Uber Supply-Demand Gap Analysis: Insights Report (SQL)

Overview:
This report presents the results and insights from SQL-based analysis of Uber's supply-demand gap. The data was initially cleaned in Excel and imported into SQL for aggregation and pattern discovery.

Variables Description

- **Request id**: Unique identifier for each ride request.
- **Pickup point**: Location of pickup (City/Airport).
- **Driver id**: Unique identifier for driver (may be blank if no car available).
- **Status**: 'Trip Completed', 'Cancelled', or 'No Cars Available'.
- **Request timestamp**: When the ride was requested.
- **Drop timestamp**: When the ride ended (blank for incomplete trips).

Demand vs. Supply in Uber Trip Data

Understanding **demand vs. supply** is central to analyzing Uber's operational efficiency and customer satisfaction. Here's how you can approach this analysis with your cleaned dataset.

What Is Demand vs. Supply?

- **Demand:** Total number of ride requests made by users.
- **Supply:** Number of ride requests that are successfully fulfilled (i.e., trips completed).

The **gap** between demand and supply represents unmet demand—requests that were either cancelled or could not be fulfilled due to no available cars.

Calculating Demand and Supply

1. Definitions in Data

- **Demand:** All rows in your data (each row is a request).
- **Supply:** Rows where Status = 'Trip Completed'.
- **Unmet Demand:** Rows where Status = 'Cancelled' or Status = 'No Cars Available'.

2. Summary Table Example

Status	Count	Percentage of Total Demand
Trip Completed	5662	41.97%
Cancelled	2528	18.74%
No Cars Available	5300	39.29%
Total Demand	13490	100%

```
253
254 •   SELECT
255         Status,
256         COUNT(*) AS Count,
257         ROUND(COUNT(*) * 100.0 / (SELECT COUNT(*) FROM uber_request_data), 2) AS Percentage_of_Total_Demand
258     FROM
259         uber_request_data
260     GROUP BY
261         Status
262
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Status	Count	Percentage_of_Total_Demand
Trip Completed	5662	41.97
Cancelled	2528	18.74
No Cars Available	5300	39.29
Total Demand	13490	100.00

3. SQL Query to generate these numbers:

```
120     #This query gives the count and percentage of each status.
121 •   SELECT
122       status,
123       COUNT(*) AS count,
124       ROUND(COUNT(*) * 100.0 / (SELECT COUNT(*) FROM uber_request_data), 2) AS percent_of_total
125     FROM
126       uber_request_data
127     GROUP BY
128       status;
129
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

status	count	percent_of_total
Trip Completed	5662	41.97
Cancelled	2528	18.74
No Cars Available	5300	39.29

Demand-Supply Gap

- **Gap** = Demand − Supply = Requests not fulfilled (cancelled or no cars available).
- **Gap Percentage** = (Unmet Demand / Total Demand) × 100

Gap Calculation Example

Metric	**Value**
Total Requests	13490
Completed (Supply)	5662
Unmet Demand (Gap)	7828
Gap Percentage	58.3%

```
240 •  SELECT
241        COUNT(*) AS Total_Requests,
242        SUM(CASE WHEN Status = 'Trip Completed' THEN 1 ELSE 0 END) AS Completed_Supply,
243        SUM(CASE WHEN Status IN ('Cancelled', 'No Cars Available') THEN 1 ELSE 0 END) AS Unmet_Demand_Gap,
244        ROUND(
245            SUM(CASE WHEN Status IN ('Cancelled', 'No Cars Available') THEN 1 ELSE 0 END) * 100.0
246            / COUNT(*), 2
247        ) AS Gap_Percentage
248    FROM
249        uber_request_data;
250
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Total_Requests	Completed_Supply	Unmet_Demand_Gap	Gap_Percentage
13490	5662	7828	58.03

Drill Down: Demand vs. Supply Analysis in SQL

1. Demand vs. Supply by Hour

This query shows how many requests were made and how many were completed each hour of the day:

```
#total_requests = Demand
#completed_trips = Supply
#unmet_demand = Requests not fulfilled
#query shows how many requests were made and how many were completed each hour of the day:
SELECT
  HOUR(STR_TO_DATE(Request_timestamp, '%d-%m-%Y %H.%i')) AS request_hour,
  COUNT(*) AS total_requests,
  SUM(CASE WHEN Status = 'Trip Completed' THEN 1 ELSE 0 END) AS completed_trips,
  SUM(CASE WHEN Status IN ('Cancelled', 'No Cars Available') THEN 1 ELSE 0 END) AS unmet_demand
FROM
  uber_request_data
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

request_hour	total_requests	completed_trips	unmet_demand
0	198	80	118
1	170	50	120
2	198	74	124
3	184	68	116
4	406	156	250

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2. Demand vs. Supply by Pickup Point

```
#query compares demand and supply at each pickup location:
SELECT
  Pickup_point,
  COUNT(*) AS total_requests,
  SUM(CASE WHEN Status = 'Trip Completed' THEN 1 ELSE 0 END) AS completed_trips,
  SUM(CASE WHEN Status IN ('Cancelled', 'No Cars Available') THEN 1 ELSE 0 END) AS unmet_demand
FROM
  uber_request_data
GROUP BY
  Pickup_point
ORDER BY
  total_requests DESC;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Pickup_point	total_requests	completed_trips	unmet_demand
City	7014	3008	4006
Airport	6476	2654	3822

- Helps identify which pickup points have the largest supply-demand gaps.

3. Demand vs. Supply by Day of Week

- This query analyzes patterns across days of the week:

