

# Indian EV Market Segmentation Analysis Report

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## Abstract

This report provides a comprehensive analysis of the Indian Electric Vehicles Market Segments based on various factors, including demographics, geographic, sales, and consumer behavior. The findings are derived from advanced data analytics techniques, including clustering and PCA, to identify distinct market segments.

## 1 Introduction

Market segmentation is a crucial strategy in modern business, allowing companies to target specific groups of consumers effectively. Here we are focusing on the EV market in India, By considering infrastructure availability that is Public Charging Stations, consumer ratings, consumer types, EV sales across the nation, and other major variables by thoroughly evaluating various government-published datasets and open-source datasets This report analyzes various segments based on data-driven approaches to uncover valuable insights for strategic decision-making for pricing and establishing EV sales on best suited geographic locations for EV sales to maximize market attention and profitability.

## 2 Data and Methodology

### 2.1 Data Collection

The datasets collected were all completely based on real and up-to-date data published through the Government Dataset Portals, Open-source datasets pre-processed from government-sourced data. The major sources for data collection were Open Government Data (OGD) Platform India, VAHAN SEWA— DASHBOARD, Kaggle, and Automotive websites.

- State/UTs-wise Current Sales of Electric Vehicles (EV) [link](#)
- EV sales by makers and category 2015-24 [link](#)
- State number of Operational Charging stations [link](#)
- EV Vehicle Dataset [link](#)
- State/UT-wise Details of Unemployment Rate as per (PLFS) during 2022-23 and 2023-24 July 2022-June 2023 [link](#)

### 2.1.1 Addressing the Data Unavailability:

Due to the unavailability of the latest demographic data since the 2011 census, the Unemployment Rate as per (PLFS) dataset from 2022 to 2023 is used as a proxy dataset as it could provide valuable insights on state-wise employment rates as well by proper data processing.

**Note:** The EV vehicle dataset contains the consumer ratings, vehicle brand and model names, market prices, vehicle battery range, and other features. These data were extracted from free and automotive-based open sources.

## 2.2 Methodology

The approach to performing the segmentation is divided into different stages to gain valuable insights into diverse fields. The different stages of segmentation performed were:

1. Gender Demographic and Geographic based Segmentation on the Indian EV market.
2. Geographic Segmentation on the Indian EV market. (for Public Charging Stations infrastructure)
3. EV Sales Market Segmentation Indian EV market.

Each of these segmentation analysis provided customer preference, strategic infrastructural locations, and best EV pricing ideas to consider for effective marketing as a Startup to decide in which vehicle/customer space it will be developing its EVs. let us go through all these individual segmentation analysis.

## 3 Gender Demographic and Geographic based Segmentation on the Indian EV market

### 3.1 Segment Extraction

#### 3.1.1 Principle Component Analysis

	PC1	PC2	PC3	PC4	PC5	PC6	PC7	PC8	PC9
Two Wheeler	0.362277	-0.102897	-0.109742	-0.021568	-0.113021	0.331008	0.081201	0.067151	0.843929
Three Wheeler	0.338841	-0.131014	-0.169560	0.508873	0.641057	-0.187507	-0.343119	-0.124349	0.031831
Four Wheeler	0.349340	-0.143862	-0.149029	-0.498528	0.111184	-0.220767	-0.197855	0.684426	-0.133566
Goods Vehicles	0.333569	0.424741	-0.074249	-0.035571	-0.020546	0.703096	-0.287797	-0.044289	-0.349277
Public Service Vehicle	0.345369	-0.200238	0.097486	0.521479	-0.209345	0.090098	0.549354	0.347867	-0.290580
Special Category Vehicles	0.291664	-0.179301	0.900939	-0.156010	0.067781	-0.004565	-0.134598	-0.154974	0.002253
Ambulance/Hearses	0.341428	-0.175635	-0.192968	0.077104	-0.678217	-0.314319	-0.375948	-0.315929	-0.097337
Construction Equipment Vehicle	0.283831	0.801231	0.104190	0.034852	-0.017476	-0.452486	0.197591	0.013977	0.145300
Other	0.345187	-0.161503	-0.249394	-0.432838	0.234063	-0.022680	0.503404	-0.514386	-0.178629

Figure 1: PCA Loadings

It was observed that both PCA1 and PCA2 had the most loading with two, three and four-wheeler vehicle types with the most influence.

### 3.1.2 K-Mean Elbow Visualiser for Optimal Number of Segments

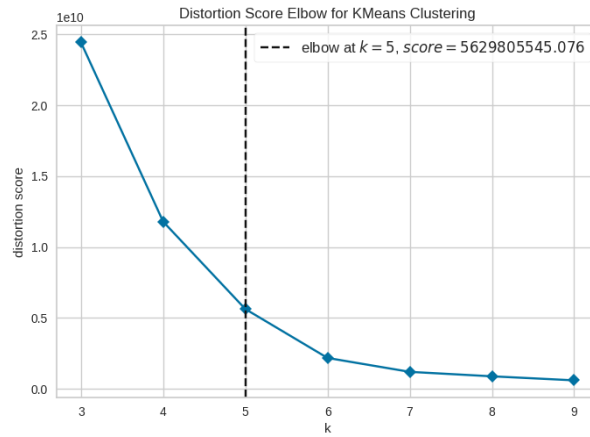


Figure 2: K-Means Elbow Method

The optimal Number of Segments was found out to be 5 for the EV Sales dataset.

