UBER Supply-Demand Gap Analysis

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Abstract :

The purpose of this investigation is to provide better visualization and cause analysis on the 'supply-demand gap' of UBER cabs on the Airport and recommending best possible solutions to resolve this.

Making it the realistic, overall strategy is to identify on which timeslots and route (city to Airport or vice versa), how many cab request are not converted with successful trips. Then analysis is done on those timeslots where maximum number of unsuccessful request happened.

The analysis is done based on below steps,

1. Identify the timeslots based on similarity of Cab Request. Amongst them which timeslots 'supply-demand gap' are high. This is observed that high gap is happened on Morning (4 AM to 11 AM) on City and Evening (5 PM to 11 PM) on Airport.

2. Identify which day on which route, less number of trip completed even if large number of requests. This is observed that on Thursday less number of trip completed from Airport to City even if demand is high.

3. Finding the route cause of above issues and finding the best solution for same.

Analysis :

<Data Understanding >

❖ All the records are unique. Request-id is unique id for every request.

❖ Date is available in different string format ("%d/%m/%Y %H:%M" and "%d-%m-%Y %H:%M:%S").

❖ Data is available for only for weekdays and for one year only.

<Analysis Scope limitation>

❖ One customer may request multiple time for same trip if previous requests are not successful.
But as there is no User-id is present in given in dataset, those cases can't be identified.

< Data Cleaning & Manipulation>

❖ Date columns are converted as POSIXlt. And derived few columns having information like 'Days of the week',
'Trip Duration' and 'Hour when trip requested'.

❖ Based on other parameters Hours are clustered on different Time-Slots.

