# Aircraft Risk Analysis for New Aviation Business

Data Science – Phase 1 Project

26/07/2025

# Business context

- General Objective: To evaluate the new ventures for commercial and Private enterprises, to purchase and operate
- Specific Objective:
  - To determine which aircraft are the lowest risk for the company to start this new business endeavour.
  - To determine which manufacturers or models are more prone to incidents than others?
  - Assess trends or patterns that inform safer investments in aircraft (e.g., geography, weather, purpose of flight)?

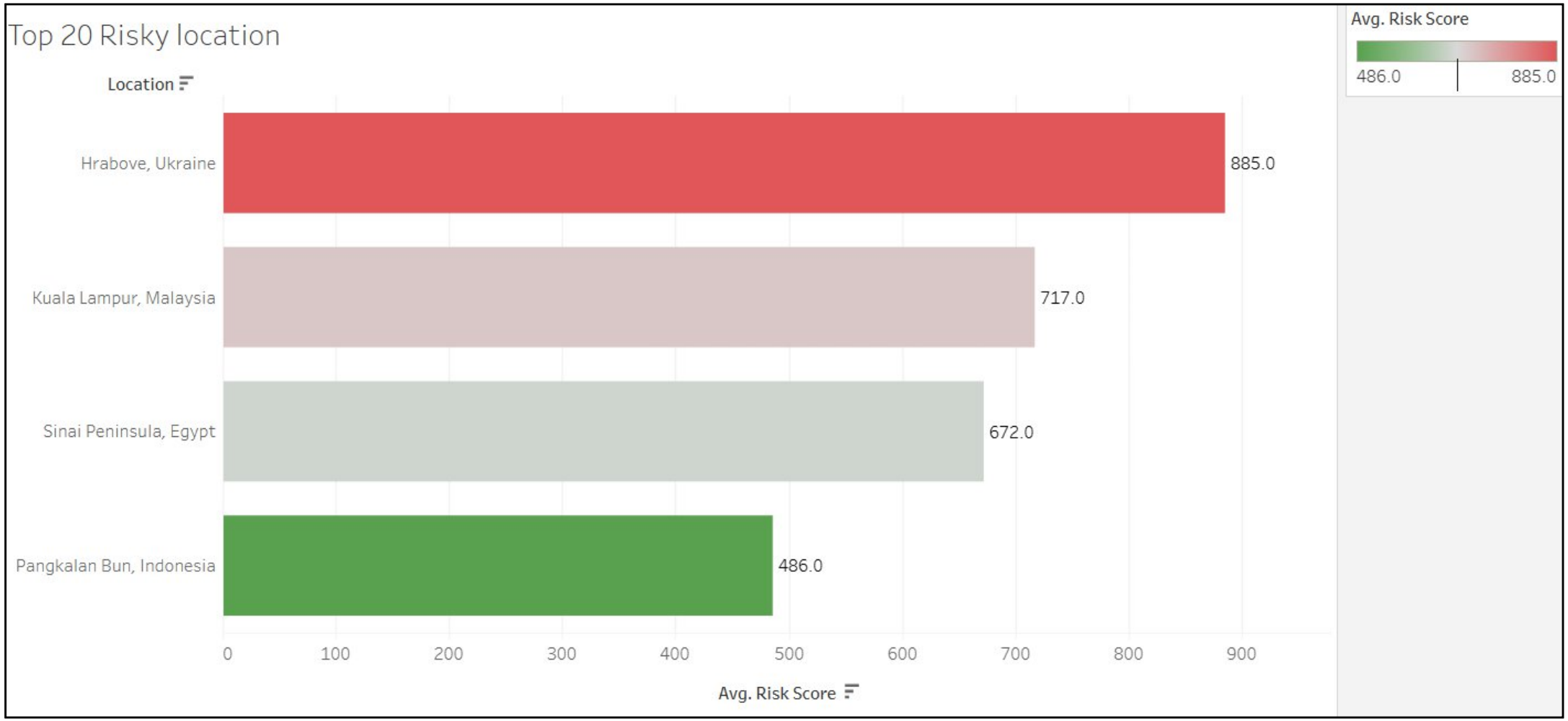
# Data Sources

- **Dataset:** Civil aviation accident and incident data from the National Transportation Safety Board (NTSB).
- **Period:** 1962–2023.
- Descriptive Statistics
- Visualization

