AIRCRAFT INCIDENT ANALYSIS FOR OPERATIONAL RISK MITIGATION

OVERVIEW

❖This project analyzes aircraft incident and accident data to help the Sky Nova company to safely enter the airline industry.

❖We examined key factors like total injuries, aircraft make/model, weather conditions, flight phases, engine types, and aircraft categories.

❖The analysis identifies patterns influencing injury rates and operational risks.

❖Insights will guide fleet procurement, pilot training strategies, weather safety protocols, and engine configuration decisions.

Goal

- **Minimize risk** and **build strong customer trust** for the company's aviation launch

Business Understanding

Stakeholders

- **Directors / Business Owners**: Prioritize purchasing aircraft with minimal safety risks to protect reputation and financial stability.
- **Operations Manager**: Optimize fleet scheduling and logistics using safety-focused insights.
- **Pilots and Crew Members**: Ensure aircraft reliability and safety across diverse operational conditions.

Key Business Questions

i. Which aircraft makes/models have the lowest historical injury rates?
ii. How do weather conditions impact injury severity?
iii. Does engine configuration (number/type) influence safety?
iv. What operational strategies minimize risk when building a new fleet?

Data Understanding

- The dataset is sourced from the **National Transportation Safety Board (NTSB)**, detailing incidents/accidents involving injuries, aircraft characteristics, and environmental factors.

Description of data

Main Features:

i. Aircraft Make and Model
ii. Total Fatal, Serious, and Minor Injuries
iii. Aircraft Category and Damage Type
iv. Broad Phase of Flight
v. Weather Conditions
vi. Number of Engines and Engine Type

New Feature Created:

- Total injuries = fatal + serious + minor injuries

Data Analysis

- **Data Cleaning:**
  - Removed missing (null) records for clean, reliable results.
- **Grouping and Aggregation:**
  - Grouped data by aircraft make, number of engines and engine types, and weather condition.
  - Summed total injuries across categories.
- **Visualization Techniques:**
  - Bar chart for comparing total injuries by aircraft make.
  - Bar chart for comparing total injuries by weather conditions.
  - Bar chart for comparing total injuries by number of engines and engine types.
- **Focus Areas:**
  - Identify safer aircraft types.
  - Understand when and why injuries are most likely to occur.

Recommendations

- Prioritize purchasing **aircraft models with lower injury records**.
- **Monitor weather conditions** closely and establish strict weather-related protocols.
- Choose aircraft with **safer engine types** (multi-engine and turbine-powered models when possible).

Next Steps

- Conduct deeper analysis on **specific makes and models** shortlisted for purchase.
- Partner with aviation experts for **fleet inspection and certification**.
- Implement **pilot and maintenance crew training programs** based on findings.
- Develop **safety manuals and emergency protocols** tailored to selected aircraft types.
- Build a **monitoring system** to collect operational data for continuous safety improvements.

Thank You

- Thank You!!

- Questions?
- Full Name: HILDA JEROTICH
- LinkedIn Profile: www.linkedin.com/in/hilda-j-505499239