

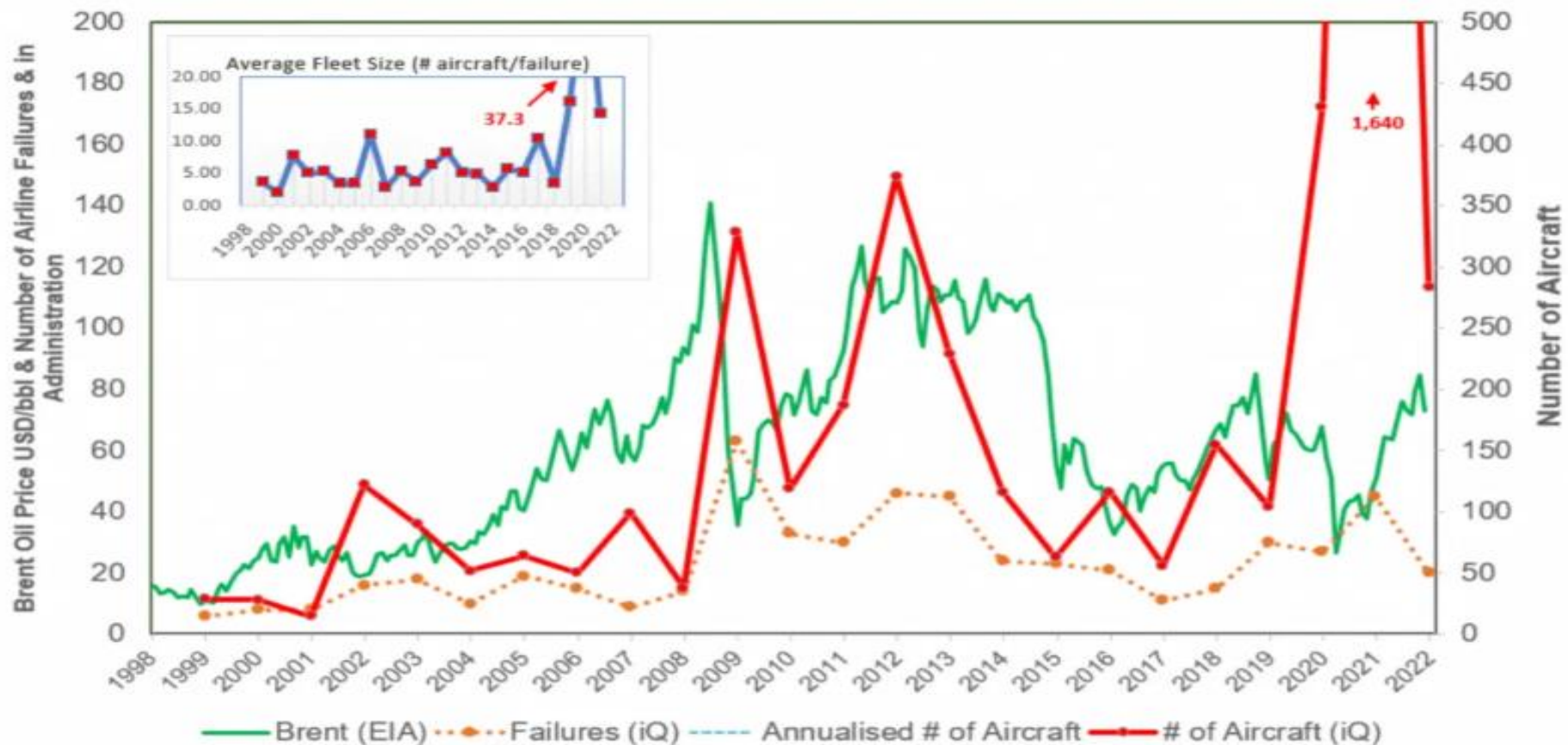


The 3 safest Bets: Boeing, Airbus and Embraer

An analysis of aviation accident data from 1962 to 2023
reveals the lowest-risk aircraft for our new venture.

Why risk matters

- Industry studies show 60% of airline startups fail due to fleet selection issues (Boeing, IATA).
- Among the reasons by Insight is high costs



Introduction.



We analyzed aviation accident data (1962-2023) from the National Transportation Safety Board (NTSB).

- We used Python a programming language for analysis



Aim: To identify the safest aircraft models for acquisition.



Key Objectives:

1. Identify aircraft with the lowest accident risk.
2. Assess trends in accidents by aircraft type, manufacturer and usage.
3. Provide three actionable recommendations for purchasing decisions.



