



Feynn Labs

Project-2

Submitted By:

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Market Segmentation Electric Vehicle (EV) Market



Abstract

With the current depletion of fossil fuels and its price hike, there is a need for another energy resource to run the vehicle. The automobile sector is considering Electric Vehicle as a solution to the industry and environment in India. However, the current market penetration of EV is relatively low despite governments implementing EV policies. Through this report we will analyse the potential scope of Electric vehicle in India and the potential market segments and suitable locations that new emerging Electric Vehicles Start-ups should target in their early market stages.

Background

The electric vehicles industry at a nascent stage in India. It is less than 1% of the total vehicle sales however has the potential to grow to more than 5% in a few years. At present there are more than 5 lac electric two-wheelers and few thousand electric cars on Indian roads. The industry volumes have been fluctuating, mostly depending on the incentives offered by the government. Many serious players (Hero Eco, Ather, Electrotherm, Avon, Lohia, Ampere, etc.) are continuing with the mission and trying to enforce the positive change under the banner of SMEV. More than 90% of electric vehicles on Indian roads are low-speed electric scooters (less than 25km/hr.) that do not require registration and licenses. Almost all electric scooters run on lead batteries to keep the prices low, however, battery failures and low life of batteries have become major limiting factors for sales besides government subsidies. Many manufacturers have taken initiatives to install the charging station with limited success. Players like Lohia and Electrotherm have developed Electric three-wheelers. Ampere and Hero have entered Electric Cycles segments. There are numbers of E-Rickshaw players mushrooming across the country and selling good numbers of E rickshaw for last-mile connectivity.

The industry is almost ready for take-off but for the incentives. It is expected that with FAME-2 the industry may witness a quantum leap in volumes and technology. SMEV sees a great opportunity with EVs in reducing the Carbon footprint, dependence on Crude oil imports, creating jobs and building a new Technology knowledge hub in India.

Objectives

The specific objectives of this report are:

1. Understanding Indian consumers' concerns and behaviours related to electrical vehicles.

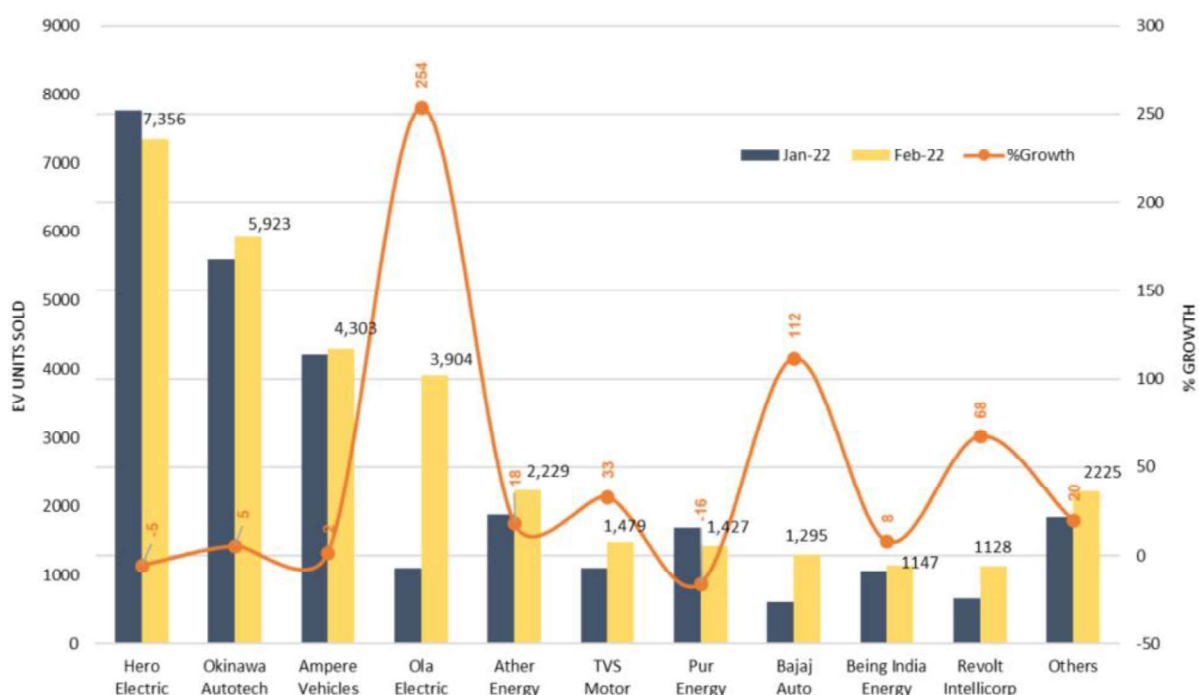
2. Indian Electric vehicle market segmentation using segmentation analysis and clustering to develop a feasible strategy for an EV Start-up to enter the market, targeting the segments most likely to use Electric vehicles.
3. To identify the states/locations which are feasible for a new EV Start-up to set up their operations in the early market.

0. Problem Breakdown

Fermi Estimation of Electric Vehicles in India

The electric car sector in India is expanding. The federal and state governments have developed plans and incentives to encourage electric mobility throughout the country, and some rules and standards are in place as well. While the government stands to profit greatly from converting from internal combustion engines to electric motors, there are hurdles such as a lack of charging points, a high initial price, and a shortage of electricity supplied from sustainable power. Nonetheless, e-commerce firms, automobile manufacturers, app-based transportation infrastructure companies, and mobile technology solutions have entered the industry and are gradually increasing the capacity and visibility of electric vehicles.

MoM increase of 18% for High Speed E-2W



India vowed during the COP26 meeting to reach net-zero emissions status by 2070 and to reduce its emission intensity by 45% from 2005 levels by 2030. EVs might assist achieve these objectives and play a critical part in India's green transformation. According to some industry analysts, this may save India more than \$14 billion (€13.5 billion) in crude oil imports each year. The rapid adoption of two- and three-wheeler electric vehicles is projected to pave the way for this transformation. India's path to a completely electric environment is still fraught with difficulties, including high pricing, poor infrastructure, and a scarcity of high-performance EVs. "The existing trend of adding even more automobiles that depend on expensive foreign gasoline and clog up already overcrowded cities that are suffering from infrastructure problems."

According to the company's new Managing Director and CEO, Hisashi Takeuchi, Maruti Suzuki wants to debut various electric car models in India by 2025 in order to catch up with competition and become a sector leader.

The business, which wants to debut its first EV model in 2025, also intends to produce EVs from its plants in the future as the country's demand for EVs increases. To begin, the first EV will be manufactured at Suzuki Motor Gujarat.

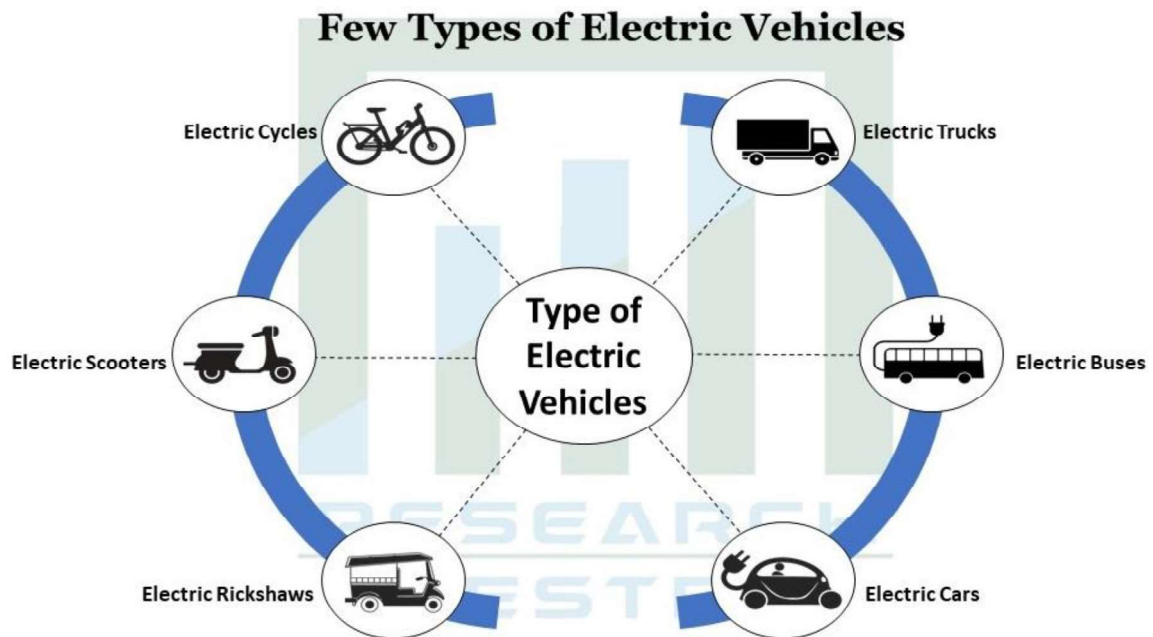
"We are lagging behind our rivals in releasing the (EV) model to the Indian market, but we perceive that market demand for such EVs is still restricted." Electric vehicle sales in India remain restricted.

In 2021, the India electric car market will be worth US\$404 million. Looking ahead, IMARC Group forecasts the market to reach US\$ 14,913 million by 2027, with a compound annual growth rate (CAGR) of 87% from 2022 to 2027. Keeping the uncertainties of COVID-19 in mind, we are constantly watching and analysing the pandemic's direct and indirect impact. These findings are cited in the study as a significant market contributor.

By FY30, India's EV ambitions will need an estimated annual battery capacity of 158 GWh. This opens up a large market for homegrown producers. Even if 50% of battery production capacity were indigenous, investments might total \$6.1 billion (42,900 crore) by FY30. Furthermore, the total investment required would approach \$12.3 billion (85,900 crore) if battery manufacture were to be completely indigenous. According to the report, the newly authorised PLI plan for the vehicle and battery manufacturing sectors might assist provide the ideal ecosystem for

indigenisation and employment development in the EV industry. In addition to in-home charging stations, India would require a network of around 2.9 million public charging stations by FY30.

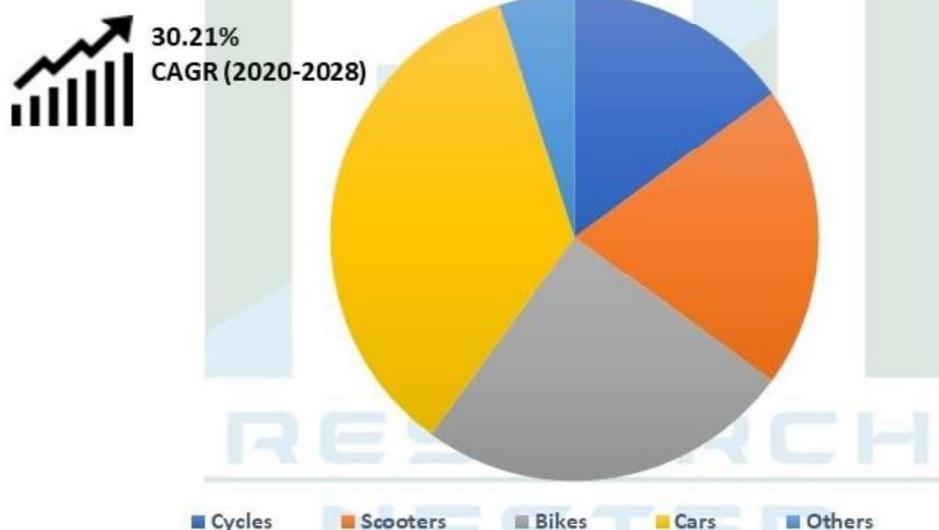
Different Segments and Needs



Source: Research Nester

Source: -<https://www.researchnester.com/reports/china-electric-vehicle-market/2265>

China Electric Vehicles Market Share (%), By Passenger Segment, By 2018



Source: Research Nester

Because of their small size, A-segment vehicles are perfect for city driving. They are very simple to drive because of their simple car controls. If you're driving needs are daily commuting and occasional lengthy journeys, B-segment automobiles or tiny hatchbacks are ideal. They are somewhat bigger than A-segment cars and provide better road stability. For additional information about the compact vehicle category. Small sedans, usually known as family automobiles, are classified as C-segments. It is broken further into two components, which we shall discuss in the next sections. When it comes to C-segment automobiles in India, there are several possibilities due to its sub-segments.

