Airline Data Management and Analysis Using Power BI

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1. Introduction

The airline industry is complex, involving various components such as flight schedules, passenger management, and ticketing systems. The goal of this project is to use Power BI to analyze and visualize airline data for better operational decision-making and enhanced customer experience. This report covers the entire process, from data preparation to final dashboard publication.

2. Datasets Used

Three datasets were used in this project:

Flight_Information: Contains FlightID, FlightNumber, Airline, Destination, and Status.

Passenger_Information: Contains PassengerID, FlightID, and SeatNumber.

Ticket_Information: Contains TicketID, FlightID, and BookingStatus.

These datasets were linked using FlightID as the key to ensure data consistency across sources.

3. Task 1: Data Preparation and Cleaning

In Power BI's Power Query Editor:

Imported all three datasets.

Removed duplicates and unnecessary columns.

Filled in missing values where applicable.

Standardized column names and data types.

This step ensured clean and structured data ready for analysis.

4. Task 2: Data Modeling

In the Power BI Model view:

Established relationships using FlightID between the three datasets.

Set cardinality as one-to-many from Flight_Information to both Passenger_Information and Ticket_Information.

Verified relationships to support accurate data analysis and reporting.

5. Task 3: Enhanced Data Insights

Performed advanced transformations in Power Query:

Added a conditional column: Flights were labeled as "Best" if their status was "On Time" or "Completed," and "To Be Improved" otherwise.

Used the "Column from Examples" feature to extract flight numbers into a new column for simplified analysis.

6. Task 4: Calculations Using DAX

Created custom DAX measures:

Total Passengers – Counted passengers per flight.

Total Tickets Booked – Counted tickets per flight.

Filtered table displaying only flights labeled as "Best."

These calculations helped provide deeper operational insights.

7. Task 5: Visualization and Interactive Features

Created dynamic visuals using Power BI:

Bar chart showing passenger count by airline.

Pie chart displaying ticket booking status.

Matrix showing flights categorized by airline and destination.

Interactive features included:

Slicers for destination and airline filtering.

Buttons for quick insights.

Separate report pages dedicated to each airline for detailed views.

8. Task 6: Final Dashboard and Power BI Service

Designed a professional dashboard combining key visuals.

Configured Row-Level Security (RLS) for Airline A to restrict data access.

Published the report to Power BI Service.

9. Conclusion and Key Insights

This Power BI project provided valuable insights into airline operations:

Identified top-performing and underperforming flights.

Showed booking trends by airline and destination.

Enabled quick decision-making through interactive dashboards.

The project demonstrates the power of business intelligence tools in transforming raw data into meaningful insights for strategic use in the airline industry.