

EV Market Segmentation

BY

Ahmed Noor

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Overview

The global electric vehicle (EV) market is undergoing a significant transformation, driven by a combination of technological advancements, environmental concerns, and changing consumer preferences. As the world grapples with the adverse effects of climate change and rising pollution levels, the shift toward sustainable transportation solutions has never been more urgent. Electric vehicles, which produce zero tailpipe emissions, present a viable alternative to traditional internal combustion engine (ICE) vehicles, offering the potential to drastically reduce greenhouse gas emissions and improve air quality in urban areas.

One of the primary drivers of EV adoption is the rapid expansion of EV charging infrastructure. Over the past decade, the number of EV charging stations has grown exponentially, facilitating greater convenience for EV owners and reducing the range anxiety that once hindered the widespread adoption of electric vehicles. According to recent data, the global network of EV charging stations has expanded in tandem with the increase in EV sales, reflecting the growing demand for sustainable mobility solutions. Governments worldwide have recognized the importance of charging infrastructure in promoting EV adoption and have introduced policies and incentives to encourage the development of a robust and accessible charging network. This growth in infrastructure is crucial for the EV market's expansion, as it directly influences consumer confidence and the feasibility of long-distance travel in electric vehicles.

The environmental benefits of electric vehicles are well-documented. Traditional vehicles powered by fossil fuels are major contributors to air pollution and greenhouse gas emissions, which are linked to a range of health issues, including respiratory diseases, cardiovascular problems, and premature death. In contrast, electric vehicles produce zero tailpipe emissions, making them an attractive option for reducing urban air pollution. Additionally, when powered by renewable energy sources such as wind, solar, or hydroelectric power, EVs can achieve near-zero carbon emissions over their lifetime, further amplifying their environmental benefits. This shift towards cleaner transportation is critical for meeting global climate targets and ensuring a sustainable future for the planet.

However, the transition to electric vehicles is not without its challenges. One of the most significant barriers to EV adoption is the upfront cost. While the total cost of ownership for an EV may be lower over time due to reduced fuel and maintenance expenses, the initial purchase price of electric vehicles is often higher than that of their ICE counterparts. This price disparity is largely due to the high cost of lithium-

ion batteries, which are the most expensive component of an electric vehicle. However, as battery technology advances and economies of scale are realized, the cost of EVs is expected to decrease, making them more accessible to a broader range of consumers.

In addition to environmental concerns, the shift towards electric vehicles also has significant economic implications. The growing EV market presents substantial opportunities for innovation and job creation across various sectors, including automotive manufacturing, battery production, and charging infrastructure development. As traditional automakers and new entrants alike invest heavily in electric vehicle technology, the industry is poised for rapid growth, with global EV sales expected to continue their upward trajectory in the coming years. This growth is also reflected in the market segmentation of electric vehicles, which encompasses a wide range of vehicle types, including 2-wheelers, 3-wheelers, and 4-wheelers.

The segmentation of the EV market is an important aspect of understanding its growth and potential. Two-wheelers, such as electric scooters and motorcycles, are particularly popular in densely populated urban areas, where they offer a convenient and affordable mode of transportation. Three-wheelers, often used for commercial purposes such as delivery services, are also gaining traction in the EV market due to their low operating costs and environmental benefits. Four-wheelers, including passenger cars and light commercial vehicles, represent the largest segment of the EV market and are the primary focus of many automakers' electrification strategies.

Despite the challenges, the advantages of electric vehicles are compelling. In addition to the environmental benefits, EVs offer a smoother and quieter driving experience compared to traditional vehicles. Electric motors provide instant torque, resulting in rapid acceleration and a more responsive driving experience. Moreover, the simplicity of electric drivetrains, which have fewer moving parts than internal combustion engines, translates to lower maintenance costs and greater reliability over the vehicle's lifetime. The potential for software updates and vehicle-to-grid (V2G) technology, which allows EVs to feed electricity back into the grid, further enhances the appeal of electric vehicles as part of a modern, connected transportation ecosystem.

The market size of electric vehicles is expanding rapidly, driven by increasing consumer awareness, favorable government policies, and advancements in battery technology. In 2023, global EV sales surpassed 10 million units for the first time, representing a significant milestone in the transition to electric mobility. This growth

is expected to continue, with some forecasts predicting that electric vehicles could account for nearly 30% of all new vehicle sales by 2030. The expansion of the EV market is not limited to passenger vehicles; commercial vehicles, including electric buses and trucks, are also seeing increased adoption, driven by the need for sustainable transportation solutions in the logistics and public transport sectors.

Market Analysis

EV sales in India were recorded at 1.3 million for 2022, and are expected to touch 1.7 million units by the end of 2023 according to IESA's projection as per business-as-usual scenario. EV market in India is expected to witness CAGR of 35% from 2023 to 2032 under business-as-usual scenario. The report covers market estimates and forecasts for India EV market by vehicle segments i.e. E-2 wheeler, E-3 wheeler, E-4 wheeler, E-bus and E-truck in terms of annual unit sales and annual battery demand (GWh).

Factors driving EV market in India include:

- FAME-II subsidy
- Entry of large number of OEMs
- Auto components production liked incentive scheme
- Major push to replace ICE fleet with EVs

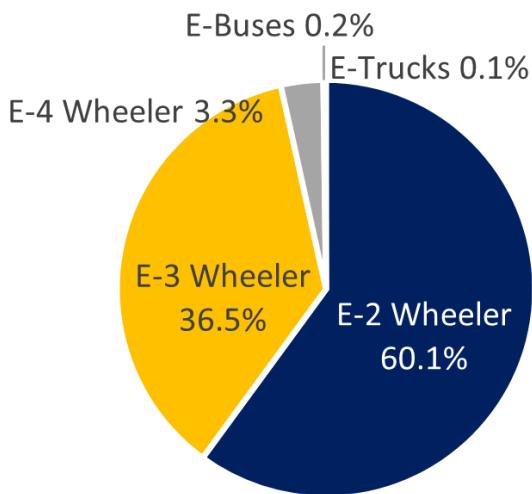
However, EV market in India is currently facing challenges such as:

- High cost of EV
- Lack of public charging infrastructure
- Requirement of investment for power grid upgradation
- Absence of subsidy in some segments

State governments in India are taking active steps through their respective EV policies to increase EV adoption, providing demand incentives such as subsidy on new EV purchase, road tax exemption, registration fee exemption, and scrapping and retrofit incentives.

Incentives and support under state EV policies are centered around manufacturing, charging infrastructure, R&D, battery recycling, employment generation and skill development. For instance, states such as Tamil Nadu, Haryana, Andhra Pradesh and Uttar Pradesh are providing incentives to encourage investment both, EV manufacturing and component manufacturing, while also looking to aid local EV ecosystem in the state.

EV Market Sales by Vehicle Segments, 2022 (1.3 Million Units)



E-4 wheeler adoption in India is driven by requirement of personal mobility and taxi fleet operators. In 2022, personal mobility dominated with around 87% market share, against 13% for fleet operators. However, sales for fleet operators have jumped four-fold in 2022 over 2021 numbers as attractive total cost of ownership prompted players such as Ola and Uber to begin replacing ICE vehicles with EVs.

E-bus segment sales have been driven by subsidy available for the category, specifically for government end-use. Convergence Energy Services Ltd acts as the major tendering agency, and is working to deploy 50,000 E-buses under the National Electric Bus Program. E-truck is one of the newer segments in India, and therefore, sales are lowest compared with other EV segments in 2022, owing to limited product offerings by players and absence of subsidy.

In terms of battery chemistries, lead acid is utilized for low-speed E-2 wheelers and low-speed E-rickshaws, while lithium-ion battery chemistries such as LFP and NMC are widely utilized in all other EV segments. Other lithium-ion chemistries such as NCA, LTO and LMO have witnessed limited application, with utilization only by certain specific players.

The rising demand and adoption of electric micro-mobility vehicles such as electric two-wheelers and electric three-wheelers is an ongoing trend in the market. Indian market is highly price-sensitive, and the majority of the Indian populace prefers two-wheelers for their daily transport due to rapidly growing traffic congestion. Therefore, in India low cost of electric two-wheelers and three-wheelers compared to four-

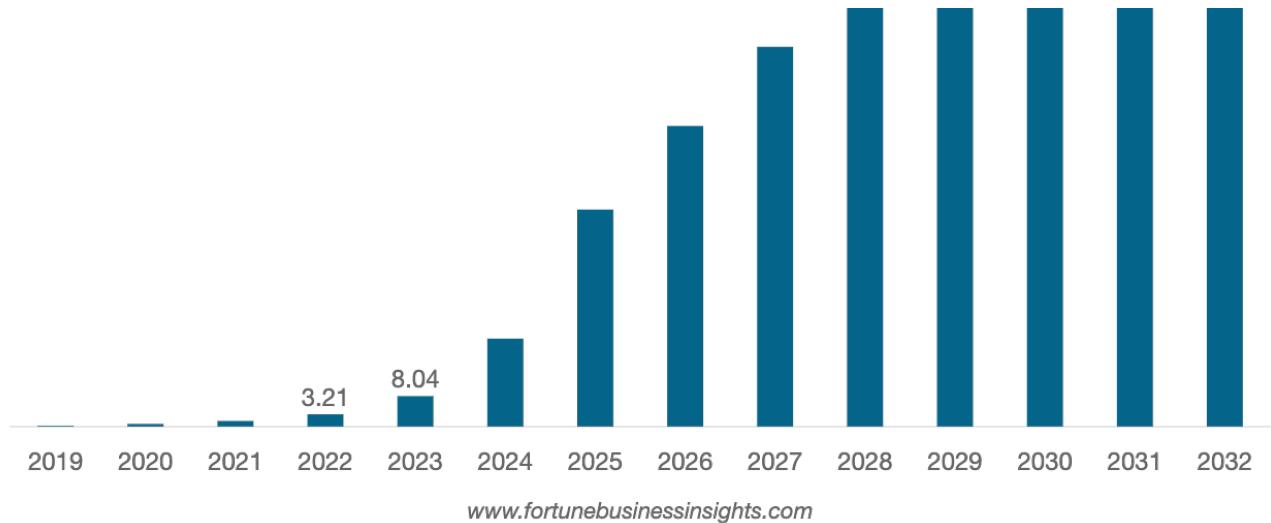
Major EV Players by Segments				
E-2W	E-3W	E-4W	E-Bus	E-Truck
				
				
				

wheelers, coupled with the high suitability of two-wheelers to Indian road traffic conditions, is anticipated to boost the adoption of electric two-wheelers and three-wheelers during the forecast period.

For instance, the cost of electric two-wheelers in India is nearly USD 600 to USD 3,755, which is significantly lower than the cost of electric four-wheelers. Some of India's most popular two-wheeler models include Revolt RV 400, Tork Kratos, and others.

To satisfy the increasing demand, various domestic electric two-wheeler brands are also penetrating the market to grab revenue growth opportunities in rapidly growing automotive electrification in India.

Moreover, the Indian government's push toward e-mobility adoption by providing FAME India subsidies and inclining consumer preference towards electric micro-mobility is expected to boost the market in future years.



Situational Analysis

Geographical segmentation

Geographical segmentation in the EV market based on states is a strategic approach that allows for a more tailored and effective market strategy. By dividing the market into states with a high density of EV stations and those where EV stations are emerging, companies can better understand the specific needs, preferences, and potential of each region. This enables targeted marketing, optimized resource allocation, and the ability to prioritize regions that are either already established or have strong growth potential.

Advantages:

1. **Targeted Marketing:** Companies can craft region-specific marketing campaigns that resonate with the local audience, increasing engagement and conversion rates.
2. **Resource Optimization:** By focusing efforts on states with high growth potential or established infrastructure, companies can allocate resources more efficiently, maximizing return on investment.
3. **Early Market Entry:** Identifying and entering emerging markets early allows companies to establish a strong presence before competitors, gaining a first-mover advantage.
4. **Adaptation to Regional Needs:** Different states may have varying levels of EV adoption, infrastructure, and regulatory environments. Geographical segmentation allows companies to adapt their strategies to the unique characteristics of each region.
5. **Improved Decision-Making:** Segmentation provides data-driven insights into market dynamics, helping companies make informed decisions about expansion, partnerships, and product offerings.

