Market Segmentation Analysis of the Indian EV Market

1. Introduction

Overview of the Indian EV Market

The Indian electric vehicle (EV) market is experiencing rapid growth, driven by various factors such as government incentives, rising fuel prices, increasing environmental awareness, and technological advancements. In 2022, the market size was valued at USD 2.2 billion and is expected to reach USD 152.21 billion by 2030, growing at a CAGR of 94.4%. The government aims to achieve 30% electrification of the country's vehicle fleet by 2030, providing opportunities for businesses in EV manufacturing, components, and services.

Problem Statement

The Indian Electric Vehicle (EV) market is rapidly evolving, with adoption patterns influenced by geographic, behavioral, and data-driven factors. Understanding these factors is crucial for formulating effective market strategies, optimizing infrastructure investments, and increasing EV penetration across the country.This study aims to analyze EV adoption trends across different states and cities, identifying regions with the highest growth and examining the impact of government incentives on sales. The findings will enable EV manufacturers, policymakers, and infrastructure providers to tailor their strategies, enhance customer targeting, and drive higher adoption rates in the Indian market.

Importance of Market Segmentation

The EV market in India is still in its early stages, but understanding different market segments is crucial for businesses and policymakers. Effective segmentation enables:

- Identification of high-potential consumer groups and regions.
- Targeted marketing strategies for different consumer segments.
- Efficient infrastructure planning, such as charging station deployment.
- Informed policymaking to encourage EV adoption.

Objectives of the Study

This study aims to:

1. Analyze EV adoption trends across different states and cities.
2. Examine the impact of government incentives on sales.
3. Understand consumer preferences for charging infrastructure (home vs. public charging).
4. Provide actionable insights for EV manufacturers, policymakers, and infrastructure providers to optimize strategies and increase EV penetration in India.

Data Collection

To conduct an in-depth market segmentation analysis, data was compiled from multiple sources, including government and industry datasets. The dataset includes information on EV sales, government incentives, charging infrastructure, energy demand, and market penetration across various states in India. Multiple datasets were merged to create a comprehensive view of the Indian EV market.

Data Sources

The following datasets were used for the study:

- **Government and Public Data:**

  - Data.gov.in - Various government-provided statistics on EV sales, incentives, and infrastructure.

	A	B	C	D	E	F	G	H	I	J
1	State Name	Two Wheeler	Three Wheel	Four Wheel	Goods Vehicl	Public Servic	Special Cate	Ambulance/I	Construction	Other
2	Andaman and	1	30	81	NA		40	NA	NA	NA	7
3	Arunachal Pr	14	NA		5	NA	NA	NA	NA	NA	1
4	Assam	721	47041	161	7	15	NA	NA	NA	2
5	Bihar	5003	59079	114	11	26	NA	NA	NA	8
6	Chandigarh	298	1410	182	NA		40	NA	NA	NA	1
7	Chhattisgarh	6424	5341	117	1077	1	NA	NA		368	100
8	Delhi	14730	112831	3051	49	39	NA	NA	NA	1602
9	Goa	1314	28	289	13	36	2	NA	NA	4
10	Gujarat	13662	1869	1309	28	278	344	NA		26	77
11	Haryana	7777	18595	186	122	8	2	NA	NA	90

	A	B	C	D	E			A	B	C	D	E	F
1	State/UT	No of RO's where EV Charging Facility available					1	State/UT	Total EV	Total Vehicle	% of Share of EV in Total Vehicles Sold		
2	Andhra Prade	65					2	Uttar Pradesl	665247	15317699	4.34		
3	Arunachal Pr	4					3	Maharashtra	439358	11055082	3.97		
4	Assam	19					4	Karnataka	350810	7315250	4.8		
5	Bihar	26					5	Tamil Nadu	228850	8476042	2.7		
6	Chandigarh	4					6	Rajasthan	233503	6490725	3.6		
7	Chhattisgarh	51					7	Bihar	214921	5763437	3.73		
8	Delhi	66					8	Delhi	216084	2799571	7.72		
9	Goa	17					9	Gujarat	191185	7450473	2.57		
10	Gujarat	87					10	Madhya Prad	144782	6812437	2.13		
11	Haryana	114					11	Kerala	151029	3781393	3.99		

- **Kaggle Datasets:**

  - Charging Stations in India - Details about the distribution and type of charging stations across India.

  - EV Population Data of USA - Used as a reference for global EV adoption trends.

  - Indian Automobile Buying Behaviour - Insights into consumer preferences and purchasing trends.

  - EV Sales by State in India - Breakdown of EV sales across different states.

  - India EV Market Data - Data on EV manufacturers and their geographic distribution.

These datasets provided key insights into EV market trends, customer preferences, infrastructure development, and the influence of government policies.

Data Preprocessing

To ensure consistency and accuracy in data analysis, several preprocessing steps were performed:

1. **Data Cleaning:**

   o Loaded the dataset into a Pandas DataFrame.

   o Checked for missing values and handled them using imputation techniques (mean, median, mode for numerical data; most frequent category for categorical data).

   o Applied alternative strategies such as forward-fill, backward-fill, or removal of incomplete records where necessary.

   o Dropped 205 duplicate entries to maintain unique records.

2. **Standardization:**

   o Standardized column names by converting them to lowercase and replacing spaces with underscores to maintain uniformity across datasets.

   o Cleaned categorical variables (e.g., "EV Maker", "Place", "State") by removing extra spaces, converting text to lowercase, and standardizing formatting.

3. **Data Transformation:**

   o Converted categorical data into numerical formats to facilitate machine learning and statistical analysis.

   o Applied encoding techniques such as one-hot encoding, label encoding, or ordinal encoding based on data requirements.

   o Created a new variable charging_speed from the type variable to classify charging stations into slow, fast, or ultra-fast categories.

4. **Outlier Detection and Handling:**

   o Filtered outliers in key financial and operational metrics, including EV sales, pricing, and charging infrastructure data.

   o Used outlier detection techniques such as Z-score method, interquartile range (IQR), and domain-specific thresholding to identify and manage anomalies.

5. **Geospatial Data Cleaning:**

   o Cleaned incorrect state and city names to ensure consistency in geographic segmentation.

   o Fixed errors in latitude and longitude variables for accurate location mapping.

These preprocessing steps helped maintain data integrity, improve analysis accuracy, and enhance the effectiveness of market segmentation efforts.

