
# Beyond Indigo: A Fragile Aviation Ecosystem

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# I. Introduction

- The Indian airline industry has emerged as the world’s third-largest home market with over 840 operating aircraft and a total of over 350 million passengers per annum, attributable to the V-shaped recovery of air travel as well as the expansion of IndiGo and Air India Group aircraft fleets.
- However, this growth has not been accompanied by a commensurate investment in pilots, training, regulation, and maintenance infrastructure. The Directorate General of Civil Aviation (DGCA), the aviation regulator, is functioning with close to 50% vacancies in the sanctioned technical posts, at a time when the number of aircraft and passenger traffic is expanding rapidly. This has led to a kind of 'growth-induced vulnerability', where the system is highly optimized for heavy use of aircraft and dense operational schedules, but is not equipped with safeguards or buffers that would help it absorb any shocks.
- The December 2025 IndiGo disruption, when more than 5,000 flights were cancelled within two weeks, was not caused by weather or fuel shortages but by pilot shortages and duty-time violations following the implementation of new fatigue rules. This event did not create the crisis, it revealed it. And as is standard, standing to lose the most was the common man, both precious time and money.

# II. Market Structure and Systemic Risk

- DGCA domestic traffic data for 2024–25 shows that IndiGo consistently controls 63–65% of the domestic passenger market, while the Air India Group holds 27–28%, resulting in a combined market share of approximately 90%. This exceeds concentration thresholds typically associated with competitive resilience.
- Such concentration transforms IndiGo from a competitive firm into a systemically important operator, where its operational decisions directly influence national connectivity, fare stability, and service availability.
- Empirical evidence from disruption episodes indicates that cancellations by dominant carriers lead to aggregate output contraction, rather than redistribution of passengers to rival airlines. This is attributable to fleet saturation, crew shortages, and slot constraints faced by marginal carriers. A similar episode in the UK in August 2023 due to NATS air traffic control failure resulted in over 1,500 flight cancellations in just two days, leading to a national capacity contraction rather than passenger distribution.
- The resulting fare volatility and connectivity losses, particularly on regional and non-metro routes, suggest that market concentration has direct consumer welfare implications beyond traditional competition metrics.

- Sectors characterised by high fixed costs, capacity rigidity, and network effects are especially vulnerable to systemic risk when market concentration increases (aircraft acquisition and leasing, fuel, maintenance, crew costs - account for more than 60% of airline operating costs, unlike railways wherein state ownership and sunk infrastructure permit lower marginal costs and lower fares for comparable distances).
- Aviation industry exhibits low short-run substitutability, meaning disruptions cannot be rapidly absorbed by competitors. This is apparent in similar markets of Brazil and Indonesia wherein dominant carriers when faced with operational shocks are required to prioritise continuity over enforcement when occupying a quasi-infrastructural role in the economy.
- Competition economists distinguish firm-level failure from system-level failure, noting that in highly concentrated network markets, dominant firms assume quasi-infrastructural roles. Operational shocks at such firms propagate across the system, affecting prices, access, and service continuity rather than remaining internalised.
- If institutional capacity is insufficient to manage transitions, regulators face pressure to dilute standards, producing what may be termed a regulatory accommodation trap.

