Uber Ride Analysis for NCR Ride Bookings Optimization

Power BI Dashboard

SUBMITTED IN PARTIAL FULFILLMENT OF THE

REQUIREMENTS OF THE COURSE

Professional Program in Data Analytics

BY

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CERTIFICATE

This to certify that

RUPESH DARPE

Have satisfactorily carried out the Power BI PROJECT work titled "**Uber Ride Analysis for NCR Ride Bookings Optimization Power BI Dashboard**" in partial fulfillment of the course of Professional Program in Data Analytics as laid down by the DVOC Institute during the academic year 2025-2026.

Prof. Sunil Dubey
Guide

Date:

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One-Page Summary

Key Metrics Overview

- **Total Bookings:** 149K
- **Completed Rides:** 93K
- **Incomplete Rides:** 9K
- **Cancelled Ride:** 37.50K
- **Total Revenue:** ₹52M
- **Peak Demand Time:** Evening (≈35%)
- **Peak booking hour:** 18 PM (6pm)
- **Peak Demand Day:** Friday
- **Highest Demand Vehicle:** Auto (37,351 bookings)
- **Top Payment Method:** UPI
- **Major cancellation reasons:** The top reasons for driver-initiated cancellations (after 'null') are "Wrong Address" (2700) and "Change of plan" (2353).

Major Challenges Identified

- High volume of **No Driver Found** incidents
- **Driver-initiated cancellations exceed customer cancellations**
- Peak-hour demand–supply mismatch
- Cancellation drivers include long pickup distance and plan changes

Business Opportunities

- Improve driver supply during **17:00–21:00** peak hours
- Introduce **dynamic, location-based pricing**
- Enhance pickup location accuracy and routing
- Incentivize drivers to reduce cancellation behaviour

Targeted improvements in driver allocation, operational planning, and customer communication can significantly increase **ride completion rates, customer satisfaction, and revenue efficiency** across the NCR region.

EXECUTIVE SUMMARY

The Uber Ride Analysis for NCR Ride Bookings Optimization project was undertaken to evaluate operational efficiency, ride reliability, and revenue performance across the National Capital Region (NCR). Using Power BI, the project transformed raw ride-booking data into a structured, interactive analytics solution covering Overview, Financial Performance, Time Analysis, and Cancellation Analysis dashboards. The primary objective was to identify the key drivers of ride completion, revenue generation, and service failures, and to provide data-backed recommendations to improve overall platform performance.

The analysis revealed that while Uber NCR demonstrates strong demand and consistent revenue generation, operational inefficiencies significantly impact ride completion rates. A large proportion of ride failures is driven by "No Driver Found" events and driver-initiated cancellations, particularly during peak evening hours (17:00–21:00) and in high-demand pickup locations. Financial insights highlighted that revenue is concentrated around specific time slots, vehicle types, and digital payment methods, with Auto and Go Mini vehicles contributing the highest booking volumes and UPI emerging as the dominant payment mode. Importantly, service time metrics such as average pickup time remained relatively stable, indicating that availability rather than speed is the core operational challenge.

Overall, the findings indicate that improving driver supply planning, cancellation control, and location-based optimization offers the greatest opportunity for performance improvement. By aligning driver incentives, pricing strategies, and customer experience initiatives with data-driven insights, Uber can significantly increase ride completion rates, enhance customer satisfaction, and drive sustainable revenue growth. The Power BI solution developed in this project serves as a scalable decision-support framework that enables stakeholders to move from descriptive reporting to actionable, strategy-driven decision-making.

3 INTRODUCTION

3.1 Project Background

This project report delivers a comprehensive data-driven analysis focused on optimizing the operational efficiency and reliability of Uber's ride-booking services within the National Capital Region (NCR). The competitive landscape and imperative for service excellence necessitate a deep understanding of current performance metrics, particularly concerning the high incidence of ride failures, which include customer/driver cancellations and 'No Driver Found' events. By leveraging the Power BI platform and a detailed NCR ride data set, this analysis moves beyond surface-level metrics to uncover the underlying temporal, geographical, and mechanical factors driving suboptimal outcomes.

The core objective of this study is to directly address ride completion rates and mitigate primary failure causes to ensure sustained growth and high customer satisfaction. The report is structured across four key dashboard areas—Operational Overview, Financial Performance, Time Analysis, and Cancellation Analysis—to provide a holistic view of the business. Key questions answered include identifying the most common payment methods, calculating average booking values by vehicle type, and correlating service metrics like Average Vehicle Time at Acceptance to Trip Start (Avg VTAT) with booking success. The insights derived herein will form the basis for tactical business recommendations designed to immediately enhance fleet management and service quality across the NCR market.

3.2 Problem definition / Business Requirements

Despite strong demand, Uber NCR experiences a significant number of ride failures caused by:

- Driver-initiated cancellations
- Customer cancellations
- “No Driver Found” events
- Incomplete rides

These issues reduce ride completion rates, impact customer satisfaction, and result in revenue leakage. The business requirement is to understand why rides fail, when failures occur, and which operational factors contribute most, so that corrective actions can be implemented.

