

UBER Case Study

Supply-Demand Gap Analysis

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Analysis Objectives

For a taxi aggregator like Uber, supply shortages caused either by driver induced request cancellations and non-availability of cars leads to loss of potential revenue. Considering inputs from customer tickets and operations, it was identified that there are issues with customers securing trips to and from the airport. This case study is focused toward the analysis of demand and supply levels for airport trips (either city to airport or vice-versa). From the results of the analysis, we must identify :

1. Identify root cause (s) for the following problems
 - Cancellation of Cabs
 - Non-Availability of Cabs
2. Possible hypothesis of the problem(s)
3. Recommend way to improve the stated problem(s)

The analytical study has been conducted on masked data set. This Case Study progresses in three stages:

1. Data Cleaning and Formatting (Performed in Python)
2. Assumptions and Reasoning
3. Data Analysis and Reporting

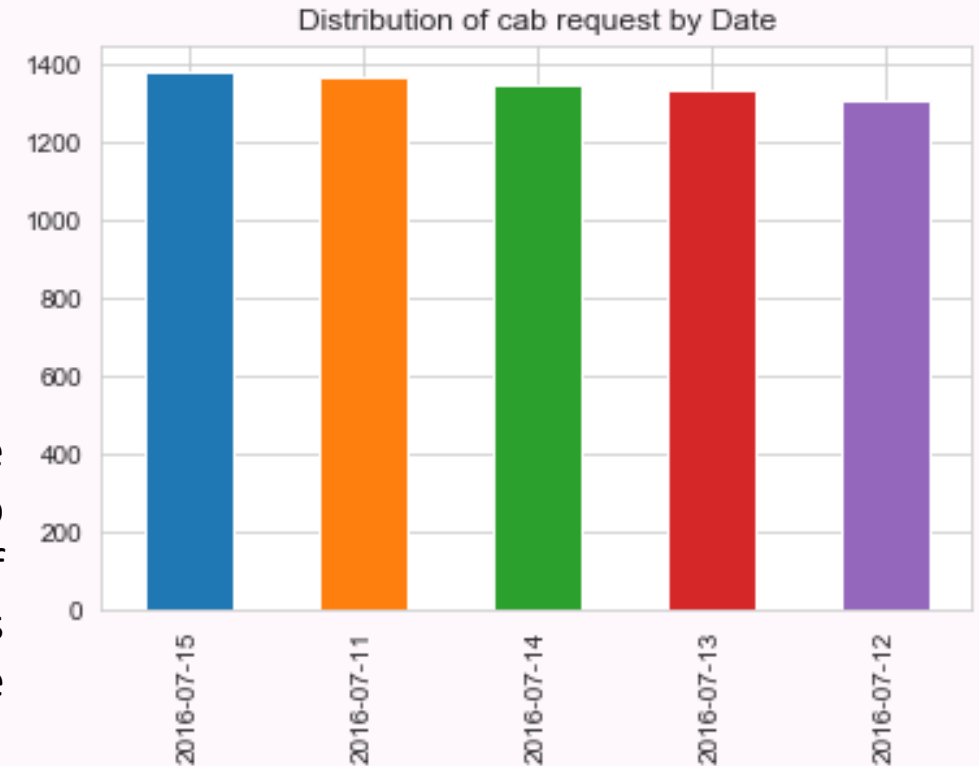
Assumptions and Reasoning

Day-Wise Distribution of Cab Request generated:

There is minimal variation in the number of requests generated with respect to the days of the week. Therefore each day can be viewed as a cycle and there are five cycles of data in our dataset.

Driver Idle Time Calculation:

As this dataset contains information only with respect to trips made to and from the airport, and there is discrepancy with respect to registering information for certain trips . Considering the scope of our analysis, driver idle time at the airport is not calculated as calculating idle time with missing information will generate misleading insights.



Demand Definition: Demand is defined as the total number of requests received within a given period.

Supply Definition: Supply refers to the total number of requests for which the trip status is completed.

Gap Definition: This refers to the number of requests for which there were no cars available or designated driver has cancelled the requests. As an expression it can be defined as Demand- Supply.

Assumptions and Reasoning – Cont.

Driver based Cancellation Trend:

From the data set the driver ID's showing extremely high number of cancelled requests (8 or above) have been shown . However, this figure might be misleading as we do not have any information with respect to the total number of trips made by these driver. As of the data available there are no outliers .

