

# BUS EXPEDITION ANALYSIS & FORECAST



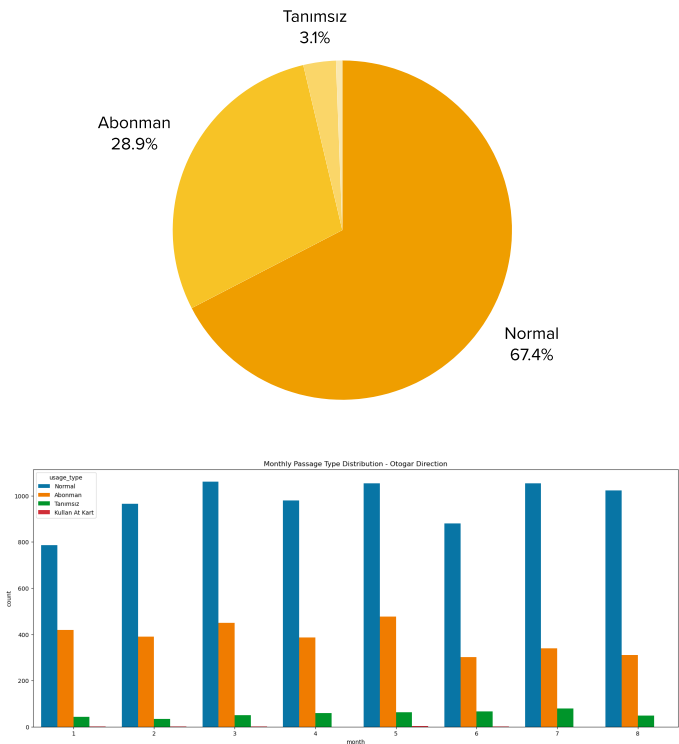
Modeling the Required Expedition and Departure Time for the  
750 (Otogar - Mecidiyeköy) Route Line

## About Project

This project aimed to estimate the required number of expeditions and expedition times for the 750 bus line using the data from the 750 line in Istanbul. Within the scope of the project, the data from the 750 line was analyzed. The passenger profile using the 750 line, the monthly and daily passenger numbers and distributions using the line, and the intensity of use of the stops on the line were analyzed.

As a result of these analyzes, the required number of expeditions and times for the line were modeled using the Poisson distribution.

## 1.Passenger Profile

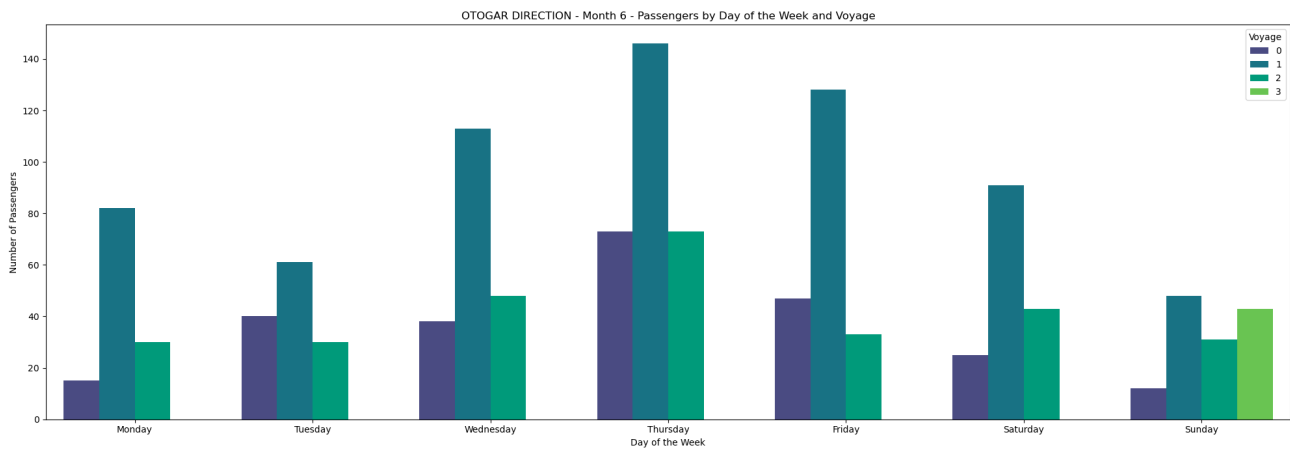


According to the direction of Otogar, the 750 bus line's monthly distribution of passenger card types is shown in the charts above.