Data Visualization: identifying issues on different hours

Based on different types of Trip Status, time is clustered as below,

NIGHT TIME: (11 PM to 4 AM)
→ Less number of Request
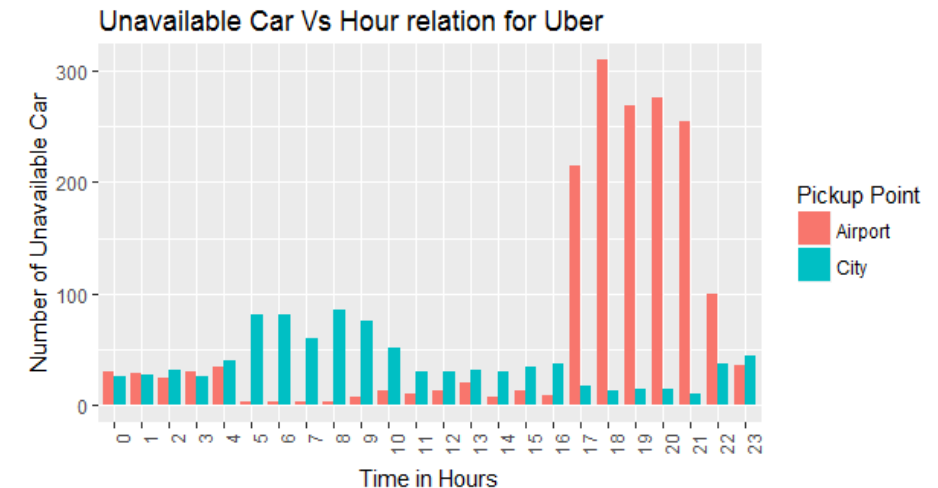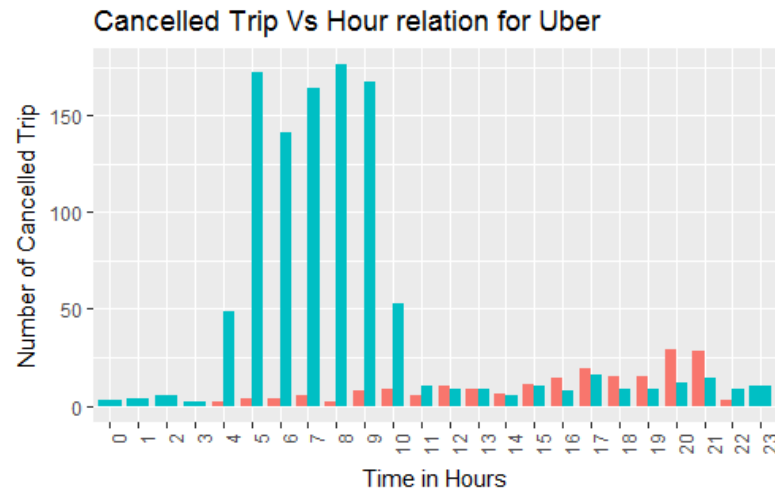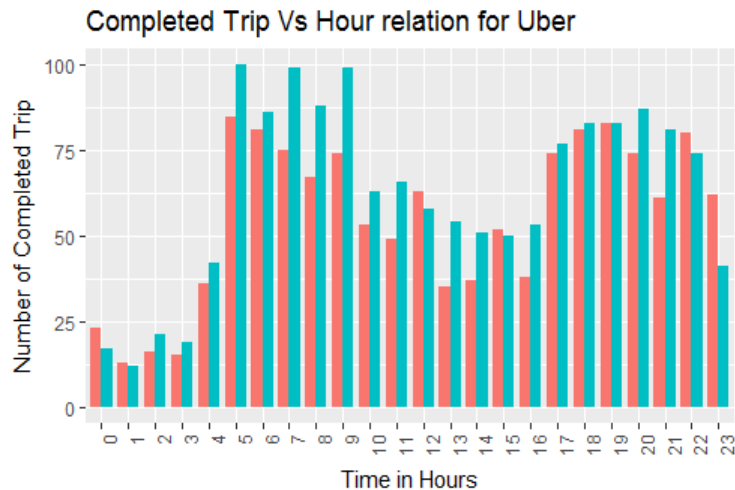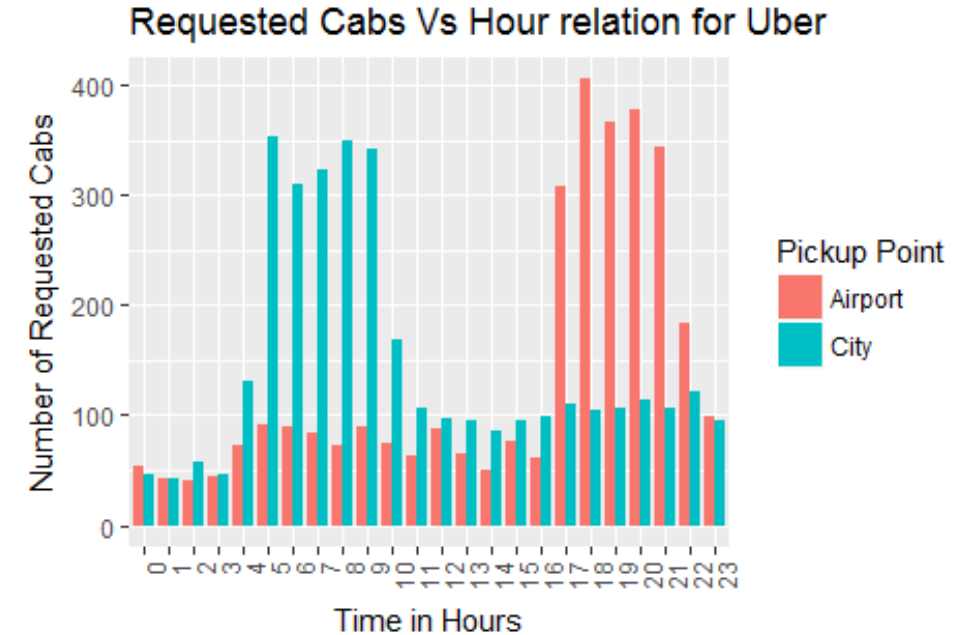*MORNING RUSH*: (4 AM to 11 AM)
→ Trip Cancelation is high on City
DAY TIME: (11 AM to 5 PM)
→ Trip Completion vs Trip Request is good
EVENING RUSH: (5 PM to 11 PM)
→ Unavailability of Cabs on Airport

Requested Cabs Vs Hour relation for Uber

Completed Trip Vs Hour relation for Uber

Cancelled Trip Vs Hour relation for Uber

Unavailable Car Vs Hour relation for Uber

Data Visualization: Problem identification

Stacked bar-charts are created on both the location to visualize 'Trip Request Status' over different 'Time Slot'.

