**Port Authority PAX BUS TALLY 2021-2023 (Team 3)**

**Introduction:**

Our team worked on a Power BI project focused on gathering data for New York and New Jersey from December 2020 to September 2023. We collected information on climate, temperature, gas prices, major and minor sports events, strikes in the week, and UN events. After compiling the data in an Excel sheet, we imported it into Power BI for analysis. The project included consolidating the information and conducting forecasting to gain insights. We used Trend line to forecast the data.

**Project Description:**

The provided data appears to describe the number of bus departures and passengers by various carriers for the weeks between 12/7/2020 to 09/25/2023.Here's a description of the data:

* Weekday: The data is for the each week, which represents a 5-day period.
* Carrier: This column lists the names of different bus carriers operating during that week.
* Departures: The "DEPARTURES" column shows the number of bus departures for each carrier during the specified week.
* Total Bus Departures: The "Total" row at the bottom provides the total number of bus departures for all carriers during the week.
* Total Passenger Departures: The "Total" row at the bottom provides the total number of passenger departures for all carriers during the week.
* Number of Carriers: There are a total of 10 different carriers listed in the data.
* Temperature: This is updated from the past data in Fahrenheit.
* Gas Prices: This column shows the historic prices for the data period given.
* Holiday in Week: This shows how man holidays are there in that particular week.
* Climate: This is updated from the past data.
* Major and Minor Sport Events: They indicate the number of events happened in a particular week.
* Strikes in a week: This column indicates the number of strikes happened in the respective week.
* UN Events: This column indicates the number of UN Events happened in the respective week.

**Problem Statement:**

1. Determine when the weekday departures will be past 125,000 passenger departures and 3,900 bus departures. Create your forecasting by year and month. Try to determine the factors that lead to those spikes. For example, a holiday, a taxi strike, a UN week or anything else.
2. The other useful component would be trying to forecast into 2030 to see how many people are projected to use the bus terminal in the years leading up to the completion of the renovation. This can be done by carrier to make it clearer and help with analysis but it’s important to know the overall usage all carriers included.

**Data Consolidation:**

In order to forecast the weekday departures exceeding 125,000 passenger departures and 3,900 bus departures, data is consolidated and forecasted using a trend line. Trend line is used to forecast the data when we have a time series or a set of data points and we want to identify and visualize a pattern or trend in that data. These trends can help us make predictions about future data points.

**Bus Departures for every week by carrier:**

This chart indicates the trend of total bus departures by all the carriers every week and the trend line is used to forecast the future. On the X-Axis, it indicates the year and Y-Axis indicates the total bus departures. In order to reach the 3900 bus departures using the current data, trend line is used which is indicated by a dotted line. After 2500 weeks, it is estimated that the projected bus departures will be met also indicated by an equation.

**Total Passenger Departures and Forecast:**

This chart indicates the trend of total passenger departures by all the carriers every week and the trend line is used to forecast the future. On the X-Axis, it indicates the year and Y-Axis indicates the total passenger departures. In order to reach the 125000 passenger departures by all carriers using the current data, trend line is used which is indicated by a dotted line. After 450 weeks, it is estimated that the projected passenger departures will be met also indicated by an equation.

**Power BI Visualization and Forecast:**

Step1: We imported the dataset from the Excel and performed data transformation.

Step2: Line Charts by considering various factors

1. **Forecast of Total Buses by Year, Quarter, Month and Year.**

This line chart illustrates the total number of buses from December 7, 2020, to September 25, 2023, with a highlighted area projecting the forecast until the total buses reach 3,900 and extend the prediction through the year 2030. The forecast predicts surpassing 3,900 buses by the second week of April 2027 (185 weeks or 3.55 years) and estimates the total number of buses to reach 4,200 by the year 2030.

1. **Forecast of Total Passengers by Year, Quarter, Month and Year.**

This line chart showcases the total passenger travel between December 7, 2020, and September 25, 2023, with a highlighted forecast area projecting travel until the total passengers reach an estimated 125,000. The forecast predicts exceeding 125,000 passengers by the second week of April 2027 (91 weeks or 1.75 years) and estimates the total number of passengers to reach 238,000 by the year 2030.

1. **Slicers:**

Slicers are visual elements that allow users to filter and interact with data in a report or dashboard. Slicers provide an easy and intuitive way for users to slice, filter, or segment data dynamically, enhancing the interactivity of the report. This helps in drilling down the data to the respective month or year or Quarter.

1. **Climate:**

The line chart, based on historical data, reveals spikes in both total passenger travel and the number of buses during periods characterized by excessively cold or freezing climates etc.,

1. **Temperature:**

The line chart, utilizing historical data, indicates an increase in both total passenger travel and the number of buses during periods with sunny temperatures (ranging from 70-82 Fahrenheit). Conversely, a declining trend is observed when temperatures reach their lowest levels (ranging from 25-38 Fahrenheit).

1. **Holidays in a week and UN Events:**

Line chart is plotted with the historic data for the given period and we found that there is a spike in the total number of passengers travelled and total number of buses if there are holidays in a week and if there are any UN Events that took place in a particular week.

**Conclusion:**

The analysis reveals a promising forecast for the total number of buses and passengers, with estimated growth trends until 2030. Slicers enhance user interaction by allowing dynamic data segmentation. Additionally, climate and temperature factors showcase their influence on travel patterns, emphasizing spikes during favorable conditions. Furthermore, the correlation between increased travel and holidays or UN events indicates the impact of external factors on transportation demand. The forecast anticipates surpassing 125,000 total passengers by the second week of April 2027 and reaching an estimated 238,000 passengers by 2030, while also estimating the total number of buses to exceed 3,900 by the same period in 2027 and to reach an estimated 4,200 by 2030.

**Student Names:**

1. Umesh Chandra, Rangu
2. Supraja Guptha, Damera
3. Sai Rahul, Chirra
4. Triveni, Pati
5. Nayan Bipinbhai Patel
6. Navitha, Ravella
7. Shashank Bharadwaj
8. Naveen Kumar, Kanoji