Time Slots:

The 24 distinct request hour attributes have been grouped into 5 time slot categories to study the supply and demand variations through different parts of the day. This grouping is not hard-coded and is open to the interpretation of the analyst. For the analysis;

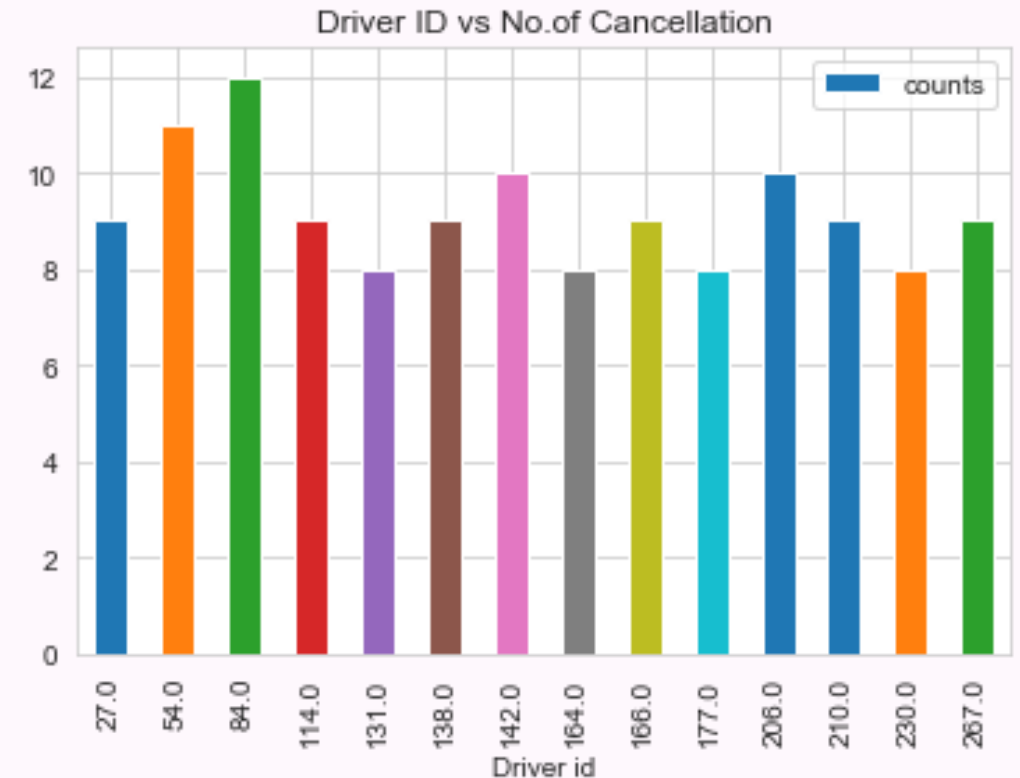
5am to 8am is Early Morning,

8am to 12pm is Morning Rush Hour,

12pm to 5pm is Afternoon,

5pm to 12am is Evening Rush Hour and

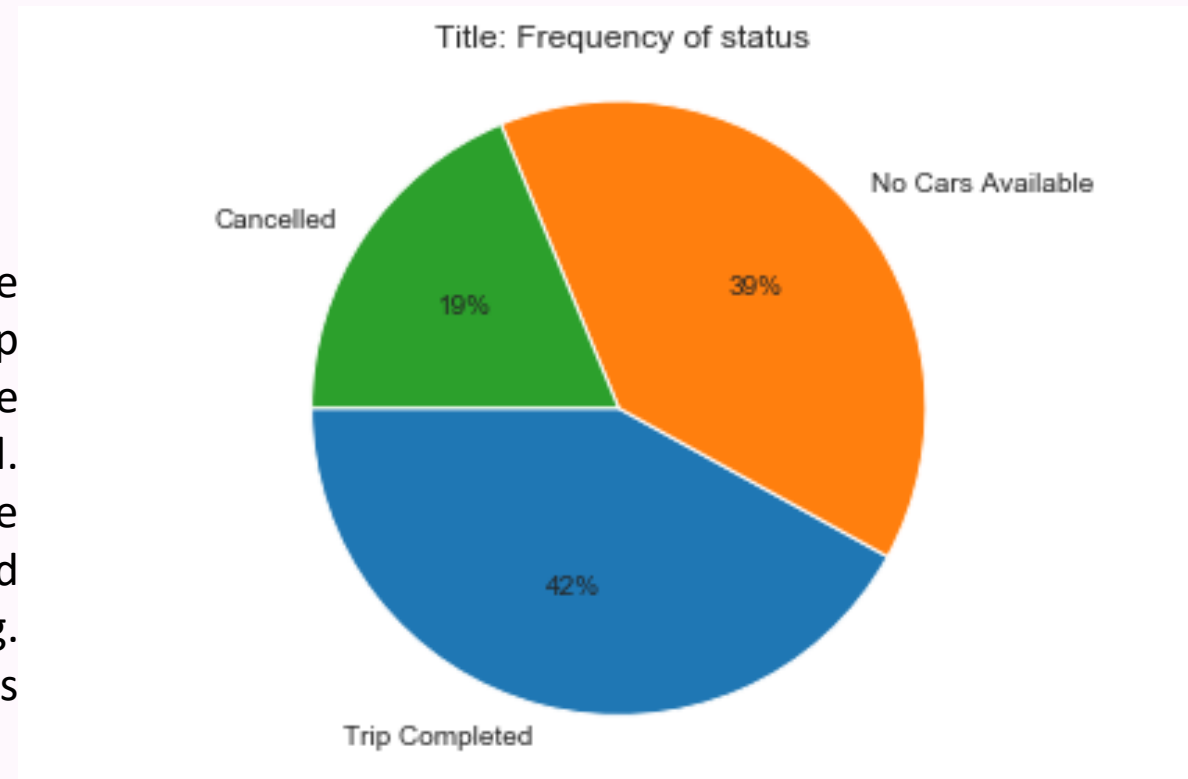
12am to 5am is Night



Identifying Most Pressing Problems