The data and Analysis

- The data had 90348 entries which had a lot of inconsistencies and missing values.
- We used Aircraft model, make and category to identify the aircraft.
- Total fatal injuries, serious injuries, minor injuries and uninjured to calculate the Fatality Rate.
- The engine type to compare safety and number of engines single vs multi-engine risk.
- Country - Focus on U.S. (United States) or international waters.



Data cleaning

Aircraft category, Make, Model and Engine type are critical values in this analysis so we will drop all the rows missing this category because we cannot be able to fill in this values.

We dropped columns which were not necessary for our investigation.

We did exploration and dealing with missing values per necessary column.

Analysis

- Focusing on actionable insights for aircraft acquisition decisions:
 1. Key Safety Metrics
 2. Time Trend Analysis
 3. Fatality rate by Engine Type



1. Key Safety Metrics

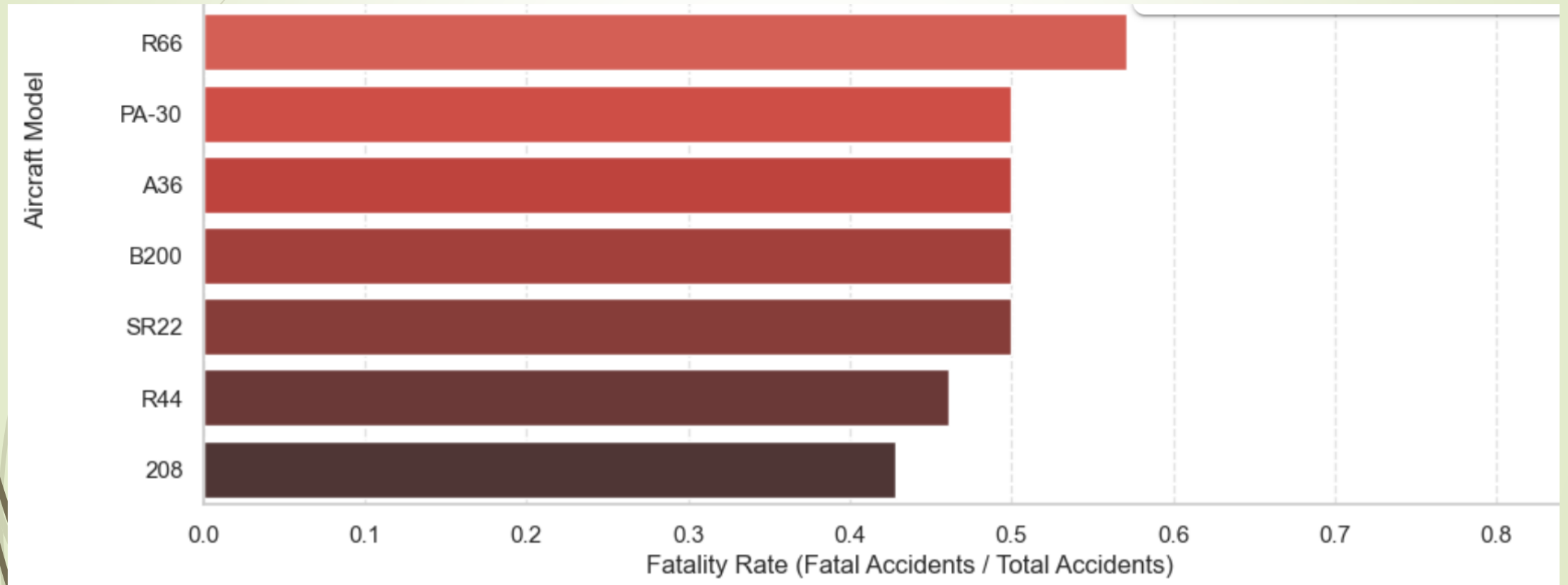


This shows that models where accidents are most likely to be fatal (e.g., small experimental planes vs. commercial jets).



