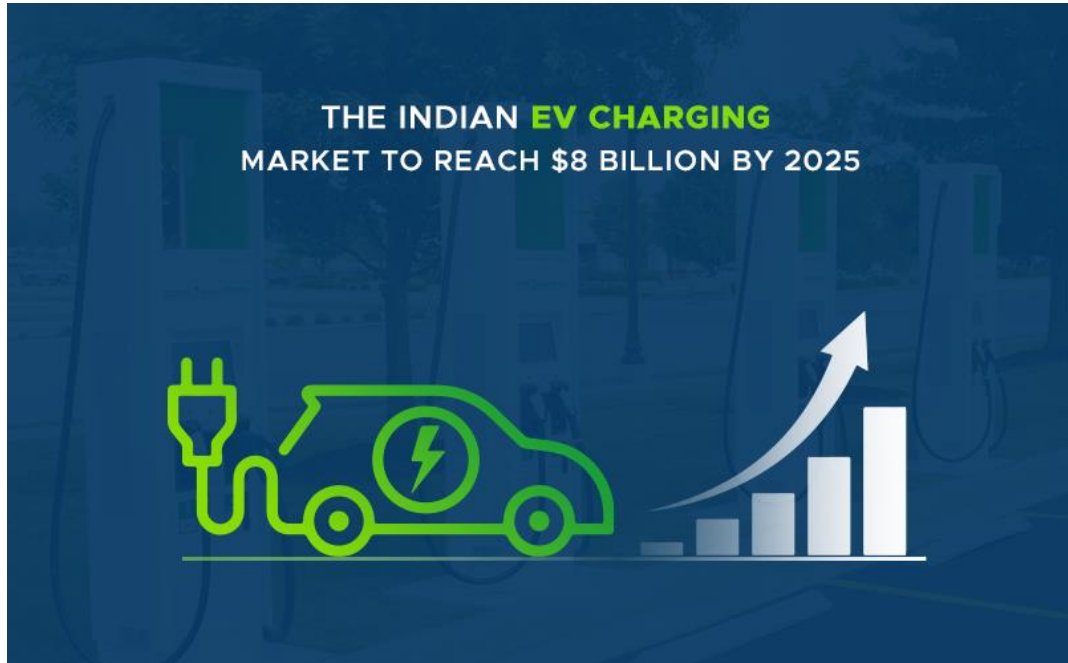


# Electric Vehicle Market in India

## Market Segmentation



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Electric cars are not going to take the market by storm, but it's going to be a gradual improvement.

(Carlos Ghosn)

## Abstract

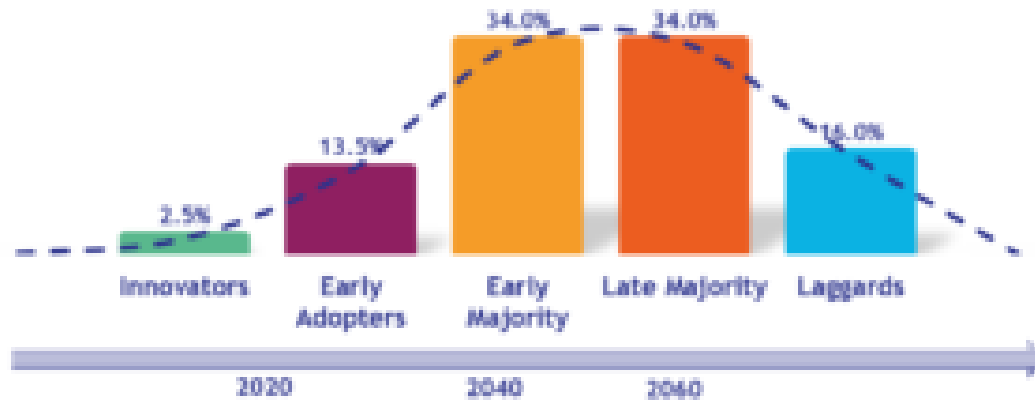
Market segmentation becomes a vital strategy for emerging markets to investigate and use for extensive adoption of emerging mobility technologies like electric vehicles (EVs). As a low emission and low operating cost vehicle, EV adoption is anticipated to increase drastically in the near future. As a result, it will stimulate a significant amount of future academic study interest. By utilising an integrated research framework of "perceived benefits-attitude-intention," the primary goal of this study is to examine and identify several sets of possible customer segments for EVs based on psychographic, behavioural, and socio-economic characterisation. To operationalize and validate segments from the data gathered from 563 respondents via a cross-sectional online survey, the study used rigorous analytical techniques like cluster analysis, multiple discriminant analysis, and the Chi-square test. . According to the data, there are three separate youthful consumer groups known as "Conservatives," "Indiffer- ents," and "Enthusiasts" who are thought to be EV buyers' buddies. The consequences are suggested, which can provide some useful direction for academics and decision-makers to boost the adoption of EVs against the backdrop of the developing sustainable transportation sector.

In this report, we'll break down the issue, assess the data, and use Fermi Estimation to find a solution.

**KeyWords :** *Electric vehicles, Market segmentation, Cluster analysis, Attitude towards electric vehicles, Subjective norms, Adoption intention, Sustainable transportation, General Vehicle Type Data, Vehicle Market Data, Charging Stations Data, Vehicle Usage Statistics in Cities etc.*

## Market Segmentation

### The EV adoption curve



### Target Market:

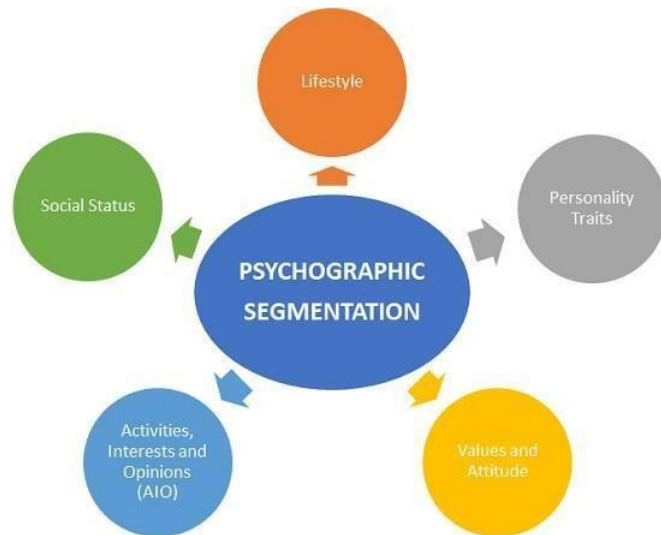
The target market of Electric Vehicle Market Segmentation can be categorized into Geographic, SocioDemographic, Behavioral, and Psychographic Segmentation.

**Behavioral Segmentation:** the process of sorting and grouping customers based on the behaviors they exhibit. These behaviors include the types of products and content they consume, and the cadence of their interactions with an app, website, or business



Figure 1: Behavioral Segmentation

**Psychographic Segmentation:** grouped based on beliefs, interests, preferences, aspirations, or benefits sought when purchasing a product. Suitable for lifestyle segmentation. Involves many segmentation variables.



**Socio-Demographic Segmentation:** a precise form of audience identification based on data points like age, gender, marital status, family size, income, education, race, occupation, nationality, and/or religion.