3.3 Aim of the Project

The aim of this project is to analyze Uber NCR ride booking data using Power BI in order to:

- Improve ride completion rates
- Reduce cancellations and operational inefficiencies
- Optimize revenue and service performance

3.4 Objectives

- To analyze ride booking patterns across time, location, and vehicle type
- To evaluate revenue performance and payment behavior
- To identify major causes of ride cancellations and incomplete trips
- To assess service efficiency using time-based metrics such as VTAT and CTAT
- To provide actionable insights for operational and strategic improvements

4. INTRODUCTION TO POWER BI

4.1 What is Power BI?

Power BI is a business intelligence and data visualization tool developed by Microsoft that enables users to analyse data and present insights through interactive dashboards and reports. It helps convert raw data into meaningful information, allowing organizations and analysts to make informed, data-driven decisions efficiently.

Power BI supports data integration from multiple sources, data cleaning and modeling, and the creation of calculated measures using DAX. Its interactive visuals allow users to explore trends, apply filters, and analyse performance across different dimensions, making it suitable for both technical users and non-technical stakeholders in academic and business environments.

4.2Introduction to Power BI Visuals

In this project, different types of visuals were used to represent operational performance, trends, comparisons, and proportions. Each visual type serves a specific analytical purpose and is selected based on the nature of the data being analyzed. The effective use of visuals helps in identifying patterns, anomalies, and relationships that may not be easily visible in raw tables.

Power BI provides a wide range of visualizations that help present data in a clear and meaningful way. Each type of chart is selected based on the nature of the data and the type of analysis required. The correct use of visuals improves data interpretation and supports accurate decision-making.

1. Bar Chart

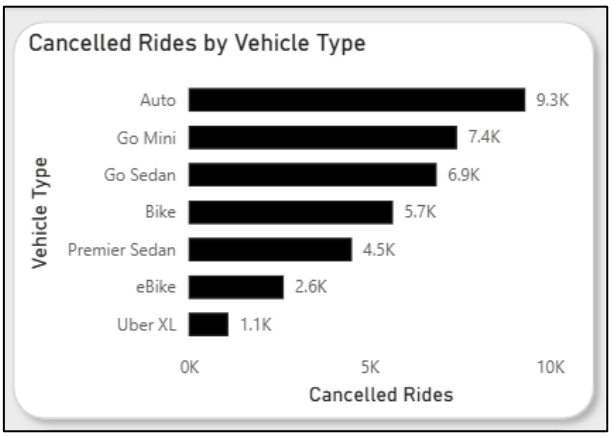


Image 1: Bar Chart

A Bar Chart is used to compare values across different categories. It is most effective when analyzing categorical data such as vehicle types, locations, or customer segments.

Use Case:

- Comparing bookings by vehicle type
- Comparing revenue across locations
- Identifying top-performing categories

2. Line Chart

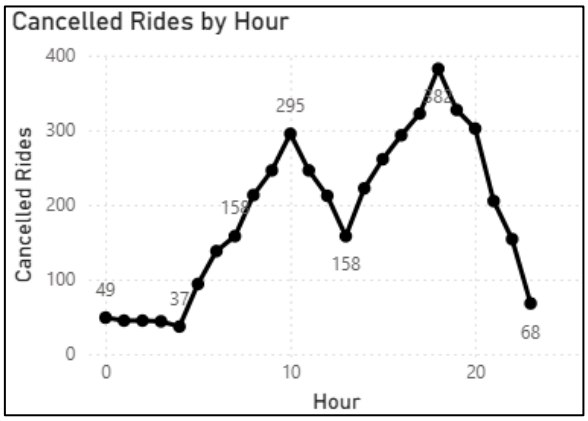


Image 2: Line Chart

A Line Chart is used to show trends and changes over a period of time. It is best suited for time-series data where the objective is to analyze growth, decline, or patterns.

Use Case:

- Monthly revenue trends
- Booking trends over time
- Performance comparison across months or quarters

3. Donut Chart

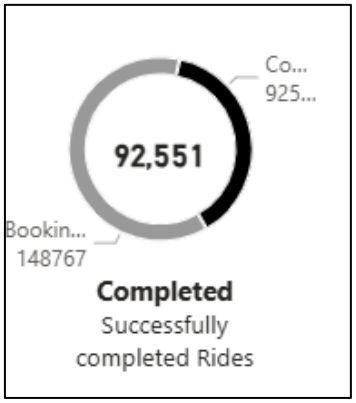


Image 3: Donut Chart

A Donut Chart is used to display the proportion of each category as part of a whole. It is effective when the number of categories is limited and percentage contribution is important.

Use Case:

- Booking distribution by time slot
- Revenue share by payment method
- Cancellation distribution by reason

4. Card Visual

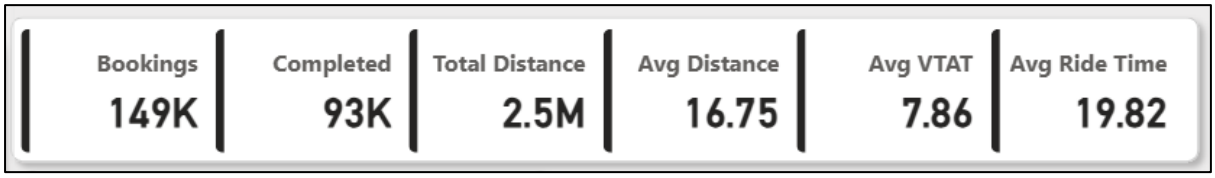


Image 4: Card Visual (KPI'S)