In 2019, India's EV market consisted of only two electric car types. As a result, between April 2019 and March 2020, just 0.15% of new passenger cars registered were BEVs. However, as of the beginning of 2021, the India electric vehicle (EV) market consists of around eight electric car types, providing additional alternatives for Indian consumers interested in purchasing electric vehicles. Furthermore, electric vehicle prices are predicted to fall during the projection period, allowing EVs to have a reduced Total Cost of Ownership (TCO) when compared to conventional cars. This is expected to pave the path for electric automobiles to enter the mainstream market.

1. Data Sources

The data used for this study are obtain from

EVIndia.csv

(<https://www.kaggle.com/datasets/kkhandekar/electric-vehicles-india>)

‘Indian automobile buying behaviour study.csv’

(<https://www.kaggle.com/datasets/karivedha/indian-consumers-cars-purchasing-behaviour>)

All official data from government of India related to EV data.

(<https://data.gov.in/search?title=Electric%20Vehicles>)

The above website contains lots of datasets like a dataset which gives state-wise sales of EVs in India, another dataset which gives total number and types of EVs in India in both Transport Vehicles and Non-Transport Vehicles. Another dataset contains the state-wise count of EVs and total number of vehicles in that state etc.

The dataset contains Electric vehicles models which are currently running in India and their specification, State wise vehicle booking count, State wise active vehicles list, Indian automobile buying behaviour study.

	Car	Style	Range	Transmission	VehicleType	PriceRange	Capacity	BootSpace	BaseModel	TopModel
0	Tata Nexon EV	Compact SUV	312 Km/Full Charge	Automatic	Electric	₹ 13.99 - 17.4 L	5 Seater	350 L	XM	Dark XZ Plus LUX
1	Tata Tigor EV	Subcompact Sedan	306 Km/Full Charge	Automatic	Electric	₹ 12.49 - 13.64 L	5 Seater	316 L	XE	XZ Plus Dual Tone
2	Tata Nexon EV Max	Compact SUV	437 Km/Full Charge	Automatic	Electric	₹ 17.74 - 19.24 L	5 Seater	350 L	XZ Plus 3.3 kW	XZ Plus Lux 7.2 kW
3	MG ZS EV	Compact SUV	419 Km/Full Charge	Automatic	Electric	₹ 21.99 - 25.88 L	5 Seater	448 L	Excite	Exclusive
4	Hyundai Kona Electric	Compact SUV	452 Km/Full Charge	Automatic	Electric	₹ 23.79 - 23.98 L	5 Seater	na	Premium Dual Tone	HSE

	Age	Profession	Marrital Status	Education	No of Dependents	Personal loan	House Loan	Wife Working	Salary	Wife Salary	Total Salary	Make	Price
0	27	Salaried	Single	Post Graduate	0	Yes	No	No	800000	0	800000	i20	800000
1	35	Salaried	Married	Post Graduate	2	Yes	Yes	Yes	1400000	600000	2000000	Ciaz	1000000
2	45	Business	Married	Graduate	4	Yes	Yes	No	1800000	0	1800000	Duster	1200000
3	41	Business	Married	Post Graduate	3	No	No	Yes	1600000	600000	2200000	City	1200000
4	31	Salaried	Married	Post Graduate	2	Yes	No	Yes	1800000	800000	2600000	SUV	1600000

Sl. No.	State/UT	Total Number of Invoice/Sales	
34	35	Ladakh	0
0	1	Jammu Kashmir	437
1	2	Himachal Pradesh	241
3	4	Chandigarh	48
6	7	Delhi	6413
18	19	West Bengal	771
28	29	Lakshadweep	4
16	17	Meghalaya	6
25	26	Andhra Pradesh	3325
14	15	Mizoram	0

2. Data Pre-processing

In data preprocessing we use different machine learning libraries, which help to understand the dataset and analyze are follow:

pandas

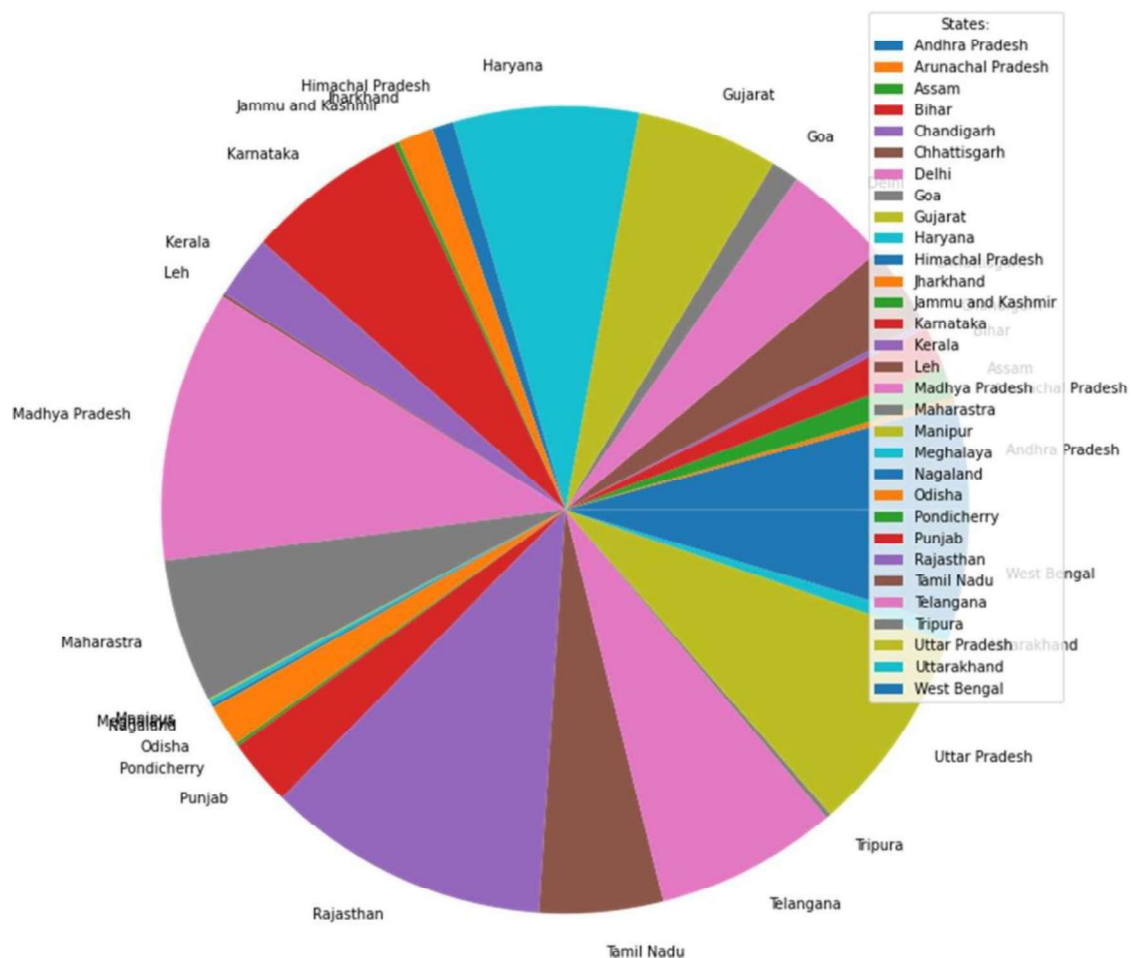
NumPy

Seaborn

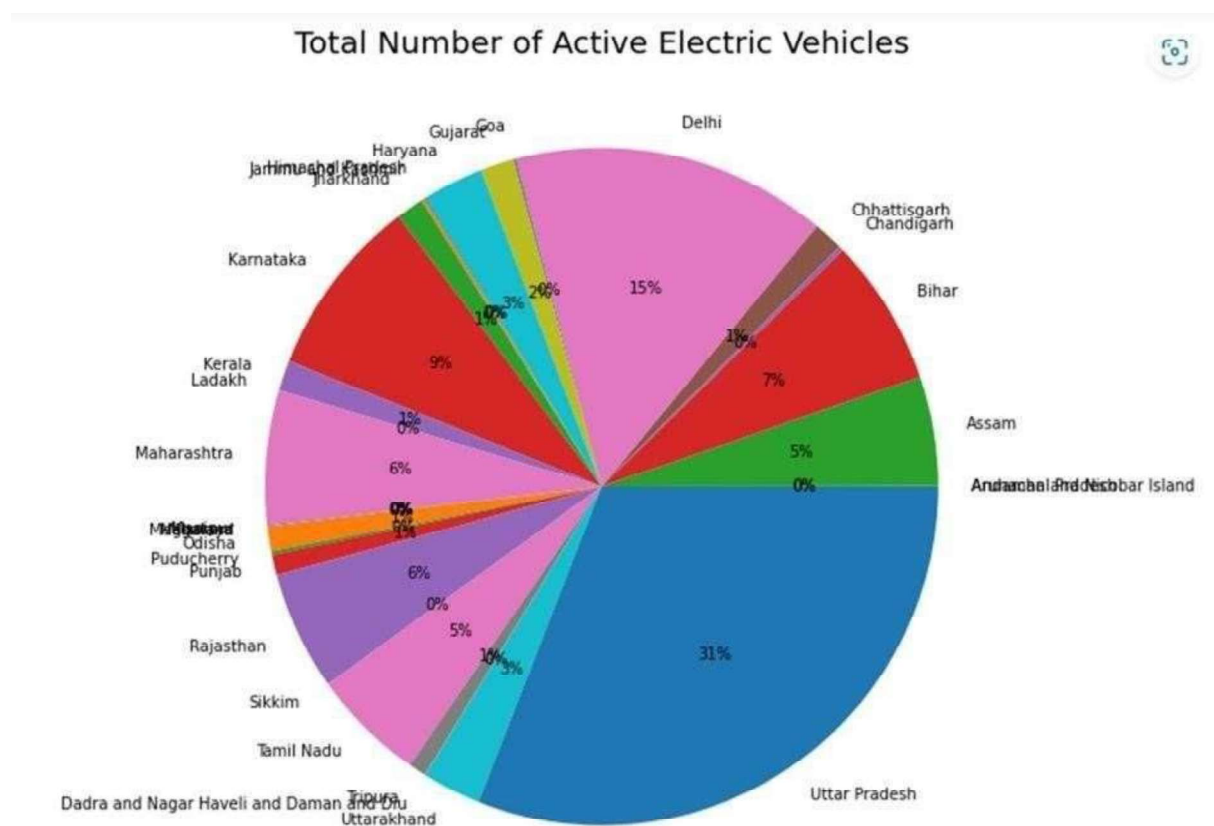
Matplotlib

First of all, import all libraries, once all these libraries were imported, we started understanding the datasets.