6. **Customer Satisfaction:** By addressing the specific needs of customers in different regions, companies can enhance customer satisfaction and loyalty, leading to long-term success.

Market Size Segmentation

Segmenting the EV market based on the size of different vehicle segments, such as 2-wheelers, 3-wheelers, and 4-wheelers, allows for a more precise understanding of where the greatest opportunities lie. This segmentation helps companies identify which segments are driving the market and where there is the most potential for growth. By focusing on the largest or fastest-growing segments, businesses can tailor their strategies to meet the specific demands and preferences of these markets, ultimately leading to more effective product development and marketing efforts.

Advantages:

1. **Market Focus:** By concentrating on the largest segments, companies can target areas with the highest sales potential, maximizing their market impact and profitability.
2. **Product Customization:** Understanding the dominant segments allows for the development of products and features that cater specifically to the needs of those customers, improving product-market fit.
3. **Efficient Resource Allocation:** Businesses can allocate their resources, such as marketing budgets and R&D investments, to the segments that offer the greatest returns, ensuring more efficient use of capital.
4. **Competitive Advantage:** Focusing on key segments can help companies differentiate themselves from competitors by offering specialized solutions that meet the unique needs of different vehicle categories.
5. **Growth Identification:** By analyzing which segments are expanding, companies can identify emerging trends and capitalize on them early, positioning themselves as leaders in those areas.
6. **Risk Management:** Diversifying focus across multiple segments (e.g., 2-wheelers and 3-wheelers) helps mitigate risk by not relying solely on one market segment, thereby ensuring more stable business growth.

Probable Markets based on EV stations

The India electric vehicle (EV) market size was valued at USD 8.03 billion in 2023. The market is projected to grow from USD 23.38 billion in 2024 to USD 117.78 billion by 2032, exhibiting a CAGR of 22.4% during the forecast period. We took a dataset from Kaggle

which shows currently operating stations in states of India. We analysed each state and tried to find which state is most probable for the company to gain dominance, apart from this checking on the customer side also weather the customer can be satisfied or not.

Dataset :

Our dataset consisted of these columns :

```
'uid',      'name',   'vendor_name',
'address',   'latitude', 'longitude',
'city',     'country',  'open',
'close',    'logo_url', 'staff',
'payment_modes', 'contact_numbers', 'station_type',
'postal_code',   'zone',       0,
'available',   'capacity', 'cost_per_unit',
'power_type',   'total',     'type',
'vehicle_type' .
```

The most important features was total stations per state , Delhi turned out to be this state.

The screenshot shows a Jupyter Notebook interface with the following code and output:

```
df=pd.read_excel('/content/ev_station_data.xlsx')
df.head()
```

	uid	name	vendor_name	address	latitude	longitude	city	country	open	close	...	postal_code	zon
0	STATIC12	GensolCharge Pvt. Ltd.	GensolCharge Pvt. Ltd.	NDSE Grid, BRPL South Extension	28.568238	77.219666	Delhi	India	00:00:00	23:59:59	...	110001	centra del
1	STATIC14	REIL	REIL	Scada office kalka ji	28.541995	77.260583	Delhi	India	00:00:00	23:59:59	...	110001	centra del
2	STATIC15	REIL	REIL	Ashram Chowk Mathura Road	28.571189	77.259806	Delhi	India	00:00:00	23:59:59	...	110001	centra del
3	STATIC16	REIL	REIL	Nizamuddin Railway station	28.588991	77.253240	Delhi	India	00:00:00	23:59:59	...	110001	centra del
4	STATIC17	BluSmart	BluSmart	BSES Bhawan, Nehru Place, New Delhi 110048	28.549427	77.254636	Delhi	India	00:00:00	23:59:59	...	110001	centra del

5 rows × 25 columns

```
[ ] df['city'].value_counts()
```

city	count
New Delhi	1743

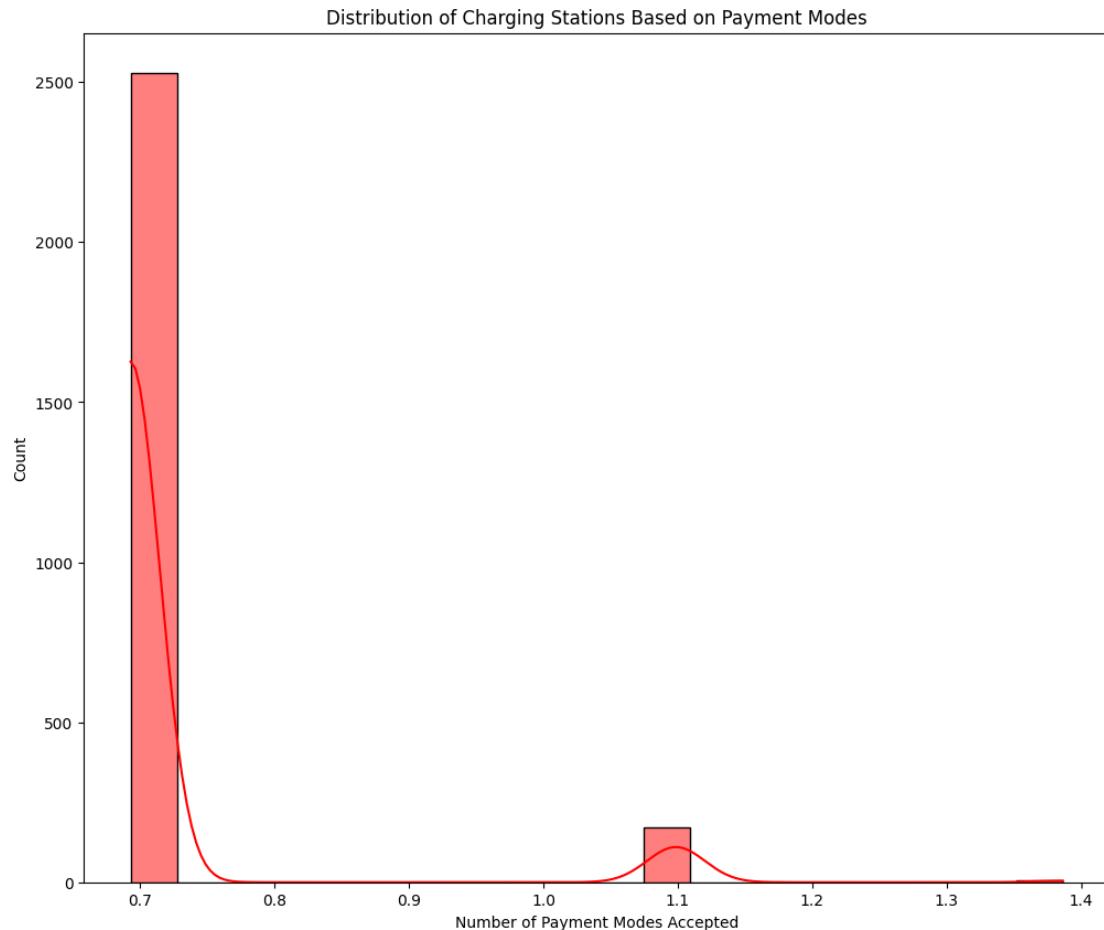
Fig 1 : Dataset

Preprocessing

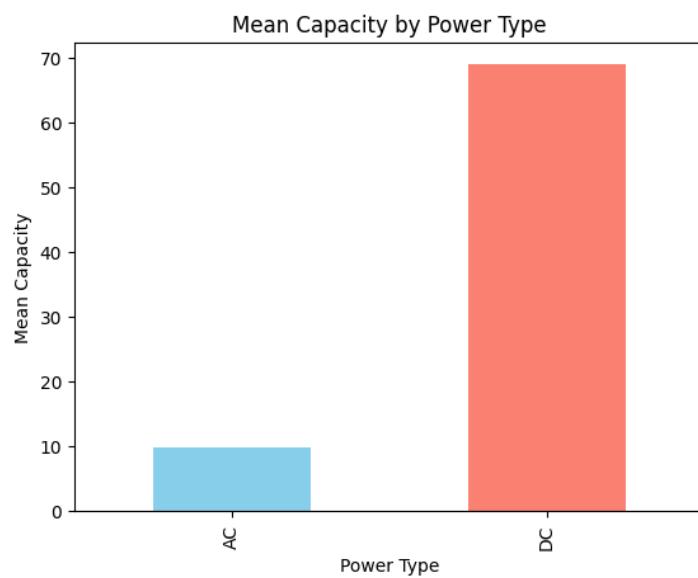
- The dataset had null values, and many object datatypes so for plotting we had to convert each of them into numerical values.
- Changed the states name New Delhi to Delhi as both are same here.
- Made our data consistent using only smaller case letters.

D. Made new column opening hour so that it can be more clear these available stations are feasible or not for the customers.

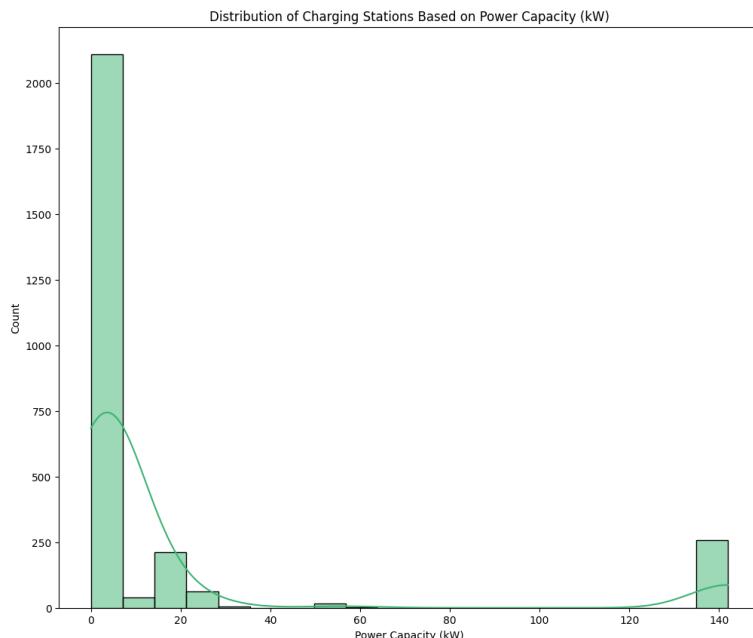
Visualisation



We can clearly see that most of the payments are available at most of the stations. Consumers do not have to worry about any kind of the payments issues like change etc.

