Electric Vehicle Market in India

Market Segmentation

CHAITHRANJALI S–25/07/2024

Abstract

The India Electric Vehicle (EV) Market has emerged as a pivotal segment in the country's transition towards sustainable transportation and environmental conservation. This market encompasses electric cars, buses, two-wheelers, and three-wheelers, driven by advancements in technology, government incentives, and increasing consumer awareness of environmental issues. With a compound annual growth rate (CAGR) of over 40% projected for the next decade, the Indian EV market is set to experience substantial growth. Key factors contributing to this growth include favorable government policies, such as the Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) scheme, tax benefits, and subsidies for EV buyers and manufacturers. Additionally, the declining cost of batteries, improvement in charging infrastructure, and collaborations between automotive manufacturers and technology firms are critical enablers. Challenges such as high initial costs, limited charging infrastructure, and consumer skepticism remain, but ongoing investments and policy support are poised to mitigate these barriers. This paper examines the current landscape, growth drivers, challenges, and future outlook of the Indian EV market, providing a comprehensive overview of its trajectory and potential to revolutionize the transportation sector in India.

Data Collection

- https://www.kaggle.com/datasets
- https://www.statista.com/statistics/1405642/united-kingdom-users-number-trial-scheme-e-scooters-age/
- https://www.imarcgroup.com/indian-electric-vehicle-companies
- https://www.mordorintelligence.com/industry-reports/india-electric-vehicle-market

Market Segmentation

Market segmentation for the Electric Vehicle (EV) market involves dividing the broad market into smaller, more manageable segments based on shared characteristics. This allows companies to tailor their marketing efforts to specific groups, making them more effective.

Segmenting the Electric Vehicle (EV) market involves dividing it into distinct groups based on various characteristics to target each group more effectively. Here's a detailed breakdown of how to segment the EV market:

- ➢ **Demographic:** Age, gender, income, education level, family size, occupation. For example, high-income individuals may prefer premium EV models, while younger, environmentally conscious consumers might be interested in more affordable options.
- ➢ **Geographic:** Region, urban vs. rural areas, climate. Urban areas might have a higher demand for EVs due to better charging infrastructure and shorter travel distances.
- ➢ **Psychographic:** Lifestyle, values, attitudes, interests. Environmentally conscious consumers may prioritize sustainability and zero-emission vehicles.
- ➢ **Behavioral:** Purchase behavior, brand loyalty, usage rate, benefits sought. Some consumers may prioritize long battery life and range, while others might focus on the vehicle's performance or brand reputation.

Data Pre-processing (Steps and Libraries used)

Import Necessary Libraries:
- ➢ **Pandas:** For data manipulation and analysis.
- ➢ **NumPy:** For numerical operations.
- ➢ **Matplotlib/Seaborn:** For data visualization.
- ➢ **Scikit-learn:** For machine learning algorithms and preprocessing tools.

Import Dataset: Load data from various formats (CSV, Excel, databases, etc.) using Pandas' read_csv, read_excel, etc. Functions.

Feature Selection:

- ➢ Correlation analysis
- ➢ Feature importance from models
- ➢ Dimensionality reduction (PCA, t-SNE)

Split Data into Training and Test Sets:

- ➢ Divide the dataset into training and testing sets using train_test_split from scikit-learn

Segment Extraction (ML techniques used)

Clustering:

- ➢ **K-Means Clustering:** This is a popular unsupervised learning technique that partitions data into 'k' clusters based on similarity. In the EV market, you can cluster customers based on factors like income, age, location, vehicle preference, charging infrastructure availability, and purchase behavior.
- ➢ **Hierarchical Clustering:** This method creates a hierarchy of clusters, allowing for more flexibility in segment identification. It can be useful for identifying nested segments within broader categories.

Profiling and describing potential segments

```
[80] df['inr(10e3)'] = df['price']*0.08320

        the rest of your code
    df['RapidCharge'].replace(to_replace=['No','Yes'],value=[0, 1],inplace=True)
    df.head()
```

	Brand	Type	Battery_capacity	model	seats	price	age	annual_savings	BodyStyle	RapidCharge	inr(10e3)
0 1	GEMPL	twowheeler	3	Ampere nexus	1	120000.0000	25-35	36445	electric bike	3.3	9984.0000
1 2	ATHER	twowheeler	3.7	Ather rizta	1	144999.0000	25-35	9972	electric bike	4.3	12063.9168
2 3	ATUL	threewheeler	12	atul elite rickshaw	4	112000.0000	25-40	108730	electric ricksaw	10	9318.4000
3 4	BAJAJ	twowheeler	3.2	Chetak Premium	1	147243.0000	25-35	30000	Steel Body	4.3	12250.6176
4 5	Electrotherm	twowheeler	1.25	YoBykes	1	58000.0000	25-35	34,500	Electric Scooters	5	4825.6000

Which vehicle has highest price?