Encoded categorical variables where necessary for clustering.

```
In [38]: # Step 5: Verify Unique Values in Categorical Columns
         print("Unique States:\n", df["state"].unique())
```

```
Unique States:
 ['maharashtra' 'karnataka' 'delhi' 'tamil nadu' 'gujarat' 'haryana'
 'rajasthan' 'telangana' 'west bengal' 'andhra pradesh' 'madhya pradesh'
 'punjab' 'uttarakhand']
              ev_maker         place        state
 0         tata motors          pune  maharashtra
 1   mahindra electric     bengaluru    karnataka
 2        ather energy     bengaluru    karnataka
 3        hero electric     new delhi        delhi
 4         ola electric   krishnagiri   tamil nadu
```

```
In [39]:  #cleaned dataset
          df.to_csv("cleaned_ev_makers.csv", index=False)

          # Display the first few rows of the cleaned dataset
          print(df.head())
```

```
              ev_maker         place        state
 0         tata motors          pune  maharashtra
 1   mahindra electric     bengaluru    karnataka
 2        ather energy     bengaluru    karnataka
 3        hero electric     new delhi        delhi
 4         ola electric   krishnagiri   tamil nadu
```

After cleaning the data

```
df = pd.read_csv("cleaned_ev_makers.csv")

# Step 1: Basic Info
print("Dataset Overview:\n")
print(df.info())   # Check data types and null values
print("\nSummary Statistics:\n")
print(df.describe())   # Check summary statistics (if applicable)

# Step 2: Check Missing Values
print("\nMissing Values:\n", df.isnull().sum())
```

```
Dataset Overview:

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 61 entries, 0 to 60
Data columns (total 3 columns):
 #   Column    Non-Null Count  Dtype
---  ------    --------------  -----
 0   ev_maker  61 non-null     object
 1   place     61 non-null     object
 2   state     61 non-null     object
dtypes: object(3)
memory usage: 1.6+ KB
None
```

Market Segmentation & EV Industry Analysis

Geographic Segmentation

1. **How does EV adoption vary across different states and cities in India?**
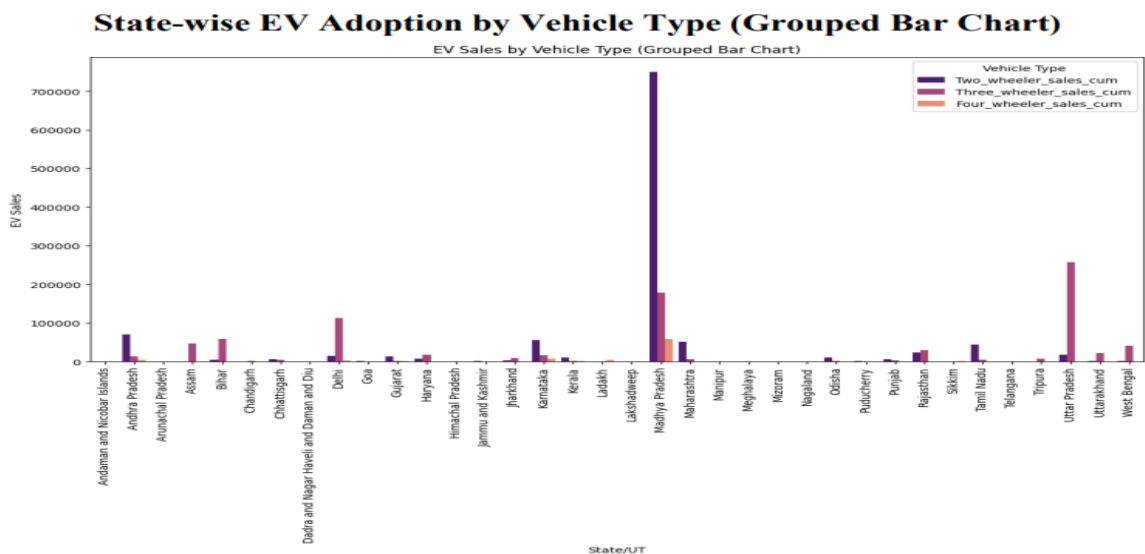
States like Maharashtra, Delhi, and Karnataka lead in EV sales, backed by strong policies and infrastructure. Northern and Western regions have higher EV penetration than Eastern and Northeastern regions.
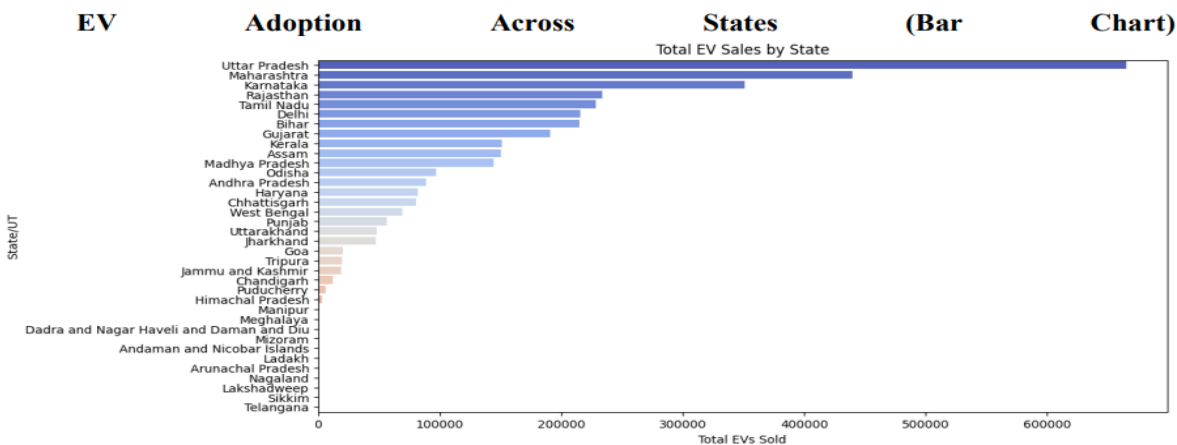
This bar chart visualizes the number of electric vehicles (EVs) adopted in different states, highlighting regions with the highest and lowest market penetration. By comparing EV adoption rates, policymakers, businesses, and manufacturers can identify key markets driving the transition to electric mobility. This visualization also helps in understanding geographical trends, infrastructure needs, and potential areas for targeted marketing and incentives.

2. **Which regions show the highest growth in EV adoption over the years?**

The Indian EV market has shown a consistent upward trend, with a sharp rise in sales post-2020. Urban regions with developed charging infrastructure have seen higher EV adoption rates.

This grouped bar chart compares EV sales across different states, broken down by two-wheelers, three-wheelers, and four-wheelers. The visualization helps identify which states have the highest demand for each vehicle type. Urbanized and industrial regions may show a higher adoption of electric four-wheelers, while rural and semiurban areas could have greater adoption of two- and three-wheelers.

3. **Is there a correlation between state-wise government incentives and EV adoption rates?**

Yes, states with higher incentives and subsidies report significantly higher EV adoption. Government policies like FAME (Faster Adoption and Manufacturing of Electric Vehicles) have driven growth.

Behavioral Segmentation

4. **What are the preferred charging methods (home charging vs. public charging) among different customer segments?**

Most EV owners prefer home charging, but public charging plays a crucial role in high-adoption areas. Lack of public charging infrastructure in tier-2 and rural areas remains a challenge.