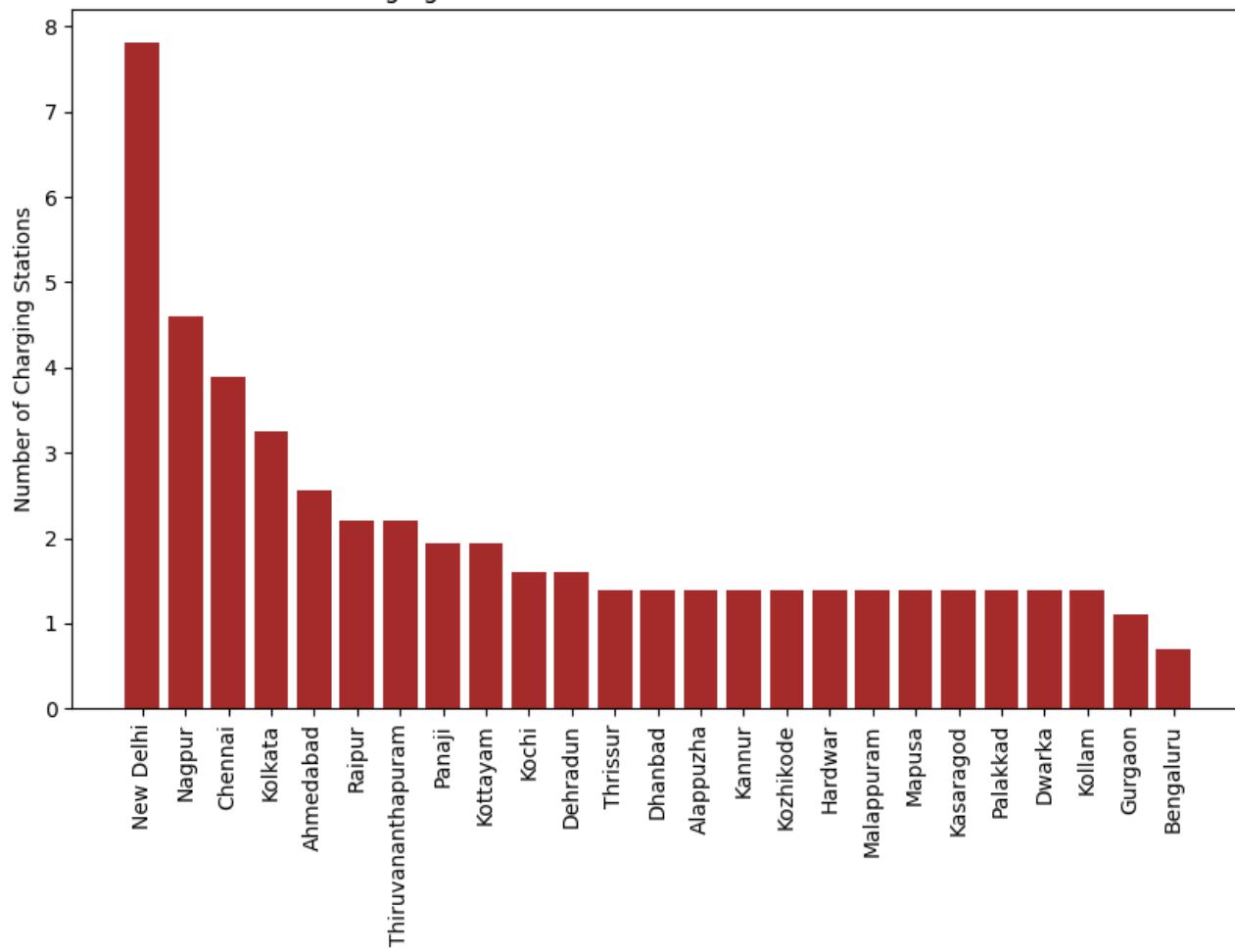


Next, we compared the power types of the EV stations, clearly we observe that most of the stations are DC type. DC cars will be more preferred in these regions. But still a forecasting is needed as there might be a shift from DC->AC.



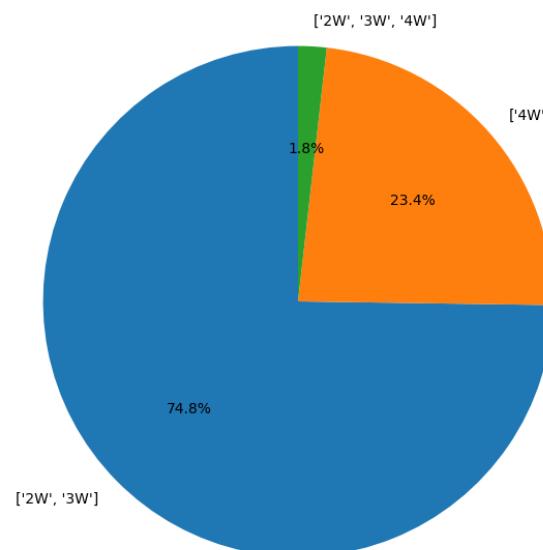
Next we compared Power Capacity counts, on account we can see that most of the stations have 3.3KW of capacity. This can be cause a game changer cause regions having most of EV station capacity 3.3KW cause dissatisfaction of consumers as charging time is increased. The EV released here must have less capacity so that charging time can reduce. On the other regions with high charge capacity should a better choice.

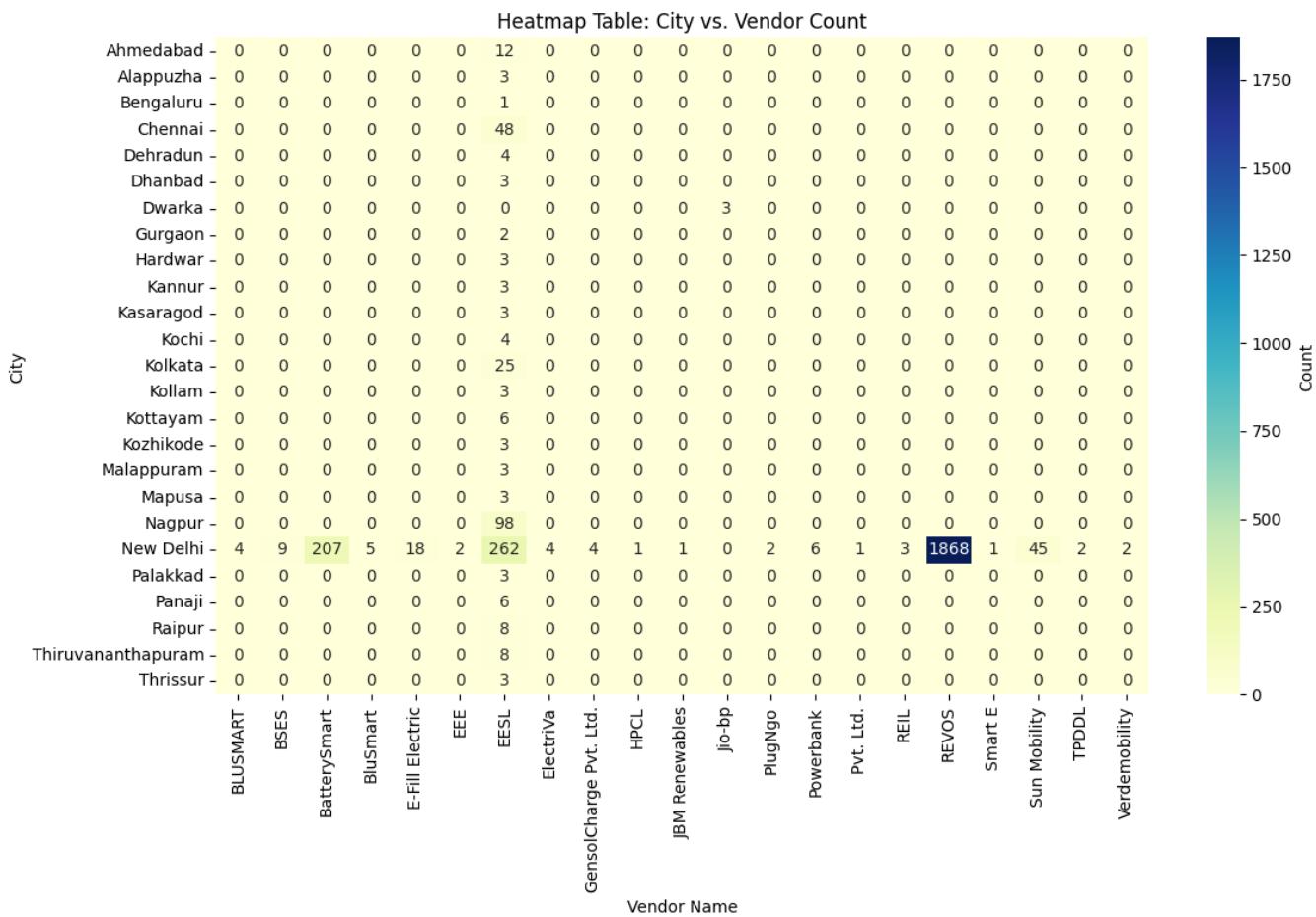
Charging Stations Distribution Across Different Cities



From above we can choose Top 5 or 10 states to get in the market. But before entering we need to make sure that most of EV stations present are operating. Also from below we can observe that current EV stations support 2W,3W stations. But 23% also supports 4W, on further analysing we got to know that in future there will be a trend to 4W , though the process might be slow but it can have a huge affect. Clearly 3W and 4W might be a should choice for the vehicle type.

Distribution of Charging Stations Based on Supported Vehicle Types





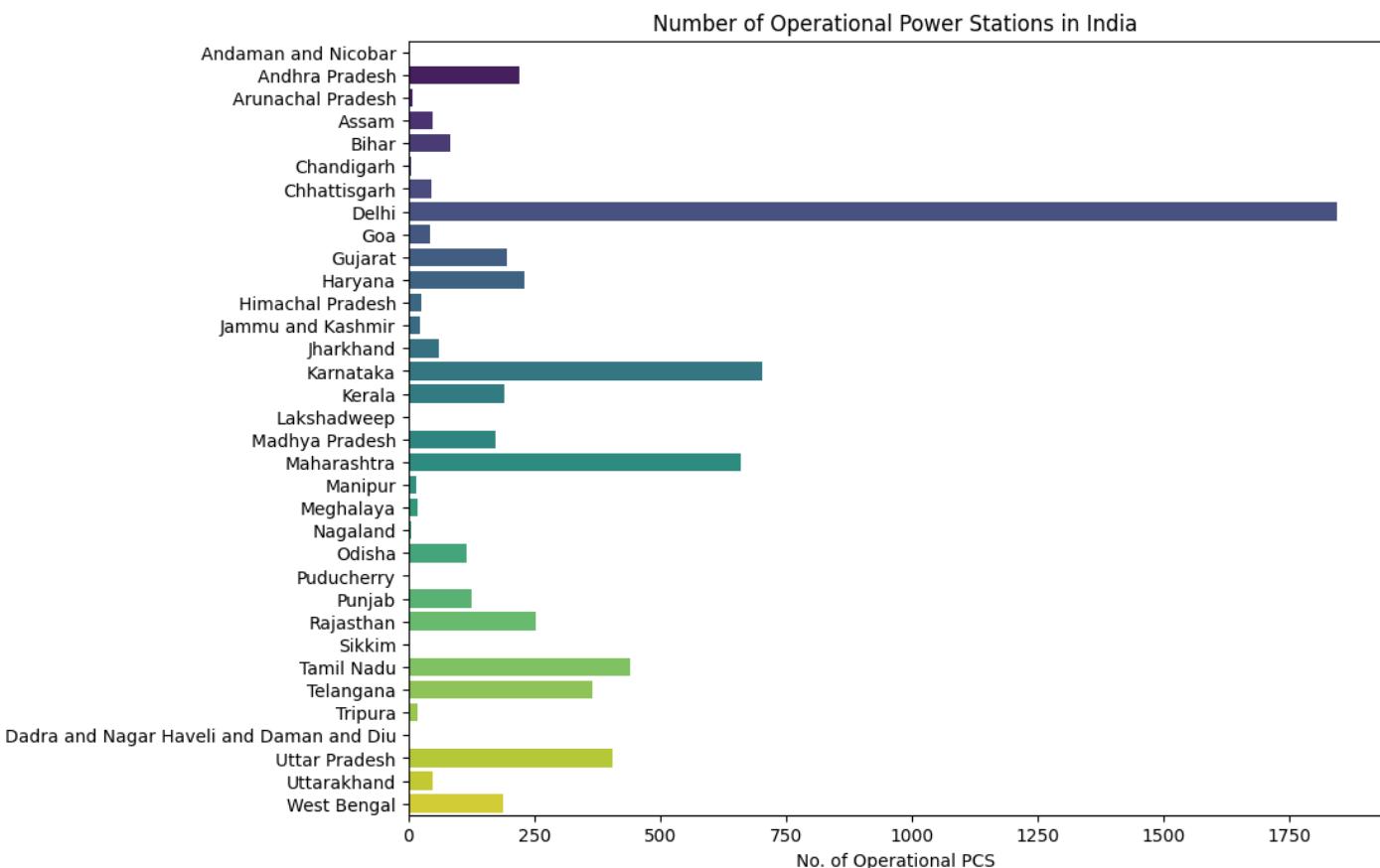
This graph displays the number of operating EV stations per state. Notably, Nagaland, Chennai, and Kolkata are emerging as key EV hubs. The competition in these areas is relatively low, presenting an opportunity for early entrants to build consumer trust. Conversely, Delhi has a high concentration of EV stations, leading to intense competition among major companies. Therefore, it is more strategic to focus on emerging states where the EV market is still in its infancy.

Dataset 2

The dataset 2 contains total Ev station in india which is given state wise. With this data we can forecast a total EV stations upcoming years and check out the potential growth EV stations in India leading to increase in the market value of EV.

