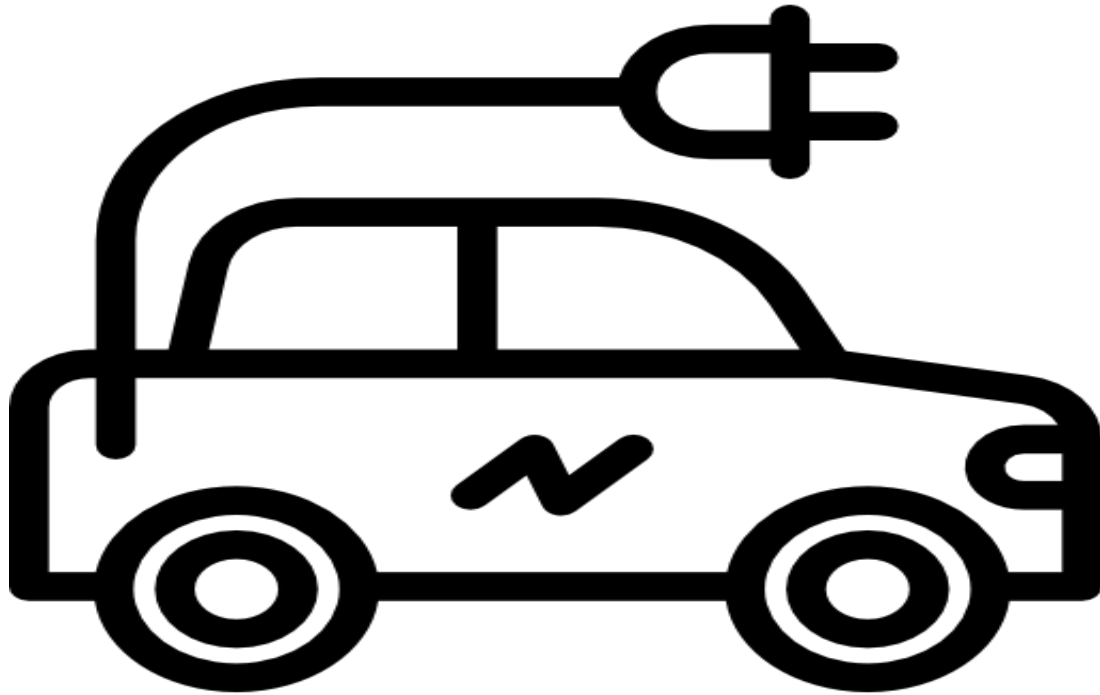# Project Report on Market Segmentation Analysis Of EV Vehicle Market in India

Sagar Santosh Rajput

21-05-2024

Electric vehicles (EVs) could account for more than 40% of India's automotive market and generate over $100 billion of revenue by 2030.

Achieving this will require concerted strategies across five areas: new product development, go-to-market/distribution, customer segment prioritization, software development, and charging infrastructure.

India's comprehensive strategy to adopt electric vehicles (EVs) across various vehicle categories is driving the nation's transition toward sustainable mobility

- India's electric vehicle (EV) market, segmented by vehicle type into passenger cars, commercial vehicles, and two-wheelers, is undergoing a significant transformation, reflecting the country's commitment to embracing clean energy and reducing carbon emissions. Each segment caters to distinct market dynamics, user needs, and growth potential, painting a comprehensive picture of India's journey toward electric mobility.
- Electric passenger cars are steadily gaining traction in the Indian market, driven by increasing consumer awareness, favorable government policies, and the growing presence of both international and local manufacturers. Although currently small compared to conventional vehicles, the segment is witnessing a rapid expansion in offerings, ranging from affordable models aimed at the mass market to premium electric cars catering to the luxury segment.
- The electric commercial vehicle sector, though still in its early stages, is set to witness significant growth. This growth is being driven by a rising emphasis on sustainability and cost-effectiveness within the logistics and transportation sectors. Electric buses, trucks, and vans are gradually making their way into urban fleets, supported by government initiatives aimed at reducing pollution and promoting electric mobility in public transportation and goods delivery. The operational cost benefits of electric commercial vehicles, coupled with various state and central government incentives, are encouraging fleet operators and businesses to transition toward electric options. This segment's growth is critical for achieving India's ambitious environmental targets and improving urban air quality.

Step 1: Deciding (not) to Segment

The India Electric Vehicle Market is segmented by Vehicle Type (Commercial Vehicles, Passenger Vehicles, Two-Wheelers) and by Fuel Category (FCEV, HEV). The report offers market size in both market value in USD and market volume in unit. Further, the report includes a market split by Vehicle Type, Vehicle Configuration, Vehicle Body Type, Propulsion Type, and Fuel Category.

Need for Segmentation is -

Diverse Customer Segments:

India's EV market caters to a wide range of customer segments, including individual consumers, fleet operators, and businesses. Understanding the unique needs, preferences, and behaviors of these segments is crucial for effective market targeting.

Product Customization:

Different customer groups have varying requirements. For instance, urban commuters may prioritize affordability and range, while commercial fleet operators focus on total cost of ownership (TCO). Segmentation analysis helps manufacturers tailor EV offerings to meet specific segment demands.