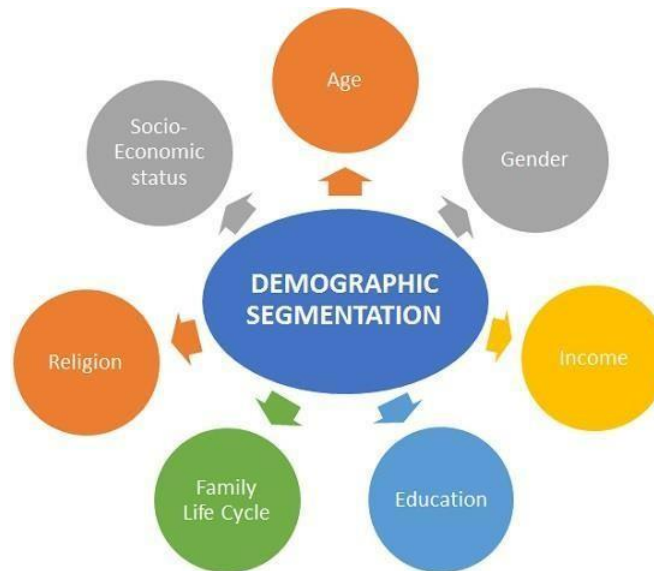


Figure 3: Behavioral Segmentation

**Advantage:** segment membership can easily be determined for every customer.

**Disadvantage:** if this criteria is not the cause for customers product preferences then it does not provide sufficient market insight for optimal segmentation decisions.

## Segmenting for Electric Vehicle Market

The market segmentation approach aims at defining actionable, manageable, homogeneous subgroups of individual customers to whom the marketers can target with a similar set of marketing strategies. In practice, there are two ways of segmenting the market-a-priori and post-hoc. An a-priori approach utilizes predefined characteristics such as age, gender, income, education, etc. to predefine the segments followed by profiling based on a host of measured variables (*behavioral, psychographic or benefit*). In the post-hoc approach to segmentation on other hand, the segments are identified based on the relationship among the multiple measured variables. The commonality between both approaches lies in the fact that the measured variables determine the 'segmentation theme'. The present study utilizes an a-priori approach to segmentation so as to divide the potential EV customers into sub-groups.

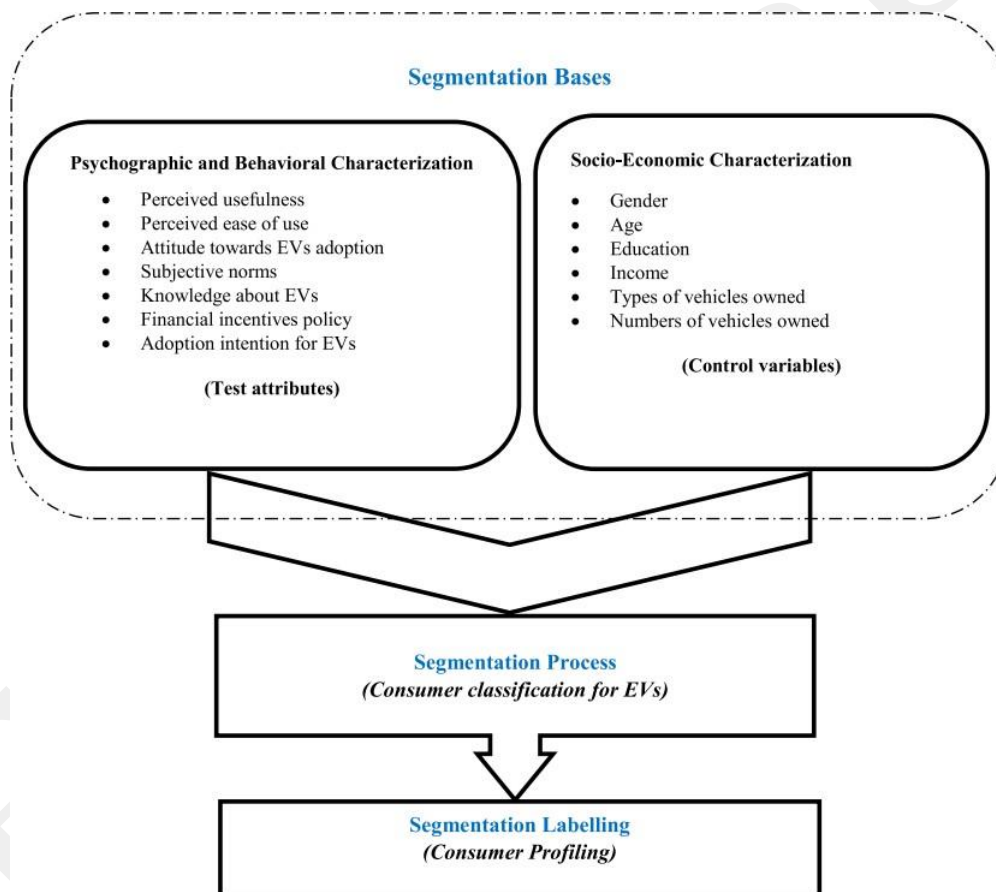


Figure 4: Market Segmentation Electric Vehicles

It is argued that the blended approach of *psychographic* and *socioeconomic attributes* for market segmentation enables the formulation of sub-market strategies which in turn satisfy the specific tastes and preferences of the consumer groups. Straughan and Roberts presented a comparison between the usefulness of *psychographic, demographic, and economic* characteristics based on consumer evaluation for eco-friendly products.

They pinpointed the perceived superiority of the psychographic characteristics over the socio-demographic and economic ones in explaining the environmentally-conscious consumer behavior and thus, the study recommended the use of psychographic characteristics in profiling the consumer segments in the market for eco-friendly products. The present study adds perceived-benefit characteristics guided by blended psychographic and socio-economic aspects for segmenting the consumer market.

## **Implementation**

### **Packages/Tools used:**

1. **Numpy:** To calculate various calculations related to arrays.
2. **Pandas:** To read or load the datasets.
3. **SKLearn:** We have used LabelEncoder() to encode our values.

### **Data-Preprocessing**

#### **Data Cleaning**

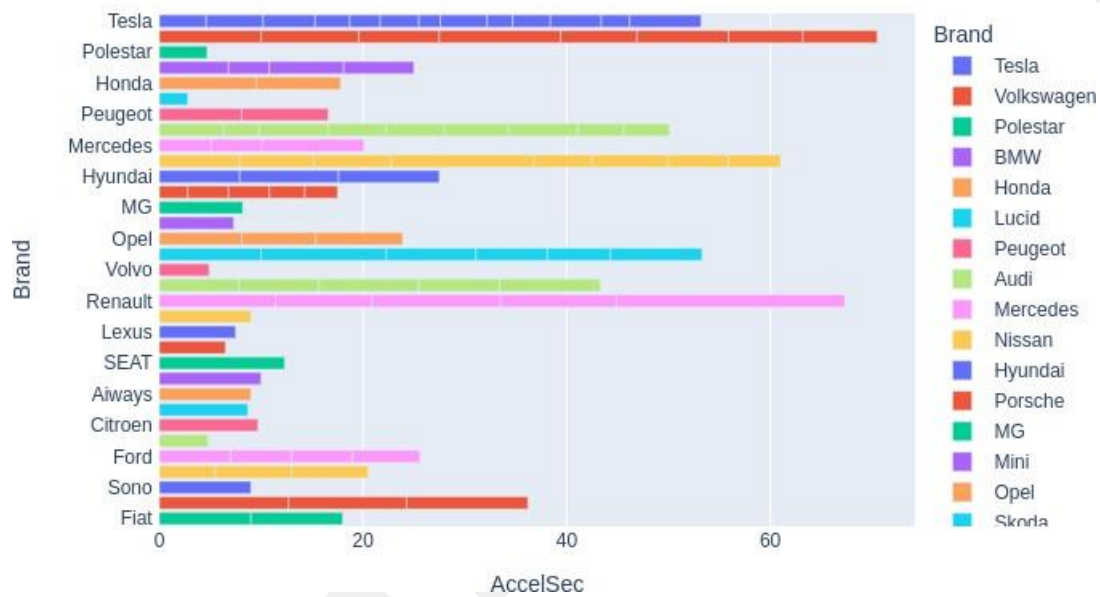
The data collected is compact and is partly used for visualization purposes and partly for clustering. Python libraries such as NumPy, Pandas, Scikit-Learn, and SciPy are used for the workflow, and the results obtained are ensured to be reproducible.