The pie chart visualization of the dataset helped us to understand that No of ROs were EV Charging Facilities of different states. The pie charts are given below-

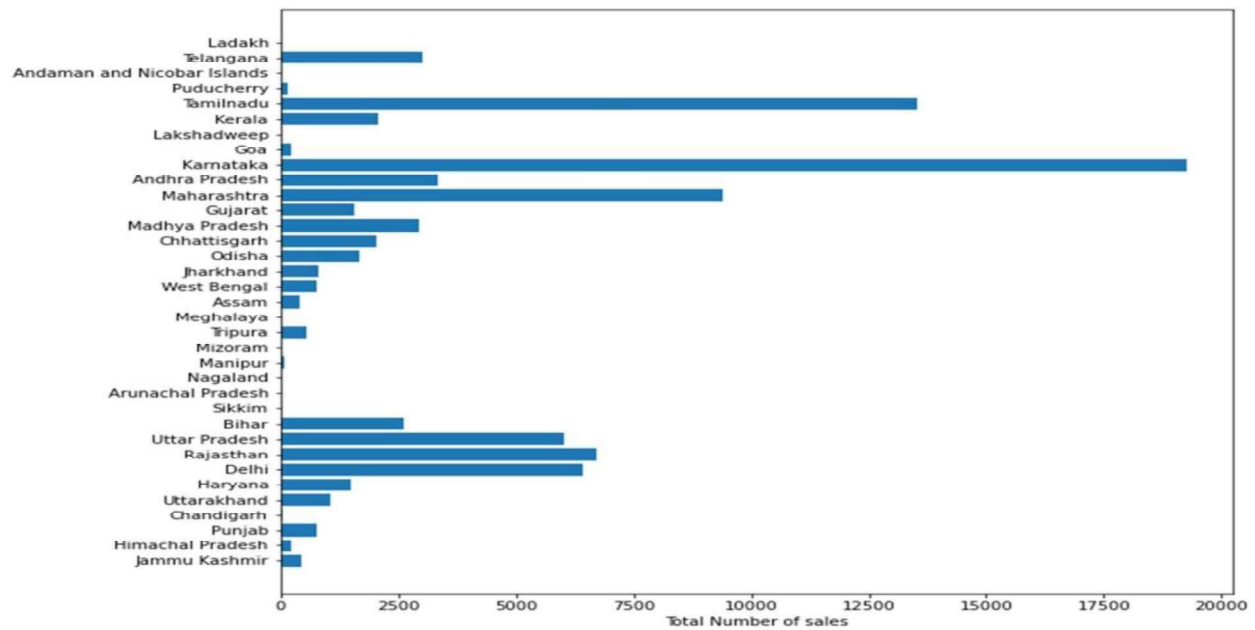


A dataset that tells us the percentages of EVs distributed across each state as of December 2021.



From the above pie chart, it can be clearly seen the most number of EVs present in the country is in Uttar Pradesh followed by Delhi, Karnataka, Maharashtra, etc.

A dataset `df_total_sales` that tells us the total number of vehicle sales across each state we visualize using a bar chart and see state Karnataka has more sales than other states. The bar charts are given below. And sort in ascending order based on the maximum number of sales see the table given below.





Unnamed: 0	Sl. No.	State/UT	Total Number of Invoice/Sales	
26	26	27	Karnataka	19270
30	30	31	Tamilnadu	13515
24	24	25	Maharashtra	9393
7	7	8	Rajasthan	6721
6	6	7	Delhi	6413
8	8	9	Uttar Pradesh	6022
25	25	26	Andhra Pradesh	3325
33	33	34	Telangana	3031
22	22	23	Madhya Pradesh	2953
9	9	10	Bihar	2615

Top 10 States sale wise

After analyzing both the above pie charts it is felt these states will be a more suitable place for an EV start-up to start its operations because it has a significant percentage of Electric Vehicles and also its EV sales have been very high in recent times. Hence it is felt that starting the start-up operations from Karnataka will help the start-up company build a strong base in the Indian EV market.

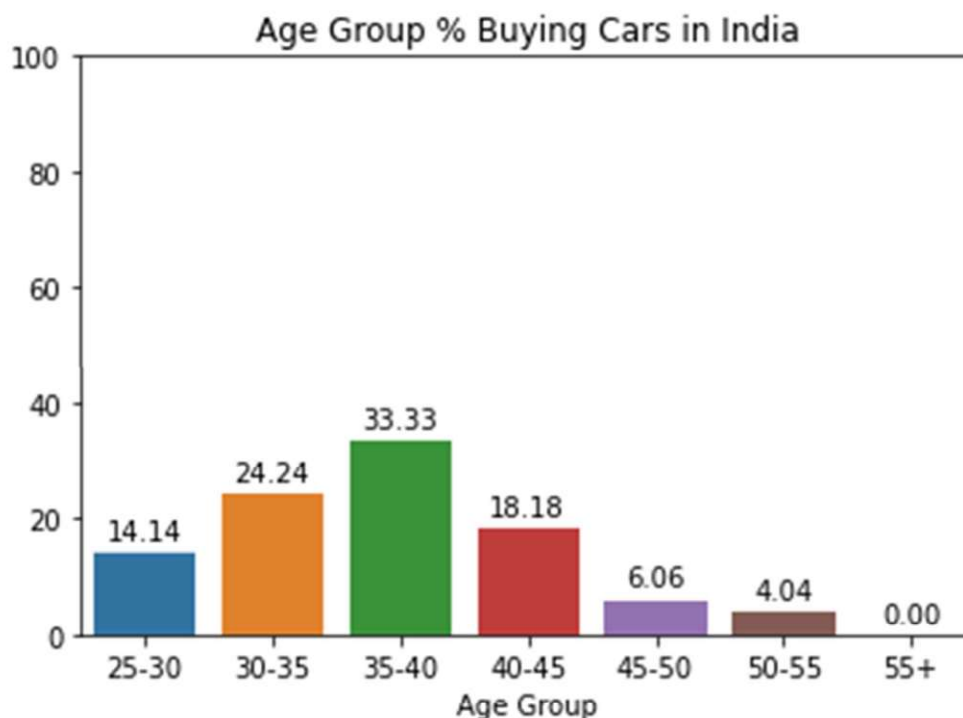
Once the geographical location for the opening up of the start-up has been decided it is important to understand the Car Buying Behavior of Indian Consumers. It will help the start-up to target the correct segment and thereby

start manufacturing the correct type of vehicle in order to attract their target consumers. The first look at the dataset df_income is as follows —

Unnamed: 0	Age	Profession	Marrital Status	Education	No of Dependents	Personal loan	House Loan	Wife Working	Salary	Wife Salary	Total Salary	Make	Price	
0	0	27	Salaried	Single	Post Graduate	0	Yes	No	No	800000	0	800000	i20	800000
1	1	35	Salaried	Married	Post Graduate	2	Yes	Yes	Yes	1400000	600000	2000000	Ciaz	1000000
2	2	45	Business	Married	Graduate	4	Yes	Yes	No	1800000	0	1800000	Duster	1200000
3	3	41	Business	Married	Post Graduate	3	No	No	Yes	1600000	600000	2200000	City	1200000
4	4	31	Salaried	Married	Post Graduate	2	Yes	No	Yes	1800000	800000	2600000	SUV	1600000

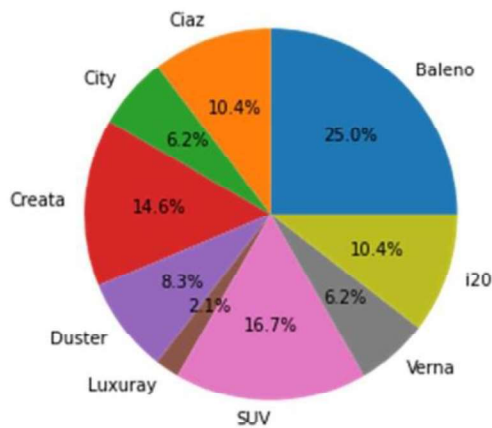
The visualization of the dataset df_income will help to provide a lot of useful information related to the dataset df_income. It can allow us to analyze the Car Buying Behaviour of Indian Consumers and hence make lots of inferences from it. Hence the visualization of the dataset df_income containing

Indian Consumer`s Car Buying Behaviour is as follows —

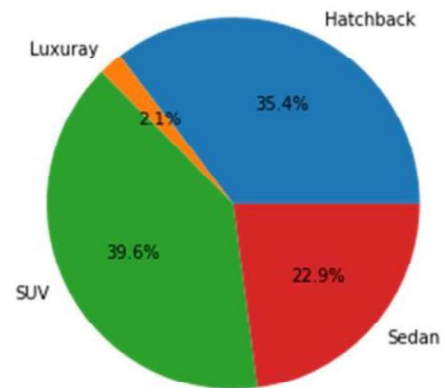


The above bar graph shows that the maximum number of people who are buying cars in India lies in the Age-Groups of 30 – 45 years. Hence targeting this age group seems to be a good option for the Company.

Married and No.of.Dependents>=3 'Car Make' chart

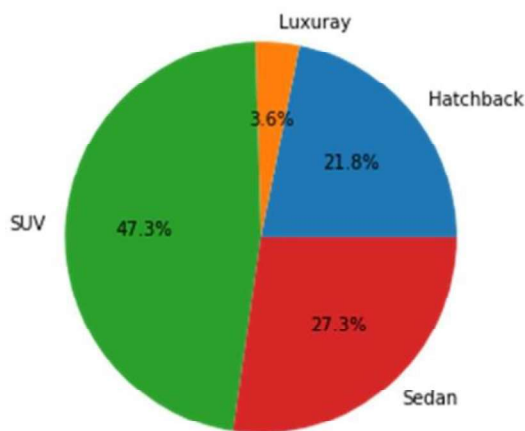


Married and No.of.Dependents>=3 'Car Type' chart

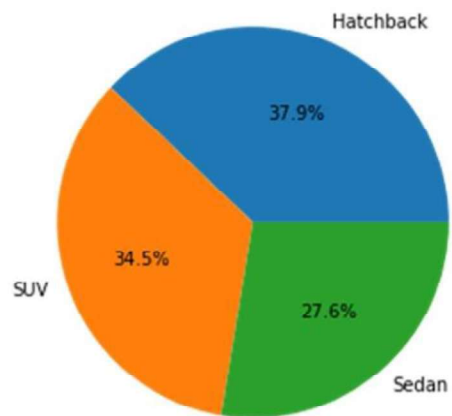


The above pie chart shows that Married People who have a number of dependents more than 3 people tend to buy SUVs more than other Car types. This will give an idea to the Company that it will be a good idea to start manufacturing an Electric SUV in order to target these people.

