

Uber Ride Demand & Operations Analysis

Executives Business Report

1. Project Objective

The objective of this project is to analyze Uber ride request data in order to understand:

- When and where ride demand occurs
- Where revenue is generated
- Where Uber loses customers and money due to supply gaps

The project follows a **real industry analytics pipeline**:

Python → SQL → Excel Dashboards

2. Data Processing & Feature Engineering (Python)

The raw ride data was first processed using Python (Pandas).

Key steps included:

- Converting timestamps into usable datetime formats
- Creating new analytical features:
 - Request hour
 - Time slots (Morning, Evening, Night, Other)
 - Day of week
 - Trip duration (drop time - request time)

These transformations allowed deeper analysis of:

- Travel patterns
- Ride length
- Demand cycles

Python was also used for initial visualizations to explore trends and validate patterns



3. Business Querying Using SQL (SQLite)

After cleaning and feature engineering in Python, the dataset was exported into a SQLite database to perform business-style analytics using SQL.

SQL was used to answer questions such as:

- Which time slots generate the highest demand?
- Which pickup locations generate the highest total trip duration (revenue proxy)?
- Where are cancellations and no-car cases highest?
- Which time slots and locations have the worst fulfillment rate?

These SQL queries simulate how data is queried in real production systems.

Peak Hour Demand

```
pd.read_sql('SELECT request_hour, COUNT(*) AS total_requests FROM uber_data GROUP BY request_hour ORDER BY total_requests DESC;', conn)
```

request_hour	total_requests
0	510
1	492
2	473
3	449
4	445
5	431
6	423
7	418
8	406
9	398
10	304
11	243
12	203
13	194

Airport vs City Demand

```
pd.read_sql('SELECT pickup_point, COUNT(*) AS total_trips FROM uber_data GROUP BY pickup_point;', conn)
```

pickup_point	total_trips
Airport	3238
City	3507

High Value Rides

Congestion Detection

```
pd.read_sql('SELECT request_hour, AVG(trip_duration_min) AS avg_trip_time FROM uber_data GROUP BY request_hour ORDER BY avg_trip_time DESC;', conn)
```

request_hour	avg_trip_time
1	57.508000
4	54.172650
6	54.064172
0	53.749167
15	53.499673
11	53.418841
9	53.401638
22	53.361797
2	53.072523
20	52.839337
21	52.698122

4. Transition to Excel for BI Reporting

The clean, SQL-validated dataset was then imported into Microsoft Excel to build business dashboards.

Excel was used to create:

- Pivot tables
- Calculated KPIs
- Interactive slicers
- Visual dashboards

This allows non-technical stakeholders to explore the data easily.

5. Dashboard-1: Demand & Operations Overview

Purpose:

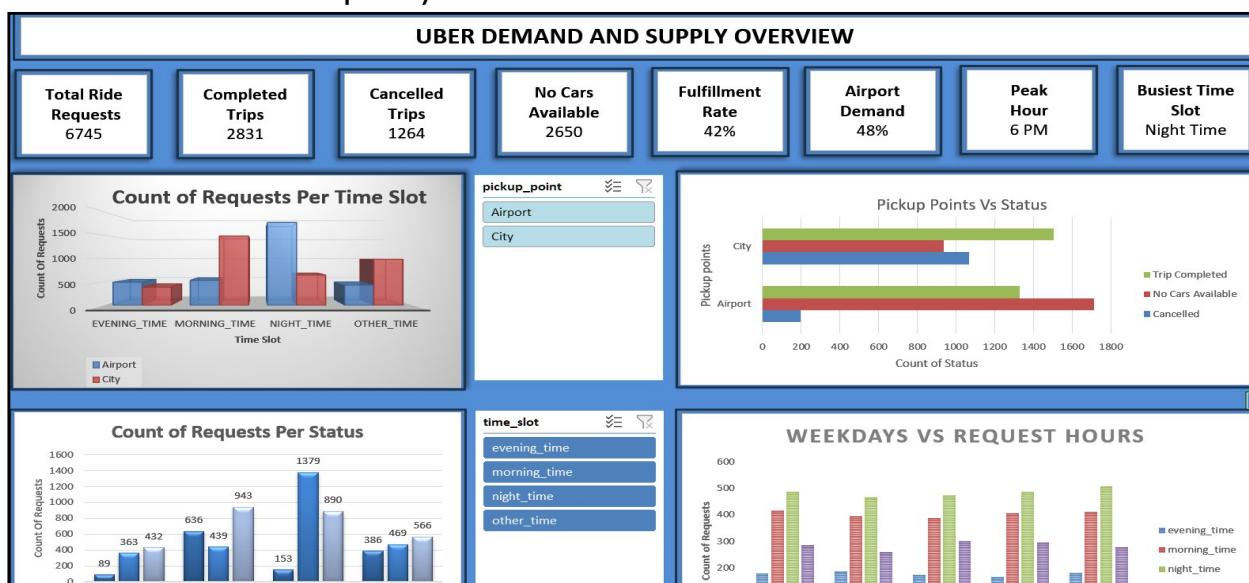
Understand when and where people request rides.