The frequency of status of all the request received:

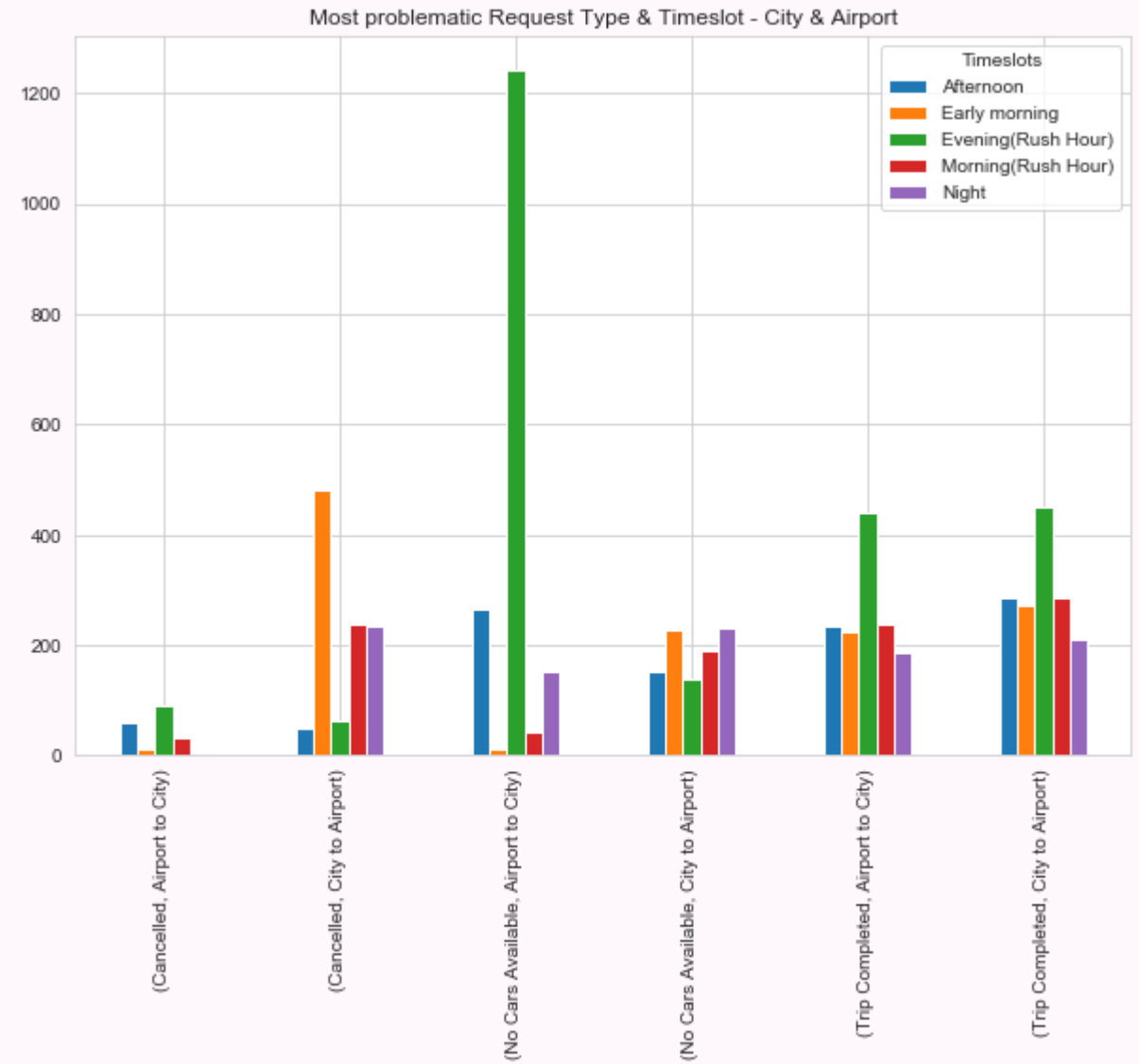
With the performance index of trips completed relative to the total requests received, Pie Chart shows the percentage of Trip completed, Cancelled and the percentage of No cars available status with respect to the total number of requests received. 58% of all customers requesting trips either to or from the airport are denied service either due requests being cancelled by drivers or no cars available at the time of booking. Therefore, we must look further into why the service requests were denied.