Market Expansion Strategies:

By identifying distinct segments, companies can develop targeted marketing and distribution strategies. For example, premium EVs may appeal to affluent buyers, while affordable options can attract mass-market consumers.

Charging Infrastructure Prioritization:

Segmentation analysis guides the deployment of charging infrastructure. Urban areas with high consumer demand may require fast-charging stations, while rural regions benefit from slower chargers.

Policy Formulation:

Policymakers can use segmentation insights to design effective incentives, subsidies, and regulations. Different segments may require specific policy interventions to accelerate EV adoption.

Step 2: Specifying the Ideal Target Segment

After having committed to investigating the value of a segmentation strategy in Step 1, the organisation has to make a major contribution to market segmentation analysis in Step 2. While this contribution is conceptual in nature, it guides many of the following steps, most critically Step 3 (data collection) and Step 8 (selecting one or more target segments). In Step 2 the organisation must determine two sets of segment evaluation criteria.
Starting a new business in the electric vehicle (EV) market in India requires thoughtful segmentation. Let's explore how segmentation is essential for success:

Understanding Customer Needs:
Psychographic Segmentation: Analyze customer reviews and ratings to identify distinct sets of potential buyer segments based on attitudes, preferences, and socio-economic characteristics
Behavioral Segmentation: Scrutinize customer behavior patterns to uncover insights about their preferences, usage, and expectations.

Tailoring Product Offerings:
Customized EVs: Use segmentation insights to design EVs that match specific consumer needs. For instance:
- Urban Commuters: Optimize for affordability, range, and city driving.
- Fleet Operators: Focus on total cost of ownership (TCO) and durability.
- Premium Buyers: Offer high-performance EVs with extended range.

Effective Marketing and Distribution:
Targeted Messaging: Shape brand communication and advertising strategies based on segment-specific requirements.
Distribution Channels: Tailor distribution networks to reach different customer groups efficiently.

Charging Infrastructure Planning:
 Segment-Specific Charging Needs: Deploy charging stations strategically based on driving patterns. Urban areas may need fast chargers, while rural regions benefit from slower ones.

Policy and Incentive Design:
Segment-Specific Policies: Use segmentation insights to formulate effective incentives, subsidies, and regulations.
Safety and Quality Standards: Address segment-specific safety concerns.

Step 3: Collecting Data

Starting a new business in India's electric vehicle (EV) market requires segmentation analysis. By understanding diverse customer needs, tailoring product offerings, planning charging infrastructure, and designing effective policies, businesses can position themselves for success. Segmentation ensures alignment with specific consumer requirements, driving sustainable growth in the EV market.

➢ Data from Web Scraping and Kaggle

The data scraped from platforms like CarWale, CarDekho, and CarTrade, where data from CarTrade is scraped and data from CarWale & CarDekho is taken from Kaggle Datasets.

Some information for data for electric vehicle (EV) market segmentation:

Interior Features:

Analyzing customer feedback helps identify preferences for interior features such as infotainment systems, comfort, seating materials, and cabin space.
Segmentation can reveal which customer segments prioritize luxurious interiors versus practical functionality.

Exterior Design:

Customer reviews provide insights into exterior aesthetics, build quality, and design elements.
Segmentation helps understand whether certain segments prefer sleek, futuristic designs or more traditional styling.

Ride Quality and Handling:

Reviews highlight ride comfort, suspension, and handling characteristics.
Different segments may have varying expectations—some prioritize smooth rides, while others seek sportier handling.

Model Preferences:

By segmenting data, you can identify popular EV models among different customer groups.
For instance, urban commuters might prefer compact EVs, while families may lean toward spacious models.

Mileage and Driven Distance:

Understanding how much customers drive their EVs helps tailor marketing messages.
High-mileage users may prioritize efficiency and range, while occasional drivers may focus on other factors.

New vs. Used Cars:

Segmentation reveals preferences for new or pre-owned EVs.
Some segments prioritize cost savings and are open to used EVs, while others prefer the latest models.

Step 4: Exploring Data

After data collection, exploratory data analysis cleans and – if necessary – preprocesses the data. This exploration stage also offers guidance on the most suitable algorithm for extracting meaningful market segments. At a more technical level, data exploration helps to (1) identify the measurement levels of the variables; (2) investigate the univariate distributions of each of the variables; and (3) assess dependency structures between variables. In addition, data may need to be pre-processed and prepared so it can be used as input for different segmentation algorithms. Results from the data exploration stage provide insights into the suitability of different segmentation methods for extracting market segments.

➢ Data Cleaning

The first step before commencing data analysis is to clean the data. This includes checking if all values have been recorded correctly, and if consistent labels for the levels of categorical variables have been used. For many metric variables, the range of plausible values is known in advance.

➢ Descriptive Analysis

Being familiar with the data avoids misinterpretation of results from complex analyses. Descriptive numeric and graphic representations provide insights into the data. Helpful graphical methods for numeric data are histograms, boxplots and scatter plots.