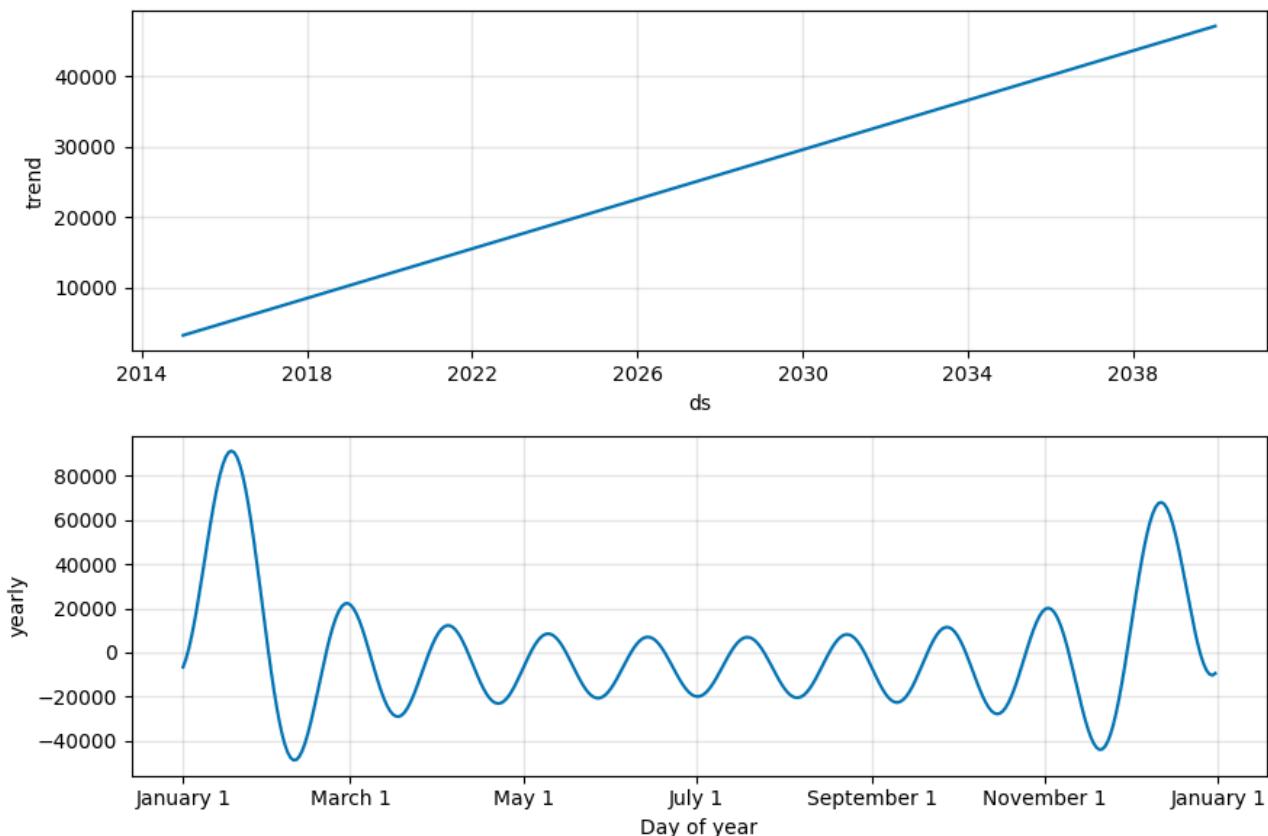
State/UT	No. of Operational PCS
Tripura	18
Dadra and Nagar Haveli and Daman and Diu	1
Uttar Pradesh	406
Uttarakhand	48
West Bengal	189

Visualisation

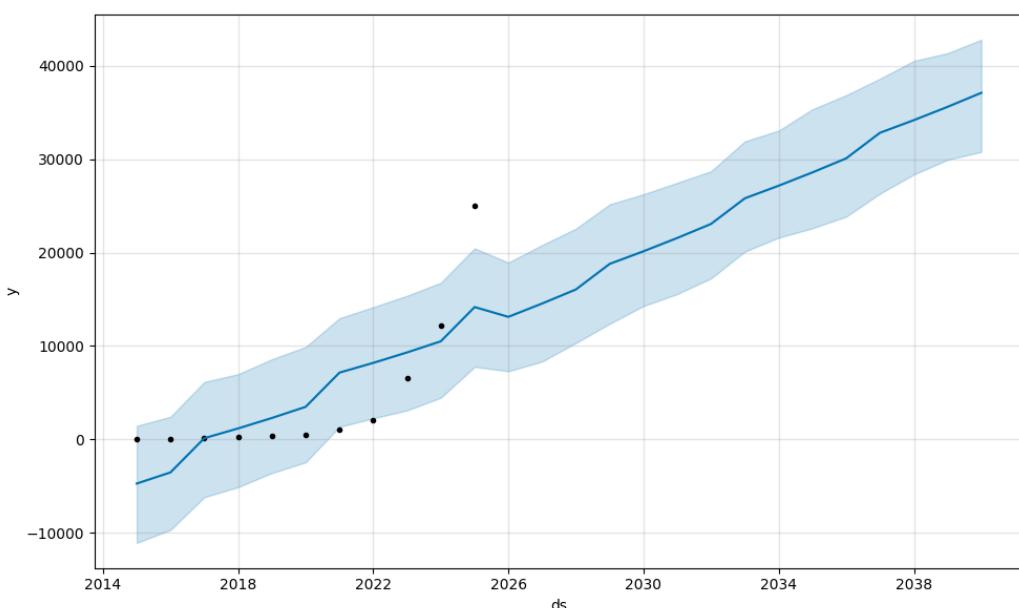


This graph illustrates the distribution of operational EV stations across India as of 2023. While Delhi remains a significant hub, other major states like Karnataka, Maharashtra, Tamil Nadu, and Uttar Pradesh also present promising opportunities for market entry. Although the EV market in these regions is not yet fully mature, this represents a unique chance for companies to establish a strong presence early on. By entering these markets at an early stage, companies can position themselves as leaders, build brand loyalty, and shape the future landscape of EV adoption in these key states. The relatively lower level of competition also allows for more flexibility in market strategies and the ability to capture a substantial share as the market grows.

Forecasting



From the trend shown in the top graph, it appears that the market size is projected to grow steadily over time, reflecting an expanding market with increasing demand. The consistent upward trend suggests that the market will continue to develop, likely driven by factors such as technological advancements, policy support, or consumer adoption. The seasonal fluctuations observed in the bottom graph indicate that there are predictable variations in market activity throughout the year. These seasonal changes could be due to factors like consumer behavior, industry cycles, or external influences that affect market dynamics at specific times of the year. Overall, the market size is expected to grow significantly, with certain periods of the year potentially offering higher or lower levels of activity.



This graph likely represents a time series forecast with a trend line and confidence intervals. The market size is depicted as growing steadily over time, with a consistent upward trajectory from around 2014 to the late 2030s. The increasing values on the y-axis suggest that the market is expected to expand significantly.

The shaded area around the trend line represents the confidence interval, indicating the range within which the market size is expected to fluctuate. The widening of this interval over time suggests increasing uncertainty in the forecast, but the overall trend remains positive.

In summary, the graph indicates a growing market size with steady expansion anticipated over the coming years, though there is some uncertainty in the longer-term forecast.

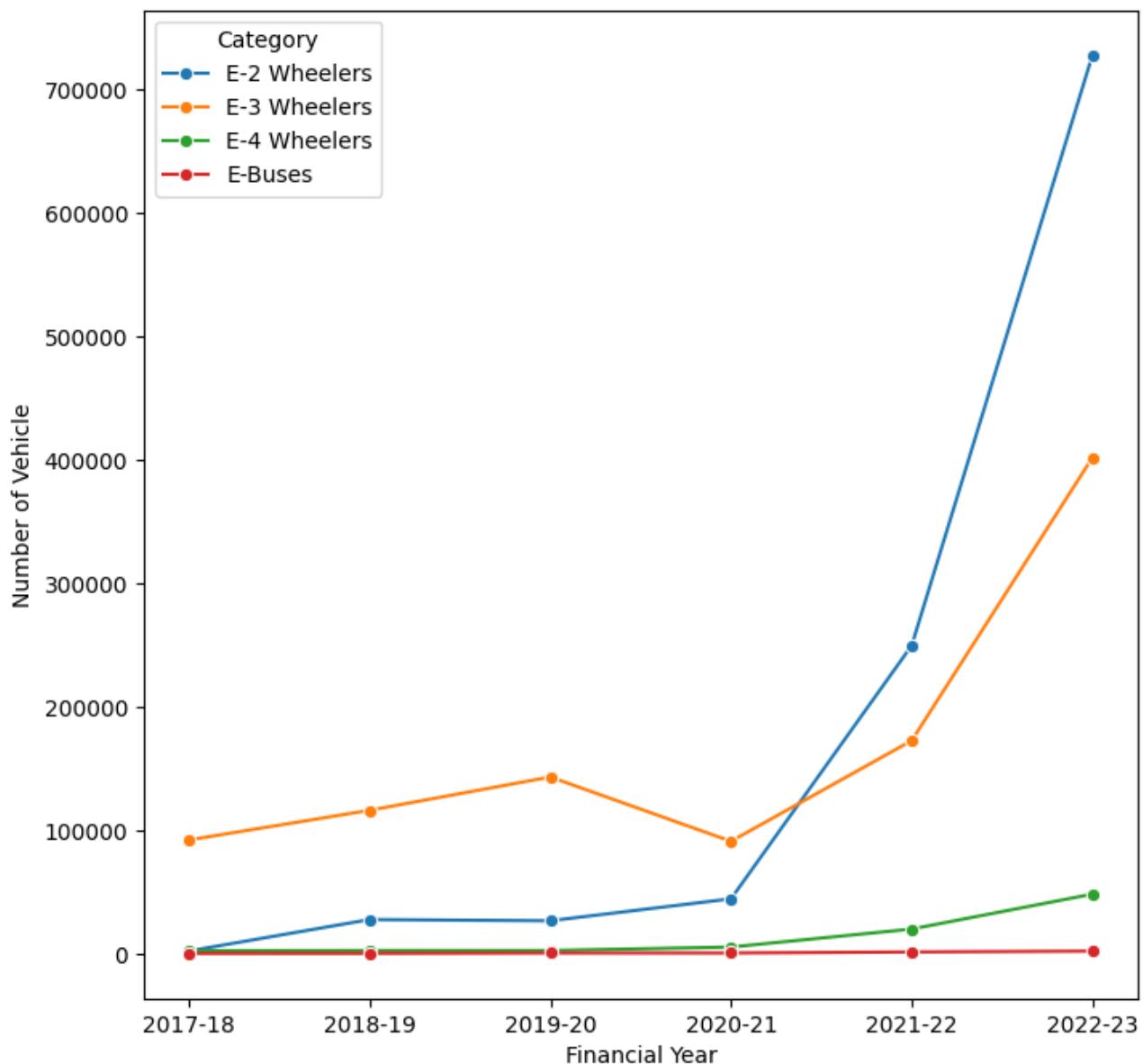
Dataset 3 & Dataset 4 (Profile Segmentation)

This dataset set contains sales of the E-2,E-3,E-3 EVs as well as their market size. The sales here are per year. Also we have review dataset where with consumer satisfaction we segment our E-i EV marke using K- clustering and visualising the segments (proceeding the way as given in the book).