Public vs. Retail outlet Charging Preferences (Grouped Bar Chart)

Comparison: Highway Chargers vs. ROs with Charging by State

The comparison of consumer preferences between retail outlet charging and public charging stations provides valuable insights into charging behavior. Understanding whether EV owners prefer the convenience of charging at retail locations (such as malls and shopping centers) or dedicated public charging stations helps companies optimize their infrastructure investments. If retail outlet charging is favored, businesses can collaborate with commercial properties to install more charging points. On the other hand, if public charging stations are in higher demand, expanding standalone charging hubs in key urban and highway locations becomes essential for improving accessibility and user adoption.

Data-Driven Market Segmentation

5. **Can clustering techniques (e.g., K-Means, Hierarchical Clustering) identify distinct customer segments in the dataset?**

Yes, clustering can help segment customers based on financial status, car preferences, and location.

K-Means Clustering (Cluster Plot)
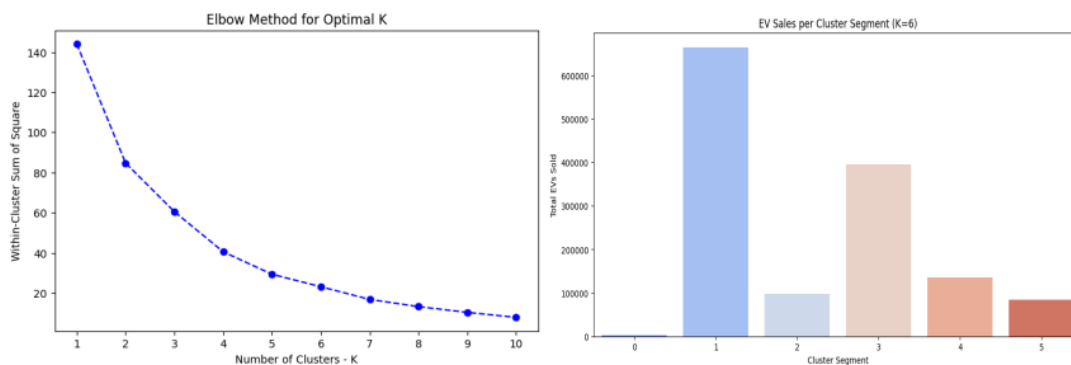
K-Means clustering is used to group EV buyers into distinct categories based on various factors such as income level, vehicle preference, charging infrastructure reliance, and environmental awareness. This segmentation helps stakeholders, including automakers, policymakers, and infrastructure providers, understand different consumer behaviors and target them effectively.

- Feature Selection: The dataset is preprocessed by selecting relevant attributes like vehicle type sales, charging preferences, government incentives, and demographic factors.
- Standardization: Since variables might be on different scales (e.g., income vs. EV sales), Min-Max Scaling or Standardization is applied.
- Finding Optimal Clusters (Elbow Method): The Elbow Method is used to determine the optimal number of clusters by plotting the within-cluster sum of squares (WCSS).
- Applying K-Means Algorithm: The dataset is then grouped into clusters based on similarities. Each cluster represents a different consumer group.
- Cluster Interpretation: The identified clusters are analyzed to extract meaningful insights.

6. **Are there distinct behavioral patterns in EV purchase trends over time?**

EV sales peak during festival seasons (October-November) due to discounts and incentives. There is increasing consumer preference for EVs with a range of at least 250-300 km per charge.

A PCA scatter plot reduces the dataset to its most influential components, helping visualize patterns and relationships between different states, vehicle types, and incentives. This analysis simplifies complex data, enabling businesses to identify major factors influencing EV adoption and streamline decision-making.

Principal Component Analysis (PCA Scatter Plot)
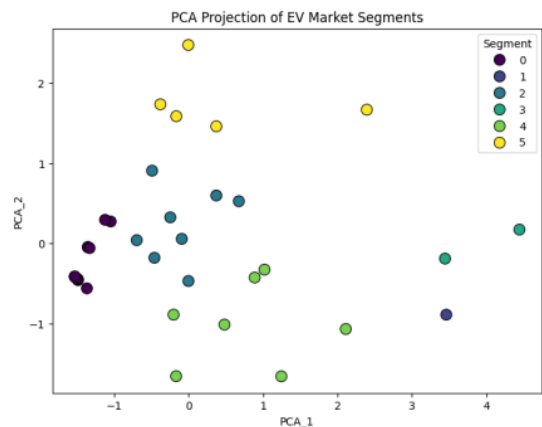
**Hierarchical Clustering (Dendrogram)**
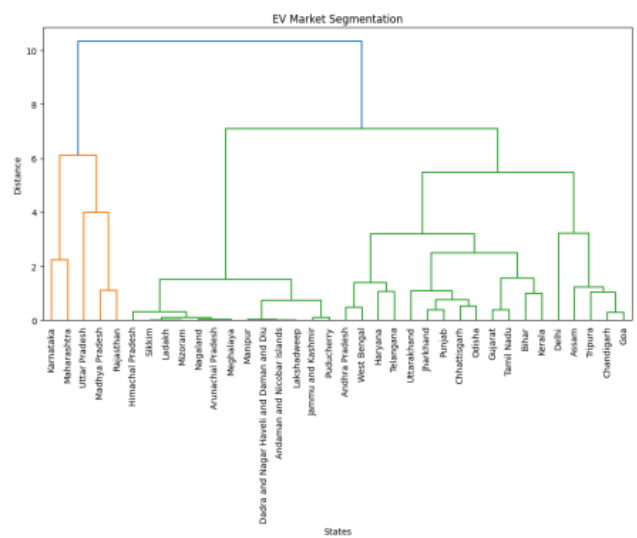
A dendrogram groups states or consumer segments based on similarities in EV adoption patterns, charging infrastructure, or government incentives. This visualization helps in market segmentation and policy planning, allowing authorities to customize strategies for different regions based on their readiness for EV adoption.

Financial Insights Segmentation

- **Salary Segmentation:**

    o Most customers earn between ₹10,00,000 and ₹25,00,000 annually, indicating an upper-middle-class or upper-class majority.

    o Wives' salaries for most customers are zero; for those employed, it ranges between ₹5,00,000 and ₹15,00,000.

   o The total household income is generally between ₹10,00,000 and ₹30,00,000.

