Data Analysis Project Submission Report

Project Title: airlines_flights_data

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Abstract

This project focuses on analyzing airline flight data to uncover patterns, trends, and insights regarding flight prices, durations, popular routes, and travel behavior. Using Excel, dashboards and KPIs were created to provide meaningful business insights. The dataset used contains 300,000+ flight records, including airline name, source and destination cities, departure/arrival times, duration, class, ticket price, and booking details.

Objectives

The key objectives of this project are:

- To analyze flight pricing patterns across different airlines.

- To identify the most popular flight routes and city pairs.

- To evaluate how booking in advance impacts ticket prices.

- To compare economy and business class pricing.

- To provide data-backed recommendations for both passengers and airlines.

Scope of the Project

The project includes cleaning, analyzing, and visualizing data from the airlines flight dataset. It does not use advanced programming languages such as Python or R. All analysis and dashboard creation are performed in Microsoft Excel. The scope is limited to the provided dataset

. Tools & Technologies Used

Tool/Technology	Purpose
Microsoft Excel	Data manipulation, analysis, and dashboard creation
PivotTables	Summarizing data for analysis
Charts & Graphs	Data visualization

Data Cleaning & Preparation

The dataset contained 300,153 flight records with details such as airline, flight, source/destination, timings, duration, class, days left, and price. An unnecessary index column was removed. No missing values were found, but data types were standardized: numeric fields (duration, days_left, price) were set as numbers, while categorical fields (airline, source_city, destination_city, class, stops) were treated as text. Duplicate checks showed no significant repeats.

For analysis, new features were derived:

- Route column combining source_city and destination_city for route trends.

- Booking trend analysis using days_left to track price variations.

- Class segmentation to compare Economy vs. Business pricing.

These cleaning and preparation steps ensured the dataset was accurate, consistent, and ready for dashboard visualization and insights.

Dashboard Design Strategy

The dashboard was designed with a clear layout: a top section for KPIs (average price, min/max price, average duration, number of airlines) and a lower section for visualizations. Bar charts were used for comparing average prices by airline and class-wise differences, while line charts highlighted booking trends over days left. Route popularity was shown with column charts for easy comparison. Interactive slicers for airline, class, and city allowed users to filter insights dynamically. This structure ensures quick understanding of key metrics and detailed exploration through visual trends.

Questions & Solutions

- **Question 1:** Which airline offers the cheapest and most expensive flights on average?

  - **Analysis:** AirAsia is best for budget-conscious travelers, while Vistara targets premium passengers with luxury pricing.
  - **Solution:** Cheapest: **AirAsia (~₹4,091)**, Most Expensive: **Vistara (~₹30,397)**

- **Question 2:** What are the most popular flight routes?
  - **Analysis:** These high-demand routes should have more frequent flights and promotional offers to capture market demand.
  - **Solution:** Delhi ↔ Mumbai (15,289 & 14,809 flights), Delhi ↔ Bangalore (14,012 & 13,756 flights)
- **Question 3:** Which airline has the shortest and longest average flight durations?
  - **Analysis:** Passengers seeking quicker travel prefer Indigo, while Air India may operate more long-haul or connecting flights.
  - **Solution:** Shortest: Indigo (~5.8 hrs), Longest: Air India (~15.5 hrs)
- **Question 4:** How does booking in advance affect ticket prices?
  - **Analysis:** Booking at least 2–3 weeks in advance saves money, while airlines profit from last-minute sales.
  - **Solution:** Last-minute (1–3 days): ₹21K–30K, Booking ~20 days ahead: ~₹19.7K
- **Question 5:** How much more expensive is Business class compared to Economy?
  - **Analysis:** Business class is about 8x more expensive than Economy, ideal for corporate and luxury travelers.
  - **Solution:** Economy: ~₹6,572, Business: ~₹52,540

Challenges Faced & Solutions

Challenge	Solution
Challenge 1: Handling an extremely large dataset (300K+ records) which made filtering and calculations slow.	**Solution:** Used PivotTables and summary aggregations instead of raw data to improve efficiency and performance.
Challenge 2: Selecting appropriate charts to represent different insights (e.g., price trends, route popularity).	**Solution:** Experimented with different visualizations; finalized line charts for trends over days left, and bar/column charts for airline and route comparisons.
Challenge 3: Redundant columns and inconsistent data formatting (e.g., index column, categorical labels).	**Solution:** Removed unnecessary columns, standardized categorical fields (airline, city, class), and reformatted data for clean analysis.

Outcome

- The analysis revealed that flight prices vary significantly depending on the number of days left before booking, the airline chosen, and the travel class.

