

# UBER SUPPLY - DEMAND GAP CASE STUDY SUBMISSION

Student Name : SHAILESH KUMAR JHA

Applicant ID : APFE18804700

PGDDS June ( 2018 - 2019)



# INTRODUCTION

## **BUSINESS UNDERSTANDING:**

Issues faced by Cab Aggregators like **UBER** are to have a greater market share and high customer satisfaction for which the Gap trend between Demand and Supply has to be assessed regarding various pickup locations. Shortage in supply either due to non availability of cars or driver initiated cancellation leads to potential revenue losses. This case study emphasises on Demand Supply Gap analysis from the given data set of trips based on trips from city to airport or vice versa and identifying various causes so as to give relevant hypothetical solutions for addressing the pressing problem.

## **DATA DEFINITION:**

There are six constraints associated with each request made by customer:

1. **Request.id**: A unique identifier of the request.
2. **Pickup.point**: The point from which the request was made. Factor with 2 levels vis.a.vis Airport and City.
3. **Driver.id**: The unique identification number of the driver
4. **Status**: The final status of the trip. Factor with 3 levels vis.a.vis Trip Completed, Cancelled, No Cars Available
5. **Request.timestamp**: The date and time at which the customer made the request.
6. **Drop.timestamp**: The date and time of drop only when the trip was completed.

# ASSUMPTIONS

1. **SUPPLY DEFINITION**: It is the total number of trips that have status as 'Trip Completed'.
2. **DEMAND DEFINITION**: It is the total number of requests for the given data set of a particular period. All the status levels are considered.
3. **GAP DEFINITION**: It is defined as the total number of value calculated by grouping the requests on basis of Status. Gap value is calculated by subtracting the total requests with final status as 'Trip Completed' from the total number of requests. It is given by Demand - Supply.
4. **DERIVED METRICS**: Request.hour and Request.Day derived from Request.timestamp. Drop.hour from Drop.timestamp.
5. **TIME SLOT**: The 24 hour Request Hour is grouped into five categories which is flexible as per the analysis. Here various time slots considered are 'Morning' (  $5 \leq \text{Request.hour} \leq 9$  ), 'Near Noon' (  $10 \leq \text{Request.hour} \leq 13$  ), 'Early Evening' (  $14 \leq \text{Request.hour} \leq 17$  ), 'Late Evening' (  $18 \leq \text{Request.hour} \leq 22$  ), 'Midnight' (  $23 \leq \text{Request.hour} \leq 4$  ).
6. **IDLE TIME**: It is not considered for analysis as the given data set has some inconsistencies. Some drivers are having city to airport request and subsequently same location request for the next day.

# IDENTIFICATION OF ISSUES

## OVERALL ANALYSIS:

**PLOT 1** shows the overall distribution of requests of customers out of which 41.97% were serviced and rest of the requests got unattended either due to non availability of cars or cancellation of requests by drivers. The non serviced customers contribute roughly to 58% of the total requests which are leading to potential revenue losses and loss of market share in competing cab aggregator business.

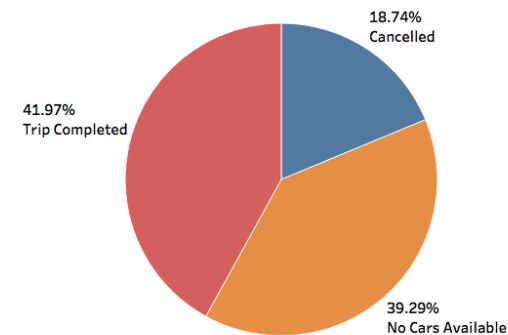
## PICKUP PROBLEM:

**PLOT 2** shows the percentage of total denied customers. Colour grouping Is indicative of the details regarding pickup point. Greater percentage of requests are cancelled by driver in city however greater Percentage of requests are denied due to non availability of cars in the airport.

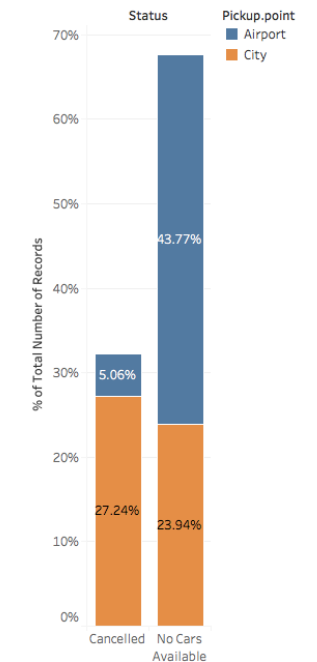
Hence problems to be addressed are-

- Denial at The City due to driver initiated cancellation.
- Denial at The Airport due to non availability of cars.