Distribution of Numerical Variables
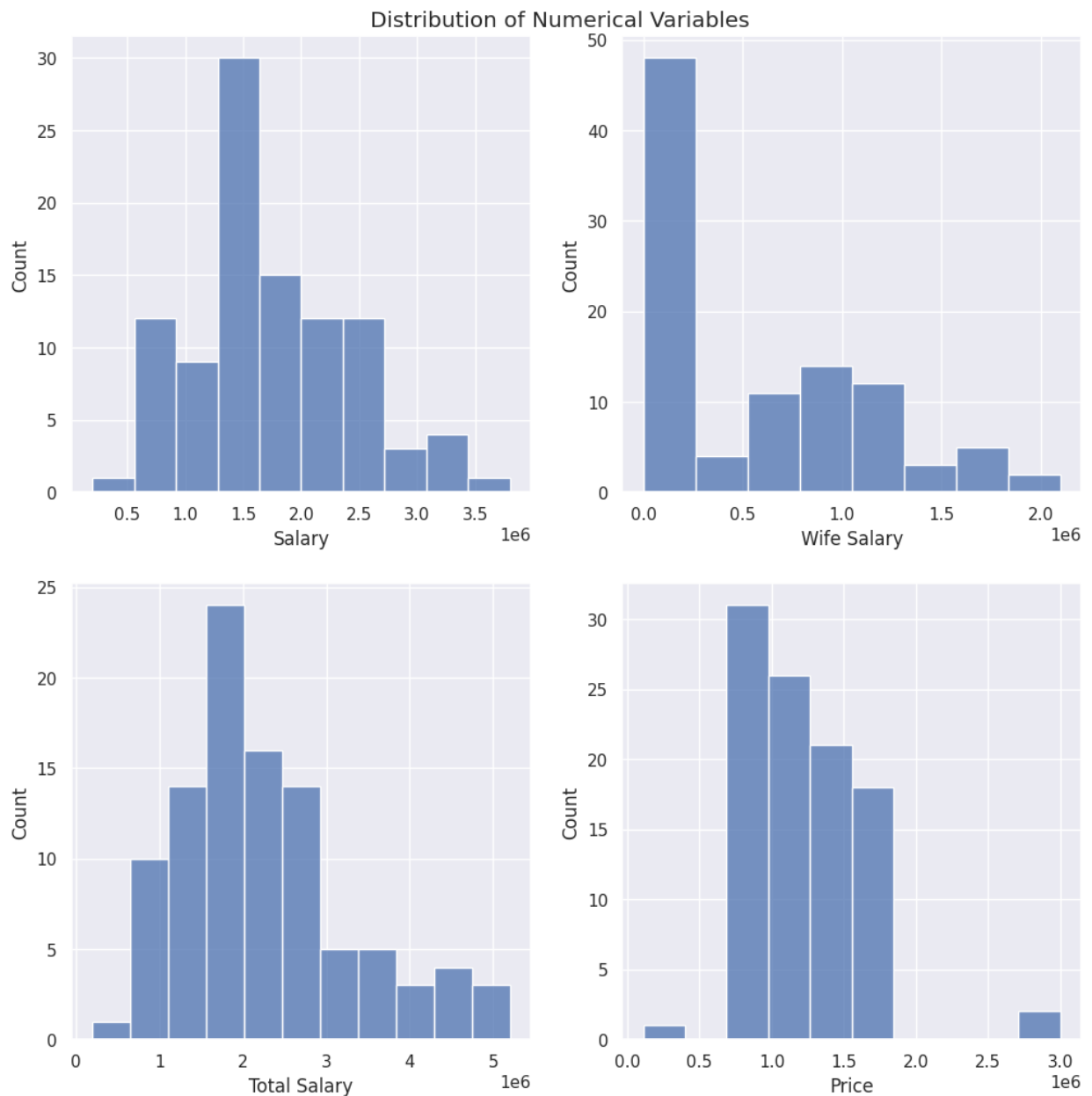
- **Purchase & Loan Insights:**

  o 65% of customers are salaried, while 35% own businesses.

  o 68% of customers do not have a personal loan, and 61% do not have a home loan, indicating financial stability.

 o Car purchases range between ₹5,00,000 and ₹20,00,000, with a preference for mid-range cars.

Distribution of Profession variable
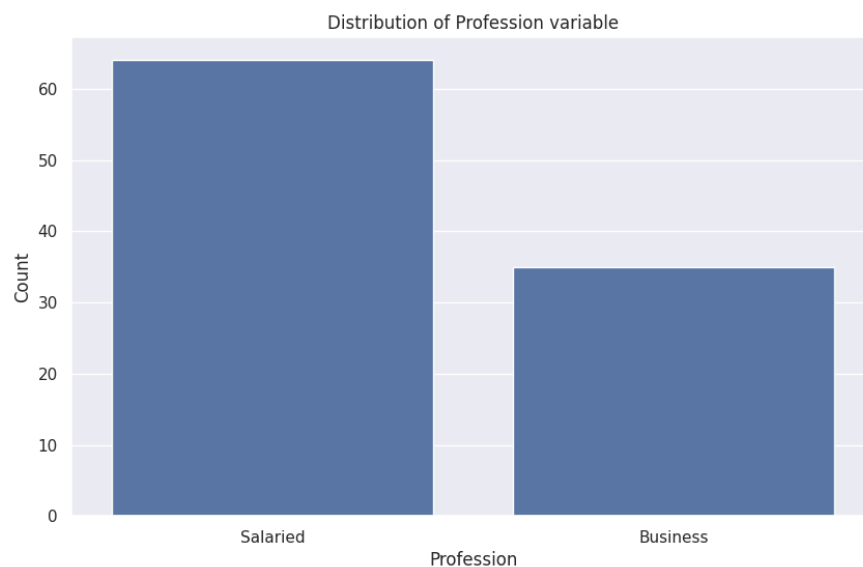
- **Education & Family Insights:**

  o 55% hold a postgraduate degree, while 35% have a graduate degree.

  o Most customers have 2-3 dependents, suggesting a focus on family-oriented vehicles.

**Distribution of Education variable**
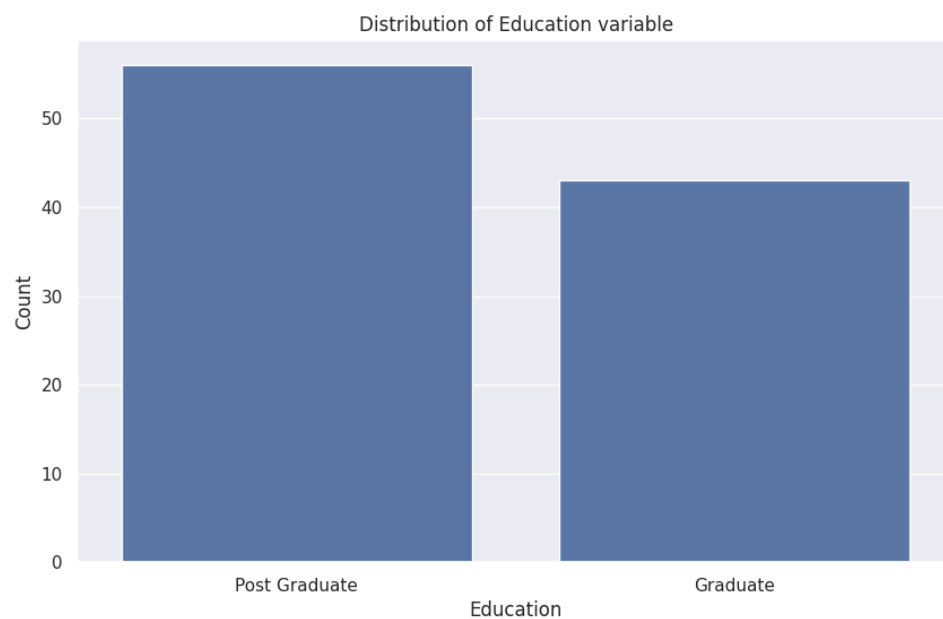
- **Vehicle Preferences:**

  o SUVs and models like Baleno & Creta are the most purchased, while luxury EVs have limited buyers.

 o Practicality and fuel efficiency play a key role in purchase decisions.

