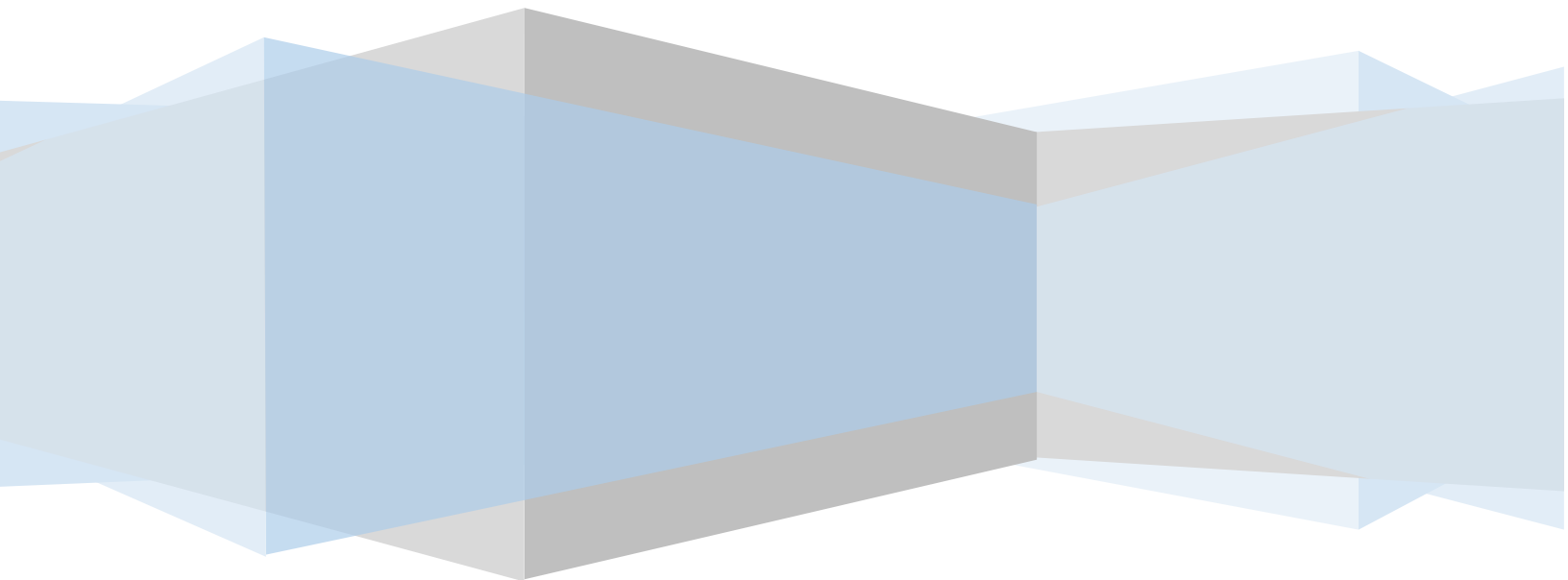


ANNUAL REPORT
ATFM OPERATIONS
(Jan 2023 to Dec 2023)

CENTRAL COMMAND CENTER, C-ATFM, DELHI







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A. ATFM-The journey so far..

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

- i. 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 (GSt) to regulate traffic (resolve Demand Capacity imbalance) at constrained airports.
- ii. 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. 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.
- iii. 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 of ATFM 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.

5 new Flow Management positions(FMPs) have been operationalized to support daily ATFM operations at Rajahmundry, Vijayawada, Dehradun, Baroda and Surat Airport.

AAI plans to pursue an aggressive ACDM implementation roadmap, enabling all international airports in India to become part of the ACDM-ATFM network, thus providing all CDM stakeholders with real time situational awareness. The Departure Planning Information(DPI) messages exchanged from A-CDM system on agreed departure milestones bring airports into the loop of the ATFM decision making process. The Flight Update



Message(FUM)/DPI message exchange ensures the punctual updating of flight data, more consistent slot calculation and improved slot adherence.

Last year, the ATFM directorate signed a Common Business Rules (CBR) document with the domestic airlines and airport operators. CBR defines the roles and responsibilities of all stakeholders for collaborative decision-making and encompasses 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 increased 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 update the current position of the flights. The space-based ADS-B integration has improved the accuracy of demand prediction in the ATFM System

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 (IFPS) 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 informed 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 true benefits of IFPS can be realized after full integration of Integrated Initial Flight Plan Processing system (IFPS) & pan India ATS Message Handling System (AMHS) for filing the flight plan & disseminating and processing ATS messages. 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 form the basis for future SWIM services.

The C-ATFM system is accessible over the internet to various categories of stakeholders. Thus, the system becomes scalable across the Indian airspace and beyond. AAI foresees the need to provide access to the C-ATFM information to adjacent States in future and the system design is well equipped for the same.

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 2023 was marked by triumphs of rising passenger traffic and record aircraft orders from major players like IndiGo and Air India. Concurrently, some airlines faced turbulent times such as engine troubles which eventually grounded the GoFirst Airline. Similar technical concerns were experienced by IndiGo Airlines. SpiceJet Airline stumbled on financial and legal hurdles while Akasa Air was troubled by pilot-related issues. Overall though, it was a tremendous year for Indian aviation sector witnessing higher YoY growth.

In calendar year 2023, India's domestic air passenger traffic grew by 8.34% year-on-year, reaching 15.20 crore. India's international air traffic also exhibited growth (data source CAPA) with year-end figure of around 70 million passengers.

Domestic IFR traffic witnessed a growth of 35% whereas international flights recorded an increase of 1.3 % this year as compared to 2022(data source SKYFLOW).

To accommodate this growing air traffic, Airports authority of India has been investing in the expansion and modernization of its existing airports and terminal. This includes the development of new airports as well as the upgrade of existing facilities at Chennai, Kanpur, Port Blair, Tezu, Rajkot and Ayodhya Airport to name a few. Various Expansion work were undertaken and completed at PPP Airports during 2023 which includes: commissioning of 4th runway and Eastern Cross Taxiway at Delhi Airport, Commissioning of new T2 terminal with domestic and international operations at Bengaluru airport and Expansion of terminal building at Hyderabad airport .

60 New RCS routes commenced and 06 Airports namely, Rourkela, Hollongi, Jamshedpur, Cooch Behar, Utkela & Shivamogga were operationalized under the RCS-UDAN. RCS UDAN scheme was launched in 2016 to enable air operations on unserved/underserved routes connecting different regions, promote balanced regional growth and make flying affordable for masses.

During 2023, three Greenfield airports, namely, Mopa, Shivammogga and Rajkot were operationalized.

ATFM played a major role in regulating air traffic congestion observed at Delhi, Mumbai, Bengaluru, Chennai and Pune Airports by implementing Ground delay measures on 348 occasions. Some of the planned events that required intervention of ATFM unit include the Republic day Airspace closure at Delhi, the biennial air show and aviation expo "Aero India 2023", in Bengaluru, Runway closure for pre and post monsoon preventive maintenance at Mumbai and G-20 summit in Delhi.

The measures applied resulted in fuel savings of 11231.55 tonnes amounting to the reduction in CO₂ emissions of approximately 35491.647 tonnes.



C. Introduction

The purpose of this document is to provide an overview of the ATFM network in India and the performance in 2023 in the areas of traffic, ATFM delays in the network and effectiveness of the ATFM measures applied.

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 structure is as follows:

Section 1: ATFM-The journey so far

Section 2: Executive Summary.

Section 3: Introduction

Section 4: Traffic Overview contains the annual traffic growth in the network, the traffic growth in the metro airports year on year (YOY) and the average monthly traffic growth at Delhi, Mumbai and Bengaluru Airport since disruptions caused by Covid-19 infections.

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 to assess the percentage of flight plans filed late (within 3 hours of their EOBT) in non-compliance to the CBR requirement.



D. Traffic Overview

I. Total IFR flight movements on monthly basis in 2023

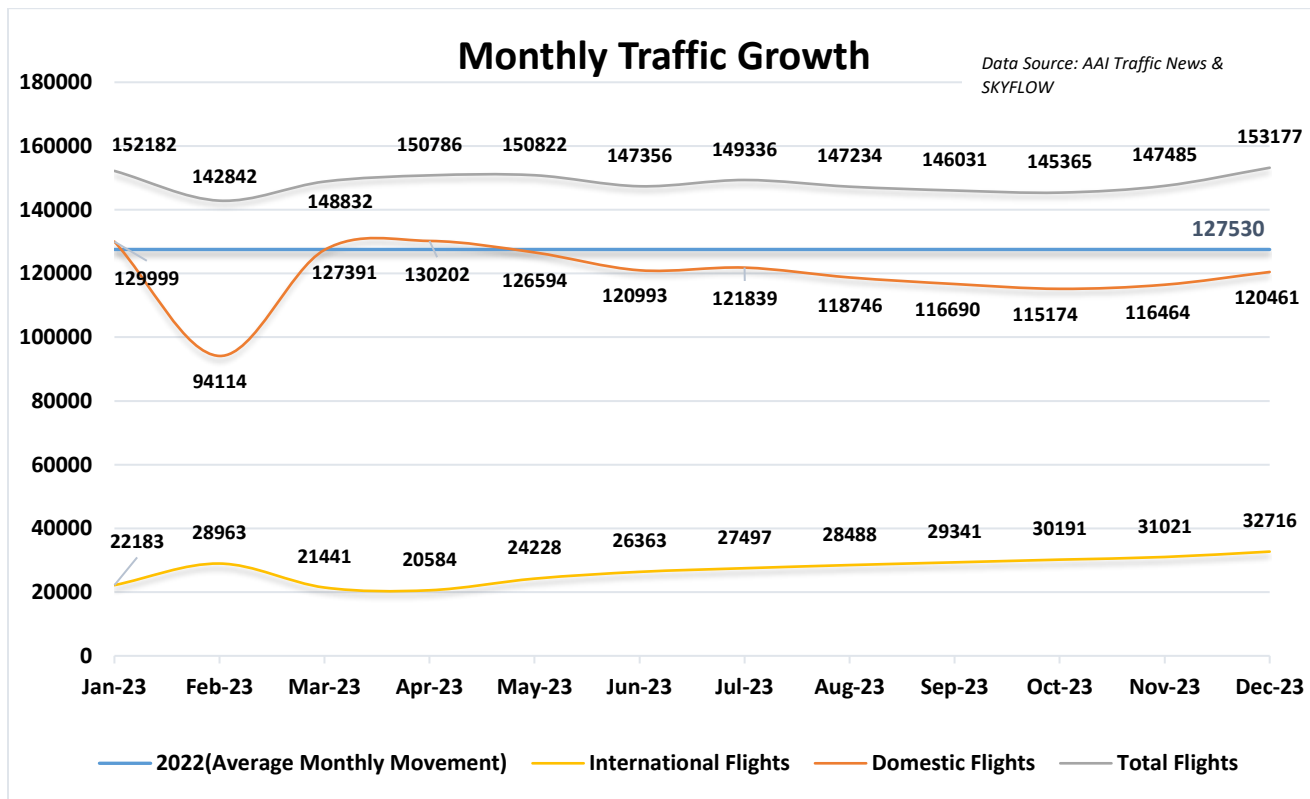


Figure 1: Monthly Traffic evolution

The graph above depicts the IFR Domestic and international Air traffic landing and taking off in the Indian ATFCM Area for the year 2023.