## 3.2 Profiling Segments

	Two Wheeler	Three Wheeler	Four Wheeler	Goods Vehicles	Public Service Vehicle	Special Category Vehicles	Ambulance/Hearses	Construction Equipment Vehicle	Other
0	3604.777778	9262.703704	581.074074	54.444444	27.444444	14.111111	0.148148	14.703704	21.592593
1	282542.000000	647186.000000	26335.000000	3036.000000	2039.000000	410.000000	6.000000	397.000000	4412.000000
2	14730.000000	112831.000000	3051.000000	49.000000	39.000000	0.000000	0.000000	0.000000	1602.000000
3	18295.000000	257159.000000	368.000000	53.000000	327.000000	2.000000	0.000000	0.000000	13.000000
4	50729.333333	9034.333333	2409.000000	488.000000	310.666667	9.000000	0.666667	0.000000	738.000000

Figure 3: Cluster centers

It was found that focusing on Two Wheelers, Three Wheelers, and Four Wheelers for further market segmentation is a logical approach based on the Segment profiles:

- Segment 2: High values in Two Wheelers and Three Wheelers.
- Segment 3: High values in Three Wheelers and Four Wheelers.
- Segment 4: Medium to high values across various vehicle types, including Two Wheelers, Three Wheelers, and Four Wheelers.

Why Focus on These Categories?

- High Representation: These Segments show strong representation in Two Wheelers, Three Wheelers, and Four Wheelers. This indicates significant market activity or potential in these segments.
- Diverse Market Needs: By focusing on these vehicle types, you address a diverse set of needs and opportunities in the market, which could be beneficial for segmentation and targeting.

Now that we understand which vehicle types to focus on for market segmentation let us go through segmentation with EV Sales and Employment rate across the states.

Feature Extraction was performed by comparing the first word from state names in df1 and df2 from their respective columns State Name and State/UT, when matches their corresponding individual value of employment rate is passed from df2 to df1. (df1 being the EV sales dataset and df2 the unemployment dataset). As we know that the proxy dataset for demographic data was the ‘Unemployment Rate as per (PLFS) dataset from 2022 to 2023’. This has to be processed as we cannot perform segmentation with unemployment rates this objective was carried out by getting the inverse of the unemployment rates to gain numerical insights into potential employment rates across the states.

	PC1	PC2	PC3	PC4	PC5
Two Wheeler	0.420743	0.544783	0.081794	0.572826	0.437455
Three Wheeler	0.422002	-0.186820	0.855436	-0.233419	-0.027521
Four Wheeler	0.283403	0.672661	-0.162653	-0.585114	-0.313682
Rural + Urban - Male	0.499691	-0.375989	-0.411989	-0.370333	0.549600
Rural + Urban - Female	0.561143	-0.272891	-0.255633	0.371324	-0.638294

Figure 4: PCA loadings on the sales and employment rate merged dataset

- PC1:

Vehicle Types: High loadings for "Two Wheeler," "Three Wheeler," and "Four Wheeler" suggest that PC1 primarily captures variations in vehicle size or type. Employment Rates: Positive loadings for both "Rural + Urban - Male" and "Rural + Urban - Female" indicate that PC1 is also associated with overall employment rates.

- PC2:

Vehicle Types: A high loading for "Four Wheeler" suggests that PC2 is related to the prevalence of larger vehicles. Employment Rates: Negative loadings for both "Rural + Urban - Male" and "Rural + Urban - Female" might indicate that PC2 is associated with lower employment rates. PC1 and PC2 seem to capture some relationship with overall employment rates

	Two Wheeler	Three Wheeler	Four Wheeler	Rural + Urban - Male	Rural + Urban - Female
Two Wheeler	1.000000	0.155726	0.370150	0.073047	0.224887
Three Wheeler	0.155726	1.000000	0.038046	0.224841	0.259571
Four Wheeler	0.370150	0.038046	1.000000	0.053276	0.046506
Rural + Urban - Male	0.073047	0.224841	0.053276	1.000000	0.454678
Rural + Urban - Female	0.224887	0.259571	0.046506	0.454678	1.000000

Figure 5: Variable Correlations

The correlation matrix moderately suggests gender-based segmentation, it provides valuable insights into the relationships between variables. Further analysis of gender-specific factors might reveal the need for separate segmentation.

2-wheeler vehicle type shows Weak Negative Correlation, The scatter plot between the Unemployment Rate (Male and Female) and Two Wheeler Sales shows a weak negative correlation. This suggests that as the unemployment rate for Males and Females increases, there's a slight tendency for Two-wheeler sales to decrease. Outliers, There are a few outliers, particularly at higher unemployment rates, which might be influencing the overall correlation. Clustering, The data points seem to cluster in certain regions, indicating potential subgroups or patterns within the data.

