

# 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	18	510
1	20	492
2	19	473
3	21	449
4	5	445
5	9	431
6	8	423
7	17	418
8	7	406
9	6	398
10	22	304
11	10	243
12	4	203
13	23	194

Terminal

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
0	Airport	3238
1	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
0	1	57.508000
1	4	54.172650
2	6	54.064172
3	0	53.749167
4	15	53.499673
5	11	53.418841
6	9	53.401638
7	22	53.361797
8	2	53.072523
9	20	52.839337
10	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:

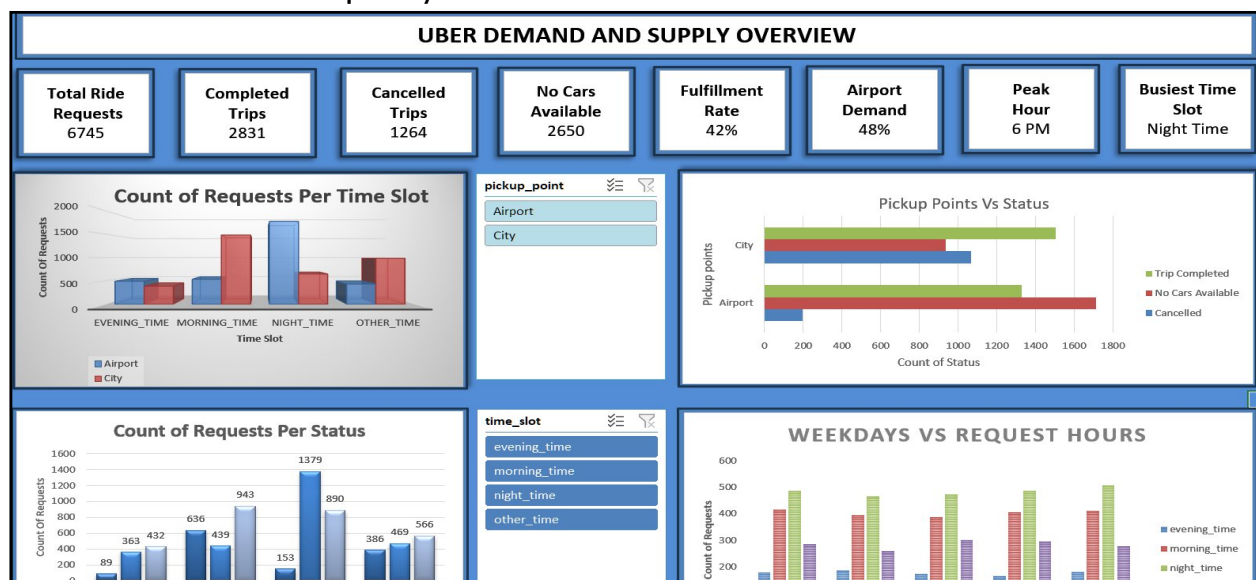
Understand when and where people request rides.

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.

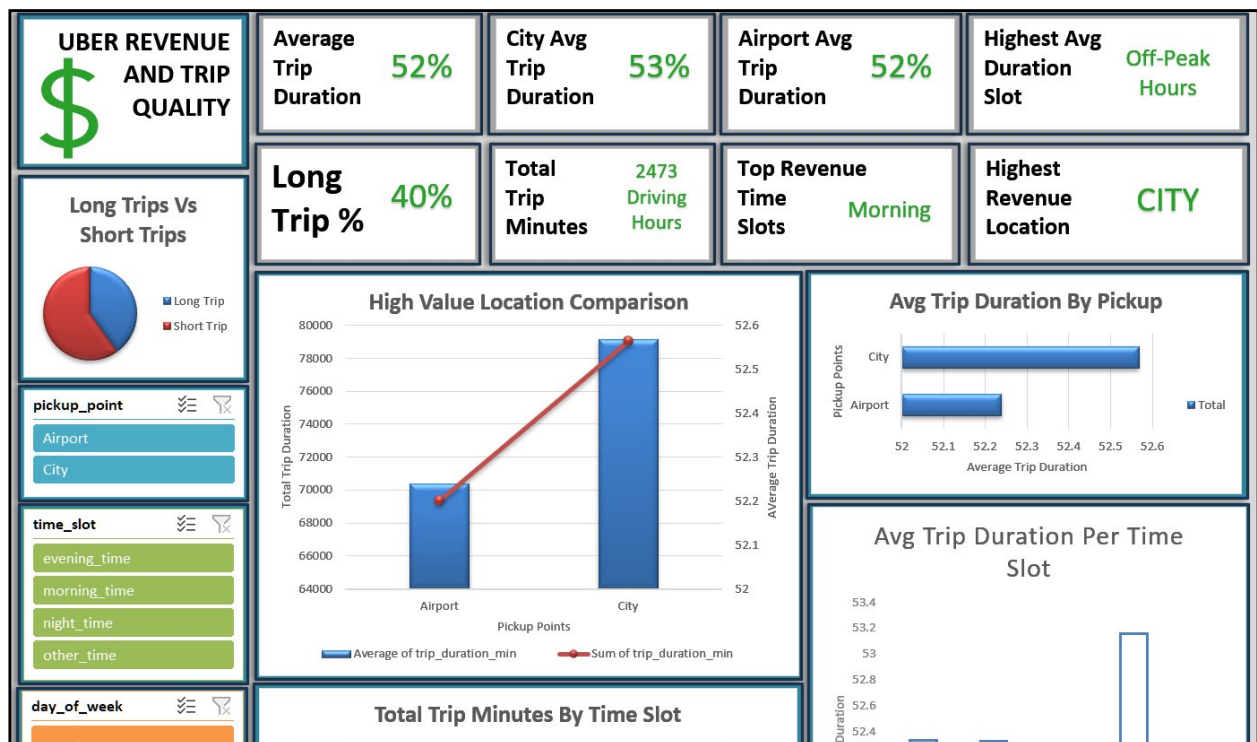
Trip duration was used as a revenue proxy (longer trips = higher fare).