PLOT 1  
DISTRIBUTION OF FINAL STATUS



PLOT 2  
PICKUP PROBLEM



# IDENTIFICATION OF ISSUES

## HOURLY PROBLEM:

**PLOT 3** shows the trend of denied requests across 24 hours of the day for the given data set. Colour grouping is done according to the reason of service denial which is either Cancellation or Non Availability of Cars. It helps us to group so as to make our further analysis meaningful by identification of the hours into roughly 4/ 5 Time Slots namely 'Morning', 'Near Noon', 'Early Evening', 'Late Evening' and 'Midnight'.

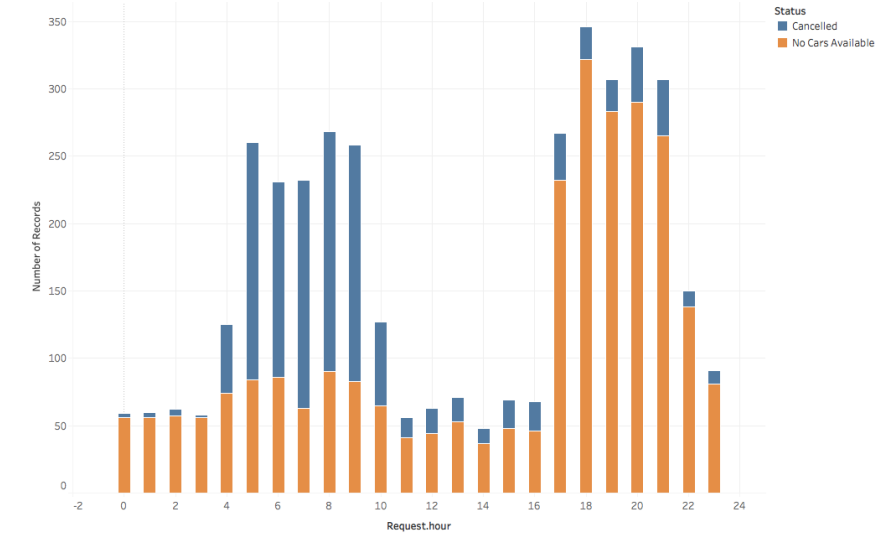
Further it reflects upon one more useful insight-

- Greater service denial at Morning mainly due to driver initiated cancellation.
- Greater service denial in the Late Evening mainly due to non availability of cars.

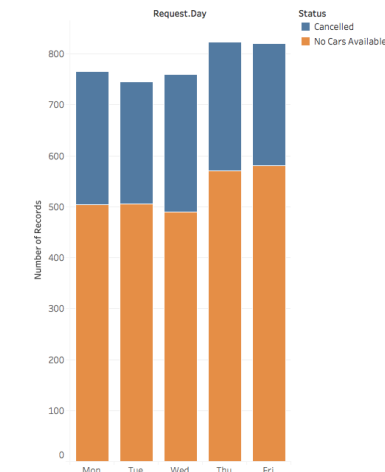
## WEEKDAY PROBLEM:

**PLOT 4** shows the analysis of variation of request denial due to various factors grouped according to location does not show any major variable trend. Hence analysing weekday trend is not much useful for the provided data set.