The average monthly traffic grew by 16% for the year 2023 as compared to average monthly traffic in year 2022. Domestic IFR traffic witnessed a growth of 35% whereas international flights recorded an increase of 1.3 % this year as compared to 2022(data source SKYFLOW).



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

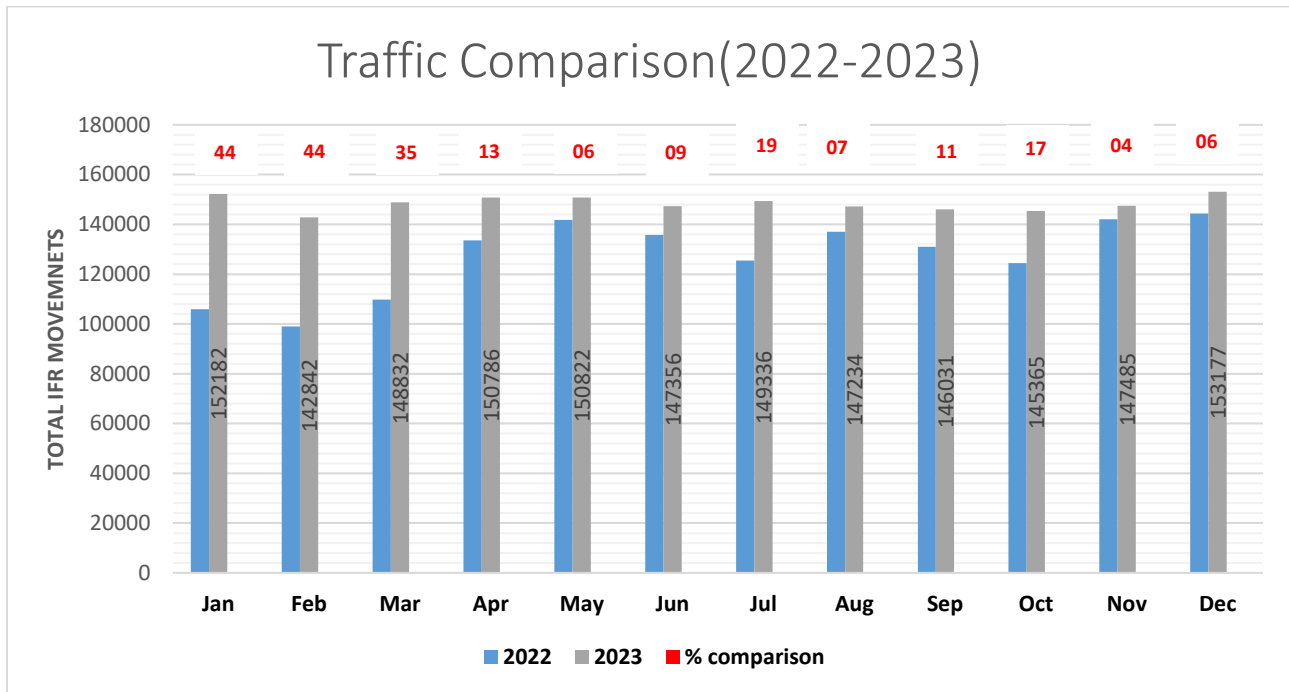


Figure 2: Traffic comparison 2022 vs 2023

Although the average monthly air traffic growth was observed to be 16% YOY, air traffic at Indian airports in January and February 2023 witnessed highest growth metric as compared to year 2022.

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 is plotted for the year 2019, 2020, 2021, 2022 & 2023.

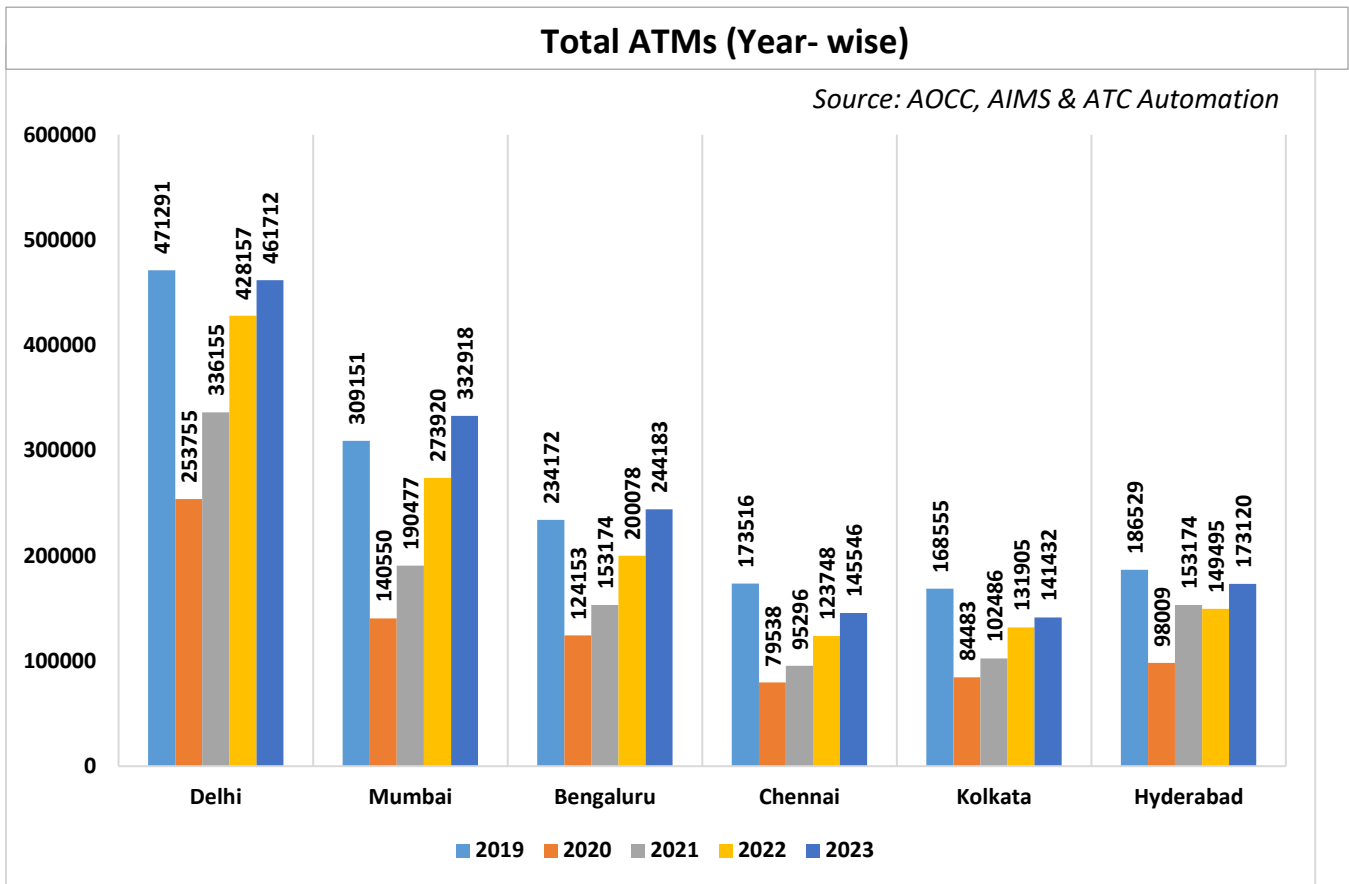


Figure 3: Percentage Traffic Variation (YoY)

Metro Airports namely Delhi, Mumbai, Bengaluru, Chennai, Kolkata and Hyderabad have witnessed a rise in Air Traffic movement in year 2023 of 7.3%,17.7%,18.1%,15%, 6.7% and 13.6% respectively as compared to the ATMs in the year 2022.