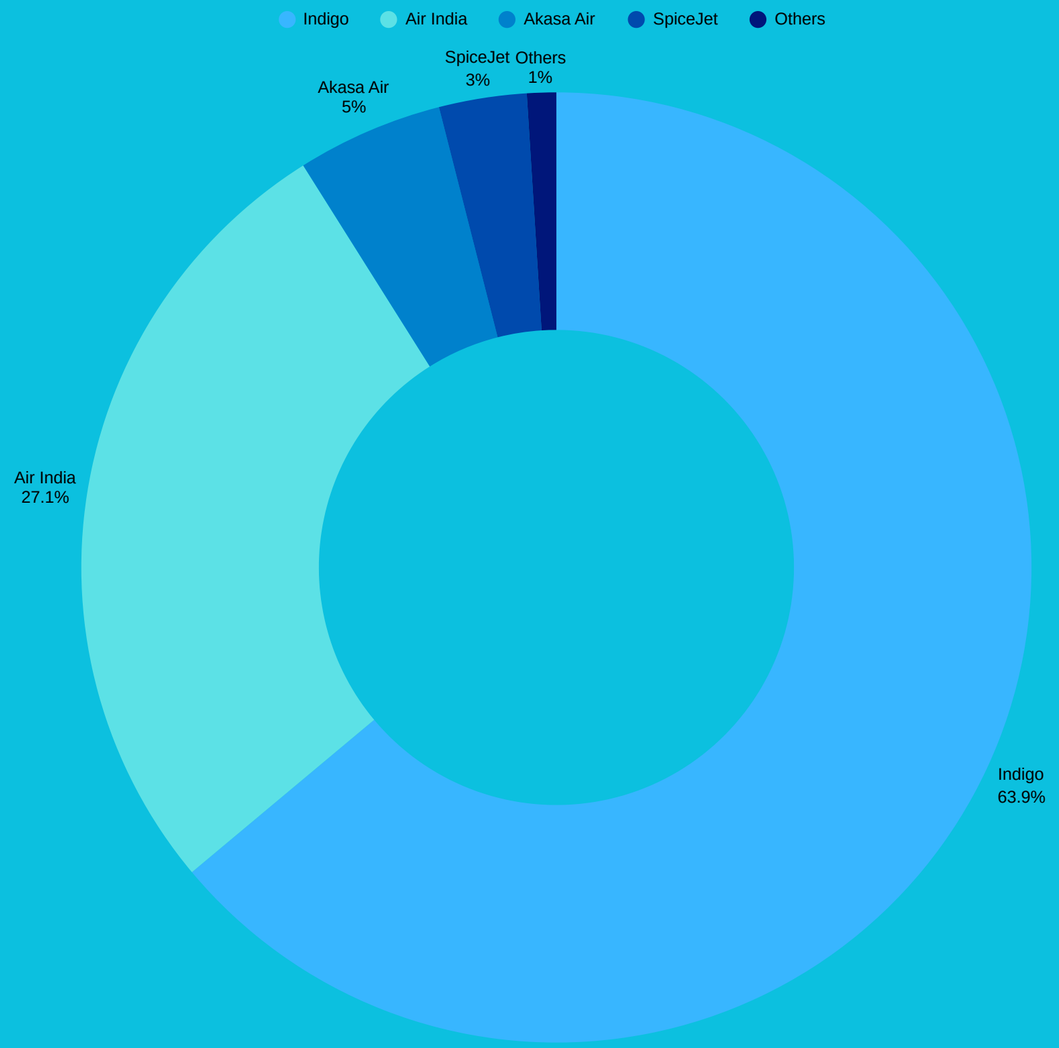



Figure 1: Domestic Market Share of Indian Airlines (2024–25)

Source: Statista, (Self Made)

# III. Labour and Pilot Supply Mismatch

- India’s aviation growth trajectory driven by accelerated fleet induction along with a strong passenger traffic growth that has surpassed global averages implies a structural increase in pilot demand. Parliament and Ministries have made disclosures which have projected a requirement of 7,000+ additional pilots between 2024–26 and 25,000–30,000 pilots over the next decade alone, driven by fleet induction and traffic growth.
- DGCA licensing data reveals that between 2020 and 2024, only 5,440 Commercial Pilot Licences (CPLs) were issued, with the annual issuance peaking at 1,622 in 2023. But this output is structurally insufficient when adjusted for attrition, medical disqualification, and type-rating delays.
- Industry operating norms indicate a requirement of 15–16 pilots per narrow-body aircraft under fatigue-mitigation regimes. Additionally, a rapid fleet expansion without proportional pilot growth has mechanically reduced pilot-to-aircraft ratios, consequently increasing scheduling rigidity.
- Structural constraints within the training ecosystem, amounting to limited instructor availability, simulator shortages, regulatory delays, and high training costs, have rendered pilot supply highly inelastic in the short and medium term.


Figure 2: CPL Issuance vs Estimated Pilot Requirement
Source: Business Standard, (Self Made)

- In 2019, it was projected that Indian airlines would need to hire 17,000 pilots over the next 10 years.
- So using this speculation, an approx. of 1700 additional pilots shall be required every year, this requirement further increased to around 2,300 per year during 2024-2026.

# Flight Duty Time Limitation (FDTL) Reforms and Capacity Stress

India’s aviation growth trajectory implies a significant increase in pilot demand. Parliamentary disclosures and ministerial statements project a requirement of 7,000+ additional pilots between 2024–26 and 25,000–30,000 pilots over the next decade, driven by fleet induction and traffic growth.

