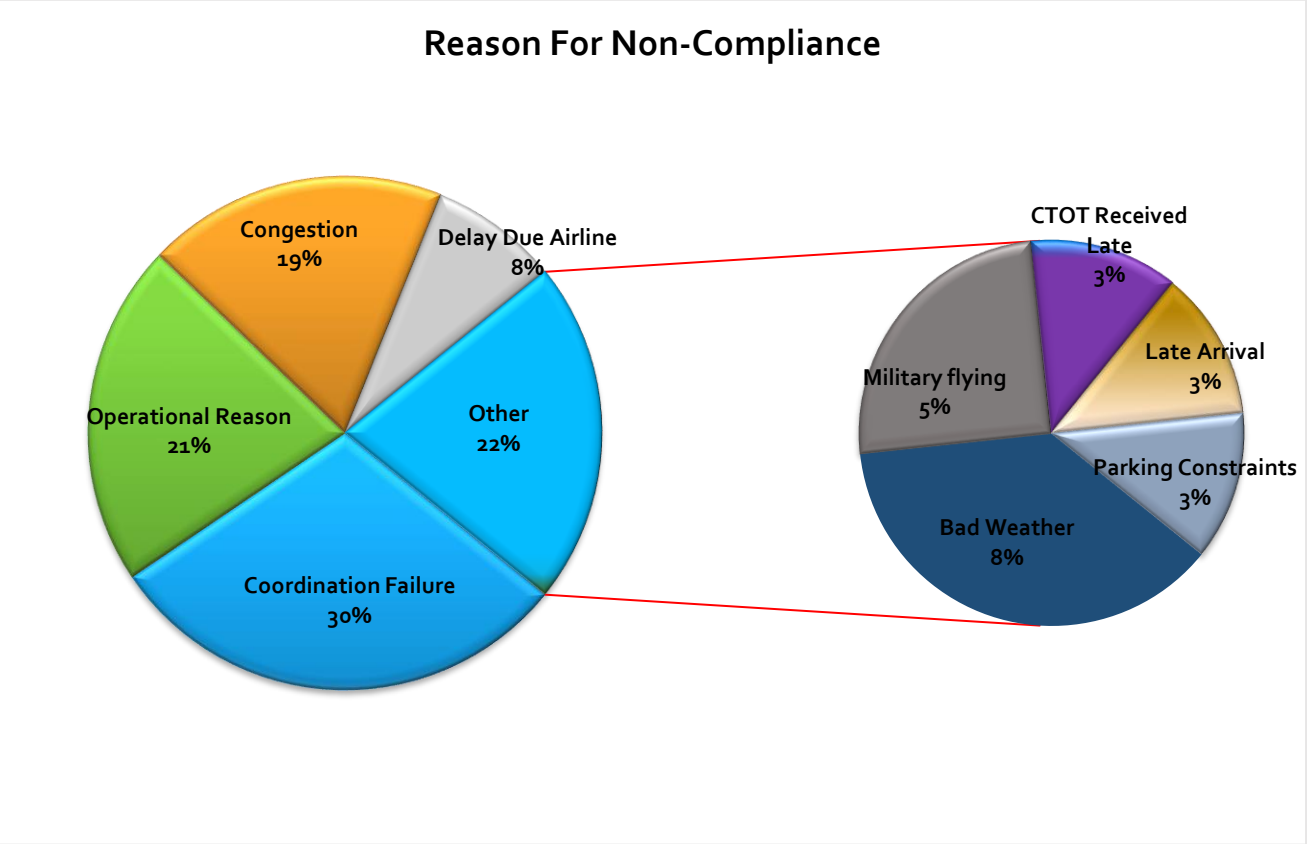


Figure 14: Reason for Non-Compliance as provided by FMPs

Inference:

1. 30 % of CTOT Non- Compliance was reported by concerned FMPs to be due to coordination failure between FMP and Station.
2. 21 % of the CTOT Non- compliance was due to operational reasons (due to Bird Activity on Runway, ATC handling emergency, Change in runway etc) and 19% due to congestion at the concerned station.
3. 8 % of the CTOT Non- compliance was reported by concerned FMPs to be due delay by airlines.
4. 8% of the CTOT Non- compliance was due to bad weather at concerned station and 5% due to military flying at the concerned station.
5. 3% each due Late arrival from previous station, parking constraints at concerned station and due to late receipt of CTOTs and by the time the aircraft had already initiated pushed back or start up.