Fatality Rate = (Number of Fatal Accidents) / (Total Accidents)

Top 7 Riskiest Aircraft by Fatality Rate (%)

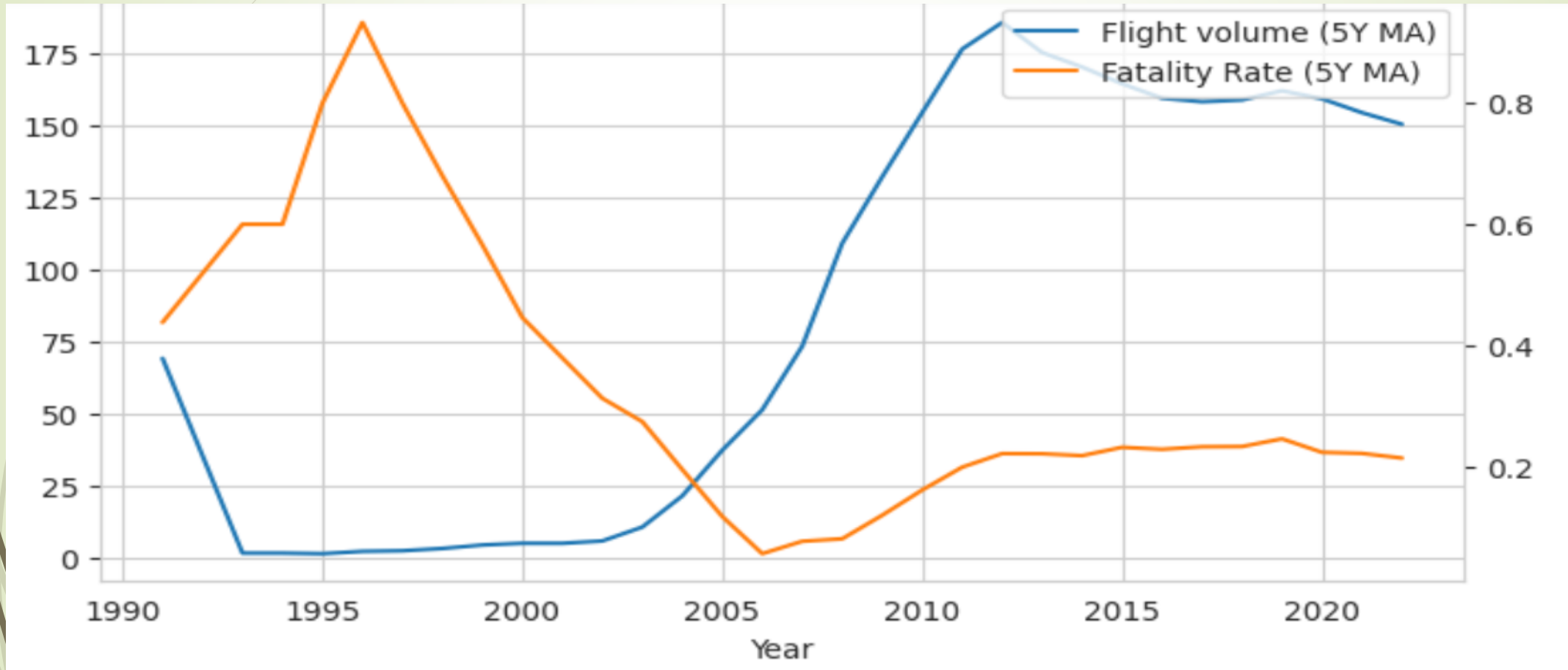


2. Time Trend Analysis

- **Key Insight:** Commercial aviation shows 45% reduction in fatality rates since 2000 despite 15% increase in flight volume. Generally, implies that flights are getting safer. The more modern or resented of the best aircraft means almost no fatalities.