## EDA

### Comparison of cars in our data

**Statement – which brand cars in the market has fastest acceleration as it will give idea what are average and maximum acceleration speed in sec which is a big factor for the youth**

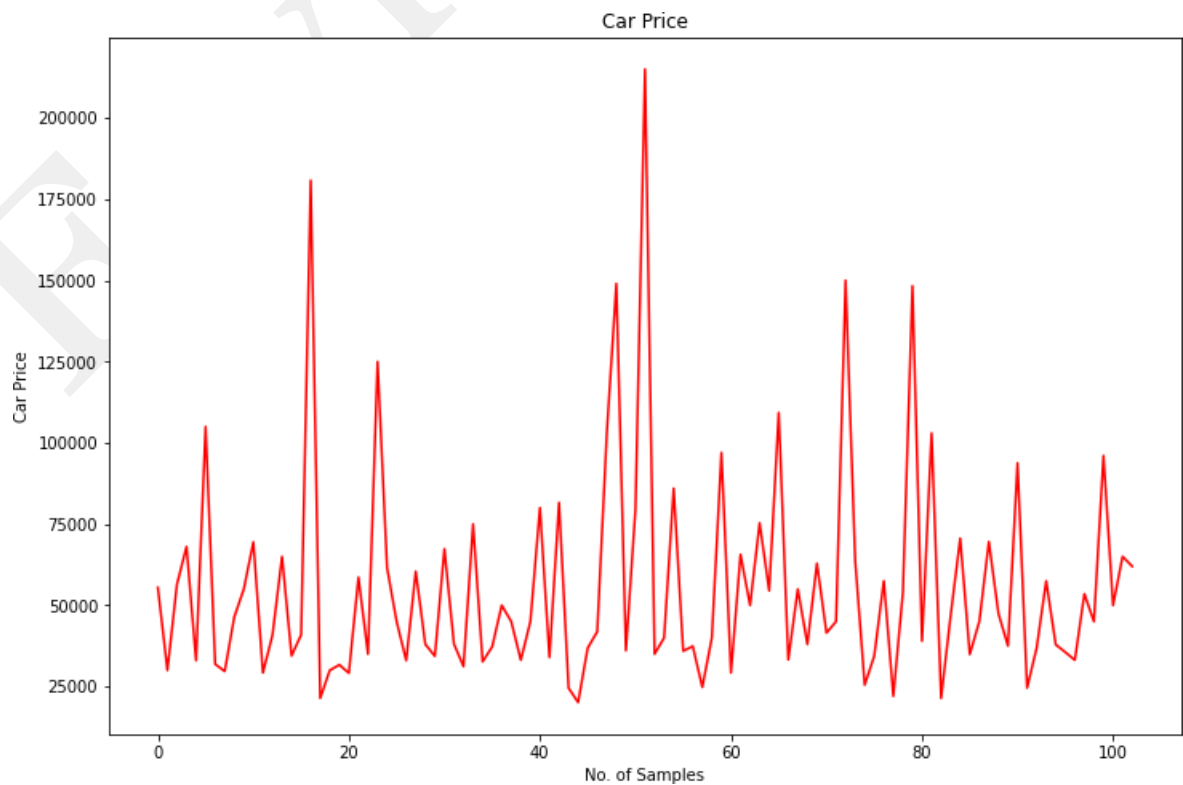
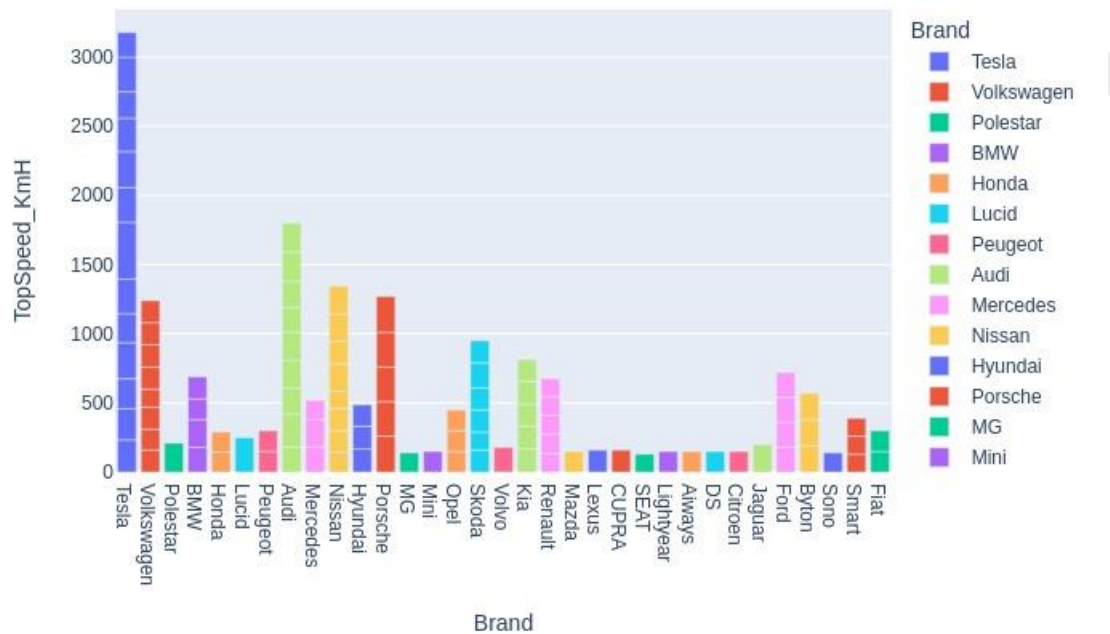
Which car has fastest acceleration?