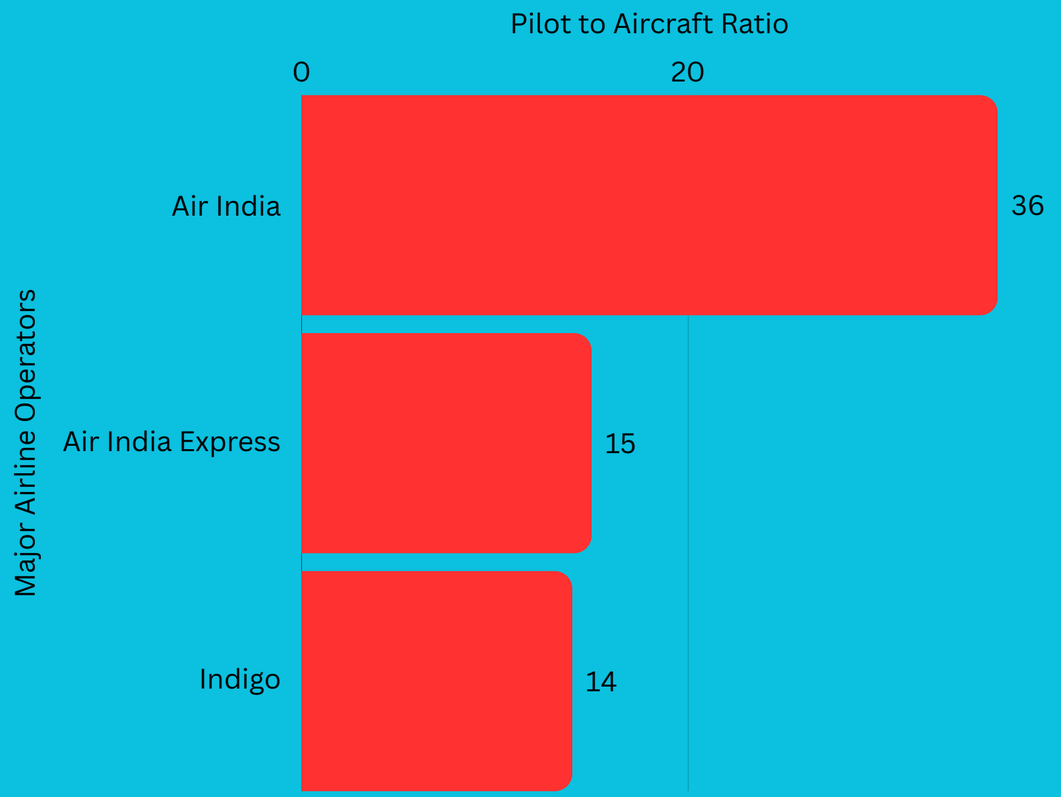



Figure 3: Pilot to Aircraft Ratio (Number of pilots per aircraft available)
Source: Statista, (Self Made)

# IV. Unintended Fragility

- During the periods of airline disruption, regulatory responses often prioritised the restoration of flight operations through exemptions and relaxations rather than strictly enforcing the revised safety norms. For instance, “night duty” was redefined from 0000-0600 hrs to 0000-0500 hrs, permissible night landings were increased from 2 to 6 and weekly rest requirements were relaxed.
- Institutional capacity constraints within the DGCA itself, particularly staffing shortages in licensing, safety oversight, and inspection divisions, have been deemed to limit the regulator’s ability to simultaneously enforce higher safety standards alongside managing large-scale capacity transitions. As of March 2025, DGCA was reported to have only approx. 829 staff against a required 1,630 i.e., over 50% of the posts were vacant.
- Repeated reliance on exemptions therefore is indicative of a shift from rule-based enforcement to discretionary crisis management, weakening the predictability and credibility of safety regulation.
- To offset domestic pilot shortages, airlines have increasingly relied on Foreign Aircrew Temporary Approval (FATA) licences. By early 2025, the DGCA had issued approximately 260+ such approvals.

- While expat pilots provide short-term operational relief, their limited scale and high costs prevent them from functioning as a structural solution. Dependence on foreign crew serves as an empirical indicator of domestic training pipeline failure.
- Continued reliance on expat pilots also increases regulatory dependence and complicates long-term workforce planning.
- India’s aviation disruptions arise from the interaction of:
  > Extreme market concentration,
  > Inelastic pilot supply,
  > Safety-driven regulatory tightening, and
  > Constrained regulatory capacity.
- These factors reinforce each other and often go hand-in-hand, converting predictable capacity constraints into recurrent systemic crises affecting connectivity (route determination), fares, and safety governance.
- From an analytical standpoint, Indian civil aviation exhibits characteristics of a capacity trap, where growth goals outpace institutional, labour, and regulatory capabilities.

# V. Crew Rostering, Fatigue & Operational Practices

- The new Flight Duty Time Limitation (FDTL) Phase-2 regulation introduced by India on 1st November cut night flights, increased rest time, and restricted overall fatigue to comply with international aviation safety norms.
- IndiGo started this transformation with a total of 5,038 pilots for a fleet of over 360 aircraft, with a pilots per aircraft ratio of 14 compared with a global norm of 18-20 per aircraft, leaving very few pilots available for training, complete mandated simulator check rides, and wait out delays.
- Post the new restrictions, it was no longer legal for IndiGo to man their schedule with aircraft, prompting more than 5,000 cancellation in December 2025, leaving about 500,000 people stranded. Notably, a healthy number of work hours a week is 40 hours. Here, the new guidelines mandated an extra 20 and yet were considered more agreeable than what was previously being followed.

| Maximum Cumulative Flight Time Limitations | Maximum Cumulative Duty Period |
|---|---|
| In 7 consecutive days | 60 hours |
| In 14 consecutive days | 100 hours |
| In 28 consecutive days | 190 hours |
| In 90 consecutive days | 600 hours |
| In 365 consecutive days | 1800 hours |

Source: Office of the Director General of Civil Aviation

Globally, airlines maintain 20–25% excess crew capacity to absorb operational shocks. International practice suggests that 5–10% of fleet size must be held as operational reserve to prevent cascading cancellations. For India's ~840-aircraft fleet, this implies 40–80 spare aircraft system-wide.