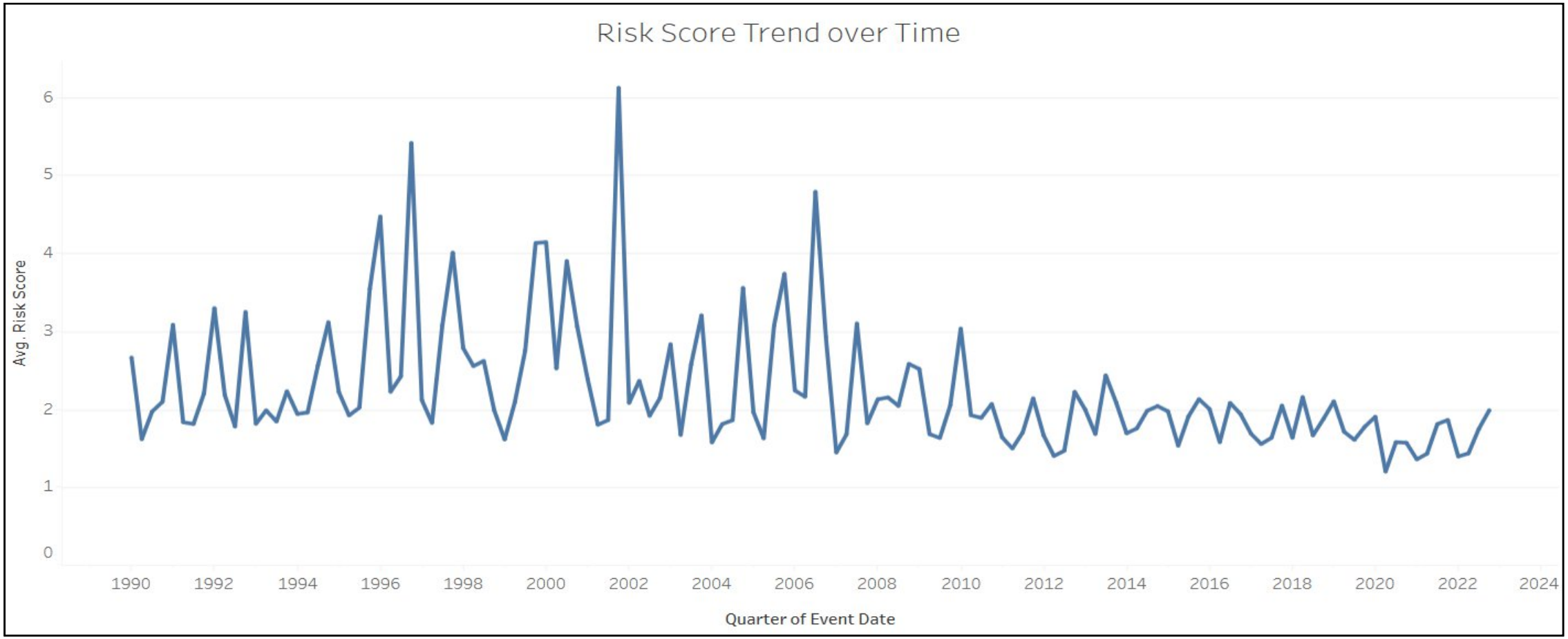
# Descriptive statistics

| | number_of_engines | total_fatal_injuries | total_serious_injuries | total_minor_injuries | total_uninjured |
|---|---|---|---|---|---|
| **count** | 82805.000000 | 77488.000000 | 76379.000000 | 76956.000000 | 82977.000000 |
| **mean** | 1.146585 | 0.647855 | 0.279881 | 0.357061 | 5.325440 |
| **std** | 0.446510 | 5.485960 | 1.544084 | 2.235625 | 27.913634 |
| **min** | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| **25%** | 1.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| **50%** | 1.000000 | 0.000000 | 0.000000 | 0.000000 | 1.000000 |
| **75%** | 1.000000 | 0.000000 | 0.000000 | 0.000000 | 2.000000 |
| **max** | 8.000000 | 349.000000 | 161.000000 | 380.000000 | 699.000000 |