**PLOT 3**  
HOURLY PROBLEM

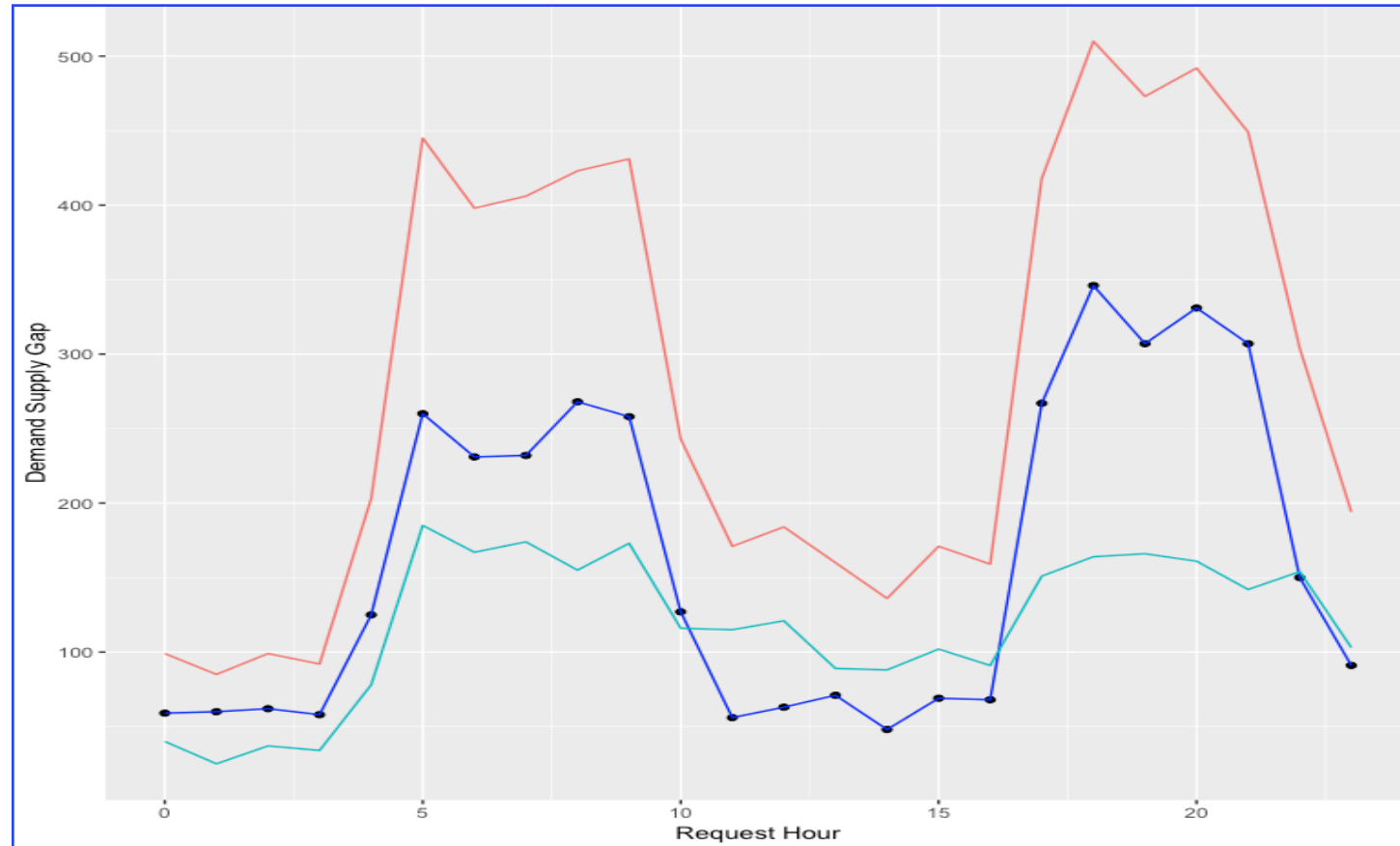


**PLOT 4**  
WEEKDAY PROBLEM



# DEMAND SUPPLY GAP TREND ON HOURLY BASIS

PLOT 5: HOURLY DEMAND SUPPLY GAP TREND



**PLOT 5** is indicative of the demand trend supply trend and gap trend.

The Demand is initially constant in the early morning hours which increases in the late morning hours, comes down to a low demand of around 200 which remains stable for certain time and again shoots upto around 500.

The Supply is not able to meet the Demand during these busy time periods hence there is a subsequent spike in the Gap Trend as shown in the plot.