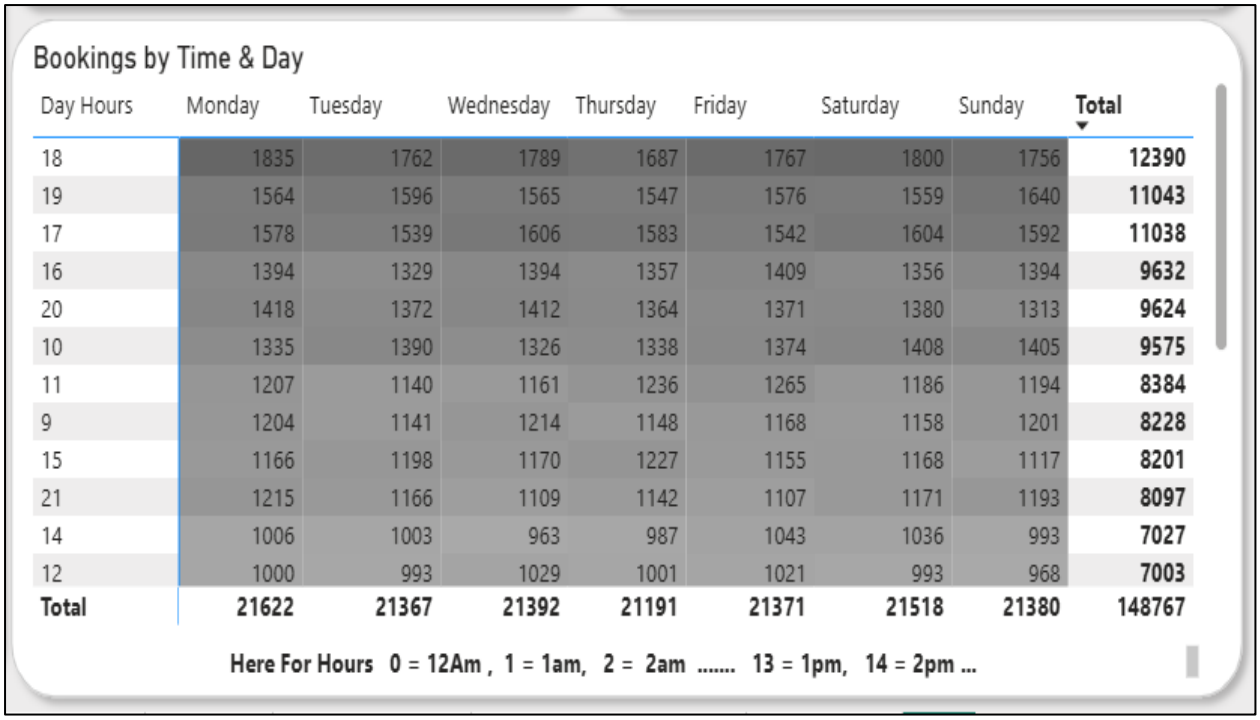
A Card visual is used to display a single key performance indicator (KPI) in a prominent and easy-to-read format. It highlights important metrics at a glance.

Use Case:

- Total bookings
- Total revenue
- Average ride distance
- Completion rate

5. Table / Matrix

Tables and Matrix visuals are used to display detailed data in a structured format. A Table shows row-level data, while a Matrix allows grouped and hierarchical analysis.



Bookings by Time & Day

Day Hours	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Total
18	1835	1762	1789	1687	1767	1800	1756	**12390**
19	1564	1596	1565	1547	1576	1559	1640	**11043**
17	1578	1539	1606	1583	1542	1604	1592	**11038**
16	1394	1329	1394	1357	1409	1356	1394	**9632**
20	1418	1372	1412	1364	1371	1380	1313	**9624**
10	1335	1390	1326	1338	1374	1408	1405	**9575**
11	1207	1140	1161	1236	1265	1186	1194	**8384**
9	1204	1141	1214	1148	1168	1158	1201	**8228**
15	1166	1198	1170	1227	1155	1168	1117	**8201**
21	1215	1166	1109	1142	1107	1171	1193	**8097**
14	1006	1003	963	987	1043	1036	993	**7027**
12	1000	993	1029	1001	1021	993	968	**7003**
Total	**21622**	**21367**	**21392**	**21191**	**21371**	**21518**	**21380**	**148767**

Here For Hours 0 = 12Am , 1 = 1am, 2 = 2am ..... 13 = 1pm, 14 = 2pm ...

Image 5: Matrix Visual

Use Case:

- Viewing detailed booking records
- Comparing metrics across vehicle types and time periods
- Analyzing multiple KPIs together

5. Dataset Overview

5.1 Data Source

The dataset used for this project was sourced from Kaggle and represents simulated Uber ride-booking data for the National Capital Region (NCR). The dataset captures detailed transactional, operational, and behavioural attributes related to ride bookings, including booking status, trip duration, distance, revenue, cancellations, and customer–driver interactions.

The dataset was selected to closely resemble real-world ride-hailing operational data and is well-suited for analyzing demand patterns, operational efficiency, ride reliability, and financial performance. It provides sufficient granularity to support time-based analysis, location-level insights, and cancellation diagnostics.