Which vehicle Has a Top speed?
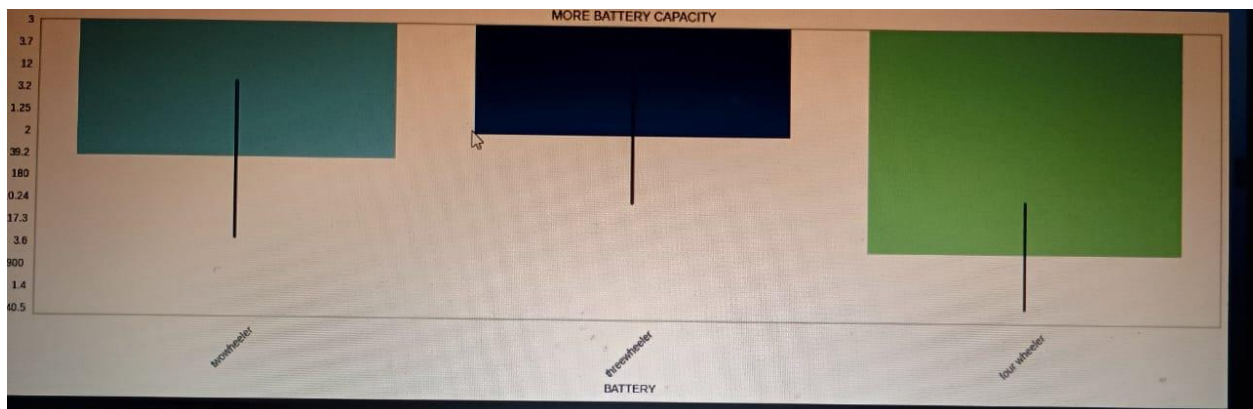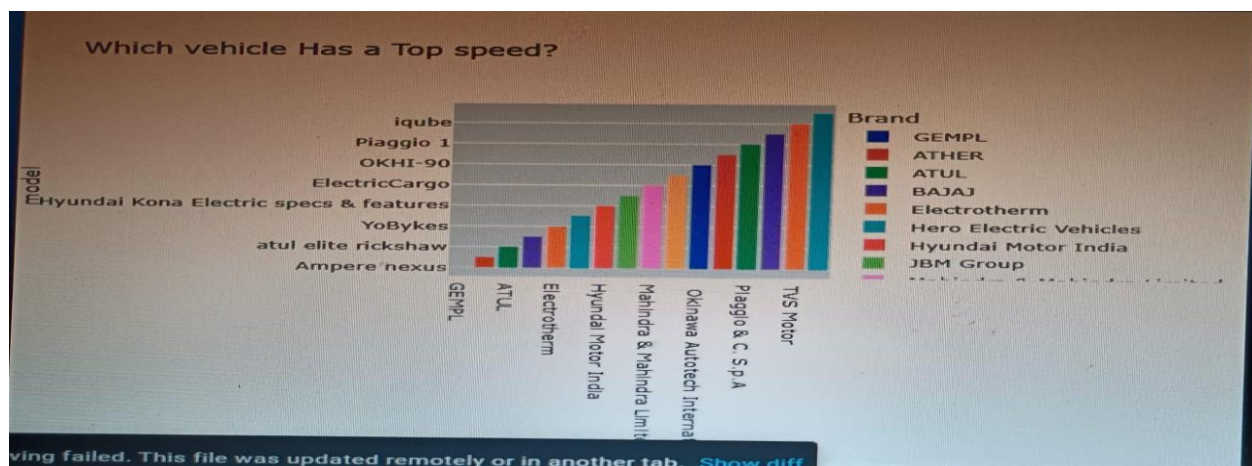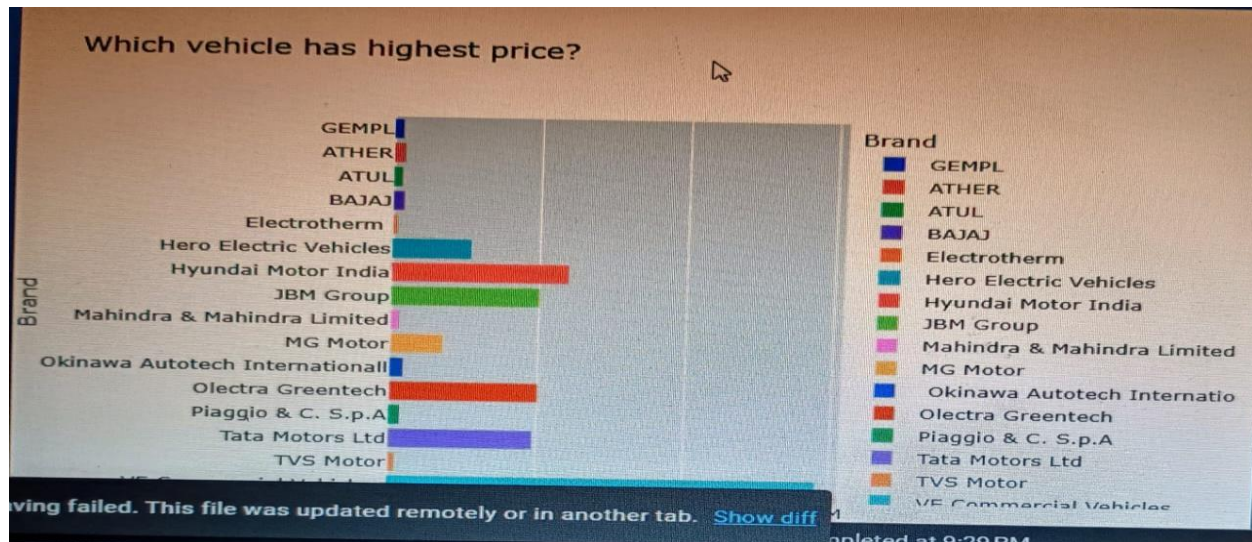
Target Segments

