

# VEHICLE POPULATION ANALYSIS DASHBOARD USING POWER BI

## A Data Analytics Project

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## 1. INTRODUCTION

Transportation plays a critical role in economic development, urban planning, and mobility management. Understanding vehicle population distribution across regions provides valuable insight into infrastructure demand, mobility trends, and commercial activity.

This project analyzes regional vehicle population data using Microsoft Power BI to uncover patterns in vehicle ownership and usage behavior. The objective is to transform raw vehicle statistics into meaningful insights that can support data-driven decision-making.

## 2. PROJECT OBJECTIVES

The main objectives of this analysis are:

1. To identify regions with the highest and lowest vehicle populations.
2. To determine the most common vehicle types across regions.
3. To compare two-wheeler and four-wheelers.
4. To analyze the distribution of commercial and private vehicles.
5. To identify patterns and trends in vehicle ownership and usage.

## 3. DATA DESCRIPTION

The dataset contains vehicle population statistics categorized by:

- Year
- Region
- Vehicle Type
- Vehicle Count

Vehicle types include categories such as motorcycles, scooters, buses, trucks, taxis, delivery vans, and private cars.

The dataset required cleaning and restructuring to prepare it for analysis in Power BI.

## 4. DATA CLEANING AND TRANSFORMATION

Data preparation was performed using **Power Query Editor** in Power BI. The following steps were taken:

- Renaming columns for clarity and consistency
- Correcting data types (text, whole numbers, etc.)
- Removing missing and inconsistent values
- Restructuring the dataset into long format using the Unpivot feature
- Creating calculated columns for:
  - Vehicle Class (Two-Wheeler vs Four-Wheeler)
  - Vehicle Usage (Commercial vs Private)

This transformation ensured the dataset followed best practices for analytical modeling.

## 5. DATA MODELING AND DAX MEASURES

To support analysis and visualization, key DAX measures were created:

- Total Vehicles
- Two Wheelers
- Four Wheelers
- Commercial Vehicles
- Private Vehicles

These measures allowed dynamic calculations across regions and categories, enabling interactive dashboard exploration.

## 6. EXPLORATORY DATA ANALYSIS (EDA)

Several visualizations were created to answer the project questions:

- Clustered bar chart showing total vehicles by region
- Stacked column chart showing vehicle types by region
- Donut chart comparing two-wheelers and four-wheelers

- Donut chart comparing commercial and private vehicles
- KPI cards summarizing key totals
- Supporting data table for transparency

Interactive slicers were added to allow filtering by region and vehicle type.

## 7. KEY FINDINGS

The analysis revealed the following insights:

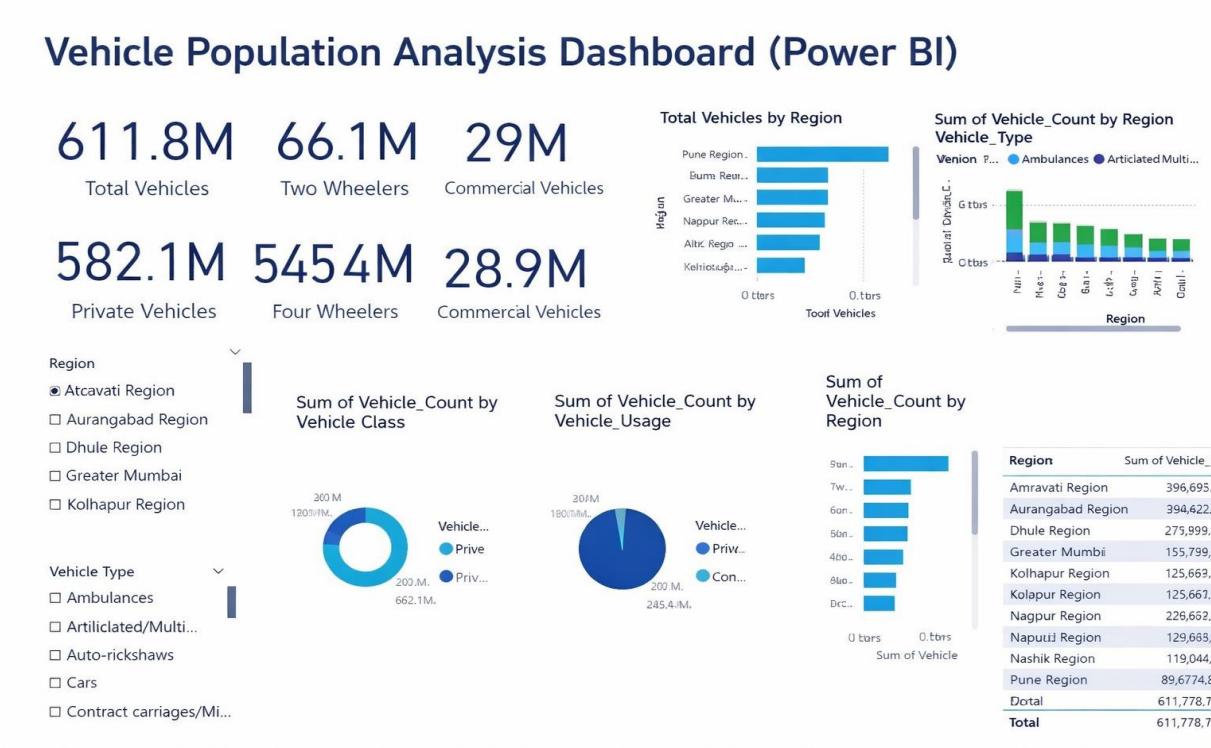
1. Vehicle population varies significantly across regions, reflecting differences in population density and economic activity.
2. Two-wheelers dominate in many regions, suggesting a preference for affordable and flexible transportation options.
3. Four-wheelers are more concentrated in regions with stronger infrastructure and higher income levels.
4. Private vehicles significantly outnumber commercial vehicles, indicating that personal mobility is the primary driver of vehicle ownership.
5. Commercial vehicles are clustered in economically active regions, supporting logistics, trade, and public transportation systems.

## 8. DASHBOARD OVERVIEW

An interactive Power BI dashboard was developed to present the findings clearly and professionally. The dashboard includes:

- KPI summary cards for quick overview
- Comparative visualizations for regional analysis
- Distribution charts for vehicle class and usage
- Interactive slicers for dynamic filtering
- Supporting data table for validation

### INTERACTIVE POWER BI DASHBOARD



The dashboard provides both high-level summaries and detailed insights, making it suitable for stakeholders and decision-makers.

## 9. BUSINESS IMPLICATIONS

The findings from this analysis can support:

- Transportation infrastructure planning
- Regional mobility policy development
- Investment decisions in commercial transportation
- Urban development strategies
- Market analysis for automotive businesses

Understanding regional vehicle distribution enables more informed planning and resource allocation.

## 10. SKILLS AND LEARNING OUTCOMES

This project strengthened my capabilities in:

- Data cleaning and transformation using Power Query
- Data modeling in Power BI
- Writing DAX measures

- Dashboard design and storytelling
- Translating raw data into actionable insights

Beyond technical skills, this project reinforced the importance of curiosity, collaboration, and continuous learning in delivering impactful data analysis.

## 11. CONCLUSION

The Vehicle Population Analysis Dashboard demonstrates how business intelligence tools like Power BI can transform raw datasets into structured, interactive, and decision-support solutions.

By combining data preparation, modeling, visualization, and storytelling, this project provides meaningful insight into regional vehicle distribution patterns and mobility trends.

## 12. TOOLS USED

- Microsoft Power BI
- Power Query
- DAX (Data Analysis Expressions)
- Microsoft Excel