5.2 Dataset Description & Key Columns

The dataset consists of ride-level records, where each row represents a unique booking transaction. It contains a total of **21 columns**, covering booking metadata, trip metrics, cancellation indicators, and customer and driver feedback.

Column	Description
Date, Time	Booking date & time
Booking Status	Completed / Cancelled / Incomplete
Vehicle Type	Auto, Go Mini, Sedan, Bike, etc.
Pickup & Drop Location	Ride origin and destination
Avg VTAT	Driver travel time to pickup
Avg CTAT	Customer ride time
Booking Value	Fare amount
Ride Distance	Distance in km
Payment Method	UPI, Cash, Wallet, Cards
Cancellation Reasons	Driver or customer initiated

Table 1: Key Data Column Detail

6 Data Cleaning and Preparation

6.1. Data Type Corrections

- Date → *Date type*
- Time → *Time type*

Date & Time Columns were converted to their respective data types.

- Ride Distance, Ratings, VTAT, CTAT → *Decimal type*

Numeric metrics like Avg VTAT, Avg CTAT, Ride Distance, Driver Ratings, and Customer Rating were converted to Decimal Numbers.

6.2 String Formatting

Leading and trailing quotes were trimmed from string identifiers like Booking ID and Customer ID.

6.3 Missing Value Handling

- Null values in count fields (Cancelled Rides by Customer, Booking Value, Ride Distance) replaced with **0**
- Cancellation/Incomplete reasons → replaced with **"N/A"** to allow for clear grouping in analysis.

6.4 Data Modeling

- Relationship model using Calendar, Bookings table, and supporting dimensions

6.5 New Columns / New Table

- **Time Slot** column (Morning / Afternoon / Evening / Night).
- **Calendar table** for Month & Quarter slicers.
- **Veh_img table** for vehicle image slicer.
- **Day Hours** column for heatmap and time-of-day analysis.

7. FEATURE ENGINEERING & REPORT INTERACTIVITY

To enhance analytical depth, usability, and executive-level exploration, multiple derived features, calculated fields, and interactive controls were implemented in the Power BI report. These elements enable flexible slicing, dynamic comparisons, and efficient storytelling without increasing visual complexity.

7.1. Derived Columns & Analytical Features

Several new columns were engineered from the raw dataset to support time-based, operational, and behavioral analysis.

1. Time Slot Classification

A new column, Time Slot, was created by categorizing booking time into four business-relevant segments:

Time Slot	Hour Range
Morning	**05:00 – 11:00**
Afternoon	**12:00 – 16:00**
Evening	**17:00 – 21:00**
Night	**22:00 – 04:00**

Purpose:

- Identify demand patterns across different periods of the day
- Analyze cancellations, bookings, and "No Driver Found" events by time segment

Business Value:
Supports demand forecasting, shift planning, and surge pricing strategies.

2. Day Hours Column

A numeric HourOfDay column (0–23) was derived from the booking time.

Purpose:

- Enable hourly trend analysis
- Support heatmap visuals (Hour × Day)
- Analyze pickup delays and cancellation peaks

Business Value:
Helps identify peak booking and cancellation hours for operational optimization.

3. Calendar Table (Date Dimension)

A dedicated Calendar table was created using the booking date range.

Features Included: Date, Month, Month Index (for correct sorting), Quarter, Year

Purpose:

- Enable time intelligence calculations
- Support Month & Quarter slicers

- Ensure chronological accuracy in visuals

Business Value:
Provides consistent and scalable time-based analysis across all dashboards.

7.2 Field Parameters

In addition to derived data features, Power BI Field Parameters were implemented to improve dashboard flexibility, reduce visual redundancy, and enhance user-driven exploration.

1. M&Q Slicer (Month & Quarter Parameter)

Dashboard Used: Overview Dashboard

Description:
The M&Q Slicer is a Field Parameter created to dynamically switch between Month-wise and Quarter-wise views within the same visual.

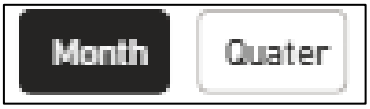


Image 6: Month and Quarter Button

Implementation Details:

- Built using Power BI Field Parameters
- Includes: Month and Quarter
- Implemented as a Button Slicer for intuitive selection

Purpose:

- Allow executives to toggle between granular and summarized time views
- Avoid duplication of visuals for Month and Quarter analysis

Business Value:
Enhances analytical flexibility while maintaining a clean, minimal dashboard layout.

7.3 Advanced Dashboard Interactivity (Bookmarks & Navigation)

To enhance user experience, improve report navigation, and reduce visual clutter, an interactive collapsible menu bar was implemented using Power BI bookmarks, selection pane, and action buttons.

1. Collapsible Menu Bar with Bookmark Navigation

Dashboards Used:
Overview, Financial Performance, Time Analysis, Cancellation Analysis

Description:
A slide-in **Menu Bar** was designed to dynamically **open and close** using bookmarks. The menu

contains contextual filters relevant to each dashboard section, along with a **Back button** for intuitive navigation.