VII.सीडीएम परिदृश्य अवधि के दौरान वायु विलंब/Air Delay during the CDM Scenario period

Average Air Delay to domestic arrivals* within the CDM Scenario period for Chennai, Delhi and Mumbai was 8.5, 10.9 and 10.8minutes respectively.

**Note: Only calculated for domestic arrivals with both ATOT and ALDT information*

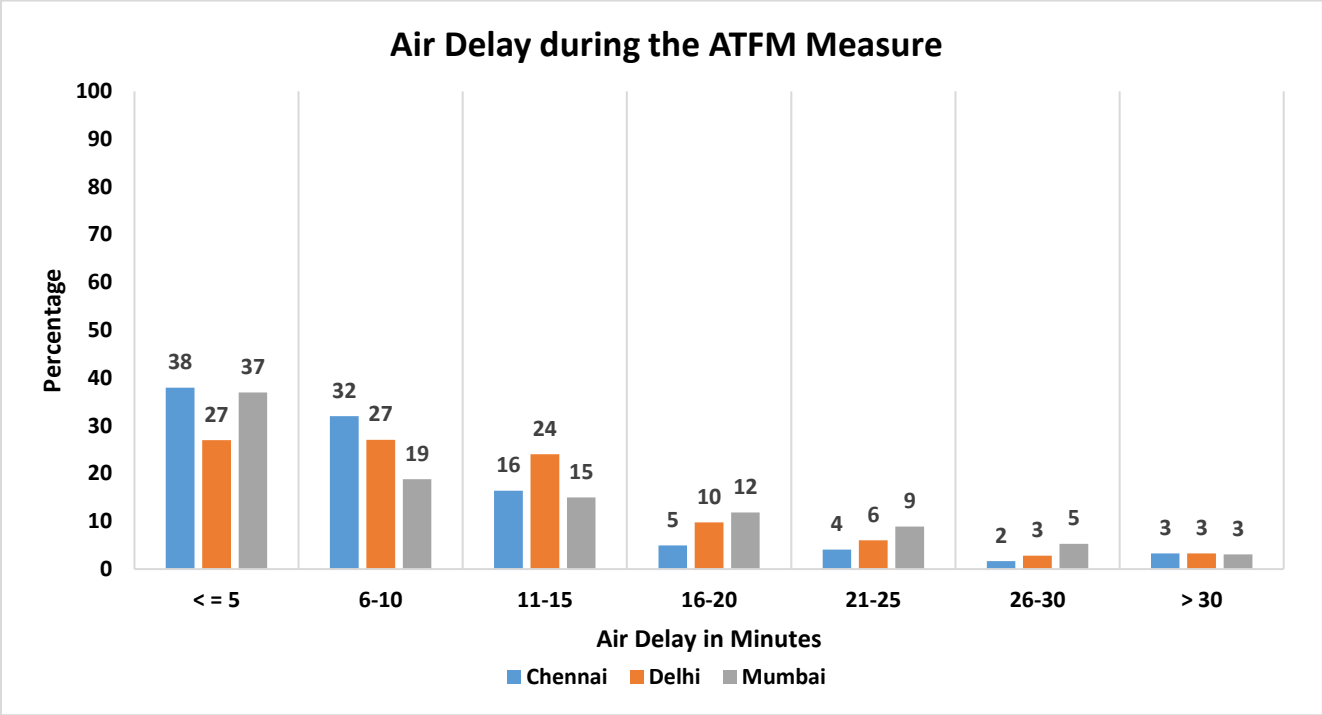


Figure 15: Air Delay distribution during the CDM period

Inference

1. 70% of domestic arriving flights to Chennai had an Air delay of equal to or less than 10 minutes during the CDM period.
2. 54% of domestic arriving flights to Delhi had an Air delay of equal to or less than 10 minutes during the CDM period.
3. 56% of domestic arriving flights to Mumbai had an Air delay of equal to or less than 10 minutes during the CDM period.