Visually identify, two most pressing problems

1. Large number of 'City to Airport' trips got cancelled during 'Morning Rush' Slot (4 AM to 11 AM)

2. Enough number of cabs are not available on Airport during 'Evening Rush' slot (5 PM to 11 PM). Hence many 'Airport to City' trips are not happened.
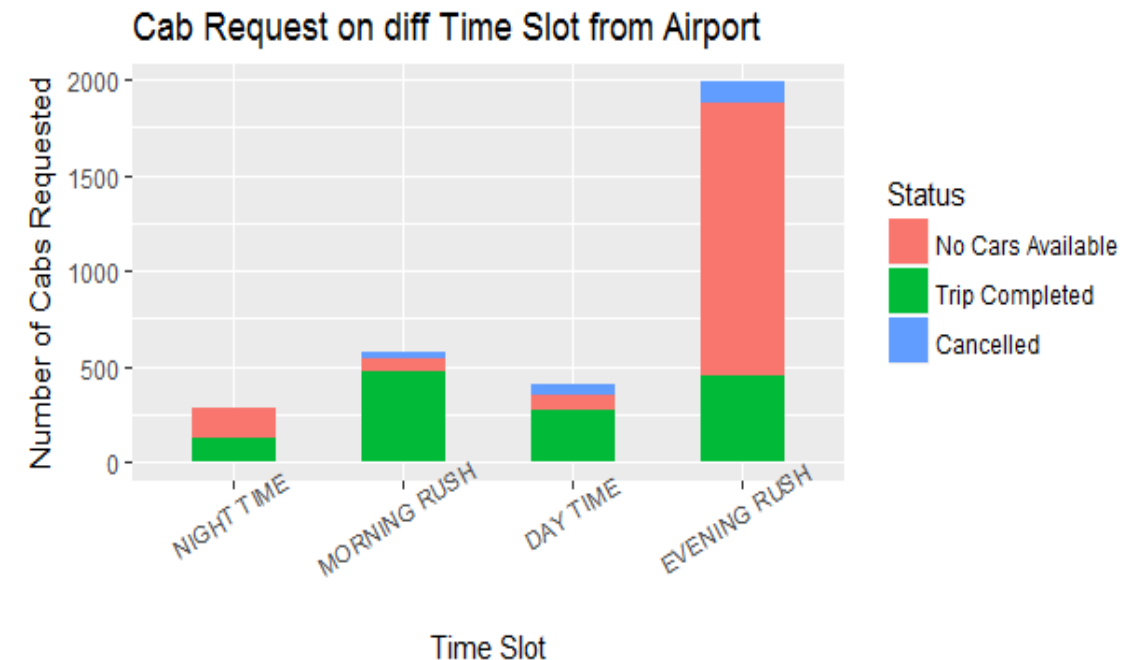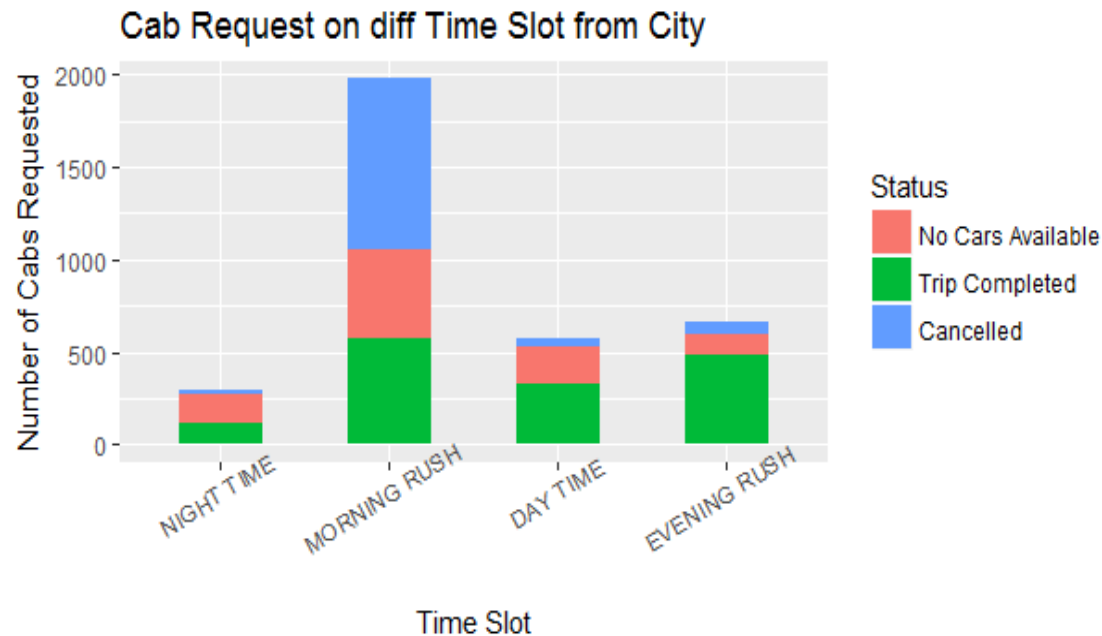
Data Analysis : Finding reason for the issue