Salaried and Married



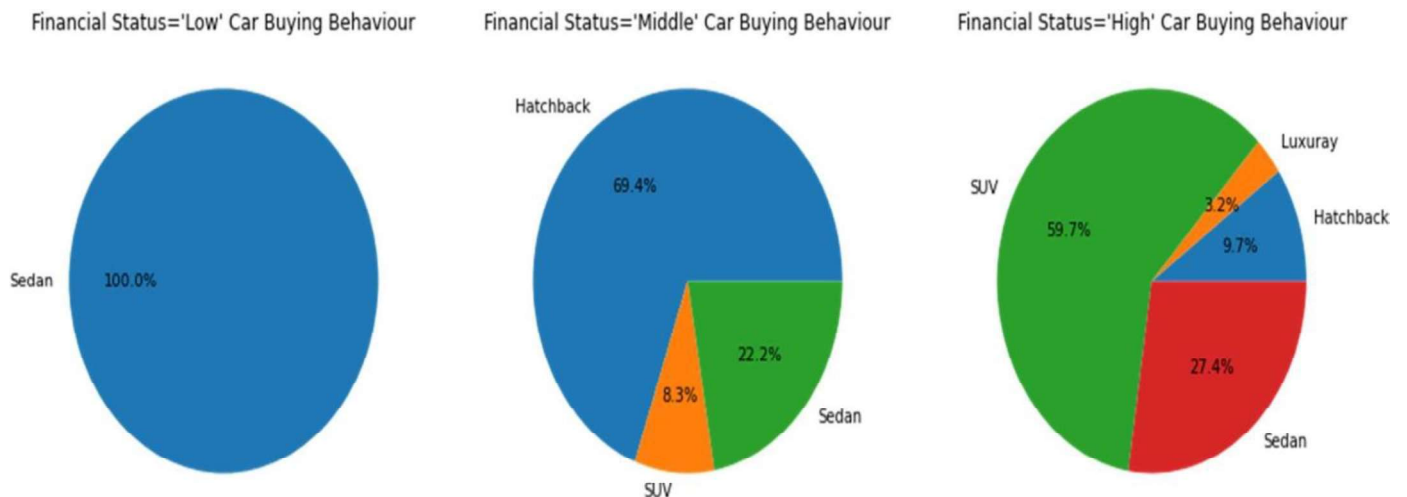
Business and Married



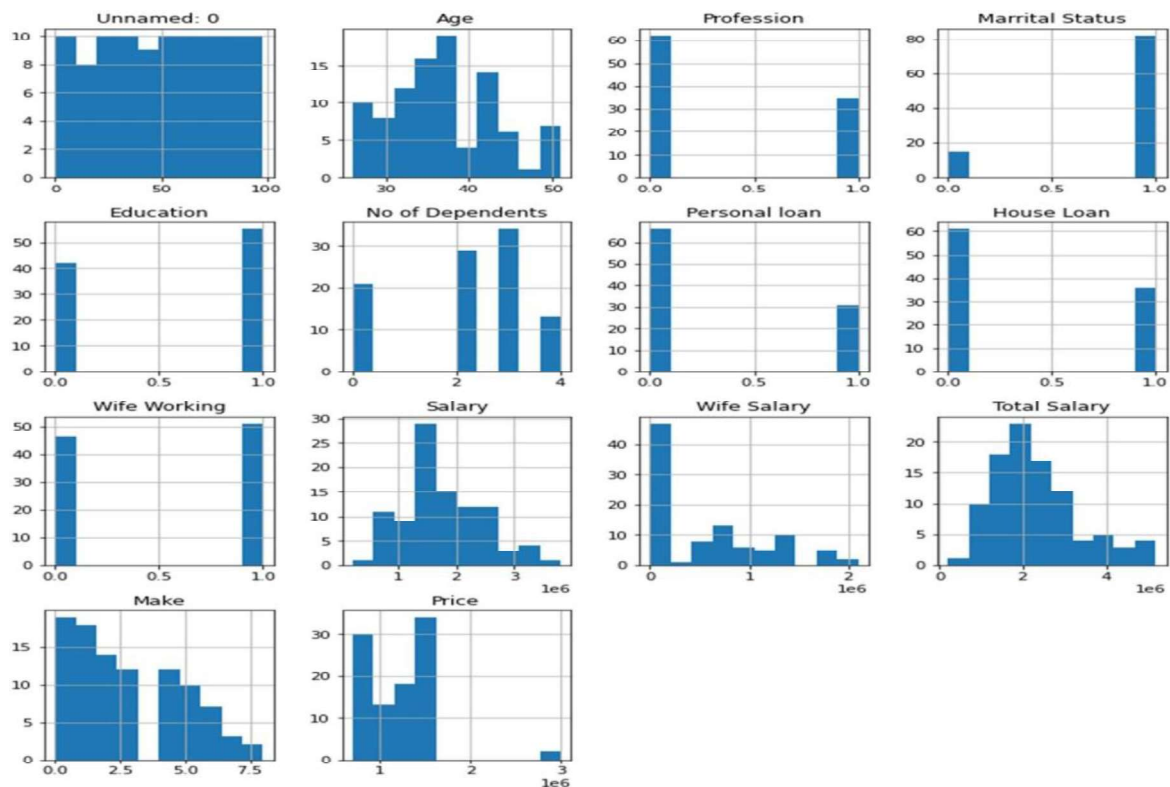
The above pie chart shows that of Consumers who are salaried and married about half of them tend to buy an SUV whereas about 35% of the consumers who are married and have their own businesses also tend to buy SUVs as well.

The above pie charts compare the Financial Status of Indian Consumers. It shows that all those people whose financial status is low end up buying a Sedan car type as it is affordable for them. Whereas consumers whose financial status is Middle Class tend to buy Hatchback car type more as compared to an SUV or a

Sedan. On the other hand, consumers whose Financial Status is high tend to buy SUVs more often than Sedans or Hatchbacks. Hence the Financial Status of a consumer greatly affects their choice of Car. The company can use this information to target consumers of a particular target segment and then can make an Electric Car of the particular type which can woo its target consumers.



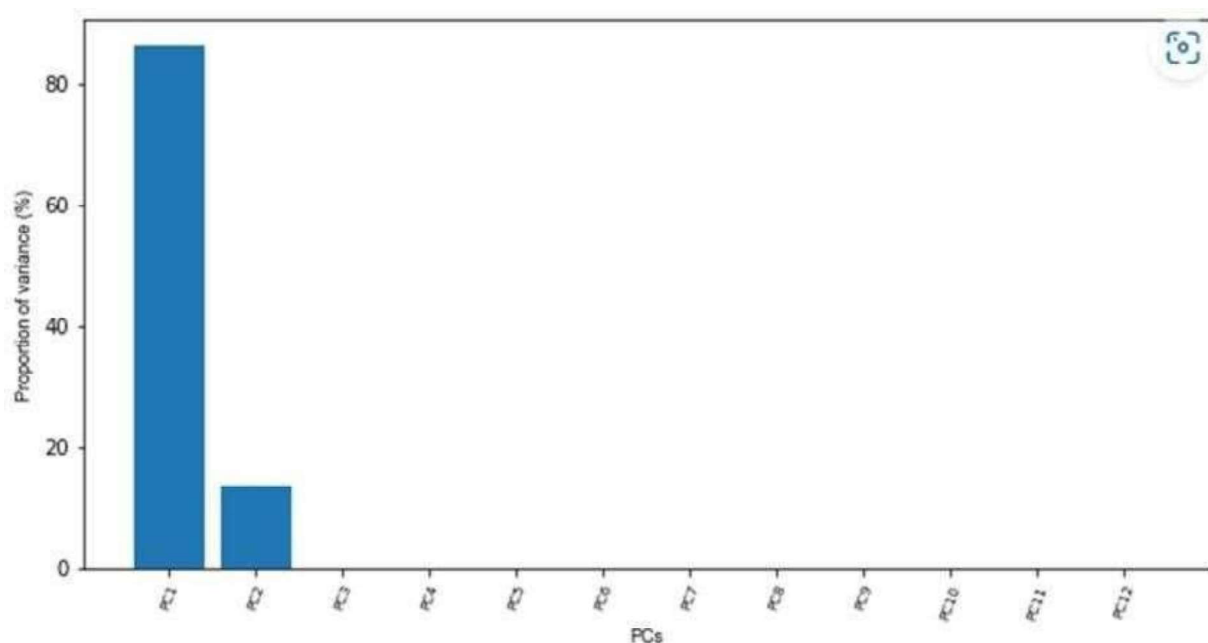
Then the histograms of the data were drawn below –



Once the histogram was plotted then the Principal Component Analysis(PCA) of the dataset was done. The PCA is a statistical process that converts a set of Correlated features into a set of linearly uncorrelated features with the help of Orthogonal Transformation. These new Transformed Features are called Principal Components.

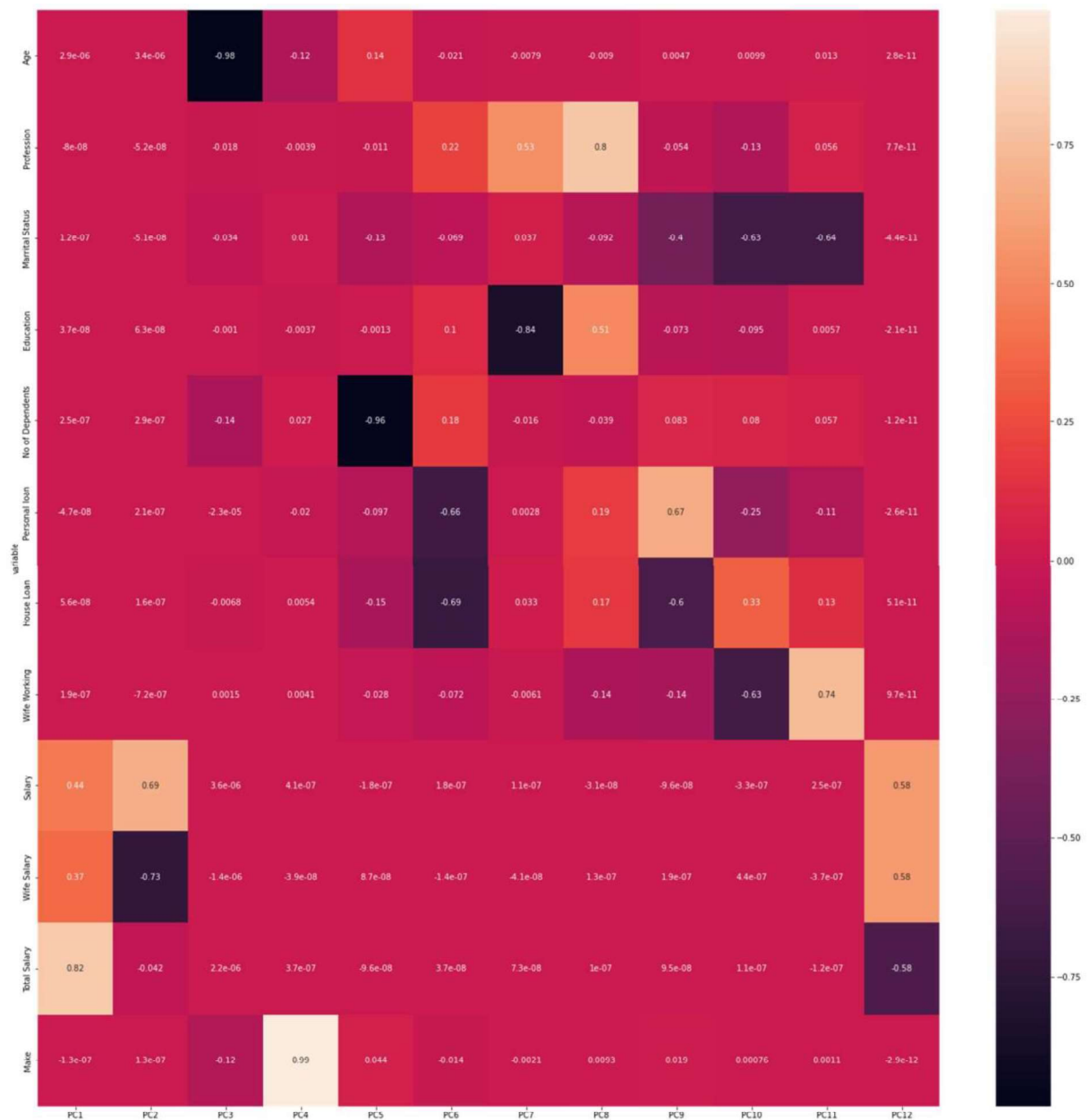
This process reduces the dimensions of the dataset and makes it cost-effective to carry out clustering operations.