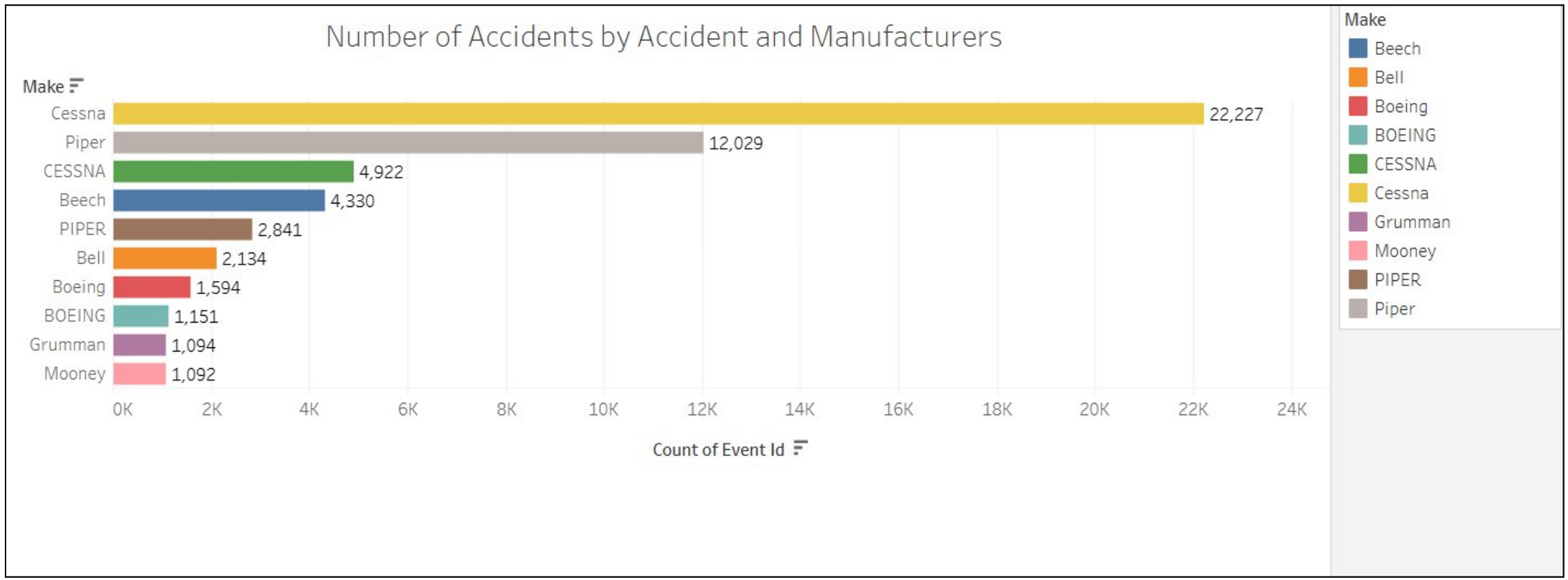
# Risky location



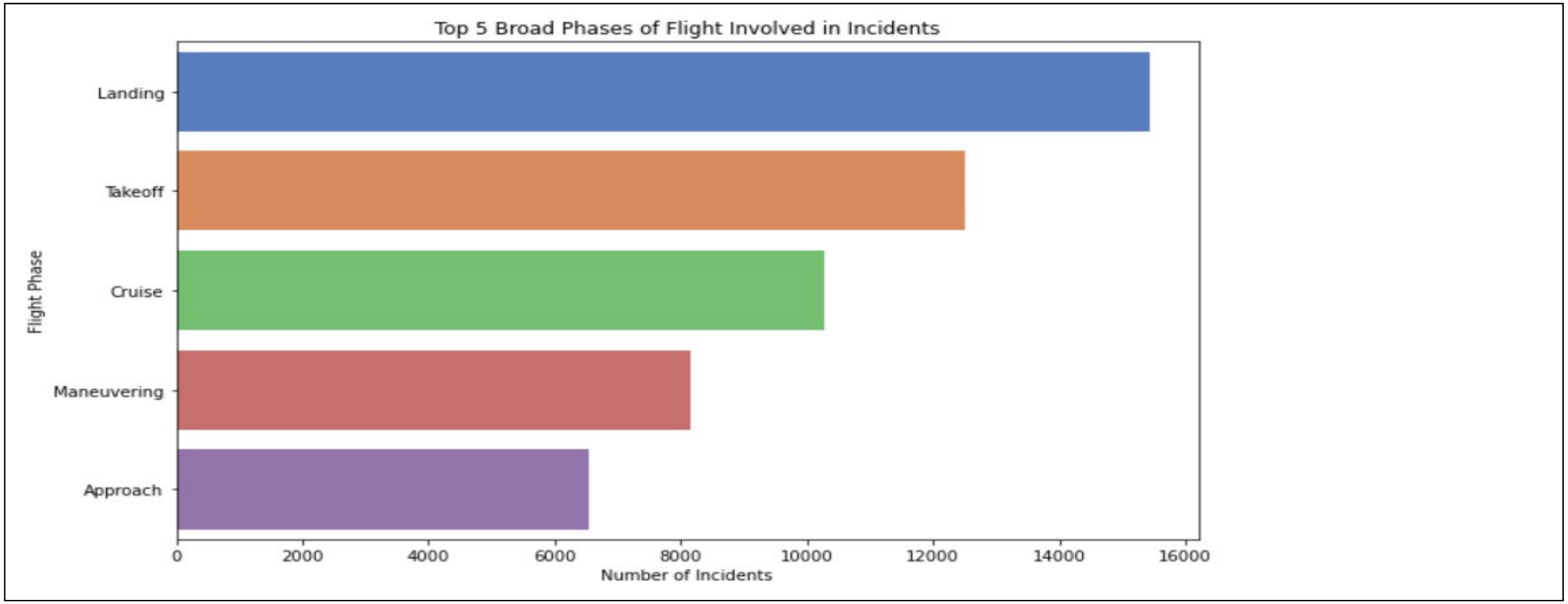
