Report

On

Project 2

“ELECTRIC VEHICLE SALES ANALYSIS IN INDIA”

ABSTRACT

India is witnessing a rapid shift towards sustainable transportation. This project analyzes Electric Vehicle (EV) sales data across Indian states to uncover regional adoption trends, vehicle preferences, and growth patterns from 2014 to 2024. The goal is to support policy-making, business planning, and infrastructure development through actionable insights.

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1. INTRODUCTION

1.1 About the Project

With the rising adoption of EVs, understanding their sales distribution helps assess state-level progress, forecast growth, and optimize investments. This project uses cleaned and structured EV sales data for in-depth state-wise and category-wise analysis.

1.2 Objective and Deliverables

- Analyze year-wise and month-wise EV sales trends
- Compare EV sales across different Indian states
- Examine sales by vehicle class, category, and type
- Provide policy and investment recommendations based on insights

2. METHODOLOGY

2.1 Tools and Technologies Used

- Programming Language: Python
- Libraries: Pandas, NumPy, Matplotlib, Seaborn
- Data Visualization: Seaborn & Matplotlib
- Environment: Jupyter Notebook / Visual Studio Code

2.2 Data Preparation

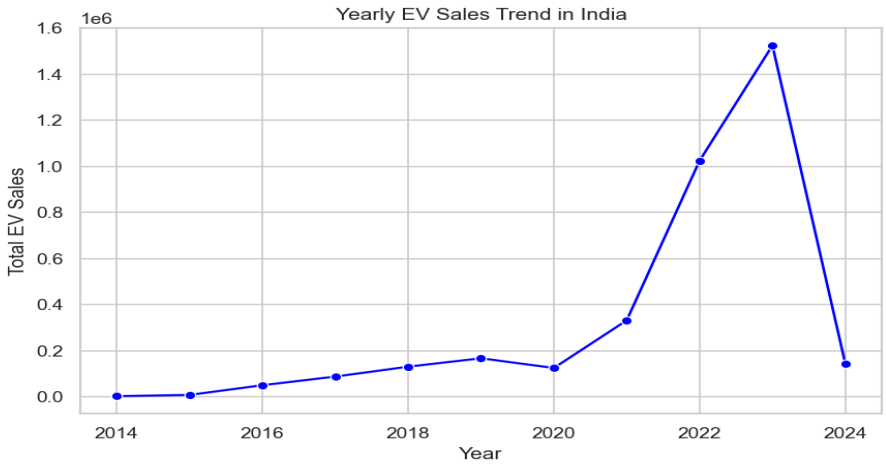
Data Source: Scraped from Clean Mobility Shift Portal
Total Records: Over 96,000 EV registration records
Preprocessing Steps:

- Removed nulls and ensured no duplicates
- Parsed date field, fixed data types
- Categorical encoding for columns like State, Vehicle_Type
- Cleaned column names (spaces, special characters removed)

3. ANALYSIS & IMPLEMENTATION

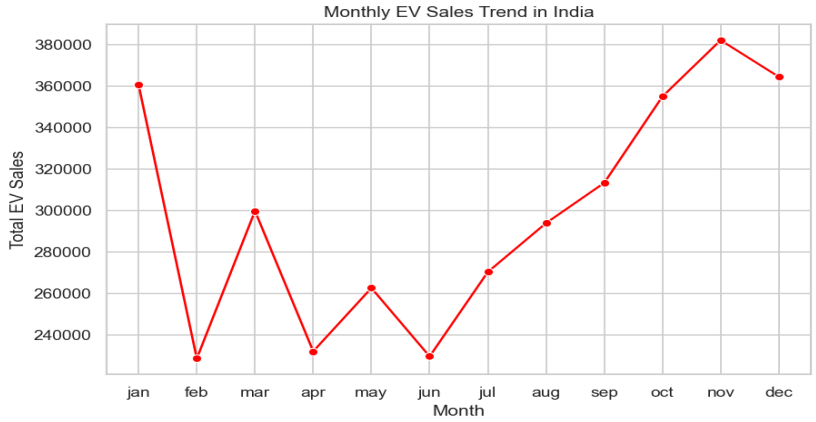
3.1 Year-wise EV Sales Trend:

EV adoption in India has grown exponentially post-2020. Peak in 2023 with over 1.5 million units sold. Drastic drop in 2024, possibly due to partial-year data or market fluctuations.