This dashboard shows:

- Total ride requests
- Completed trips
- Cancelled and no-car cases
- Fulfillment rate
- Peak demand hour
- Busiest time slot
- Airport vs City demand

This helps identify:

- Peak usage windows
- Customer behavior
- Overall service quality



6. Dashboard-2: Revenue & Trip Quality

Purpose:

Understand where Uber makes money.

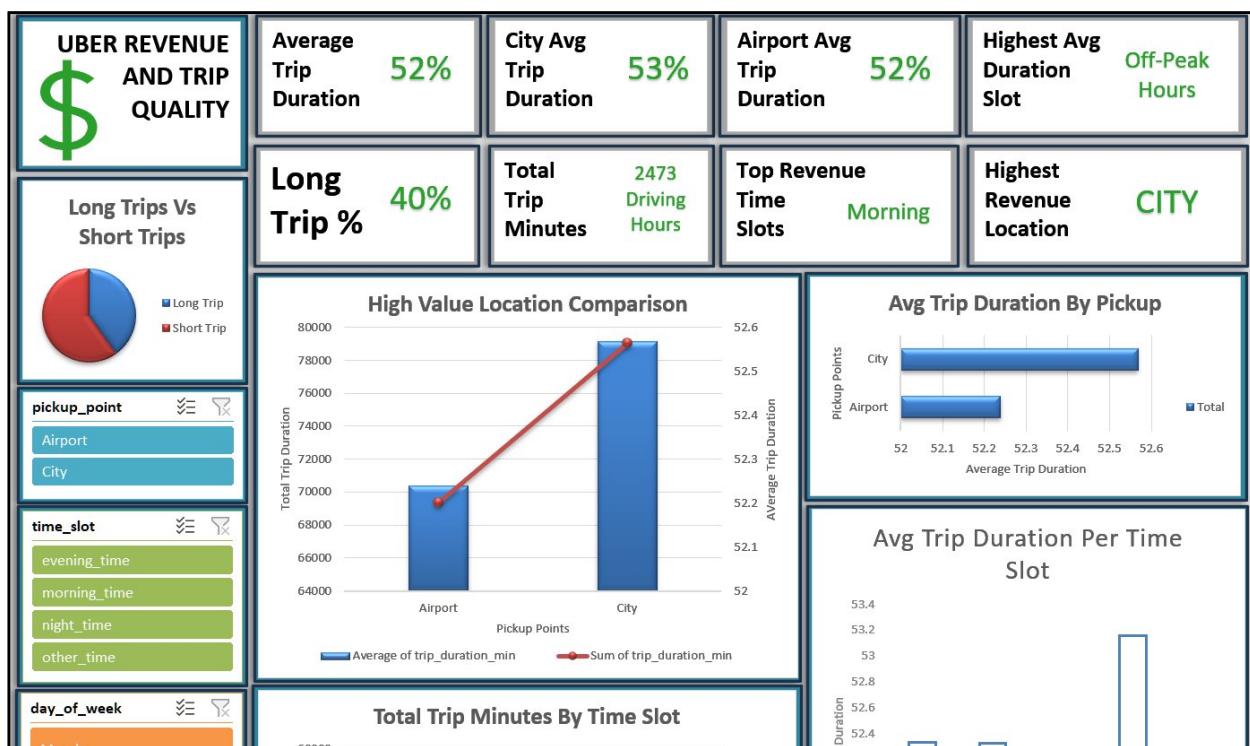
Trip duration was used as a revenue proxy (longer trips = higher fare).

This dashboard highlights:

- Average trip duration
- Long trip percentage
- Total driving hours (revenue proxy)
- Highest revenue time slot
- Highest revenue pickup location
- Comparison between City and Airport rides

Key insight:

City rides generate more total revenue, while Off-Peak hours generate the longest trips.



7. Dashboard-3: Supply Loss & Operational Efficiency

Purpose:

Identify where Uber is losing customers and money.

