MTA Ridership Recovery Analysis & BI Dashboard

1. Executive Summary

This project involves a comprehensive analysis of the Metropolitan Transportation Authority (MTA) daily ridership data. The primary objective was to evaluate the post-pandemic recovery of New York City's public transportation network. By processing raw daily records, a dynamic Power BI Dashboard was developed to visualize ridership trends, compare performance across different transit modes (Subways, Buses, Commuter Rails), and measure recovery rates against pre-pandemic baselines.

2. Business Problem & Purpose

The Challenge: Post-COVID-19, transportation patterns shifted drastically. Stakeholders required a clear view of how different transit modes were recovering to optimize operations and resource allocation. The raw data provided was in a wide, non-normalized format, making direct comparative analysis and time-series forecasting difficult.

The Solution: This project transformed raw data into a structured Business Intelligence (BI) solution. It provides an interactive platform for monitoring:

- Daily ridership volume vs. pre-pandemic levels.

- Month-over-Month (MoM) growth rates.

- Operational recovery disparities between public transit (Subways/Buses) and private vehicle traffic (Bridges/Tunnels).

3. Methodology & Technical Workflow

Phase 1: ETL (Extract, Transform, Load) using Power Query

- Data Transformation: Converted the dataset from a wide format to a long format using unpivoting.

- Data Cleaning: Split composite attributes to separate transport mode from metric type.

- Pivoting: Created distinct fields for total ridership and recovery percentage.

- Null Handling: Applied logic to correctly handle missing values.

Phase 2: Data Modeling (Star Schema)

- Fact Table: Fact_Ridership (daily transactional data)

- Dimension Tables: Dim_Date, Dim_Transport

- Built one-to-many relationships for filtering and drill-down.

Phase 3: Advanced Analytics (DAX)

- Used dynamic measures instead of calculated columns.

- Key measures: MoM Growth %, Avg Recovery %, time intelligence calculations.

Phase 4: Visualization & UI/UX

- Implemented Z-pattern layout.

- Card visuals for KPIs; line/area charts for trends.

- Professional color palette with card effects.

4. Key Insights & Results

- Subways have the highest ridership volume.

- Bridges & Tunnels recovered faster than public transit.

- Weekend vs. weekday behavior reflects post-pandemic work patterns.

5. Tools & Technologies

- Data Processing: Excel, Power Query

- Visualization: Power BI

- Languages: DAX, M Language