➢ Pre-Processing

● Categorical Variables

Two pre-processing procedures are often used for categorical variables. One is merging levels of categorical variables before further analysis, the other one is converting categorical variables to numeric ones, if it makes sense to do so. Merging levels of categorical variables is useful if the original categories are too differentiated (too many).

Car Driven and Car Condition are the two Categorical variable which is considered for data pre-processing

● Numeric Variables

Exterior, Comfort, Performance, Fuel Economy, Value For Money is scaled using MinMaxScaler.

➢ Principal Components Analysis

Principal components analysis (PCA) transforms a multivariate data set containing metric variables to a new data set with variables – referred to as principal components – which are uncorrelated and ordered by importance. The first variable (principle component) contains most of the variability, the second principle component contains the second most variability, and so on. After transformation, observations (consumers) still have the same relative positions to one another, and the dimensionality of the new data set is the same because principal components analysis generates as many new variables as there were old ones. Principal components analysis basically keeps the data space unchanged, but looks at it from a different angle. Principal components analysis works off the covariance or correlation matrix of several numeric variables. If all variables are measured on the same scale, and have similar data ranges, it is not important which one to use. If the data ranges are different, the correlation matrix should be used (which is equivalent to standardising the data).

Step 8: Selecting the Target Segment(s)

➢ The Targeting Decision

1. Which of the market segments would the organisation most like to target? Which segment would the organisation like to commit to?

2. Which of the organisations offering the same product would each of the segments most like to buy from? How likely is it that our organisation would be chosen? How likely is it that each segment would commit to us?

Answering these two questions forms the basis of the target segment decision.

> **Market Segment Evaluation**

Market segment evaluation is a critical process in understanding and targeting specific customer groups within a broader market. It involves analyzing various factors to divide the market into distinct segments based on shared characteristics, needs, and behaviors. By evaluating these segments, businesses can tailor their marketing strategies, product offerings, and distribution channels effectively. The goal is to identify high-potential segments that align with the company's objectives and create value for both customers and the business. Through segmentation, companies gain insights into consumer preferences, demographics, psychographics, and purchase patterns, allowing them to make informed decisions and allocate resources efficiently. Ultimately, successful market segment evaluation leads to better customer satisfaction, increased sales, and sustainable growth

The aim of all these decision matrices along with their visualisations is to make it easier for the organisation to evaluate alternative market segments, and select one or a small number for targeting. It is up to the market segmentation team to decide which variation of the decision matrix offers the most useful framework to assist with decision making. Whichever variation is chosen, the two criteria plotted along the axes cover two dimensions: segment attractiveness, and relative organisational competitiveness specific to each of the segments.

Sentiment Analysis of ev vehicles in India : Sentiment Analysis on the reviews of all three websites customer reviews was done in general way was done which revealed that the data is unbalanced with respect to positive - negative sentiment.

Step 9: Customising the Marketing Mix

Marketing was originally seen as a toolbox to assist in selling products, with marketers mixing the ingredients of the toolbox to achieve the best possible sales results. In the early days of marketing, it was postulated that marketers have at their disposal 12 ingredients: product planning, packaging, physical handling, distribution channels, pricing, personal selling, branding, display, advertising, promotions, servicing, fact finding and analysis. Many versions of this marketing mix have since been proposed, but most commonly the marketing mix is understood as consisting of the *4Ps*: Product, Price, Promotion and Place.

For reasons of simplicity, the traditional 4Ps model of the marketing mix including Product, Price, Place and Promotion serves as the basis of this discussion. Be it twelve or four, each one of those aspects needs to be thoroughly reviewed once the target segment or the target segments have been selected. To best ensure maximising on the benefits of a market segmentation strategy, it is important to customise the marketing mix to the target segment. The selection of one or more specific target segments may require the design of new, or the modification or re-branding of existing products (Product), changes to prices or discount structures (Price), the selection of suitable distribution channels (Place), and the development of new communication messages and promotion strategies that are attractive to the target segment (Promotion).

Product

EV Models: Offer a range of EVs, from compact city cars to premium SUVs.

Features: Focus on efficiency, range, safety, and smart connectivity.

Price

Affordability: Price competitively to attract mass-market consumers.

Value Proposition: Highlight long-term cost savings (lower fuel and maintenance costs).

Place

Urban Centers: Establish showrooms and service centers in major cities.

Online Channels: Leverage e-commerce platforms for sales and bookings

Promotion

Digital Marketing: Use social media, influencers, and targeted ads.

Educational Campaigns: Raise awareness about EV benefits and dispel myths

Reference:

- Market Segmentation Analysis by *Sara Dolnicar*, *Bettina Grün* and *Friedrich Leisch.*
- Data : CarWale, CarDekho (kaggle) and CarTrade (web scraping)
- India Electric Vehicle Report 2023 | Bain & Company

Note:

This report is a project report made by all important points available in book of Market Segmentation Analysis for study purpose only.

Second Project Code:

[elementary-projects/feynn-labs-internship/ev-vehicle-market-segementation at main • sagarrajput1412/elementary-projects (github.com)](https://github.com)