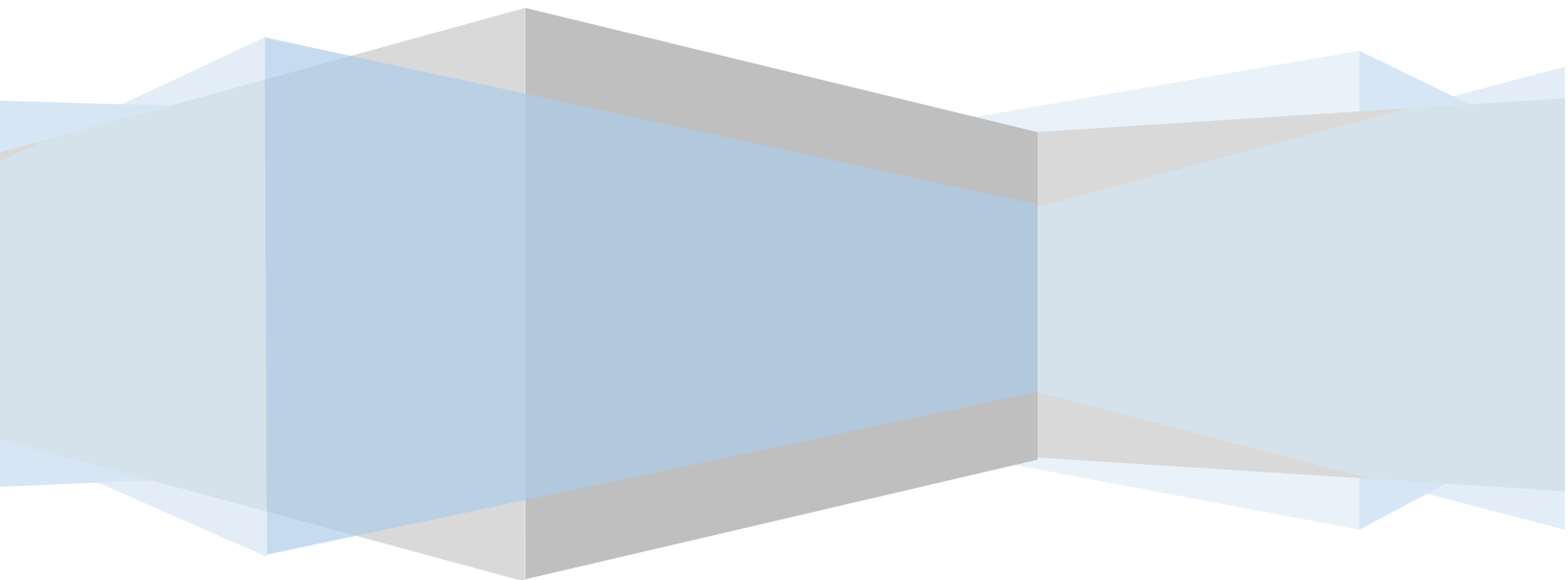


ANNUAL REPORT
ATFM OPERATIONS
(JANUARY 2024 TO DECEMBER 2024)

CENTRAL COMMAND CENTER
CENTRAL AIR TRAFFIC FLOW MANAGEMENT
AIRPORTS AUTHORITY OF INDIA
VASANT KUNJ, NEW DELHI
INDIA







Contents

A. Preface	4
B. Executive Summary	6
C. Introduction	7
D. Traffic Overview	8
I. Total IFR flight movements on monthly basis in 2024	8
II. Comparison of total IFR traffic in the network (YoY)	9
III. Comparison of total ATMs at Six metro Airports (Year-wise)	10
IV. Monthly Average Air Traffic Movement for Six Major Airports.....	11
V. Top city pairs India:.....	12
VI. International Traffic :	13
VII. Top International city pairs :	14
VIII. Flight Operations – Airlinewise	15
E. ATFM Post Operations – CDM Analysis.....	16
I. Introduction	16
II. Overall Compliance	19
III. CTOT Compliance rate –Airportwise	21
IV. Reason For Non-Compliance (2024)	26
V. CTOT Compliance rate – Airlinewise	27
VI. Air Delay during the CDM Scenario period	28
VII. Fuel Saving & Reduction in Emissions per flight during the CDM Scenario period	29
VIII. Tangible benefits of ATFM measures applied(2024)	30
F. Glossary	31
Annexure A- Flight Plan Analysis (1st Jan'24 to 31st Dec'24).....	32



List of Figures

Figure 1: Monthly Traffic evolution	8
Figure 2: Traffic comparison 2023 vs 2024.....	9
Figure 3: Percentage Traffic Variation (YoY).....	10
Figure 4: Monthly Average Air Traffic Movement For Six Major Airports.....	11
Figure 5: Busiest Domestic City Pairs	12
Figure 6: Busiest International City Pairs	13
Figure 7: Busiest International City Pairs	14
Figure 8: Flight Movements –Airlinewise	15
Figure 9: ATFM measures 2023 vs 2024	16
Figure 10: ATFM regulation Reasons-2024	17
Figure 11: Affected Flight Statistics	18
Figure 12: Overall Compliance	19
Figure 13: ATFM Compliance –Monthwise	20
Figure 14: Reason for Non-Compliance.....	26
Figure 15: CTOT Compliance-Airlinewise	27
Figure 16: Air Delay during CDM Period	28
Figure 17: Fuel Savings & CO ₂ Emissions reduction	29
Figure 18: Tangible benefits(2024).....	30
Figure 19: Percentage of flight filling FPL within 3 Hrs of EOBT.....	33
Figure 20: Percentage of late flight plan filling -Airlines wise.....	34
Figure 21: Percentage of flight for which DLA msg not received.....	35
Figure 22: Percentage of flight plan for which DLA Msg not received -Airlines wise	36
Figure 23: Percentage of flight for which CNL msg not received.....	37
Figure 24: Percentage of flight plan for which CNL Msg not received -Airlines wise	38



A. Preface

ATFM (Air Traffic Flow Management) refers to the system and procedures implemented to manage air traffic in a safe and efficient manner. ATFM is a key component of air traffic management, helping to balance the demand for air traffic services with the available capacity of the airspace and airports.

The primary goals of ATFM include:

- **Optimizing Air Traffic Flows:** ATFM aims to optimize the use of available airspace and airport capacity, ensuring that air traffic can move efficiently and safely.
- **Minimizing Delays:** By managing and regulating air traffic flows, ATFM helps minimize delays for both airlines and passengers.
- **Enhancing Safety:** ATFM contributes to the overall safety of air travel by preventing congestion and ensuring that air traffic controllers can effectively manage and communicate with aircraft.

Air Traffic Flow Management is being implemented in phased manner in India.

- Phase-I implementation included activation of 36 Flow Management positions in different ATS units including eight (8) civil –military Airports and application of Ground Delay Program (GDP) and Ground Stop Program (GSP) to regulate traffic (resolve Demand Capacity imbalance) at constrained airports.
- Phase –II implementation process included the integration of ATFM and Airport CDM of 8 Airports namely Mumbai, Kolkata, Chennai, Delhi, Jaipur, Guwahati, Trivandrum and Ahmedabad with the ATFM SKYFLOW system to increase the operation efficiency and situation awareness of all the stakeholders. In view of increased traffic demand, five additional flow management positions have been operationalized, such positions include Dehradun, Surat, Vadodara, Vijayawada and Rajahmundry leading to total 41 flow management positions across India to support ATFM operations. Phase-II also includes addressing the demand capacity imbalance in Airspace through Airspace Flow Program such as Miles/Minutes in trail, Sequencing Programs (Arrival, Departure, En-route), Fix Balancing, Re-routing etc.
- Phase-III implementation is planned to include capability for cross border ATFM, enhanced post ops analysis tools and capabilities and closer integration with Airspace Management.

The operational structure comprises of Central Command Centre (CCC) established in Delhi, at the helm of affairs, supported by Flow Management positions (FMPs) at designated Air Traffic Control Towers, Approach and Area Control Centers.

AAI plans to pursue an aggressive ACDM implementation roadmap, enabling 36 airports in India to become part of the ACDM-ATFM network, thus providing all CDM stakeholders with real time situational awareness.



Despite continuous efforts, the presence of correct and timely flight plan intent in SKYFLOW has been a challenging task. To resolve this constraint, an integrated Initial Flight Plan Processing System is being implemented as a part of the ATFM system. The IFPS system comprises the process of receiving flight plans and associated messages, validating this information against syntactic and semantic rules, identifying the destination addresses based on the aerodromes and route provided and distributing the information to all identified and informed addresses. This centralization of the Flight Plan processing system also ensures that each key player in the ATM process receives the same Flight Plan information. The full integration of the Integrated Initial Flight Plan Processing system (IFPS) and the upcoming ATS Message Handling System (AMHS) is where the true benefits of IFPS can be realized. Currently the ATS messages are disseminated over AFTN network through an indigenous Automatic Message Switching System (AMSS). The proposed IFPS-AMHS system will also support B2B APIs. The AMHS/UAs/web Services of AMHS will be ADEXP compatible. The network architecture will serve as the foundation for future SWIM services. In addition, collaborative efforts have been initiated with stakeholders so as to progressively bring improvement in the provision of updated flight intent. All such issues have been made part of the monthly and annual post operation report, wherein all such data is being published for appropriate action by the stakeholders to ensure continual improvement.

Airlines and airport operators are committed to collaborative ATFM process through the Common Business Rules (CBR) document that defines the roles and responsibilities of all stakeholders for collaborative decision-making, as well as a membership agreement for data exchange to support ATFM operations.

To enhance the infrastructure for Surveillance over Oceanic Airspace, India has engaged into a contract with a service provider for Space-based ADS-B services over Oceanic Airspace. Integration of Space-based ADS-B surveillance into the automation system of Mumbai, Chennai and Kolkata has provided the flight coverage over the Arabian Sea and Bay of Bengal. The ATFM System uses the processed CAT-62 data from these automation systems to constantly update the current position of the flights. This integration of space-based ADS-B has improved the accuracy of demand prediction in the ATFM System.

The C-ATFM system is a user friendly and internet-based system providing access to various categories of stakeholders. Thus, C-ATFM system can be accessed across the Indian airspace and even beyond. Additionally, the system design has taken into consideration the future need to provide access to C-ATFM information to adjacent states, ensuring its readiness for expansion.

The Central Command Center (CCC) will act as the ATFM node for India in Cross Border ATFM process. All communications pertaining to Cross Border ATFM will be received at CCC and distributed to relevant stakeholders in India by CCC.



B. Executive Summary

The year 2024 was marked by rising number of aircraft movements and passenger traffic all over India. In this year, Airlines underwent through the process of consolidation, wherein M/s Vistara consolidated with M/s Air India and M/s Air Asia consolidated with M/s Air India express. In year 2024, M/s Air India started its Airbus 350 aircraft operations, with Indigo also placing order in this category. Overall it was a tremendous year for Indian aviation sector witnessing higher YoY growth.

IFR traffic witnessed a year on year growth of 12.4 % for 2024 as compared to 2023(*data source SKYFLOW*).

To support this growing air traffic, Airports authority of India has been investing in the expansion and modernization of its existing airports and terminal. Significant infrastructure development included laying the foundation for new terminals at Varanasi, Agra, Darbhanga, and Bagdogra and inauguration of new airports at Aligarh, Azamgarh, Chitrakoot, Moradabad, and Shravasti. , 12 new Greenfield airports, namely Durgapur, Shirdi, Sindhudurg, Pakyong, Kannur, Kalaburagi, Oravakal (Kurnool), Kushinagar, Itanagar, Mopa, Shivammogga and Rajkot have been operationalized. Further, development works at two major airport projects i.e. Noida (Jewar) and Navi Mumbai International Airports are at advance stage of completion and these airports are targeted for operationalization by first quarter of FY 2025-26 (*Source: Press Release PIB MoCA*).

RCS-UDAN celebrated its 8th anniversary, with 619 routes and 88 airports operationalized since the launch to enable air operations on unserved/underserved routes connecting different regions, promote balanced regional growth and make flying affordable for masses.

102 New RCS routes commenced in the year 2024 of which 20 new RCS routes commenced in the North Eastern States of the country under the visionary RCS-UDAN scheme of Ministry of Civil Aviation exemplifying the government's commitment to affordable air travel.

Airports Authority of India has been driving adoption of non-conventional sources of energy at airports reducing the carbon footprint of operations. 12 airports have switched over to 100% green energy in 2024. Bengaluru Airport has achieved the highest Carbon Accreditation Level 5 of Airports International Council (ACI), whereas Airports viz. Delhi, Mumbai and Hyderabad have achieved Level 4+ ACI accreditation, becoming Carbon neutral.

ATFM played a greater role this year and implemented Ground delay measures on **757 occasions** to ease out congestion in Indian airspace observed at Ayodhya, Bengaluru, Chennai, Delhi, Hyderabad, Kolkata and Mumbai Airport during the calendar year 2024. This resulted in **fuel savings of 32653.7 tonnes** amounting to the reduction in **CO2 emissions of approximately 103185.83 tonnes**. **Compliance of calculated take off time (CTOT)** in year 2024, rose significantly to **98%** due to active collaboration among the stakeholders.