IV. Monthly Average Air Traffic Movement for Three major Airports

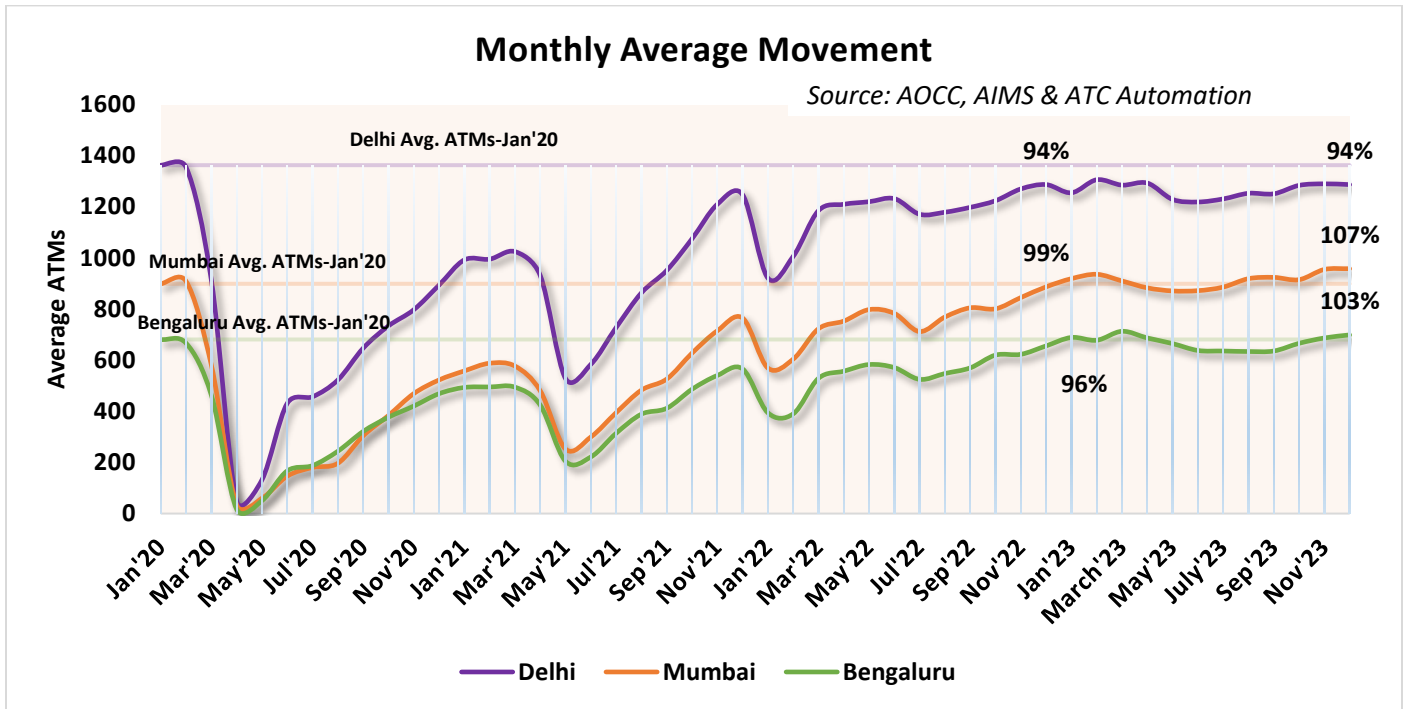


Figure 4: Monthly Average Air Traffic Movement For Three Major Airports

The above graph tracks the Monthly average Air Traffic Movements for three major Airports- Delhi, Mumbai and Bengaluru in India from January'20(Pre-covid-19) to December'23. The Average Monthly ATMs in Delhi stands at a deficit of 6 percent whereas Mumbai and Bengaluru stands at an increment of 7 and 3 percent respectively as compared to the Average Monthly ATMs recorded in January 2020 for the same Airports.



V. Top city pairs

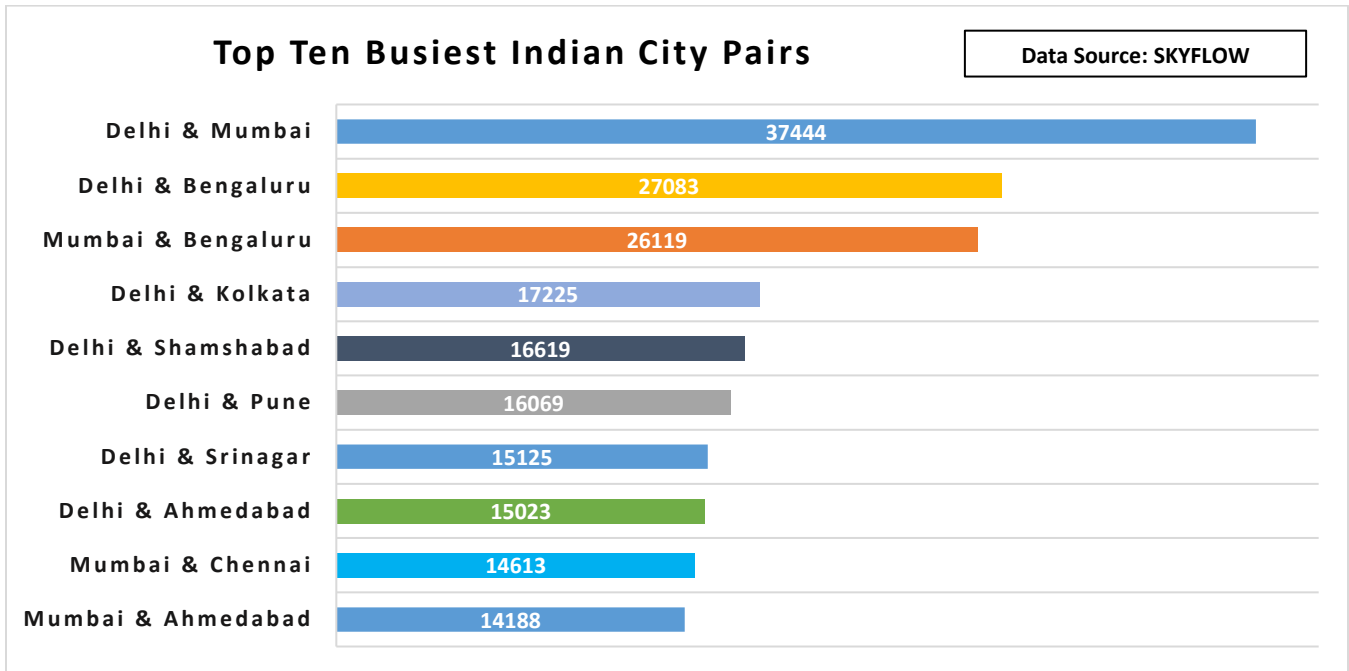


Figure 5: Busiest Domestic City Pairs

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

Delhi and Mumbai are the busiest major to major city pair with total 37444 flights for the year whereas, Delhi and Pune are the busiest major to non major city pair with 16069 flights operating to/from these airport

vi. International Traffic to/from India

As per the data collected in the SKYFLOW system, the international traffic to/from Indian Airports constitutes 21.4 % of the total traffic. The distribution of the same based on the station of origin/destination is graphically presented below:

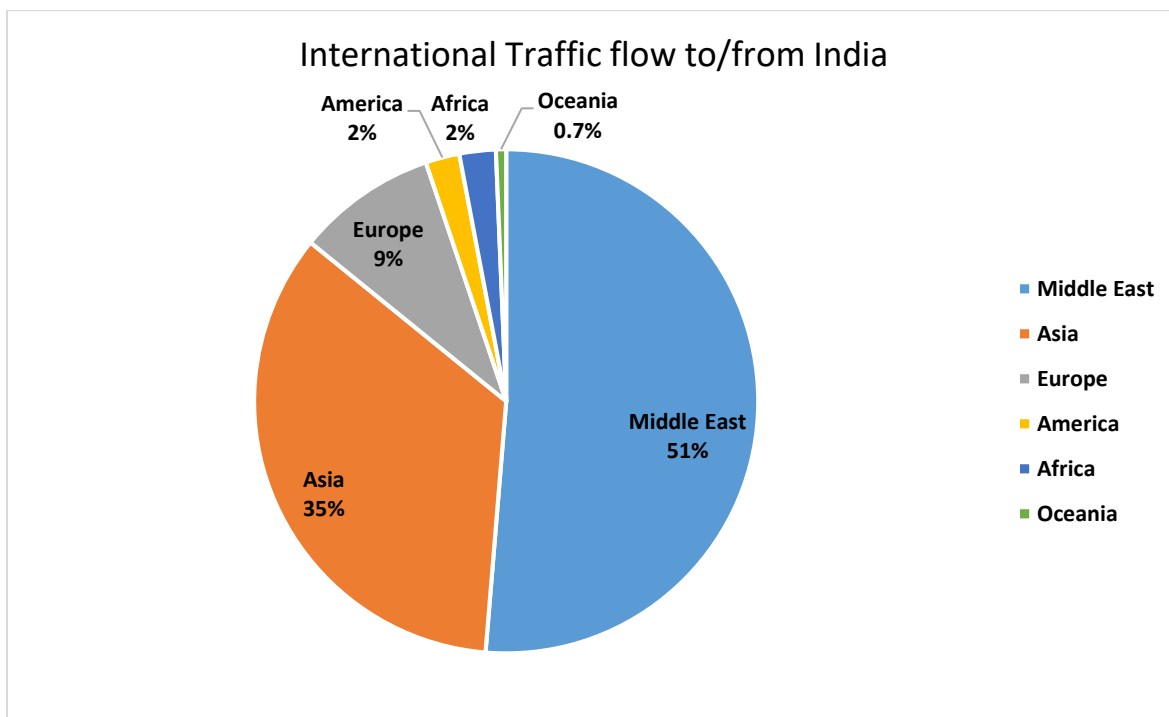


Figure 6: Internation Traffic distribution

As is evident from the above chart, maximum internation traffic to India is from middle east countries followed by air traffic from east Asia, mid Asia and south east Asia region.

Within the traffic flow to/from the middle east region, the top 10 city pairs based on the air traffic movements to/from in India include city pairs

Mumbai & Muscat, Mumbai & Jeddah, Chennai & Dubai, Delhi & Doha, Hyderabad & Dubai, Cochin & Abu Dhabi, Cochin & Dubai, Mumbai & Abu Dhabi, Delhi & Dubai and Mumbai & Dubai.