Distribution of Make variable
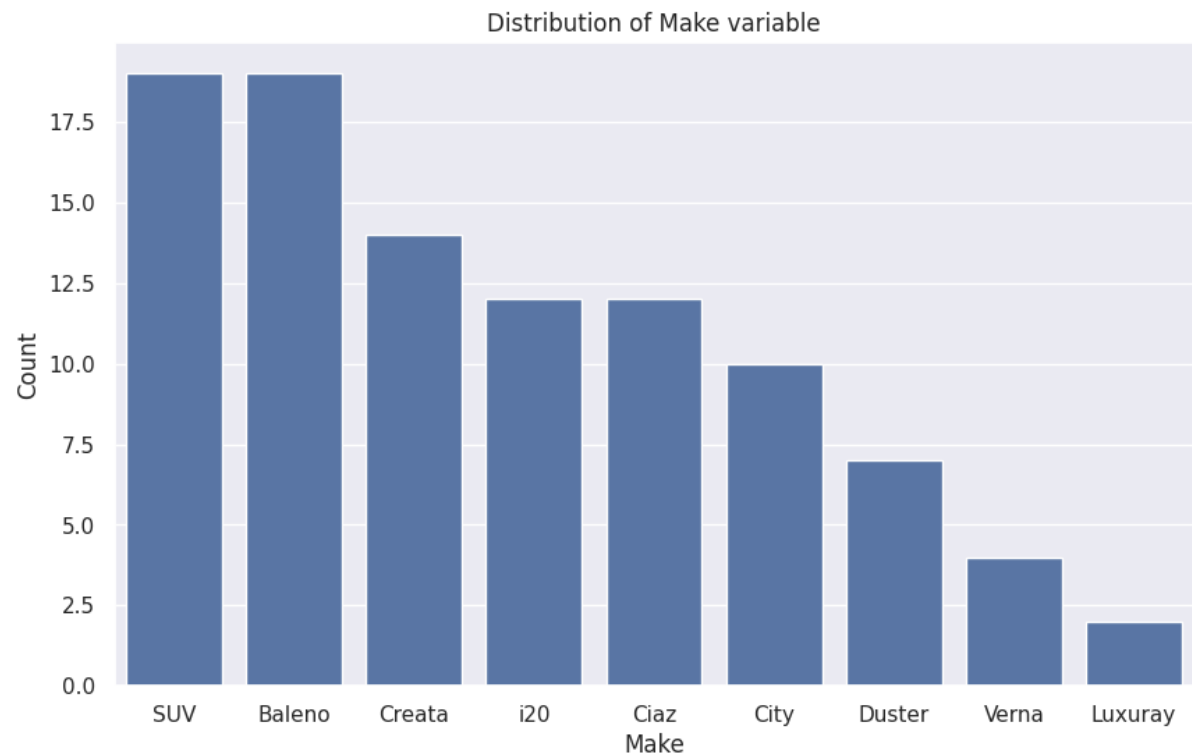
EV Market-Specific Analysis

7. What Are the EV Sales Trends from 2015 to 2024?

The graph shows the total EV sales trend over the years 2015 to 2024. From 2015 to 2020, EV sales exhibited a slow but steady increase. In 2020, there was a slight dip, possibly due to the impact of the COVID-19 pandemic. However, from 2021 onwards, there was a significant surge in EV sales, peaking in 2023. This sharp increase could be attributed to advancements in EV technology, government incentives, growing consumer interest, and improved charging infrastructure. In 2024, the sales appear to have declined from the 2023 peak, indicating possible market saturation, supply chain issues, or other external economic factors affecting demand.


Total EV Sales Trend (2015-2024)
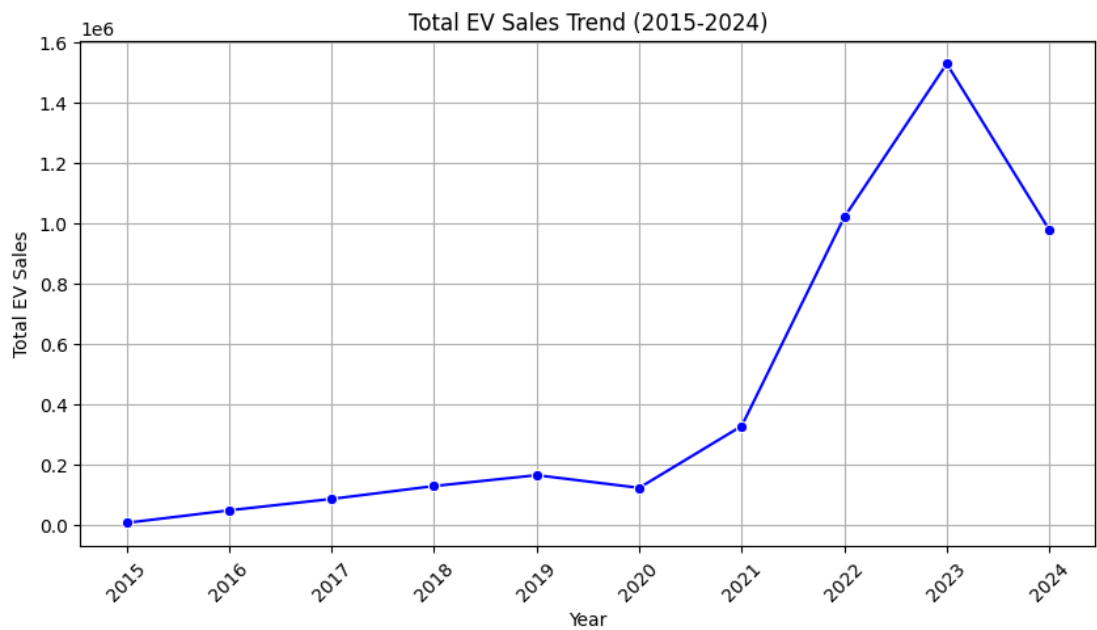
8. What is the market share of the top 10 EV makers from 2015 to 2024?

