

PRESENTATION CONTENT

PROJECT REPORT :RISK ASSESSMENT FOR AIRCRAFT
PURCHASE

INTRODUCTION

- As the company seeks to diversify its portfolio by purchasing and operating airplanes for commercial and private enterprises, understanding the potential risks associated with aircraft is paramount.
- The goal of this project is to identify the lowest risk aircraft options for the company to consider.
- By analyzing aviation accident data we aim to uncover patterns and provide actionable insight that can guide the decision making process for purchasing aircraft that will minimize risks and ensure operational safety
- This report summarizes the findings from the aviation accident database up to 2023, focusing on aircraft related risks and how they impact accident frequency injury severity and overall safety. The goal is to present recommendations that will help the head of your new aviation division to make informed decisions on which aircraft to purchase, with the focus on minimizing risk exposure and optimizing safety

PROJECT GOALS

GOAL1

- To assess and identify the aircraft categories with the lowest accident frequencies and severity.

GOAL2

- To provide actionable recommendations based on risk levels for aircraft types, allowing the company to make informed purchase

GOAL3

- To evaluate how operational factors such as Weather conditions influence accident risks, guiding the company in minimizing these risks

DATA OVERVIEW

The data analyzed for this report comes from the *Aviation Accident Database* and include key information on:

Aircraft Data:

- Aircraft Category, Make, Model, Number of Engines, Engine Type and more

Accident Information

- Event ID, Accident Number, Event Date, Injury Severity, Aircraft Damage and more

Operational Factors

- Purpose of Flight, Schedule, Broad Face of Flight

Environmental Data

- Weather Conditions, Location, Latitude, Longitude
- These columns are directly relevant to the goal of assessing aircraft risk as they provide insights into accident rates, injury severity and operational contexts that influence aircraft performance

METHODOLOGY

DATA CLEANING

- Missing values were handled by filling in 'Unknown' or the mode value for non-numerical columns
- Duplicates were removed to ensure data accuracy
- Outliers were managed to ensure the validity of the analysis.

DATA ANALYSIS

- Descriptive statistics were computed to analyze accident rates, injury severity, and correlations with aircraft features.
- A focus was placed on identifying which aircraft categories had the lowest accident rates and least severe injuries.

VISUALIZATION

- Visualizations, such as bar charts, heatmaps, and geographical maps, were created to help identify patterns in accident rates across different aircraft categories and operational conditions.

FINDINGS

1. Accident Frequency by Aircraft Category:

- The analysis reveals that helicopters and small single-engine aircraft have significantly higher accident frequencies compared to other categories. These aircraft types have been associated with a higher risk profile, suggesting they may not be the best choices for the company.
- Low-risk aircraft: Commercial jets and twin-engine aircraft exhibit lower accident frequencies and may present less risk for the company's operations.
- Visualization: A bar chart showing the accident frequency by aircraft category.

2. Injury Severity by Aircraft Category:

- The severity of injuries in accidents involving helicopters and small single-engine planes is higher compared to other categories, with a notably greater proportion of fatalities and serious injuries.
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- Low-risk aircraft: Larger commercial aircraft and twin-engine models generally have lower injury severity, making them more favorable options for the company's safety requirements.
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- Visualization: A stacked bar chart comparing the severity of injuries by aircraft category.

3. Weather Conditions and Accident Severity:

- Adverse weather conditions (such as fog, thunderstorms, and IMC) contribute to a higher likelihood of severe accidents, particularly for small aircraft and helicopters.
- Recommendation: Aircraft that are designed to handle challenging weather conditions, such as commercial jets with advanced navigation systems, should be prioritized.
- Visualization: A heatmap showing the correlation between weather conditions and accident severity.

4. Injury Severity by Aircraft Usage (Purpose of Flight):

- Training flights exhibit a higher risk for fatalities and serious injuries, especially when involving smaller aircraft.
- Recommendation: It may be beneficial for the company to avoid purchasing small aircraft primarily used for training purposes unless specific training-related safety protocols are implemented.
- Visualization: A stacked bar chart showing injury severity by flight purpose.

5. Geographical Trends:

- Accidents in certain regions (e.g., areas with frequent severe weather or higher traffic volumes) show elevated accident rates, especially for smaller aircraft.
- Recommendation: Consider purchasing aircraft that are better equipped for handling specific regional risks (e.g., aircraft with weather adaptability for areas prone to fog or storms).
- Visualization: A geographical map illustrating accident frequency by region.

RECOMMENDATIONS

1. For Aircraft Purchases:

- Low-risk aircraft: Prioritize twin-engine aircraft and commercial jets with advanced safety features and weather handling capabilities.
- High-risk aircraft: Avoid purchasing helicopters and small single-engine planes, which have a higher accident frequency and injury severity, unless specific operational needs require them.

2. For Operational Considerations:

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- Develop safety protocols for operations in adverse weather conditions, particularly for regions with high incident rates in storms or fog.
- Consider purchasing aircraft with advanced weather systems and backup engines to enhance safety in challenging environments.

3. For Training Flights:

- Avoid purchasing small aircraft primarily used for training unless there are specific safety measures and pilot training protocols in place.
- If training is essential, consider investing in simulators or flight training devices to reduce risk exposure during training flights.

CONCLUSION

This analysis has identified key aircraft types and operational conditions that influence accident risk. Based on the findings, twin-engine aircraft and commercial jets emerge as the most favorable options for your company's new aviation business. These aircraft categories are associated with lower accident frequencies and injury severity, making them a safer investment.

By prioritizing these low-risk aircraft types and operational strategies, your company can reduce its exposure to accidents, ensure safer operations, and make informed purchasing decisions for its new aviation division.

The insights and recommendations provided in this report are intended to support your company's decision-making process and ensure that safety remains a top priority as you expand into the aviation industry.

NEXT STEPS

1. For Aircraft Purchases:

- Begin sourcing twin-engine and commercial jets from reputable manufacturers with a strong safety record.

2. For Training and Operations:

- Develop comprehensive safety protocols for adverse weather and challenging operational conditions.
- Review training protocols for pilots and crew to ensure safe operations across all aircraft types.
- By implementing these recommendations, your company can mitigate risks and successfully expand into the aviation sector with a strong emphasis on safety and operational excellence.