VIII. एटीएफएम उपायों के कारण मूर्त लाभ/Tangible Benefits due to ATFM Measures

A modest attempt is made to find out the tangible benefit of ATFM measures applied.

Assumptions:

•When ATFM measures are not in force, all flights take off at their ETOT where Estimated take off time(ETOT)= Estimated off block time(EOBT) + default taxi time

•All flights have an Estimated elapsed time(EET) as calculated by SKYFLOW using the Flight Plan information and Basic Aircraft data.

Methodology:

Air delay (with ATFM measures in force) is calculated during the period when ATFM measures are in force by summing the air delay for all the flights landing at constrained Airport.

i.e. **Total Air Delay = ∑ (Actual Flying time – SKYFLOW calculated EET)**

Air delay (with no ATFM measures) is calculated as the sum of Air delay for all the flights during the above said period with no ATFM measures in place and the air delay for each flight is the difference in its ideal landing time and its ideal estimated landing time.

Total Air Delay (with no ATFM measures) = **∑ (Ideal LDT - Ideal ELDT)**

*Ideal LDT is taken by assuming every flight is landing at a specified interval based on the Arrival acceptance rate(AAR) defined,

*Ideal ELDT = ETOT + SKYFLOW calculated Flying time

Fuel Saving Calculation :

Great Circle Distance(GCD)* was calculated for all the arrivals during the ATFM Measure from the point of origin to destination. Assuming Airbus 320 as reference aircraft for flights (flight distance equal to or less than 3000 nm) and B777 for international flights (flight distance more than 3000nm):

Fuel consumption (Kgs / nm) for each affected flight in the scenario was then calculated using the Reference document: ICAO Carbon emissions calculator methodology, version10, Appendix C: ICAO Fuel Consumption Table.

The Fuel consumed per minute(Kg/min) was calculated for each affected flight.

Total Air Delay(with ATFM Measures)= 29772 mins

Total Air Delay (with no ATFM measures) = 52107 mins

Reduction in Air delay due to ATFM measures= (52107-29772) = **22335 mins**

Fuel Saving Calculation:

Total Fuel saved during the ATFM Measure: ***13,42,786.614 Kg***

Total reduction in CO_2 emission : 3.16(KgCO_2/kg fuel)* 13,42,786.614 **Kg** ***= 42,43,205.7 Kg***

**GCD (Great Circle Distance): The distance between origin and destination airports is derived from latitude and longitude coordinates originally obtained from ICAO Location Indicators database.*

3.16 = constant representing the number of tonnes of CO2 produced by burning a tonne of aviation fuel.

D. शब्दकोश/**Glossary**

ATFM Parameters	**Definition**
Affected Flight statistics	An insight of participating traffic in the scenario i.e. ratio of the domestic arrivals to the constrained airport affected by ATFM measures (assigned delay by the Ground Delay Program) to the domestic arrivals not affected by ATFM measures (not assigned any delay) within the CDM scenario.
ATFM Ground delay	ATFM ground delay defined as CTOT-ETOT (Calculated take off time – Estimated take off time)
Average ATFM delay	$\frac{\boldsymbol{Total\ monthly\ ATFM\ delay\ (in\ minutes)}}{\boldsymbol{Total\ Domestic\ Arrivals}}$
Maximum ATFM delay	Maximum ATFM delay (in minutes) assigned in the month
Overall compliance rate	Defined as monthly ATFM departure slot adherence rate of regulated flights. Flights having ATOT within theATFM Slot Tolerance Window (STW) of minus 5 to plus 10 minutes of CTOTs, are considered as compliant flights
CTOT Compliance rate of Airline operators	An overview of CTOT compliance rate of various Airline operators
CTOT Compliance rate of Airports within different Regions	An overview of CTOT compliance rate of Airports within 4 FIRs
Air delay statistics	Air delay defined as difference between AET & EET, whereAET(actual elapsed time) can be obtained from (ALDT-ATOT) and estimated elapsed time(EET)can be obtained from FPL/RPL or (CLDT-CTOT). **Therefore, Air delay = AET-EET** Average Air Delay is calculated as: $\boldsymbol{Average\ Air\ Delay} = \frac{\boldsymbol{Total\ Air\ Delay\ to\ domestic\ arrivals\ (with\ values\ greater\ than\ zero)}}{\boldsymbol{Total\ Domestic\ Arrivals}}$ *CLDT: Calculated Landing Time* *CTOT: Calculated Take off Time* *ALDT: Actual Landing Time* *ATOT: Actual Take off Time*