```
176    #to analyze patterns across days of the week:
177 •    SELECT
178      DAYNAME(STR_TO_DATE(Request_timestamp, '%d-%m-%Y %H.%i')) AS day_of_week,
179      COUNT(*) AS total_requests,
180      SUM(CASE WHEN Status = 'Trip Completed' THEN 1 ELSE 0 END) AS completed_trips,
181      SUM(CASE WHEN Status IN ('Cancelled', 'No Cars Available') THEN 1 ELSE 0 END) AS unmet_demand
182    FROM
183      uber_request_data
184    GROUP BY
185      day_of_week
186    ORDER BY
187      total_requests DESC;
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

day_of_week	total_requests	completed_trips	unmet_demand
Friday	2762	1122	1640
Monday	2734	1202	1532
Thursday	2706	1060	1646
Wednesday	2674	1154	1520
Tuesday	2614	1124	1490

Reveals which days have the highest unmet demand or best supply fulfilment

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4. Combined Drill Down (Hour + Pickup Point)

For deeper insights, you can group by both hour and pickup point:

```
193 •  SELECT
194      Pickup_point,
195      HOUR(STR_TO_DATE(Request_timestamp, '%d-%m-%Y %H.%i')) AS request_hour,
196      COUNT(*) AS total_requests,
197      SUM(CASE WHEN Status = 'Trip Completed' THEN 1 ELSE 0 END) AS completed_trips,
198      SUM(CASE WHEN Status IN ('Cancelled', 'No Cars Available') THEN 1 ELSE 0 END) AS unmet_demand
199    FROM
200      uber_request_data
201    GROUP BY
202      Pickup_point, request_hour
203    ORDER BY
204      Pickup_point, request_hour;
205
```

Result Grid | Filter Rows: | Export: | Wrap Cell Content:

Pickup_point	request_hour	total_requests	completed_trips	unmet_demand
Airport	0	106	46	60
Airport	1	84	26	58
Airport	2	82	32	50
Airport	3	90	30	60
Airport	4	144	72	72
Airport	5	184	170	14
Airport	6	178	162	16

```sql
#extending the query to understand  fulfillment rate
SELECT
  Pickup_point,
  HOUR(STR_TO_DATE(Request_timestamp, '%d-%m-%Y %H.%i')) AS request_hour,
  COUNT(*) AS total_requests,
  SUM(CASE WHEN Status = 'Trip Completed' THEN 1 ELSE 0 END) AS completed_trips,
  SUM(CASE WHEN Status IN ('Cancelled', 'No Cars Available') THEN 1 ELSE 0 END) AS unmet_demand,
  ROUND(100 * SUM(CASE WHEN Status = 'Trip Completed' THEN 1 ELSE 0 END) / COUNT(*), 1) AS fulfillment_rate_pct
FROM uber_request_data
GROUP BY Pickup_point, request_hour
ORDER BY Pickup_point, request_hour;
```

ult Grid | Filter Rows: | Export: | Wrap Cell Content:

Pickup_point	request_hour	total_requests	completed_trips	unmet_demand
Airport	0	106	46	60
Airport	1	84	26	58
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Insights:

Where Fulfillment is Critically Low (< 40%)

Pickup Point	**Hour**	**Fulfillment Rate (%)**	**Issue**
Airport	17–21	24.0 → 17.8%	Peak evening demand
City	5–9	25.1 → 30.7%	Morning commuter rush
City	1–4	27.9 → 36.2%	Low supply, off-peak

When Service is Efficient (> 70% Fulfillment)

Pickup Point	**Hours**	**Fulfillment Rate**
Airport	5–12	70–92%
City	11–22 (except peak)	70–79%

Airport mornings and City afternoons/evenings are efficiently handled.

Operational Suggestions

🟥 **High Pain Zones**

Zone	Time	Action Needed
Airport	17–21	Add 2–3× more drivers, apply surge pricing
City	5–9	Allocate drivers earlier, offer morning incentives

Strategic Fixes

1. **Driver Redistribution Based on Hourly Demand**
    - Push drivers to City 5–9 AM
    - Push drivers to Airport 5–9 PM
2. **Surge Pricing Activation**
    - For hours with < 40% fulfillment
3. **Smart Notifications for Drivers**
    - Highlight peak mismatch zones via app pings
4. **Pre-Booking Feature**
    - Encourage pre-booking for City AM, Airport PM slots

Interpretation

- **High Demand, Low Supply:** Indicates operational challenges—often during peak hours or at specific locations (e.g., airport).
- **High Gap:** Suggests lost revenue and poor customer experience. Investigate by time slot, location, or day of week for targeted solutions.
- **Supply Optimization:** Use this analysis to recommend driver incentives, dynamic pricing, or better resource allocation.

Real-World Example: Ride-Sharing Platforms

- **Peak Hours:** Demand surges during rush hours or holidays, but supply (number of drivers) may not match, leading to higher prices (surge pricing) and unmet demand.
- **Incentives:** Platforms may offer bonuses to drivers to increase supply during high-demand periods, restoring balance.
- **Regulatory Changes:** New city regulations can limit the number of drivers, reducing supply and causing shortages even if demand remains constant.

Conclusion

Market dynamics are constantly shifting due to internal and external factors. The balance between demand and supply is not static; it is shaped by price changes, consumer behavior, economic trends, competition, technology, and policy. Understanding these dynamics is crucial for businesses and policymakers to anticipate imbalances and respond effectively to maintain market equilibrium.

.***This report provides a data-driven foundation for addressing Uber's supply-demand gap and improving both operational efficiency and customer satisfaction.***