🛩️ Airline Market Analysis — Statistical Insight Sheet

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📊 Hypothesis Testing Summary

#	Business Question	Statistical Test	Result
1	Are LCC fares significantly lower than large carriers?	**T-Test**	✅ Significant ($p < 0.001$)
2	Is passenger volume higher in Q3 than Q1?	**Paired T-Test**	✅ Significant ($p = 0.0051$)
3	Does route distance correlate with fare per mile?	**Pearson Correlation**	✅ Negative correlation ($r = -0.598$)
4	Has Southwest Airlines (WN) grown post-2019?	**T-Test**	❌ Not significant ($p = 0.2883$)

📈 Key Visuals

- **Figure 1**: Boxplot — LCC vs Large Carrier Fares
- **Figure 2**: Boxplot — Q3 vs Q1 Passenger Volume
- **Figure 3**: Scatter Plot — Route Distance vs Fare Per Mile
- **Figure 4**: Line Plot — Market Share of Carrier WN Over Time

📌 *Full visuals available in Jupyter Notebook and Power BI dashboard.*

📌 Strategic Insights & Recommendations

✓ LCC Pricing Advantage

Low-Cost Carriers offer statistically lower fares than large carriers.
🟢 **Action**: Legacy airlines should reevaluate routes where they face price-sensitive competition and adopt bundled service models.

✓ Peak Demand in Q3

Q3 sees significantly higher passenger volume than Q1.

🟢 **Action**: Recommend increased staffing, marketing push, and aircraft readiness in Q3.

✓ **Route Length Matters**

A moderate **negative correlation** between fare per mile and route distance suggests economies of scale.

🟢 **Action**: Long-haul routes can be priced more aggressively. Use this to guide new route development or seasonal promotions.

✕ **WN Market Share Growth Not Proven**

Southwest Airlines has not shown statistically significant growth post-2019.

🔴 **Action**: Focus should be on optimizing the existing network and reducing operational cost per route rather than expansion.

📎 **Want to explore more?**

📘 **Full Python Notebook** (EDA + Hypothesis Testing + Modeling):

➡️ *[GitHub Repository Link]* (Replace with actual link)

📊 **Interactive Power BI Dashboard** (Fare, Volume, Market Share):

➡️ *[Power BI Public Link]* (if published)