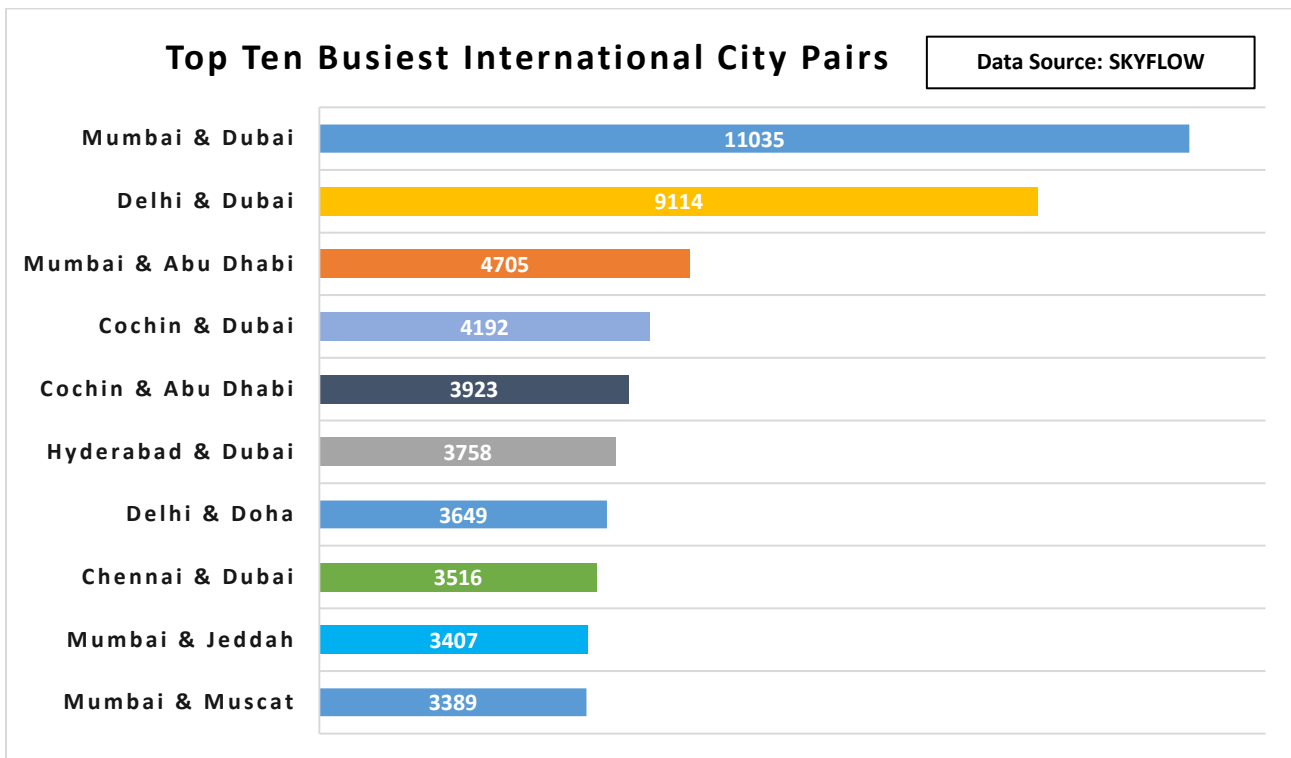


Figure 7: Top international busy city pairs

The above graph shows the ten busiest International city pairs in India (data source:SKYFLOW)

Dubai and Mumbai are the top most busiest city pair with a total of 11035 flights operating for the year 2023. Cochin and Dubai is the top most busiest major to non major international city pair with 4192 flights operating for the year 2023.



VII. Flight Operations – Airlinewise

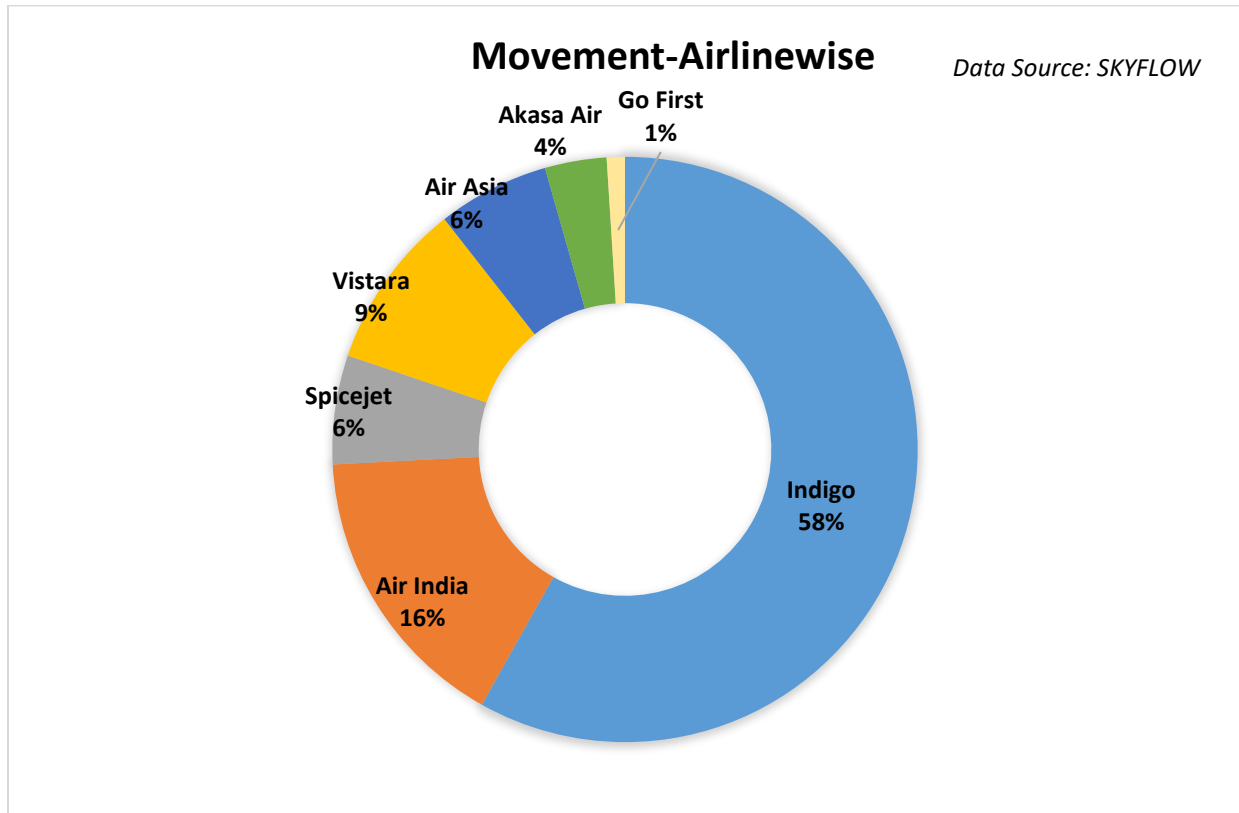


Figure 8: Flight Movements –Airlinewise

Indigo Airlines constitutes the maximum 58 % of the total scheduled aircraft movements for the Year 2023 followed by Air India at 16%, Vistara at 9%, Spicejet and Air Asia at 6 % each and Akasa Air at 4%.Go first Airline has a very small percentage of total movements captured as it ceased operations in May'23.



E. ATFM Post Operations – CDM Analysis

I. Introduction

Analysis Period 1stJanuary'23– 31stDecember'23

Back Ground During the above mentioned period, ATFM measures were applied **One Hundred sixty one(161)** times for **Delhi Airport**, **One Hundred twelve (112)** times for **Mumbai Airport**, **Fifty (50)** times for **Chennai airport**, **Twenty (20)** times for Bengaluru Airport and **Five(05)** times for **Pune Airport** due to the following reasons as illustrated in the bar chart below:-

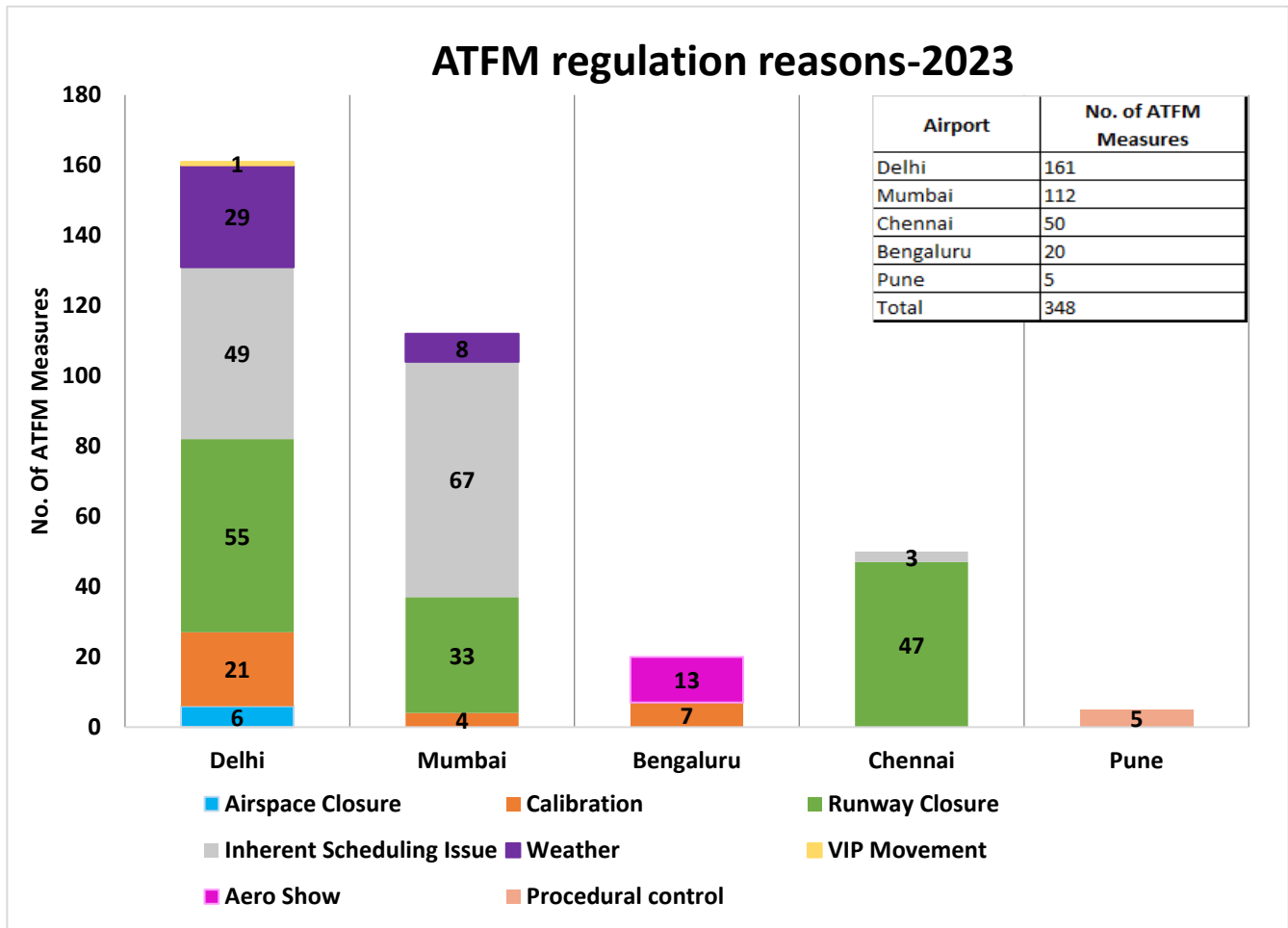


Figure 9: ATFM regulation Reasons-2023



II. ATFM Measures Overview

| | Delhi | Mumbai | Chennai | Bengaluru | Pune |
|---|-------|--------|---------|-----------|------|
| Number of ATFM measures applied | 161 | 112 | 50 | 20 | 5 |
| Average ATFM Ground delay due to measures | 20 | 16.4 | 19.7 | 13.6 | 11.7 |
| Maximum ATFM Ground delay due to measures | 109 | 85 | 47 | 56 | 48 |
| % Compliance | 75.8 | 78.1 | 84.5 | 81.3 | 80 |