## 2.Monthly and Daily Passengers

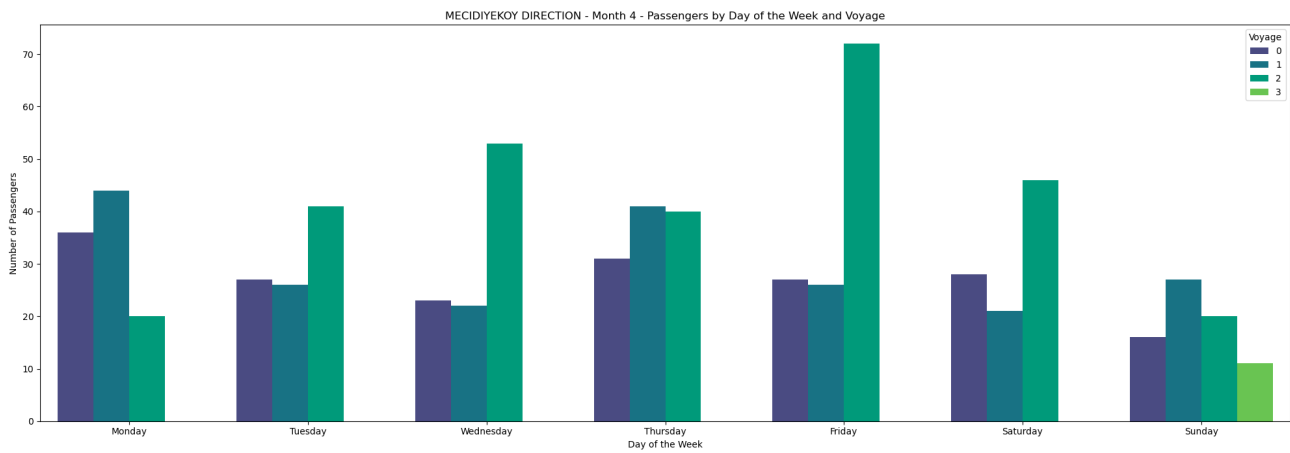
This analysis covers the period from January to August of 2023 in both directions. It displays passenger numbers based on daily expeditions for each month. The number of expeditions on weekdays, Saturdays, and Sundays is derived from the IETT website.

### Otogar Direction



In the chart above, June (Month 6) was selected.