Identifying Most Problematic Type of Request

A higher percentage of customers booking an Uber taxi from the **Airport to City** and during the **Evening rush hours** are denied service due to **no cars available**. Hence, customer requests with pick-up location specified as airport are more problematic and are more likely to be denied service.

The Morning Rush Hour Time slot shows excessively high number of customer requests for taxi, cancelled by the driver. This mainly impacts customers booking a taxi from the city to the airport. The Evening Rush Hours Time slot shows excessively high number of customer requests denied due to lack of organic flow, i.e. No cars available. This mainly impacts customers booking a taxi from airport towards the city.



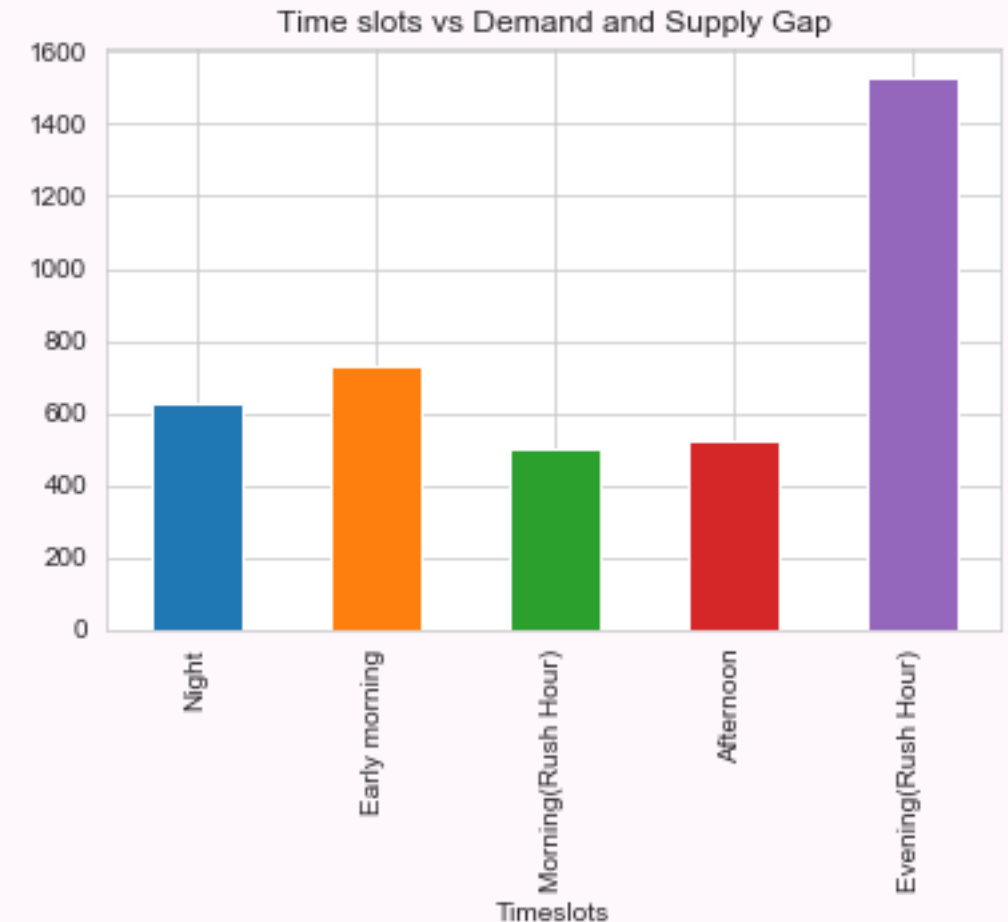
Gap between Demand & Supply – Timeslot Basis

