UK Railway Analytics – End-to-End Performance Report (Jan–Apr 2024)

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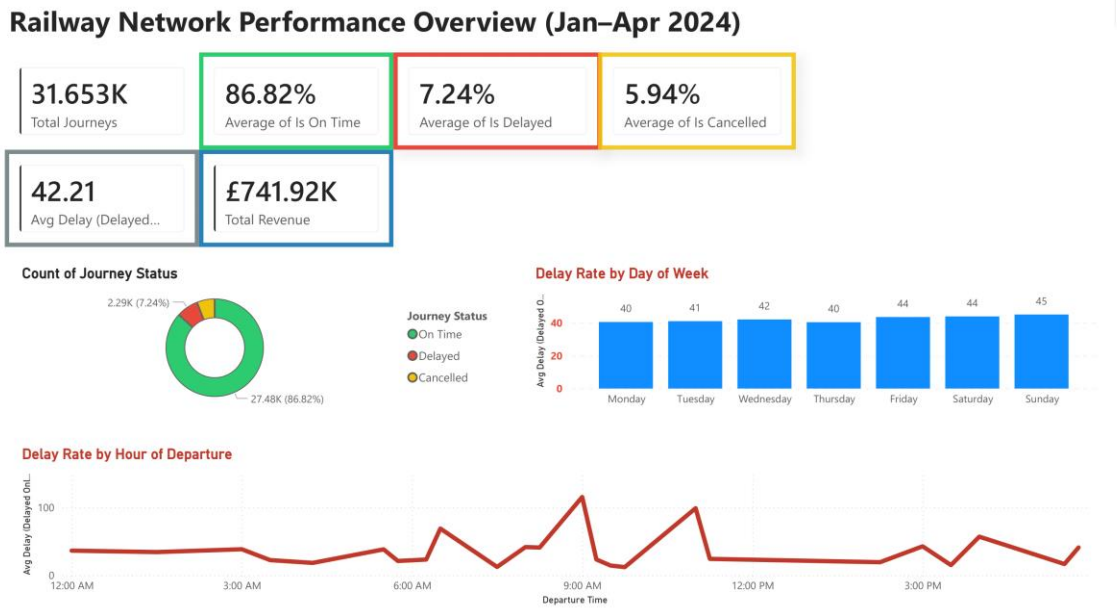
Introduction

This report provides a clear and simple overview of railway performance in the UK between January and April 2024. It summarises four key analytical areas using Power BI dashboards: operational performance, ticket pricing, customer behaviour, and route performance. The aim is to explain what the data shows, why it matters, and how the service can improve. The analysis was produced as part of an end-to-end data analytics project, including data cleaning, feature engineering, DAX measure development, and interactive dashboard design. The goal was not only to explore the dataset, but also to demonstrate strong data storytelling and the ability to translate insights into practical recommendations for business stakeholders. This report is designed to be accessible for both technical and non-technical readers, offering a balanced view of performance trends, commercial patterns, and customer behaviour across the UK railway network.

1. Operational Performance Overview



Insight 1 — Most journeys arrive on time, but delays still affect many passengers.

Data:
- Total journeys: 31,653
- On-time: 86.82%
- Delayed: 7.24%
- Cancelled: 5.94%

Story:
The network performs well overall, but almost 13% of journeys still experience delays or cancellations. This affects thousands of customers every day.

Recommendation:
Focus improvement efforts on the hours and routes with the highest delays.

Insight 2 — The highest delays occur in the morning peak.

Story:
Morning travel is sensitive because it affects the rest of the day's timetable. Delays around 09:00–09:30 can cause a chain reaction across multiple services.

Recommendation:
Review crew readiness, rolling-stock availability, and timetable spacing.

Insight 3 — Weekend days show worse delay performance.

Story:
Leisure travel and maintenance windows create more disruption during weekends.