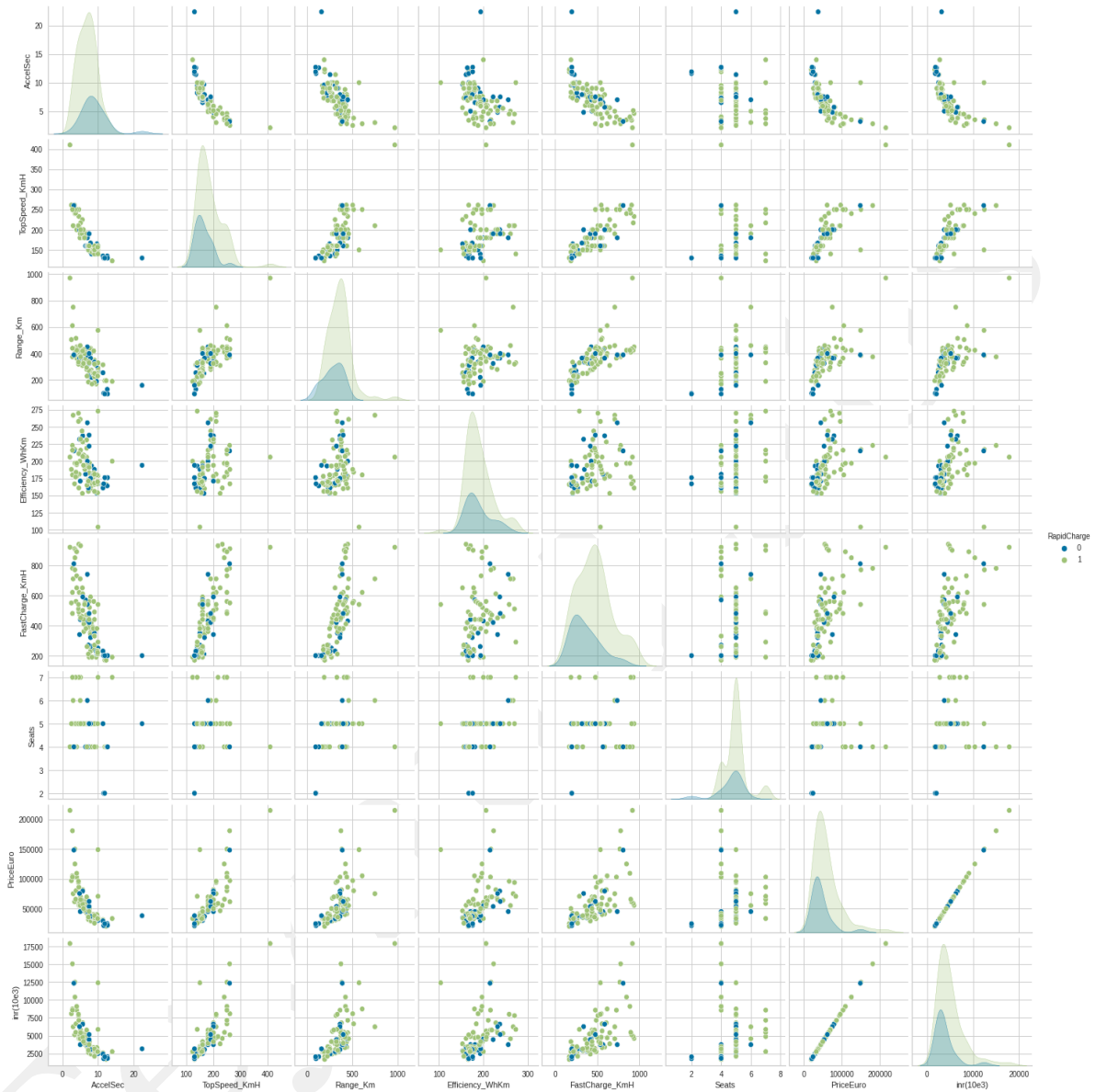


**Statement – which brand cars in the market has Maximum or top speed as it will give idea what is in the market and effect the demand of the vehicle engines helps in manufacturing**

Which Car Has a Top speed?



**For Electric Vehicle Market one of the most important key is Charging:**



**Correlation Matrix:** A correlation matrix is simply a table that displays the correlation. It is best used in variables that demonstrate a linear relationship between each other. Coefficients for different variables. The matrix depicts the correlation between all the possible pairs of values through the heatmap in the below figure. The relationship between two variables is usually considered strong when their correlation coefficient value is larger than 0.7.

**Statement – What are the relation between dataset and which factor correlate to which other features what are the major reason effecting the price of car**