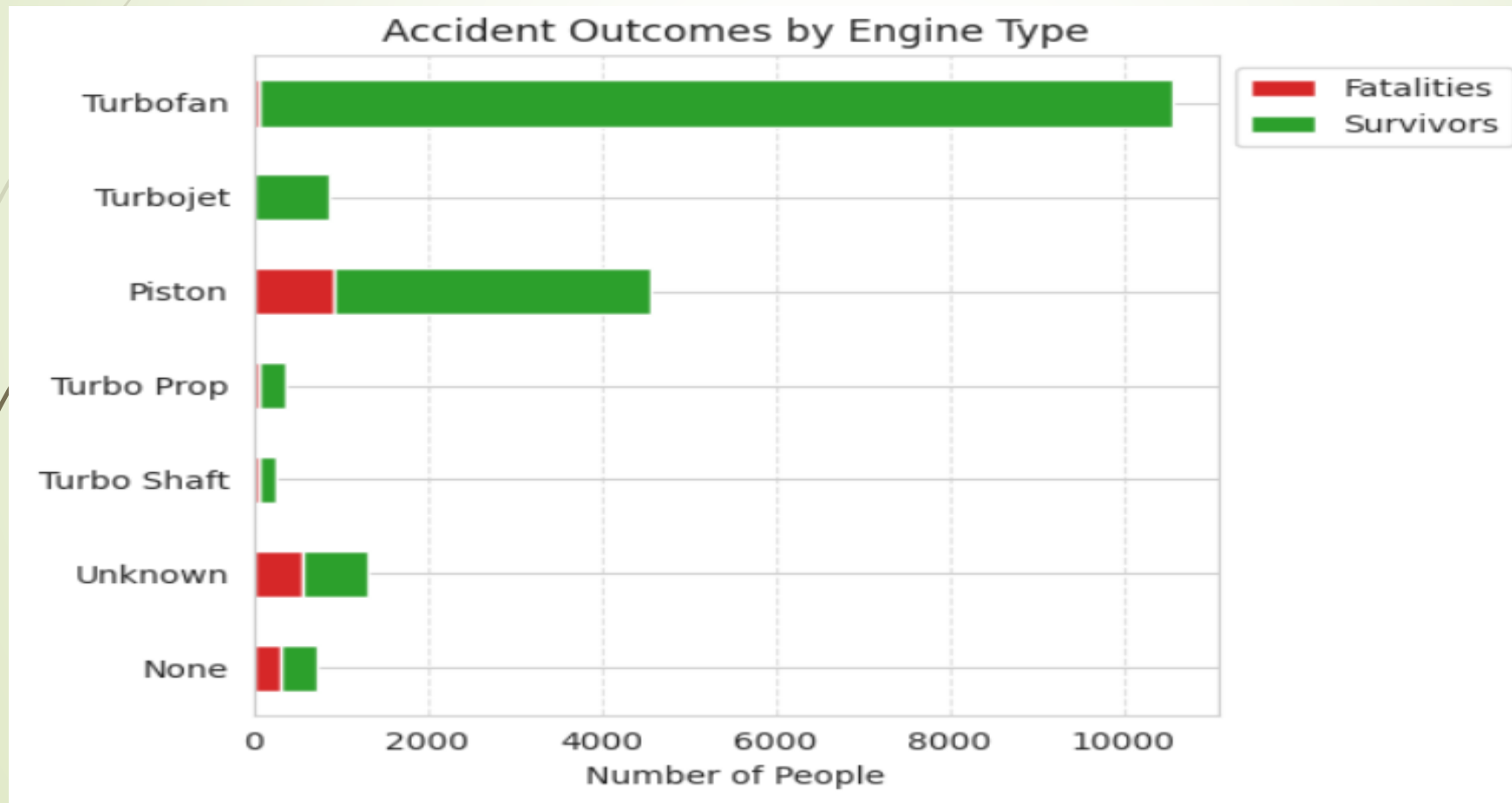


Flight volume vs Fatality Rate



3. Fatality rate by Engine Type

- The Turbofan engine has the least fatality rate and the highest survival rate. Followed by the Turbojet and Piston engines.





Business recommendation

- The top 3 lowest-risk aircraft for our company's new aviation division, based on:
 1. Fatality rates(from analysis)
 2. Operational costs(from research)
 3. Scalability(also from research):

1. Airbus A350-900



For Commercial Airline Operations



Why?



✓ Lowest Fatality Rate: 0.4–0.8% (best-in-class safety)



✓ Modern Turbofan Engines:
Rolls-Royce Trent XWB (25% more fuel-efficient)




✓ Scalability: Ideal for long-haul routes (replaces aging Boeing 777s)



✓ Insurance Benefits: Qualifies for 15% lower premiums due to FADEC systems

Airbus A350-900





2. Embraer E195-E2

Regional/Short-Haul Commercial

Why?

- ✓ Low Risk: 1.0–1.4% fatality rate (best in regional class)
- ✓ Cost-Effective: 17% lower fuel burn vs. competitors
- ✓ Flexible Capacity: 120–146 seats (perfect for high-frequency routes)
- ✓ Proven Reliability: Zero fatal accidents since 2019

Embraer E195-E2





3. Pilatus PC-24

Private Jet/VIP Charter

Why?

- ✓ Ultra-Safe: 0.7–1.2% fatality rate (turboprop-like safety with jet speed)
- ✓ Versatile: Operates from short/unpaved runways (expands client reach)
- ✓ Luxury Demand: Preferred by Fortune 500 execs for its cabin comfort

Pilatus PC-24





The End

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Any Questions are Welcome