Annexure-A

एयरलाइनों द्वारा सामान्य व्यावसायिक नियमों (सीबीआर) की उड़ान योजना आवश्यकताओं का अनुपालन - दिसंबर 2025

Compliance by Airlines with Flight Planning Requirements of Common Business rules(CBR)- December 2025.

I. Introduction:

Accurate and timely input in respect of flight intent is paramount to the correct traffic demand projection and eventually effective ATFM implementation. FPLs remain the main source of tactical demand prediction for ATFM systems. Early filing of error free FPL helps in improving the lead time required for ATFM measures and reduces the number of unexpected flights(pop-up). This in turn helps in improving the accuracy of demand-capacity imbalance prediction and optimizes slot utilization.

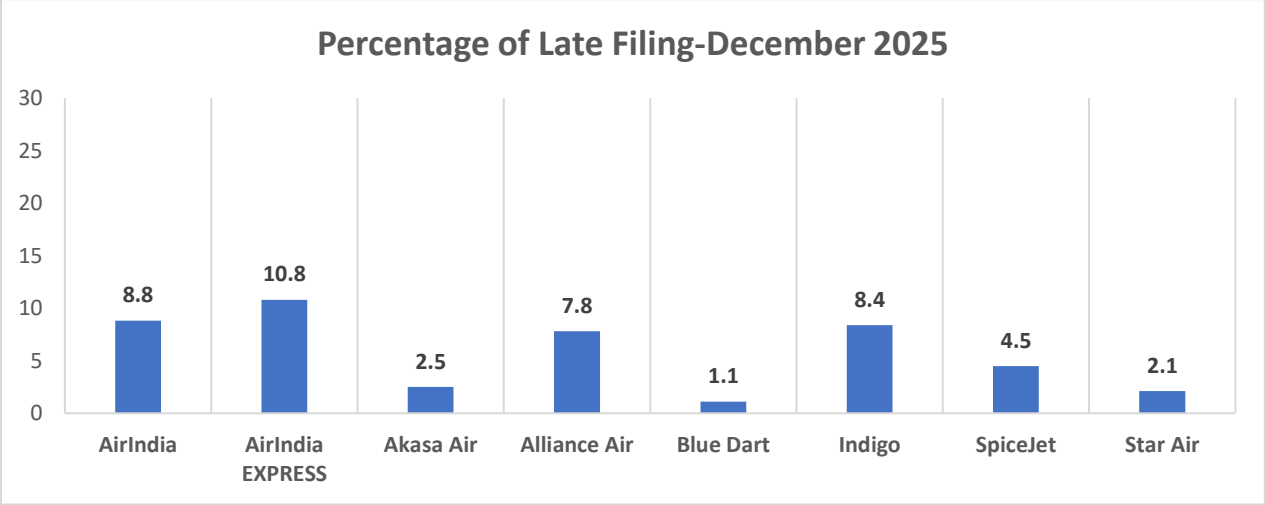
AIP India, ENR 1.9 section 4 on Flight Planning in the context of ATFM recommends Flight Planning requirements for all Airline Operators –

a) Flight plans shall be submitted at least 3 hours before the estimated off block time (EOBT);
b) The window for filing FPL is between 3 Hours and 120 Hours (Five days) before the EOBT. Earlier filing of FPL will give a realistic demand data to the CCC and hence the requirement of ATFM measures can be identified early for better planning. Late filing of a flight plan will lead to inaccuracies in predicting the demand and may lead to undesirable delay;"

II. Analysis

A. An analysis has been conducted to find out the difference between the flight plan filing time and filed EOBT for all the FPLs received at ATFM system from 1st December 2025 to 31st December 2025.
The purpose of the analysis is to monitor the compliance with provisions of AIP India, section 4, ENR 1.9 regarding Flight Planning requirements in context of the ATFM.