The Principal Components of the Indian Consumer Car Buying Behavior dataset is as follows –



From the above bar chart, it can be clearly seen that the first 2 Principal Components themselves account for 100% of the variance in the data.

Also, the heatmap between the original variables and the principal components can be shown as follows –



From the above heatmap it can be inferred that for the first principal component Salary, the Wife's Salary, and Total Salary are the original variables that are highly correlated with it, and similarly for other principal components as well.

3.Segment Extraction (K-Means Methods)

Now for the extraction of the segments the K-Means algorithm has been used. K-Means algorithm is an unsupervised learning algorithm which is used to solve clustering problems in ML. It allows us to cluster the dataset into K number of group in a convenient way. The number K either must be known in advance or it must be found out using the elbow method. This algorithm allows us to identify segments of groups in an unlabelled dataset without the need for any training. The main aim of the algorithm is to divide the dataset into k number of segments in such a way that there is minimum sum of distance between a data point and its corresponding segment.

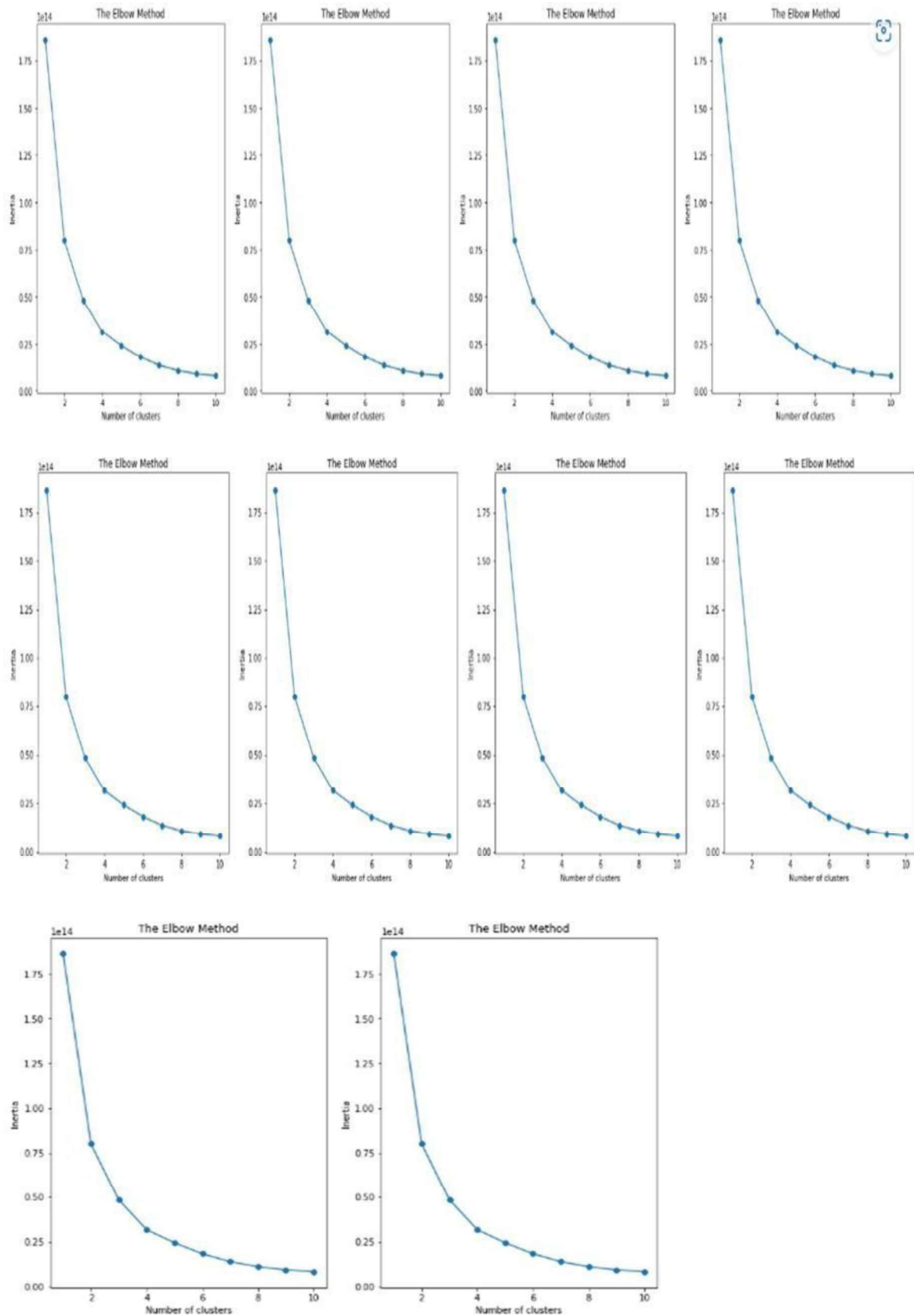
First in order to extract the segments it is important to know the correct number of segments in the data. The correct number of segments can be known by using a method called elbow methods. The elbow method helps us to choose the optimum value of k by fitting the model with a range of k values. The sum of squares of distances also called the epsilon or the cost function of the K-means algorithm is used to find the elbow. The epsilon is expected to decrease with increasing value of k. The value of k after which the value of epsilon decreases very less is considered to be the optimum value of k. In our dataset we performed the elbow method 10 times to get the average value of k.

The code for elbow method is as follows –

```
In [86]: from sklearn.cluster import KMeans
# Get the inertia values for number of clusters varying from 1 to 10
for j in range(1,11):
    inertia = []
    for i in range(1, 11):
        kmeans = KMeans(n_clusters = i, init = 'k-means++', max_iter = 300, n_init = 10, random_state = 0)
        kmeans.fit(data_beh)
        inertia.append(kmeans.inertia_)

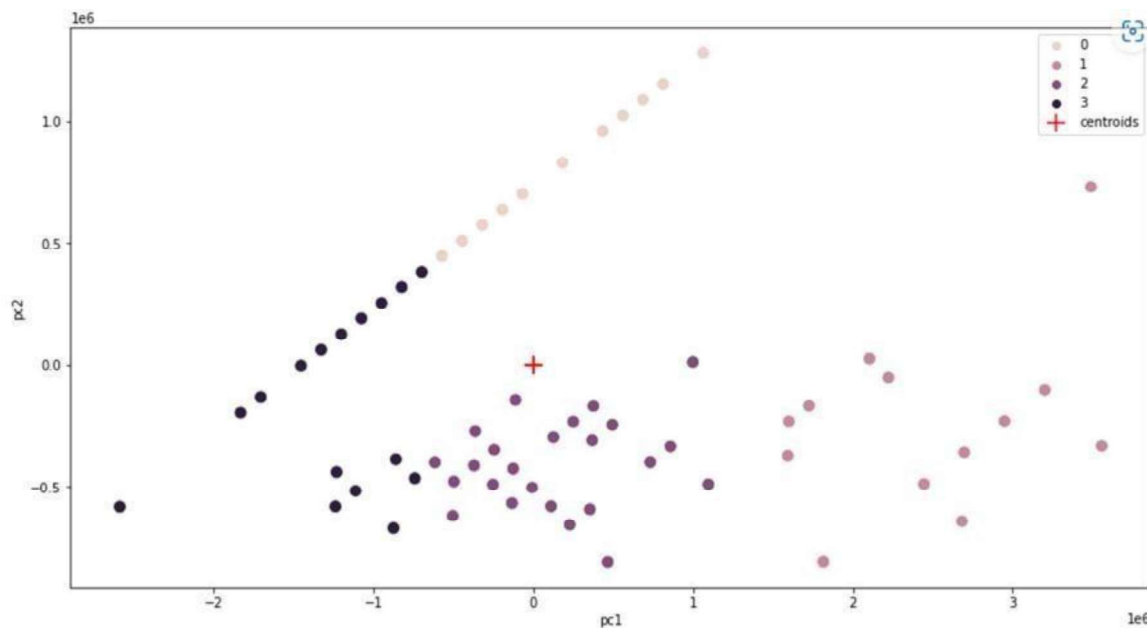
# Plot the inertia values for these clusters to choose the appropriate number of clusters
plt.subplot(3,4,j)
plt.plot(range(1, 11), inertia,marker = "8")
plt.title('The Elbow Method')
plt.xlabel('Number of clusters')
plt.ylabel('Inertia')
plt.show()
```

The graphs showing the decrease in the value of epsilon are as follows



So from observing all the 10 graphs it can be concluded that the optimum number of clusters will be 4.

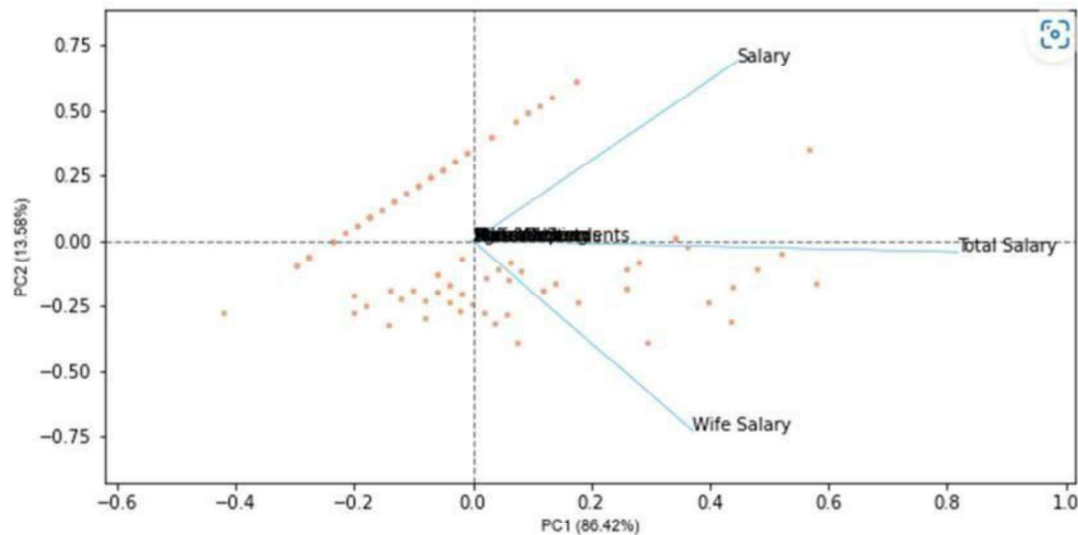
Hence the value of K for K-Means algorithm will be taken as 4. The clusters obtained after applying K-Means algorithm will be as follows –



4.Profiling and Describing Potential Segments

Now once we have extracted the segments from the dataset the next thing to do is to profile the segments. The Segments can be profiles by drawing a perceptual map of the dataset. This perceptual map will indicate the columns which are dominant in each segment. This perceptual map is used for segment separation using the Principal Components 1&2 for the Indian Consumers car Buying Behaviour Dataset.