3-wheeler vehicle type shows a Weak Negative Correlation, The scatter plot between Unemployment Rate (Male and Female) and Three Wheeler Sales still shows a weak negative correlation. This suggests that as the unemployment rate for Males and Females increases, there's a slight tendency for Three Wheeler sales to decrease. Outliers, There are a few outliers, particularly at higher unemployment rates, which might be influencing the overall correlation. Clustering, The data points seem to cluster in certain regions, indicating potential subgroups or patterns within the data.

4-wheeler vehicle type shows a Weak Negative Correlation, The scatter plot between Unemployment Rate (Male and Female) and Four Wheeler Sales shows a weak negative correlation. This suggests that as the unemployment rate for Male and Females increases, there's a slight tendency for Four Wheeler sales to decrease. Outliers, There are a few outliers, particularly at higher unemployment rates, which might be influencing the overall correlation. Clustering, The data points seem to cluster in certain regions, indicating potential subgroups or patterns within the data.

	Two Wheeler	Three Wheeler	Four Wheeler	Rural + Urban - Female
Segment				
0	3437.333333	705.000000	3474.000000	93.400000
1	1840.181818	4026.909091	195.909091	94.381818
2	18295.000000	257159.000000	368.000000	98.200000
3	56737.000000	16478.000000	7212.000000	97.600000
4	657.500000	29.000000	185.000000	82.750000
5	47725.500000	5312.500000	7.500000	96.500000
6	5950.909091	18511.272727	249.272727	97.890909
7	14730.000000	112831.000000	3051.000000	97.800000

Figure 6: Female employment specific segment profile

	Two Wheeler	Three Wheeler	Four Wheeler	Rural + Urban - Male
Segments				
0	2567.181818	10176.545455	452.090909	97.909091
1	47725.500000	5312.500000	7.500000	96.200000
2	18295.000000	257159.000000	368.000000	97.400000
3	4614.384615	9194.461538	365.923077	95.223077
4	14730.000000	112831.000000	3051.000000	98.200000
5	56737.000000	16478.000000	7212.000000	97.500000
6	12.000000	0.000000	5484.000000	93.700000
7	4545.500000	9311.500000	237.500000	92.950000

Figure 7: Male employment specific segment profile

### 3.3 Selecting the Target Segments

- **Among Males, Segment 5 appears to be a promising segment for EV market.**
- States under the segment 5: Karnataka. High Prevalence of "Two Wheeler" and "Four Wheeler" Vehicles: This suggests that there's a strong demand within this segment, making it a potential target for entry-level or budget-friendly and four wheeler EV models. Moderate Presence of Other Vehicle Types: The additional Presence of "Three Wheeler" among other vehicles types indicates a diverse range of transportation needs within this segment. This could provide opportunities for a broader range of EV products. Slightly Higher Male Employment Rate: This might suggest a higher level of disposable income or purchasing power within this segment, making it a more attractive market for EV products.
- Similar to Segment 5, Segment 6 Both segments have a high prevalence of "Two Wheeler" vehicles and moderate levels of other vehicle types.
- states under the segment 6: Delhi.
- **For Females, Segment 3 appears to be a promising segment for EV market.**
- States under the segment: Karnataka. This segment has a very high number of Two-wheelers, a considerable number of Four-Wheelers, and a significant number of Three-wheelers. The female employment rate is high at 97.6 percent, reflecting areas with a high concentration of vehicles across all categories and a strong female workforce.
- Segment 7, This segment has a higher number of Two Wheelers and Three Wheelers, with a relatively moderate number of Four Wheelers. The female employment rate is moderately high at 97.4 percent. This segment represents areas with balanced vehicle distribution.
- States under the segment 7: Delhi.

### 3.4 Results

Although there is a moderate difference in the gender demographics, it is quite evident that the High Prevalence of "Two Wheeler" and "Four Wheeler" Vehicles for males in states like Karnataka and Delhi. And the high number of "Two Wheeler" in the state Karnataka wheeler. Therefore Karnataka and Delhi seems to be promising states for consumer's attention on the 2-wheeler and 4-wheeler market.

## 4 Geographic Segmentation on the Indian EV market. (for Public Charging Stations infrastructure)

### 4.1 Segment Extraction

After Performing necessary data cleaning and feature extraction using the EV Sales dataset and Number of PCS dataset segment extraction was done to gain insights on

the infrastructural relation with EV Sales.