The plot clearly show us that the time slots with the highest gap between demand and supply is:

1. Evening Rush Hour
1. Morning Rush Hour

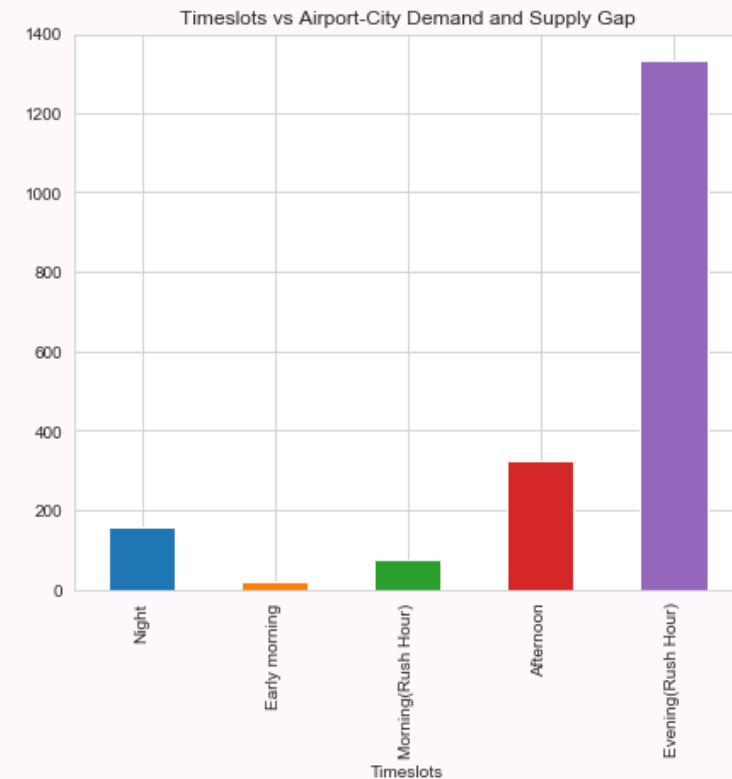
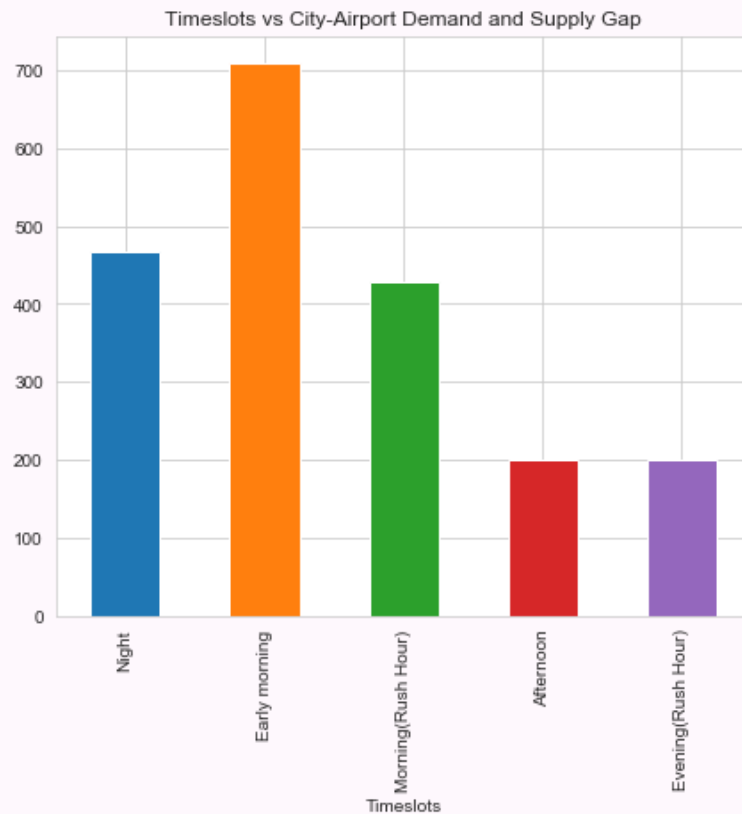
With this two time-slots being our focal problem area, let us study the contribution of type of request (city-airport or airport to city) for which the gap is most severe.

