Results & Outcomes Report Template

Graduation Project – Data Analysis Track (Power BI)

Submit as: PDF & Submit The Power BI File [.pbix] and a published link

Executive Summary

- This project analyzes MTA ridership patterns after COVID-19 using Power BI to understand how travel behavior in New York has changed since the pandemic.

- By examining daily ridership data from 2020–2024 across subways, buses, commuter rail, Access-A-Ride, and bridges & tunnels, the study measures recovery rates, identifies new travel trends such as the "Friday Effect," and compares weekday vs. weekend usage.

- The Power BI dashboard provides interactive visuals and key KPIs—like Ridership Recovery %, Mode Share, and Traffic Comparison—to help decision-makers improve service planning, resource allocation, and fare strategies.

- Ultimately, the project delivers data-driven insights that support smarter and more sustainable post-pandemic transportation management.

Methodology

- Data Collection & Sources
  - The dataset used in this project was obtained from the Metropolitan Transportation Authority (MTA) Open Data portal, which provides daily ridership reports for all major transit services in New York.
  - Data spans from March 2020 to 2024 and includes subways, buses, commuter rail (LIRR and Metro-North), Access-A-Ride, bridges & tunnels, and the Staten Island Railway.
  - MTA Open Data (official ridership and traffic datasets)
- Data Preprocessing
  - Before analysis, the team conducted comprehensive data cleaning and transformation to ensure accuracy and consistency:
    - Converted date fields to proper Date format.
    - Checked and removed duplicate or missing entries.
    - Standardized numeric columns (ridership counts & percentages).
- Analytical methods applied
  - The team used Power BI to build interactive dashboards that visualize key ridership patterns — including daily trends, weekday vs weekend behavior, and the "Friday Effect."
  - Using DAX calculations, several KPIs were developed such as Total Ridership, Recovery %, Mode Share, and Traffic Recovery.
  - Through trend and correlation analysis, the team explored the link between public transit usage and private vehicle traffic, supported by time-series visuals (line and area charts) that revealed seasonality and recovery patterns across different transport modes.
- Tools used (Power BI).

Measure Name	Purpose / What It Does
Avg Daily Ridership	Calculates the average number of passengers per day across all transit modes, helping to identify general ridership trends.
Friday Effect Gap %	Measures the decrease in ridership on Fridays compared to midweek days (Tuesday–Thursday), indicating the hybrid work "Friday Effect."
Mode Share %	Shows the contribution of each transportation mode (subway, bus, rail, etc.) to the total ridership.
Peak Day Ridership	Identifies the highest ridership day during a selected period, highlighting demand peaks.
Revenue Impact	Estimates total fare revenue by multiplying total ridership by the average fare value.
Ridership Recovery %	Indicates how close current ridership levels are to pre-pandemic (2019) averages.
Total Ridership	Aggregates the total number of passengers across all MTA services per day.
Traffic Recovery %	Compares current bridge and tunnel traffic levels to pre-COVID baselines, showing vehicle recovery trends.
Weekday vs Weekend Ratio	Compares average weekday ridership with weekend ridership to analyze changes in commuting versus leisure travel.
Weekend Drop %	Measures the decline in ridership during weekends compared to weekdays.
YoY Ridership Change %	Calculates the year-over-year percentage change in ridership, showing long-term growth or decline trends.

- **Calendar Columns Summary**

Column Name	Description / Purpose
Date	The main date field used for linking tables and performing time-based analysis.
Day	Numeric day of the month (1–31).
DayName	Full weekday name (e.g., Monday, Tuesday).
IsHoliday	Flags whether a date is a public holiday (True/False).
Month / MonthName	Displays both numeric and text versions of the month for grouping and filtering.
Quarter / QuarterName	Indicates the quarter of the year (Q1–Q4) for period-based aggregation.
Season	Categorizes each date into a season (Winter, Spring, Summer, Autumn) for seasonal analysis.

WeekdayNum	Numeric value of the weekday (1 = Monday, 7 = Sunday).
WeekNum	Represents the week number of the year.
WorkdayType	Defines whether a date is a "Weekday" or a "Weekend."
Year / YearMonth	Combines year and month values for monthly and yearly trend analysis.