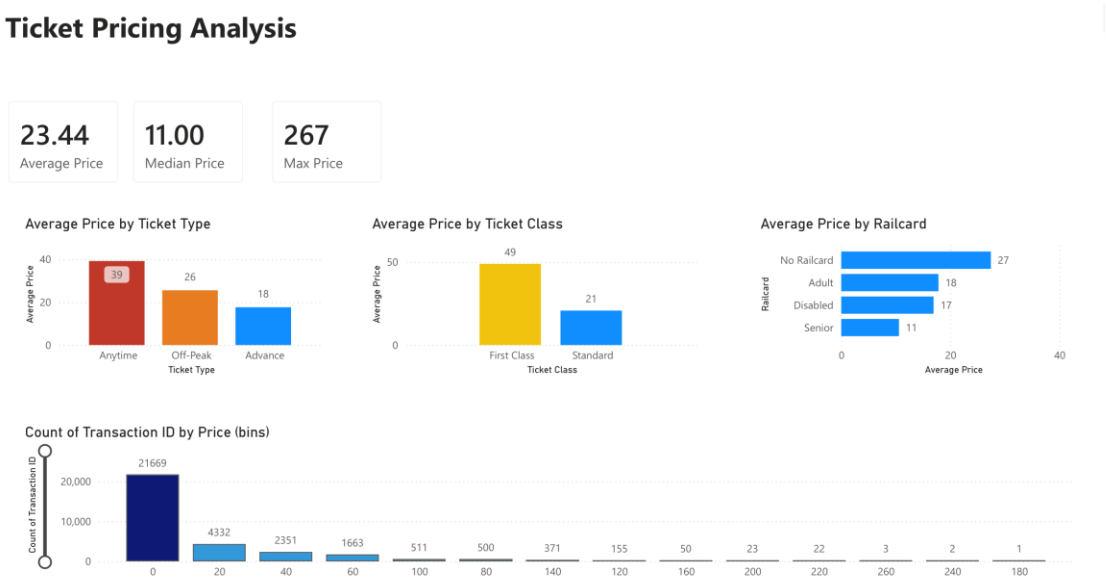
Recommendation:
Adjust maintenance timing and weekend timetables.

Insight 4 — Revenue is linked to journey volume.

Story:
Reliable operations support stronger revenue, as customers travel more when service is stable.

Recommendation:
Improve performance during high-volume periods.

2. Ticket Pricing Analysis



Insight 1 — Railcard users pay much less than other passengers.

Story:
Railcards allow customers to reduce travel costs. This is attractive for frequent or cost-sensitive travellers.

Recommendation:
Promote Railcard usage through targeted digital campaigns.

Insight 2 — First Class prices are more than double Standard Class.

Story:
There is strong price segmentation, but many First Class seats remain empty at off-peak times.

Recommendation:
Apply dynamic pricing to increase First Class occupancy.

Insight 3 — Most tickets are priced below £60.

Story:
Passengers prefer affordable travel, making the market volume-driven.

Recommendation:
Maintain competitive pricing in popular fare ranges.

Insight 4 — Ticket type strongly affects price.

Story:
Customers who plan ahead pay less, while flexible travellers pay more.

Recommendation:
Highlight cheaper ticket types on digital platforms.

3. Customer Behaviour & Purchase Trends

Insight 1 — Online purchases are more common than station purchases.

Story:
Passengers prefer fast and convenient digital booking.

Recommendation:
Improve the digital experience for smoother online purchases.

Insight 2 — Ticket purchases follow daily and hourly patterns.

Story:
Commuters buy tickets during morning and evening peaks, while weekend travel drives Sunday demand.