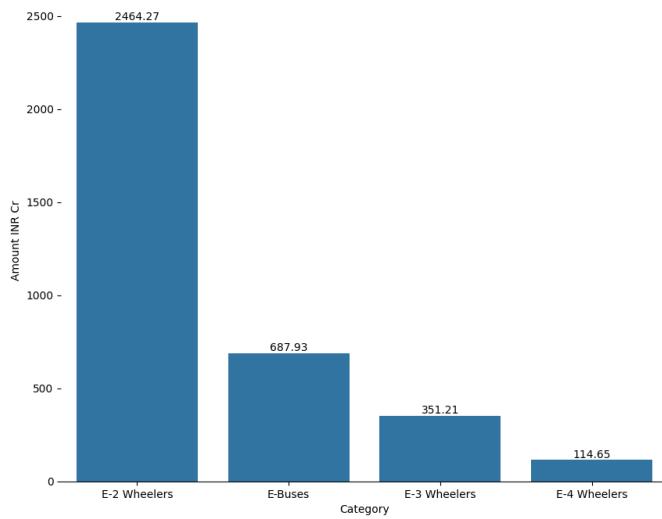
Preprocessing

- A. There are many NaN values in dataset 3 but it useless to fill them, I tried with kNN imputer but a realisation struck that these data are obtained from consumer so it is to useful to fill these NaN places.
- B. Using the NLTK we imported Sentiment analyser which can predict wheather a sentence is negative, positive or neutral.
- C. I added column named ‘Sentiments’ which later groupby and perform all the visualisations and tasks.
- D. PCA was used the dimension and also plotted the PCA to gain some insights of features vector and direction (This was 2-D plot)
- E. Replaced the NAN values to 0.
- F. Finally converting all non-numerical values into numerical.
- G. Also a pivot table was for better understanding of the data.

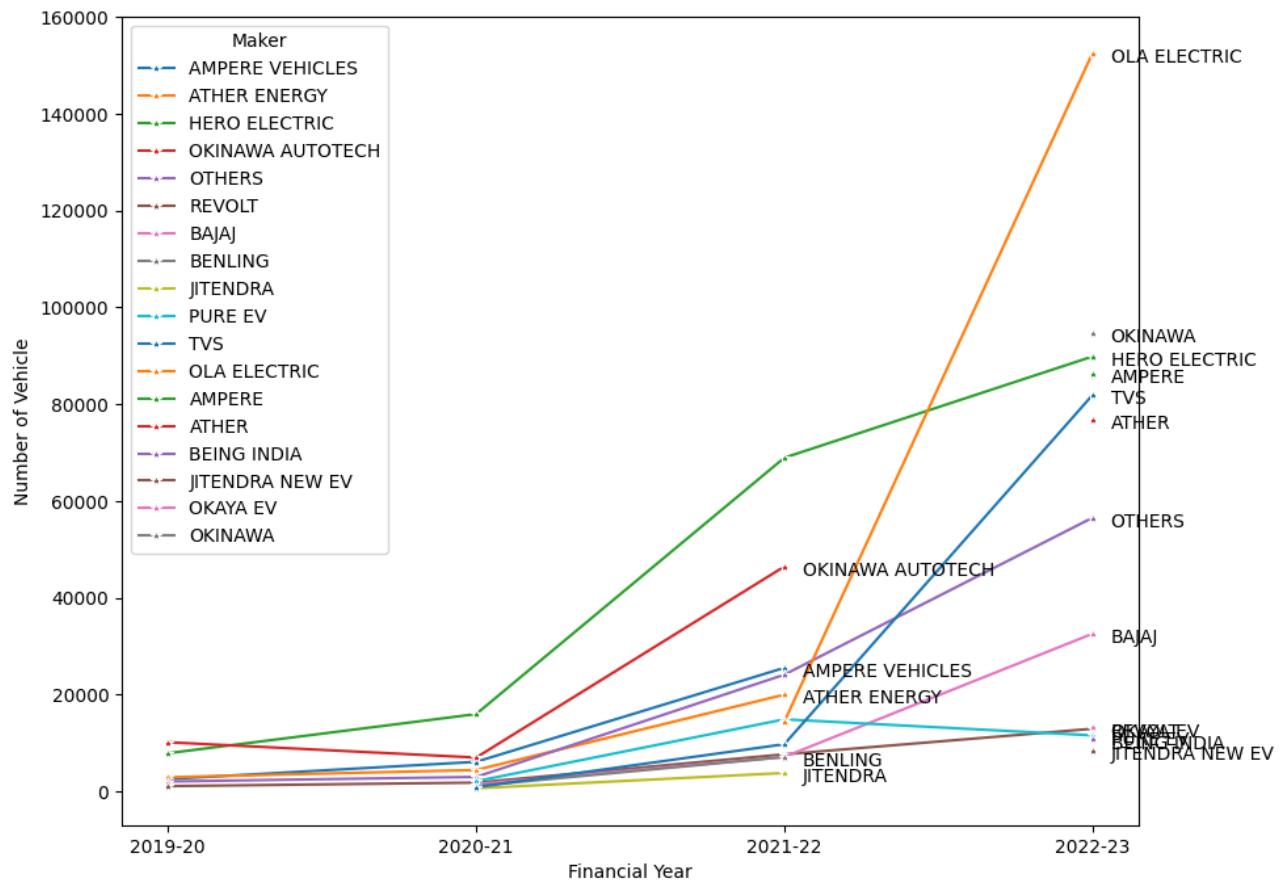
Visualisation



These are the sales of each Vehicle types (2-wheeler, 3-wheeler etc). E-2 has a good potential growth from all of the above then comes the E-3 vehicles. The E-4 and E-Buses doesn't have a increasing growth. This makes us think that a consumers prefer more E-2 than E-4 it is resonable as E-2 will take less power, easier to use, can be used for daily work etc. Maybe a good staragic to focus on E-2 , E-3 vehicle since this yet at developing stage so it must be easier to be a early competitor. Apart from a E-2,E-3 vehicle with less than power , supports 3,4 W charging can appeal more of the consumer. We also to need to research the flows in current E-2,E-3 vehicle and then use it as our advantage.



This is the sales of all vehicles types (EV). The biggest market is of E-2 followed by E-3.

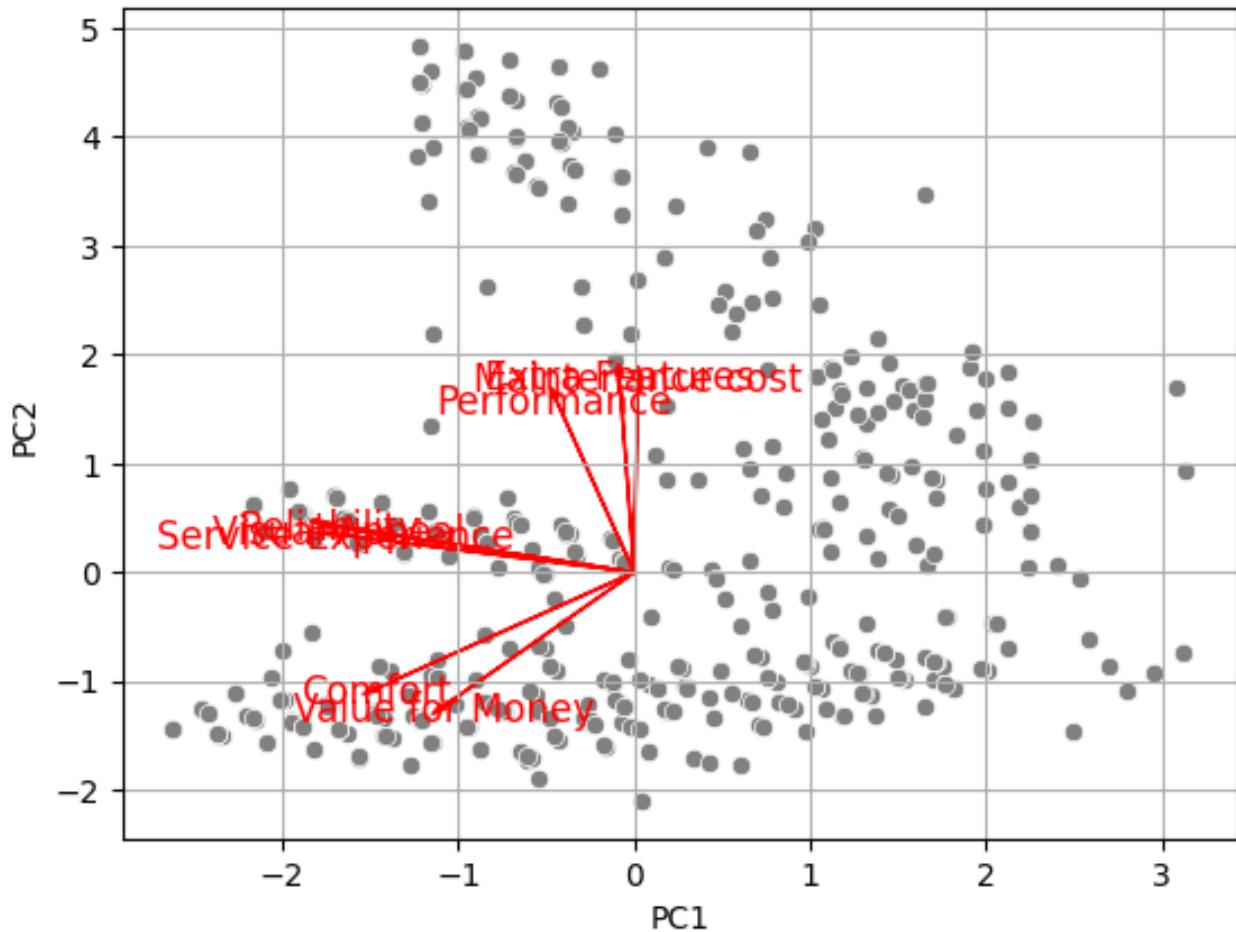


This Graphs show the Major companies sales in EV sector. There is a stiff competition but **OLA electronics** is the leading company with a large margin. **Okinawa, Hero Electric, Ampere, and TVS** also show substantial growth, indicating they are strong players in the EV market. Some brands like **Bajaj, Benling, and Jitendra** show slower growth compared to the market leaders. This insight can help us to get into the market. (For E2 sales)

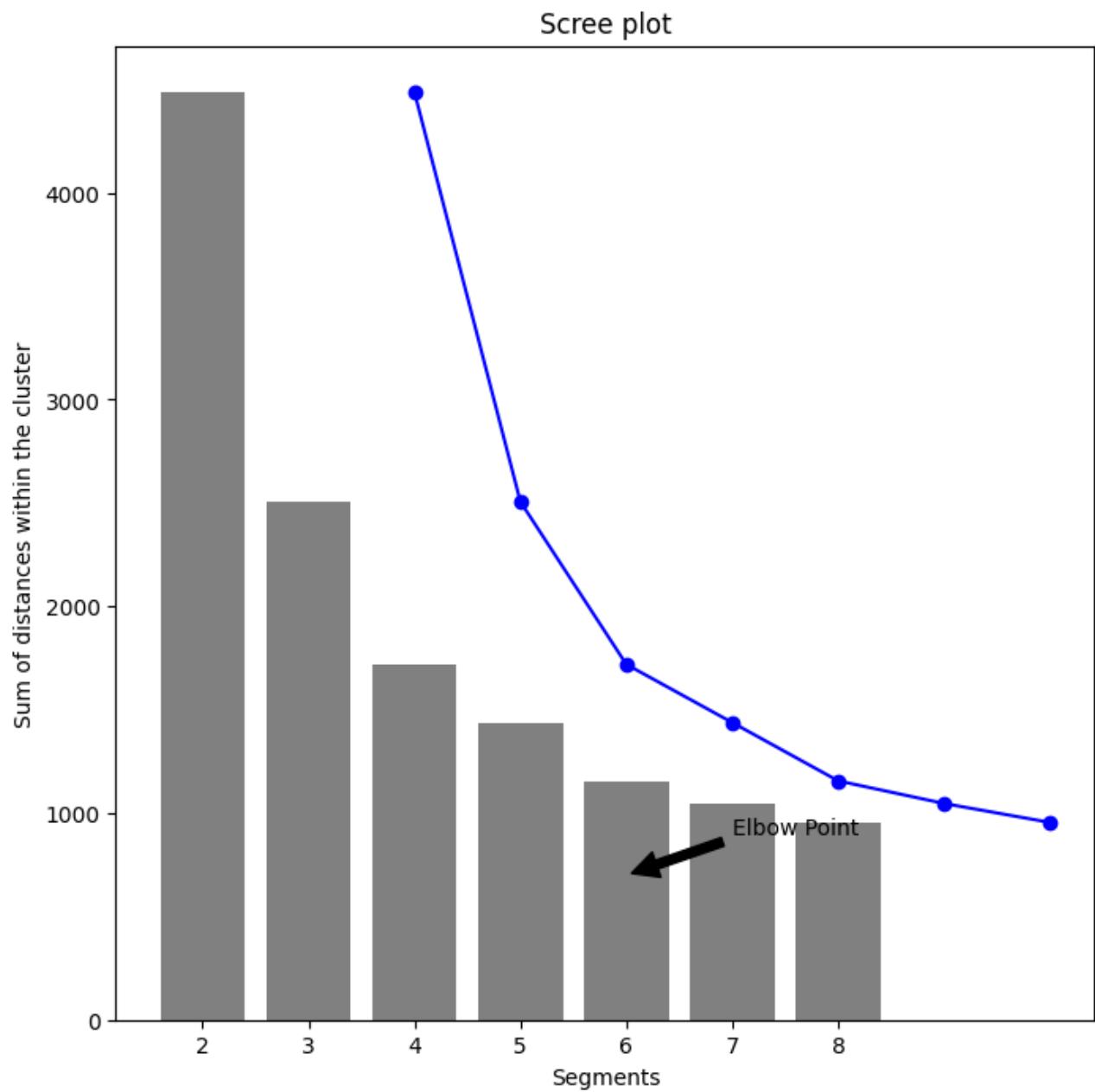
	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8
Visual Appeal	-0.480170	0.117814	0.063320	-0.730598	0.247014	0.105903	0.375474	0.067539
Reliability	-0.494758	0.124910	-0.002776	0.152447	-0.819319	0.060484	0.117211	0.166384
Performance	-0.128721	0.459145	0.574833	-0.005549	-0.019902	-0.025704	-0.288468	-0.598232
Service Experience	-0.486499	0.100691	-0.054176	0.653781	0.470391	0.052432	0.311210	-0.044129
Extra Features	-0.024373	0.519633	-0.364578	-0.023208	0.116821	0.559390	-0.456829	0.246323
Comfort	-0.418255	-0.304266	0.249807	-0.020111	0.172621	-0.296656	-0.623271	0.404238
Maintenance cost	0.005912	0.513208	-0.386495	-0.054822	0.020302	-0.762039	-0.003360	0.055435
Value for Money	-0.309572	-0.351548	-0.563840	-0.107598	-0.046688	0.009572	-0.260855	-0.617065