#### 4.1.1 K-Means Elbow Visualiser for optimal number of segments

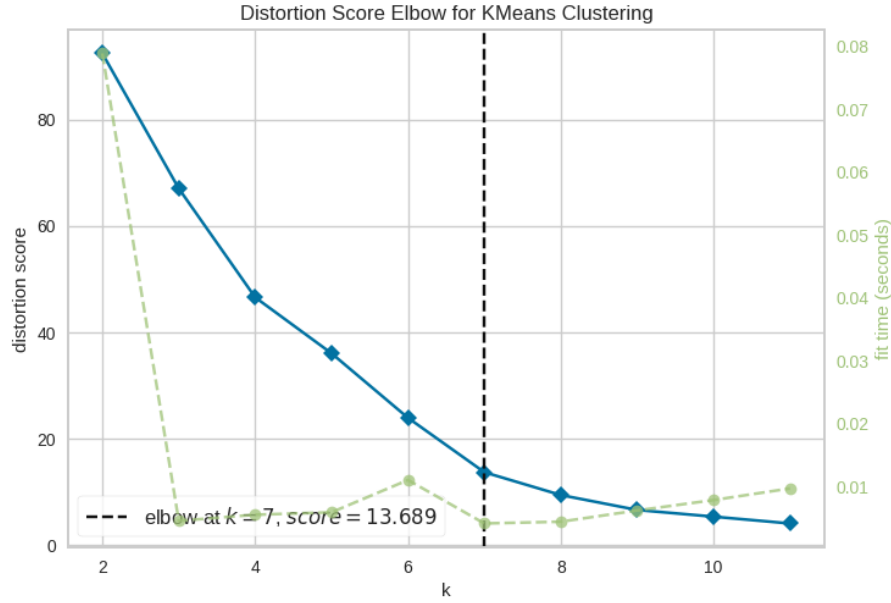


Figure 8: K-Means Elbow method on sales and PCS merged dataset

The optimal number of segments was found as 7

## 4.2 Segment Profiling



Figure 9: Segment Separation Plot for EV Sales and number of operational PCS

PC1: The "Two Wheeler" and "No. of Operational PCS" variables are positively correlated with PC1, suggesting that states with higher numbers of two-wheelers and operational PCS tend to be grouped together. PC2: The "Three Wheeler" variable is positively correlated with PC2, while "Four Wheeler" is negatively correlated. This indicates a trade-off between these two vehicle types. States with higher numbers of

three-wheelers might have lower numbers of four-wheelers and vice versa. Cluster Distribution: The clusters appear to be somewhat separated along PC1, suggesting that there might be differences in the distribution of two-wheelers and operational PCS across the clusters. The distribution along PC2 might indicate variations in the balance between three-wheelers and four-wheelers.

### 4.3 Selecting the Target Segments

	Two Wheeler	Three Wheeler	Four Wheeler	No. of Operational PCS
Segment				
0	3437.333333	705.000000	3474.000000	284.666667
1	14730.000000	112831.000000	3051.000000	1886.000000
2	27136.666667	11990.000000	444.666667	539.666667
3	56737.000000	16478.000000	7212.000000	1041.000000
4	1848.481481	8017.703704	146.148148	114.259259
5	18295.000000	257159.000000	368.000000	582.000000
6	51149.000000	6155.000000	2.000000	3079.000000

Figure 10: Segment Profile

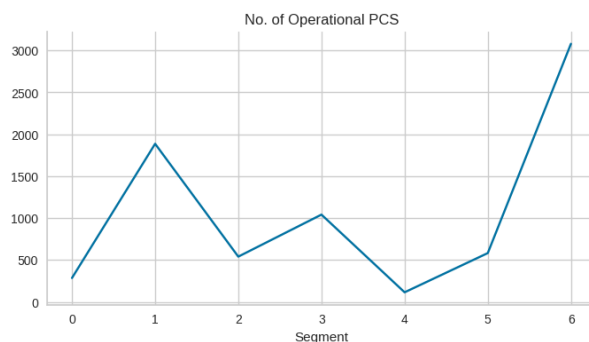


Figure 11: Segments vs No. of operational PCS

Detailed observations revealed that :

- Segment 0 (Kerala, Ladakh, Sikkim)

Vehicle Distribution: A relatively balanced distribution of two-wheelers and four-wheelers, with a very small number of three-wheelers. PCS: A moderate number of PCS, suggesting a developing infrastructure for electric vehicles.

- Segment 1 (Delhi)

Vehicle Distribution: A high number of two-wheelers, with a very small number of three-wheelers and four-wheelers. This indicates a strong preference for two-wheelers in this region. PCS: A good number of PCS, suggesting a well developed infrastructure development to support electric vehicles.

- Segment 2 (Gujarat, Rajasthan, Tamil Nadu)

Vehicle Distribution: A high number of four-wheelers, with a moderate number of two-wheelers and three-wheelers. PCS: A very high number of PCS, indicating a well-developed infrastructure for electric vehicles.



- Segment 3 (Karnataka)

Vehicle Distribution: A balanced distribution of two-wheelers and three-wheelers, with a moderate number of four-wheelers. PCS: A high number of PCS, suggesting a strong focus on electric vehicle infrastructure.