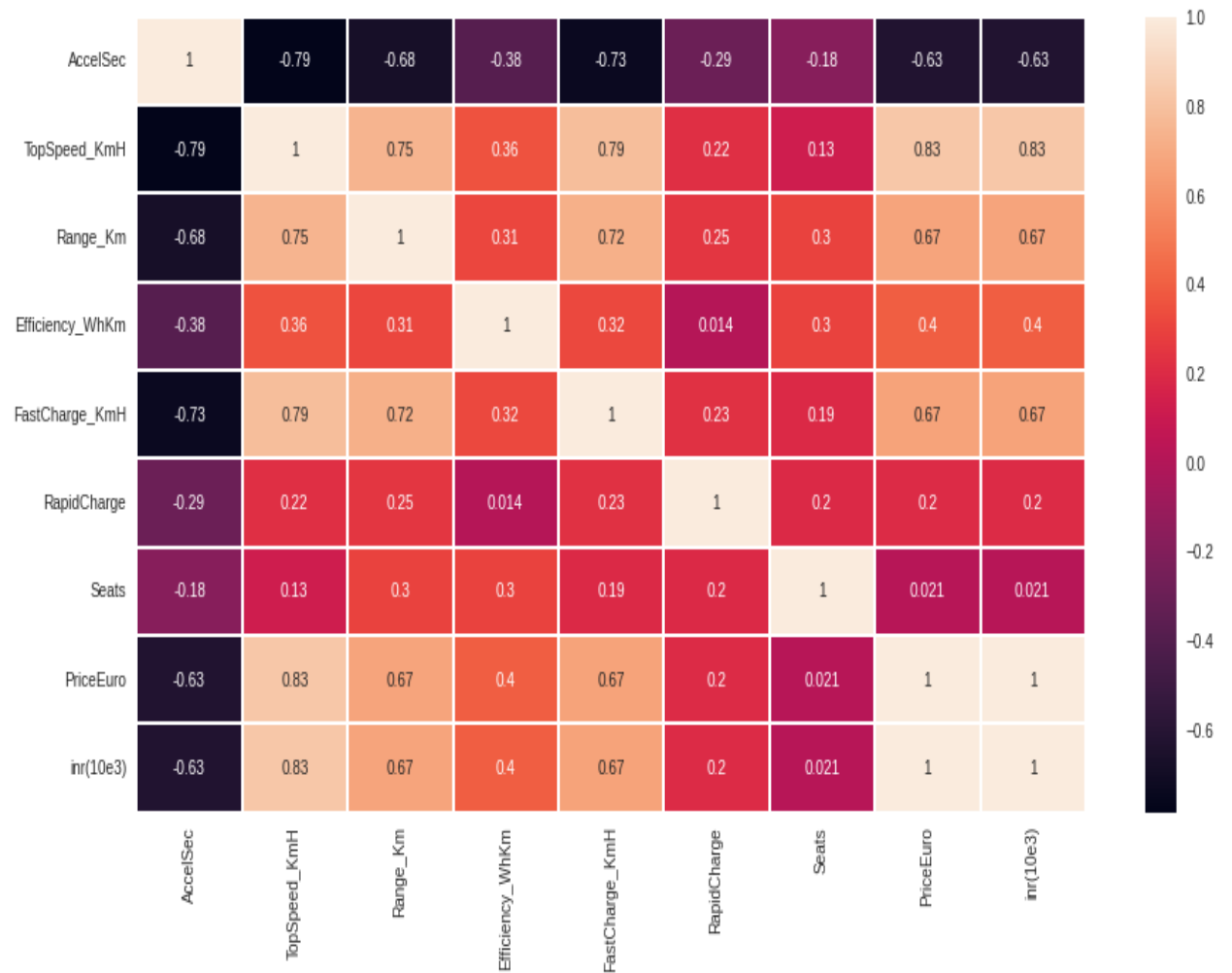
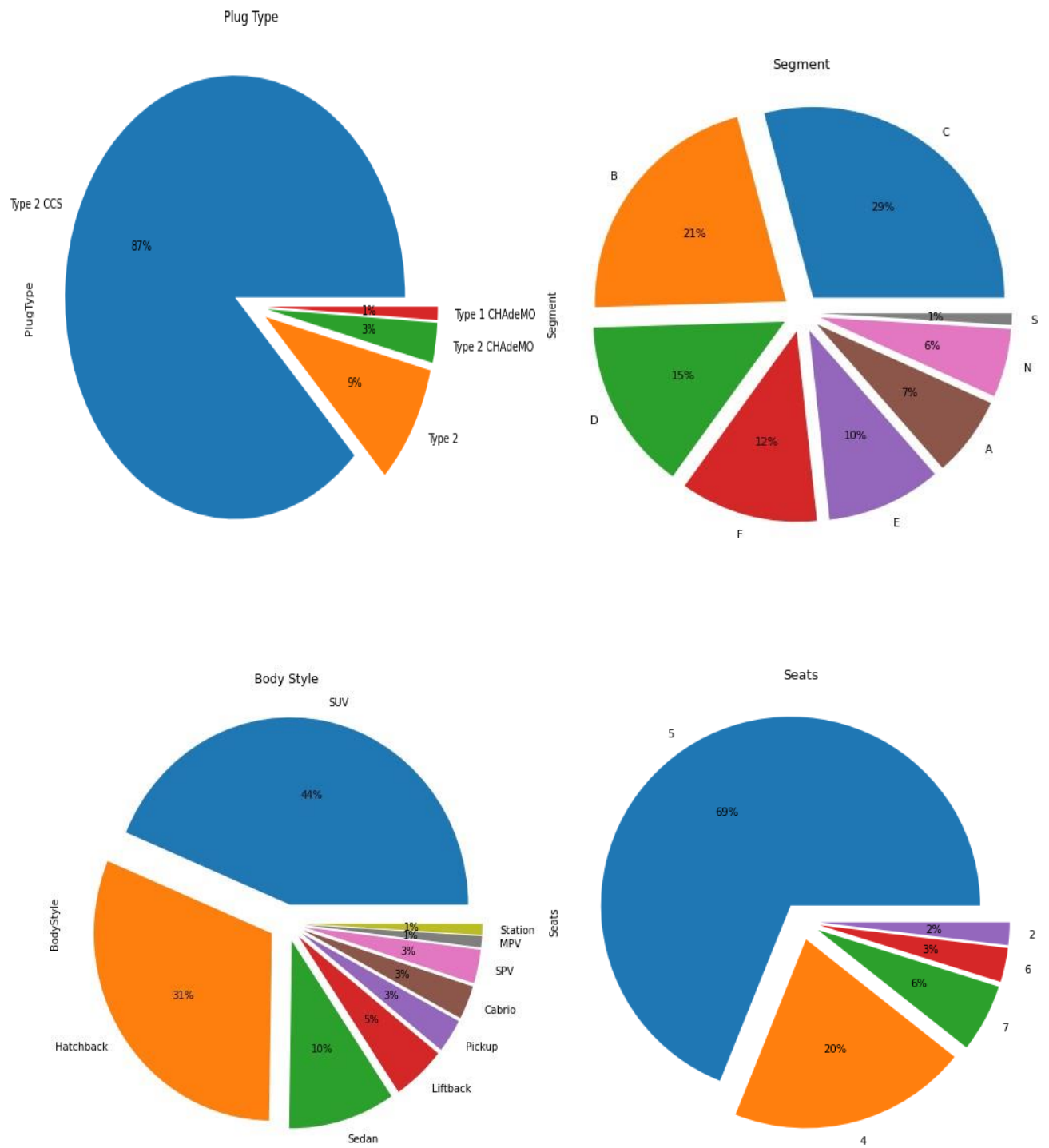


Figure 5: Correlation Matrix for the dataset

Here we get to know the range\_km features which describes the range of electric vehicles in a single charge is the main reason for the cost of a car

- Statement – 1) What are the plug used for charging ....**  
**2) what are the major segments in which the car fall under**  
**3) what is the body styles of most ev vehicle which can be help in making ev for a specific segment**  
**4) what is the maximum no of seats vehicle**



Now we can see that the requirements of what type of cars are most needed for customers and from the past 10 years there is a rapid growth of Electric vehicles usage in India

EV sales, cars, India, 2010-2021  
sales

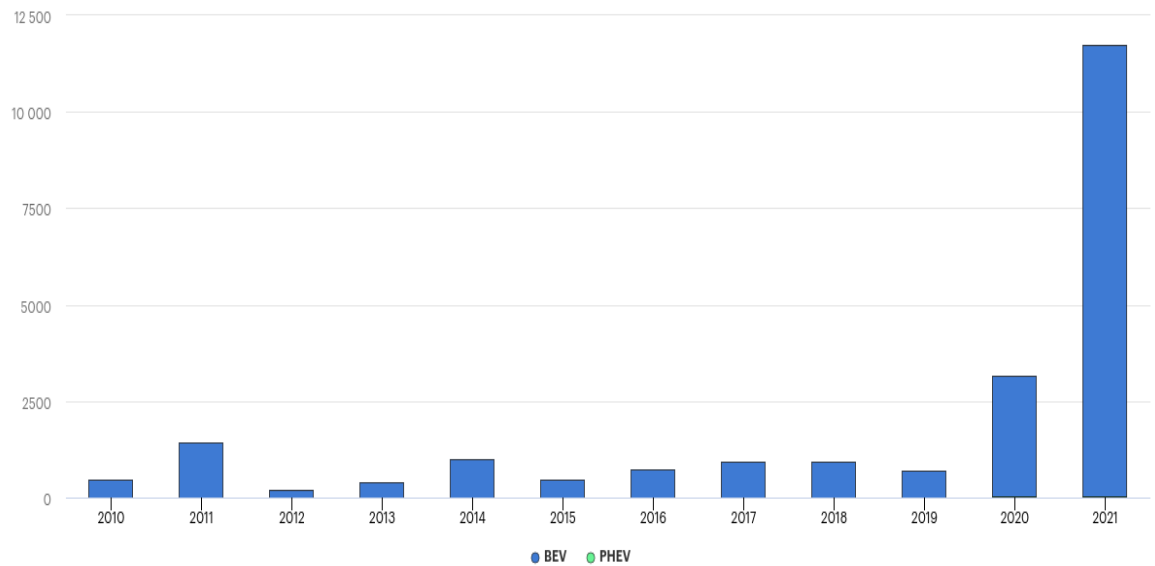
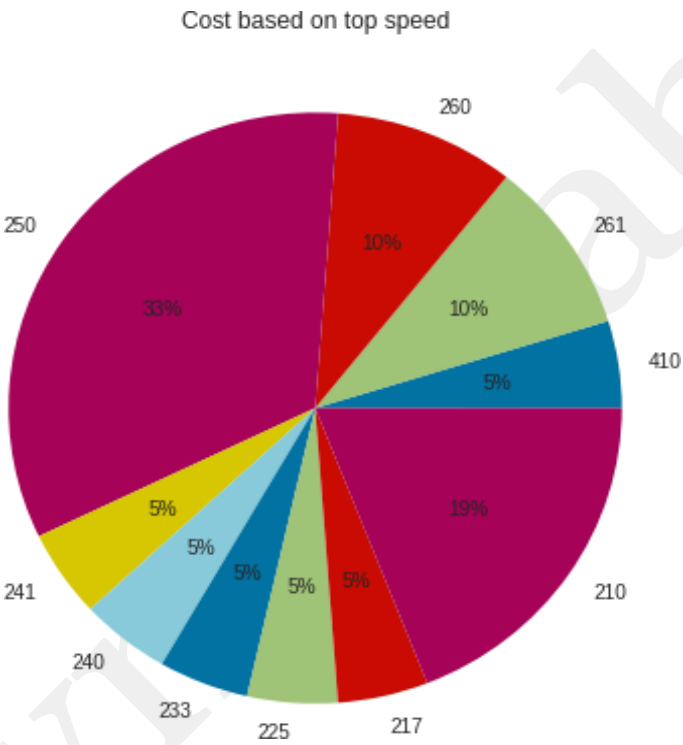