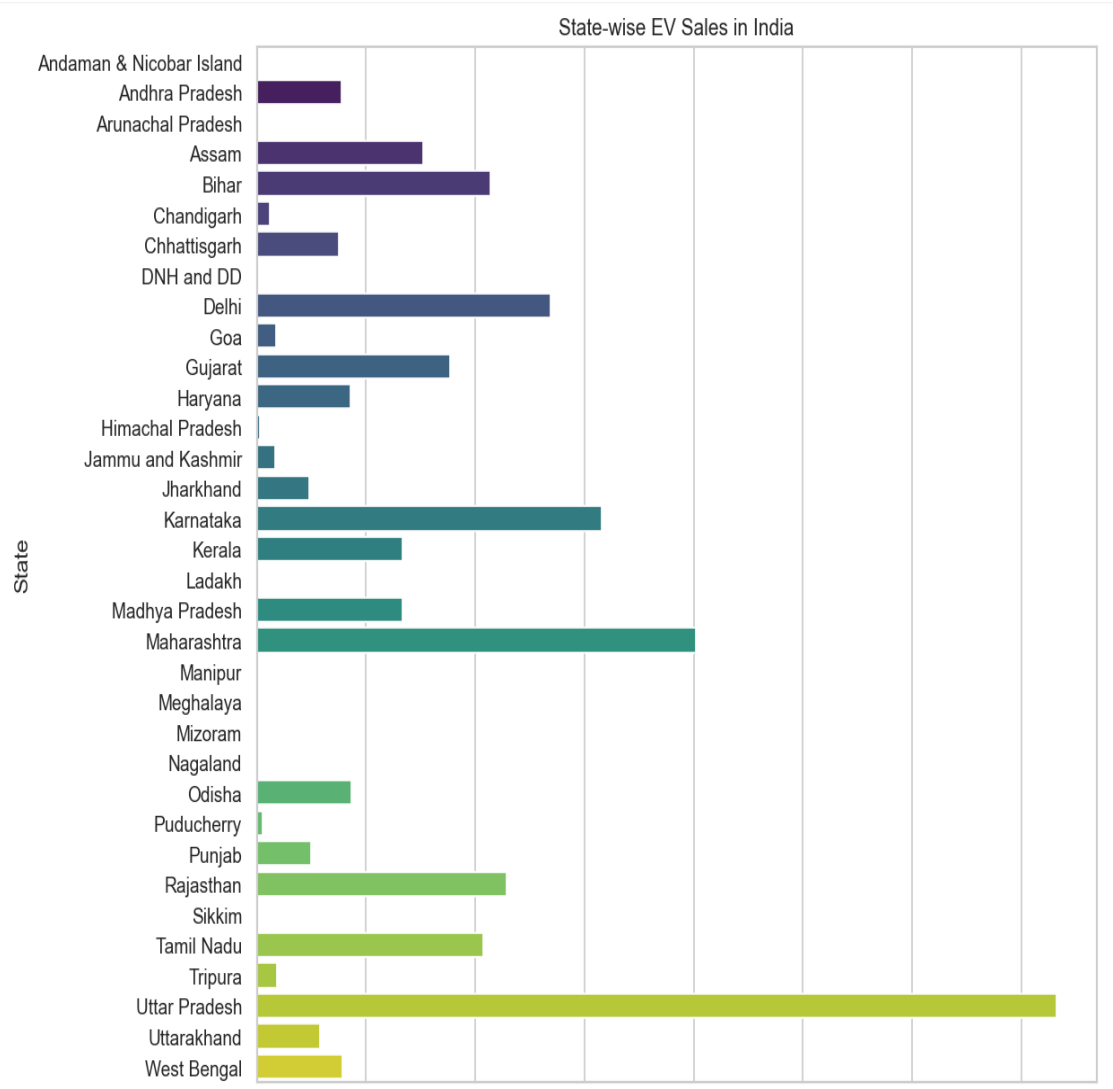
3.2 Month-wise EV Sales Trend:

Sales peak in November, followed by October and December. Lowest sales consistently in February and April.



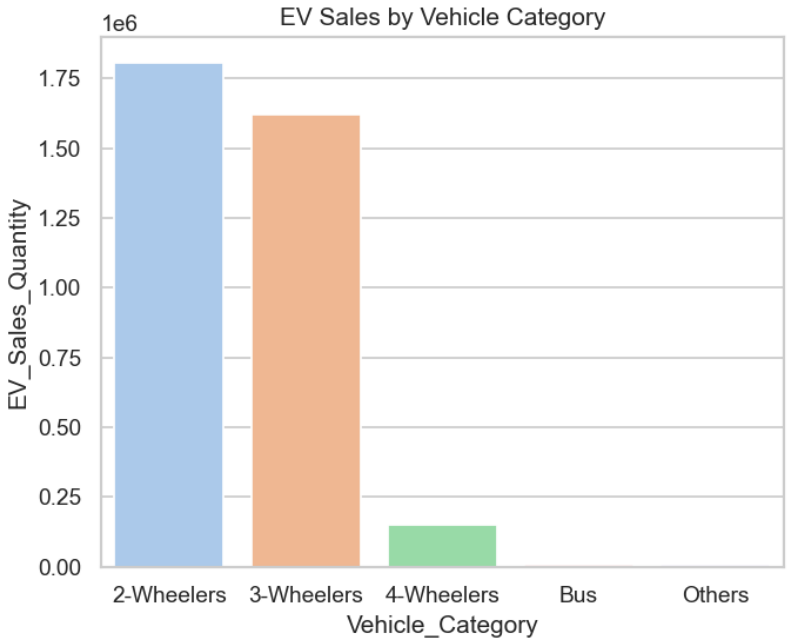
3.3 State-wise EV Sales Trend:

Uttar Pradesh, Maharashtra, and Karnataka are the top-performing states. High EV penetration in urbanized and industrially progressive regions.



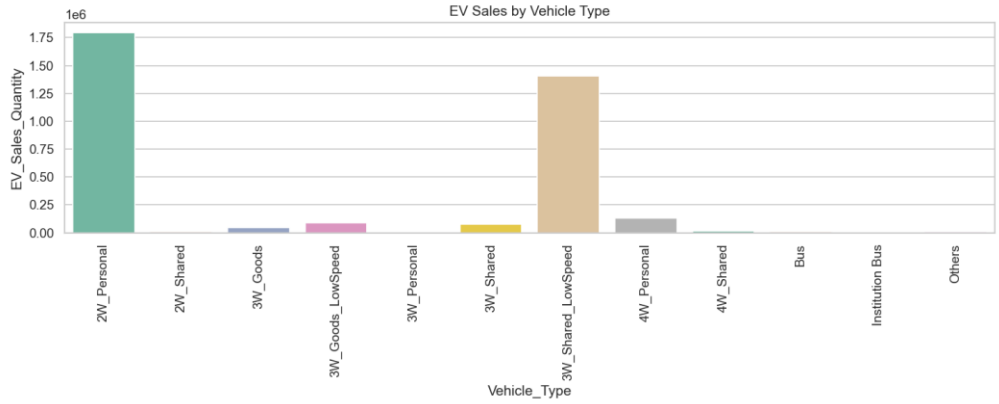
3.4 Vehicle Category Analysis:

2-Wheelers dominate the Indian EV market. 3-Wheelers follow due to their use in public transport (e-rickshaws). 4-Wheelers and Buses show comparatively lower adoption.