- Segment 4 (Andaman and Nicobar Island, Arunachal Pradesh, Assam, Bihar, Chandigarh, Chhattisgarh, Goa, Haryana, Himachal Pradesh, Jammu and Kashmir, Jharkhand, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Puducherry, Punjab, Tripura, Dadra and Nagar Haveli and Daman and Diu, Uttarakhand, West Bengal, Andhra Pradesh, Lakshadweep, Madhya Pradesh, Pondicherry, Telangana)

Vehicle Distribution: A high number of two-wheelers, with a moderate number of three-wheelers and four-wheelers. PCS: A moderate number of PCS, indicating a developing infrastructure for electric vehicles.

- Segment 5 (Uttar Pradesh)

Vehicle Distribution: A very high number of two-wheelers, with a small number of three-wheelers and four-wheelers. PCS: A moderate number of PCS, suggesting a growing infrastructure for electric vehicles.

- Segment 6 (Maharashtra)

Vehicle Distribution: A balanced distribution of two-wheelers, three-wheelers, and four-wheelers. PCS: A very high number of PCS, indicating a well-developed infrastructure for electric vehicles. Key Observations Regional Preferences: Some regions show a strong preference for two-wheelers (e.g., Delhi, Uttar Pradesh), while others have a more balanced distribution (e.g., Maharashtra, Karnataka). Infrastructure Development: The number of PCS varies significantly across segments, highlighting the uneven development of electric vehicle infrastructure in different regions. Geographic Factors: The geographic location of the segments likely influences the vehicle distribution and infrastructure development. For example, regions with dense urban areas may have a higher demand for two-wheelers and more developed charging infrastructure.

## 4.4 Results

The best segments to consider for Geographic Segmentation would be Segment 1, 3 and 6

- Segment 3 (Karnataka) with a high number of PCS, suggesting a strong focus on electric vehicle infrastructure.
- Segment 6 (Maharashtra) with a very high number of PCS, indicating a well-developed infrastructure for electric vehicles.
- Segment 1 (Delhi) with a good number of PCS, suggesting a well-developed infrastructure that supports electric vehicles

## 5 EV Sales Market Segmentation Indian EV market

Feature Extraction was performed between EV sales by category dataset and Vehicle dataset by comparing the first word of each data inside 'Maker' and 'Brand' columns of sales dataset and vehicle dataset, when matched their respective column data of total sold unit values 'Total Sales' is extracted and passed to the sales dataset, thereby having a more featured dataset is extracted

### 5.1 K-Means elbow visualiser for optimal Segments

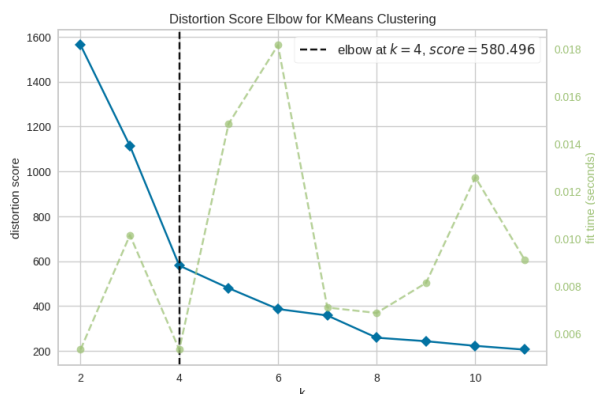


Figure 12: K-Means elbow method

The optimal number of clusters was found was 4.

### 5.2 Profiling Segments



Figure 13: Segment Separation Plot

**Feature Directions:** The arrows pointing from the origin to the labels of the features (Price Range, Rating, Total Sales, Top Speed, Charging Time, Load Capacity) indicate the direction in which these features contribute to the variation captured by PC1 and PC2. **Range (km) and Price:** The arrows for Range (km) and Price are pointing in a similar direction, suggesting that vehicles with higher ranges tend to have higher prices. **Class :** The importance of Class variable suggests us to perform separate segmentation analysis for different EV types (2W, 3W, and 4W)