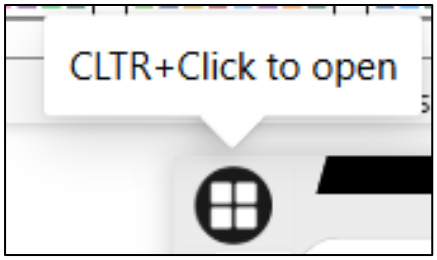


Image 7: Menu bar (Open) Icon

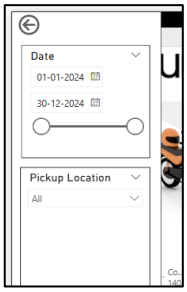


Image 8: Filter with menu close Icon

Implementation Details

- **Bookmarks Used:**
  - *Menu Open* – Displays filter panel and navigation controls
  - *Menu Close* – Hides the filter panel to maximize canvas space
- **Selection Pane:**
  - Used to group slicers and menu components
  - Controlled visibility during bookmark states
- **Action Buttons:**
  - Open Menu icon → Linked to *Menu Open* bookmark
  - Back Button → Returns user to previous state or Home page
- **Bookmark Settings:**
  - *Data option disabled* to avoid unintended filter resets
  - Only visibility and display states are controlled

8. DAX MEASURES USED (High-Level)

Only high-level measures are listed to maintain report readability.

- Bookings = DISTINCTCOUNT(ncr_Uber[Booking ID])
- Completed Rides = CALCULATE([Bookings Count],ncr_Uber[Booking Status]="Completed")
- Cancelled Rides = SUM('ncr_Uber'[Cancelled Rides by Customer]) + SUM('ncr_Uber'[Cancelled Rides by Driver])
- Average Rate = DIVIDE([Revenue],[Bookings Count], BLANK())
- Revenue = SUM(Booking Value)
- Avg Distance = AVERAGE(Ride Distance)
- VTAT / CTAT averages
- Booking Remove Status Filter = CALCULATE([Bookings Count],ALL(ncr_Uber[Booking Status]))

Time Slot Column

```
Time Slot = VAR Hr = HOUR('ncr_Uber'[Time]) RETURN
 SWITCH(
    TRUE(),
    Hr >= 5  && Hr <= 11, "Morning", Hr >= 12 && Hr <= 16, "Afternoon",
    Hr >= 17 && Hr <= 21, "Evening", Hr >= 22 || Hr <= 4,  "Night",
    "Unknown"
)
```

9. DASHBOARD STRUCTURE & PAGE OVERVIEW

The Power BI report is organized into one landing page and four analytical pages, each designed to address a specific business dimension of Uber's NCR ride performance. These pages include:

- **Landing Page/Home Page -** Serves as a centralized navigation hub for the end-user. It contains clickable navigation buttons for each main dashboard page.
- **Overview Page** – Focuses on operational efficiency, reliability, and high-level KPIs.

This structured, multi-page layout ensures seamless navigation and provides stakeholders a comprehensive end-to-end understanding of operational, financial, temporal, and reliability aspects of Uber NCR rides.

