

# **Data-Driven Insights for Aircraft Risk Assessment**

**Presented By:  
Emmanuel Kipleting**



# TABLE OF CONTENTS

**01**

**OVERVIEW**



**02**

**BUSINESS UNDERSTANDING**



**03**

**DATA UNDERSTANDING**



**04**

**DATA ANALYSIS**



**05**

**RECOMMENDATIONS**



**06**

**NEXT STEPS**



# WELCOME TO PRESENTATION

I'm Emmanuel, and I'll be sharing with you my beautiful ideas on how to use data cleaning, imputation, analysis, and visualization to generate insights for a business stakeholder



# 01

# OVERVIEW

- This project aims to assist the company in making informed decisions about the acquisition and operation of airplanes for both commercial and private enterprises. As the company seeks to expand into the aviation industry, it faces the challenge of understanding the potential risks associated with different types of aircraft. By analyzing aviation accident data, the goal is to identify which aircraft are involved in the most accidents and those with the most severe outcomes, helping the company minimize operational risks.
- The analysis focuses primarily on **airplanes**, as they are the company's main interest, but also explores **helicopters** and **gliders** as potentially lower-risk alternatives. This presentation will highlight key findings on accident frequency and severity across various aircraft makes, followed by actionable recommendations. These insights will guide the company in selecting safer aircraft for purchase, with an emphasis on minimizing accident risks, ensuring better safety protocols, and considering the benefits of alternative aircraft types.







# BUSINESS UNDERSTANDING

- The company is expanding its portfolio by acquiring airplanes for both commercial and private enterprises. However, the company faces a significant challenge in determining which aircraft to purchase, as they are unaware of the potential risks associated with different aircraft types. This includes understanding the frequency of accidents, the severity of accidents, and the overall safety record of various aircraft makes. Selecting the wrong aircraft could lead to higher risks, increased costs, and potential harm to passengers and operations.
- The primary stakeholders in this analysis are the aviation division heads and senior management. They need clear, actionable insights to inform their decision-making and ensure that the aircraft purchased for the company are safe and cost-effective. The results of this analysis will directly impact the company's operational strategy, risk management practices, and long-term business success. By making data-driven decisions, the company can improve safety, reduce operational risks, and optimize the financial performance of their new aviation business.

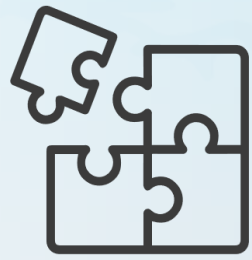
# 03 DATA UNDERSTANDING

## DATASET

The dataset used for this analysis is sourced from the National Transportation Safety Board (NTSB) and includes aviation accident records from 1962 to 2023. The data contains a comprehensive record of civil aviation accidents and selected incidents in the United States and international waters. It includes various attributes such as aircraft make, accident severity, weather conditions, phase of flight, and injury statistics.

## KEY FEATURES

1. Aircraft Make: Identifies the manufacturer and model of the aircraft involved in the accident.
2. Injury Severity: Includes information on fatalities, serious injuries, and minor injuries resulting from the accident.
3. Accident Details: Provides context such as weather conditions, flight phases (takeoff, cruising, landing), and the number of injuries.
4. Location and Date: Includes the location and date of the accident, which can be used for trend analysis over time and by region.



## Accident Frequency and Severity by Aircraft Make

- ✓ Airplanes (specifically Cessna, Piper, and Beech) were found to have the highest accident frequency and severity, indicating they are at a higher risk.
- ✓ Helicopters and gliders showed lower accident frequencies and could be considered safer alternatives.



## High-Risk Aircraft

- ✓ Aircraft makes such as Cessna, Piper, Beech, Boeing, and Airbus were identified as having both high accident rates and high accident severity, including fatalities and serious injuries.
- ✓ These aircraft types should be avoided if safety is a priority.



## Low-Risk Aircraft

- ✓ Aircraft makes such as EVANS ROBERT W SR, P&M Aviation, QUAD CITY ULTRALIGHT CORP, SUMINSKI WALTER M, and ORLICAN S R O were identified with lower accident frequency and should be considered as safer options for purchase.



## Weather and Flight Phases

- ✓ VMC (Visual Meteorological Conditions) were associated with a higher frequency of accidents compared to IMC (Instrument Meteorological Conditions). Cruise and maneuvering phases of flight had the highest number of fatalities, highlighting areas where enhanced safety measures could be beneficial.

# RECOMMENDATION 1

By following this recommendation, the company can significantly reduce the likelihood of accidents and improve the safety of its aircraft operations.



## 1. Airplanes to Avoid (High Risk):

- ✓ Cessna, Piper, Beech, Boeing, and Airbus have the highest accident frequencies and severity, including numerous fatalities and serious injuries.
- ✓ Recommendation: Avoid purchasing aircraft from these makes due to their high risk. If these models must be used, ensure enhanced safety protocols, frequent maintenance, and extensive pilot training are implemented.



# RECOMMENDATION 2

By following this recommendation, the company can significantly reduce the likelihood of accidents and improve the safety of its aircraft operations.

## 2. Airplanes to Consider (Low Risk):

- ✓ EVANS ROBERT W SR, P&M Aviation, QUAD CITY ULTRALIGHT CORP, SUMINSKI WALTER M, and ORLICAN S R O have a much lower accident frequency, making them safer options for the company.
- ✓ **Recommendation:** Prioritize purchasing aircraft from these makes to ensure safer operations and minimize risks.



# RECOMMENDATION 3

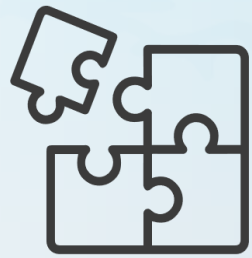
By following this recommendation, the company can significantly reduce the likelihood of accidents and improve the safety of its aircraft operations.



## 3. Focus on Helicopters and Gliders (Low Risk)

- ✓ Helicopters and gliders have shown lower accident frequencies compared to airplanes.
- ✓ Recommendation: In addition to airplanes, consider helicopters and gliders as part of the fleet, particularly for specific applications like private operations or aerial tours, where lower risk is a priority.

# NEXT STEPS



## 1. Implement Safety Protocols for High-Risk Aircraft

- ✓ For aircraft makes with high accident frequency and severity, such as Cessna and Piper, implement comprehensive safety measures to reduce the risk of accidents. This includes regular maintenance schedules, advanced training for pilots, and emergency preparedness protocols.



## 2. Purchase Low-Risk Aircraft

- ✓ Focus on acquiring aircraft from low-risk makes such as EVANS ROBERT W SR, P&M Aviation, and QUAD CITY ULTRALIGHT CORP. These aircraft types have shown a lower frequency of accidents, offering a safer option for both commercial and private operations.



## 3. Explore Helicopter and Glider Alternatives

- ✓ Helicopters and gliders have demonstrated lower accident frequencies and could be considered for specialized operations. The company should explore the feasibility of incorporating these aircraft types into their fleet, especially for operations where safety is a priority.



## 4. Monitor and Reevaluate Risk Profiles Regularly

- ✓ Continuously monitor the safety records of the aircraft in operation and reevaluate risk profiles as new data becomes available. This will ensure that the company maintains a proactive approach to safety and can adapt to any emerging risks.



# **“A PICTURE IS WORTH A THOUSAND WORDS**



**For Any questions kindly contact me on:**



**Email : [kiplinge123@gmail.com](mailto:kiplinge123@gmail.com)**



**Phone : + 254 758 517 032**