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

| | |
|--|-------|
| Total affected flights in scenario (Domestic Arrivals) | 17572 |
| Total Domestic Arrivals with zero ATFM delay | 1891 |
| Total Domestic Arrivals with ATFM delay | 15681 |

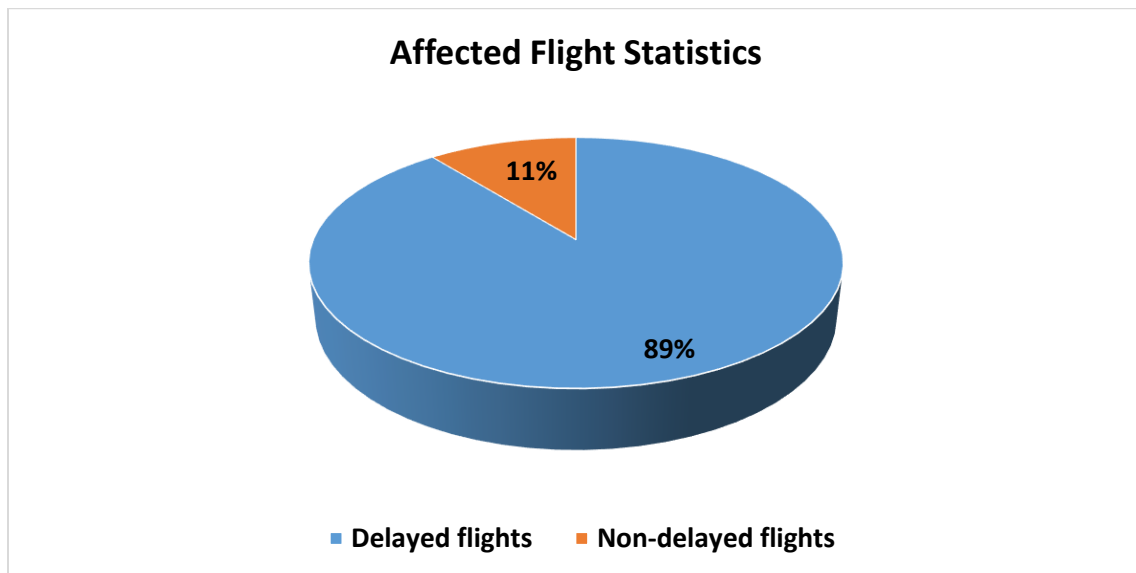


Figure 10: Affected Flight Statistics



III. Overall Compliance

| | |
|--|-------|
| Total Arrivals | 21495 |
| Domestic arrivals | 17572 |
| Flights with complete data (ATOT) | 17096 |
| Flights with incomplete data | 119 |
| Flights Not Operated | 357 |
| Compliant* | 13176 |
| Non-Compliant | 3920 |

Total No. of Revised CTOTs issued = 3851 (Compliance of flights which were issued revised CTOT is measured w.r.t. new CTOT issued)

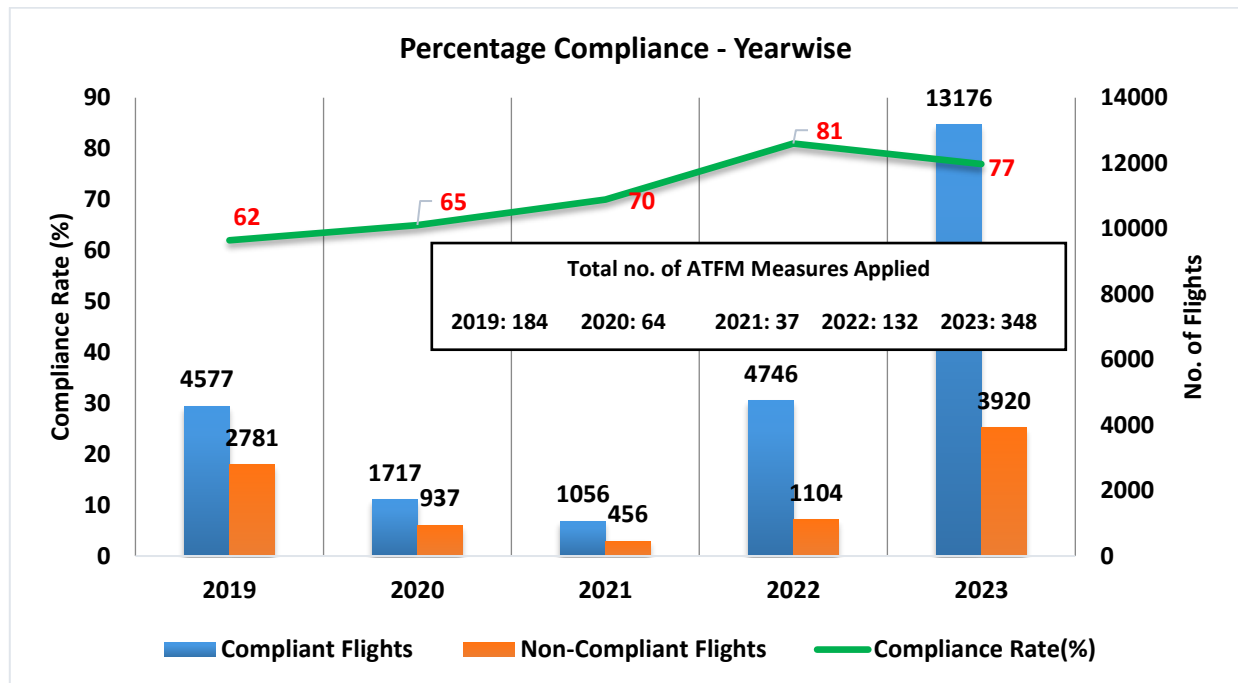


Figure 11: Overall Compliance

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

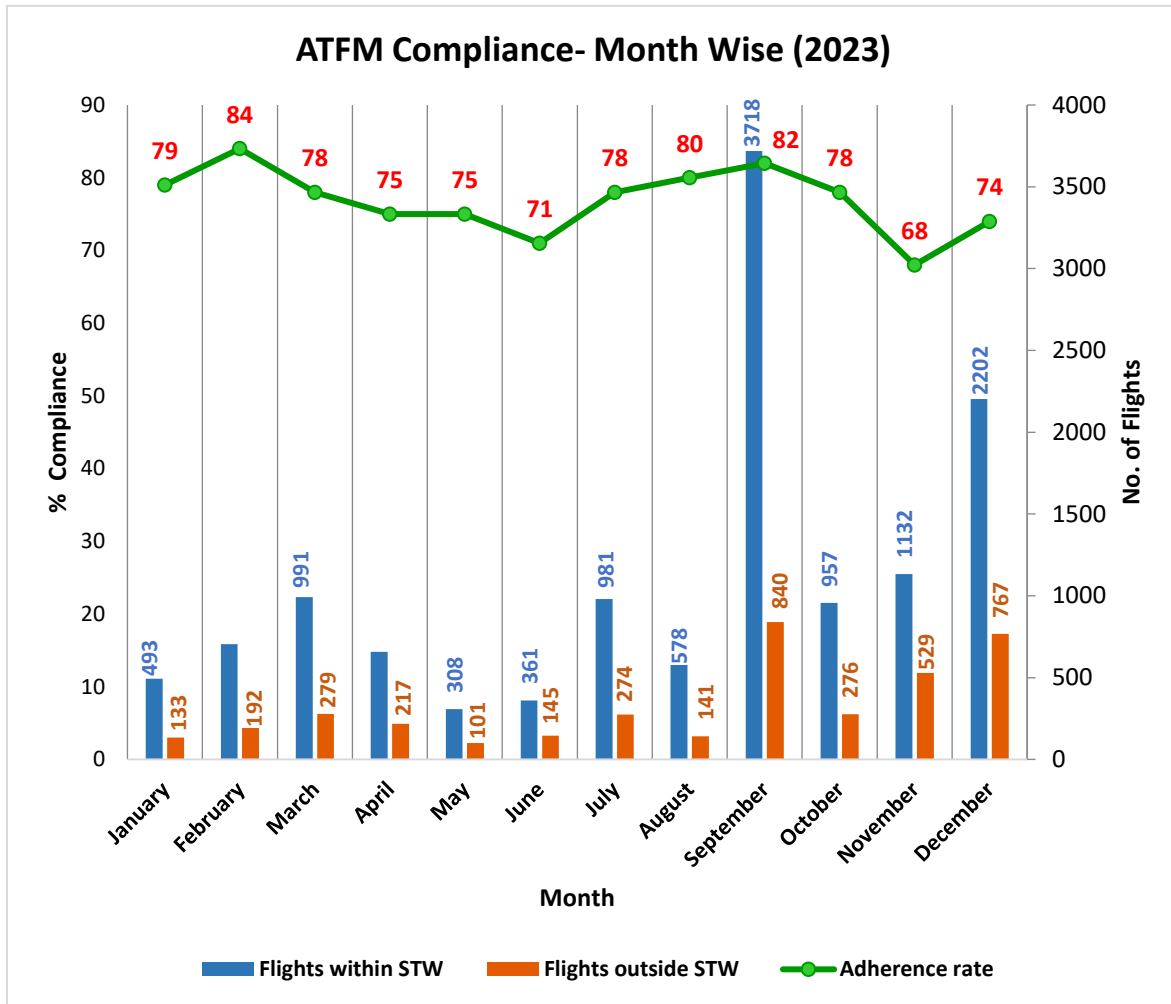




Figure 12: ATFM Compliance –Monthwise

Inference


1. Out of the total arrivals(21495) captured for the constrained Airports during the CDM period in the year 2023,82% of flights i.e. Domestic arrivals, are participating.
2. Out of these Domestic Arrivals(17572), 89% of arrivals(15681) are assigned ATFM ground delay & 11% of flights are without any ATFM ground delay.
3. For the year 2023, therefore,out of the total arrivals(21495) captured to the constrained Airports during the period when ATFM measures were in force, 73% of flights(15681) are assigned ATFM Ground Delay.




