

AIRLINE OPERATIONS PERFORMANCE ANALYSIS - (MOCK PROJECT): A COMPREHENSIVE CASE STUDY (POWER BI)

Business & Data Analyst Portfolio Project

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Tools: Power BI • Power Query • DAX • Excel

PROJECT OVERVIEW & OBJECTIVE

Project Overview:

This mock project focuses on analyzing revenue performance for a fictional airline company using an aggregated flight dataset. The goal is to design a dynamic Power BI dashboard that helps business leaders understand revenue patterns, passenger behavior, route profitability, and monthly performance trends.

The dashboard is designed as a real-world simulation of what business analysts produce for finance, operations, and strategy teams.

Business Objective

- ◆ To create a revenue intelligence dashboard that answers key strategic questions:
- ◆ Which flight routes contribute the most to overall revenue?
- ◆ How do passenger trends correlate with changes in ticket fares?
- ◆ What seasonal patterns exist in revenue performance?
- ◆ Which factors drive fluctuations in revenue across months?
- ◆ How can executives quickly identify under-performing or high-potential routes?

This case study demonstrates my ability to:

- ✓ Clean and transform raw data
- ✓ Build an analytical data model
- ✓ Apply DAX for calculations
- ✓ Create interactive dashboards
- ✓ Extract business insights that support decision-making

DATASET OVERVIEW

Dataset Description

The dataset used in this project contains operational flight and revenue-related information. Key columns include:

Core Fields

- **Date** – Monthly or daily flight records
- **Route** – Origin–destination combination
- **Passengers** – Number of passengers per route
- **Revenue** – Total revenue generated
- **Average Fare** – Ticket price per passenger

Data Transformations Performed (Power Query)

I leveraged **Power Query (M Language)** for initial data cleansing and transformation, and **DAX** to build the core analytical intelligence:

1. Data Cleaning

- Removed duplicates
- Standardized date format to *YYYY-MM*
- Ensured numeric fields were properly typed (e.g., Decimal Number)

2. Data Enrichment

- **Time Intelligence Logic:** I engineered the underlying data model, Created **Month Name and Month Number** columns and time intelligence logic to correctly sort the Month Name (e.g., Jan, Feb, Mar) chronologically, resolving the fundamental visualization flaw of alphabetical sorting.
- Created Revenue Group and Delay Category columns.
- Created robust measures to calculate the custom On-Time Rate (15%) and Delay Rate (85%), On-Time Status. I then applied conditional logic within these measures to set performance benchmarks and used Conditional Formatting to instantly flag the severe performance status (Red).
- **Custom Classification:** To provide immediate diagnostic clarity, I authored a calculated column to classify raw delay times into business-relevant categories: **Minor, Moderate, and Severe**. This classification is essential for prioritizing quick-win fixes versus complex, long-term technical overhauls.

3. Data Quality Checks

- ◆ Checked for missing values

4. Modeling

Engineered a robust, normalized Date table with strong relational integrity to support cross-functional analysis.

This ensures optimized report performance and accurate DAX calculations.

DASHBOARD FEATURES & DESIGN RATIONALE

Main Dashboard Features

1. Revenue by Route (Stacked Bar Chart)

- Shows how each route adds or reduces total revenue
- Highlights top-performing routes

2. Passenger Volume vs Average Revenue By Month (Combo Chart)

- Line represents average revenue trend
- Bars represent passenger volume
- Useful for identifying price elasticity or demand changes

3. Revenue Contribution by Month (Stacked Column Chart)

- Shows how each month adds to total revenue
- Highlights which month (1st quarter - Jan → Mar) with the highest revenue

4. Delay Category :Shows the proportion of each delay category

5. Delay Reason By Delay Category

- Shows the factor contributing the most delay
- Show the proportion of each delay category recorded in each delay factor

6. Total Delay (mins) By Route (Stacked)

- Shows the total delay time each route scored within the first quarter (Jan - Mar)
- Highlights the top and the least delayed routes.

7. Passenger vs Total Revenue By Route (Line Chart)

- The green line represents total revenue
- The blue line represents total passengers
- Useful for identifying the most passenger-densed route and the highest revenue generating route.