9.1 OVERVIEW PAGE (Operations & Reliability)

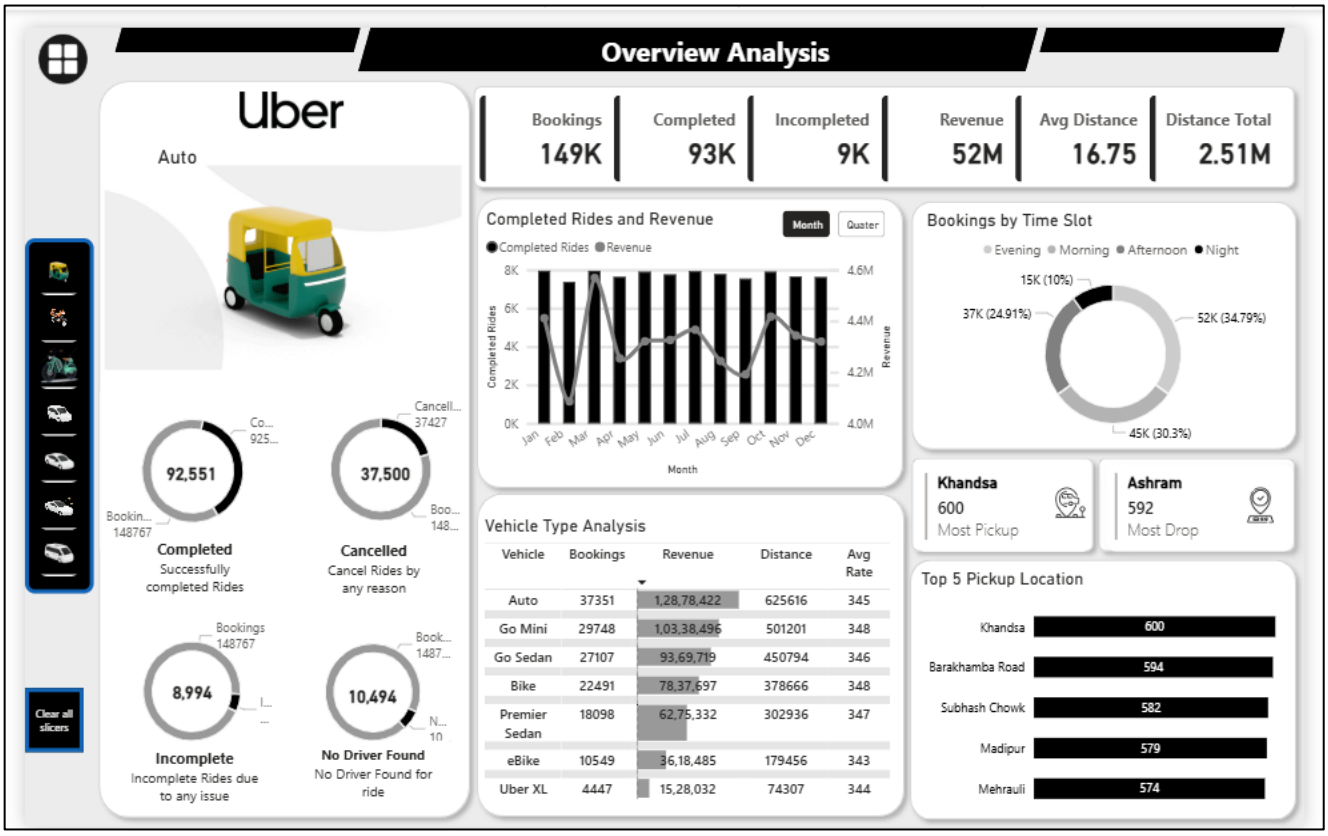


Image 9: Overview Page

This page provides a high-level snapshot of key operational metrics: total bookings, completed rides, incomplete rides, revenue, average distance, and distance travelled. It highlights performance by vehicle type, top pickup/drop locations, booking distribution by time slots, and completion vs. cancellation patterns.

KPIs

Image 10: KPI's

- **Total Bookings (149K):** Represents overall ride demand across the selected period.
- **Completed Rides (93K):** Successfully fulfilled rides.
- **Incomplete Rides (9K):** Rides that failed due to operational issues.
- **Revenue (₹52M):** Total booking value generated.
- **Average Distance (16.75 km):** Average trip length.
- **Total Distance (2.51M km):** Total distance covered by all rides.

Role:
These KPIs allow decision-makers to quickly evaluate platform scale, efficiency, and revenue health at a glance.

Slicers & Filters

Image 11: Filters

Image 12: Vehicle type Slicer

The Overview page includes interactive slicers to enable focused analysis:

- **Date Range Slicer:** Filters data across selected time periods.
- **Pickup Location Filter:** Analyzes demand by origin zones.
- **Drop Location Filter:** Helps identify popular destinations.
- **Day Hours Filter:** Enables hourly operational analysis.
- **Vehicle Type Slicer (Image based):** Allows comparison across vehicle categories.

Key Visuals & Insights

1. Completed, Cancelled, Incomplete & No Driver Found (Donut Charts)

What it shows:

- Distribution of ride outcomes:
    - Completed Rides
    - Cancelled Rides
    - Incomplete Rides
    - No Driver Found cases

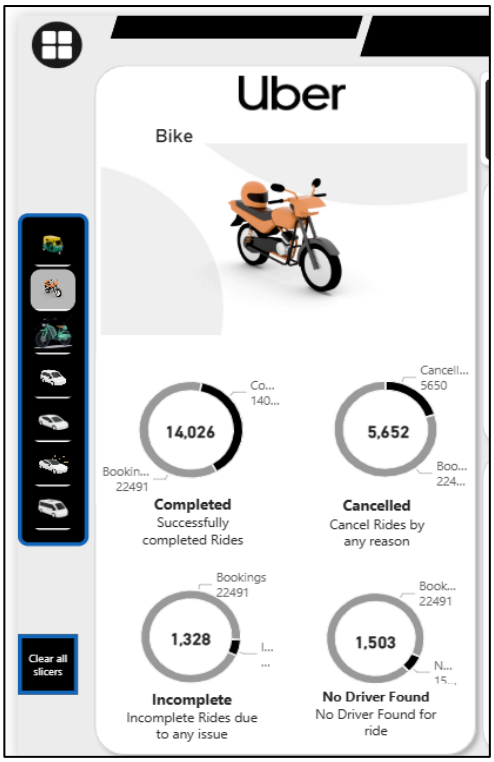


Image 13: Ride Status Donut Chart

Insight:

- A significant portion of ride failures is driven by “No Driver Found”, indicating supply-side constraints rather than customer behavior.
- Cancellations also form a sizable share, impacting overall completion rate.

2. Completed Rides and Revenue Trend (Column and Line chart)

What it shows:

- Monthly completed rides (bar)
- Monthly revenue trend (line)
- Toggle between **Month and Quarter** using the M&Q parameter