## 5.3 2 Wheeler Vehicle type Segmentation

### 5.3.1 K-Means Elbow Visualiser for optimal segments

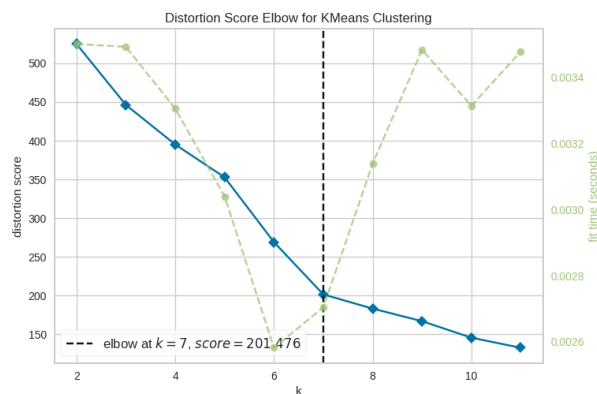


Figure 14: K-Means elbow method

Optimal number of clusters found was 7

### 5.3.2 Segment Speration Plot

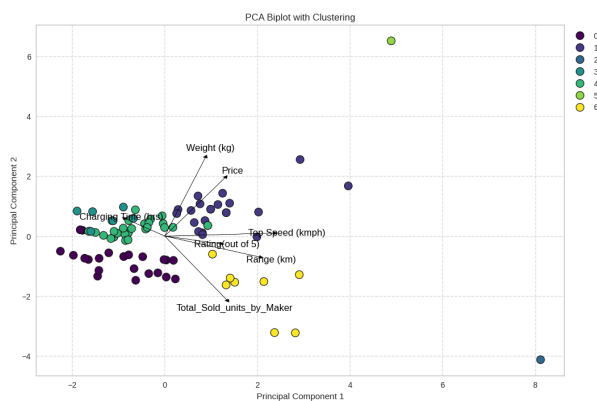


Figure 15: Segment Speration plot on 2 Wheeler EV sales and vehicle data

**Price and Weight (kg):** These arrows point to the upper right, suggesting that these features are strongly correlated with each other and contribute positively to both PC1 and PC2. This means that vehicles with higher prices also tend to have greater weight. **Top Speed (kmph):** The arrow points to the right, suggesting it primarily contributes to PC1. **Range (km):** The arrow points to the lower right, indicating a strong positive

correlation with PC1 but a slightly negative contribution to PC2. Rating (out of 5): This arrow is relatively shorter, suggesting it has a smaller impact on the principal components compared to other features. Total Sold Units by Maker: This arrow points to the lower right, indicating that higher sales units are associated with higher PC1 values. Charging Time (hrs): The arrow points to the left, suggesting that it negatively correlates with PC1 and slightly with PC2, meaning that vehicles with longer charging times are associated with lower PC1 values. "Charging Time (hrs)" is negatively correlated, meaning that higher-priced and ranged vehicles might have shorter charging times.

### 5.3.3 Selecting the Target Segments

Cluster Profiles:							
	Rating(out of 5)	Top Speed (kmph)	Range (km)	Weight (kg)	Charging Time (hrs)	Price	Total_Sold_units_by_Maker
Segment							
0	3.58	43.71	99.12	7.38	5.92	90,288.83	72,020.50
1	4.32	93.86	145.18	132.95	5.32	163,443.91	51,281.91
2	5.00	194.00	579.00	0.00	0.00	199,999.00	588,266.00
3	0.28	46.00	95.50	103.50	3.83	94,548.67	6,850.17
4	3.75	41.31	86.46	85.57	4.11	83,850.20	13,404.11
5	4.50	120.00	130.00	231.00	4.00	1,490,000.00	0.00
6	4.20	98.62	132.50	55.00	2.62	125,680.00	464,948.62

Figure 16: Segment Profiles

Based on the segment profiles, Segment 0 seems promising in terms of all the variables. with the best pricing Rs.90,288.83 but has a moderate rating (3.58). and in terms of ratings, Segment 2 seems also promising(5.00), but comes under an expensive vehicle group (Rs.199,999.00).