# Trend of Risk Score over Time



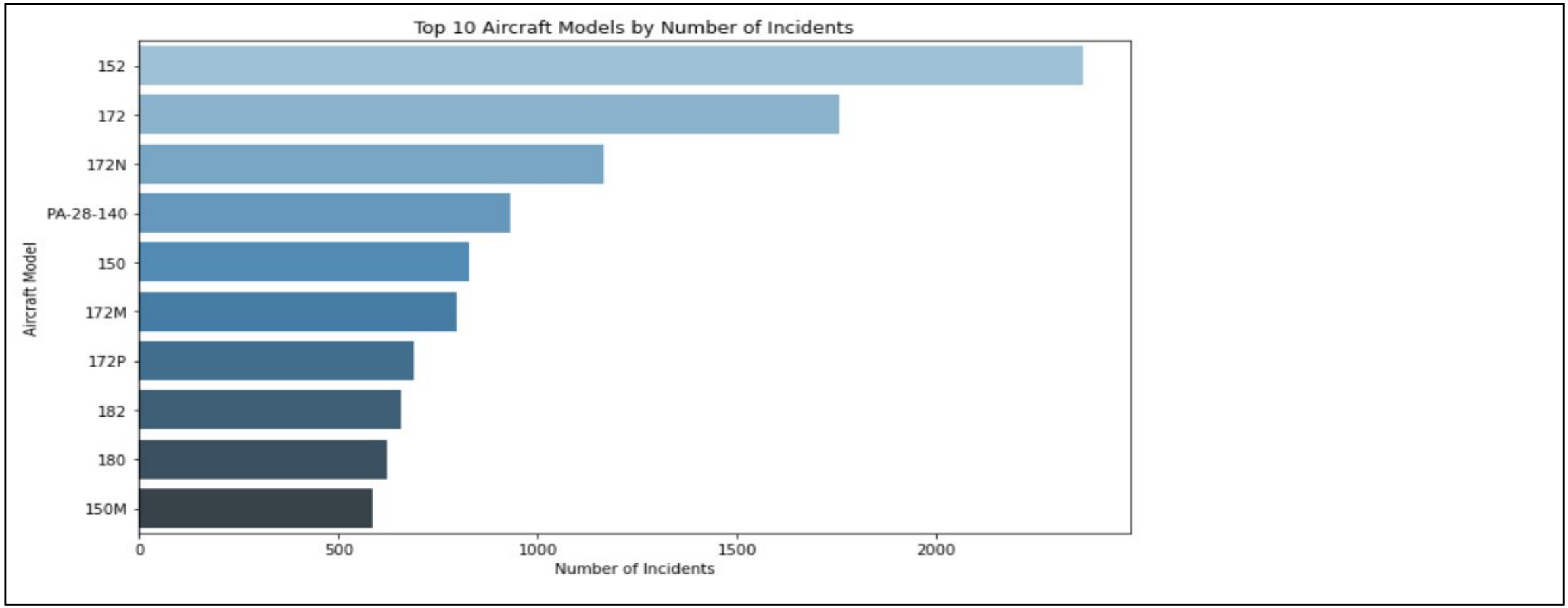
# Number of accidents by Accidents and Manufacturer