Indian carriers operate close to 100% utilisation, leaving almost no shock-absorption capacity. This means:

- One delayed aircraft can cause multiple crew duty violations
- One sick pilot can cancel several rotations
- One congested hub can destabilise an entire network
- In such a system, even routine winter fog or minor maintenance delays cascade into mass cancellations.

| City | Passengers (millions) | Runways | Saturation |
|---|---|---|---|
| Delhi | 109 yearly | 4 | Near Max |
| Mumbai | 55.5 yearly | 2 | Maxed |
| Bengaluru | 44 yearly | 2 | Near Max |
| Patna | 4 yearly | 1 | Constrained |
| Ranchi | 2.5 yearly | 1 | Under-served |

Source: Ministry of Civil Aviation, The Times of India, The Times of India (Self Made)

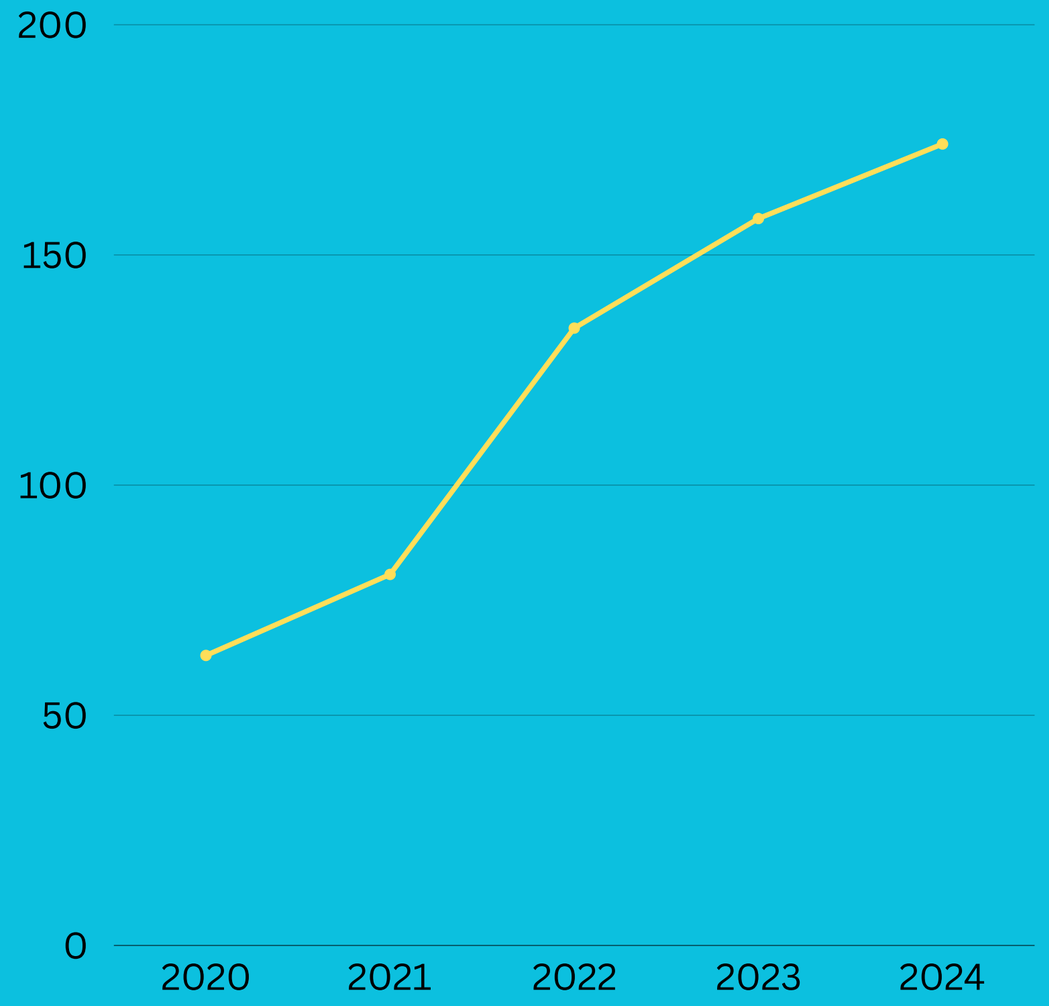
- Manpower in DGCA is overstretched: 1,630 sanctioned posts, only 829 occupied (serious shortage in technical manpower) and 801 vacant. It reduces regulatory flexibility at a time when airline operations and fleet sizes are increasing.
- There are limited DGCA-approved flight schools & simulates per projected demand for pilots in India, making training capacity a difficult constraint in terms of throughput.
- MRO and airport capacity are uneven: Bengaluru has had extensive MRO hang development, while Chennai and Delhi are still bottlenecked today with many heavy checks on wide-bodies outsourced offshore. Congestion in the hubs (Delhi/Mumbai/Bengaluru) drives crew scheduling disruptions.
- Market concentration amplifies systemic risk: IndiGo (~65% market share) and the Air India Group together dominate domestic traffic; when a dominant carrier faces roster stress, multiple routes lose service at once. On 500+ domestic sectors, a single carrier provides the only scheduled service — a structural connectivity risk.