IV. CTOT Compliance rate –Airportwise

| MUMBAI FIR | 2022 (84%)* | 2023 (78%)*  |
|-------------|----------------|--|
| Ahmedabad | 85 | 85 |
| Aurangabad | 92 | 78 |
| Mumbai | 86 | 79 |
| Bhuj | - | 56 |
| Vadodara | 88 | 69 |
| Bhopal | 94 | 88 |
| Bhavnagar | 0 | 67 |
| Diu | 50 | 38 |
| Hirasar | - | 74 |
| Indore | 87 | 82 |
| Jabalpur | 80 | 81 |
| Jamnagar | 81 | 68 |
| Kandla | 78 | 67 |
| Kolhapur | 67 | 67 |
| Keshod | - | 67 |
| Mundra | - | 0 |
| Nagpur | 91 | 79 |
| Nasik | 0 | 71 |
| Pune | 73 | 68 |
| Porbandar | 100 | 50 |
| Rajkot | 84 | 87 |
| Shirdi | 67 | 82 |
| Surat | 86 | 77 |
| Udaipur | 86 | 81 |
| KOLKATA FIR | (84%)* | (78%)*  |
| Prayagraj | 78 | 70 |
| Agartala | 67 | 85 |
| Siliguri | 66 | 84 |
| Shillong | | 91 |
| Varanasi | 84 | 77 |



| | | |
|-----------------------------|---------------|---|
| Bhubaneswar | 95 | 82 |
| Bilaspur | 100 | 50 |
| Kolkata | 86 | 79 |
| Chakeri | 40 | 61 |
| Durgapur | 69 | 80 |
| Darbhanga | 89 | 62 |
| Hollongi | | 79 |
| Gorakhpur | 68 | 56 |
| Guwahati | 82 | 79 |
| Gaya | 83 | 88 |
| Imphal | 84 | 76 |
| Jharsuguda | 89 | 64 |
| Jagdapur | | 100 |
| Kushinagar | 0 | 79 |
| Raigarh | | 57 |
| Aizawl | 100 | 55 |
| Dibrugarh | 78 | 80 |
| Dimapur | 91 | 40 |
| Patna | 89 | 84 |
| Pakyong | 100 | 60 |
| Ranchi | 88 | 75 |
| Rourkela | | 100 |
| Raipur | 95 | 84 |
| Tezpur | | 50 |
| DELHI FIR | (54%)* | (69%)*  |
| Agra | 50 | 35 |
| Ambala | | 0 |
| Amritsar | 79 | 66 |
| Awantipur Air Force Station | | 50 |
| Adampur | 0 | 67 |
| Bikaner | 25 | 54 |
| Bhuntar | 67 | 0 |
| Beas | | 0 |
| Bathinda | 0 | 0 |



| | | |
|---------------------------|---------------|---|
| Bareilly | 30 | 53 |
| Chandigarh | 56 | 68 |
| Dehradun | 81 | 77 |
| Delhi | 76 | 75 |
| Hindon | 0 | 20 |
| Kangra | 100 | 77 |
| Gwalior | 63 | 62 |
| Hisar | - | 0 |
| Halwara Air Force Station | 0 | 29 |
| Jodhpur | 61 | 70 |
| Jaipur | 85 | 74 |
| Jaisalmer | 50 | 48 |
| Jammu | 66 | 69 |
| Ajmer | 0 | 50 |
| Ludhiana | - | 100 |
| Leh | 66 | 61 |
| Lucknow | 82 | 80 |
| Pathankot | 100 | 0 |
| Suratgarh | | 33 |
| Shimla | 86 | 73 |
| Sarsawa Air Force Station | | 0 |
| Srinagar | 66 | 57 |
| Sirsa | 100 | 67 |
| Uttarlai | | 25 |
| Udhampur | | 0 |
| CHENNAI FIR | (83%)* | (81%)*  |
| Hal Bangalore | 50 | 56 |
| Bangalore | 90 | 83 |
| Belgaum | 100 | 65 |
| Bidar | - | 33 |
| Vijayawada | 83 | 75 |
| Coimbatore | 84 | 93 |
| Kochi | 89 | 89 |
| Calicut | 57 | 89 |



| | | |
|---------------------|-----|-----|
| Kadapa | 100 | 50 |
| MOPA Goa | - | 69 |
| Gulbarga | - | 88 |
| Goa | 63 | 63 |
| Hubli | 60 | 88 |
| Hakimpet, Hyderabad | 100 | 50 |
| Hyderabad | 87 | 84 |
| Begumpet Hyderabad | 67 | 80 |
| Vijaynagar | 67 | 67 |
| Kannur | 40 | 83 |
| Kurnool | 100 | 91 |
| Madurai | 79 | 87 |
| Mangalore | 87 | 74 |
| Chennai | 87 | 85 |
| Mysore | 0 | 50 |
| Nanded | - | 55 |
| Port Blair | 100 | 61 |
| Pondicherry | - | 0 |
| Rajahmundry | 100 | 100 |
| Salem | - | 33 |
| Sindhudurg | 50 | 46 |
| Tuticorin | 50 | 96 |
| Tirupati | 100 | 86 |
| Tiruchirappally | 100 | 59 |
| Thiruvananthapuram | 91 | 90 |
| Visakhapatnam | 80 | 71 |

**FIR wise compliance rate.*

V. Reason For Non-Compliance (2023)

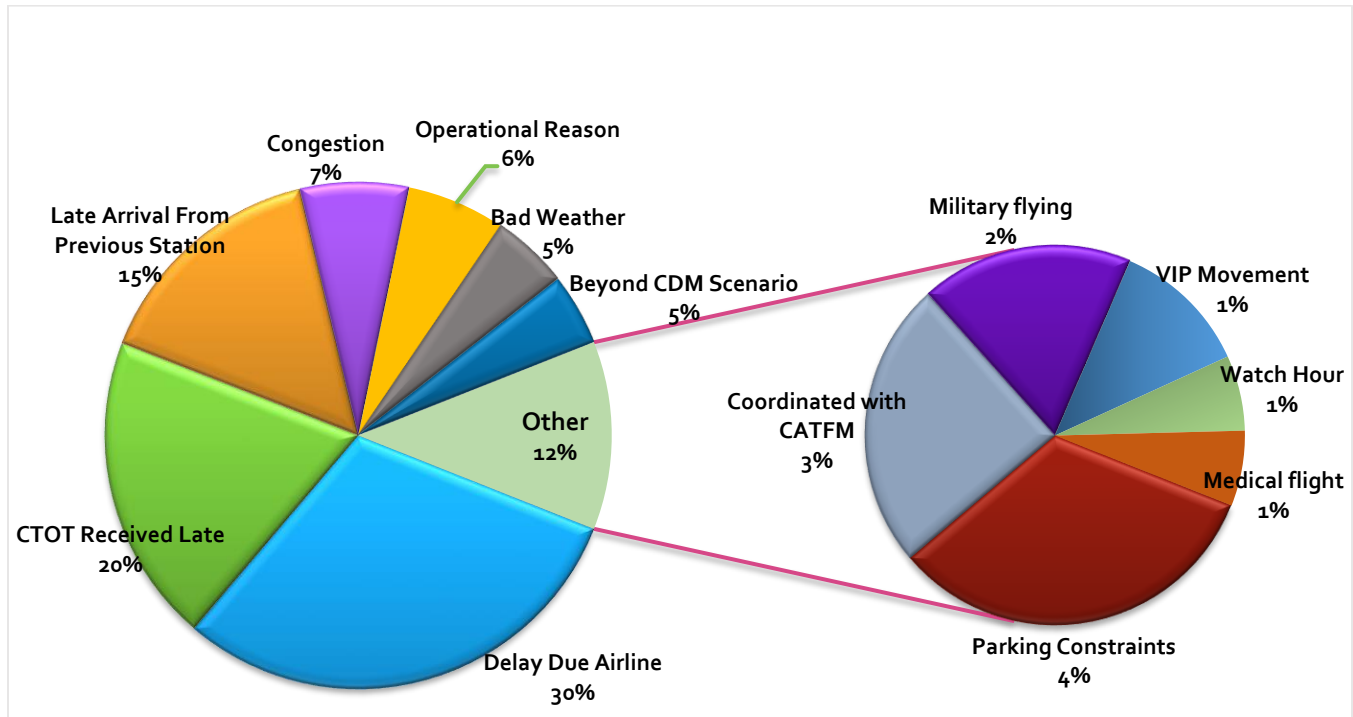


Figure 13: Reason for Non-Compliance

Inference:

1. 30 % of CTOT Non- Compliance was reported by concerned FMPs to be due to delay by Airlines. Updated EOBT was timely not available with ATC unit.
2. 20% 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. 15 % of the CTOT Non- compliance was reported to be due to late arrival of the aircraft from the previous station. Updated EOBTs of such flights was not available to ATFM unit leading to wastage of unused slots.
4. 12% of CTOT Non-compliance is attributed to parking constraints, military flying, watch hour restrictions and VVIP movements.
5. 7 % of CTOT Non- Compliance was reported by concerned FMPs to be due to congestion at airport of departure.



CCC has already identified issues with the delay in dissemination of CTOT and working on improving the information flow. This remedial action would address the 20 percent of the non-compliance experienced this year.

We have also conducted several meetings with Airlines and stressed on the importance of timely sharing of ATS messages such as 'delay', 'cancel' and 'change' for correct demand projection.