C. Introduction

This report provides an overview of the ATM network in India and its performance for the year 2024 in the areas of traffic, ATFM delays in the network and ground operations.

The report analyses the annual results in light of the main events that took place in the course of the year based on the key performance metrics defined.

The document is structured as follows:

Section 1: Preface

Section 2: Executive Summary.

Section 3: Introduction

Section 4: Traffic Overview insights on the annual traffic growth in the network and categorically in the metro airports year on year

Section 4: ATFM Post Operations – CDM Analysis assesses the effectiveness of the ATFM measures applied on the basis of the key performance indices (KPIs) defined.

Section 5: Glossary explains the KPIs

Annex A: Flight Plan Analysis highlights non-compliance to the CBR requirement to assess the percentage of flight plans filed late (within 3 hours of their EOBT) etc.



D. Traffic Overview

I. Total IFR flight movements on monthly basis in 2024

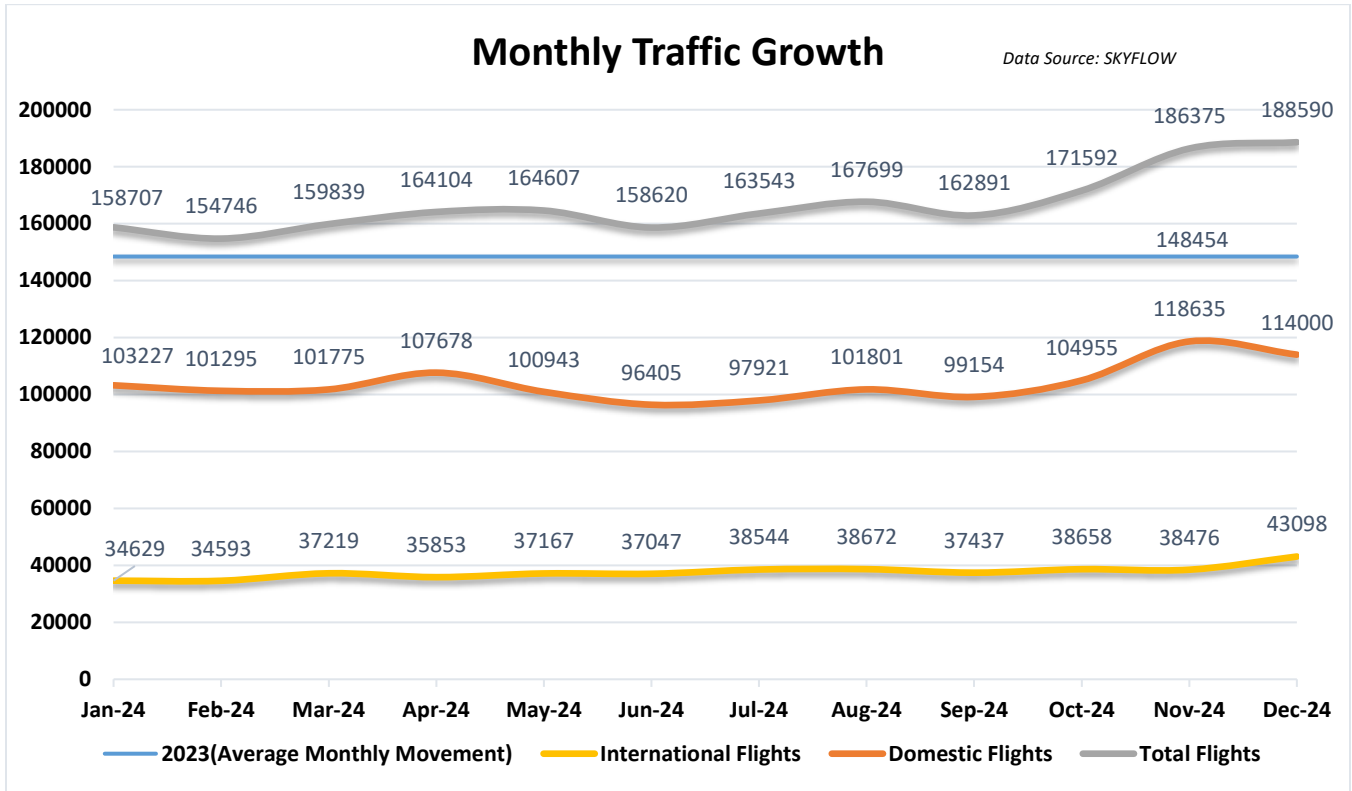


Figure 1: Monthly Traffic evolution

The graph above depicts the total air traffic (Domestic, international and overflying flight), IFR Domestic and international flights in the Indian ATFCM Area for the year 2024. The average monthly traffic (Domestic, international and overflying flight) in year 2024 grew by 12.4% in comparison to year 2023.

Domestic IFR flights witnessed an average growth of 1.05% month on month from January 2024 to December 2024 whereas international flights recorded an average increase of 2.1 % month on month from January 2024 to December 2024 (data source SKYFLOW).



II. Comparison of total IFR traffic in the network (YoY)

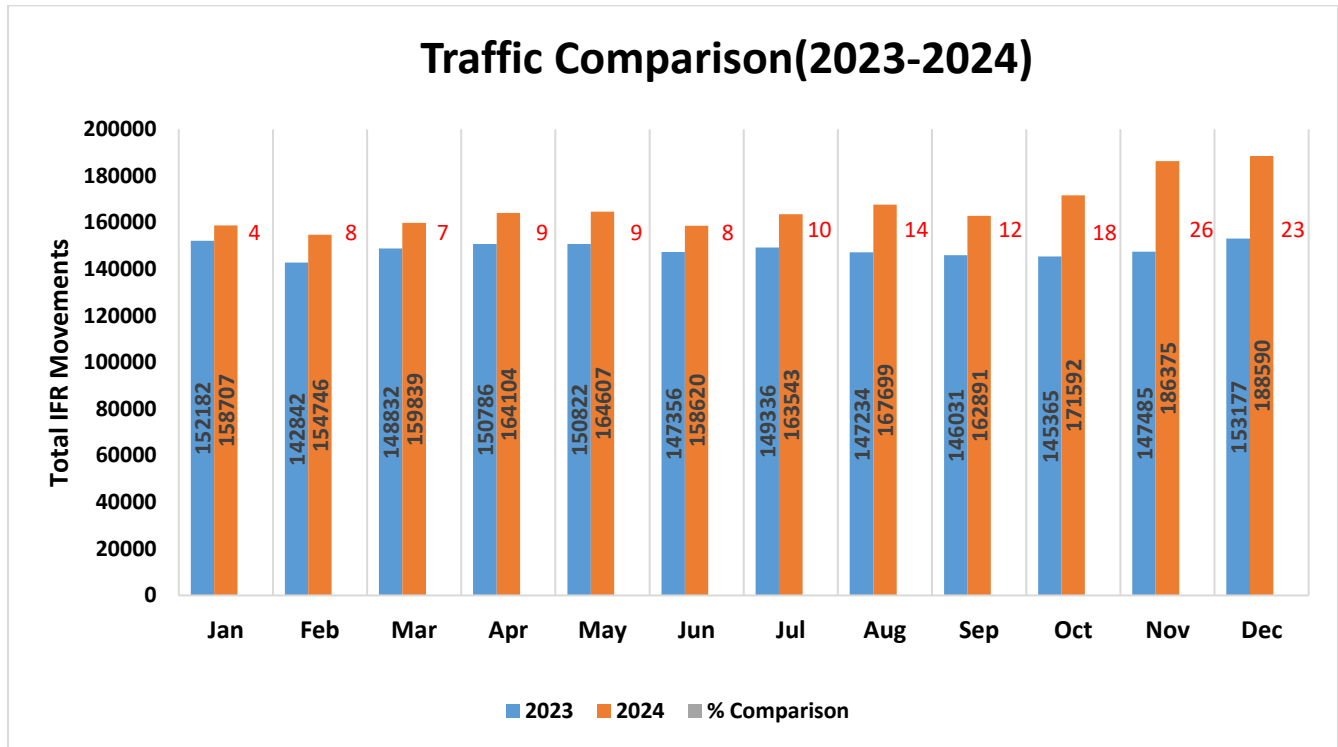


Figure 2: Traffic comparison 2023 vs 2024

Indian airspace witnessed highest growth metric compared to year 2023 in the month of Nov'24 and Dec'24. Although the traffic grew by 12.4% on average the least monthly growth as compared to last year was for Jan'24.



III. Comparison of total ATMs at Six metro Airports (Year-wise)

The total Air traffic movement including Passenger and Combination of other flights i.e. All-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 are plotted for the year 2020, 2021, 2022, 2023 & 2024.

Metro Airports namely Bengaluru, Chennai, Delhi, **Hyderabad**, **Kolkata** and Mumbai have witnessed a rise in Air Traffic movement in year 2024 of 8.1%, 4.9%, 5.1%, **12.6%**, **3.3%** and 4.1% respectively as compared to the ATMs in the year 2023.

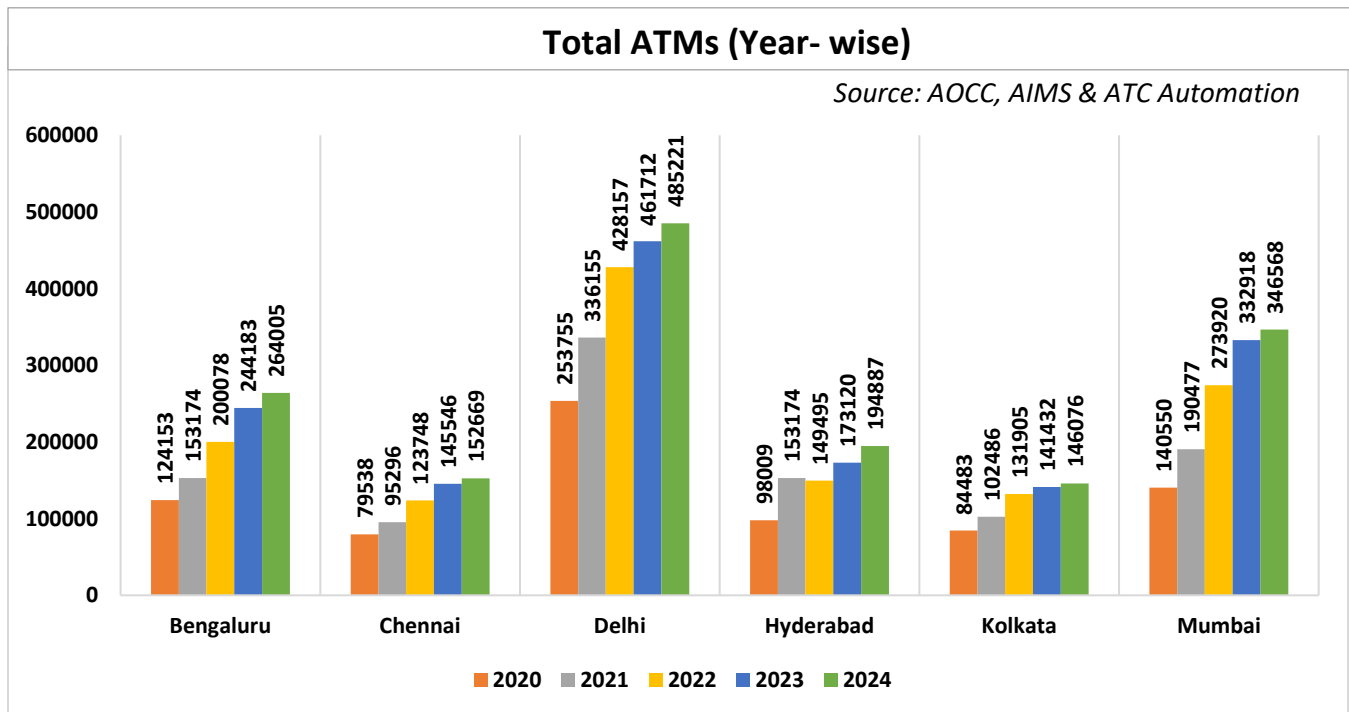


Figure 3: Percentage Traffic Variation (YoY)