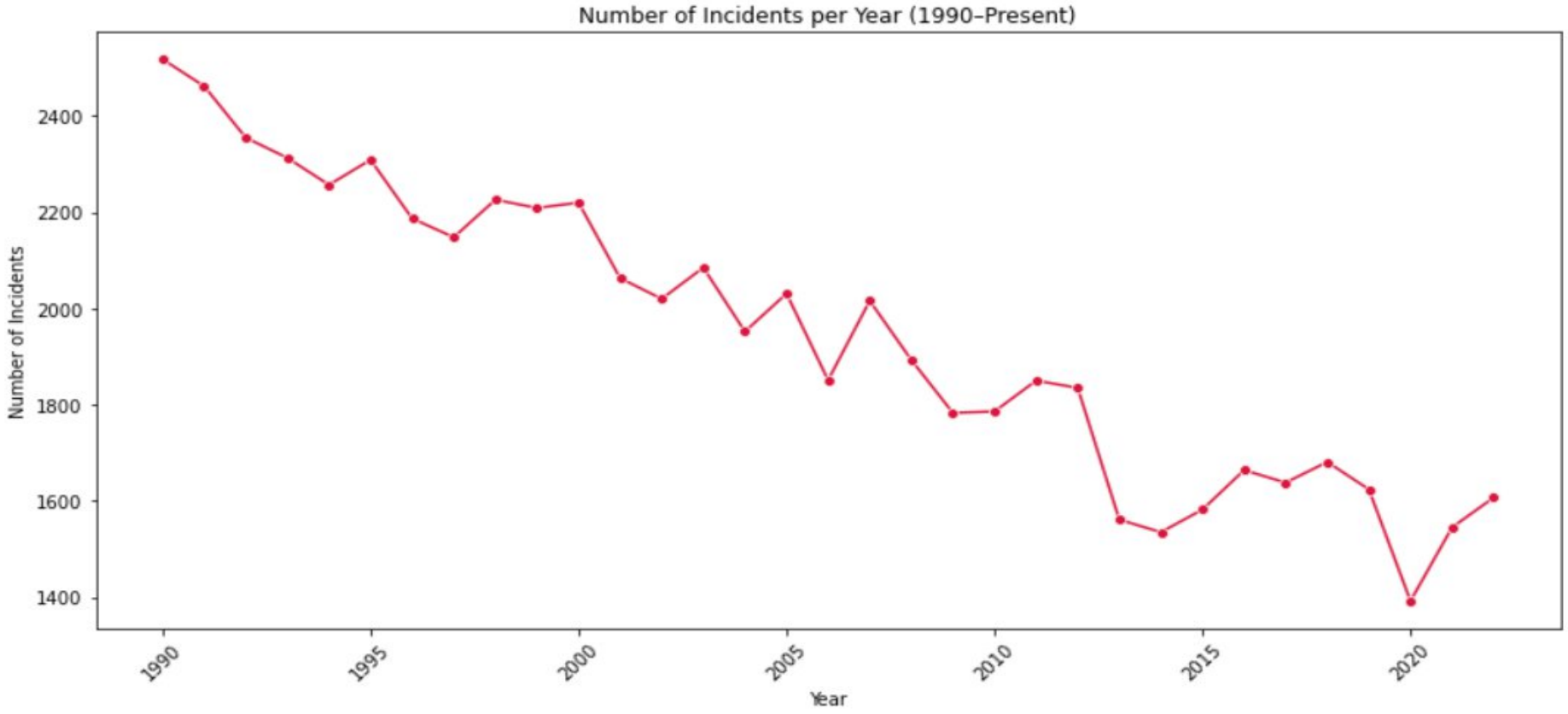
# Top 5 Broad Phases of Flight Involved in Incidents



# Top 10 Aircraft by Number of Incidents



# Trends in incidents per year (1990 – Present)




The number of incidents has generally declined since 1990, indicating improvements in technology, regulation, or reporting.

# Summary and Conclusion

- **Downward Trend in Incident Frequency over Time**
- Since 1990, the annual rate of aviation accidents has steadily declined, particularly in the commercial sector. This trend likely reflects advancements in regulatory standards, aircraft technology, pilot training, and incident reporting practices.
- **Low–Risk Aircraft Models Identified**
- Specific aircraft models, including the Cessna 172, Piper PA-28, and Beechcraft Bonanza, exhibit the lowest incidence of fatal or severe accidents relative to their prevalence in the dataset. These models demonstrate consistently favourable safety profiles across multiple decades.

## Strategic recommendation

- Prioritise Proven Low-Risk Aircraft
- Focus on Commercial and Business Operations
- Adopt Risk-Informed Procurement Criteria

# Contact Information

Thank You!


- MaryBennah N Kuloba

- marybennahkuloba@gmail.com