VI. CTOT Compliance rate – Airlinewise

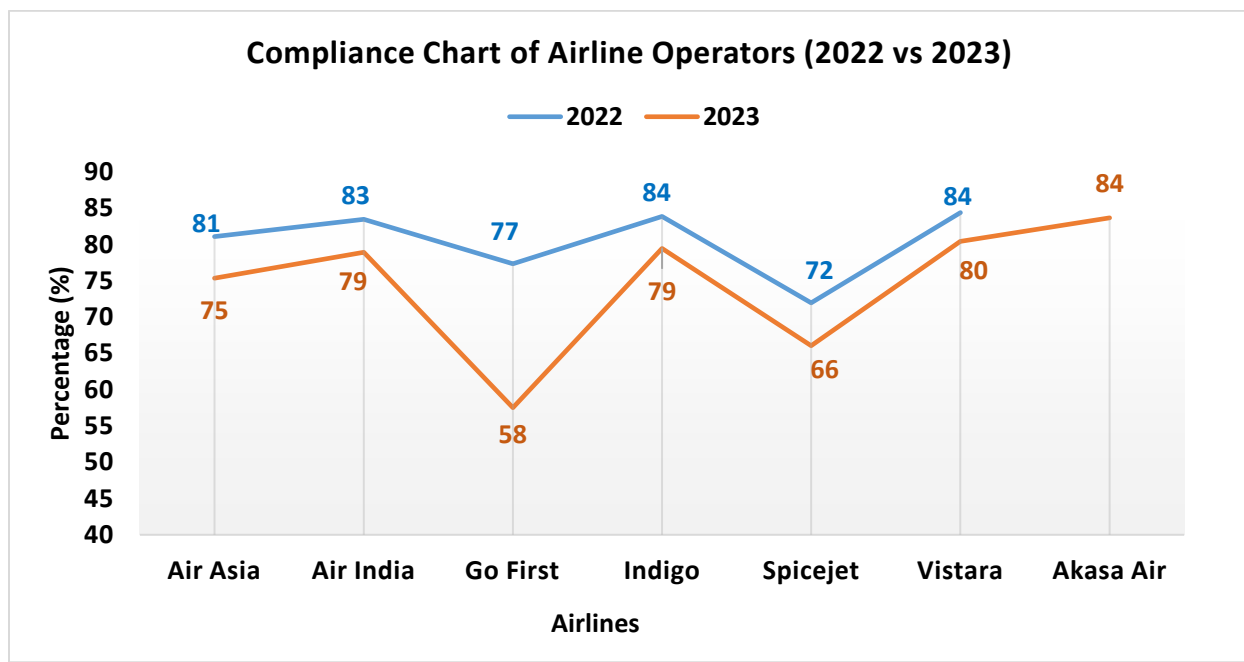


Figure 14: CTOT Compliance-Airlinewise

Inference

1. Out of the total domestic arrivals with complete data in the CDM scenario, 75% arrivals are compliant.
2. For the year 2023 Chennai region has the highest compliance rate of 81% where as Delhi region has the lowest compliance rate of 69%.
3. Air India, Indigo, Vistara and Akasa Air Airlines have a compliance rate above the average recorded 77% compliance for the year.

VII. Air Delay during the CDM Scenario period

In the year 2023, the Average Air Delay to domestic arrivals* during the period when ATFM measures were in force for Delhi, Mumbai, Chennai, Bengaluru and Pune are 12 min, 10.3 min, 10.1 min, 4.7 min and 7.4 min respectively.

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

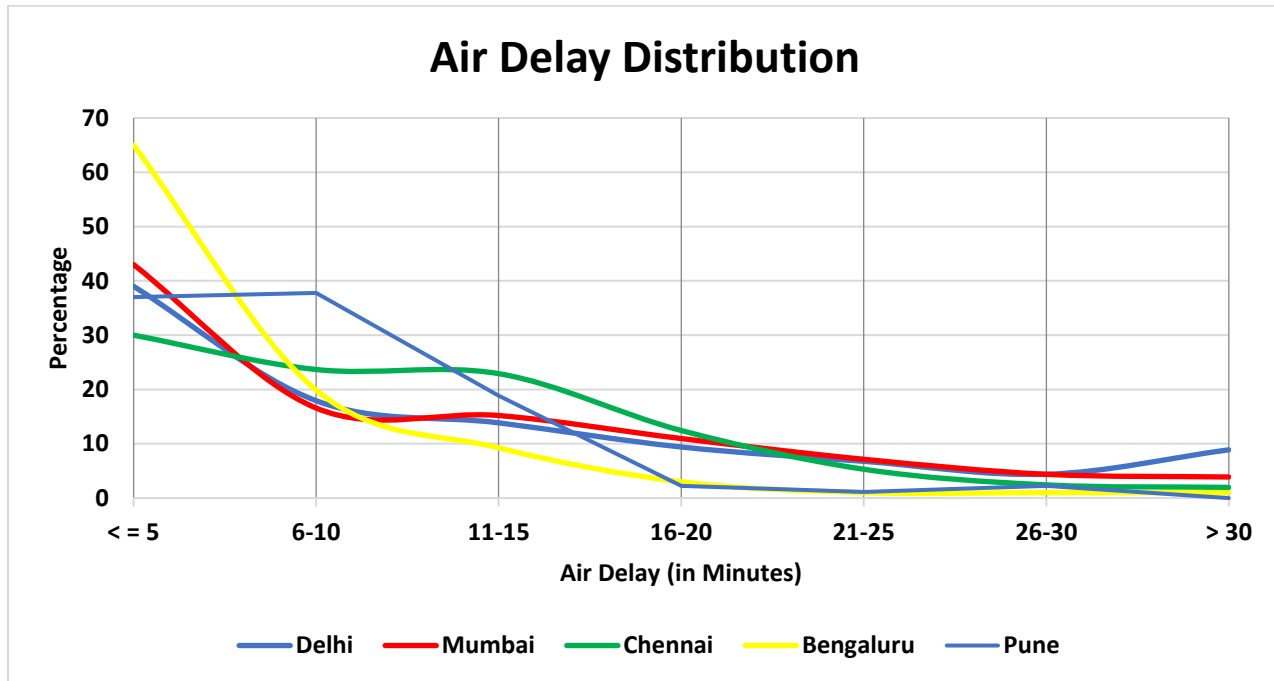


Figure 15: Air Delay during CDM Period

Inference

- i. 71% of arriving flights to Delhi had an Air delay equal to or less than 15 minutes during the CDM period.
- ii. 75% of arriving flights to Mumbai had an Air delay equal to or less than 15 minutes during the CDM period.
- iii. 77% of arriving flights to Chennai had an Air delay equal to or less than 15 minutes during the CDM period.
- iv. 94% of arriving flights to Bengaluru had an Air delay equal to or less than 15 minutes during the CDM period.
- v. 94% of arriving flights to Pune had an Air delay equal to or less than 15 minutes during the CDM period.



VIII. 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 2023.

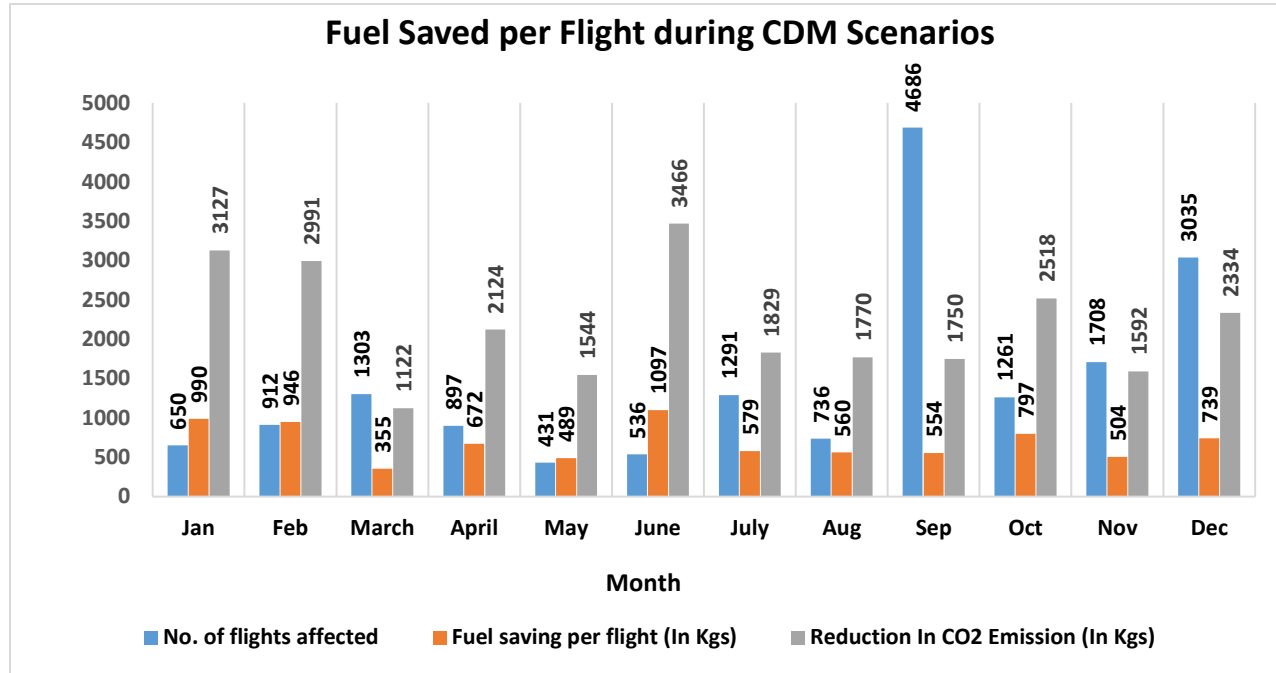


Figure 16: Fuel Savings & CO₂ Emissions reduction

Inference

- i. June 2023 recorded the maximum Fuel savings per flight of 1097 Kg and maximum reduction in emissions of 3466 Kg of CO₂ per flight