## 5.4 3 Wheeler Vehicle type Segmentation

### 5.4.1 K-Means Elbow Visualiser for optimal segments

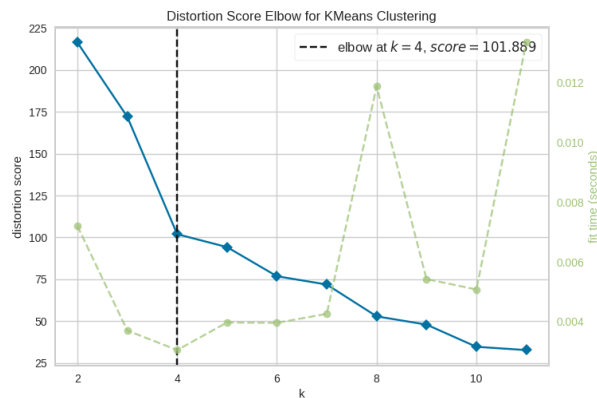


Figure 17: K-Means Elbow Method

The optimal Number of Segment found was 4

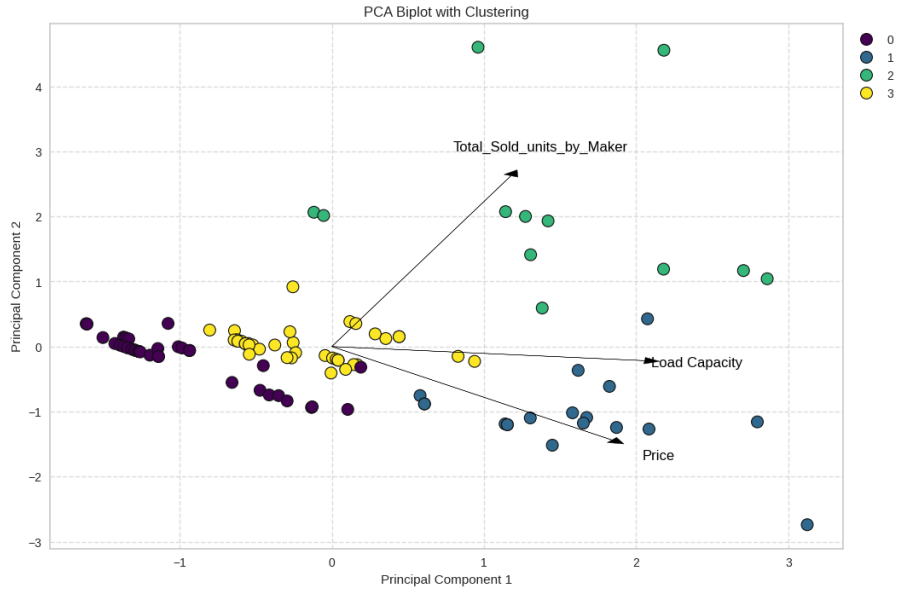


Figure 18: Segment Separation plot for 3 wheeler vehicle type data

#### 5.4.2 Segment Separation Plot

**Total Sold Units by Maker:** This arrow points upwards and slightly to the right, indicating that it has a positive correlation with both PC1 and PC2. Vehicles in the upper-right region likely have higher total sold units by their maker. **Load Capacity:** This arrow points to the right, showing a strong positive correlation with PC1. This suggests that vehicles with higher load capacity are associated with higher PC1 values. **Price:** The arrow points downward and slightly to the right, indicating that higher prices are negatively correlated with PC2 but positively correlated with PC1.

#### 5.4.3 Selecting the Target Segments

	Price	Load Capacity	Total_Sold_units_by_Maker
Segment			
0	174,256.41	35.15	1,771.82
1	393,444.44	789.22	4,891.17
2	231,166.67	565.08	83,441.50
3	126,368.42	569.03	4,912.82

Figure 19: Segment Profiles

Based on the profile, Segment 2 appears to be the best target segment due to the following reasons:

**High Market Demand:** It has the highest total sold units, indicating strong customer acceptance. **Balanced Pricing:** The price is moderate, making it accessible to a broad customer base. **High Load Capacity:** It offers a good load capacity, making it suitable for commercial or heavy-duty use.

## 5.5 4 Wheeler Vehicle type Segmentation

### 5.5.1 K-Means Elbow Visualiser for optimal segments

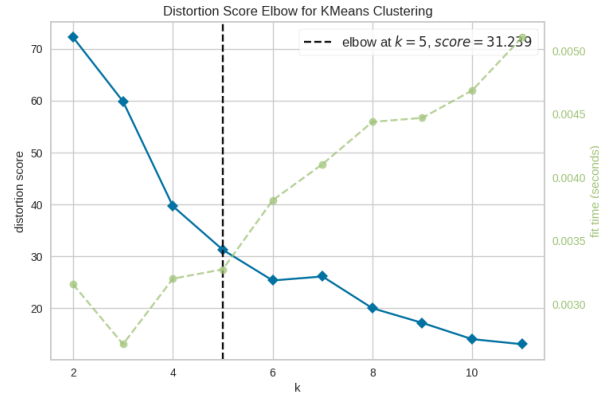


Figure 20: K-Means Elbow Method

Optimal number of Segments found was 5

### 5.5.2 Segment Separation Plot

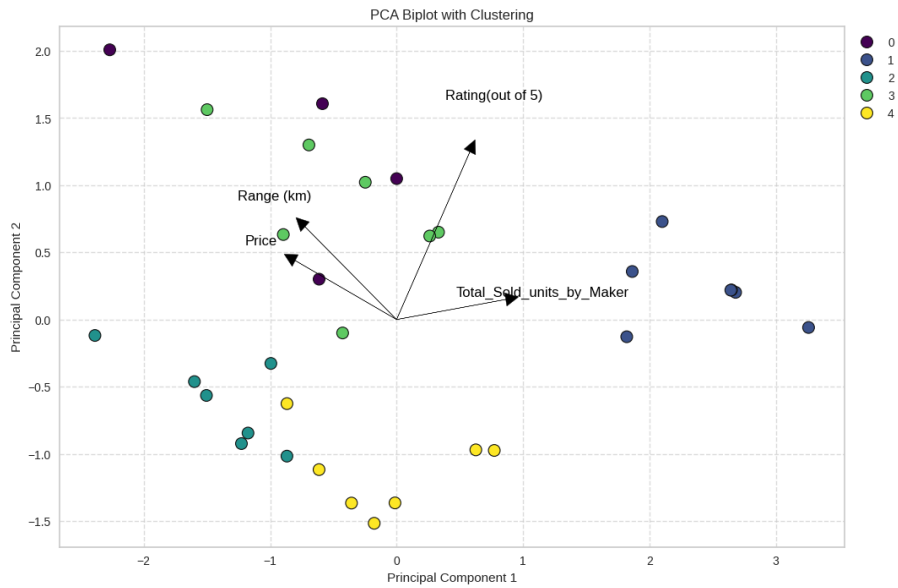


Figure 21: Segment Separation Plot of 4Wheeler data and Vehicle Details

Price: This arrow points leftward and slightly upwards, indicating a negative correlation with PC1 and a small positive correlation with PC2. Vehicles with higher prices are associated with lower PC1 values. Range (km): This arrow points leftward and slightly upwards, similar to the Price arrow, indicating a strong negative correlation with PC1 and a slight positive correlation with PC2. Rating (out of 5): This arrow points upward and slightly to the right, indicating that higher ratings are positively correlated with both PC1 and PC2. Total Sold Units by Maker: The arrow points to the right, showing a strong positive correlation with PC1 and a small positive correlation with PC2. "Price" and "Range (km)" are negatively correlated with "Total Sold Units by Maker."