After PCA we can see that PC1 and PC2 contributes to total of 80% of the variance of E-2 bike sale. Now let's plot PC1 and PC2 with the feature.

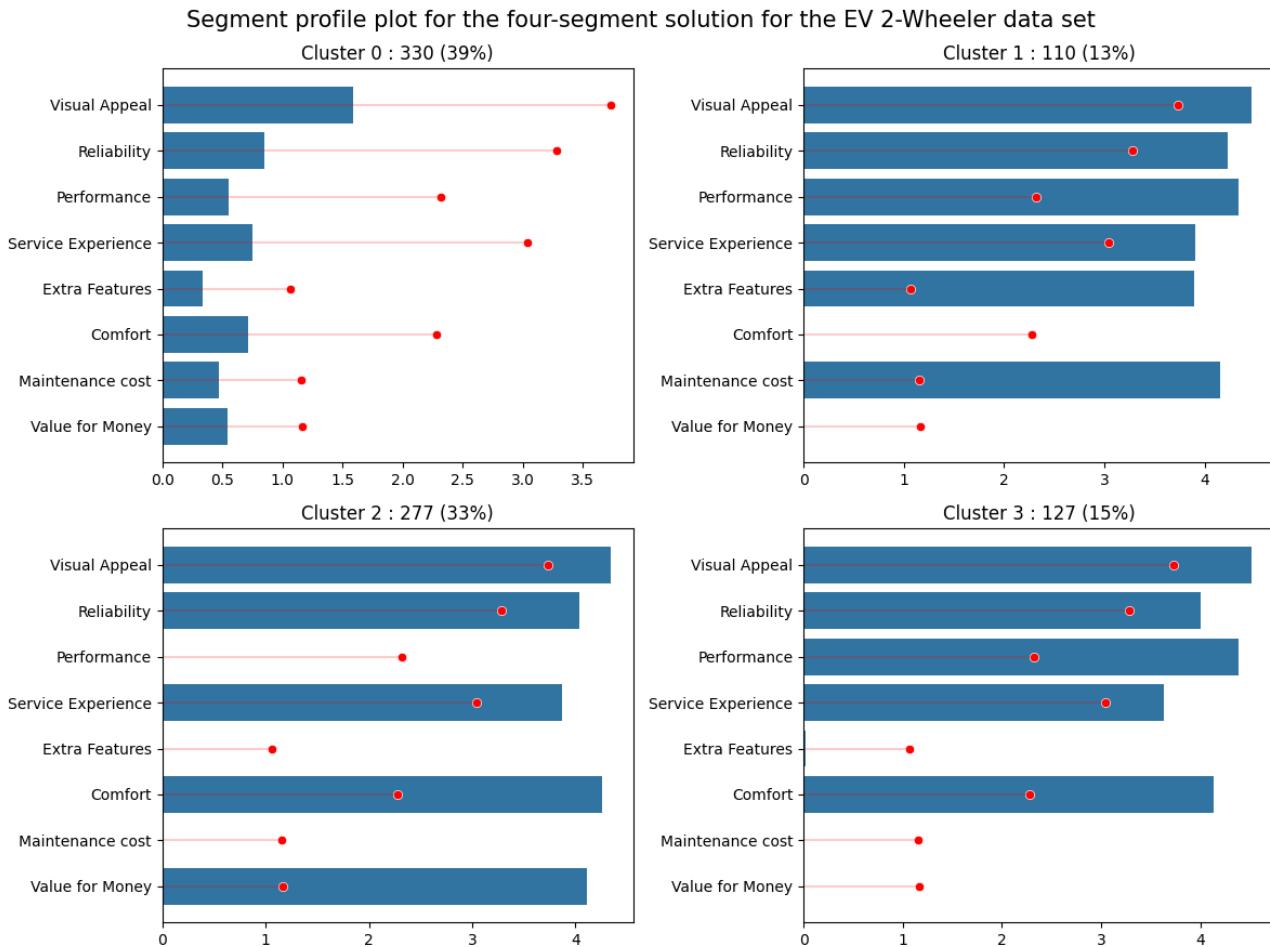
A Principal components analysis of the EV 2-Wheeler data set



Variables pointing in the same direction as the principal component axes have a strong influence on that component. For example, "Manufacture cost" and "Nameplate" seem to have a strong influence on PC1, while "Performance" and "Reliability" have a strong influence on PC2. Features that are close to each other are positively co-related.



We performed K-means clustering, took random segments (2-9) and plotted the interia via a scree plot. To find the Kink we can see after 4th segment the difference in distance is pretty less hence, dividing our data in 4 segments is the optimal value.



Cluster 0 (39% of the total sample):

- Visual Appeal:** The most important attribute for this segment, with a score above the overall mean.
- Reliability, Performance, Service Experience, Extra Features, Comfort, Maintenance cost, and Value for Money:** All these attributes are rated below the overall mean, indicating that customers in this cluster prioritize Visual Appeal above all other attributes.

Cluster 1 (13% of the total sample):

- Visual Appeal and Reliability:** These are the top attributes for this segment, both scoring above the overall mean.
- Performance and Service Experience:** Also important but slightly below the overall mean.
- Extra Features, Comfort, and Maintenance Cost:** These attributes are of moderate importance, with scores close to the overall mean.
- Value for Money:** Rated below the overall mean, indicating less concern for this attribute.

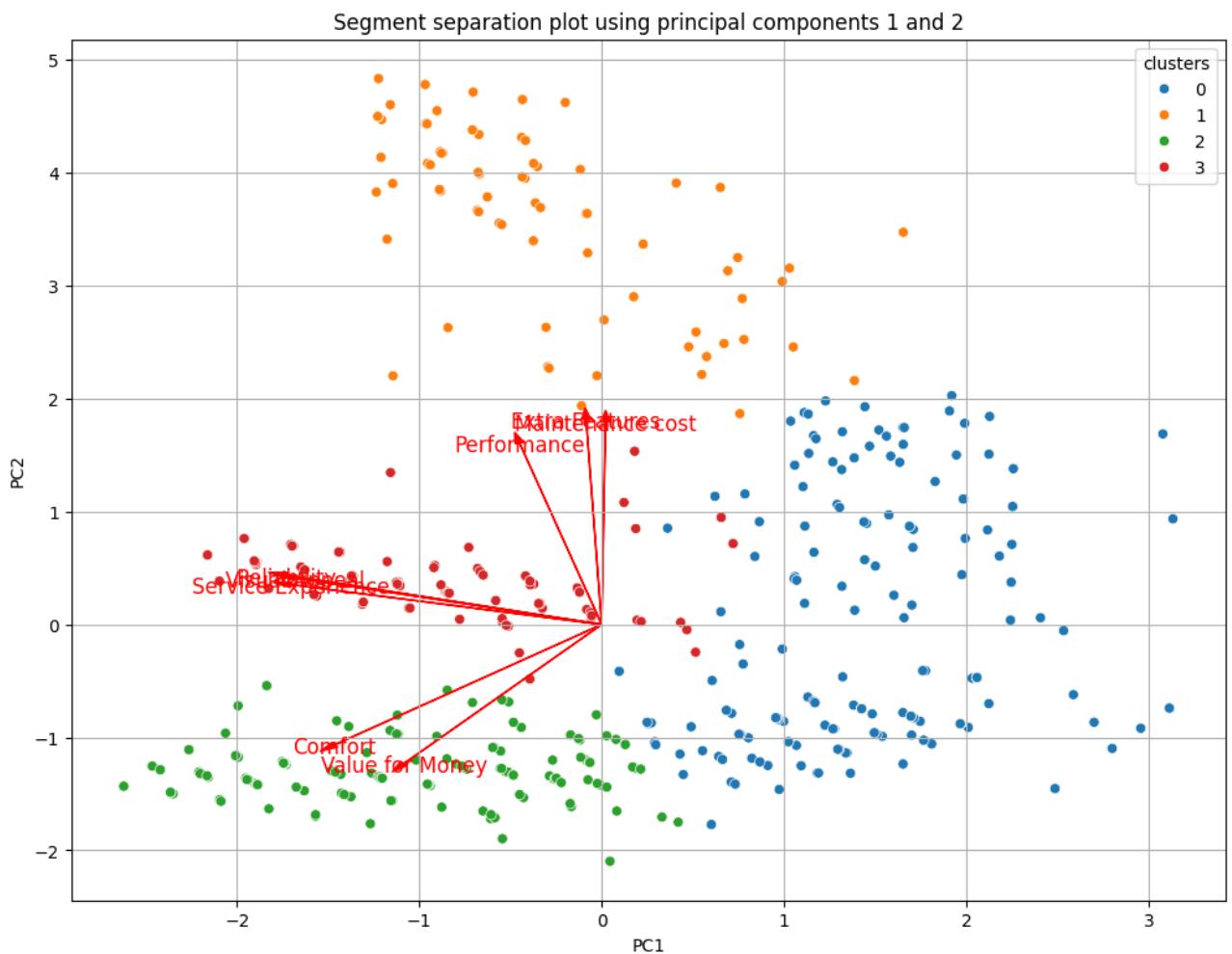
Cluster 2 (33% of the total sample):

- Visual Appeal, Reliability, and Service Experience:** These are the key attributes for this segment, all scoring above the overall mean.
- Performance:** Important, with a score slightly below the overall mean.
- Extra Features, Comfort, and Maintenance Cost:** Moderately important, with scores close to the overall mean.

- **Value for Money:** This attribute is rated below the overall mean, showing less concern in this segment as well.