8. On-Time Rate By Month (Line Chart)

- Shows the rate of operations' promptness over the months.
- The visual immediately highlights the most critical operational problem: the **rate of decline**.
- It visually confirms the 85% Delay Rate is not a stable issue, but a **rapidly deteriorating crisis** that reached its worst point in March.

9. Delayed Flight vs Delay reason By Month: Shows the number of delayed flights and the root cause of the delays.

10. Table of Key Metrics

A summary table displaying:

- Flight ID
- Route
- Passengers
- Delay (mins)
- Revenue
- Delay Category
- Revenue Group

Provides a compact view for decision-making and export.

11. Revenue Change By Month (Period-Over-Period) - Waterfall Chart

- Shows how each route adds or reduces to the total revenue from the previous months
- Highlights the month with the highest growth in revenue from the previous months
- Helps identify low or negative contribution routes

12. Revenue Change By Route Ranking (Waterfall Chart):

This shows the difference between the previous route's revenue and the next route's revenue (Previous Route is ranking based).

The previous revenue is the revenue of the route ranked immediately after the current route when sorted by total revenue (descending).

13. Slicers

- Route
- Month Name
- Delay Category
- Delay Reason

These allow stakeholders to drill down instantly.

14. KPI Cards

- Total Revenue
- Total Passengers
- Avg Revenue
- On-Time Rate

- On-Time Status
- Delay Rate
- Sum Of Fuel Used
- Total Flights
- Total Passengers
- Top Revenue Route
- Top Delayed Route
- Avg Delay (mins)

These KPIs give executives and Operations Managers a quick, high-level snapshot.

ANALYSIS & INSIGHTS

Route-Level Revenue Analysis

- The top 2 routes contribute a significant portion of total revenue.
- Several routes show strong passenger volume but below-average fare — indicating potential for premium pricing.
- Some routes have high fares but low demand, suggesting price sensitivity or competition.

1. Passenger & Revenue Trend Insights

- When average revenue increases, passenger numbers decline slightly — typical revenue optimization pattern.
- Some months show rising passengers despite constant fares, indicating seasonal high demand.
- Sharp drops in Revenue usually correspond with increased passenger volumes.

2. Seasonality Observations

- Revenue peaks in march.
- Low performance months show both reduced passenger volume and lower fares.
- Recommendation: Introduce targeted promotions in historically low months.

3. Revenue Drivers

Key drivers identified:

A. Route Mix

Certain routes consistently outperform others due to fare pricing.

B. Passenger Volume

Passenger count is the strongest contributor to revenue changes month-to-month.

C. Pricing Strategy

Fare fluctuations significantly influence revenue and passenger behavior..

5. Opportunities for the Business

- Strengthen marketing on low-revenue but high-passenger routes
- Introduce dynamic fare pricing
- Expand frequency on top-performing routes
- Reevaluate or optimize underperforming routes

This dashboard helps executives make data-backed decisions aligned with revenue growth.

TOOLS & SKILLS USED

Tools

Power BI Desktop – report building

Power Query – data cleaning, modeling

DAX (Data Analysis Expressions) – calculations, measures

Excel – data preparation

Key Skills Demonstrated

- Data Transformation
- Cleaning, shaping, merging tables
- Creating dimension tables
- Time intelligence setup

DAX Measures Created

- Total Revenue
- Total Passengers
- Average Revenue
- Revenue Per Passenger
- MoM Growth Metrics
- Top Revenue Route
- Top Delayed Route
- Average Delay (mins)
- Total Delayed Flights
- Total Flights
- On-Time Status

Dashboard Design

- Visual storytelling
- Executive-level UI layout
- Color balance & accessibility

Analytical Interpretation

- Identifying revenue patterns
- Understanding price-demand behavior
- Providing actionable business insights

CONCLUSION

This Revenue Analytics Dashboard demonstrates an end-to-end BI workflow — from raw data transformation to insight extraction.

The project showcases my ability to:

- Understand business problems
- Translate data into meaningful insights
- Create dashboards that support strategic decisions
- Communicate findings clearly through visuals and color codes

This mock project is one of several portfolio pieces reflecting my capability as a **Business/Data Analyst**.