This flight plan filing requirement has been reiterated through the recently agreed ATFM common business rules (CBR) document and is recognized as a metrics to be monitored regularly for any improvement.



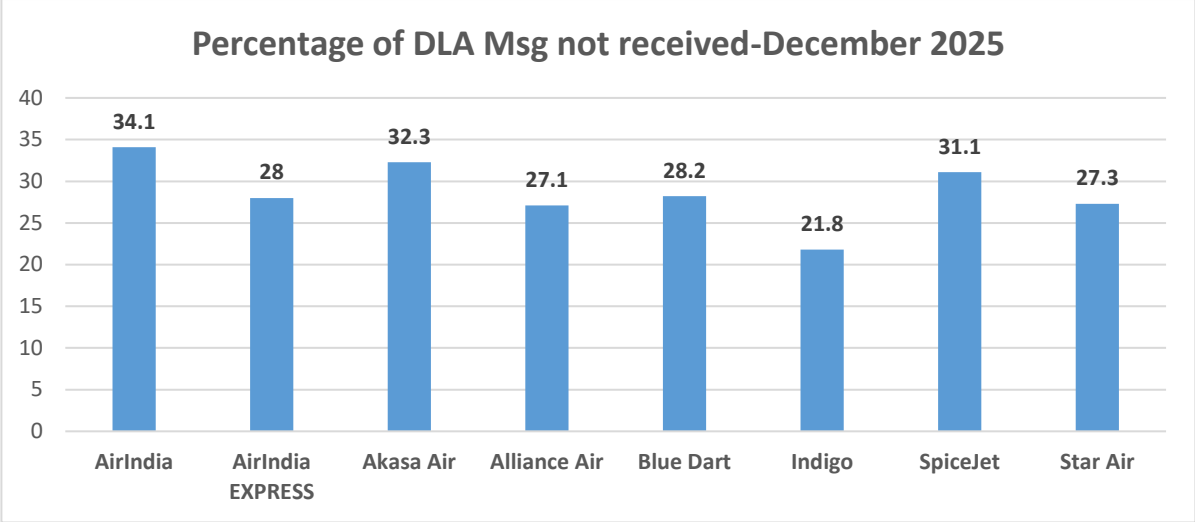
The table below lists number of filed flight plans (FPLs) with less than 3 Hours prior to EOBT:

Name of Airline	Late Filed FPL	Total No. Of FPL	% Delayed Filing
AirIndia	1916	21545	8.8
AirIndia EXPRESS	1712	15767	10.8
Akasa Air	127	4989	2.5
Alliance Air	104	1332	7.8
Blue Dart	8	710	1.1
Indigo	5515	65672	8.4
SpiceJet	247	5393	4.5
Star Air	40	1838	2.1
Total no. of FPLs for Scheduled Airlines	**9669**	**117246**	**8.2**

B. For the analysis of non-receipt of DLA (Delay) messages for flight plans filed, the EOBT of FPL received has been compared with Actual Take off time (ATOT)received through DEP(Departure)messages.
Thus, only those FPLs were considered for analysis for which DEP messages were available and no associated DLA messages was received.

The Table below lists number of flights for which no DLA message was received in December 2025. **{(EOBT of original FPL)- (ATOT received)} > 30 minutes)**

Name of Airline	DLA Message not received	Total No. of flights considered for analysis	% of flights for which no DLA message was received
AirIndia	5841	17116	34.1
AirIndia EXPRESS	2939	10495	28
Akasa Air	1180	3646	32.3
Alliance Air	169	623	27.1
Blue Dart	140	496	28.2
Indigo	9752	44638	21.8
SpiceJet	1174	3770	31.1
Star Air	167	610	27.3



C. For analysis of non-receipt of CNL (cancel) messages for December 2025, annulled FPLs were considered for which no CNL/DEP/DLA messages were received. A FPL gets annulled in SKYFLOW system, if it doesn't get activated through Dep message /surveillance data/ manual activation by FMP within a defined system parameter.