Dodged bar-charts are created for both the 'Rush-Time Slot' to visualize how 'Trip Request Status' varied over different 'Location'.

Visually identified, the root cause is not getting same number of trip request from both the end. May be due to skewed flight timing or alternative public-transport availability Cab-drivers have to spend more idle time for return.

1. During 'Morning Rush' Slot, many Customers are going from City but there is not enough customer from Airport to City. So Cab driver decline the request as there is a high chance to stay idle longer time on Airport.

2. During 'Evening Rush' slot, many customers are going from Airport to City but not enough customer from City to Airport. So supply of Cab is less on Airport although there is a huge demand.

Requested Trip Status on Morning Rush Time

Requested Trip Status on Evening Rush Time
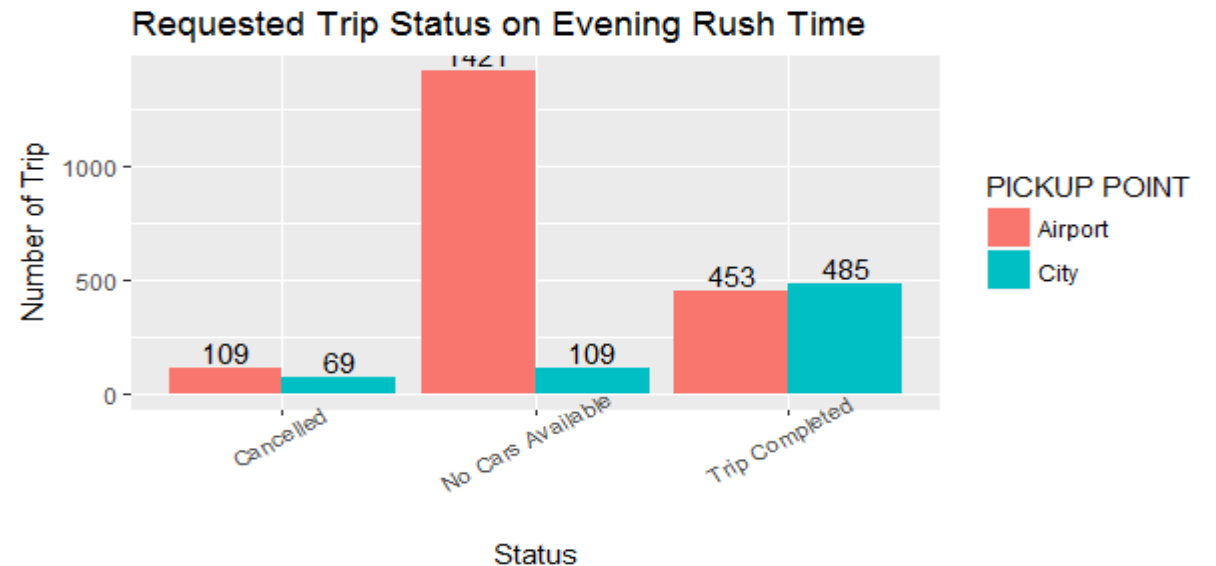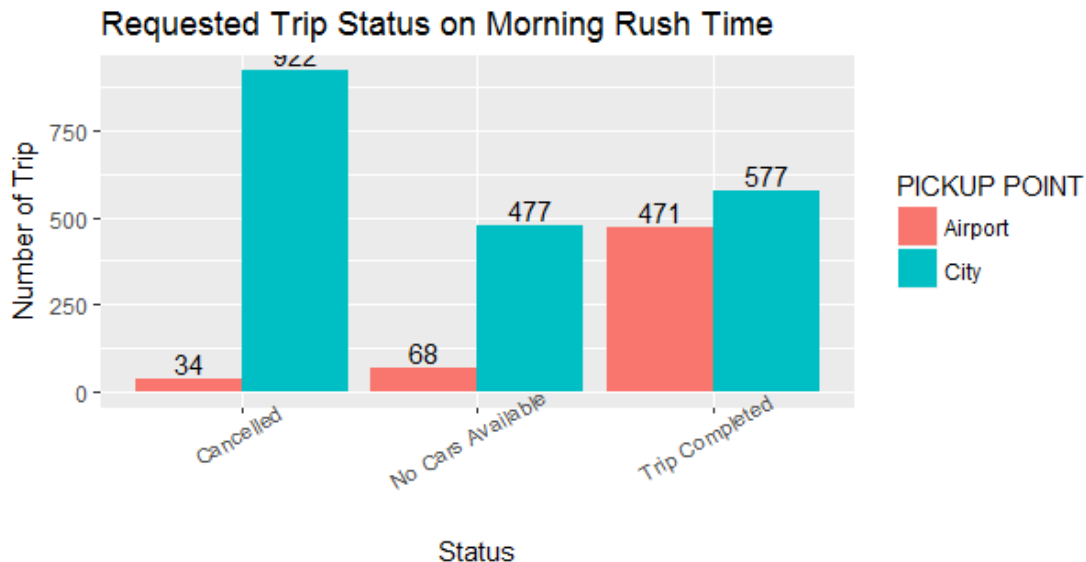
Recommendation to resolve the supply-demand gap