- The dashboard provided quick insights into average, minimum, and maximum fares, popular airlines, and price patterns across routes.

- The interactive filters allowed easy comparisons between economy and business classes, enhancing decision-making.

- This project improved my skills in data cleaning, visualization design, and extracting business insights from raw data.

Conclusion

This project strengthened my ability to analyze and present data effectively using Microsoft Excel. I learned how to clean and prepare large datasets, create meaningful dashboards, and highlight key insights. The hands-on experience deepened my understanding of how airlines pricing trends and customer preferences can be studied to make informed business decisions. Overall, the project enhanced both my technical and analytical skills, making me more confident in solving real-world data problems.

Visualizations

Table 1:

Average of price Row Labels	Column Labels Business	Economy	Grand Total
Air_India	47,131.04	7,313.68	23,507.02
AirAsia		4,091.07	4,091.07
GO_FIRST		5,652.01	5,652.01
Indigo		5,324.22	5,324.22
SpiceJet		6,179.28	6,179.28
Vistara	55,477.03	7,806.94	30,396.54
Grand Total	**52,540.08**	**6,572.34**	**20,889.66**

Table 2:

Average of price Row Labels	Column Labels Bangalore	Chennai	Delhi	Hyderabad	Kolkata	Mumbai	Grand Total
Bangalore		23,321.85	17,723.31	21,226.12	23,500.06	23,128.62	21,469.46
Chennai	25,081.85		18,981.86	21,591.35	22,669.93	22,765.05	21,995.34
Delhi	17,880.22	19,369.88		17,347.29	20,566.41	19,355.83	18,951.33
Hyderabad	21,347.18	21,848.07	17,243.95		20,823.89	20,080.07	20,155.62
Kolkata	22,744.11	23,660.36	19,422.35	21,500.01		22,078.88	21,746.24
Mumbai	23,147.07	22,781.90	18,725.32	21,004.05	22,379.15		21,483.82
Grand Total	**21,593.96**	**21,953.32**	**18,436.77**	**20,427.66**	**21,959.56**	**21,372.53**	**20,889.66**

Table 3:

Average of price Row Labels	Column Labels Afternoon	Early_Morning	Evening	Late_Night	Morning	Night	Grand Total
Air_India	23,789.17	23,346.06	23,366.25	26,479.15	21,747.79	25,968.72	23,507.02
AirAsia	4,342.76	4,527.00	4,058.76	4,183.13	4,102.57	3,343.72	4,091.07
GO_FIRST	5,482.20	5,659.07	5,604.05	4,006.55	6,501.00	4,861.95	5,652.01
Indigo	5,666.36	5,203.60	4,813.68	4,317.20	5,904.38	4,324.24	5,324.22
SpiceJet	7,720.38	5,813.59	5,720.60		6,894.05	5,533.12	6,179.28
Vistara	28,656.02	30,021.53	31,081.61		30,608.39	31,029.40	30,396.54
Grand Total	**18,179.20**	**20,370.68**	**21,232.36**	**9,295.30**	**21,630.76**	**23,062.15**	**20,889.66**

Table 4:

Average of price Row Labels	Column Labels Air_India	AirAsia	GO_FIRST	Indigo	SpiceJet	Vistara	Grand Total
one	24,805.78	4,096.96	5,972.27	5,733.03	6,789.36	32,353.15	22,900.99
two_or_more	13,771.10	4,432.96	7,107.71	7,034.04		18,050.77	14,113.45
zero	14,403.19	3,747.96	3,526.92	4,023.05	4,556.43	16,416.27	9,375.94
Grand Total	**23,507.02**	**4,091.07**	**5,652.01**	**5,324.22**	**6,179.28**	**30,396.54**	**20,889.66**

Table 5:

Sum of index Row Labels	Column Labels Bangalore	Chennai	Delhi	Hyderabad	Kolkata	Mumbai	Grand Total
Air_India	1966050808	2335496316	1759538043	2345107454	2344385266	2430070179	13180655596
AirAsia	328993125	286653191	97343140	304034993	382605780	131337413	1530967642
GO_FIRST	450043916	246548282	110702338	408414764	477019937	337139222	2030668459
Indigo	715210096	1390630250	1016246759	1049946406	1001167269	484264001	4747640101
SpiceJet	119903279	229204055	57570169	54054143	259456567	106848129	827916242
Vistara	4208349696	4339692838	2667262328	4108622539	3621216413	3702669594	22727613408
Grand Total	**7789329150**	**8748304932**	**4878663077**	**8270980299**	**8085851232**	**7272632938**	**45045761628**

Afternoon