Figure 6: *Electric Cars sales in India*

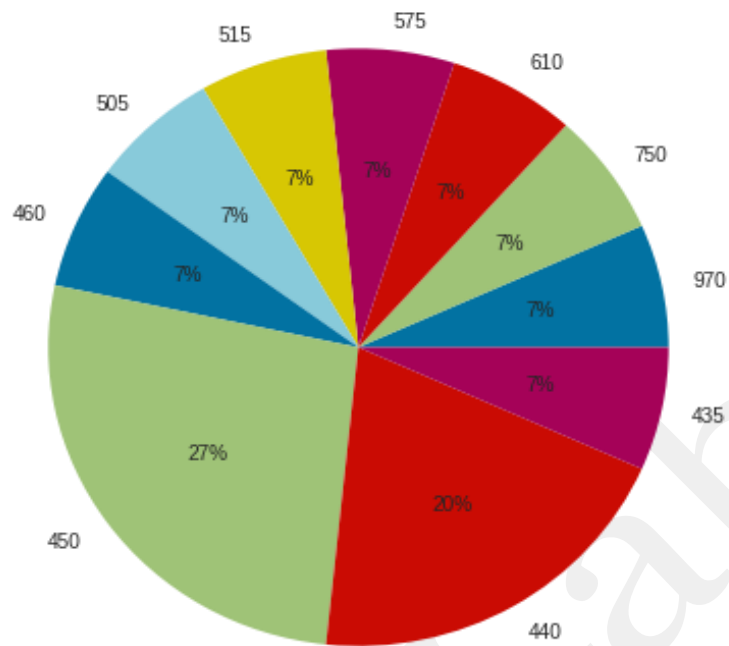
**Profiling and Describing the Segments**

Sorting the Top Speeds and Maximum Range in accordance to the Price with head () we can view the Pie Chart.