IV. Monthly Average Air Traffic Movement for Six Major Airports

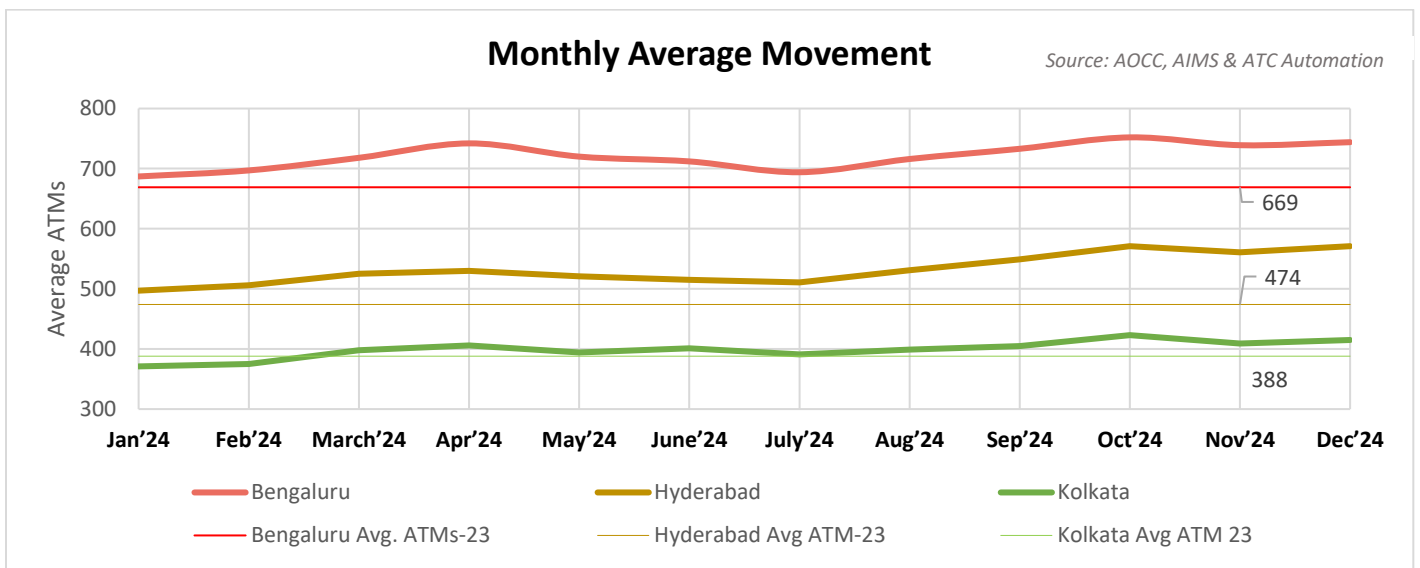
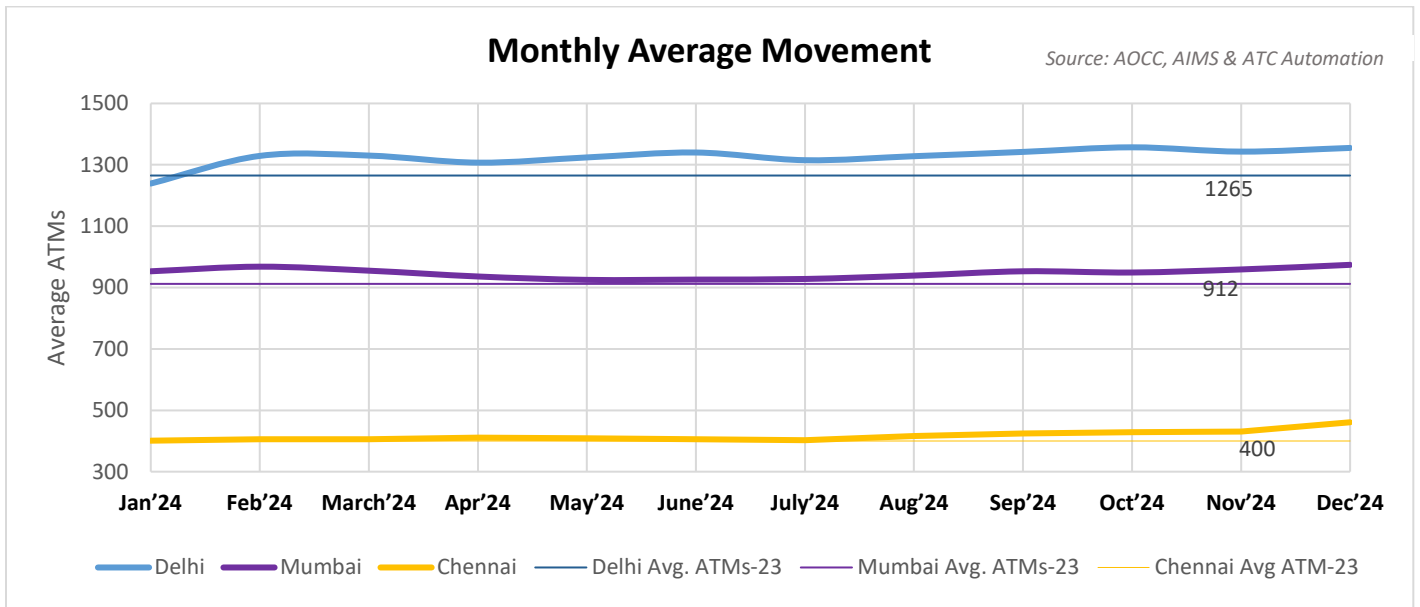


Figure 4: Monthly Average Air Traffic Movement For Six Major Airports

Monthly average Air Traffic Movements for Six major Airports- Delhi, Mumbai, Bengaluru, Chennai, Hyderabad and Kolkata in India for the year 2024 is depicted in the above graph. The Average Monthly ATMs in Bengaluru, Chennai, Delhi, Hyderabad, Kolkata and Mumbai Delhi recorded an increment of 7.8%, 4.3%, 4.7%, 12.2%, 2.9% and 3.81% respectively than the Average Monthly ATM recorded in the year 2023 for the same Airports.



V. Top city pairs India:

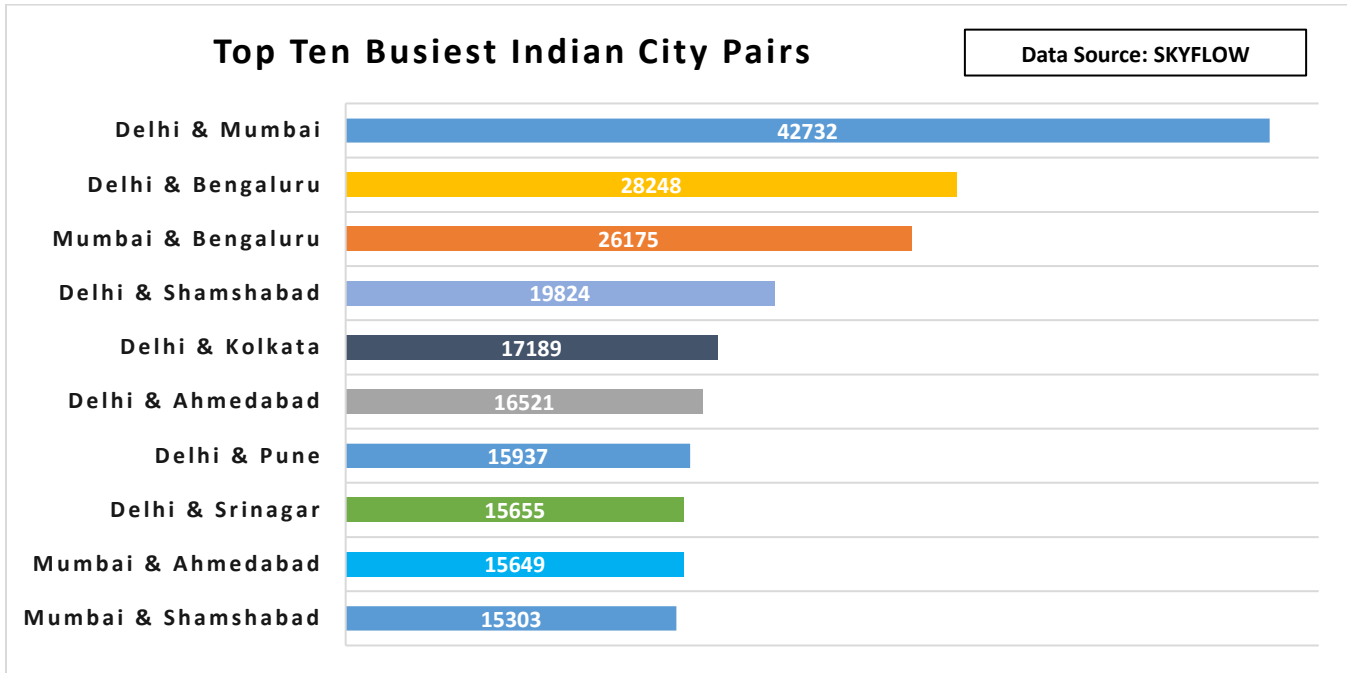


Figure 5: Busiest Domestic City Pairs

The above graph shows the ten busiest Indian city pairs as per the movement data received from SKYFLOW system:

Inference

- i. For the year 2024, Delhi and Mumbai are the top busiest city pair with a total of 42732 flights.
- ii. Delhi-Pune is the top busiest major to non-major city pair with 15937 flights operating to/from these airports.



VI. International Traffic :

International Traffic Flow to/from India:

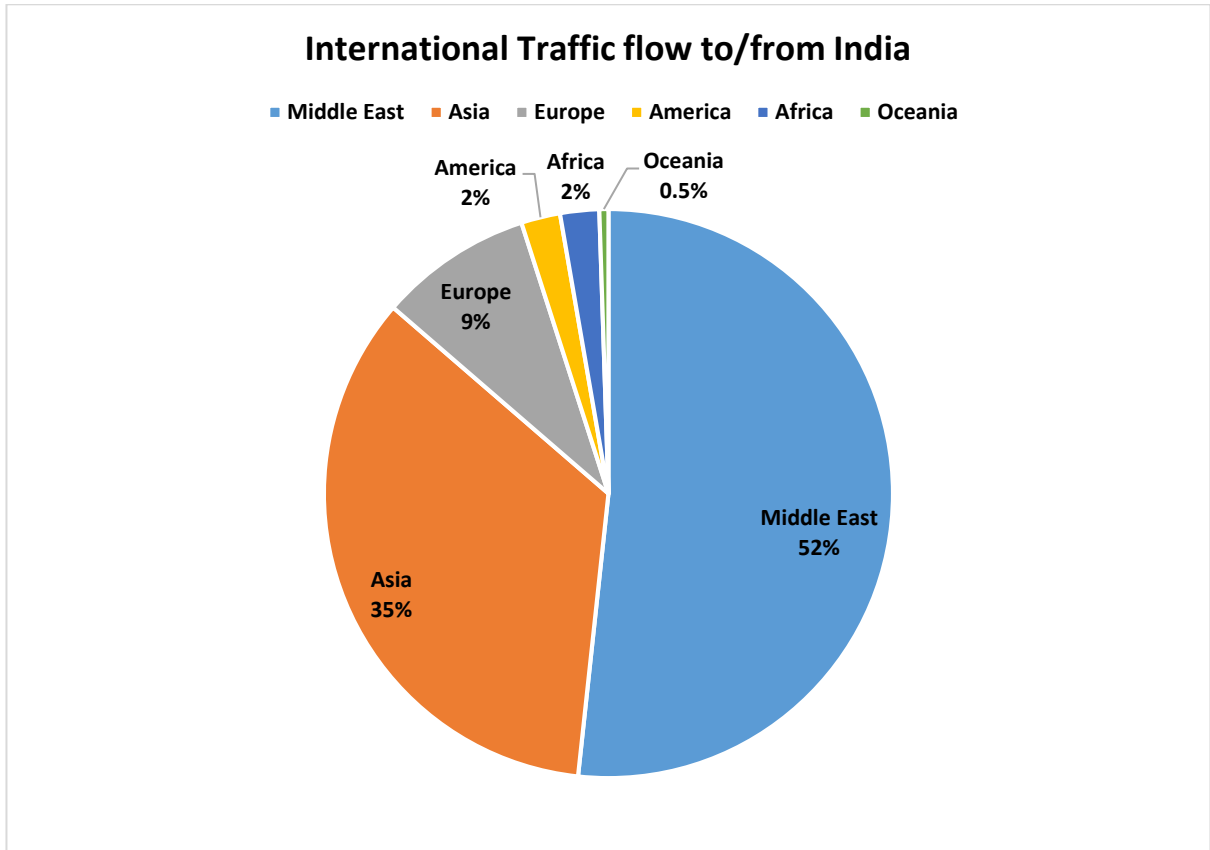


Figure 6: Busiest International City Pairs

The above graph shows the international Traffic flow data received from SKYFLOW System:

Inference:

- i. Middle east region accounts for the maximum (52%) international traffic flow to/from India.
- ii. Oceania region accounts for the least (0.5%) international traffic flow to/from India.