Top 10 EV Makers Market Share (2015-2024)
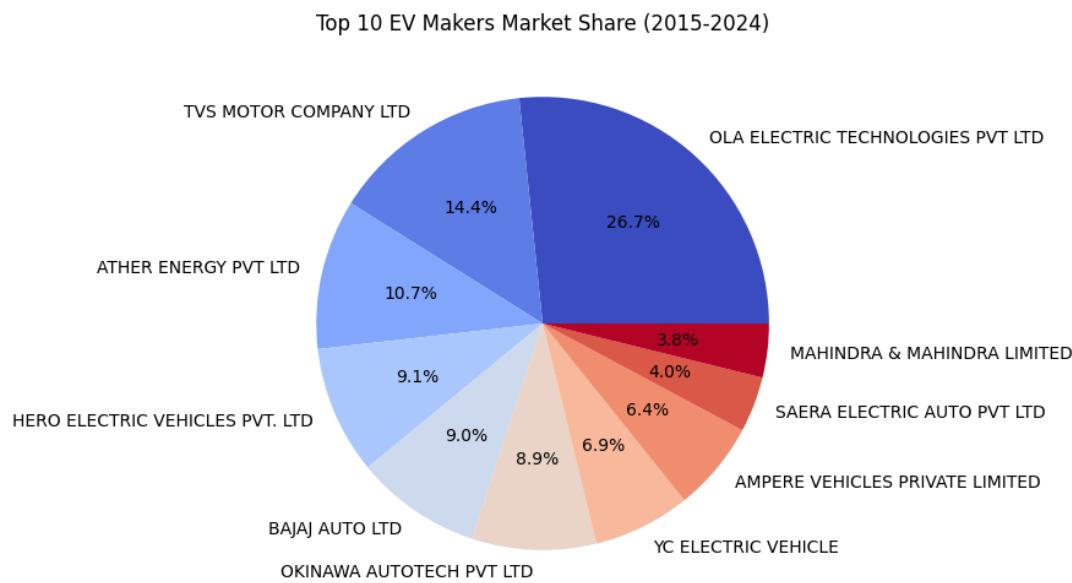
The **market leader** in EV sales from 2015 to 2024 is **Ola Electric Technologies Pvt Ltd**, capturing **26.7%** of the market. **TVS Motor Company Ltd** follows with **14.4%**, and **Ather Energy Pvt Ltd** holds **10.7%**. Other key players include **Hero Electric Vehicles Pvt Ltd (9.1%)**, **Bajaj Auto Ltd (9.0%)**, and **Okinawa Autotech Pvt Ltd (8.9%)**. The remaining companies—**YC Electric Vehicle, Ampere Vehicles Private Ltd, Saera Electric Auto Pvt Ltd, and Mahindra & Mahindra Ltd**—have a combined market share of approximately **20%**, highlighting a competitive and growing EV industry.

9. What are the EV sales by category from 2015 to 2024?
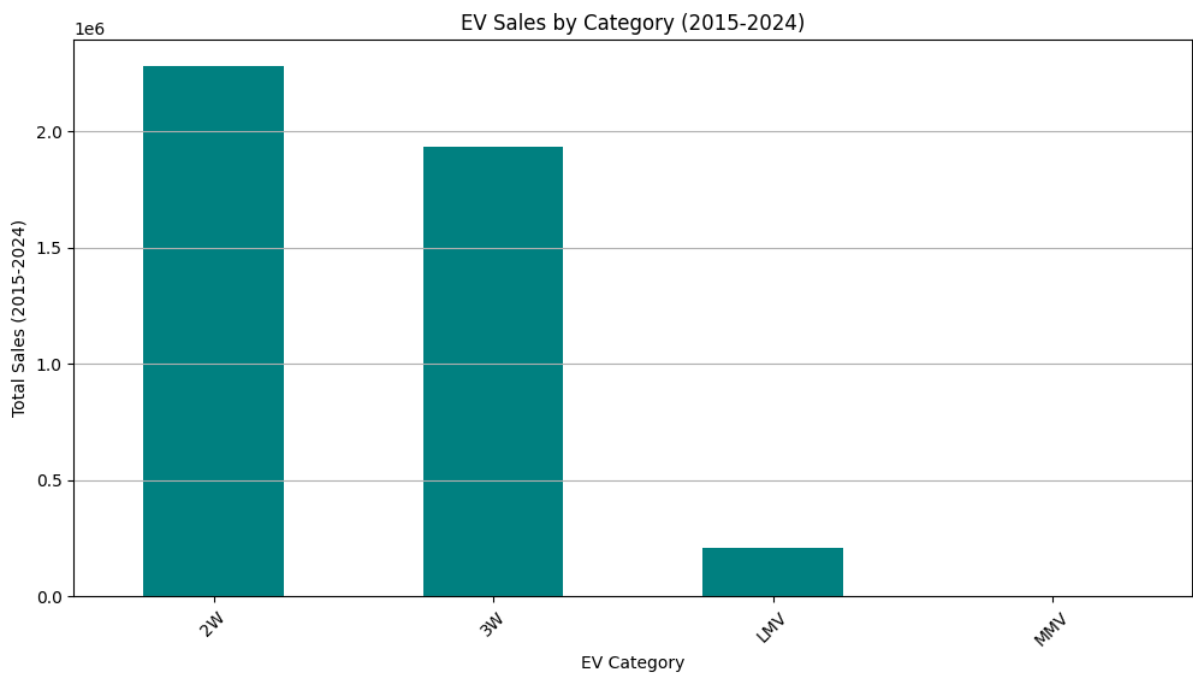
The EV sales data from 2015 to 2024 show that two-wheelers (2W) had the highest sales, followed closely by three-wheelers (3W). Light motor vehicles (LMV) had significantly lower sales, while medium and heavy motor vehicles (MMV) recorded negligible or no sales. This trend suggests that electric two- and three-wheelers are more widely adopted, possibly due to affordability, government incentives, and growing demand in urban and commercial transportation sectors.

10. Which Regions and States Lead in EV Sales Across India?

The bar chart represents the total EV sales by state or region in India from 2015 to 2024. Maharashtra and Tamil Nadu lead the EV market, likely due to **government incentives, strong infrastructure, and EV manufacturing facilities**. Other states show growing adoption, reflecting India's push toward sustainable mobility.
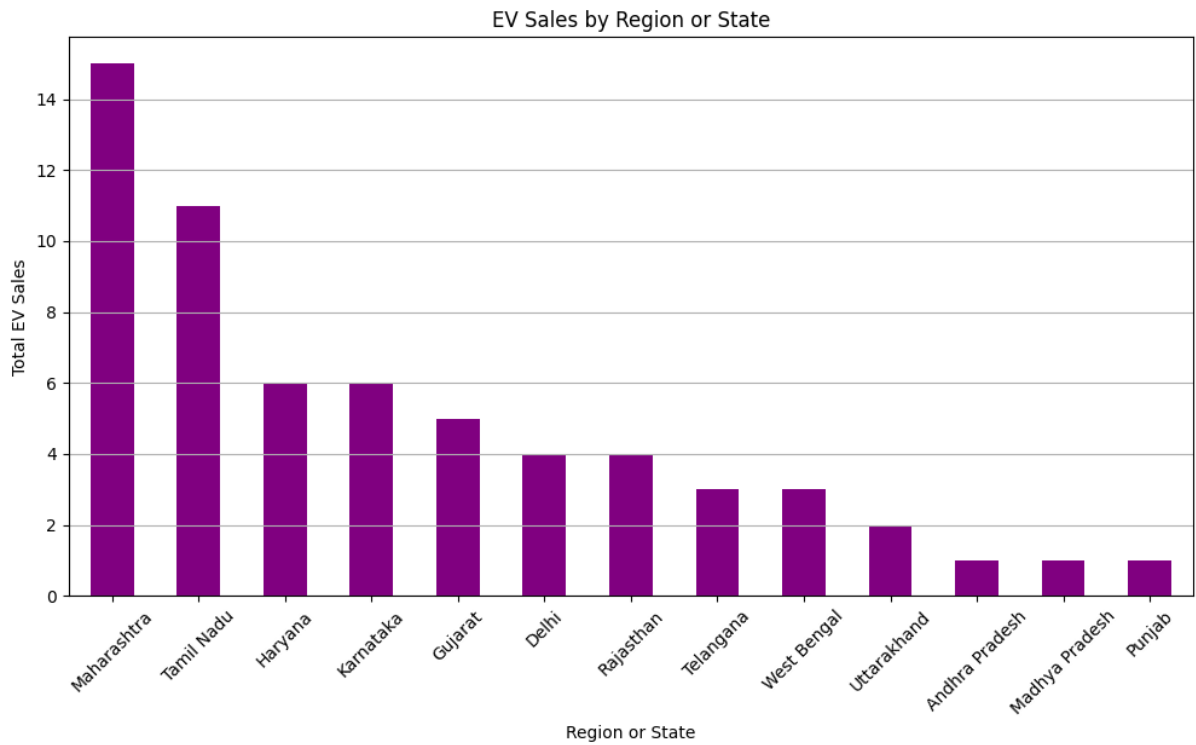
11. How Does Charging Infrastructure Impact EV Sales?