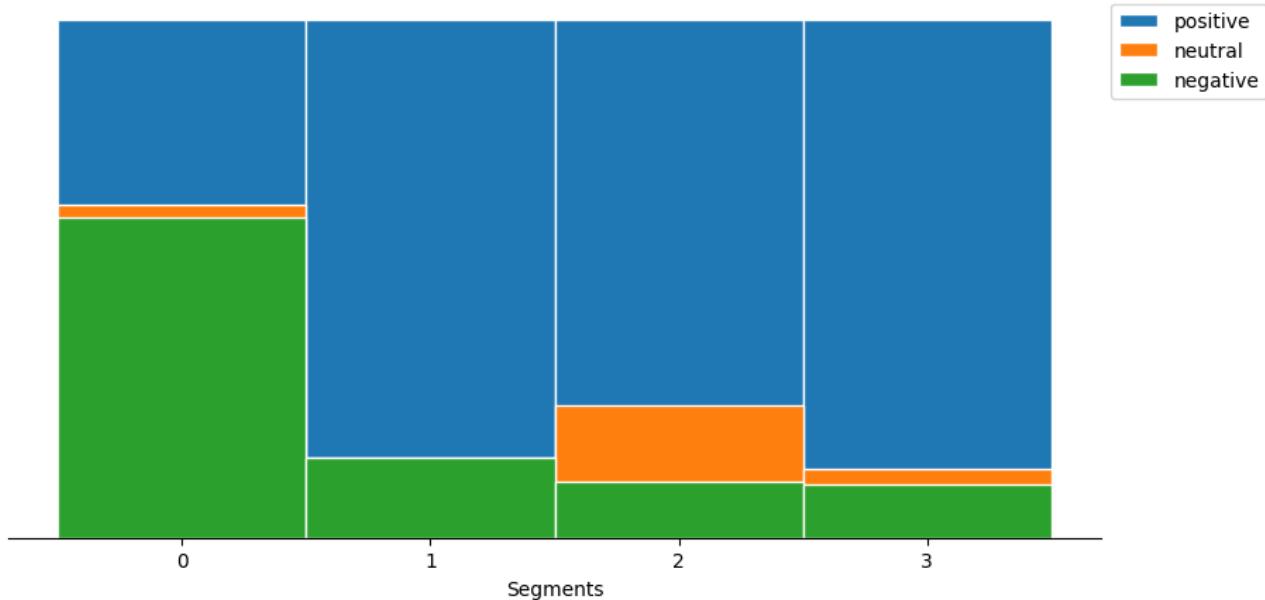
Cluster 3 (15% of the total sample):

- **Visual Appeal and Comfort:** These are the primary concerns for this segment, both scoring above the overall mean.
- **Reliability and Performance:** These attributes are important, with scores slightly below the overall mean.
- **Service Experience, Extra Features, and Maintenance Cost:** These attributes are moderately important, with scores near the overall mean.
- **Value for Money:** This attribute is rated below the overall mean, indicating it is not a primary concern for this cluster.



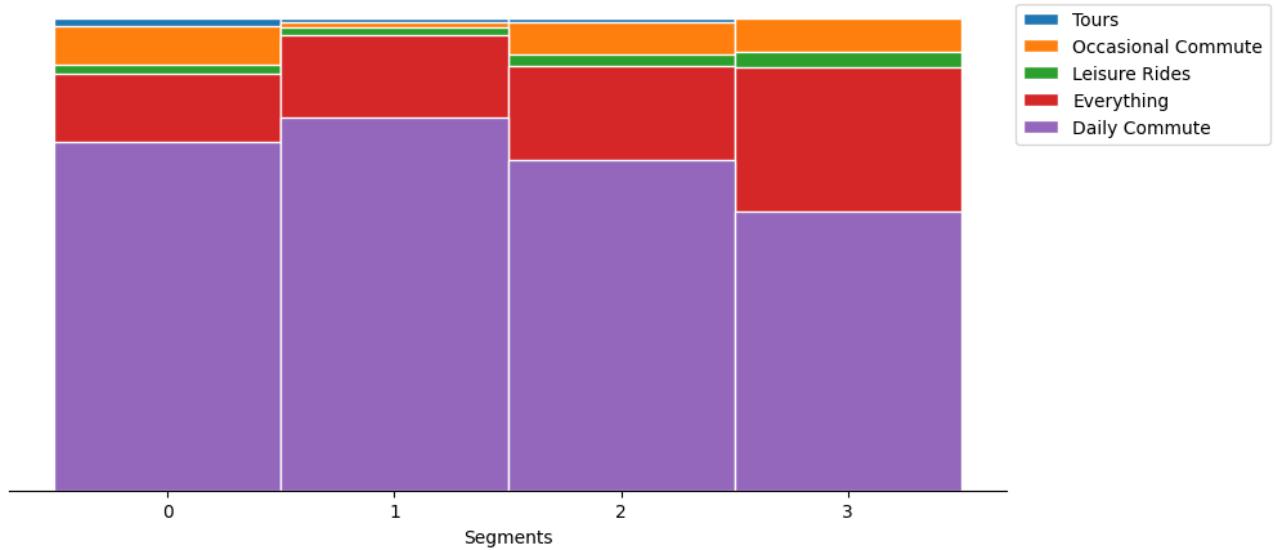
With plot we observe that what features co-related to each of the segments. Segment 0 does not co-relates to any of the feature.

Simple Mosaic Plot



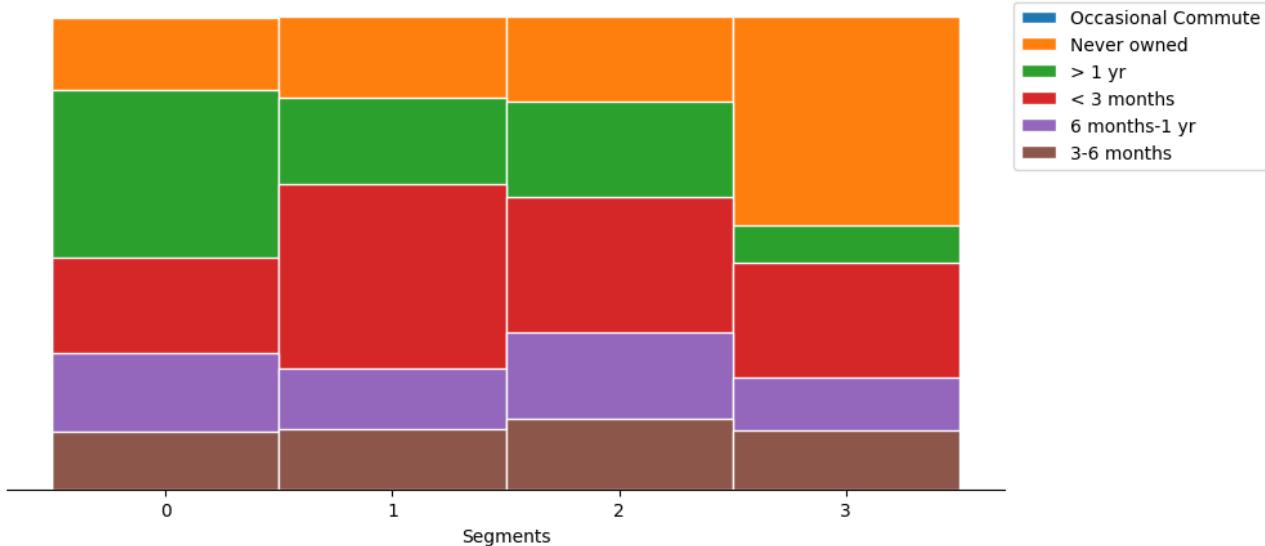
Clearly we can see that these people from segment 1 are satisfied on the other hand people from the segment 0 aren't much satisfied though its 50%, so we can look into these segments by reading the reviews of these people we can rough idea of what necessary thing can be done so that these people can change their opinion

Mosaic Plot for used in all segmentation



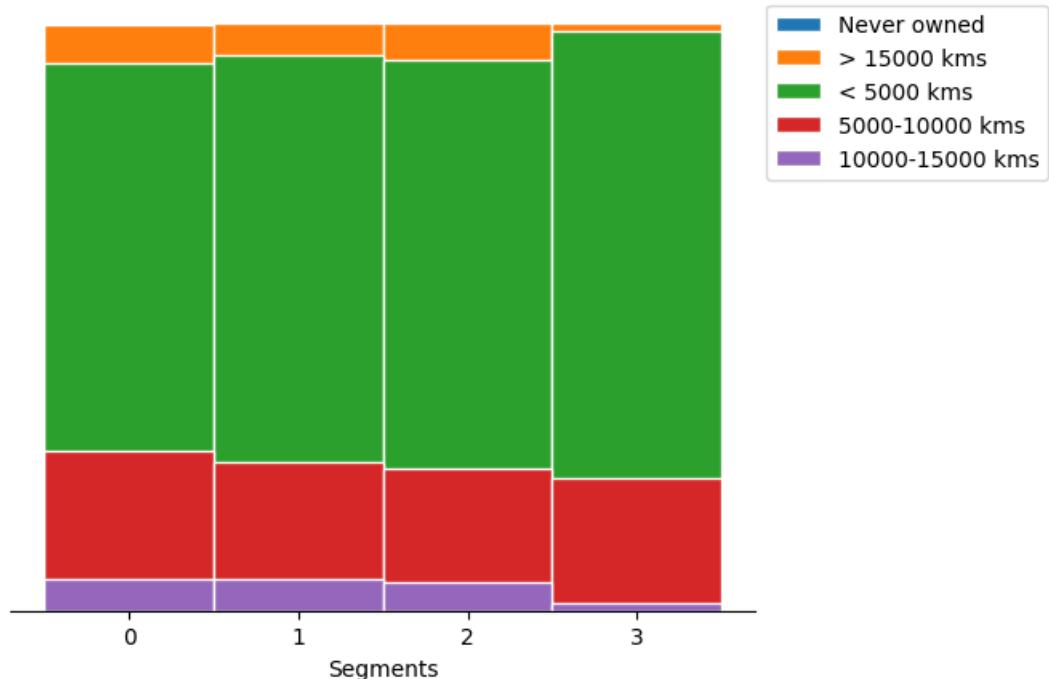
Here most of the 2 wheeler bikes are being used for the daily commute, if we make a 2-wheeler for good performance , milage also affordable for that people in the segments can change their opinion.

Mosaic Plot for Owned in all segmentation



- Across all segments, the most dominant categories are those who have never owned an EV 2-wheeler and those who have owned one for more than 1 year.
- Shorter ownership durations (<3 months, 6 months-1 year, 3-6 months) are represented to varying degrees across the segments but generally occupy smaller portions.
- Segments 0, 1, and 2** have a similar distribution pattern, with significant portions of customers who have never owned an EV and those who have owned one for more than 1 year.
- Segment 3** shows a relatively smaller representation of long-term owners (>1 year) and a more balanced distribution among the shorter ownership durations.

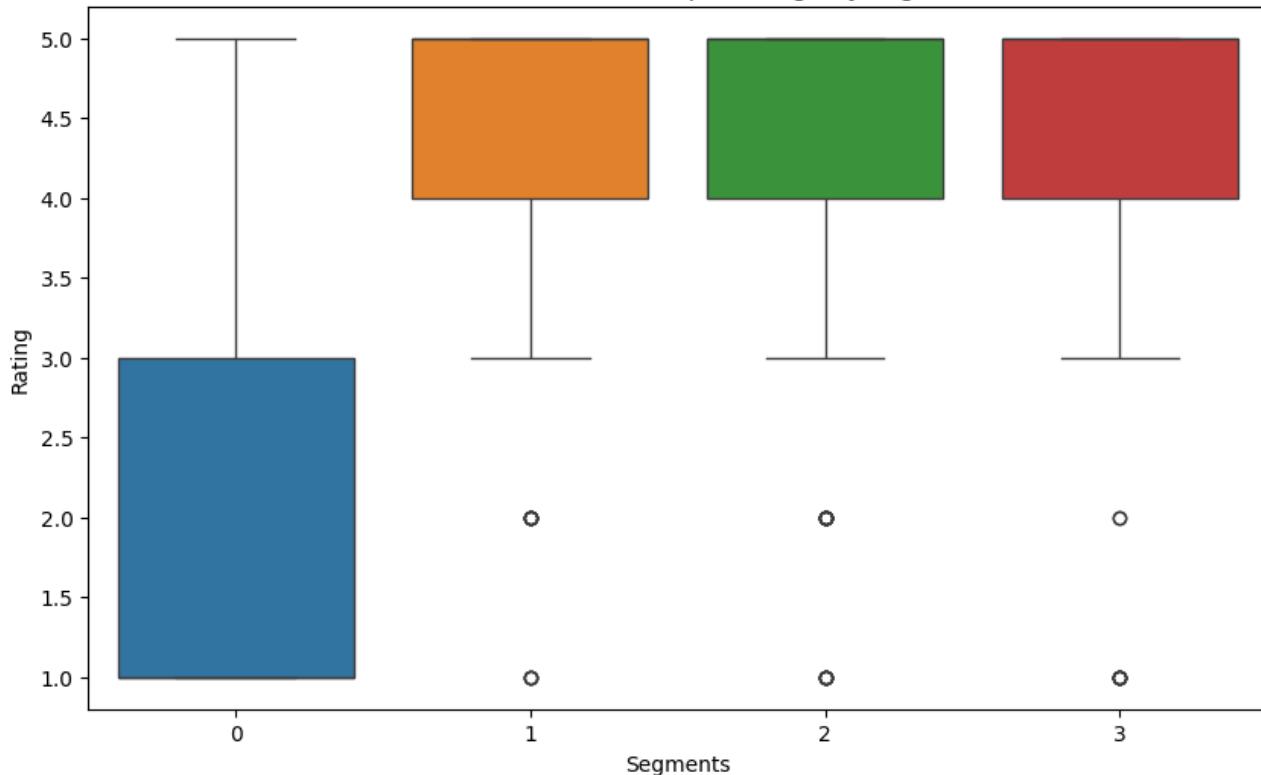
Mosaic plot for cross-tabulation of clusters and ridden for the EV 2-Wheelers data set