The table below lists the number of Flights for which no CNL Msg. was received in December 2025:

Name of Airline	**CNL message not received**	**No. of flights annulled**
AirIndia	152	156
AirIndia EXPRESS	126	137
Akasa Air	30	30
Alliance Air	133	134
Blue Dart	1	1
Indigo	1382	1401
SpiceJet	65	70
Star Air	35	35

Annexure-B

बंगाल की खाड़ी सहयोगी वायु यातायात प्रवाह प्रबंधन (बीओबीसीएटी): अनुपालन रिपोर्ट दिसंबर 2025

Bay of Bengal Co-operative Air Traffic Flow Management (BOBCAT): Compliance Report December 2025.

I. Introduction:

On 24 July 2006, the States of the ICAO Asia/Pacific Region within the Bay of Bengal, South Asia and Pakistan airspace implemented an operational trial of an automated Air Traffic Flow Management (ATFM) service under the auspices of the ICAO Bay of Bengal ATS Coordination Group - ATFM Task Force. Pursuant to comprehensive reviews of the performance of the operational trial by the ATFM Task Force, ATFM procedures were permanently implemented.
Bay of Bengal cooperative ATFM system (BOBCAT), services were temporarily suspended since 08th September 2021, due to the absence of Enroute overflight Air Traffic Service (ATS) in Afghanistan airspace (Kabul FIR) and lack of traffic demand to operate through the Kabul FIR.

The States of the ICAO Asia/Pacific Region, which have westbound night time flights operating through the Kabul FIR between 2000 UTC to 2359 UTC, re-activated the integrated Air Traffic Flow Management (ATFM) service using the BOBCAT wef 04 September 2025. However, enroute ATS service in the Kabul FIR remain unavailable. Aircraft's are operating through Kabul airspace via designated routes using Traffic information broadcast by aircrafts (TIBA) with larger longitudinal separation of 15 minutes.

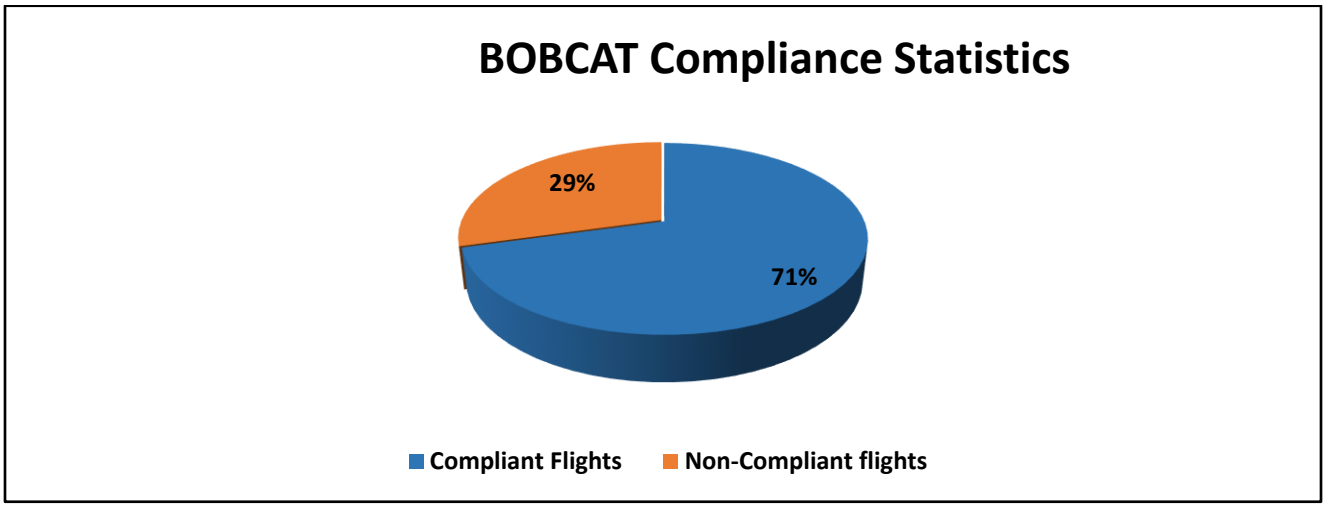
India is also part of BOBCAT reactivation group. Accordingly, AAI has also published AIP supplement 139 of 2025 effective from 04.09.2025 for the reactivation of Bay of Bengal Cooperative Air Traffic Flow Management (BOBCAT) Procedures and Implementation of BOBCAT Services. The cited AIP supplement contains the detailed processes, procedure, and duties and responsibilities of the stakeholders.
The cited AIP supplement is complimented by NOTAM G-325 issued by Kabul FIR OAKX and/or any subsequent relevant NOTAM issued by Kabul FIR OAKX.