- Demand Trend
- Supply Trend
- Demand Supply Gap Trend

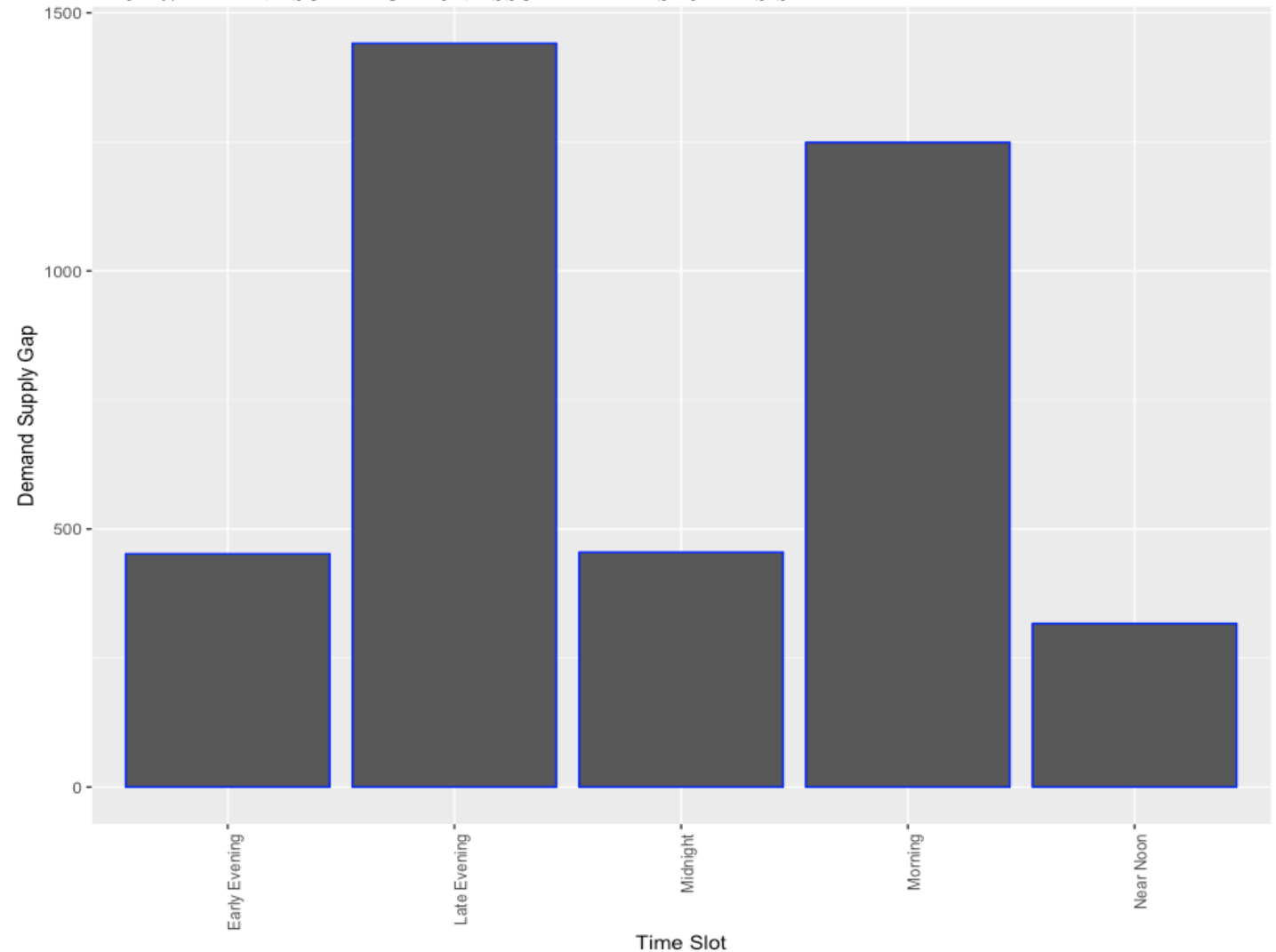
# DEMAND SUPPLY GAP ON TIME SLOT BASIS

**PLOT 6** shows the gap between demand and supply  
By categorising the hours into suitable time slots namely  
'Morning', 'Near Noon', 'Early Evening', 'Late Evening'  
And 'Midnight'.

It Clearly shows that demand supply gap is high during **Late Evening** followed by during **Morning** which clearly shows that suitable redressal of problem is to be done during these two time slots.