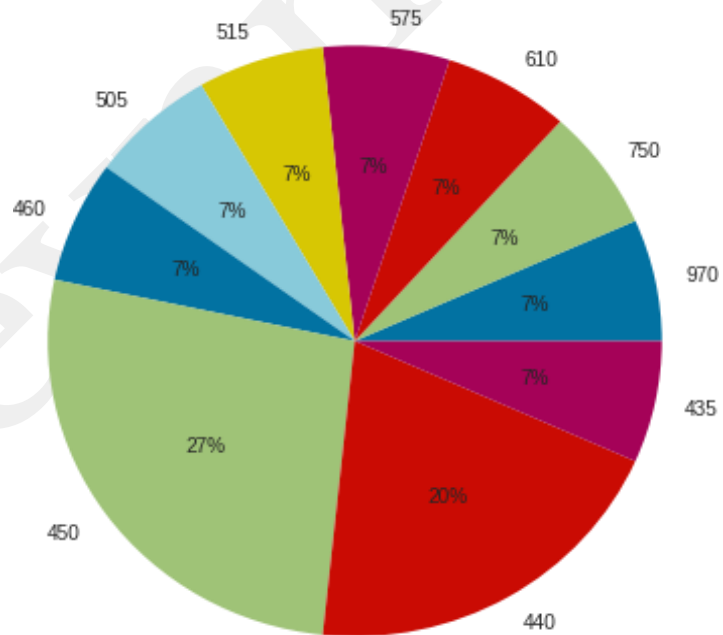
**Pie Chart:**



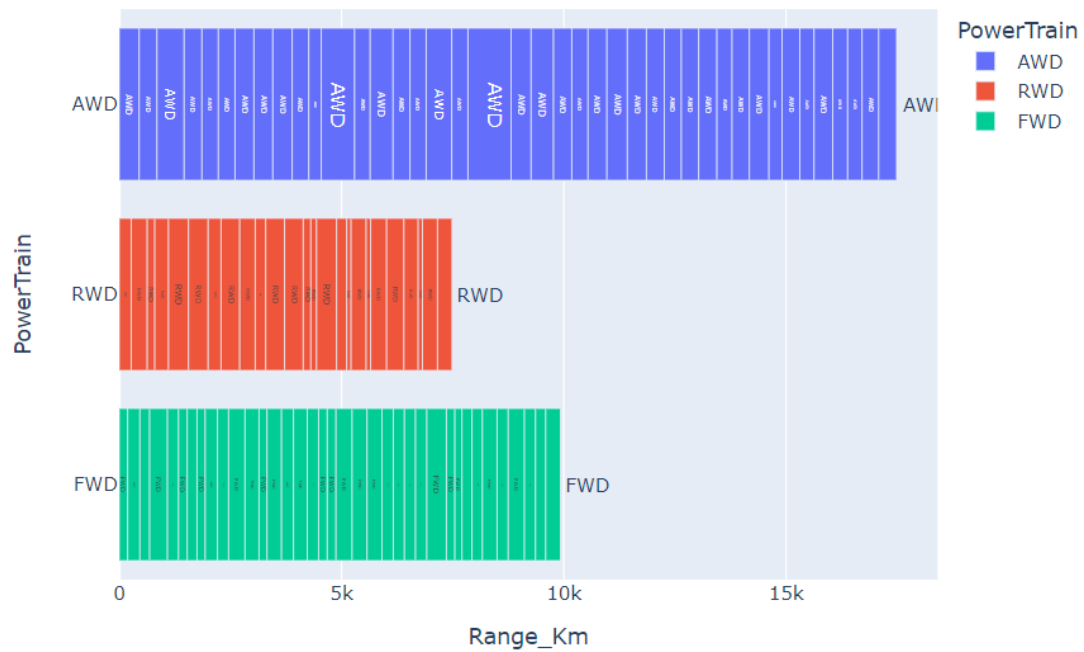
Cost based on Maximum Range



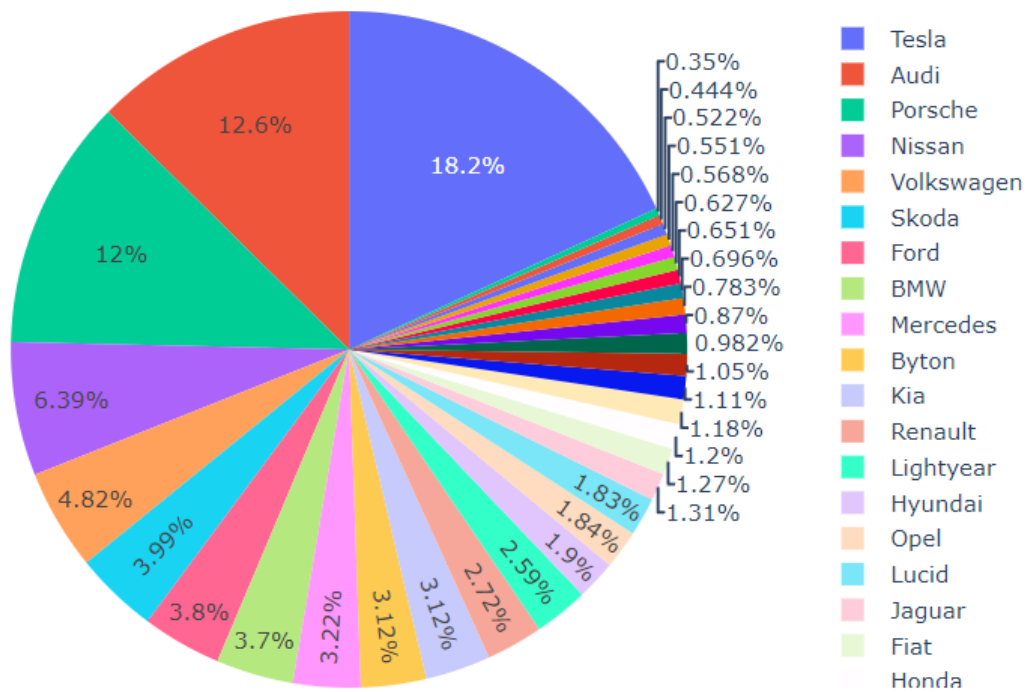
Top Speeds based on Maximum Range



**Statement – which Power train vehicle from (AWD,RWD,FWD) gives the maximum range for choosing the type of car to give maximum efficiency**

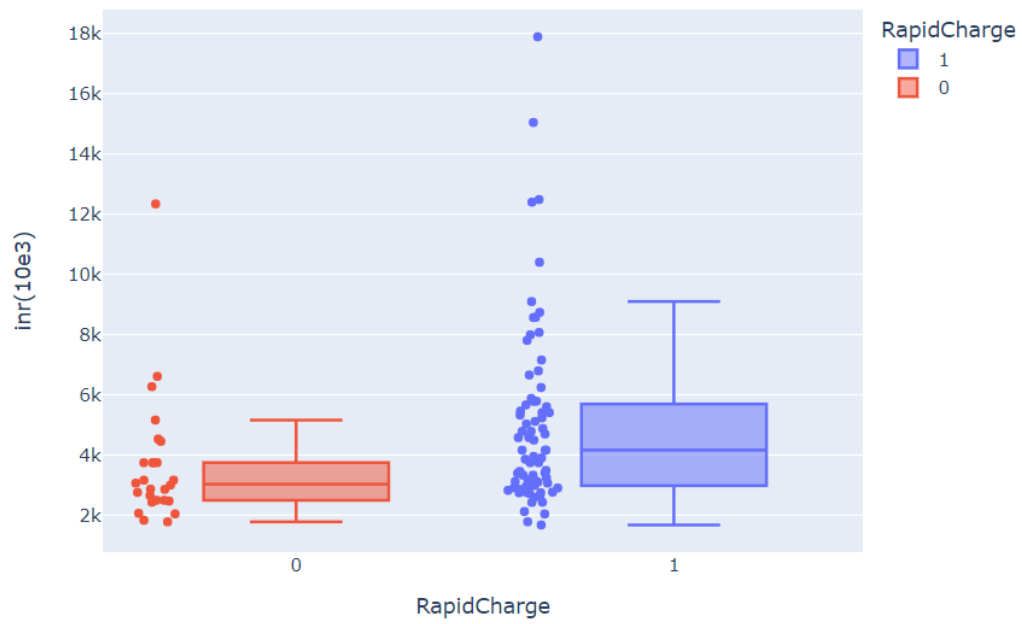


**Statement – which Brand has Maximum pricing of their cars and value in the market**

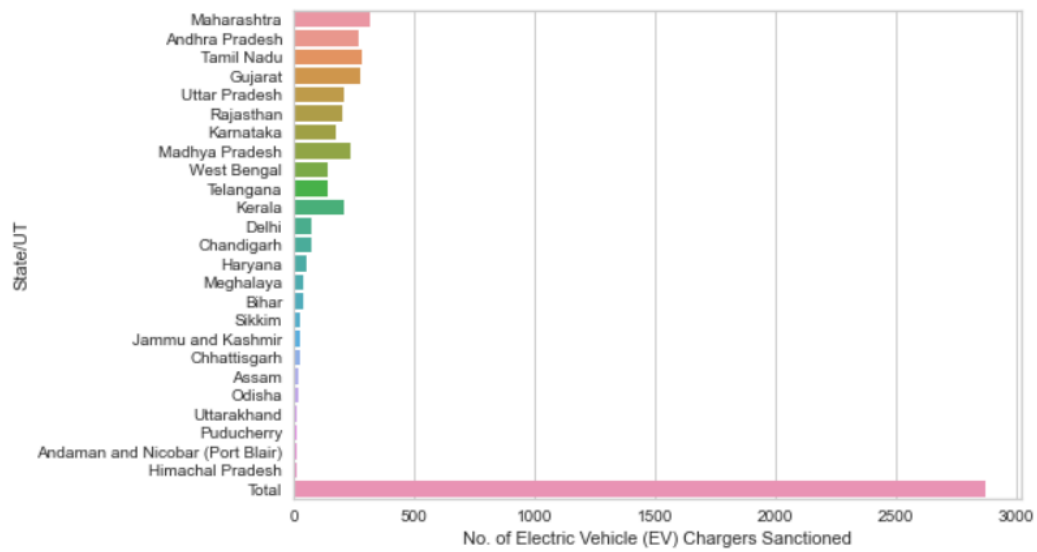




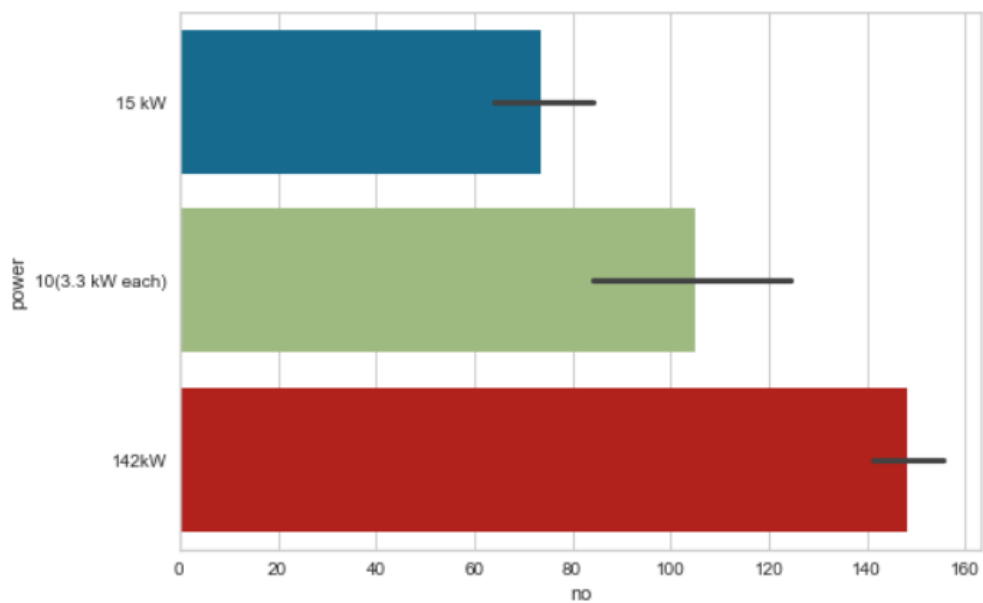
**Statement – Will the pricing of car will depend on the charging system of simple or rapid charge**