Segment	Rating(out of 5)	Range (km)	Price	Total_Sold_units_by_Maker
0	4.80	683.75	8,371,250.00	823.75
1	4.93	351.57	1,421,571.43	19,750.71
2	4.03	501.57	14,489,428.57	822.57
3	4.86	468.57	13,352,571.43	565.86
4	4.14	432.43	3,603,285.71	1,159.86

Figure 22: Segment Profiles

### 5.5.3 Selecting the Target Segments

Segment 1 emerges as the best target cluster due to the following reasons:

**High Market Demand:** The cluster has by far the highest total sold units, indicating a strong preference in the market. **Affordability:** The lower price point makes it accessible to a wider audience. **High Customer Satisfaction:** The highest rating among the clusters suggests that customers are very satisfied with vehicles in this cluster.

## 5.6 Results

In 2 Wheeler vehicle type, Segment 0 seems promising in terms of all the variables. with the best pricing Rs.90,288.83 but has a moderate rating (3.58). and in terms of ratings, Segment 2 seems also promising(5.00), but comes under an expensive vehicle group (Rs.199,999.00).

In 3 wheeler vehicle type, Segment 2 appears to be the best target segment due to the following reasons: **High Market Demand:** It has the highest total sold units (83,441.50), indicating strong customer acceptance. **Balanced Pricing:** (INR 231,166.67)The price is moderate, making it accessible to a broad customer base. **High Load Capacity:** (565.08kg) It offers a good load capacity, making it suitable for commercial or heavy-duty use

In 4 wheeler vehicle type,Segment 1 emerges as the best target cluster due to the following reasons:

**High Market Demand:** The cluster has by far the highest total sold units(19,750.71), indicating a strong preference in the market. **Affordability:** The lower price point(INR 1,421,571.43) makes it accessible to a wider audience. **High Customer Satisfaction:** The highest rating(4.93) among the clusters suggests that customers are very satisfied with vehicles in this cluster.

## 6 Conclusion

Based on the Market Segmentation analysis of the Indian EV market, several key insights have emerged that highlight promising opportunities for market segmentation and strategic targeting.

Geographic Segmentation revealed that Karnataka, Delhi, and Maharashtra stand out as the primary states or regions for concentrating on the EV market. Karnataka and Delhi, with their high prevalence of Two Wheeler and Four Wheeler vehicles among males, indicated the strong consumer interests and potential for market growth. The well-developed electric vehicle infrastructure, indicated by the number of Public Charging Stations (PCS), further supports the strategic importance of these states. Segment 3

(Karnataka) and Segment 6 (Maharashtra) show particularly high numbers of PCS, suggesting a robust infrastructure that can support the growth of EV adoption. Similarly, Segment 1 (Delhi) also demonstrates a favorable environment for EV market expansion.

Segment Analysis by Vehicle Type identified key target segments across Two Wheeler, Three Wheeler, and Four Wheeler categories:

- Two Wheeler: Segment 0 offers the most promising opportunity due to its competitive pricing at approximately INR 90,288.83, though it has a moderate customer rating of 3.58. For premium consumers, Segment 2, despite its higher price point of INR 199,999.00, boasts an excellent rating of 5.00, making it an attractive option for a niche market.
- Three Wheeler: Segment 2 emerges as the best target due to its high market demand with total sold units of 83,441.50, balanced pricing at INR 231,166.67, and strong load capacity at 565.08 kg. This combination makes it highly suitable for commercial and heavy-duty use, appealing to a broad customer base.
- Four Wheeler: Segment 1 is identified as the most favorable cluster, with the highest market demand reflected in total sold units of 19,750.71. Its lower price point of INR 1,421,571.43, coupled with the highest customer satisfaction rating of 4.93, suggests that this segment offers a compelling value proposition for consumers, making it an ideal target for manufacturers and marketers.

In conclusion, the Indian EV market presents substantial opportunities, particularly in the states of Karnataka, Delhi, and Maharashtra. Targeting specific segments within the Two Wheeler, Three Wheeler, and Four Wheeler categories, as identified in this analysis, can enable manufacturers to effectively capture market share and meet the diverse needs of Indian consumers. With the right strategic focus on these segments, companies can achieve significant growth and contribute to the broader adoption of electric vehicles in India.