- o A strong correlation exists between charging infrastructure and EV adoption.
- o States with more charging stations witness higher EV sales.

Correlation between EV Makers & Charging Infrastructure
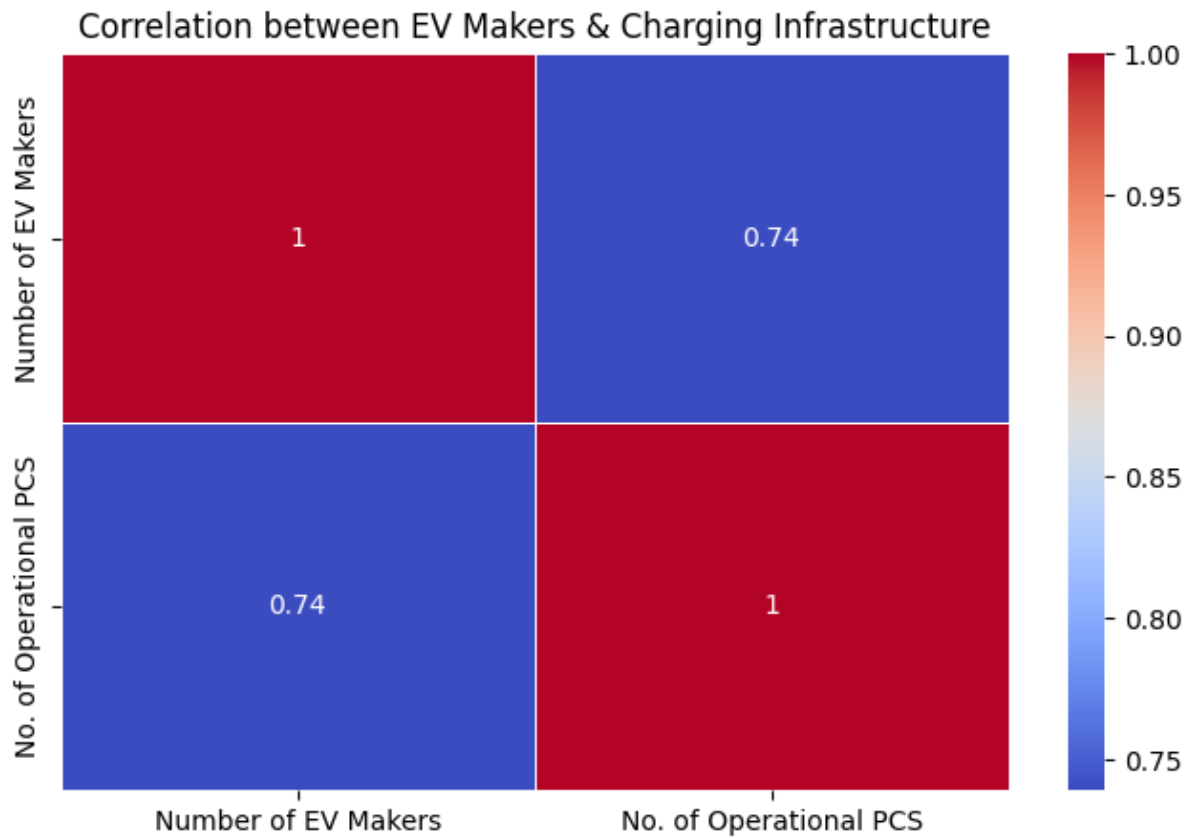
12. **What Are the Seasonal Trends in EV Sales?**

- o Sales peak during festivals like Diwali due to discounts and incentives.

- o Year-end sales and government subsidies also drive seasonal spikes.

13. **How Does Battery Range Influence Consumer EV Purchases?**

- o Consumers prefer EVs with a range of at least 250-300 km per charge.

- o High-range and fast-charging EVs are gaining traction in premium segments.

14. **What Is the Impact of Pricing on EV Sales in India?**

- o Mid-range EVs (₹10-₹15 lakh) have the highest demand.

- o Affordable two-wheelers are driving mass adoption, while luxury EVs remain niche.

Conclusion from Predictive Model Analysis

The **linear regression model** was used to predict EV sales for the years **2025-2030** based on past trends. Here are the key takeaways from the analysis:

1. Predicted EV Sales Growth (2025-2030)

- The model forecasts **steady growth** in EV sales over the next six years.

- By **2025**, expected sales are around **1.02 million** units.

- By **2030**, projected sales reach **1.62 million** units, reflecting a **~60% increase** compared to 2025.

- This suggests a consistent upward trend in EV adoption, assuming no major market disruptions.

2. Model Performance Evaluation

- **Mean Absolute Error (MAE): ~433,939**, indicating the average error in sales prediction.

- **Mean Squared Error (MSE): ~289.8 billion**, highlighting the variability in predictions.

- **R² Score: 0.47**, meaning the model explains only **47%** of the variance in EV sales.

```
# Predictive Model
data = datasets["EV_Sales_by_Makers_and_Cat"].iloc[:, 2:].sum().reset_index()
data.columns = ["Year", "Total_Sales"]
data["Year"] = data["Year"].astype(int)
X = data[["Year"]]
y = data["Total_Sales"]
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)

model = LinearRegression()
model.fit(X_train, y_train)

future_years = pd.DataFrame({"Year": range(2025, 2031)})
future_sales_pred = model.predict(future_years)

# Model Evaluation
y_pred = model.predict(X_test)
mae = mean_absolute_error(y_test, y_pred)
mse = mean_squared_error(y_test, y_pred)
r2 = r2_score(y_test, y_pred)

# Output Predictions
print("Predicted EV Sales (2025-2030):", list(zip(future_years["Year"], future_sales_pred)))
print("Model Performance: MAE:", mae, "MSE:", mse, "R2 Score:", r2)

Predicted EV Sales (2025-2030): [(2025, 1017367.1810344756), (2026, 1137742.5775862038), (2027, 1258117.974137932), (2028, 1378493.3706896603), (2029, 1498868.7672413886), (2030, 16193...
Model Performance: MAE: 433939.0000000149 MSE: 289859113511.21545 R2 Score: 0.470662912485186
```

Marketing Strategy for an EV Startup in India

<u>Target Segment</u>

The ideal target segment consists of **younger, price-sensitive professionals** looking for **affordable, efficient, and stylish EVs**. This segment represents the **largest and fastest-growing** consumer base in the Indian EV market. The startup should prioritize affordability while ensuring that the EV meets Indian driving conditions.