VII. Top International city pairs :

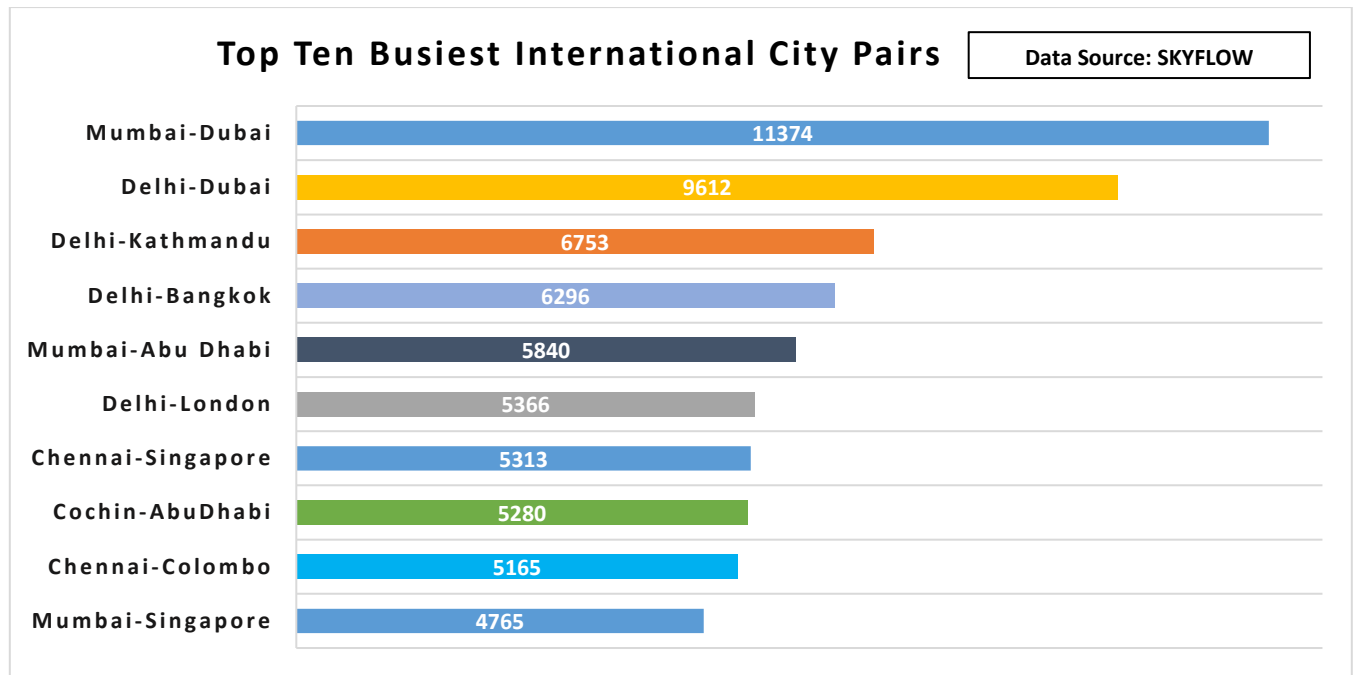


Figure 7: Busiest International City Pairs

The above graph shows the ten busiest International city pairs movement data received from SKYFLOW System:

Inference:

- i. Dubai and Mumbai are the top busiest city pair with a total of 11374 flights operating for the year 2024.
- ii. Cochin and Abu-Dhabi is the top busiest major to non-major international city pair with 5280 flights operating for the year 2024.



VIII. Flight Operations – Airlinewise

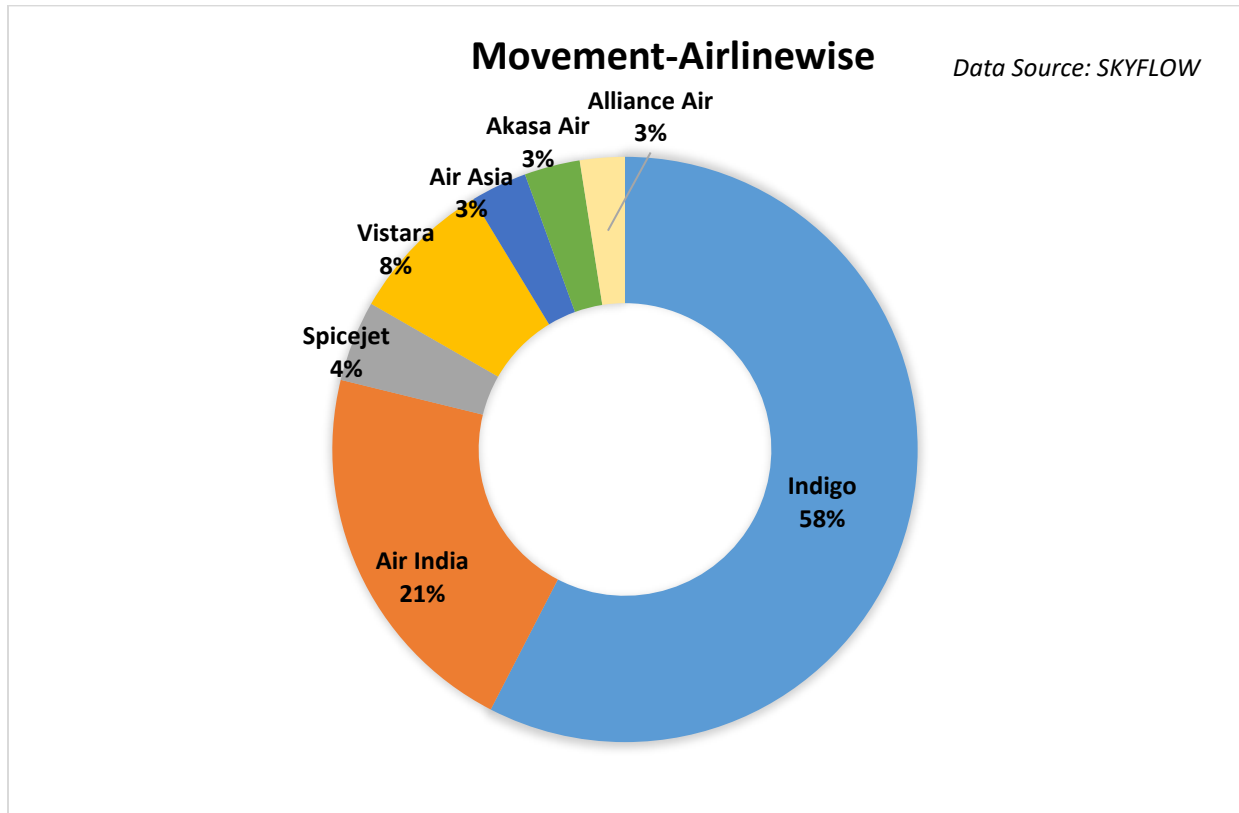


Figure 8: Flight Movements –Airlinewise

Indigo Airlines constitutes the maximum 58 % of the total scheduled aircraft movements for the Year 2024 followed by Air India at 21%. Alliance Airlines has the least recorded air traffic movement.



E. ATFM Post Operations – CDM Analysis

I. Introduction

Analysis Period: 1stJanuary'24– 31stDecember'24

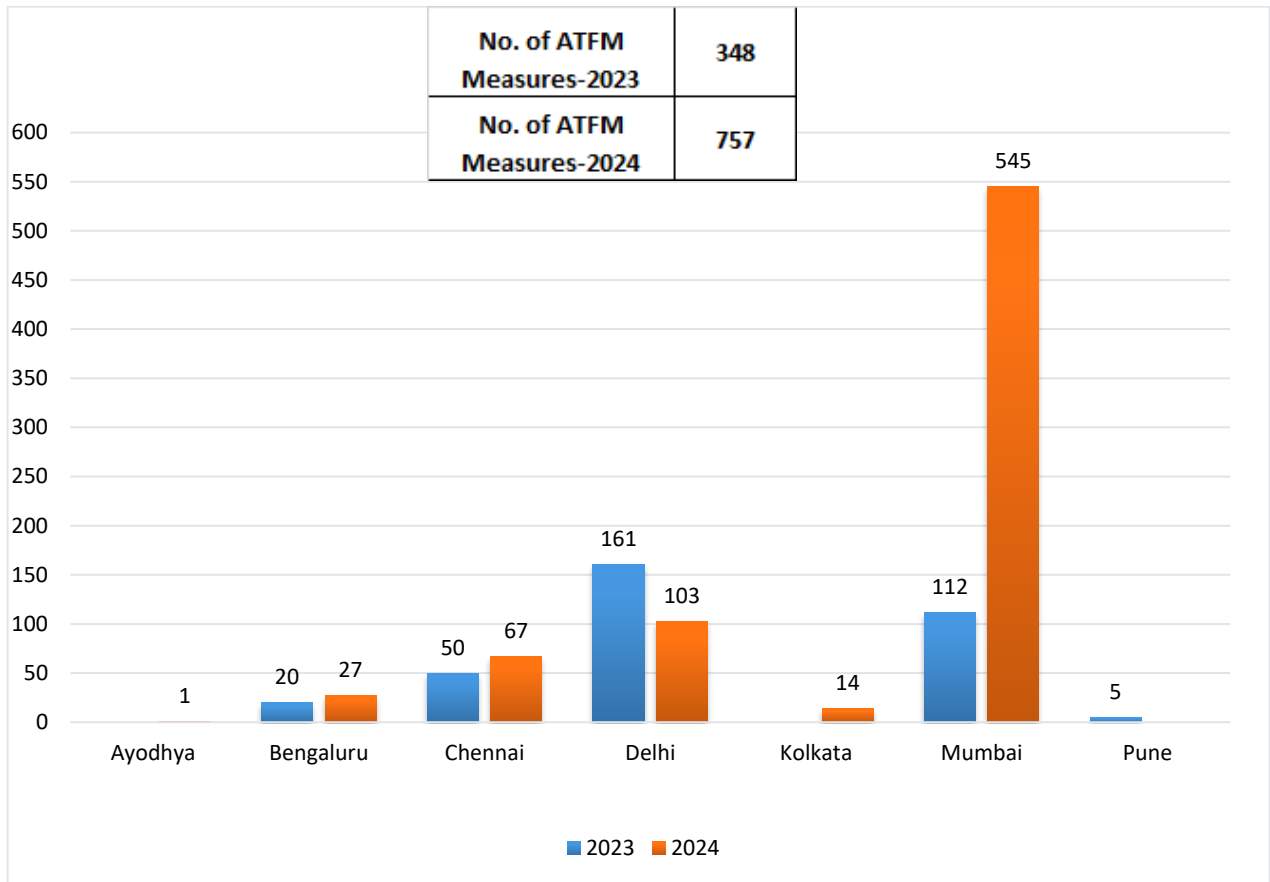
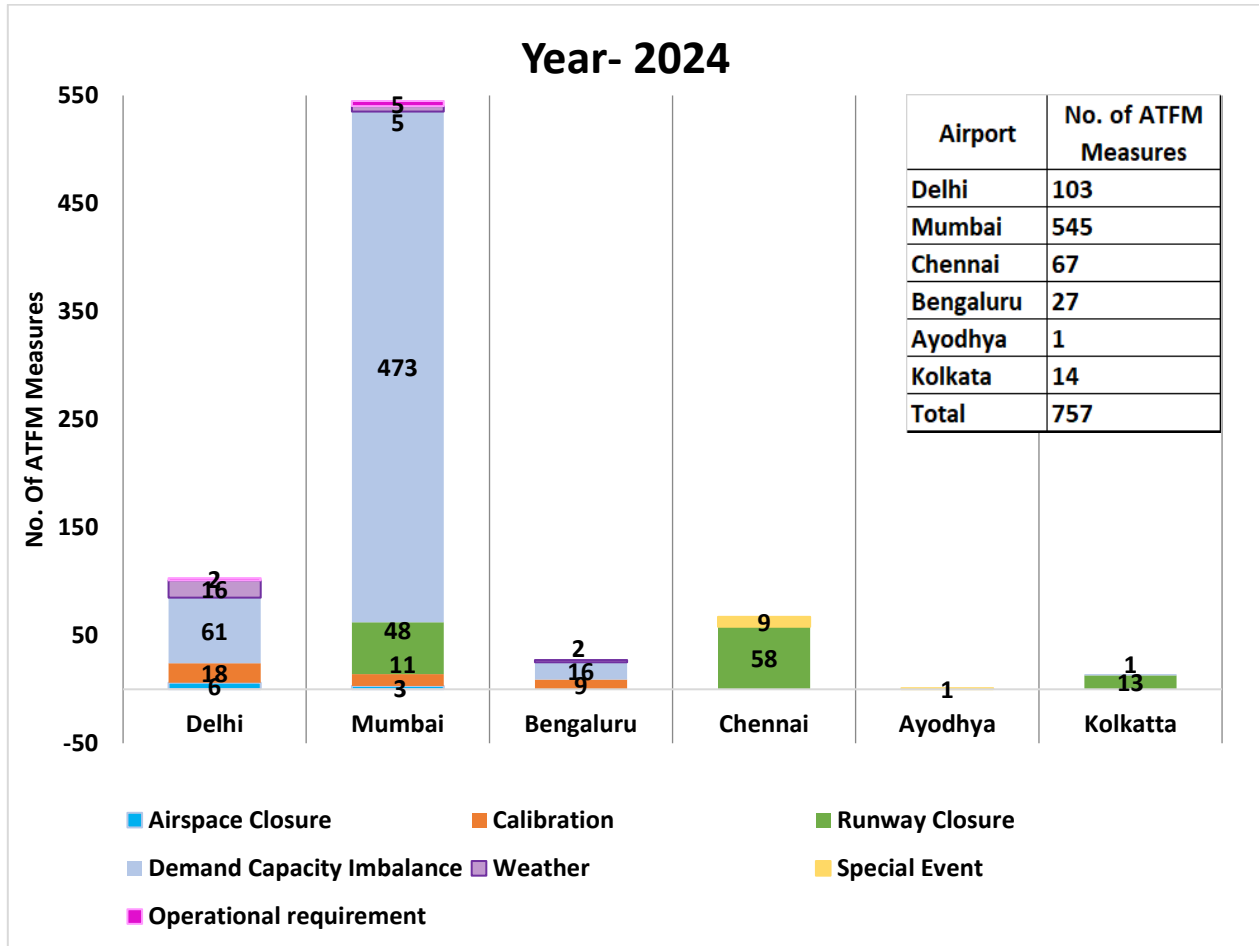


Figure 9: ATFM measures 2023 vs 2024

A total of **757 ATFM measures were applied in 2024** for Ayodhya, Bengaluru, Chennai, Delhi, Kolkata and Mumbai whereas only 348 ATFM measures were applied for Bengaluru, Chennai, Delhi, Mumbai and Pune in the year 2023. In year 2024, there has been **an increase of 117% in the number of ATFM measures** applied on the arrivals within ATM network, in comparison to year 2023.