Status	Demand	Supply	Gap
Timeslots			
Night	1023	399	624
Early morning	1227	496	731
Morning(Rush Hour)	1029	525	504
Afternoon	1044	521	523
Evening(Rush Hour)	2422	890	1532



Gap between Demand & Supply – Pickup Point

The Morning Rush Hour Time slot shows excessively high Demand & supply gap from the city to the airport. The Evening Rush Hours Time slot shows excessively high Demand & supply gap from airport to city.



Considering the additional information sourced from a newspaper and attached below, it shows the hourly number of flights departing and arriving at Mumbai Airport on a Friday. The image reveals the general trend that

1. There are significantly more outgoing flights than incoming flights during the morning to noon hours. For the trips taken in the “Early Morning” & “Morning Rush hours, the waiting time is very high. Waiting time reduces as the day progresses and is minimum in the evening. Which is evident from Airport analysis that due to large inflow of flights in the evening, demand increased at airport in the evening. Also In some cases the driver might have to return back to the city without a customer, therefore incurring a loss and waste of fuel. This might be the reason contributing to the high number of city-airport requests cancelled by the driver contributing to the large supply and demand gap.
2. There are significantly more incoming flights than outgoing flights during the Evening Rush Hour. This may be due to the high number of flights landing during the late evening to night time. Therefore, there is significant reduction in natural supply of taxi's to the airport during the late evening rush hour. This imbalance leads to a surge in the demand for cars from customers desiring to leave the airport. The increased demand and insufficient supply contributes to the significant supply-demand gap at the airport during the Late Evening Rush Hour.

SECTION

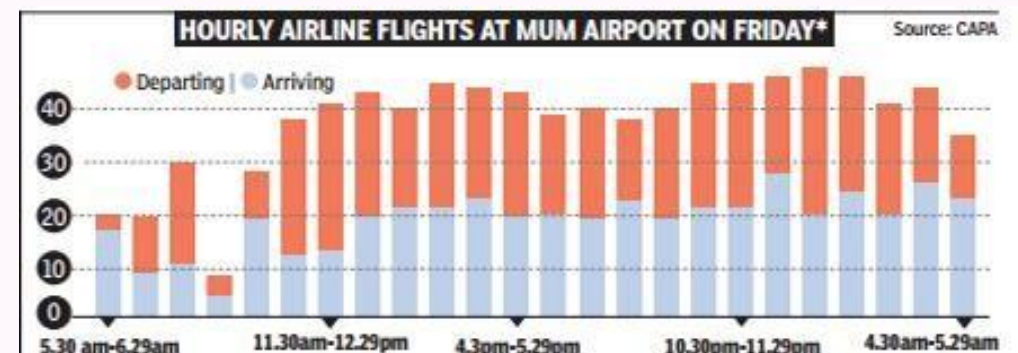
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With 1,003 Flights In 24 Hours, Mumbai Airport Is World's Busiest

Mumbai Airport is the world's busiest single runway airport. The previous record was also held by the Mumbai airport, which handled landing and departure of 980 flights in February this year.

Mumbai | Reported by Saurabh Gupta, Edited by Vaibhav Tiwari | Updated: June 07, 2018 10:43 IST



Recommendations

- Increasing the profit margin for drivers making trips from the city to the airport during Morning Peak Hours thereby encouraging the driver to take up more city-airport trips during this time slot.
- Surge pricing, by increasing the rate charged to the customer we can increase the revenue generated instead of changing the profit margin with normal prices. The benefit of the surge charge can be passed on to the drivers making this trip.
- Maintaining transparency with respect to the surge charging of customers during Morning Peak Hours.
- Encourage ride-sharing or Taxi pooling for customers leaving the airport during the Late Evening Rush Hour. This will improve the number of customers serviced through fewer supply of taxis.