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**EV Market Segmentation Report**

**1. Problem Statement**

With the rapid shift towards sustainable transportation, electric vehicles (EVs) have gained significant traction across India. For a new EV startup to successfully penetrate the market, it is essential to understand regional demand, vehicle preferences, and sales trends. The objective of this report is to perform market segmentation based on real EV sales data to guide the company's strategic decisions regarding:

- Which type of EV to manufacture?

- Where to sell it?

- How to approach the target audience?

**2. Dataset Overview**

The dataset used for this analysis provides EV sales data across Indian states over several years, categorized by vehicle type. The key columns include:

- **State:** Name of the Indian state

- **Year:** The year of the EV sales record

- **Vehicl**e\_**Type**: Type of EV (e.g., 2W\_Personal, 3W\_Shared)

- **EV\_Sales\_Quantity**: Number of EVs sold

* **Sample (Dataset Head):**

A screenshot of a computer

AI-generated content may be incorrect.

**3. Market Segmentation Process**

* **Libraries Used:**

- Pandas : Data manipulation

- Matplotlib / Seaborn : Visualization

- Scikit-learn : Clustering (KMeans)

**Steps Performed:**

1. Data Cleaning: Column names were formatted and missing data handled.
2. Grouping by Year/State/Type: Aggregated to understand trends.
3. Trend Analysis: EV sales growth year-over-year.
4. Pie Charts: To visualize contribution of each year and vehicle type.
5. Bar Charts: State-wise and type-wise volume comparisons.
6. Clustering: KMeans clustering used to identify state clusters based on vehicle preferences.
7. Outlier Detection: Rajasthan emerged as a high performer despite being mid-tier in past years.

**4. Key Insights**

- **Vehicle Types :**

- 3W\_Shared\_LowSpeed and 2W\_Personal dominate sales.

- 4W and Bus categories lag behind.

**- Top States :**

- Uttar Pradesh leads in EV sales.

- Maharashtra and Gujarat show strong, consistent growth.

- Rajasthan shows an unexpected spike, indicating emerging opportunity.

- **Trend Over Time :**

- Major rise in EV sales post-2021.

- Market is maturing rapidly with broader adoption.

**5. Visualizations**

Note: All graphs were generated using matplotlib and pandas.

**- Line Graph : Top 10 vehicle types over time.**

A graph of sales and trends

AI-generated content may be incorrect.

- **Bar Chart : Top states by total EV sales.**

A graph with green squares

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**- Pie Chart : Annual EV sales share.**

A pie chart with numbers and a number of sales

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- **Clustering Plot : Segmentation of states based on vehicle preference.**

A graph with dots and numbers

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**6. Recommendation to the Company**

* **What to Produce:**

- Begin with 3W\_Shared (auto-rickshaws, tuk-tuks) for urban public use.

- Optionally expand to 2W\_Personal for youth/commuters.

* **Where to Launch:**

- Primary Targets : Uttar Pradesh, Maharashtra, Gujarat

- Emerging Opportunity : Rajasthan (spike in 2022)

* **How to Proceed:**

- Partner with regional dealers and governments.

- Focus marketing efforts in Tier 2 and Tier 3 cities.

- Offer competitive financing options to penetrate deeper markets.

**7. Conclusion:**

The segmentation analysis of the Indian Electric Vehicle (EV) market indicates a strong and growing demand, especially in the categories of **3W Shared Low-Speed** and **2W Personal** vehicles. These segments currently dominate EV adoption across the country.

Key findings suggest that **Uttar Pradesh** leads in overall EV sales volume, while **Rajasthan** has shown a notable increase in recent years, identifying it as a potential growth market. Sales have significantly accelerated post-2021, aligning with national policy shifts and increased consumer awareness.

Cluster analysis has revealed distinct state-level preferences, allowing for data-driven regional strategies rather than uniform national approaches. This segmentation can support targeted marketing, production, and distribution efforts.

In summary, the insights derived from this analysis provide clear guidance on:

* **What to produce**: Focus on high-demand vehicle categories such as 3W Shared and 2W Personal.
* **Where to launch**: Target high-performing states like Uttar Pradesh, Maharashtra, and Gujarat, with strategic interest in emerging markets like Rajasthan.
* **How to proceed**: Implement a phased, region-specific rollout supported by financing, government partnerships, and awareness campaigns.

**8. Dataset Source and Github Link:**

Kaggle Dataset :

[Electric Vehicle Sales by State in India](https://www.kaggle.com/datasets/mafzal19/electric-vehicle-sales-by-state-in-india)

GitHub: (https://github.com/jajisan/EV\_Market\_segmentation)