During the year 2024, **One (01)** ATFM measures was applied for Ayodhya Airport, **Twenty-Seven (27)** for Bengaluru Airport, **Sixty seven (67)** for Chennai airport, **One Hundred three (103)** times for Delhi Airport, **fourteen (14)** for Kolkata Airport and **Five Hundred Forty Five (545)** for Mumbai airport due to the following reasons as illustrated in the bar chart below:-





ATFM Measures Overview

	Ayodhya	Bengaluru	Chennai	Delhi	Kolkata	Mumbai
Number of ATFM measures applied	1	27	67	103	14	545
Average ATFM Ground delay due to measures	95	17.2	22.2	26	12.9	30.1
Maximum ATFM Ground delay due to measures	179	65	51	200	50	158
% Compliance	48	85.8	84.5	75.4	83.3	87.2

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

Total affected flights in scenario (Domestic Arrivals)	41646
Total Domestic Arrivals with zero ATFM delay	3025
Total Domestic Arrivals with ATFM delay	38621

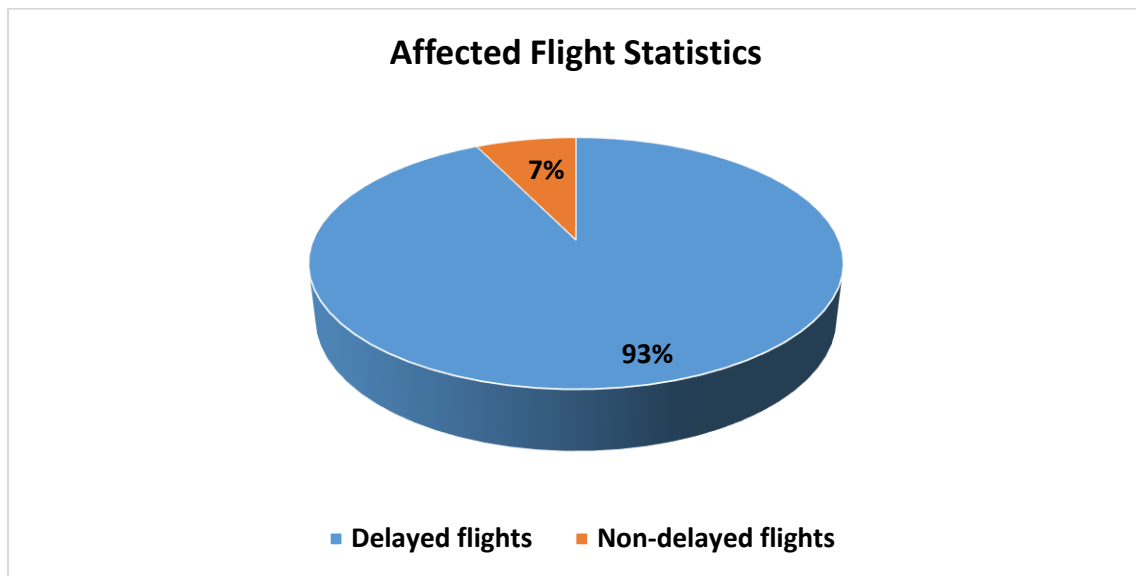


Figure 11: Affected Flight Statistics



II. Overall Compliance

Total Arrivals	54029
Domestic arrivals	41646
Flights with complete data (ATOT)	40402
Flights with incomplete data	272
Flights Not Operated	972
Compliant*	34196
Non-Compliant	6206

Total No. of Revised CTOTs issued = 12958 (Compliance of flights which were issued revised CTOT is measured w.r.t. new CTOT issued)

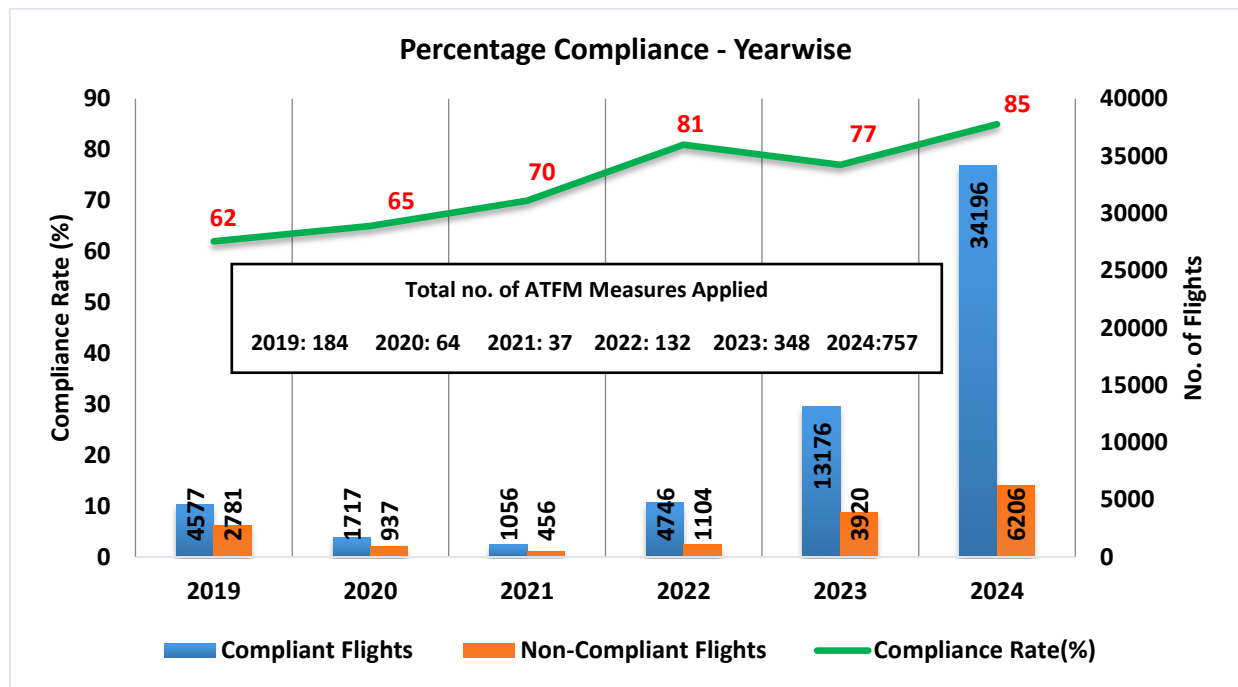


Figure 12: Overall Compliance

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

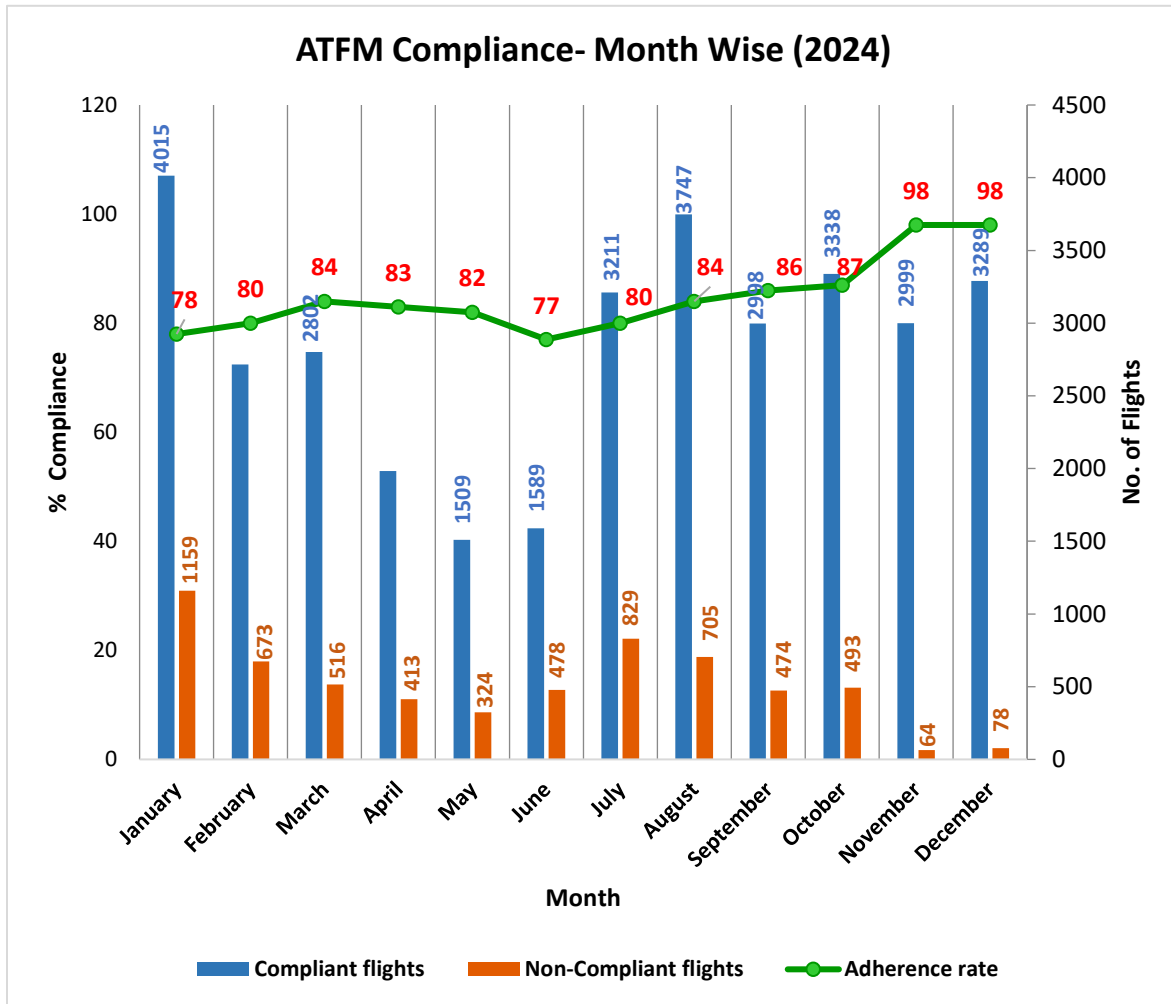




Figure 13: ATFM Compliance –Monthwise

Inference

1. Out of the total arrivals (54029) captured for the constrained Airports during the CDMs period in the year 2024, 77% of flights i.e. Domestic arrivals, are participating.
2. Out of these Domestic Arrivals (41646), 93% of arrivals (38621) are assigned ATFM ground delay & 7% of flights are without any ATFM ground delay.
3. For the year 2024, therefore, out of the total arrivals (54029) captured to the constrained Airports during the period when ATFM measures were in force, 72% of flights (38621) are assigned ATFM Ground Delay.