So from the analysis we can see that the optimum targeted segment should be belonging to the following categories:

Behavioral: EV vehicles which includes seats, body type

Demographic: Battery capacity and charging speed.

Psychographic: price of twowheelers to fourwheelers.

Customizing the Marketing Mix

Target Audience Segmentation:

➢ **Deepen Segment Understanding:** Go beyond basic demographics. Explore psychographics, behavioral patterns, and EV-specific preferences within each segment.

➢ **Tailored Messaging:** Develop unique messaging and value propositions for each segment, highlighting benefits that resonate with their specific needs and aspirations.

➢ **Channel Selection:** Choose the most effective marketing channels for each segment. For example, digital platforms for urban tech enthusiasts and traditional media for rural value seekers.

Product Positioning:

➢ **Highlight Unique Selling Points (USPs):** Emphasize features and benefits that align with segment priorities. For instance, focus on affordability for price-sensitive segments and range for urban commuters.

➢ **Create Compelling Brand Stories:** Develop narratives that resonate with each segment's values and aspirations.

➢ **Leverage Local Insights:** Incorporate cultural nuances and regional preferences into product positioning.

Pricing Strategy:

➢ **Value-Based Pricing:** Set prices based on perceived value for each segment. Consider factors like income levels, willingness to pay, and competition.

➢ **Bundling and Discounts:** Offer packages and discounts tailored to specific segments, such as financing options for middle-class buyers or fleet management solutions for businesses.

➢ **Government Incentives:** Clearly communicate the benefits of government incentives and subsidies to boost affordability.

Distribution Channels:

- ➢ **Expand Reach:** Explore various distribution channels to cater to different segments, including online sales, dealerships, and rural retail outlets.
- ➢ **Build Strong Partnerships:** Collaborate with local distributors and dealers to enhance brand visibility and customer reach.
- ➢ **Optimize Inventory:** Manage inventory levels based on segment-specific demand to avoid stockouts or overstocking.

Marketing Communication:

- ➢ **Localized Content:** Create content that resonates with local cultures, languages, and preferences.
- ➢ **Influencer Marketing:** Partner with influencers who have a strong following within target segments.
- ➢ **Experiential Marketing:** Organize test drives, EV exhibitions, and charging infrastructure awareness campaigns to engage customers.

References

https://www.mordorintelligence.com/industry-reports/india-electric-vehicle-market

https://www.researchandmarkets.com/

https://economictimes.indiatimes.com/

McDonald, M., amp; Dunbar, I. (2003). /emphMarket segmentation. Butterworth Heinemann.

GITHUB LINK

https://github.com/Chaithranjali/EV_MARKET-FEYNN-LABS.git