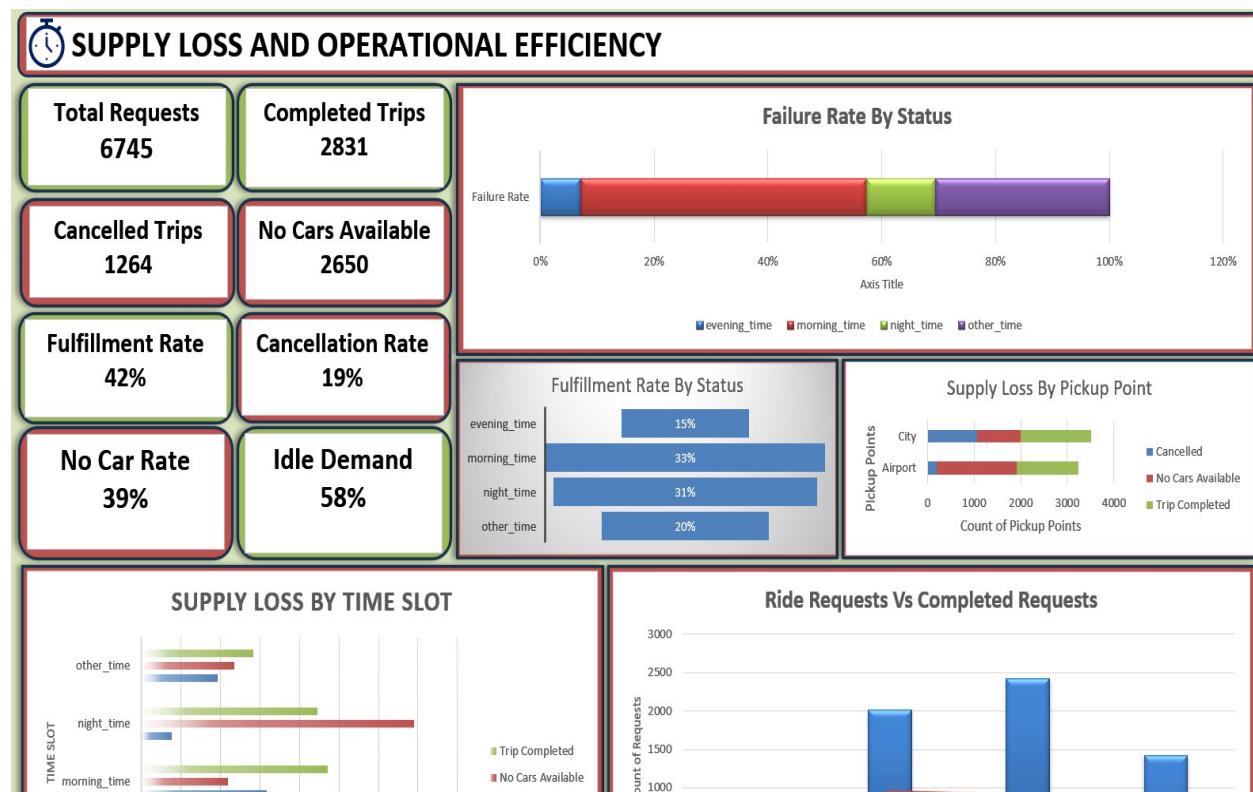
This dashboard shows:

- Fulfillment rate
- Cancellation rate
- No-car rate
- Idle demand
- Supply loss by time slot
- Supply loss by pickup point
- Requests vs completed trips

It reveals:

- Night-time suffers from major driver shortages
- Morning time has high customer cancellations
- More than half of demand is lost during peak windows

This dashboard acts as an operations control panel.



8. Final Business Insights

From the combined analysis:

- Demand is highest in **morning and night**
- Revenue is driven mostly by **City rides and Off-Peak long trips**
- The biggest losses occur during:
 - **Night time** (no drivers available)
 - **Morning time** (high customer cancellations)

This indicates that Uber's growth opportunity lies in:

- Better driver incentives at night
- Improved morning supply and wait-time management

9. Key Takeaways

1. Demand is concentrated in Morning and Night time slots

Most ride requests occur during morning commute hours and late-night travel, making these the most critical windows for operational planning.

2. City rides generate more total revenue than Airport rides

Although airport rides are often perceived as premium, the analysis shows that city trips have higher average duration and higher total driving hours, making them the main revenue contributor.

3. Off-Peak hours produce the longest trips

Early morning and late-night rides (Off-Peak Hours) have the highest average trip duration, indicating fewer but higher-value long-distance rides.

4. More than half of demand is lost due to supply gaps

Only about 42% of all ride requests are successfully completed. The remaining 58% is lost due to cancellations and no-car availability, representing a significant revenue leakage.

5. Night time is a major supply problem

Over half of night-time ride requests fail because no cars are available, showing that driver availability does not match demand.

6. Morning time has a severe customer drop-off issue

Despite high demand, morning slots show very high cancellation rates, suggesting long waiting times and poor customer experience.

7. Evening time is the most operationally stable window

Evening rides have lower failure rates compared to morning and night, making it the most balanced time slot in terms of supply and demand.

8. There is a strong opportunity for targeted driver incentives

Redirecting drivers toward night-time and morning peak slots could significantly improve fulfillment and unlock lost revenue.

10. Conclusion

This project demonstrates a **full analytics workflow**:

Raw Data → Python → SQL → Excel → Business Dashboards

It shows the ability to:

- Clean and transform data
- Perform analytical SQL queries
- Build interactive BI dashboards
- Convert data into business decisions

This mirrors how real data teams operate in modern companies.