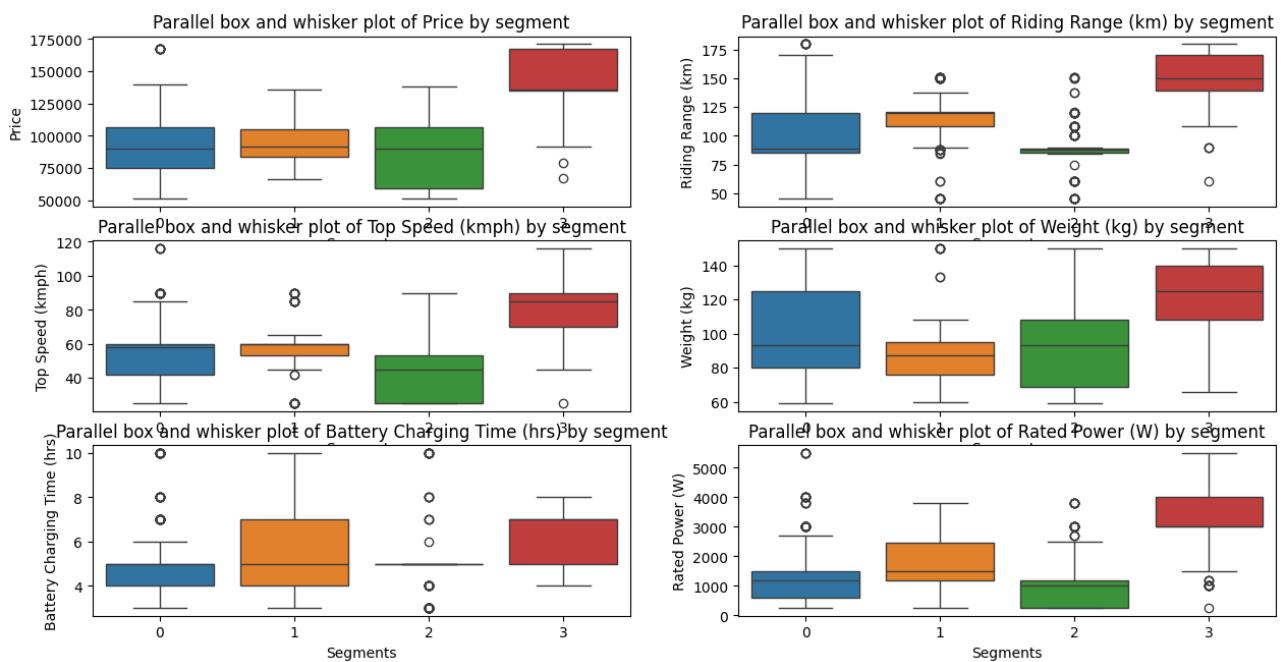
From this plot we can observe that most of the people use their EV (E-2) wheeler for commute purpose only.

Observing this whisker plot in context of ratings we see that segment 0 has given lowest rating and

Parallel box and whisker plot of age by segment



Observing this whisker plot in context of ratings we see that segment 0 has given lowest rating and are dissatisfied, other segments even with lesser feature seems satisfied.



Segment 0: This segment is characterized by a wide range of vehicle features, with variability in price, speed, weight, and power. It suggests a diverse group that includes both lower and higher-end EVs.

Segment 1: This segment appears to consist of more affordable, lighter, and lower-power EVs, with shorter charging times and lower top speeds.

Segment 2: Similar to Segment 1 but with even lower top speeds and riding ranges, indicating the most basic or entry-level vehicles.

Segment 3: This segment includes the most premium EVs, with the highest prices, weights, top speeds, and power ratings, but also longer charging times. These are likely high-performance vehicles with extended ranges and advanced features.

Conclusion

(How to do improvement in each segment)

Segment 0:

- **Characteristics:**
 - Wide range of prices, riding range, and top speed.
 - Varied customer experiences, with some owners having longer ownership durations.
 - Diverse features and performance levels.
- **Improvement Strategies:**
 - **Enhance Customization Options:**
 - Offer customizable options for customers to select features that match their specific needs (e.g., battery capacity, motor power, accessories).
 - Consider offering upgrades for performance (e.g. optional power boosts, range extenders).
 - **Targeted Marketing:**
 - Focus on the wide range of options available within this segment to appeal to a broader audience.
 - Highlight value propositions such as “Choose your perfect fit” to attract both budget-conscious and performance-oriented buyers.

Segment 1:

- **Characteristics:**
 - Moderately priced, with lower top speeds and lighter weights.
 - Shorter battery charging times.
 - High percentage of customers who have never owned an EV.
- **Improvement Strategies:**
 - **Focus on First-Time Buyers:**
 - Create educational campaigns that address common concerns of first-time EV buyers (e.g., range anxiety, charging infrastructure).
 - Offer test drives and demo days to familiarize potential buyers with the EV experience.

- **Promote Efficiency and Usage:**

- Highlight the quick charging times and ease of handling (lightweight) as key benefits.
- Offer incentives for first-time buyers, such as discounts on home charging units or free public charging for a limited period.
-

Segment 2:

- **Characteristics:**

- Lower prices, top speeds, and shorter riding ranges.
- Focused on entry-level or basic EVs with minimal features.
- Appeals to price-sensitive customers.

- **Improvement Strategies:**

- **Optimize Cost Efficiency:**

- Streamline production to reduce costs without compromising quality, allowing for more competitive pricing.
- Introduce finance plans or leasing options that make these vehicles more accessible to budget-conscious consumers.

- **Improve Basic Features:**

- Enhance the riding range and top speed slightly to make these EVs more appealing without drastically increasing costs.
- Consider offering a “Plus” model with a few additional features (e.g., better battery, slightly higher power) at a marginally higher price.

Segment 3:

- **Characteristics:**

- High prices, top speeds, riding ranges, and power ratings.
- Longer battery charging times.
- Likely appeals to performance-oriented and premium customers.

- **Improvement Strategies:**

- **Enhance Performance and Luxury Features:**

- Introduce high-end features such as advanced infotainment systems, premium materials.
- Improve the performance further with higher torque motors, faster acceleration, and longer ranges.

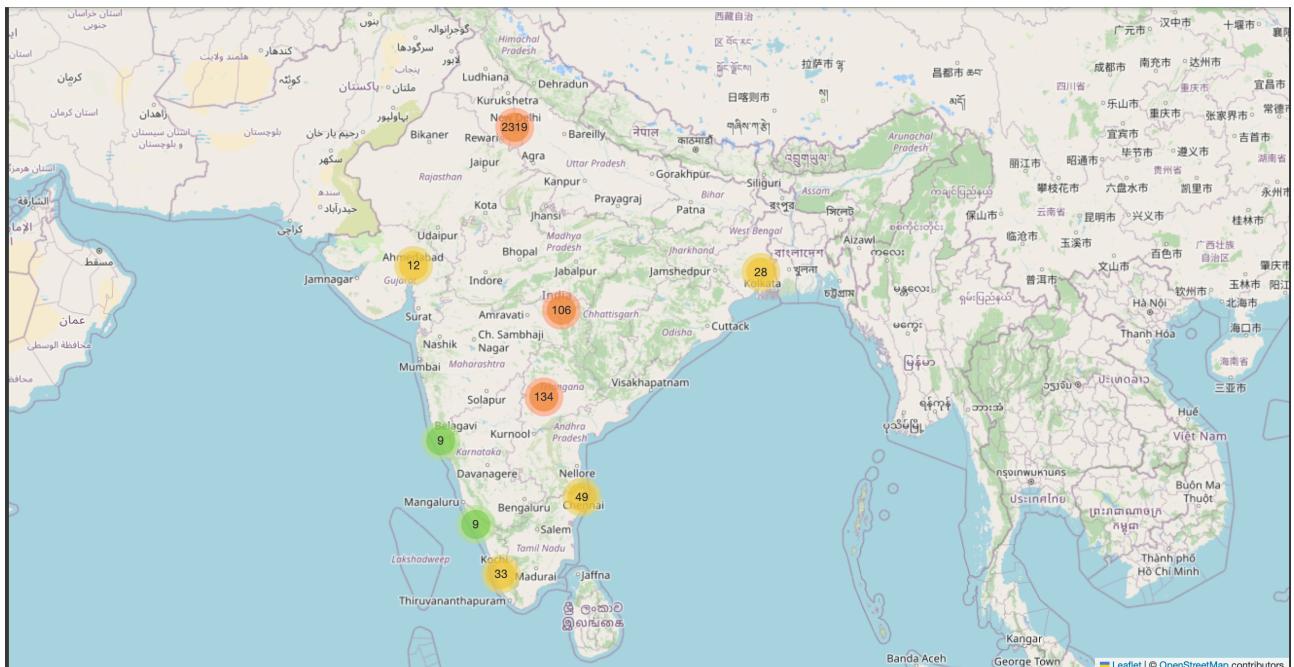
- **Reduce Charging Times:**

- Invest in fast-charging technology or larger battery capacities that can hold more charge without increasing charging times.

- Partner with fast-charging networks to offer complimentary charging sessions or discounts.
- **Create a Premium Ownership Experience:**
 - Offer white-glove service, including home delivery, on-site maintenance, and exclusive customer support.
 - Launch a loyalty program that provides benefits such as access to exclusive events, priority service appointments, and discounts on future purchases.
- **Focus on Branding and Image:**
 - Position these vehicles as the “flagship” models of your brand, emphasizing their premium status and cutting-edge technology.
 - Use high-impact marketing strategies, such as celebrity endorsements or collaborations with luxury brands, to enhance brand perception.

By implementing these strategies tailored to each segment, your business can better meet the needs of a diverse customer base and enhance the overall market penetration of your EV 2-wheelers.

Final Conclusion :



So, We have our targeting states and our profile segments aswell, entering into each market following the above approach can result in good competition and ensure loyal consumer.

Eg :

Assume we enter Nagaland, where the EV market is still developing. We begin by assessing the needs of consumers across the four segments, focusing on various variants for each segment based on factors such as price, needs, performance, value for money, charging time, and additional features. This segmentation allows us to dive deeper into factors like “Charging Type,” “Power Type,” “AC/DC,” “Payment Modes,” and “Capacity.” By considering these elements, we can effectively penetrate the developing market and outperform other early competitors.

Dataset Links :

<https://www.kaggle.com/datasets/nezukokamaado/e-v-charging-stations>
<https://www.data.gov.in/resource/stateut-wise-electric-vehicle-charging-stations-sanctioned-68-cities-across-25-under-fame>
<https://www.kaggle.com/datasets/nikhillm/indian-2-wheeler-ev-sales-datafy19-20-to-fy23-24>
<https://www.kaggle.com/datasets/sanhitasaxena/indian-electric-vehicle-dataset>

Github Link :

[https://github.com/ahmed-byte-sys/My-Projects/tree/main/EV Market Segmentation](https://github.com/ahmed-byte-sys/My-Projects/tree/main/EV%20Market%20Segmentation)

THANK YOU