MTA RIDERSHIP ANALYSIS DASHBOARD

We still have more improvements to do , waiting for your comments

MTA Ridership

Apply all slicers   Clear all slicers

Total Ridership
7,930,759,337

Avg Daily Ridership
4,648,745

Peak Day Ridership
7,535,723
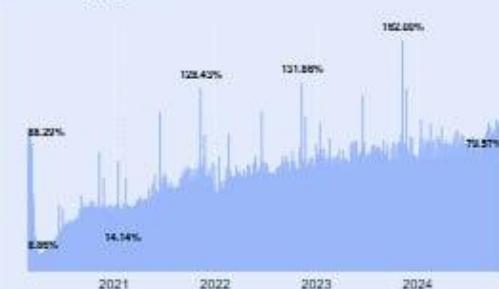
Date
3/1/2020   10/31/2024

Means of transportation
All
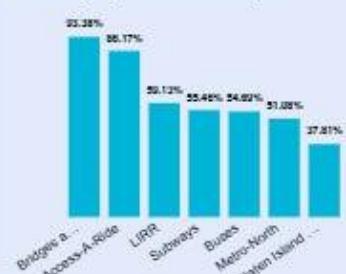
Table title

| Means of transportation	Total Ridership	Contribution
Subways	4,280,447,795	53.97%
Buses	1,717,716,966	21.66%
Bridges and Tunnels	1,459,658,489	18.41%
LIRR	231,947,958	2.92%
Metro-North	195,999,394	2.47%
Access-A-Ride	37,432,255	0.47%
Staten Island Railway	7,556,480	0.10%
Total	7,930,759,337	100.00%
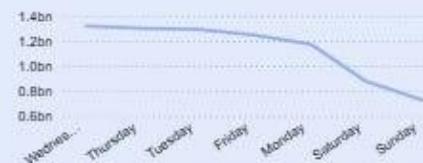
Recovery by time

Recovery by Means of transportation
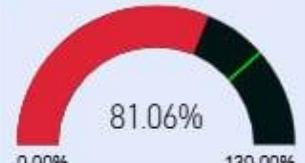
Total Ridership by DayName

Total Ridership by Date and Means of transportation

Access-A-Ride, Bridges and Tunnels, Buses, LIRR, Metro-North, Staten Island Railway, Subways

Recovery in 2024

81.06%

0.00%   130.00%

RECOVERY ANALYSIS DASHBOARD

Access-A-Ride	Bridges and Tunnels	Buses	LIIR	Metro-North	Staten Island Railway	Subways
86.29%	93.36%	59.46%	80.91%	75.69%	46.01%	69.60%

Slicers

2020	2023
2021	2024

2022

False

True
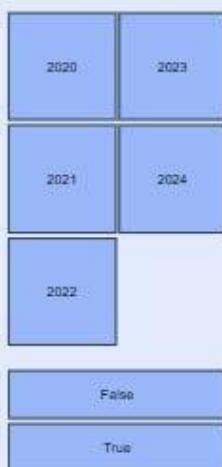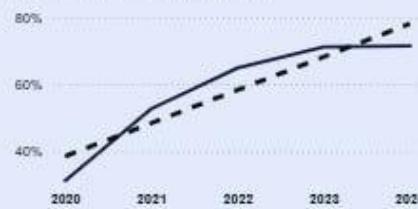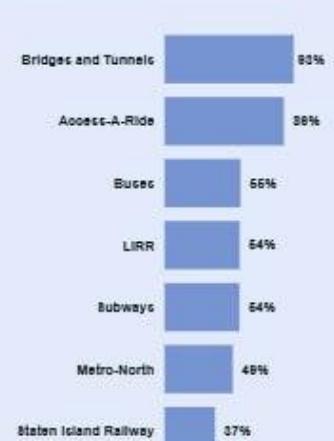
Ridership Recovery % by Year

Ridership Recovery % by Season

82.60% Fall	80.23% Winter
57.84% Summer	55.88% Spring

Ridership Recovery % by DayName

Sunday	86.73%
Saturday	84.27%
Wednesday	58.81%
Thursday	58.48%
Tuesday	57.51%
Friday	56.89%
Monday	56.26%

Ridership Recovery % by Means of transportation

Bridges and Tunnels	93%
Access-A-Ride	86%
Buses	56%
LIRR	54%
Subways	54%
Metro-North	49%
Staten Island Railway	37%