II. Analysis:

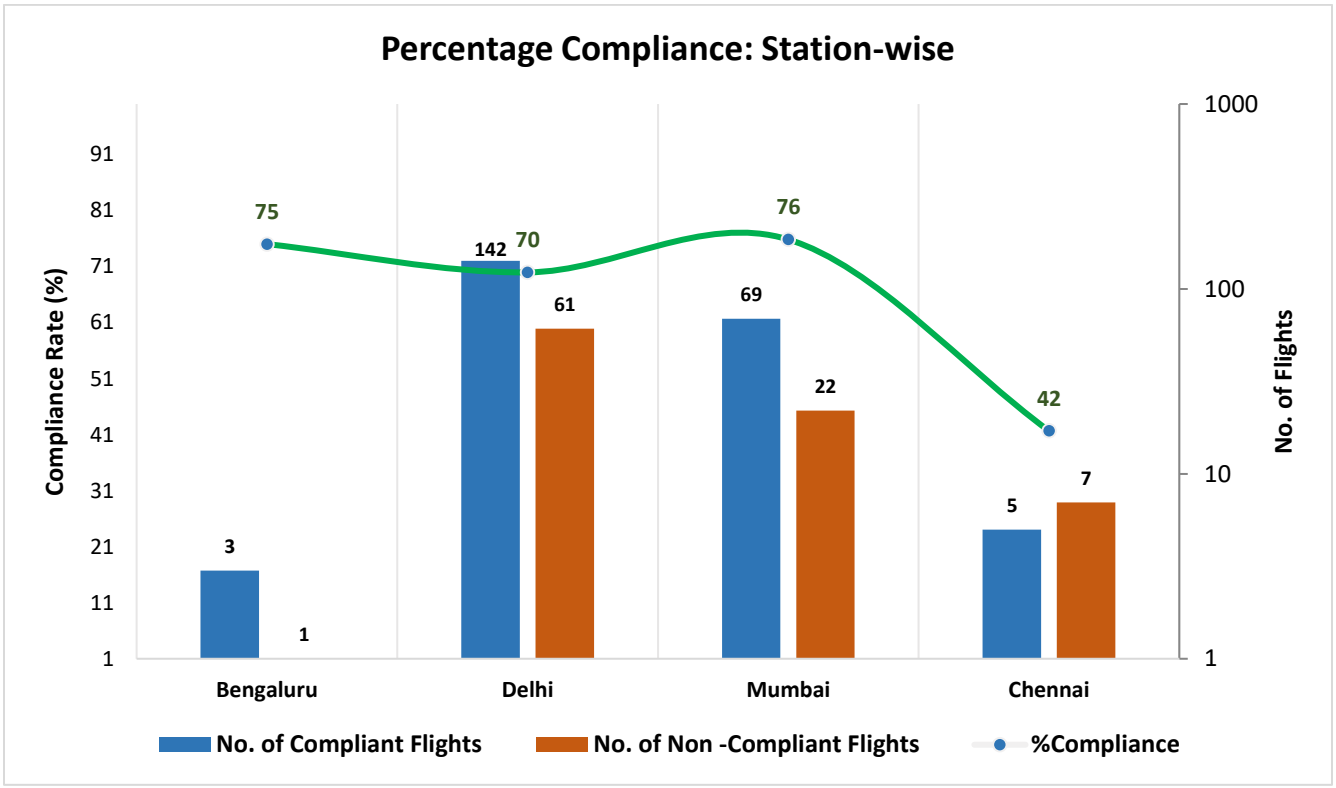
The compliance analysis is performed only for departures from India participating in the BOBCAT. As it is an airspace program the compliance window for the same is from -5 minutes to +5 minutes of the CTOTs issued.