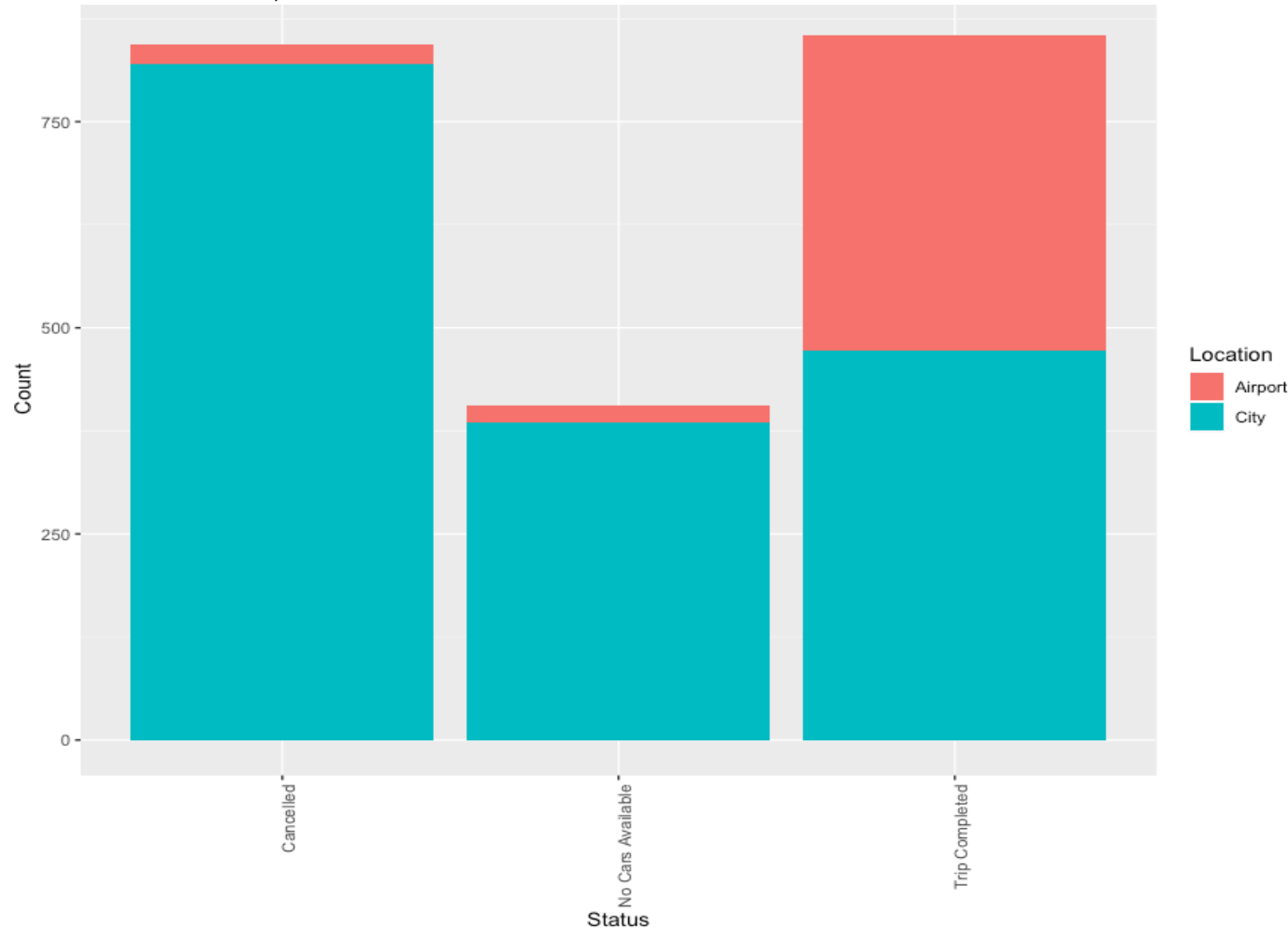
TIME SLOT	DEMAND	SUPPLY	GAP
Early Evening	884	432	452
Late Evening	2228	787	1441
Midnight	772	317	455
Morning	2103	854	1249
Near Noon	758	441	317

PLOT 6: DEMAND SUPPLY GAP ON ASSUMED TIME SLOT BASIS



# IDENTIFIED ISSUE I, SUITABLE HYPOTHESIS AND RECOMMENDATION

PLOT 7: MORNING, PICKUP ANALYSIS



**PLOT 7:** During Morning peak hours the demand is not met mainly from the City to Airport and more gap is observed due to driver initiated cancellation rather cab unavailability.

## HYPOTHESIS:

As more service denial is due to cancellation hence there may be more Outgoing Flights in the Morning rather than incoming hence drivers may be facing higher IDLE TIME issue. Hence they evidently cancel the requests to Airport during morning peak hours.