Marketing Mix (7Ps) for EV Market Penetration

1. Product

- The EV should be **affordable, efficient, and stylish**, catering to price-conscious buyers.

- It must have a **suitable range for Indian driving conditions**, addressing both city and semi-urban commutes.

- Reliability and durability should be key features, considering road conditions and climate variations.

2. Price

- The pricing should be **competitive yet affordable**, making EVs accessible to a broader audience.

- Leveraging **government subsidies and financing options** can further reduce upfront costs.

- **Highlight long-term savings** on fuel and maintenance to attract budget-conscious buyers.

3. Place (Distribution Strategy)

- The EV should be available in **urban and semi-urban dealerships**, where demand is rising.

- **Expanding into high-growth states** with **strong EV adoption and government incentives** ensures sustained sales.

- Dealerships should be **equipped with charging stations** to address range anxiety and improve customer confidence.

4. Promotion (Marketing & Communication Strategy)

- **Online and offline marketing campaigns** should be deployed to reach the target audience.

- **Customized messaging** for different consumer segments:

  - **Cost-sensitive buyers** → Highlight long-term savings and government incentives.

- o **Eco-conscious consumers** → Emphasize sustainability benefits.
- **Strategic partnerships with influencers and digital platforms** to build trust and awareness.

5. People (Customer Service & Workforce)

- The startup should hire **experienced professionals passionate about EVs**.
- Customer support teams should be trained to **educate buyers** on EV benefits, government incentives, and financing options.
- **Personalized financing and leasing plans** can increase adoption rates among young professionals.

6. Process (Sales & Customer Experience)

- The startup should **streamline the buying process**, making it **simple, transparent, and efficient**.
- A seamless **online-to-offline sales model** should allow potential customers to research, book test drives, and purchase vehicles easily.
- Providing **excellent after-sales support** (warranty, service, and charging solutions) ensures customer retention.

7. Physical Evidence (Brand Presence & Dealerships)

- The **dealerships should reflect the brand's commitment to quality** and customer satisfaction.
- Charging stations at dealerships and key urban areas improve accessibility and enhance the brand's image.
- The EV design itself should communicate **modernity, reliability, and efficiency** to appeal to Indian consumers.

Strategic Growth Solutions for the EV Startup

1. Expand in High-Growth States with Government Incentives

- **Target states with strong EV adoption and favorable policies** to maximize sales potential.
- **Collaborate with state governments** to enhance subsidies and infrastructure support.

2. Strengthen Charging Infrastructure

- Deploy **public charging stations in underserved areas** to increase accessibility.
- Promote **home charging solutions in urban areas** to improve convenience for EV owners.

3. Segment-Specific Marketing Campaigns

- **Cost-sensitive buyers**: Focus on affordability, EMI options, and government benefits.

- **Eco-conscious buyers**: Highlight sustainability and zero emissions.

- **Tech-savvy consumers**: Promote advanced features like smart connectivity and battery efficiency.

4. Leverage Data-Driven Market Segmentation

- Use **clustering techniques** to identify high-potential consumer segments.

- Offer **personalized promotions and financing options** based on buyer behavior.

Comprehensive Conclusion on EV Market Analysis and Predictive Modeling

Our analysis of EV adoption, consumer segmentation, and predictive modeling highlights key trends shaping the future of electric vehicle (EV) sales in India. The study provides insights into regional adoption patterns, government influence, consumer behavior, and sales forecasting.

Key Findings from EV Market Analysis

1. **Urban States Lead in EV Adoption**

   o States like Maharashtra and Tamil Nadu dominate EV sales due to **better infrastructure** and **government policies** supporting electric mobility.

   o The presence of **EV manufacturing hubs** and **charging stations** contributes to higher adoption rates.

2. **Government Incentives Strongly Impact Sales**

   o States offering **better subsidies and tax benefits** experience higher EV adoption.

   o **Lower road taxes, purchase incentives, and direct cash benefits** play a crucial role in making EVs attractive to consumers.

3. **Public Charging Infrastructure is Critical**

   o The availability of **charging stations** directly affects consumer confidence.

   o States with an extensive **charging network** see faster EV penetration, whereas regions with limited access face slower adoption.

4. **Consumer Behavior Varies Across Segments**

   o Behavioral segmentation reveals two primary types of EV buyers:

     ▪ **Cost-conscious consumers**: Prioritize affordability, fuel efficiency, and long-term savings.

- **Environmentally motivated buyers**: Choose EVs for sustainability and reduced carbon footprint.
  - o These distinctions help in designing **better marketing strategies and product positioning**.

5. **Data-Driven Clustering of EV Buyers**

   - o **Cluster 1**: Younger professionals (~30 years old), earning around **₹16,00,000 annually**, prefer affordable models like **Baleno, Ciaz, and Creta**.

   - o **Cluster 2**: Middle-aged professionals (~40 years old), earning around **₹25,00,000 annually**, favor luxury **SUVs** with high performance and comfort.

   - o The segmentation helps manufacturers tailor their **sales approach, product offerings, and pricing strategies**.

Predictive Model Analysis: EV Sales Forecast (2025-2030)

1. Predicted EV Sales Growth

- The **linear regression model** predicts **steady growth** in EV sales.

- Expected sales:

  - o **2025**: ~**1.02 million** units

  - o **2030**: ~**1.62 million** units (**~60% growth**)

- The trend indicates **sustained demand for EVs**, assuming no major market disruptions.

2. Model Performance & Limitations

- **Mean Absolute Error (MAE): ~433,939** (average error in prediction).

- **Mean Squared Error (MSE): ~289.8 billion** (high variability in sales predictions).

- **R² Score: 0.47**, meaning the model explains **47% of EV sales variation**.

  - o External factors like **government policies, battery technology, and economic conditions** influence EV sales beyond historical trends.

3. Insights and Recommendations

- **Potential Underestimation**: The model may **undervalue actual future sales**, as emerging factors (e.g., rapid price drops, stronger incentives, and rising fuel costs) are not fully captured.

- **Infrastructure & Affordability**: Expanding **charging networks** and offering **affordable EVs** will accelerate adoption.

- **Enhancing Model Accuracy**: Future models should integrate **policy changes, consumer sentiment, and global EV trends** to improve predictions.