| Metric | Value (2025) |
|---|---|
| % of routes with single operator (monopoly) | ~64.5% of routes are served by only one airline |
| % of routes where IndiGo is the sole operator | ~60.4% of all routes |
| % of routes where Air India Group is sole operator | ~3% of routes |
| % of routes where SpiceJet is sole operator | ~1.1% of routes |

Source: Business standard (Self Made)

# VI. Passenger Demand vs. System Capacity

- Due to disposable incomes, an ever-expanding middle class and improved regional connectivity, air travel has risen as a routine mode of commute in India.
- In 2024, India’s domestic air passenger traffic jumped 6.12%, to 16.1 crore passengers and by October 2025, the country recorded 1.42 crore passengers on a monthly basis with a passenger load factor of 84.7%, meaning that nearly 85% of available seats were always occupied.
- After the pandemic low of 62 and 80.6 million passengers respectively partaking in air travel in 2020 and 2021, the sector rebounded to a 174.1 million total passenger departures in 2024.




Number of origin-destination passengers in India through the years of 2020-2024

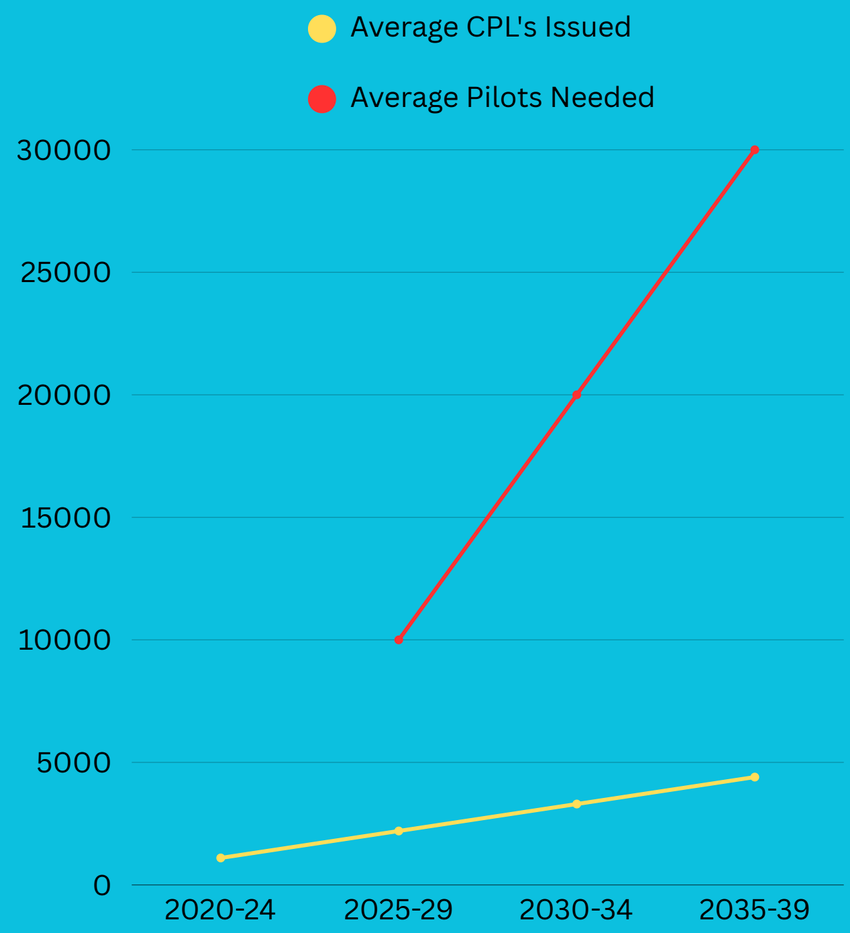
Sources:

1. The Economic Times
2. IATA

- India currently ranks as the 3rd largest air transport market globally, by 2024 accounting for 4.2% of the global air travel market.

- India’s rapidly growing middle class, projected to reach **715 million** by 2030 (47% of India’s population), combined with schemes such as UDAN aimed at making the aviation market more accessible, has led to an unprecedented increase in the customer-base for air travel in India.

- However, the civil aviation demand curve is vastly outpacing the capacity building curve, particularly in the realms of pilot training and crew availability. The Ministry of Civil Aviation has estimated the current need for trained pilots to be about 30,000 to 34,000 by 2035-40, while DGCA-approved flying schools issue a limited number of Commercial Pilot Licenses each year. From 2020 to 2024, only 5440 CPL’s were issued in totality, therefore averaging yearly CPL issuance at 1100 licenses.