UBER is clearly missing some business due to these supply-demand gap.
Hence UBER need to customize the cab-fare like below so that the gap are minimized.

- **During Morning Rush time**

1. Increase cab-fare to compensate cab-driver for 'City to Airport' trip. As there are huge demand it shouldn't affect much.

2. Decrease cab-fare from Airport to City, so that more customers avail UBER. And more Cabs came back on city with customer.

3. Encourage Cab-sharing (like 'UBER_POOL') from 'City to Airport' trip so that less number of cabs are moved on Airport. As the demands are high, chances are greater for getting customer on cab-sharing.

- **During Evening Rush time**

1. Increase cab-fare to compensate cab-driver for 'Airport to City' trip. As there are huge demand it shouldn't affect much.

2. Decrease cab-fare from City to Airport, so that more customers avail UBER. And more Cabs are available on Airport.

3. Encourage Cab-sharing (like 'UBER_POOL') from 'Airport to City' trip so that maximum benefits are taken even though cabs are limited.

# Observation: How supply-demand gap changed on weekdays

After analyzing how supply-demand gap changed on various day of the week, it is observed that on Thursday, maximum completed trip happened from City to Airport. But very less number of trip occurred from Airport to City.

Hence total completed trip is lesser than other days. In short, previous issues are affecting more on Thursday.