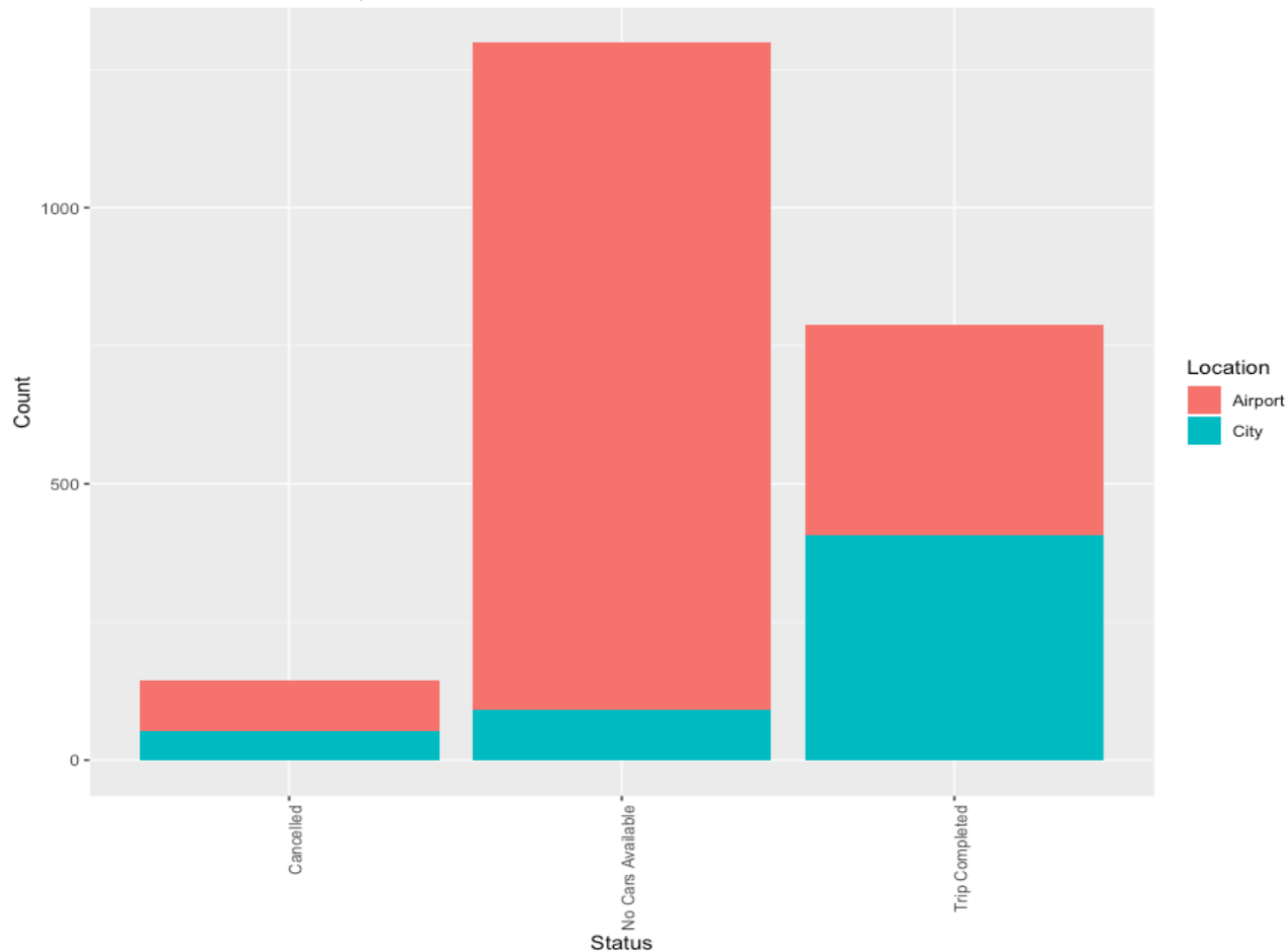
## RECOMMENDATION:

Surge Pricing during these hours for trips to airport which can complement the Driver Pay Margin so they get encouraged to embark on trips to Airport from City and also it complements the loss due to idle time.



# IDENTIFIED ISSUE II, SUITABLE HYPOTHESIS AND RECOMMENDATION

PLOT 8: LATE EVENING, PICKUP ANALYSIS



**PLOT 8:** During rush hours of Late Evening the demand is not met at the airport which is mostly due to Non Availability Of Cabs. Demand gap due to driver initiated cancellation is of minimum significance.

## HYPOTHESIS:

A surge in Demand Supply Gap during Late Evening is mainly due to non availability of cars so the possible reason may be more incoming flights in comparison to outgoing flights so there is a natural shortage of cars at the airport.

## RECOMMENDATION:

- Transparent surge pricing policy.
- Introduction of cab pooling facility for customers from Airport to City.