No. of Compliant Flights	No. of Non- Compliant Flight	Total
219	91	310

A) BOBCAT Compliance Overview:

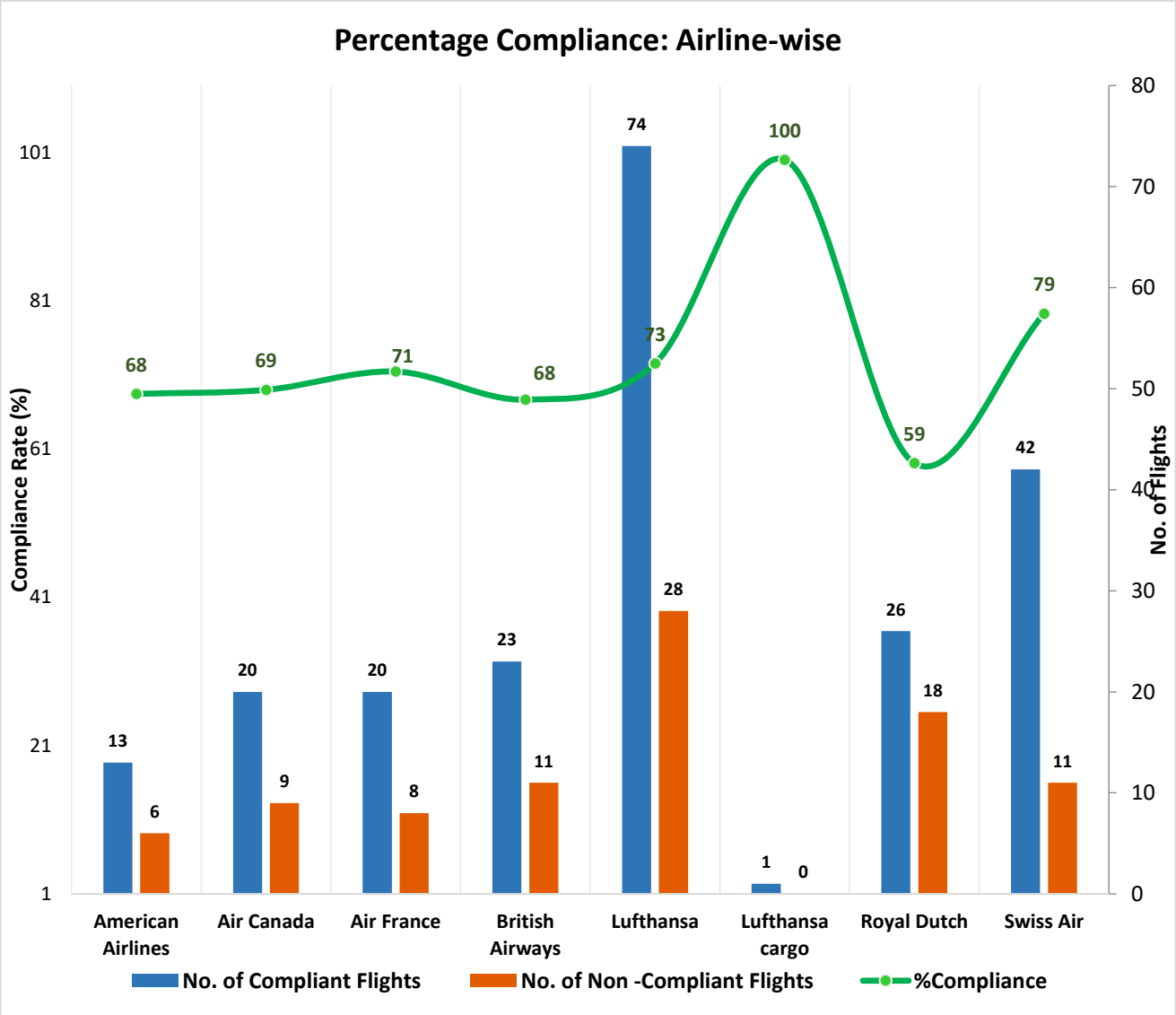


B) Station Wise Compliance:



	Bengaluru	Delhi	Mumbai	Chennai
No. Of Compliant Flights	3	142	69	5
No. of Non-Compliant Flights	1	61	22	7
Compliance %	75	70	76	42

C) Airline wise Compliance:



--END of REPORT--