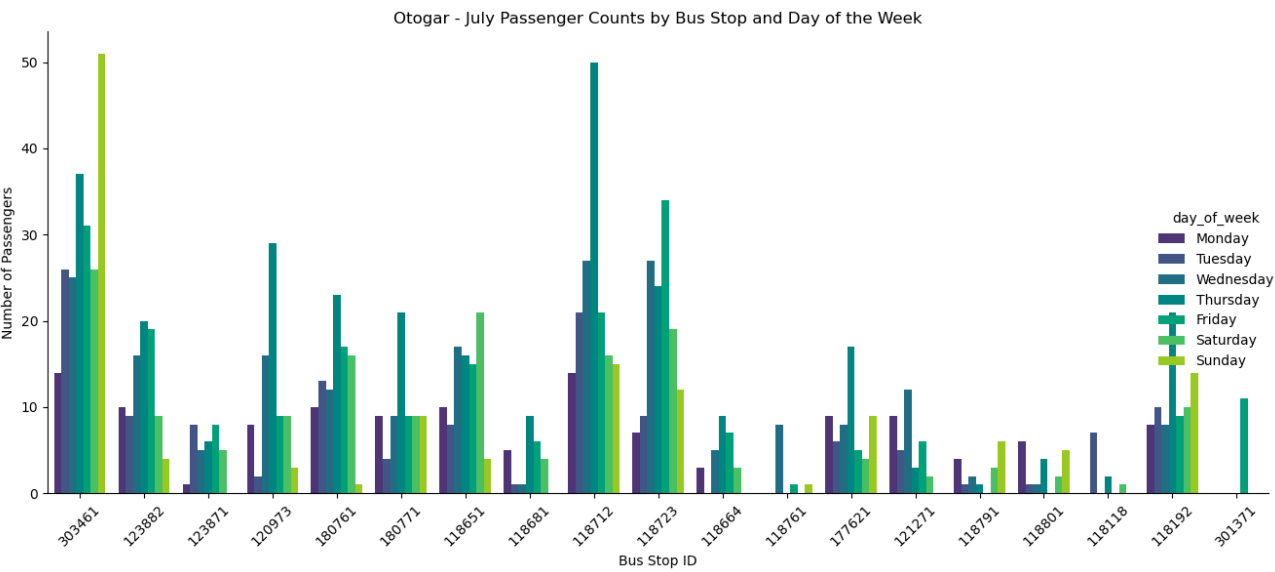
### Mecidiyeköy Direction



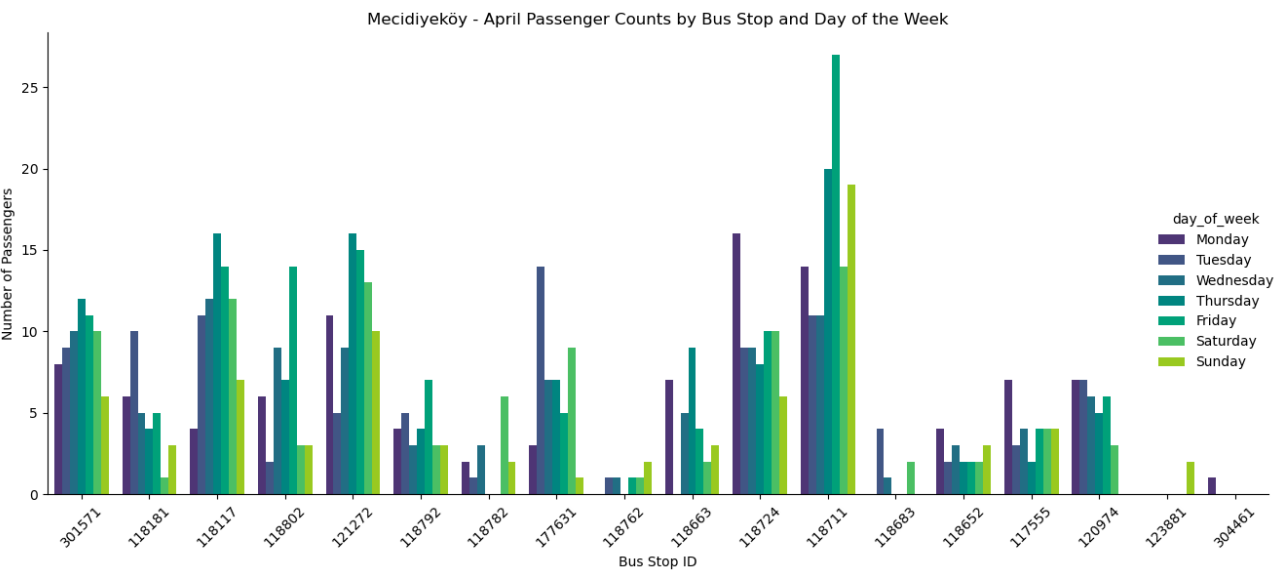
In the chart above, April (Month 4) was selected.

