Maven Rail Challenge - Data Analysis & Insights

Introduction

As a BI Developer for National Rail, the goal of this analysis is to provide insights on train travel patterns. The dashboard has been designed to address four key business questions:

1. **Identify the most popular routes**
2. **Determine peak travel times**
3. **Analyze revenue from different ticket types & classes**
4. **Diagnose on-time performance and contributing factors**

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1. Identify the Most Popular Routes

Business Question:

Which routes are the most popular among passengers?

Insights:

- The **Top 10 Most Popular Routes** have been identified based on the number of journeys taken.
- **Manchester, Piccadilly-Liverpool, and London** are among the busiest routes, with over **4,000 journeys each**.

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2. Determine Peak Travel Times

Business Question:

What are the busiest travel hours in a day?

Insights:

- The **peak travel hours** occur between **6 AM - 9 AM** and again between **5 PM - 7 PM**, indicating rush-hour commuter traffic.
- The data suggests that most travel happens during working hours, likely due to office and business travel.
- The analysis helps in **resource allocation** like increasing train frequency during peak hours.

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3. Analyze Revenue from Different Ticket Types & Classes

Business Question:

How does revenue distribution vary across different ticket types and classes?

Insights:

- Ticket revenue is highest for **Advance bookings (2,44,368 GBP)**, followed by **Anytime (1,73,772 GBP)** and **Off-Peak (1,69,072 GBP)** tickets.
- **Standard Class** generates **4,62,711 GBP**, significantly more than **First Class (1,24,501 GBP)**, indicating a higher preference for affordable travel options.
- The revenue breakdown helps in understanding **pricing strategies** and **demand for premium services**.

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4. Diagnose On-Time Performance and Contributing Factors

Business Question:

What are the key factors affecting train cancellations and delays?

Insights:

- **Weather issues** caused the highest number of delays (**657 cases**), followed by **technical issue (324 cases)** and **Signal Failure (332 cases)**.
- **Signal failures (472 cases)** were the primary reason for cancellations.
- The analysis enables railway operators to **prioritize maintenance and operational improvements**.

Conclusion & Recommendations

- **Optimize train schedules** for peak travel hours to reduce congestion.
- **Increase revenue** by promoting advance ticket bookings and improving first-class services.
- **Improve infrastructure** to minimize delays and cancellations due to weather and technical issues.

This dashboard provides a **clear, data-driven approach** to improving National Rail's operational efficiency and passenger experience.