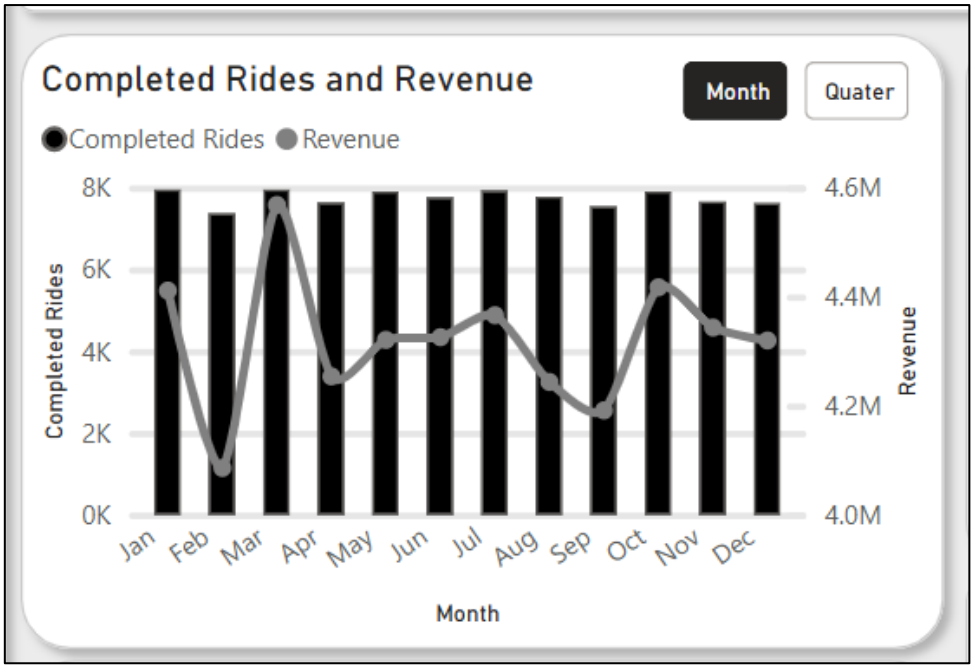


Image 14: Completed Rides and Revenue Chart

Insight:

- Ride volume and revenue show **seasonal fluctuations**.
- Revenue does not always move proportionally with ride count, indicating **pricing or distance variation effects**.

3. Bookings by Time Slot (Donut Chart)

What it shows:

- Distribution of bookings across:
    - Morning
    - Afternoon
    - Evening
    - Night

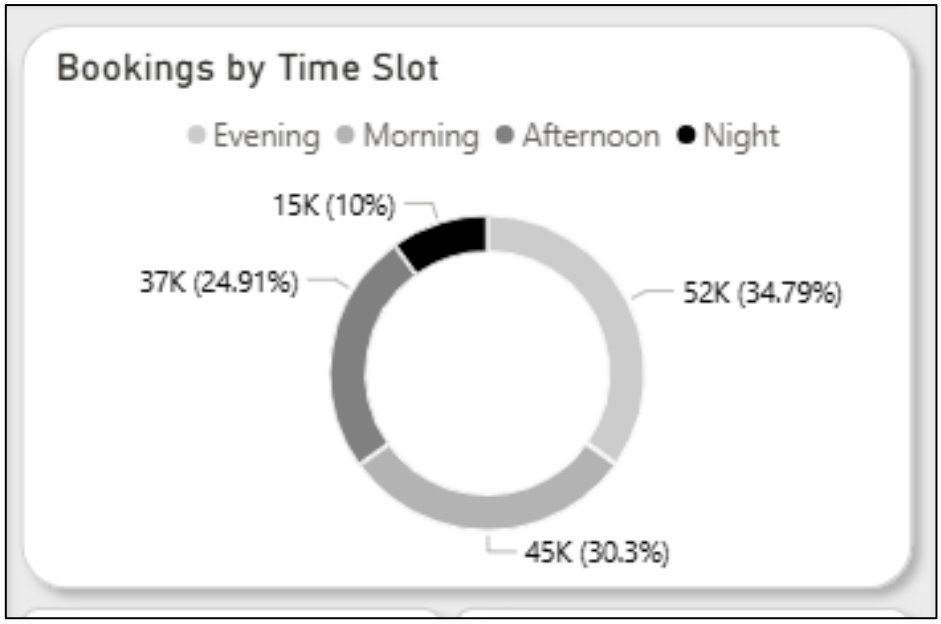


Image 15: Bookings by Time Slot Chart

Insight:

- **Evening hours dominate bookings (~35%)**, confirming peak demand **(5pm to 9pm).**
- Night demand is significantly lower, highlighting opportunities for cost optimization.

4. Vehicle Type Analysis (Matrix Table)

What it shows:

- Bookings, revenue, distance, and average rate by vehicle type.

Vehicle Type Analysis

Vehicle	Bookings	Revenue	Distance	Avg Rate
Auto	37351	1,28,78,422	625616	345
Go Mini	29748	1,03,38,496	501201	348
Go Sedan	27107	93,69,719	450794	346
Bike	22491	78,37,697	378666	348
Premier Sedan	18098	62,75,332	302936	347
eBike	10549	36,18,485	179456	343
Uber XL	4447	15,28,032	74307	344

Image 16: Vehicle Type analysis Matrix chart

Insight:

- **Auto and Go Mini** drive the highest booking volumes.
- Premium vehicles generate higher average rates but lower volumes.
- Revenue contribution is strongly volume-driven.

5. Top Pickup & Drop Locations (Cards)

What it shows:

- Most frequent pickup and drop locations.