# 3.Bus Stop Density

## Otogar Direction



## Mecidiyeköy Direction



The IDs of the stops along the 750 route have been listed, and a graph has been generated to show where passengers boarded in sequence. For both directions, it was determined that the first stops and **118711-18712** stops (Cemal Kamacı Stops) were the most commonly used stops. The preference for this stop is associated with its proximity to the metrobus transfer point.

## 4.Expedition Prediction

After analyzing the data, the Poisson distribution was used to determine the daily required number of expeditions for the 75O bus line. According to this distribution, the capacity of a bus was taken as 70 and expeditions were planned separately in three categories: weekdays, Saturday and Sunday.

Since the result of the Poisson distribution is a decimal number, the result is rounded to the nearest integer and the required number of times is obtained.

### Results for Otogar Direction

Days	Current Expeditions	Expected Expeditions	Required Expeditions
Weekdays	3	3.341429	4
Saturday	3	2.173214	3
Sunday	4	1.732143	2

As a result, it is advisable to add one more expedition on weekdays due to the high demand and to reduce the number of expeditions to two on Sundays because of lower demand.

### Results for Mecidiyeköy Direction

Days	Current Expeditions	Expected Expeditions	Required Expeditions
Weekdays	3	2.323929	3
Saturday	3	1.185714	2
Sunday	4	0.964286	1

In conclusion, it is advised to decrease the number of expeditions on Saturdays and Sundays in the Mecidiyeköy direction, as they exhibit lower usage, similar to the approach mentioned earlier.

## 5.Expedition Time Prediction

After determining the required number of expeditions, an estimate for the departure time of each expedition was made by analyzing the busiest hours for the routes. Based on this estimate, the following table was created:

### Otogar Direction

#### Weekdays

Expeditions	Current Expeditions	Required Expeditions
1	06:00	06:22
2	07:50	07:52
3	18:00	08:26
4		18:31

#### Saturday

Expeditions	Current Expeditions	Required Expeditions
1	06:00	07:51
2	07:50	08:09
3	18:00	18:25

#### Sunday

Expeditions	Current Expeditions	Required Expeditions
1	11:00	-
2	13:00	-
3	15:00	15:37
4	17:00	17:08

Mecidiyeköy Direction

Weekdays

Expeditions	Current Expeditions	Required Expeditions
1	07:00	07:11
2	09:10	09:27
3	19:10	19:19

Saturday

Expeditions	Current Expeditions	Required Expeditions
1	07:00	07:08
2	09:10	-
3	19:10	19:23

Sunday

Expeditions	Current Expeditions	Required Expeditions
1	12:00	-
2	14:00	-
3	16:00	-
4	18:30	18:34

## 6.Seasonal Expedition Analysis

Upon analyzing the data, it was noticed that the recommended number of expeditions on Sundays is quite low. When we looked at the data on a monthly basis, we found that January and August have very little data for Sundays. To address this, we divided the months into two groups: one for January and August, and another for the rest of the months. We then recalculated the expeditions specifically for Sundays.

Season 1 : February to June

Season 2 : January & August

### Results for Otogar Direction

Days	Current Expeditions	S1 Required Expeditions	S2 Required Expeditions
Sunday	4	3	1

The current number of expeditions for Sundays is 4. Previously, when we made predictions using all the months, we got 2. After the analysis of the season, it was observed that there should be 3 times in Season 1 and 1 time in Season 2. This confirms that the data in January and August lowered the average number of expeditions.

### Results for Mecidiyeköy Direction

Days	Current Expeditions	S1 Required Expeditions	S2 Required Expeditions
Sunday	4	2	1

For the Mecidiyeköy direction, the current number of expeditions is 4, while the recommended number of expeditions is 1. Upon seasonal analysis, similar to the Otogar direction, it is suggested that in Season 1, there should be 3 expeditions, and in Season 2, 1 expedition is recommended.

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