III. CTOT Compliance rate –Airportwise

MUMBAI FIR	2023 (78%)*	2024 (82%)* 
Ahmedabad	85	90
Aurangabad	78	86
Mumbai	79	77
Bhuj	56	67
Vadodara	69	75
Bhopal	88	88
Bhavnagar	67	73
Diu	38	70
Hirasar	74	85
Indore	82	83
Jabalpur	81	81
Jalgaon	0	87
Jamnagar	68	62
Kandla	67	72
Kolhapur	67	88
Keshod	67	89
Mundra	0	100
Nagpur	79	88
Nasik	71	39
Pune	68	69
Porbandar	50	0
Rajkot	87	100
Shirdi	82	80
Solapur	0	0
Surat	77	79
Udaipur	81	85
KOLKATA FIR	(78%)*	(85%)* 
Prayagraj	70	65
Angul	0	0




Agartala	85	78
Ayodhya	0	81
Siliguri	84	85
Shillong	91	80
Varanasi	77	83
Bhubaneswar	82	89
Bihta, Patna	0	100
Bilaspur	50	80
Kolkata	79	88
Cooch Behar	0	82
Chakeri	61	75
Durgapur	80	84
Darbhanga	62	78
Deoghar	0	86
Gorakhpur	56	80
Guwahati	79	81
Gaya	88	86
Hollongi	79	60
Alipurduar	0	0
Imphal	76	85
Jharsuguda	64	85
Jagdapur	100	100
Jamshedpur	0	100
Jorhat	0	50
Khajuraho	0	81
Silchar	0	100
Aizawl	55	67
Dibrugarh	80	82
Dimapur	40	74
Patna	84	87
Purnea	0	0
Pakyong	60	0
Ranchi	75	77
Raigarh	100	0
Raipur	84	90



DELHI FIR	69%)*	(81%)* 
Agra	35	56
Ambala	0	50
Amritsar	66	77
Adampur	67	33
Bikaner	54	29
Bakshi ka talab Lucknow	0	100
Bhuntar	0	43
Bathinda	0	38
Bareilly	53	55
Chandigarh	68	75
Safdarjung ,Delhi	0	100
Dehradun	77	77
Delhi	75	87
Hindon	20	33
Kangra	77	60
Gwalior	62	54
Halwara Air Force Station	29	100
Jodhpur	70	61
Jaipur	74	86
Jaisalmer	48	61
Jammu	69	76
Kishangarh	50	50
Ludhiana	100	0
Leh	61	56
Lucknow	80	86
Narnaul	0	100
Pathankot	0	100
Pantnagar	0	54
Suratgarh	33	33
Shimla	73	61
Sarsawa Air Force Station	0	0
Srinagar	57	61
Sirsa	67	0



Thoise	0	0
Uttarlai	25	33
Udhampur	0	0
CHENNAI FIR	(81%)*	(90%)* 
Agatti	0	0
Hal Bangalore	56	49
Baldota Koppal, karnataka	0	43
Bangalore	83	90
Belgaum	65	66
Bidar	33	50
Vijayawada	75	89
Coimbatore	93	95
Kochi	89	92
Calicut	89	90
Kadapa	50	100
MOPA Goa	69	87
Gulbarga	88	63
Goa	63	83
Hubli	88	74
Hakimpet, Hyderabad	50	100
Shamsabad, Hyderabad	84	88
Begumpet Hyderabad	80	77
Vijaynagar	67	67
Kannur	83	86
Kurnool	91	100
Madurai	87	88
Mangalore	74	88
Chennai	85	88
Mysore	50	75
Nanded	55	40
Port Blair	61	77
Pondicherry	0	0
Rajahmundry	100	92
Shivamogga	0	67



Salem	33	57
Sindhudurg	46	69
Sulur	0	80
Tuticorin	96	87
Tirupati	86	70
Tiruchirappally	59	73
Thiruvananthapuram	90	93
Visakhapatnam	71	71

**FIR wise compliance rate.*

Inference

1. Out of the total domestic arrivals in the CDM scenario, **85% arrivals were Calculated take off time (CTOT) compliant for the year 2024** compared to **77% in year 2023**.
2. Maximum monthly CTOT compliance were **98%** in the month of November and December 2024
3. For the year 2024 Chennai region has the highest compliance rate of 90% whereas Delhi region has the lowest compliance rate of 81%.



IV. Reason For Non-Compliance (2024)

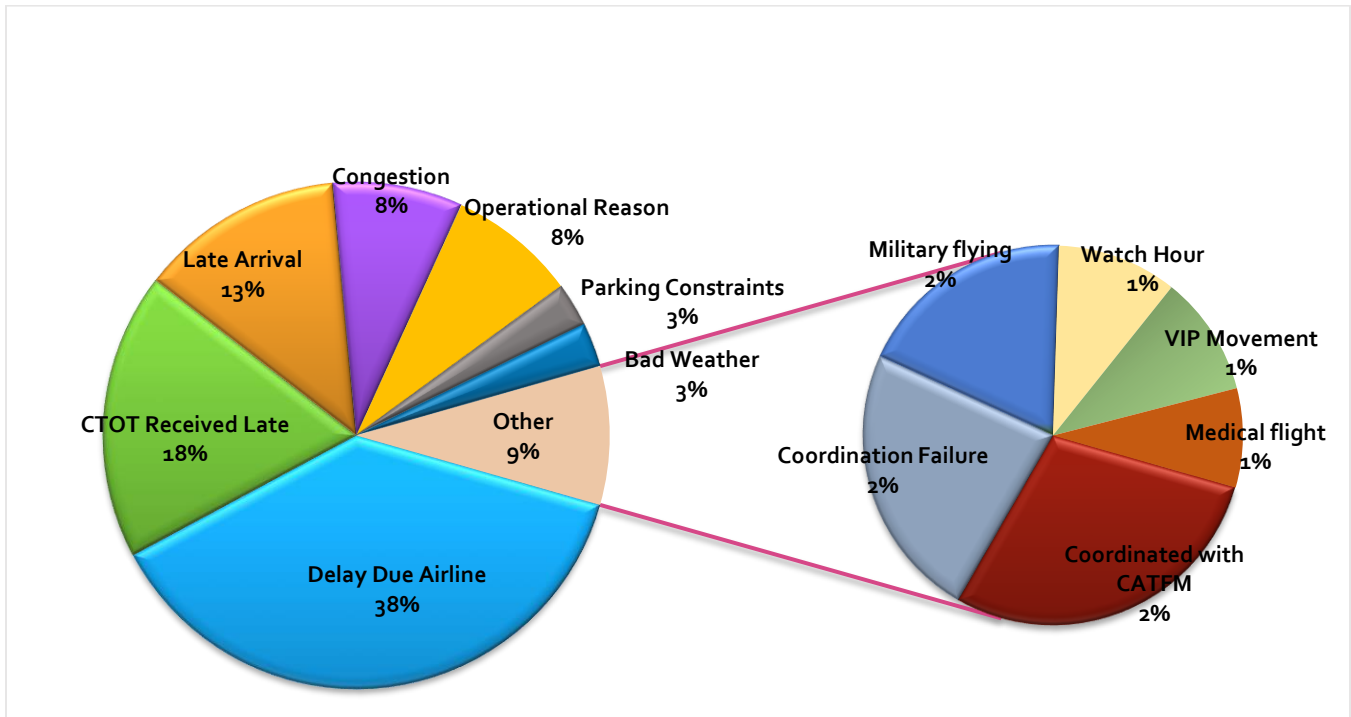


Figure 14: Reason for Non-Compliance

Inference

1. 38 % of the CTOT Non- compliance was due to airline delay. Updated EOBTs of such flights was not available to ATFM unit leading to wastage of unused slots.
2. 18 % of the CTOT Non- compliance was reported by concerned FMPs to be due to late receipt of CTOTs and by the time the aircraft had already initiated pushed back or startup.
3. 13 % of CTOT Non- Compliance was reported by concerned FMPs to be due to late arrival from previous station.
4. 8 % of the CTOT Non- compliance was due to traffic congestion at the departure airport leading to delay and non-compliance.



V. CTOT Compliance rate – Airlinewise

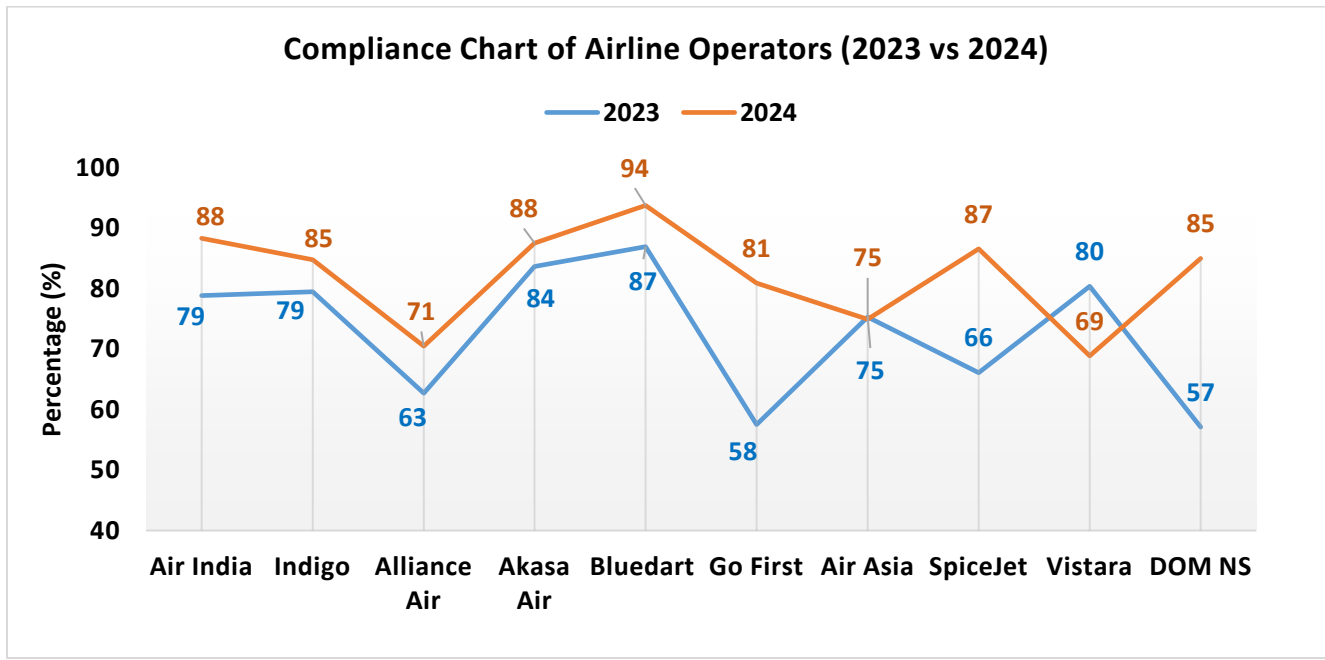


Figure 15: CTOT Compliance-Airlinewise

Inference

5. Out of the total domestic arrivals with complete data in the CDM scenario, 85% arrivals are compliant.
6. Indigo, Air India, Akasa Air and Spicejet Airlines have a compliance rate above the average recorded 85% compliance for the year.



VI. Air Delay during the CDM Scenario period

In the year 2024, the Average Air Delay to domestic arrivals* during the period when ATFM measures were in force for Delhi, Mumbai, Chennai, Bengaluru and Kolkata are 10.5 min, 11.8 min, 8.1 min, 7.9 min and 5.1 min respectively.

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

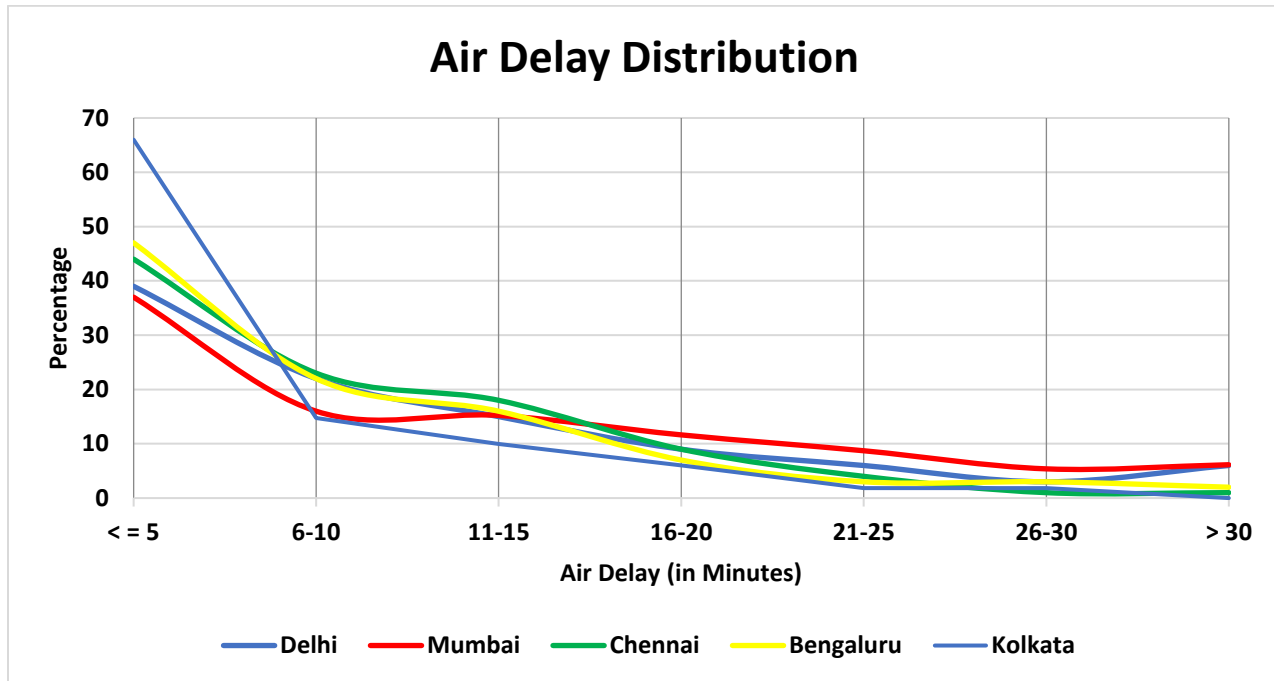


Figure 16: Air Delay during CDM Period

Inference

- i. 76% of arriving flights to Delhi had an Air delay equal to or less than 15 minutes during the CDM period.
- ii. 68% of arriving flights to Mumbai had an Air delay equal to or less than 15 minutes during the CDM period.
- iii. 85% of arriving flights to Chennai had an Air delay equal to or less than 15 minutes during the CDM period.
- iv. 85% of arriving flights to Bengaluru had an Air delay equal to or less than 15 minutes during the CDM period.
- v. 91% of arriving flights to Kolkata had an Air delay equal to or less than 15 minutes during the CDM period.