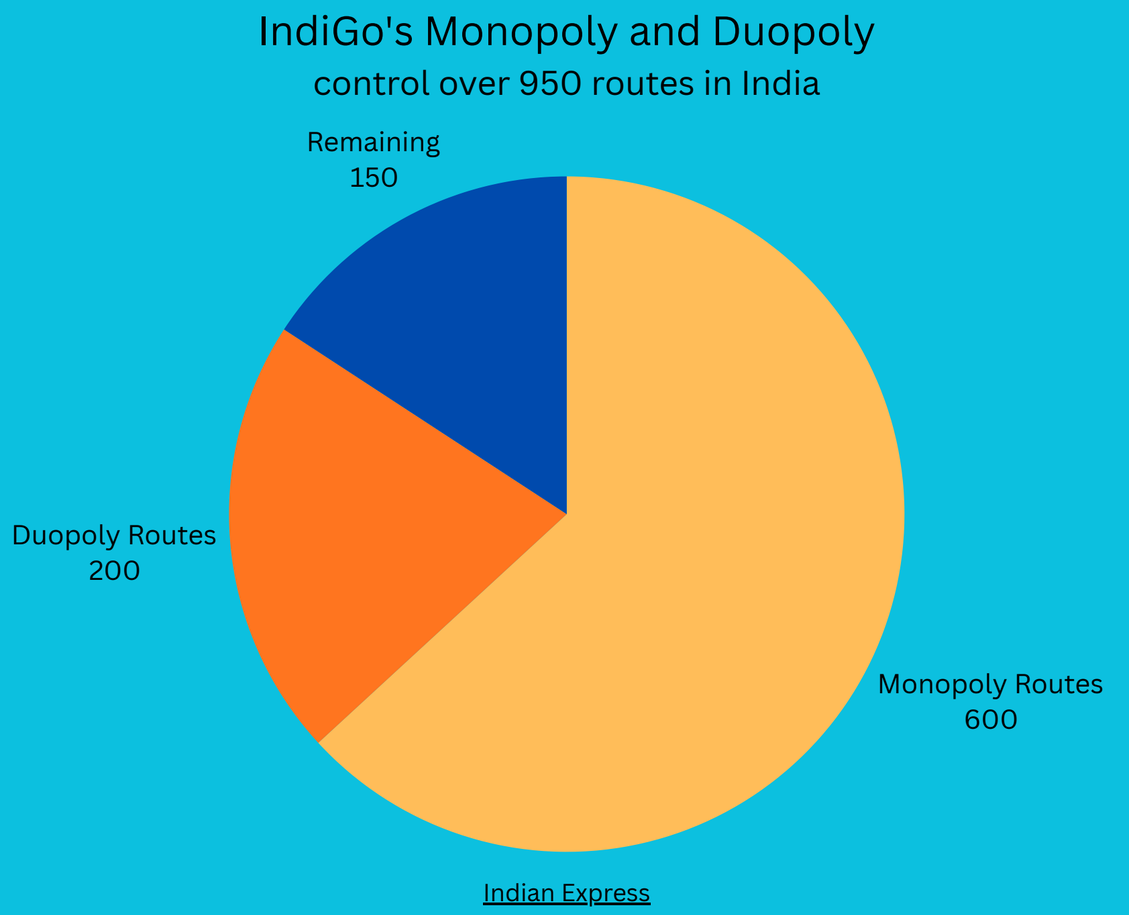



Comparison of the average number of CPL’s issued every four years (1100) with the average number of pilots needed (30,000 by 2040)

Sources:

- IATA
- Press Information Bureau
- Open Govt Data Platform India

- This divergence between demand and capacity has impacted the routes monopolised or near-monopolised by IndiGo – nearly 60-63% of all routes IndiGo operates on, through a rise in airfare and reduced alternatives at Tier-2 and Tier 3 cities.
- Through the UDAN scheme, 619 routes and 88 airports were operationalised by 2025. 102 new routes were launched, including 20 in the North-East region, with the aim of facilitating air travel for 1.5 crore passengers and extending to 4 crore in the next decade by adding 120 more destinations.
- However, Tier 2 and Tier 3 cities continue to only be served by one or two airlines with limited frequency. Any extreme operational issue faced by IndiGo, being the major aircraft carrier in India, will risk cancellation of the new routes; taking away air travel as an option for a substantial part of the population.