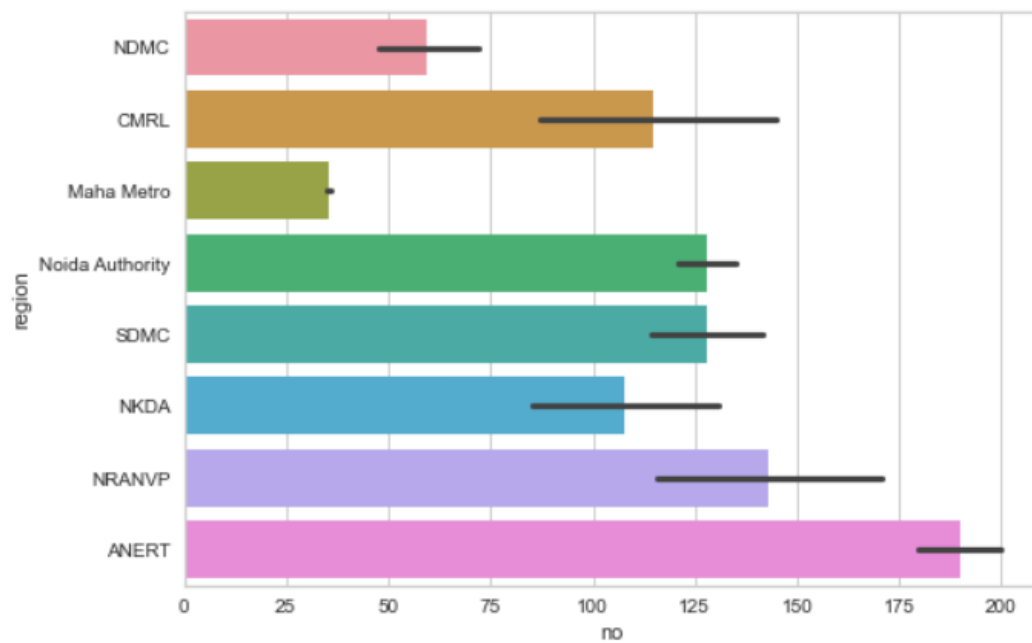
**Statement – what is the no of electric vehicle chargers sanctioned in the states**



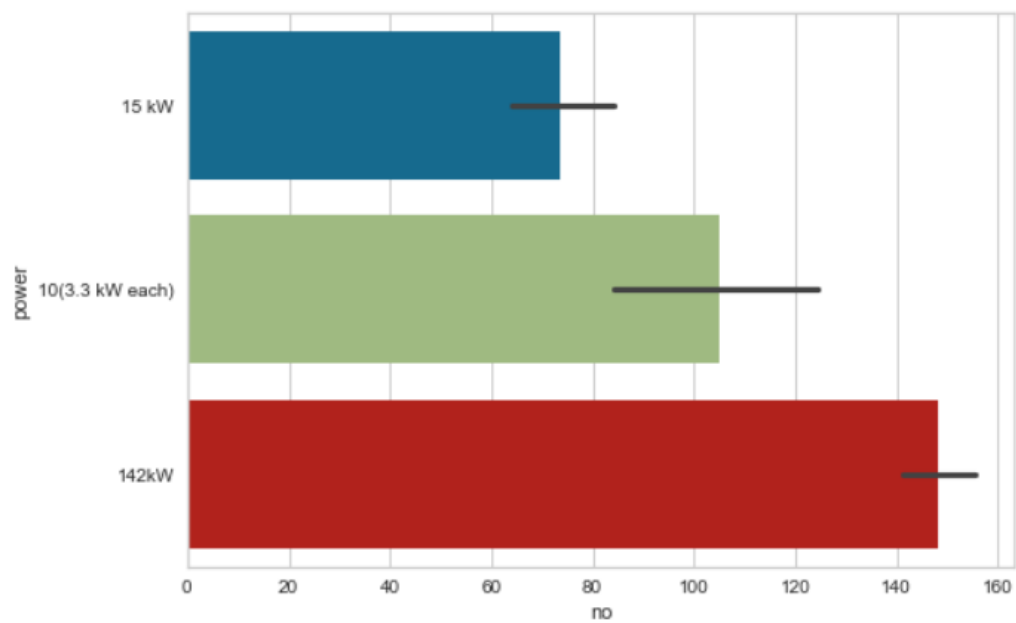
**Statement – What is the charging station environment in India so accordingly the company think of providing the services according to the charging station environment**



***Statement – Which region has maximum no of charging stations so the target market will be there***



***Statement – what is the type of charger installed***



## Target Segments:

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

**Behavioral:** Mostly from our analysis there are cars with 5 seats.

## Demographic:

- *Top Speed & Range* : With a large area of market the cost is dependent on Top speeds and Maximum range of cars.
- *Efficiency* : Mostly the segments are with most efficiency.

## Psychographic:

- *Price* : From the above analysis, the price range is between 16,00,000 to 1,80,00,000.

Finally, our target segment should contain cars with most **Efficiency**, contains **Top Speed** and price between **16 to 180 lakhs** with mostly with **5 seats**.

## Customizing the Marketing Mix



The marketing mix refers to the set of actions, or tactics, that a company uses to promote its brand or product in the market. The 4Ps make up a typical marketing mix -Price, Product, Promotion and Place.

- **Price:** refers to the value that is put for a product. It depends on segment targeted, ability of the companies to pay, ability of customers to pay supply - demand and a host of other direct and indirect factors.
- **Product:** refers to the product actually being sold – In this case, the service. The product must deliver a minimum level of performance; otherwise even the best work on the other elements of the marketing mix won't do any good.
- **Place:** refers to the point of sale. In every industry, catching the eye of the consumer and making it easy for her to buy it is the main aim of a good distribution or 'place' strategy. Retailers pay a premium for the right location. In fact, the mantra of a successful retail business is '*location, location, location*'.
- **Promotion:** this refers to all the activities undertaken to make the product or service known to the user and trade. This can include advertising, word of mouth, press reports, incentives, commissions and awards to the trade. It can also include *consumer schemes, direct marketing, contests and prizes*.

All the elements of the marketing mix influence each other. They make up the business plan for a company and handle it right, and can give it great success. The marketing mix needs a lot of understanding, market research and consultation with several people, from users to trade to manufacturing and several others.