VII. Fuel Saving & Reduction in Emissions per flight during the CDM Scenario period

The chart below shows fuel saved per flight and reduction in CO₂ emissions per flight due to ATFM measures in CDM Scenarios on monthly basis for the year 2024.

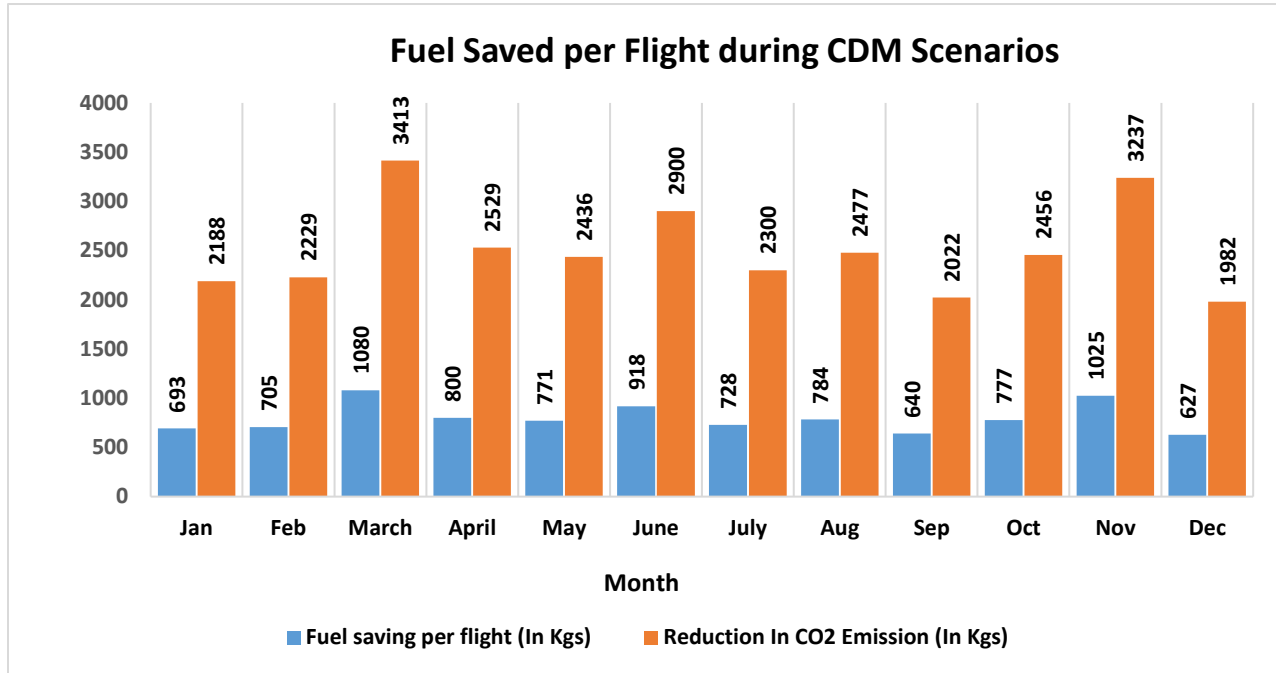


Figure 17: Fuel Savings & CO₂ Emissions reduction

Inference

1. March 2024 recorded the maximum Fuel savings per flight of 3413 Kg and maximum reduction in emissions of 1080 Kg of CO₂ per flight
2. ATFM measures applied in the year 2024 resulted in total fuel savings of 32653.7 tonnes amounting to the reduction in CO₂ emissions of approximately 103185.83 tonnes.



VIII. Tangible benefits of ATFM measures applied (2024)

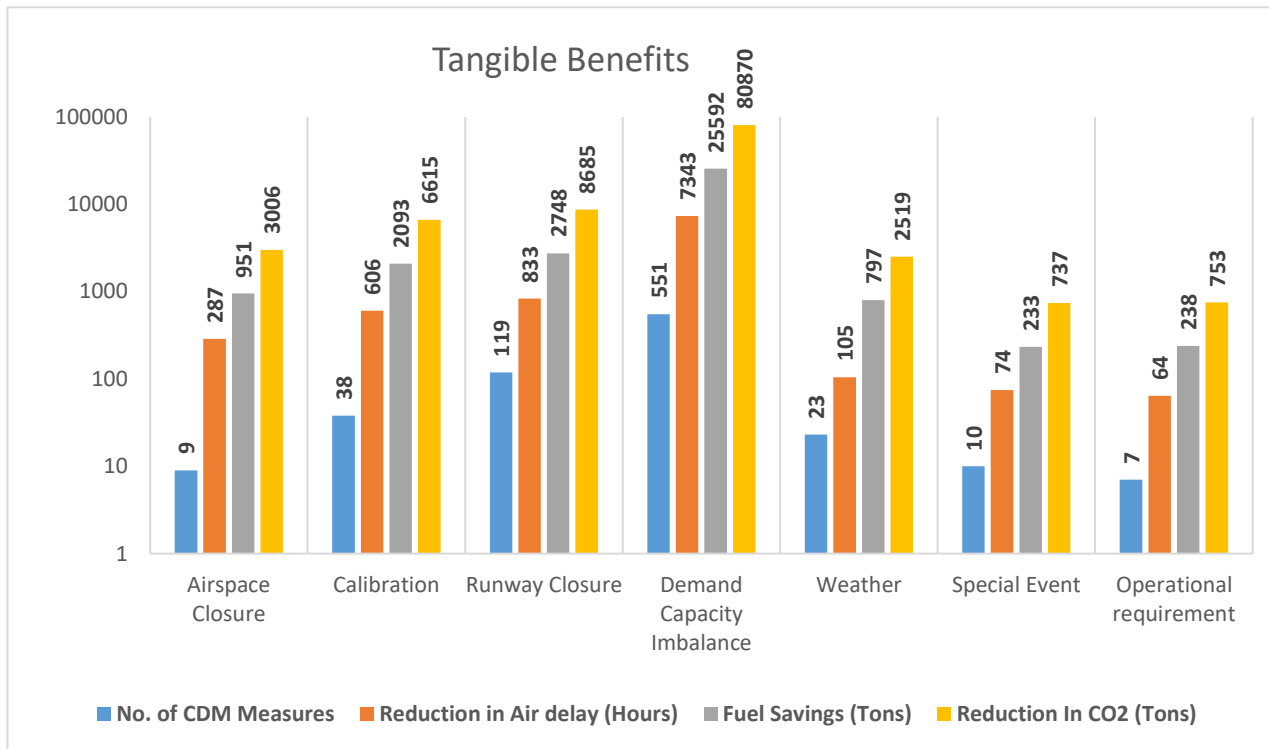


Figure 18: Tangible benefits(2024)

ATFM played a greater role this year and implemented Ground delay measures on **757** occasions to ease out congestion in Indian airspace observed at Ayodhya, Bengaluru, Chennai, Delhi, Mumbai, and Kolkata Airport during the calendar year 2024. This resulted in **fuel savings of 32653.7 tonnes** amounting to the **reduction in CO₂ emissions of approximately 103185.8 tonnes** in 2024 compared to fuel savings of 11231.6 tonnes and reduction in CO₂ emissions of 35491.6 tonnes in the year 2023.



F. Glossary

ATFM Parameters	Definition
<i>Affected Flight statistics</i>	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)
<i>Average ATFM delay</i>	$\frac{\text{Total monthly ATFM delay (in minutes)}}{\text{Total Domestic Arrivals}}$
<i>Maximum ATFM delay</i>	Maximum ATFM delay (in minutes) assigned in the month
<i>Overall compliance rate</i>	Defined as monthly ATFM departure slot adherence rate of regulated flights. Flights having ATOT within the ATFM Slot Tolerance Window (STW) of minus 5 to plus 10 minutes of CTOTs, are considered as compliant flights
<i>CTOT Compliance rate of Airline operators</i>	An overview of CTOT compliance rate of various Airline operators
<i>CTOT Compliance rate of Airports within different Regions</i>	An overview of CTOT compliance rate of Airports within 4 FIRs
Air delay statistics	<p>Air delay defined as difference between AET & EET, where AET (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</p> <p>Average Air Delay is calculated as:</p> $\text{Average Air Delay} = \frac{\text{Total Air Delay to domestic arrivals (with values greater than zero)}}{\text{Total Domestic Arrivals}}$ <p>CLDT: Calculated Landing Time CTOT: Calculated Take off Time ALDT: Actual Landing Time ATOT: Actual Take off Time</p>



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Annexure A- Flight Plan Analysis (1st Jan'24 to 31st Dec'24)

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 for better planning. Hence, the requirement of ATFM measures can be identified early. 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 monthwise for the year 2024.

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 the context of 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 above data is shown in the following graph which shows the percentage of FPLs filed late for the year 2024. The table below shows the no. of flights which is filed within 3hrs of their EOBT and their percentage.

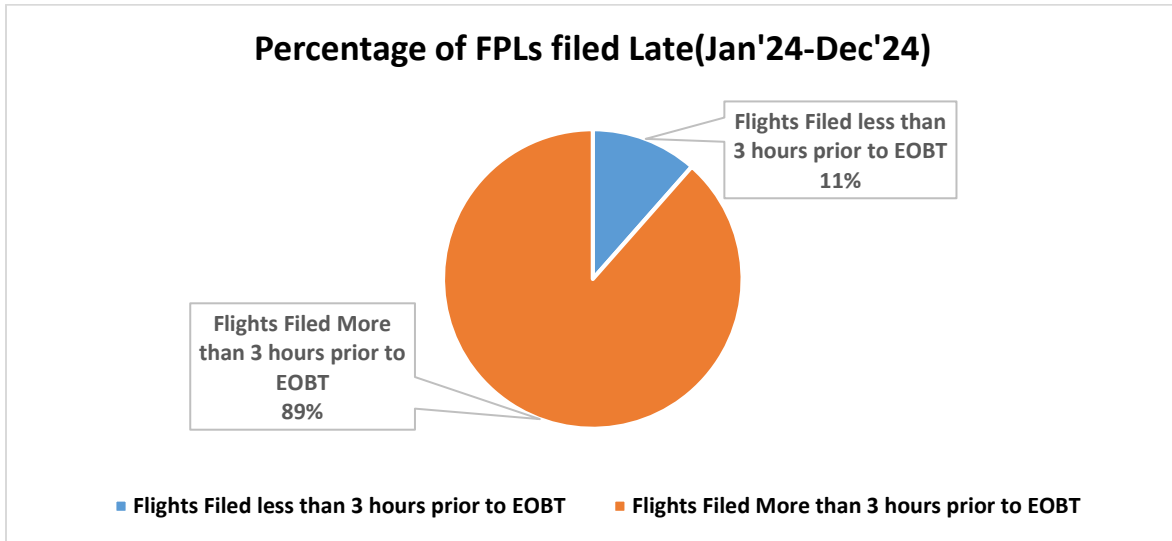


Figure 19:Percentage of flight filling FPL within 3 Hrs of EOBT

Major Domestic Airlines Wise Analysis (Jan'24-Dec'24)

Airlines	Number of Flight plans filed less than 3 Hours prior to EOBT	Total no. of filed Flight Plans	Percentage
Air Asia	2739	59409	4.6
Air India	16432	159561	10.2
AirIndia Express	19198	105823	18.1
Akasa	3836	40960	9.3
Alliance Air	3066	37257	8.2
Blue Dart	13973	122137	11.4
Indigo	76971	640529	12.0
SpiceJet	5837	48733	11.9
Star Air	1797	25323	7.0
Vistara	11330	105087	10.7

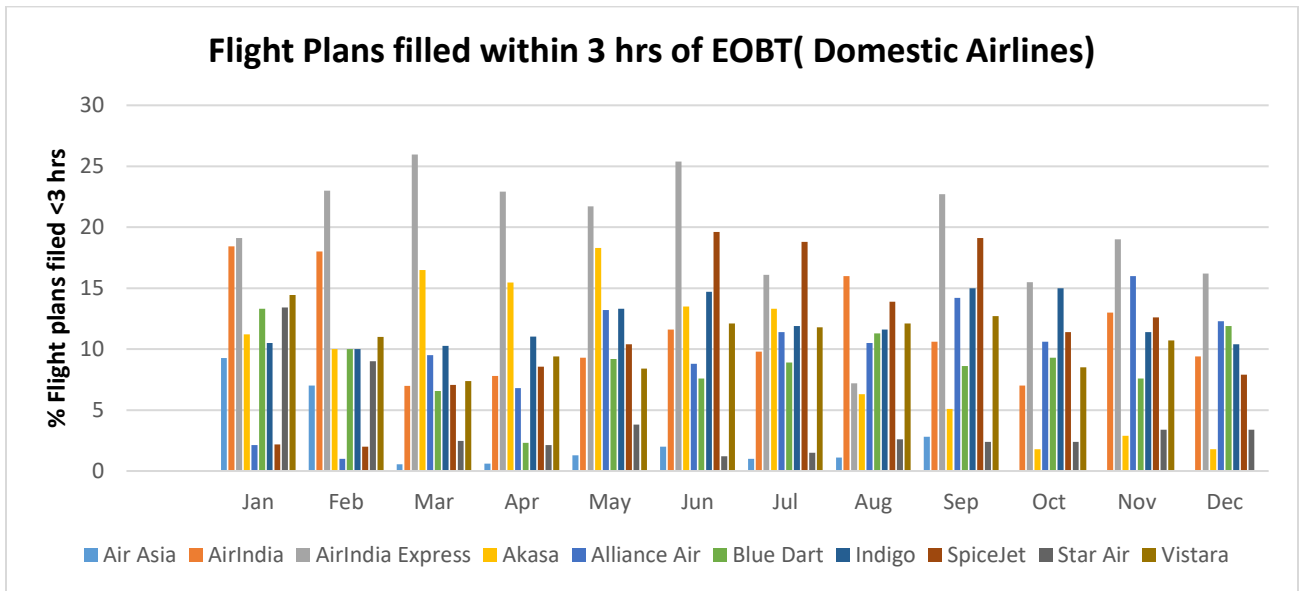


Figure 20:Percentage of late flight plan filling -Airlines wise

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 graph and Table below shows the number/percentage of flights for which no DLA message was received for the year 2024. $\{(EOBT \text{ of original FPL}) - (ATOT \text{ received})\} > 30 \text{ minutes}$.