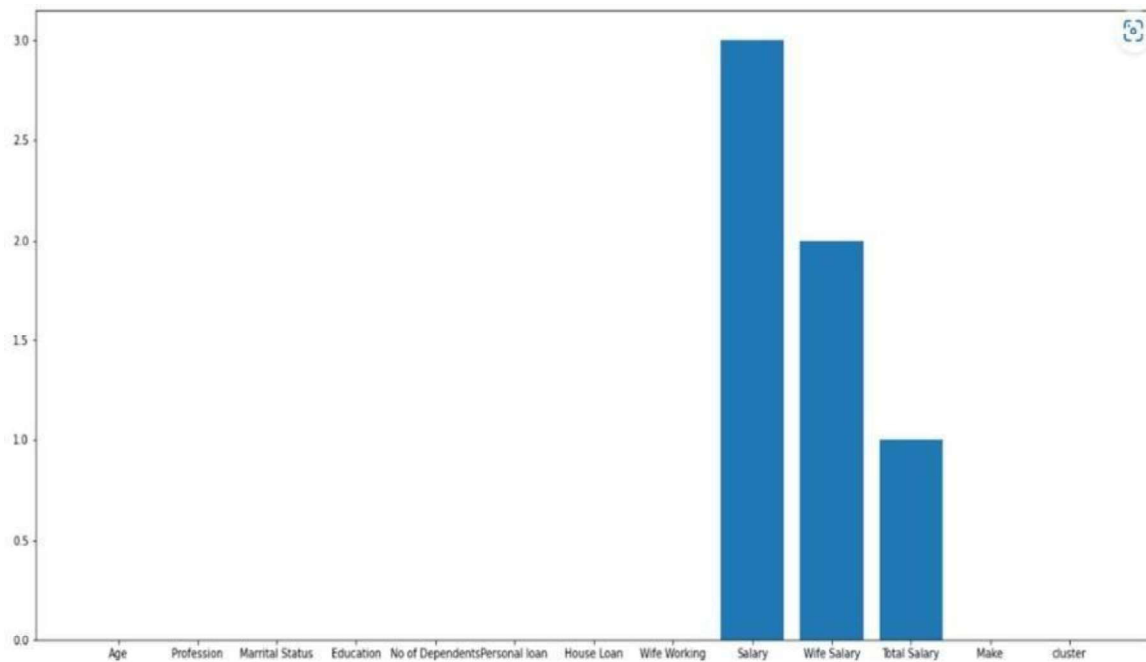
The Perceptual Map will be as follows –



The perceptual map above shows that in the four segments the Segmentation Variables Salary, Total Salary, Wife Salary will be dominant in describing 3 segments. This can further be confirmed by plotting a segment profile plot. It can be plotted by first doing hierarchical clustering of the segmentation variables and then plotting them into a bar graph. The code for plotting the segment profile plot is as follows –

```
from sklearn.cluster import AgglomerativeClustering
from scipy.cluster import hierarchy as shc
from sklearn.metrics import pairwise_distances
clust2 = AgglomerativeClustering(n_clusters = 4).fit_predict(pairwise_distances(data_beh.transpose()))
plt.figure(figsize = (20,10))
plt.bar(data_beh.columns,clust2)
```

The resultant bar plot will be as follows –



From the above bar plot it can be confirmed that the Segmentation variables in the 4 segments are as follows –

Segment 0 – Age, Profession, Marital Status, Education, No of Dependents, Personal Loan, House Loan, Wife Working, Make.

Segment 1 – Total Salary.

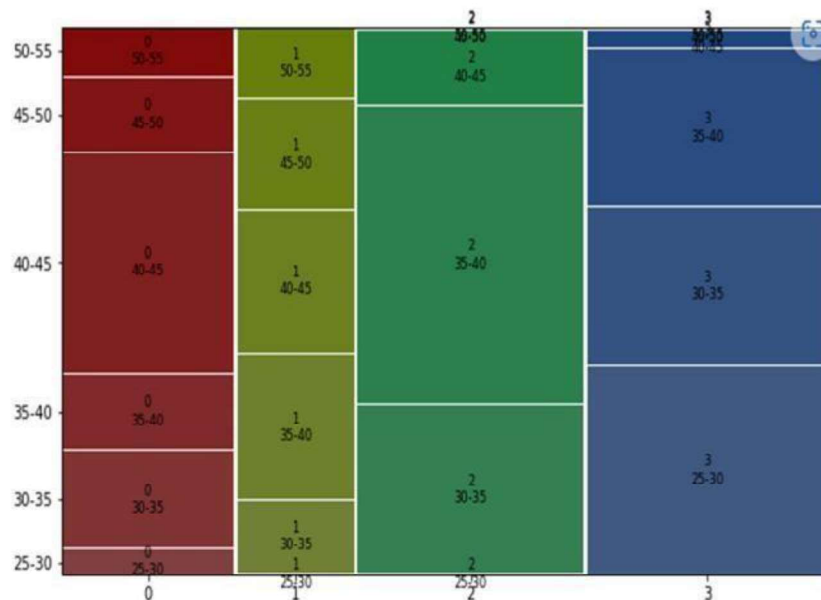
Segment 2 – Wife Salary.

Segment 3 – Salary.

Now these segments can be described further using various visualisations. In order to describe these segments, we will plot the mosaic plot of these segments which will describe these segments to us on the basis of the variables. Some of these mosaic plots are as follows

– **Mosaic Plot for AgeGroup**

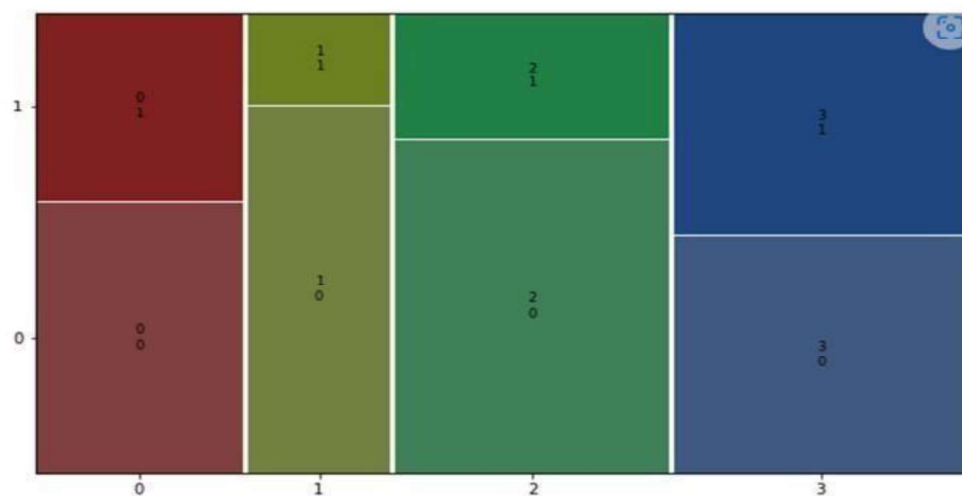
AgeGroup	25-30	30-35	35-40	40-45	45-50	50-55
cluster						
0	1	4	3	9	3	2
1	0	2	4	4	3	2
2	0	9	16	4	0	0
3	12	9	9	1	0	0



The above mosaic plot tells us that the Segment 0 has more people of the AgeGroup 40-45, the Segment 1 has more people in the AgeGroup 35-45, the Segment 2 has more people in the AgeGroup 35-40 and the Segment 3 has more people in the AgeGroup 25-30.

Mosaic Plot for Profession

Profession	0	1
cluster		
0	13	9
1	12	3
2	21	8
3	16	15



The above mosaic plot shows the relationship between Segments and profssion as follows –

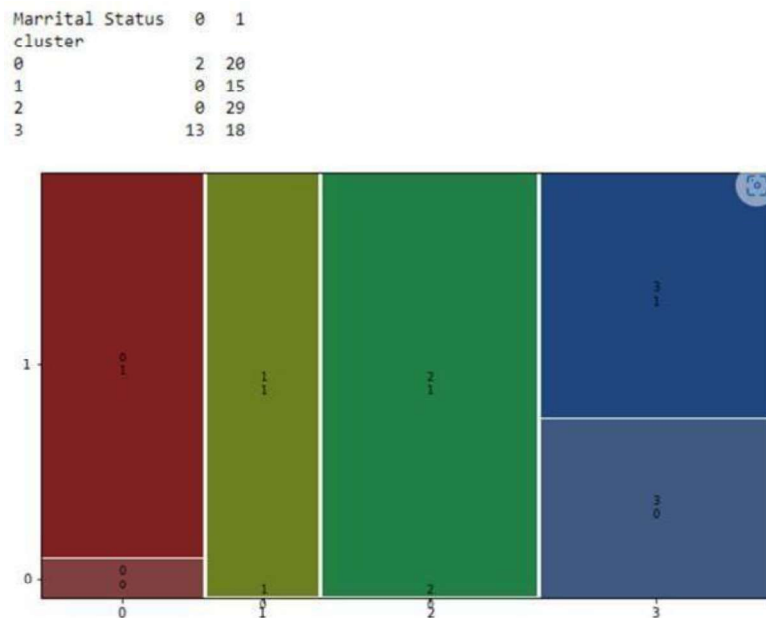
Segment 0 = Salaried People -13, Business People – 9.

Segment 1 = Salaried People – 12, Business People – 3.

Segment 2 = Salaried People – 21, Business People – 8.

Segment 3 = Salaried People – 16, Business People – 15.

Mosaic Plot for Marital Status



The above plot can be described as follows – Segment 0 = Unmarried – 2, Married – 20.

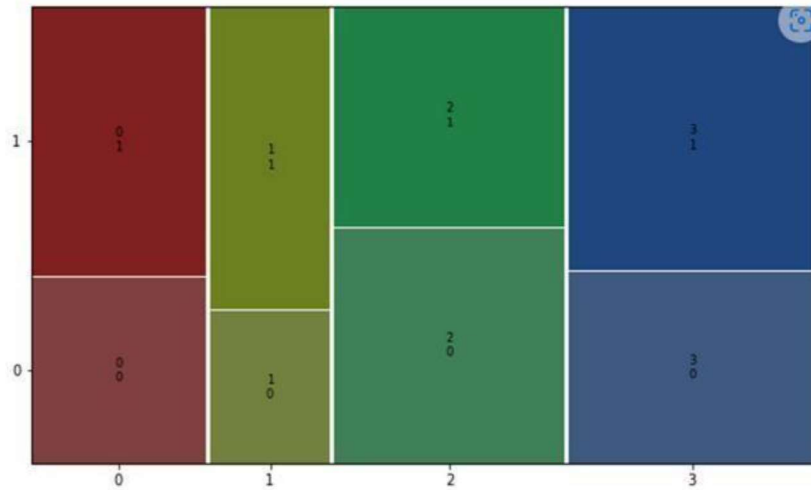
Segment 1 = Unmarried – 0, Married – 15.

Segment 2 = Unmarried – 0, Married – 29.

Segment 3 = Unmarried – 13, Married – 18.

