



AVIATION SAFETY ANALYSIS FOR AIRCRAFT PROCUREMENT

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BUSINESS PROBLEM

Our company is expanding into aviation to diversify its portfolio. The challenge is to identify aircraft with minimal risk profiles suitable for both commercial and private operations to optimize safety and operational costs



DATA ANALYSIS APPROACH

- **Data Source:** National Transportation Board (Kaggle dataset)
- **Steps Taken:**
 - Data Cleaning and Standardization
 - Exploratory Data Analysis (EDA)
 - Safety Scoring Methodology
 - Model Recommendations



WHAT DOES DATA CLEANING MEAN?

- Standardized column names for consistency and ease of analysis.
- Handled missing values:
 - Filled essential categorical missing data with “unknown”.
 - Ensured numerical columns used appropriate data types for analysis.

WHAT DOES EXPLORATORY DATA ANALYSIS MEAN?

- Analyzed injury severity distribution to understand safety outcomes.
- Explored aircraft damage types to assess financial risk implications.
- Identified most common aircraft makes and models involved in incidents.
- Examined accident trends over time to assess historical risk patterns.

WHAT DOES A SAFETY SCORING METHODOLOGY MEAN?

- Developed a combined safety score integrating:
- Injury Severity Score: Scaled from 0 (fatal) to 1 (non-fatal).
- Aircraft Damage Score: Scaled from 0 (destroyed) to 1 (minor damage).
- Calculated an average safety score per aircraft model to rank models objectively.
- Filtered makes with at least 3 incident records to ensure statistical reliability.

FINDINGS

During the first decades air transport was not a common use of transport, due to the rising growth in the aviation industry some problems started to occur.

There was an increase in the use of air transport but we notice a trend that accidents increased due to the growth in the aviation industry as also witnessed in following years, but as time went by the number of accidents reduced.

Most accidents involved are usually flights that are designated for personal use.

Weather conditions did not play a big role in aircraft accidents.

Aircrafts with one engine have a higher accident rate making aircrafts with more than one engine safer.

Aircrafts with the engine type LR are safer.

RECOMMENDATIONS

BASED ON SAFETY SCORES AND DATA ANALYSIS: IT IS ADVISABLE TO CONSIDER ROBINSON AND HUGHES AIRCRAFT MODELS, AS THEY HAVE SHOWN LOWER ACCIDENT FREQUENCIES.

ADDITIONALLY, SELECTING AIRCRAFT WITH TWO OR MORE ENGINES IS RECOMMENDED TO ENHANCE OPERATIONAL SAFETY. THESE AIRCRAFT MODELS COMBINE HIGHER SAFETY SCORES WITH ESTABLISHED OPERATIONAL HISTORY, MINIMIZING INITIAL RISKS AS THE COMPANY VENTURES INTO AVIATION.