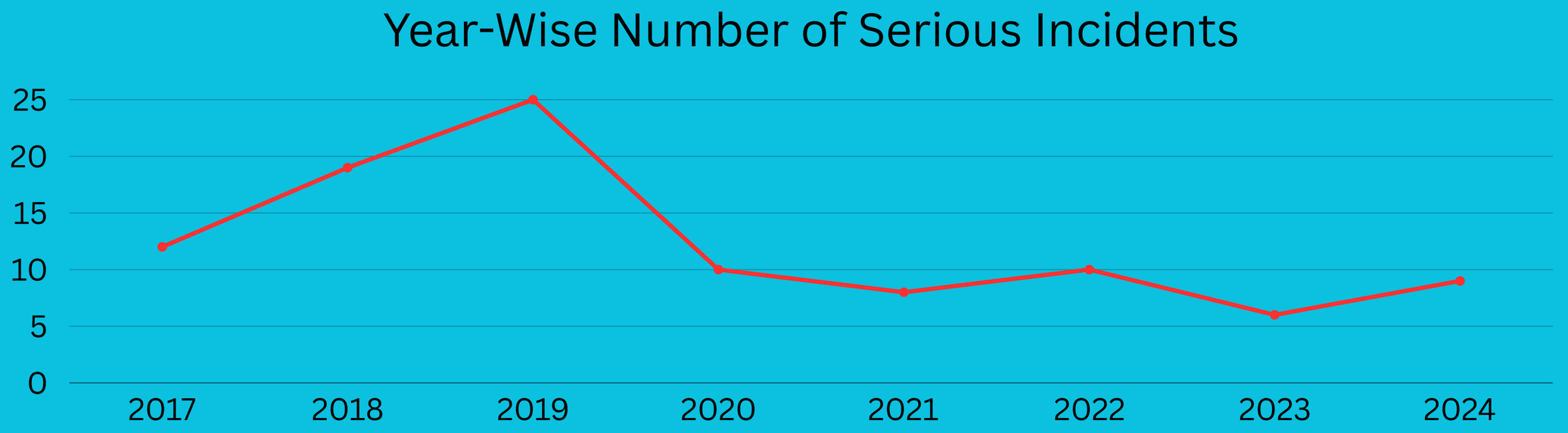



Sources:

1. Indian Express
2. Press Information Bureau

# VII. Incidents as Symptoms of Deeper Structural Issues

- The increasing number of delays and incidents such as increased technical checks are indicators of the aviation system operating beyond its safe design limits. In 2025 alone, Indian airlines reported 183 aircraft technical faults up to July 23, representing a 6% decline from 448 faults in 2023 but still signaling persistent operational pressure. The DGCA issued 19 safety violation notices to airlines in 2025 (through November), including breaches of Flight Duty Time Limitations (FDTL), unauthorized cockpit access, inadequate quality assurance audits, and aircraft operated with expired emergency equipment.




Directorate of Air Safety, DGCA

Sources:
1. The Telegraph
2. DGCA

- The Ahmedabad crash (Air India Flight 171, June 12, 2025) occurred when the Boeing 787-8 flight lost thrust in both engines a mere 32 seconds after takeoff. The crash killed all 241 people on board, making it the deadliest aviation disaster India had seen in decades.

- An investigation conducted by the Aircraft Accident Investigation Bureau confirmed that both engine fuel control switches had moved from RUN to CUTOFF three seconds after liftoff had occurred, thus depriving the engines of fuel.

- However, no cause for the switch movement was identified.

- The report submitted by the AAIB left questions about inspection backlogs, maintenance pressures, crew fatigue or procedural lapses that could have contributed to the eventual accident. After the crash, nine show-cause notices were issued to Air India by the DGCA.

- Even though such reasons cannot be proven to be attributed to the crash, structural issues like a shortage of crew, loopholes in regulations and infrastructure issues can plausibly increase the likelihood of similar accidents.

Source: Times of India

# VIII. Emerging Players

- In a move to encourage more airlines in the Indian aviation market, the Ministry of Civil Aviation granted No Objection Certificates (NOCs) to three regional airlines, namely Shankh Air, alhindair and FlyExpress in December 2025.

- All three airlines intend to focus on intraregional connectivity and servicing shorter overlooked routes. “alhindair” plans to service connectivity from the Kochi port and Shankh Air is looking to establish a base of operations at the upcoming Noida International Airport and build a connecting web across Uttar Pradesh, while FlyExpress plans to operate as a low-cost passenger and cargo carrier from Telangana.

- It is possible that emerging players can have a positive effect on the aviation market by working under schemes like UDAN, connecting Tier 2 and Tier 3 cities and appealing to the wider middle-class market, making air travel affordable for the average Indian citizen.

- The emergence of these new airlines combined with the fact that UDAN aspires to build fifty new airports in India over the next five years seems to project a future for positive growth in the aviation industry in India.

- However, the fragility of past regional airlines proves that it is necessary for schemes like UDAN to be implemented even more effectively in the future to ensure the survival of emerging players.

- Former regional airlines have failed to operate successfully in India (Paramount Airways, TruJet etc.) due to extreme price competition, limited demand on smaller routes and other factors such as infrastructural problems at regional airports.