Mosaic Plot for Education

Education	0	1
cluster		
0	9	13
1	5	10
2	15	14
3	13	18

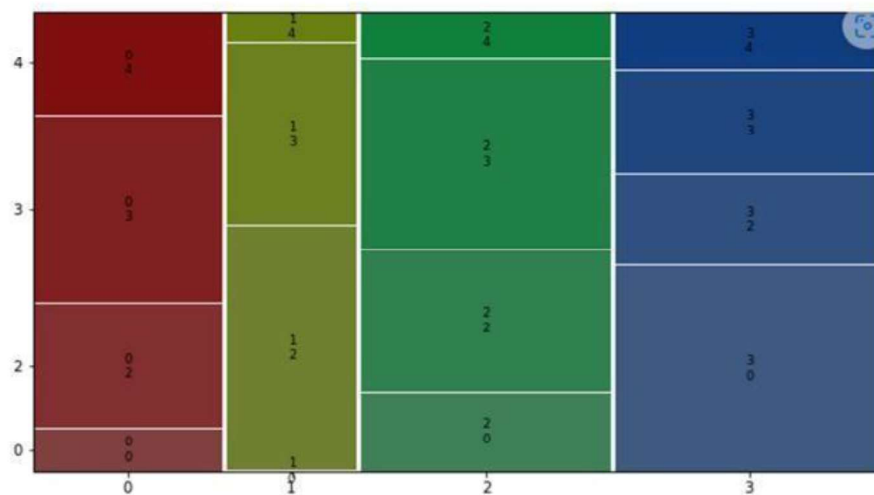


The above mosaic plot can be described as follows – Segment 0 = Graduate – 9, Post Graduate – 13. Segment 1 = Graduate – 5, Post Graduate – 10.

Segment 2 = Graduate – 15, Post Graduate – 14.

Segment 3 = Graduate – 13, Post Graduate – 18.

No of Dependents	0	2	3	4
cluster				
0	2	6	9	5
1	0	8	6	1
2	5	9	12	3
3	14	6	7	4

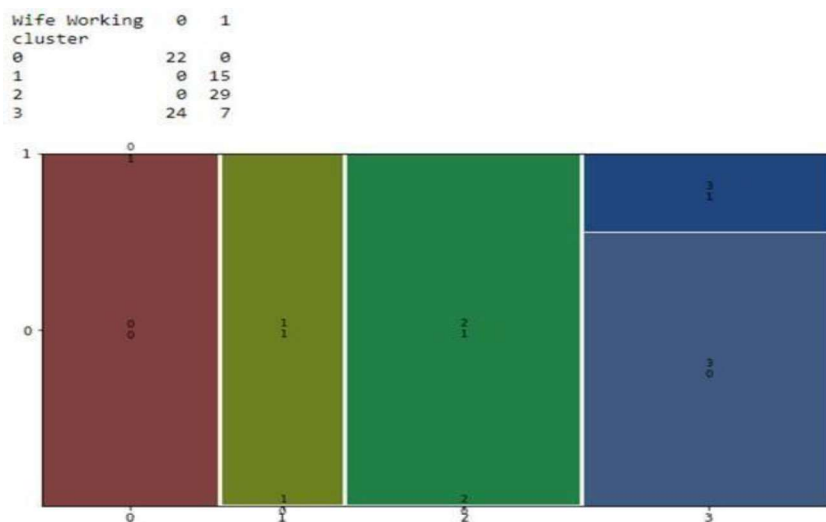


In the above mosaic plot, it can be seen that –

Segment 0 and Segment 2 has most no of consumers having no of dependents 2 or 3.

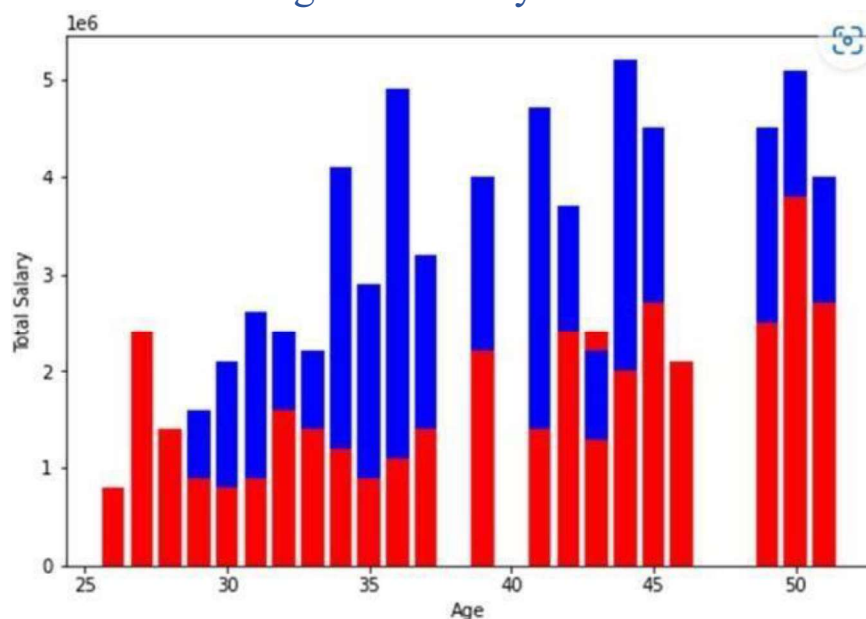
Segment 1 has most no. of consumers having 2 number of Dependents.

Segment 4 has most number of consumers having 0 Dependents.

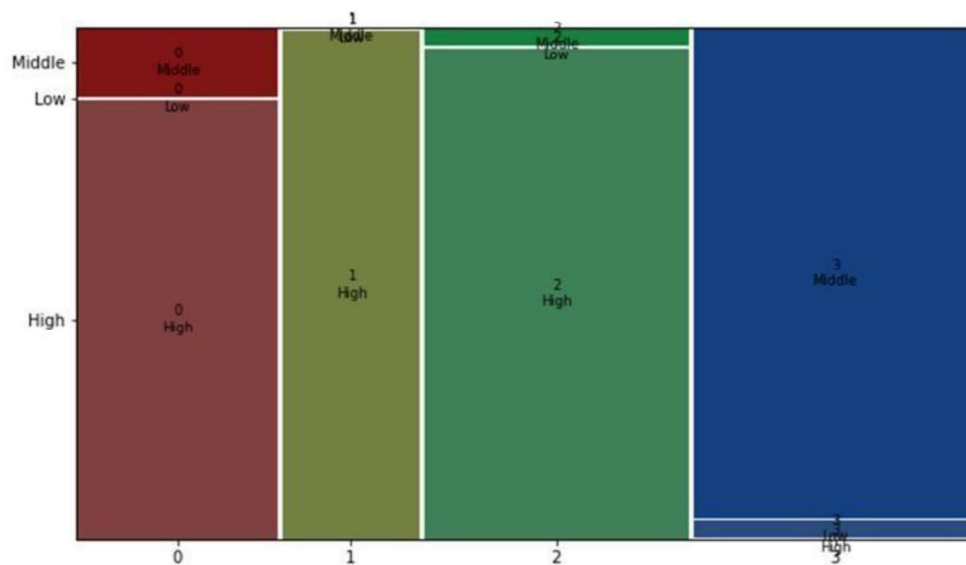


In the above mosaic plot, it can be seen that Segment 0 has only Non-Working Wife whereas Segment 1 and Segment 2 have only Working Wife. On the other hand, Segment 3 has Majority of Non-Working Wife and minority of Working Wife.

Bar Plot Showing Total Salary of Consumers with respect to their Age.



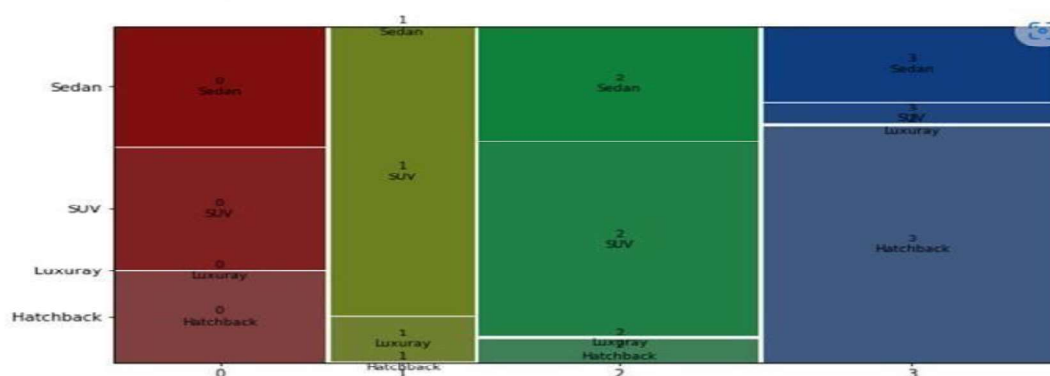
Financial Condition	High	Low	Middle
cluster			
0	19	0	3
1	15	0	0
2	28	0	1
3	0	1	30



In the above Mosaic plot it can be seen that in Segment 0, Segment 1, Segment 2 the number of people having High Financial Conditions are more whereas in Segment 3 the number of people having Middle Financial Condition are more.

Mosaic Plot for Car Type

Car Type	Hatchback	Luxuray	SUV	Sedan
cluster				
0	6	0	8	8
1	0	2	13	0
2	2	0	17	10
3	22	0	2	7



In the above mosaic plot it can be seen that people from Segment 0, Segment 1, Segment 2 are more inclined towards buying an SUV whereas the people in Segment 3 are more inclined towards buying the Hatchback Car Type.

5. Selecting Target Segment

Selecting the target segment of many marketing segments is the most important decision. The selection of one or more target segments is a long-term decision significantly affecting the future performance of an organization. Below we can see a table which compares the values of all of the variables from each market segment.

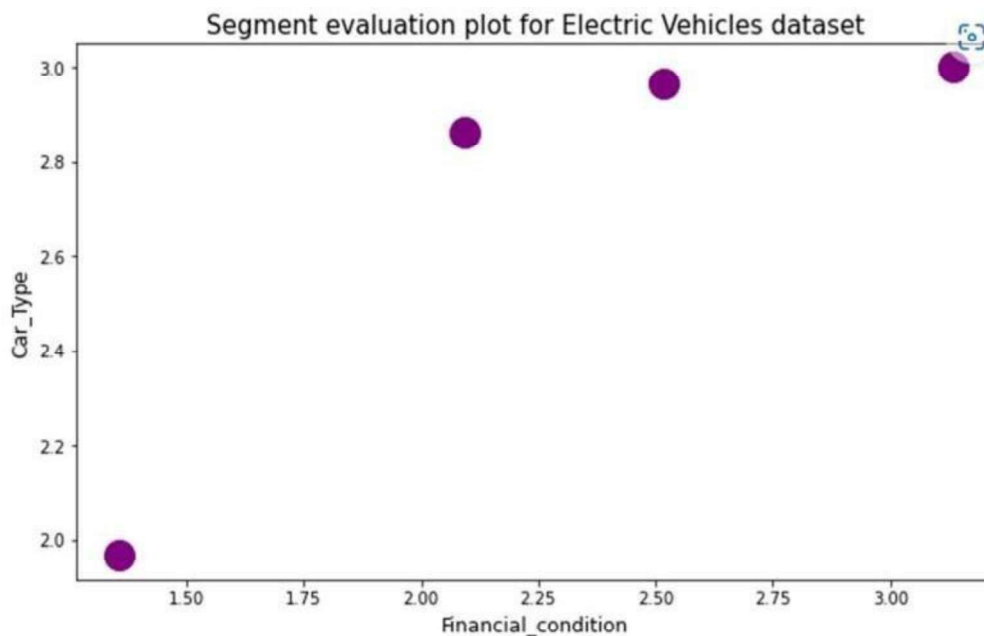
cluster	Financial Condition	Wife Salary	Salary	Total Salary	Age	Marital Status	Profession	Education	No of Dependents	Car Type	Price	
0	0	2.863636	0.000000e+00	2.290909e+06	2.290909e+06	40.545455	0.909091	0.409091	0.590909	2.681818	2.090909	1.136364e+06
1	1	3.000000	1.586667e+06	2.653333e+06	4.240000e+06	42.200000	1.000000	0.200000	0.666667	2.533333	3.133333	1.740000e+06
2	2	2.965517	8.655172e+05	1.517241e+06	2.382759e+06	35.379310	1.000000	0.275862	0.482759	2.275862	2.517241	1.341379e+06
3	3	1.967742	1.032258e+05	1.141935e+06	1.245161e+06	31.612903	0.580645	0.483871	0.580645	1.580645	1.354839	8.838710e+05

From the above table we can infer that our target segment should be Segment 2. The reason for this selection is as follows –

- 1) Consumers in Segment 2 have high Financial Status and hence they can easily afford to buy Electric Vehicles.
- 2) The average age in Segment 2 is close to 35 and hence this segment is more likely to buy EV as compared to others according to various researches which states that men aged between 30-45 years are most likely to buy EVs.
- 3) Also, most of the consumers in this segment are salaried people and hence they have a stable income and comparatively more job secure and hence their chances of buying EV will be high.