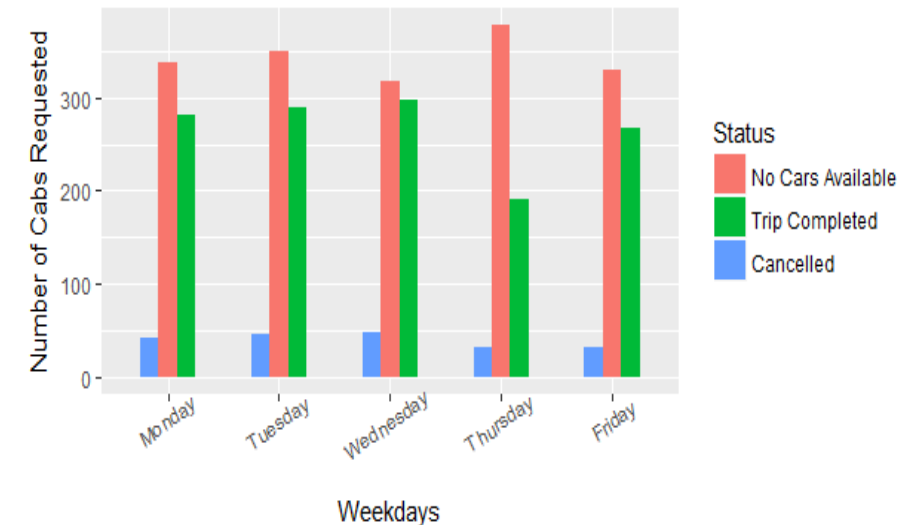Hence more fare should be charged for 'City to Airport' trip on Thursday.
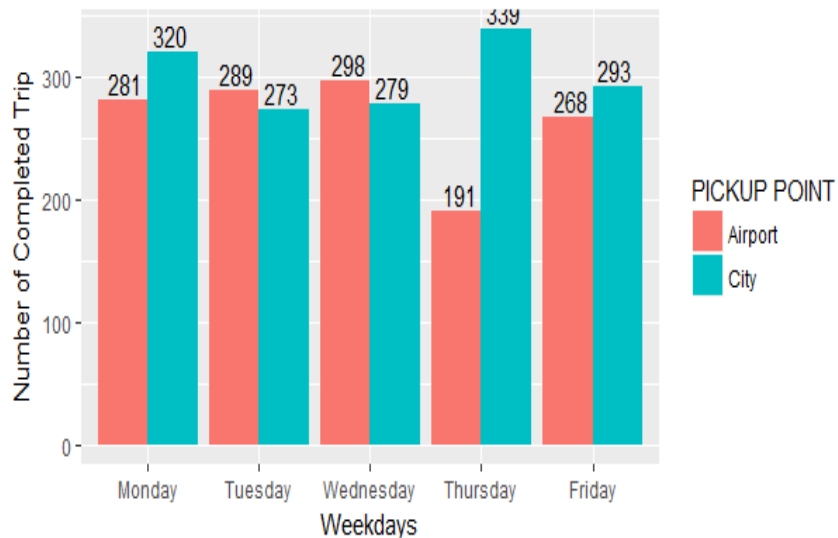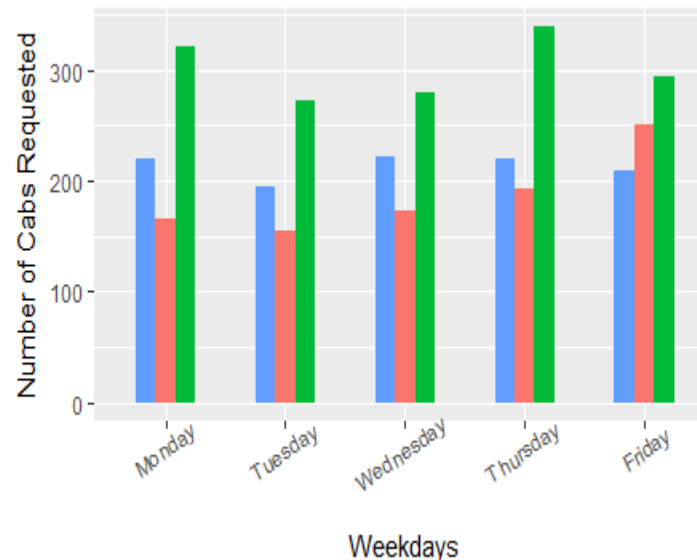
Conclusions :

Based on the analysis, it can concluded that UBER need to maintain the supply-demand gap minimal for making the business better.
For that, cab-fare need to be changed during different time and direction even on different days of the week although same path is covered on trip and there is no significant changes on trip-duration.

When Cab Supply is more than demand, Cab fare should be minimal if on destination side demand is more than supply. And that will be compensated on return trip by charging more. As that time Cab supply is lower than demand, it won't have much effect on business .
CAB sharing also a good alternative option when demand is high.

By doing this UBER can avail maximum number of 'completed trips' and get maximum benefits.