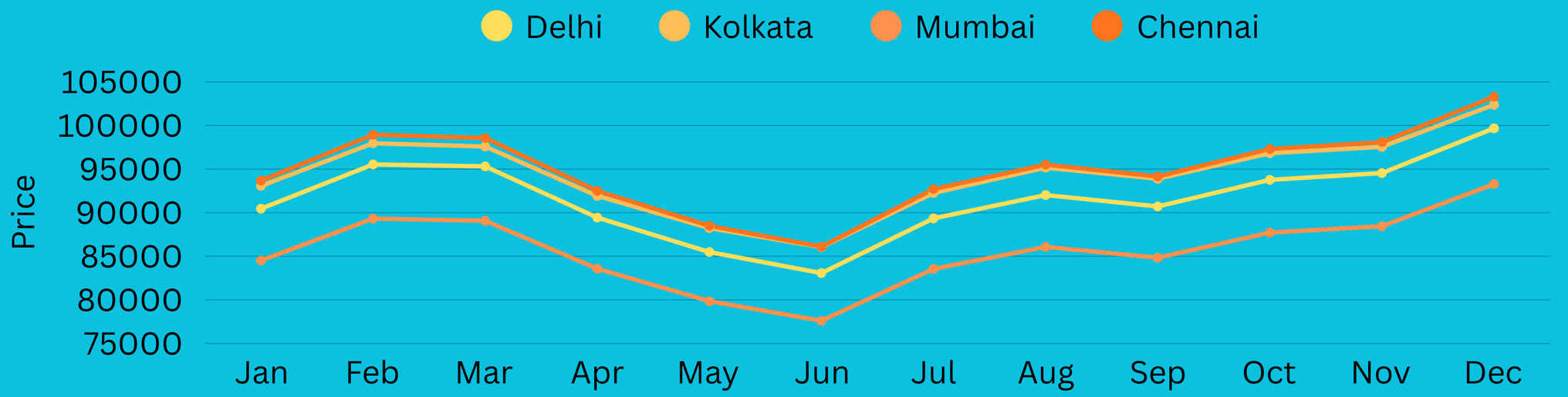
| Airline | Year of Collapse | Reason for Collapse |
|---|---|---|
| Paramount Airways | 2010 | Legal disputes, unpaid dues, financial mismanagement |
| Kingfisher Airlines | 2012 | Financial crisis due to overspending, inefficient fleet planning and high fuel prices |
| Jet Airways | 2019 | Competition from low-cost rivals |
| TruJet | 2022 | Financial strain combined with losses from pandemic |
| Go First | 2023 | Half the fleet grounded due to engine supply issues, leading to debt |
| Vistara | 2024 | Acquisition by Air India |

Source: NDTV

- The volatility of ATF (Aviation Turbine Fuel) prices is one of the major reasons other than price competition that emergent players in India's aviation market go into debt and eventually shut down.
- This volatility is due to the fact that the price of ATF is heavily dollar-linked; most of the crude oil used in India is imported and priced internationally in dollars. This, combined with the value of the rupee falling against the dollar gives a bleak future to regional airlines where failure due to unattainable profit goals is a real possibility.
- The only way to positively ensure survival of the new airlines is to actively push them along with schemes such as UDAN and create a new incentive to the general public to move away from the pre-existing duopoly.

## ATF Prices Across Major Cities

Source: Indian Oil



# IX. Conclusion

- The crisis in India's aviation is one that has been brought upon itself by structural imbalance. Aircraft and passenger volumes have grown much quicker than the structures that make flying safe like dependable-pilots, training pipelines, regulators, and upkeep capacity. The December 2025 disruption at IndiGo showed how a system aligned with utilisation, rather than robustness, cannot take even regular shocks when regulations become binding.
- The dominance of the two carriers has amplified this fragility. When IndiGo or the Air India Group experiences operational stress, entire regions lose connectivity because a majority of domestic routes are served by only one operator. In such a market, airline-level failures are transmitted directly into national transport breakdowns, converting what should be local disruptions into crises. Market concentration is a safety risk, not just a competition issue.
- A sustainable and effective aviation policy, thus, cannot limit itself to isolated safety provisions and needs to address the entire ecosystem. Even fatigue limits, training, and maintenance provisions can be effective only if there is sufficient air force personnel, spare aircraft, and even a regional aviation force available to support these provisions. Otherwise, the growth in India's aviation sector will continue to be a source of unconnectivity, and not connectivity.

# Policy Directions

- Make FDTL enforceable through capacity: Mandate 18 pilots per aircraft and 20–25% standby crew buffers to absorb leave, training and disruptions; link schedule approvals to staffing adequacy to avoid repeated DGCA relaxations.
- Scale pilot training and licensing: Expand DGCA-approved flight schools from <40 to ~80 within five years and raise annual CPL issuance to 3,000+, supported by subsidised simulators and instructor capacity.
- Strengthen regulatory oversight: Fill ~800 vacant DGCA technical posts and establish a dedicated fatigue and roster audit unit to monitor compliance proactively.
- Reduce duopoly concentration risk: Introduce route-level competition review for monopoly routes, apply temporary fare caps where single-operator dominance persists, and reform slot and ownership norms to ease entry.
- Build operational slack: Require 5–10% spare aircraft capacity (≈40–80 aircraft system-wide) and accelerate airport and MRO expansion in high-demand Tier-2/3 regions.
- Support regional and new entrants: Lower capital thresholds and provide concessional aircraft financing for UDAN-linked carriers (e.g., ShankhAir, Alhind Air, FlyExpress) to stabilise connectivity and dilute duopoly risk.

# Thank You

For inputs, comments or clarifications please contact The Centre for New Economics Studies at cnes@jgu.edu.in