4) Also, the preferred Car Type of the Segment 2 is SUV and the average price range of an EV SUV is 14 lakh – 17 lakh which is closer to the price paid by this segment for their conventional SUVs. Hence EV SUVs will be able to easily attract this market segment.

Hence after going through all the analysis conducted above the target segment for an EV startup company should be segment 2. Now the other dilemma is to establish the type of Car to be manufactures to attract this market segment. Hence to analyse that we willplot a Segment Evaluation plot.



In the above segment evaluation plot, it is clear that Segment 2 which is having good Financial Condition are preferring to Buy SUVs over other Car Types. Hence it can be concluded that the new EV start-up Company should initially focus on manufacturing EV SUVs in order to attract this particular market segment which will help them to create a strong potential customer base in the early market.

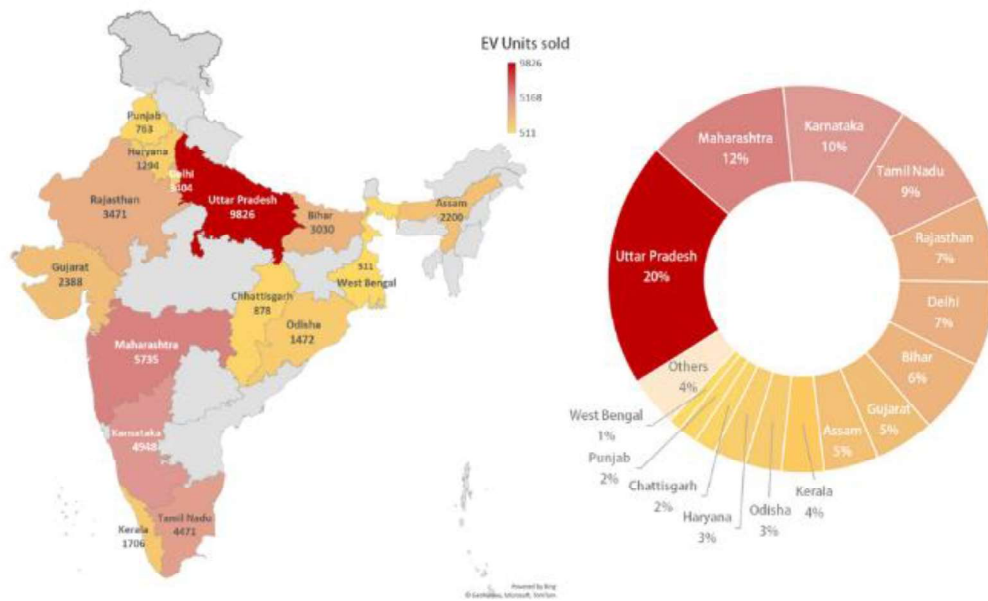
6. Marketing Mix

For marketing, geometric segmentation plays an important and crucial role.

Geographic segmentation categorizes the target market into segments where marketers can better serve customers in a specific region. This kind of Market segmentation is based on the geographical entities themselves (countries, states, city, etc.), but also depends on various geographical factors such as climate, culture, etc. settings, population, etc. Geographic segmentation includes segmentation Target users based on where they live or work. You can do this any number of times Possibilities: Group customers by country of residence or smaller geographical countries Department from region to city to postal code.

Geographic segmentation is probably the simplest market segmentation Please look back. However, there are still many opportunities that companies will never take advantage of think about. The size of the target area should be changed as needed business

After our analysis and research, we came to the conclusion that in India there are 4-5 states such as Uttar Pradesh, Delhi, Maharashtra, Karnataka, Tamil Nadu etc which provide suitable locations for EV start-ups to start their operations. These states have announced several policies for the growth of EV Vehicles and hence are ideal destinations for any EV Start-up company to start their operations.



India's Electric Vehicle Sales Trend | January

2022

7.Potential Customer Base for Business Markets

There are 87,554 electric vehicles sold during 2017-2018, it increased to 131,554 units in

2018-2019 and again raised in 2019-2020 to 161,308 further due to Covid-19 it became 119,650 units. This number included both two-wheelers, three-wheelers, four wheelers and buses but two-wheeler sales have been increasing. A significant portion of the electric vehicles registered in the country are two- and three-wheelers.

- The Electric 2-Wheeler sales have increased by 463.61% from FY 2021 to FY2022. It is increasing rapidly; the Electric 2-Wheeler sale will reach 400,000 units to 450,000 units in FY 2023.

The Electric 3-Wheeler sale has increased by 212.45% from FY 2021 to FY2022.It is increasing rapidly the Electric 3-Wheeler sale will reach 75,000 units to 80,000 units in FY 2023.

- The Electric 4-Wheeler sales have increased by 344.65% from FY 2021 to FY2022. It is increasing rapidly the Electric 4-Wheeler sale will reach 50,000 units to 55,000 units in FY 2023.
- Karnataka, Tamil Nadu, Maharashtra, Telengana and Rajasthan have combined 67% sales share in high speed 2-wheeler electric vehicles.
- Uttar Pradesh,
- Bihar, Delhi and Assam have highest percentage of L3 category 3- wheelers electric vehicles sales.
- Telangana, Karnataka and Delhi have highest number of high speed L5 category electric 3-wheeler vehicles sales.
- Maharashtra has highest 4-wheeler EV sales in 2021 (26%) followed by Delhi and Telangana (13% each).
- Maharashtra and Gujarat have highest e-Bus sales accounting for 47% and 18% units sold respectively.

Potential Customer Base * Your Target Price Range = Potential Profit

- For Electric 2-Wheeler, the per unit average price will be 1,00,000 and the number of units sold will be around 4,25,000.

Potential Profit in India = $425000 * 100000 = \text{Rs } 42.5 \text{ Billion}$

Potential Profit in Karnataka = $35,000 * 1,00,000 = \text{Rs } 3.5 \text{ Billion}$.

Potential profit in Maharashtra and Tamil Nadu = $30,000 * 1,00,000 = \text{Rs } 3 \text{ Billion}$ each in both the states.

- For Electric 3-Wheeler, The per unit Average price will be 2,00,000 and the number of units sold will be around 150000.

Potential Profit in India = $150000 * 200000 = \text{Rs } 30 \text{ billion}$

Potential profit in Uttar Pradesh = $65000 * 200000 = \text{Rs } 13 \text{ Billion}$.

- For Electric 4-Wheeler, The per unit Average price will be 15,00,000 and the number of units sold will be around 50000.

Potential Profit = $50000 \times 15,00,000 = \text{Rs } 75 \text{ billion}$.

Potential Profit for Electric 4-wheelers in Maharashtra = $5000 \times 15,00,000 = \text{Rs } 7.5 \text{ billion}$

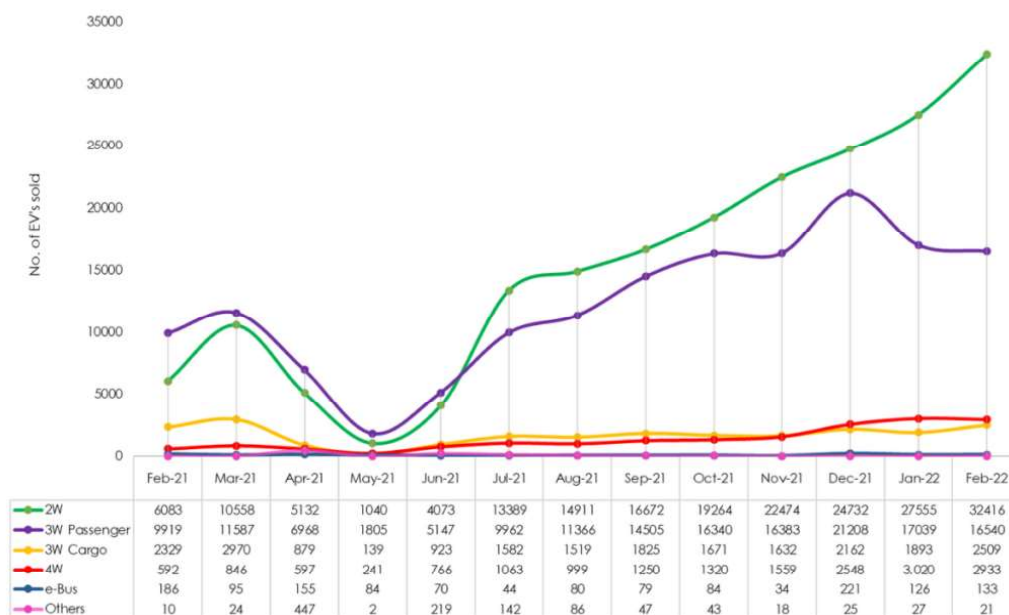
Potential Profit for Electric 4-wheelers in Delhi and Telangana = $2500 \times 15,00,000 = \text{Rs } 3.75 \text{ Billion each in both these states}$.

8.MOST OPTIMAL MARKET SEGMENTS

From the above report, we conclude that to create an Electric Vehicle startup in India, the most optimal market segment for us will be based on Geographic and Demographic segments which would be the most amount of EVS sold in particular states and the type of electric vehicle respectively.

EV Category wise Sales trend from Feb 2021- Feb 2022

3,99,349 EVs sold from Feb '21 to Feb '22



Electric Vehicles(EV) Sales in India FY 2022

Segment-wise sale of Electric Vehicles in India in H1 FY2022



EVs Sold FY 2022:

1,23,915 Units

2-Wheelers  46%
57,043

3-Wheelers  48%
58,397

4-Wheelers  3%
5,726

Commercial  1%
990

Source : CEEW-CEF | ecogears.in

Graphics@ecogears.in

After analyzing the EV market using Market Segmentation Analysis, the feasible strategy that we have come up with is that we should focus on the states that have more demand for EVs like Uttar Pradesh, Delhi and Karnataka, Maharashtra.

Also, one more reason to set up the start-up in these 3 states is that the infrastructure required for the EVs including the charging station is available which would ease the burden in setting up of the start-up process and also the governments are providing a lot of subsidies to the people as well as for the company in order to encourage electric vehicles.

Also, the EV start-up company should focus on developing EV 2-Wheelers and SUVs in EV 4-wheelers which will help them get a good potential customer base according to our research and analysis and will help the company to grow in the early market.

GitHub Link :- https://github.com/AkshayAthelits/Fenny_Lab_Project_3

Thank you !