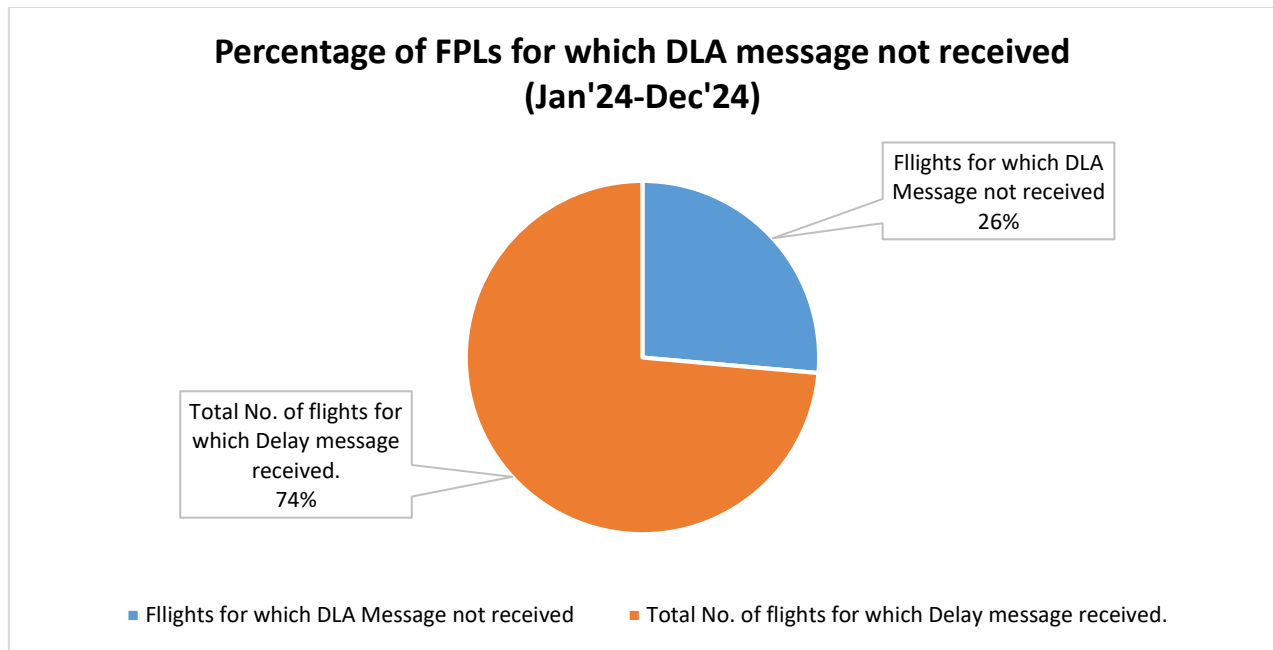


Figure 21: Percentage of flight for which DLA msg not received.

Major Domestic Airlines Wise Analysis(Jan'24-Dec'24)

Airlines	Number of Flights for which DLA Message not received	Total No. of flights considered for analysis	Percentage
Air India	46724	144946	32.2
Akasa Air	8191	35776	22.9
Air India Express	19626	65070	30.1
Blue dart	1534	6440	23.8
Air Asia	5473	30707	17.8
Indigo	133744	570657	23.4
Alliance Air	4182	18438	22.6
Star Air	1057	5550	19.0
Spice Jet	12625	39730	31.7
Vistara	25721	83549	30.7

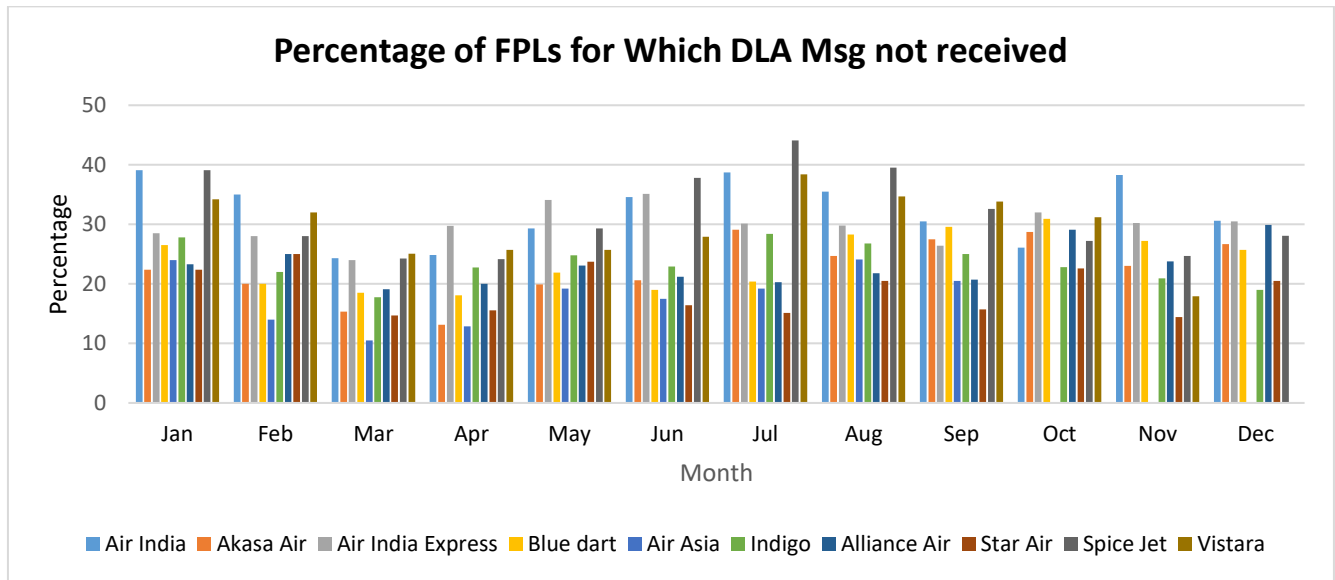


Figure 22: Percentage of flight plan for which DLA Msg not received -Airlines wise

C. For analysis of non-receipt of CNL (cancel) messages for the year 2024, 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 graph and table given below shows/lists the number/percentage of Flights for which no CNL Msg. was received in the year 2024:

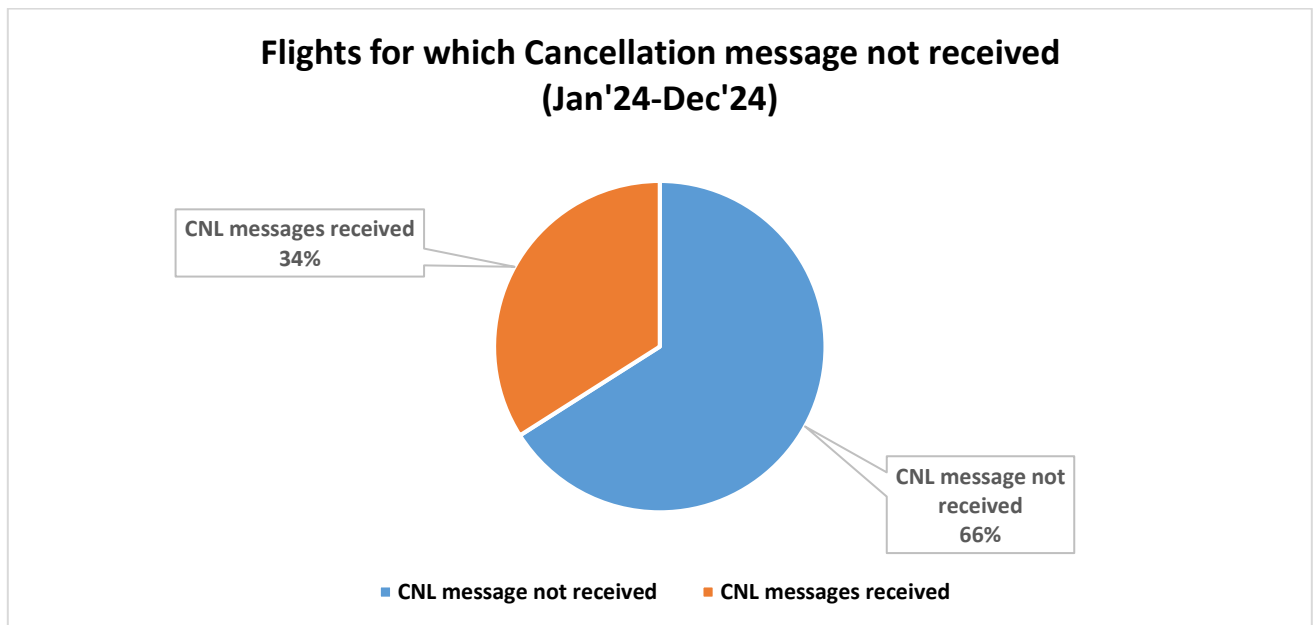


Figure 23:Percentage of flight for which CNL msg not received.

Airlines	CNL message not received	No. of flights annulled	Percentage
Air India	860	1275	67
Akasa Air	148	210	70
Air India Express	884	1296	68
Blue dart	75	100	75
Air Asia	214	298	71
Indigo	2812	3989	70
Alliance Air	1808	2312	78
Star Air	303	407	74
Spice Jet	1245	1773	70
Vistara	825	1251	65

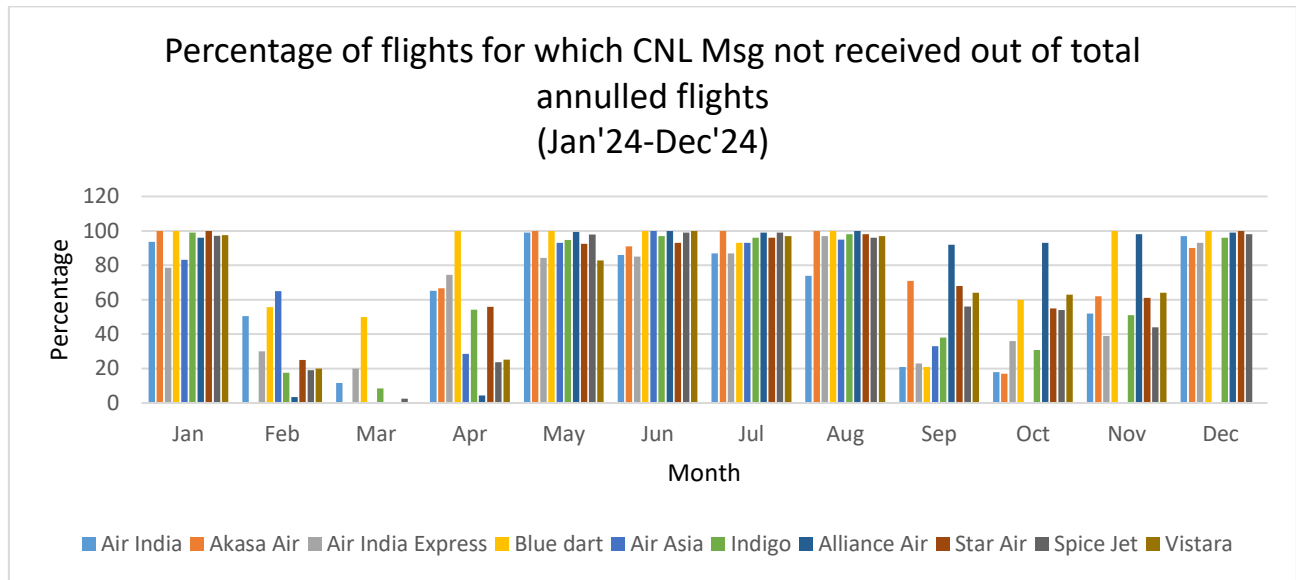


Figure 24:Percentage of flight plan for which CNL Msg not received -Airlines wise

Inference:

- i. Percentage of late filing of flight plan has been consistently less for Air Asia, Akasa Air and Star Air whereas Air India express has a high percentage of late FPL filing.
- ii. Spicejet and Indigo Airlines have marginally improved their FPL filing time over the period of last six months.

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