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.

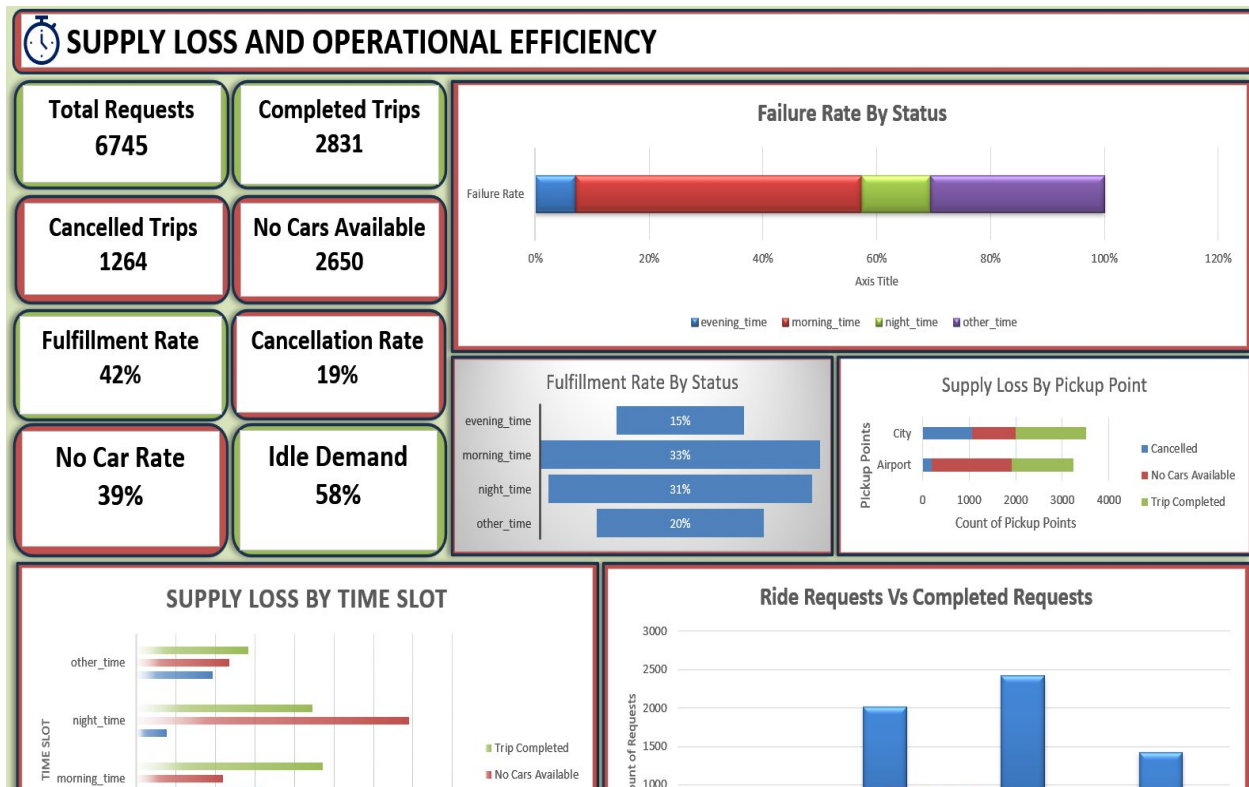
This dashboard shows:

- 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.