IX. Tangible benefits of ATFM measures applied(2023)

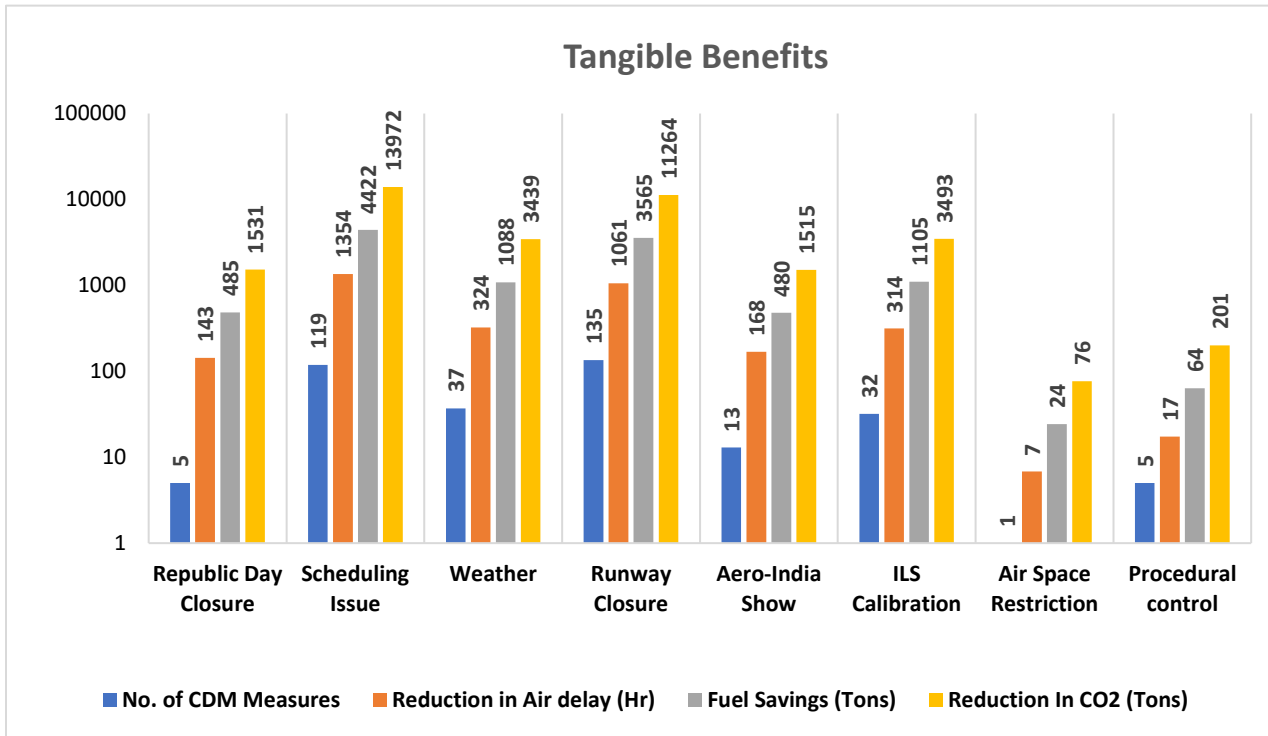


Figure 17: Tangible benefits(2023)

ATFM Ground delay measures were applied on 348 occasions to ease out congestion at Delhi, Mumbai, Bengaluru, Chennai and Pune Airports this year. This resulted in fuel savings of 11231.55 tonnes amounting to the reduction in CO2 emissions of approximately 35491.647 tonnes.



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> |



Annexure A- Flight Plan Analysis (1st July'23 to 31st Dec'23)

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 from 1st December 2023 to 31st December 2023. 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.

Total **568069** correct Flight plans were received by SKYFLOW system and analyzed

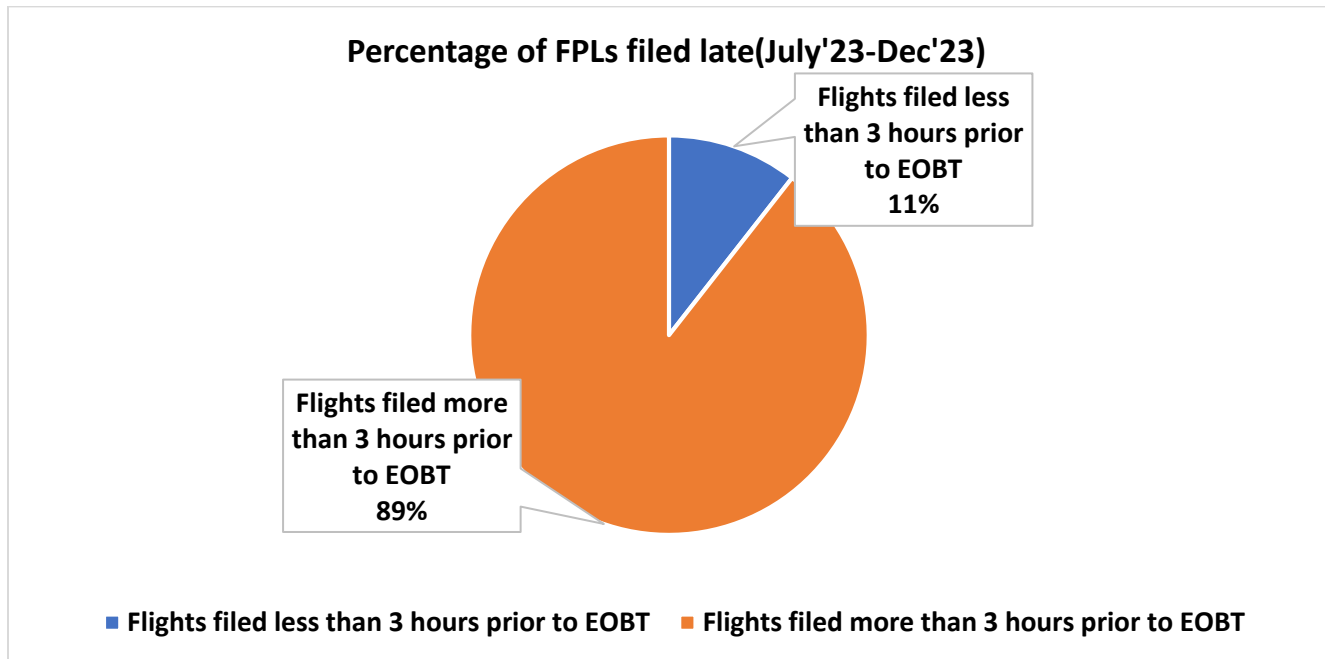


Figure 18:Percentage of flight filling FPL within 3 Hrs of EOBT

Major Domestic Airlines Wise Analysis

| Airlines | Number of Flight plans filed less than 3 Hours prior to EOBT | Total no. of filed Flight Plans | Percentage |
|--------------|--|---------------------------------|--------------|
| Air India | 5677 | 86432 | 6.6% |
| Akasa Air | 5235 | 23665 | 22.1% |
| Bluedart | 389 | 3431 | 11.3% |
| Air Asia | 601 | 34678 | 1.7% |
| Indigo | 42182 | 357571 | 11.8% |
| Alliance Air | 1243 | 20963 | 5.9% |
| Star Air | 193 | 4998 | 3.9% |
| Spicejet | 4543 | 36331 | 12.5% |
| Vistara | 4786 | 53999 | 8.9% |
| TOTAL | 60063 | 568069 | 10.6% |

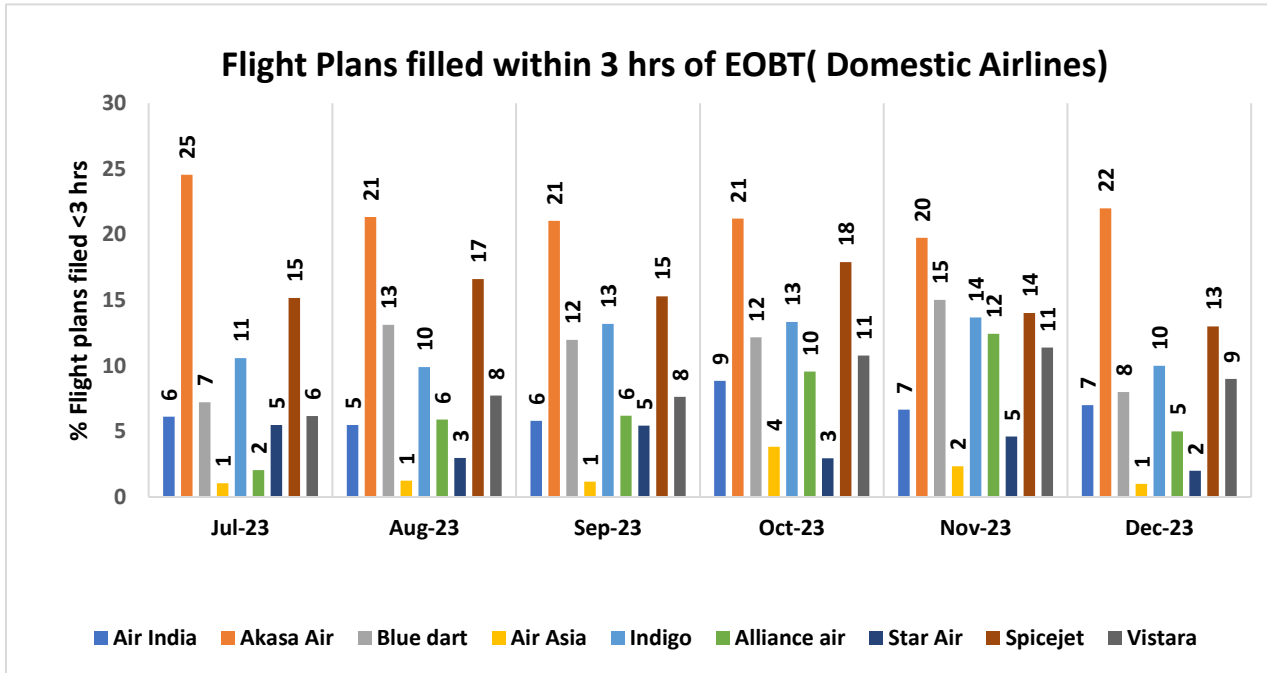


Figure 19:Percentage of late flight plan filling -Airlines wise

Inference:

- i. Percentage of late filing of flight plan has been consistently less for Air India, Air Asia and Star Air whereas Akasa Air 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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