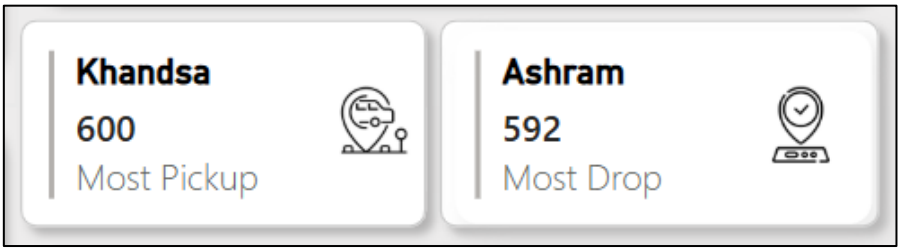


Image 17: Most Pickup & Drop Location Cards

Insight:

- Certain zones consistently generate high demand, making them priority areas for driver availability and surge planning.
- Khandsa (600) is the Most pickup location and Ashram (592) is the Most drop location

6. Top 5 Pickup Locations by Bookings (Bar Chart)

What it shows:

- Top pick up locations ranked by completed rides.

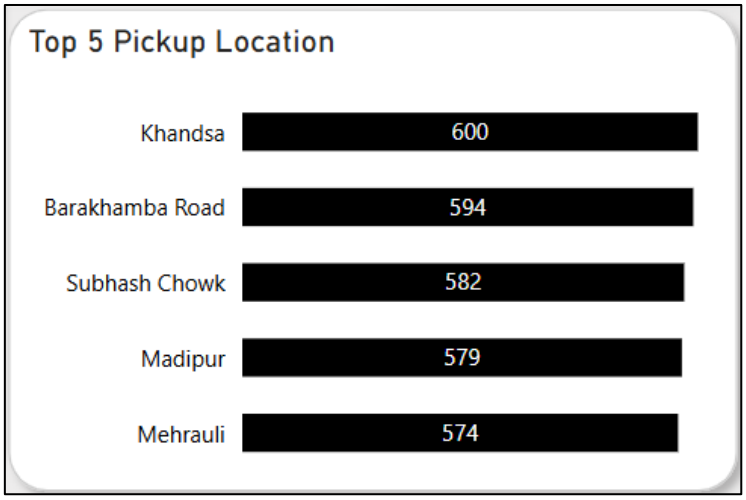


Image 18: Top 5 Pickup Location

Insight:

- Demand is geographically concentrated.
- Targeted driver positioning in these locations can significantly improve completion rates.

Key Operational Insights (Summary)

- High demand is concentrated in **evening hours** and specific locations.
- **No Driver Found** is the primary contributor to ride failures.
- Vehicle mix strongly influences volume and revenue.
- Completion efficiency varies by time and location, not by average trip distance.

10. CONSOLIDATED BUSINESS RECOMMENDATIONS

1. **Improve Driver Availability During Peak Hours**
    - Introduce targeted driver incentives between **17:00–21:00**.
    - Optimize driver distribution in high-demand pickup zones.
2. **Reduce "No Driver Found" Incidents**
    - Dynamic surge pricing for supply-deficit locations.
    - Predictive driver allocation based on historical demand.
3. **Optimize Vehicle Utilization**
    - Encourage high-volume vehicles (Auto, Go Mini) during peak demand.
    - Promote premium vehicles during off-peak hours to balance supply.
4. **Location-Based Strategy**
    - Prioritize driver onboarding and retention in top pickup areas.
    - Use geo-fencing to proactively push ride requests to nearby drivers.

11. CONCLUSION

This project, **Uber Ride Analysis for NCR Ride Bookings Optimization**, successfully transformed raw ride-booking data into a comprehensive decision-support system using Power BI. Through structured data cleaning, feature engineering, advanced DAX calculations, and interactive dashboard design, the analysis delivered clear visibility into **operational efficiency, revenue performance, demand patterns, and ride reliability** across the NCR region. The dashboards were designed not only to present metrics but to tell a cohesive business story, enabling stakeholders to quickly identify performance gaps and opportunities.

The analysis revealed that while overall demand and revenue growth remain strong, **ride completion efficiency is the key operational challenge**. High cancellation volumes—primarily driven by driver-initiated cancellations and "No Driver Found" scenarios—were concentrated during peak evening hours and high-demand locations. Financial insights further highlighted that revenue is heavily influenced by **time-based demand, vehicle mix, and digital payment adoption**, with certain vehicle categories and time slots consistently outperforming others. Importantly, the findings indicate that most revenue leakage is preventable through improved supply allocation and operational planning rather than demand generation.

Overall, this project demonstrates how data-driven insights can be directly linked to **actionable business strategies**. By aligning driver availability, pricing mechanisms, vehicle utilization, and customer experience initiatives with analytical findings, Uber can significantly improve ride reliability, customer satisfaction, and profitability. The Power BI solution developed in this project serves as a scalable framework that can support both tactical decisions and long-term strategic planning.

11.2 Future Scope

1. **Predictive Demand Forecasting:** Integrate machine learning models to forecast ride demand by hour, location, and vehicle type. This would enable proactive driver deployment and reduce peak-hour supply shortages.
2. **Real-Time Dashboard Integration:** Connect live streaming data to monitor bookings, cancellations, and driver availability in real time, allowing operations teams to take immediate corrective actions.
3. **Advanced Cancellation Prediction:** Develop models to predict the likelihood of driver or customer cancellations based on historical behaviour, trip distance, and pickup location, enabling preventive interventions.
4. **Customer Segmentation & Lifetime Value Analysis:** Extend financial analysis to identify high-value and repeat customers, enabling targeted promotions, loyalty programs, and personalized pricing strategies.