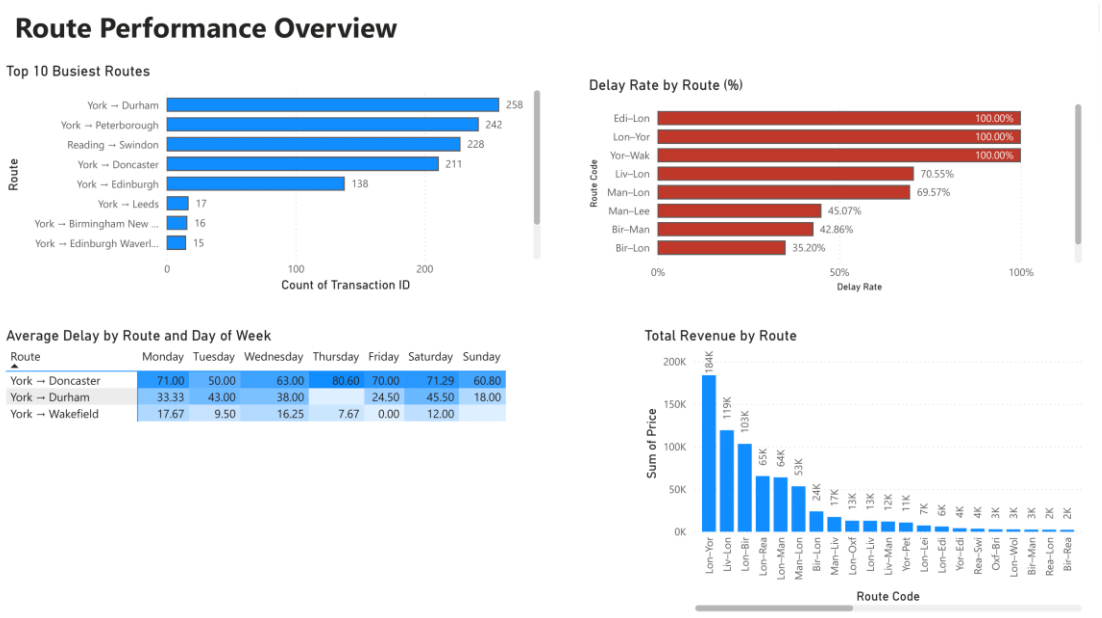
Recommendation:
Use targeted messages and appropriate staffing during peak buying times.

Insight 3 — Digital purchasing is linked to ticket type.

Story:
Advance and Off-Peak tickets are mostly bought online by price-sensitive travellers.

Recommendation:
Use digital offers to guide purchase behaviour.

4. Route Performance Overview



Insight 1 — A few routes carry most passenger volume.

Story:
Problems on major routes affect the largest number of passengers.

Recommendation:
Prioritise investment and reliability improvements on key corridors.

Insight 2 — Some routes show extremely high delay rates.

Story:
These routes may have structural or scheduling problems that need deeper analysis.

Recommendation:
Perform detailed operational diagnostics.

Insight 3 — Revenue is concentrated in major intercity routes.

Story:
Long-distance routes generate most of the revenue and must be protected.

Recommendation:
Ensure strong reliability and capacity planning on these routes.

Insight 4 — Delays vary by weekday.

Story:
Different routes show different delay patterns depending on the day.

Recommendation:
Adjust staffing and scheduling based on weekday behaviour.

5. Final Recommendations

- Improve peak-hour operations.
- Strengthen digital ticketing.
- Maintain competitive pricing.
- Protect high-revenue intercity routes.
- Improve weekend service performance.
- Use dynamic pricing where appropriate.

6. Project Resources & Contact

GitHub Repository:
https://github.com/su7ri/uk-railway-data-analytics

Portfolio Website:
https://azed.uk

Power BI Dashboard (PBIX):
Included in the GitHub repository

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https://linkedin.com/in/soroush-azed

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7. Data Source

This project uses publicly available data from Kaggle:

National Rail UK Train Ticket Data (Jan–Apr 2024)
https://www.kaggle.com/datasets/motsimaslam/national-rail-uk-train-ticket-data

The dataset includes ticket types, journey dates, departure/arrival stations, prices, and additional attributes used for operational, pricing, customer behaviour, and route-level analysis.