3.5 Vehicle Type Analysis:

2W_Personal and 3W_Shared_LowSpeed are the top types. Institution buses, goods carriers, and 4W_Shared have relatively niche usage.



3.6 Descriptive Statistics of Sales Data:

Mean sales per entry: **~37 units**

Maximum recorded sale in a single row: **20,584 units**

Median and quartile values suggest that most rows report very low sales, with few very large values (long tail distribution).

	EV_Sales_Quantity
count	96845.000000
mean	37.108896
std	431.566675
min	0.000000
25%	0.000000
50%	0.000000
75%	0.000000
max	20584.000000

3.7 Vehicle Class Distribution:

2-Wheelers dominate EV sales, followed by 3-Wheelers (mostly e-rickshaws). Heavy-duty vehicles like buses and goods carriers are still niche.

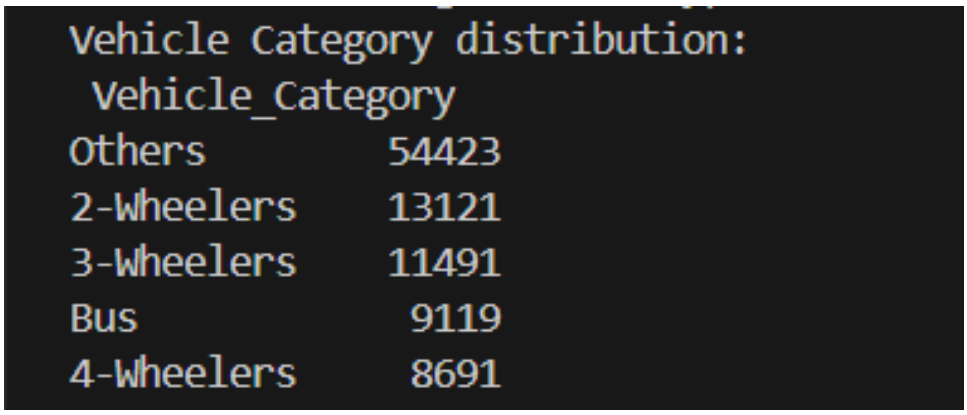
Vehicle Class distribution:

Vehicle_Class	
MOTOR CAR	4111
M-CYCLE/SCOOTER	4101
GOODS CARRIER	4096
MOTOR CAB	3985
BUS	3813
	...
SEMI-TRAILER (COMMERCIAL)	18
X-RAY VAN	12
MOTOR CYCLE/SCOOTER-WITH TRAILER	9
MODULAR HYDRAULIC TRAILER	3
MOTOR CARAVAN	3

3.8 Vehicle Category Distribution:

EVs categorized by use-case show:

- Personal 2-wheelers dominate
- Shared 3-wheelers and institutional use buses follow in volume



3.9 Descriptive Statistics:

- Average Sales per Entry: **~37 units**
- Max Sales in a single record: **20,584 units**
- Distribution: Positively skewed with few high-value entries

4. KEY INSIGHTS

- EV adoption rose drastically post-2020 due to policy initiatives and cost parity.
- Q4 months show seasonal demand peaks — likely from incentives and offers.
- 2-Wheelers and 3-Wheelers dominate due to affordability and urban commuting needs.
- State-wise differences show the impact of local policy and infrastructure.

5. CONCLUSION

India is progressing toward electric mobility with impressive adoption in several key states. However, the growth remains concentrated in affordable segments and urban hubs.

6. RECOMMENDATIONS

- Promote adoption of 4-wheelers and buses to diversify usage
- Expand charging infrastructure in underperforming states
- Use high-performing states as models for policy replication
- Leverage seasonal insights for marketing and inventory decisions