MARKET SEGMENTATION STUDY

Analysing the Electric Vehicle Market in India for New Product Launch

By

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Introduction

India, the world's third-largest automobile market, is making major strides in its electric vehicle (EV) transition to reduce reliance on imported fossil fuels and combat intense urban pollution. The EV industry in India is witnessing rapid expansion, driven by supportive government policies, growing environmental awareness, and ongoing technological progress. Through initiatives such as the FAME (Faster Adoption and Manufacturing of Hybrid and Electric Vehicles) scheme, the country is actively promoting EV adoption to transform its transport system toward a more sustainable and innovative future.

India EV Market Growth Targets

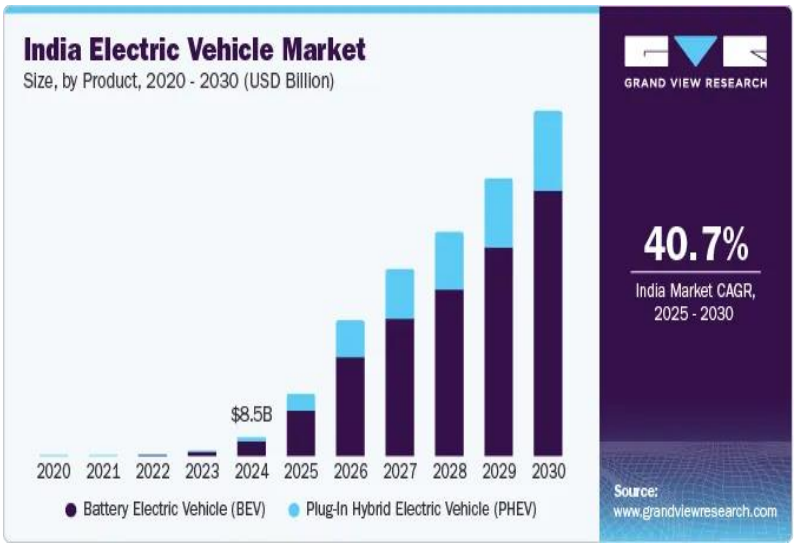
India has set ambitious targets for electric vehicle (EV) adoption by 2030, aiming for EVs to comprise 30% of private car sales, 70% of commercial vehicles, 40% of buses, and 80% of two- and three-wheelers. This translates to a projected 80 million EVs on Indian roads by the end of the decade. The country also seeks to achieve full domestic EV manufacturing under the 'Make in India' initiative.

Globally, the EV market was valued at US$ 255.54 billion in 2023 and is expected to soar to approximately US$ 2,108.80 billion by 2033, reflecting a robust compound annual growth rate (CAGR) of 23.42% from 2024 onward.

In India, EV sales reached 1,69,931 units in January 2025, marking a 19.4% month-over-month and 17.1% year-over-year increase. The year 2023 saw a 49.25% rise in EV sales, totaling 1.52 million units, signaling growing momentum despite the industry still being in its developmental phase.

Looking ahead, Indian carmakers are set to introduce nearly a dozen new EV models in 2025, with an emphasis on premium offerings. This comes as domestic EV sales continue to climb—up 20%—despite a slowdown in global demand, aligning with the nation's 30% adoption goal by 2030.

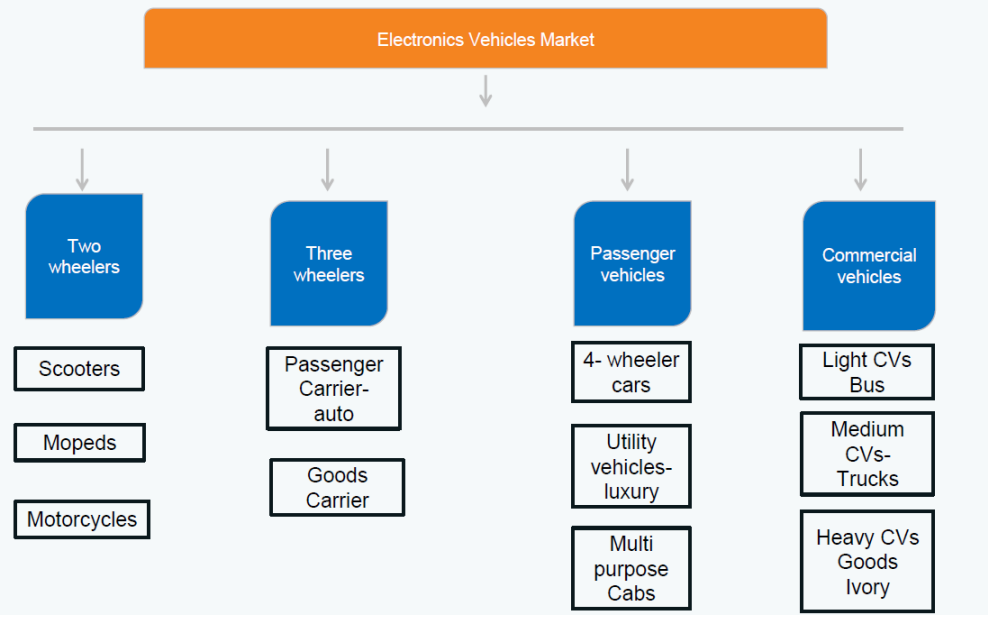
Growth of the Electric Vehicle Market



India is expected to see more electric vehicle (EV) launches than petrol and diesel car launches in 2025. Eighteen out of 28 planned vehicle launches are electric. This is a significant increase from the four to five EV models launched annually in the past two years. It also surpasses the 11 and 15 total vehicle launches (including both EV and internal combustion engine models) in 2023 and 2024, respectively.

Zero-emission vehicles are predicted to drive growth in the auto sector, accounting for over half of the sales increase. Analysts expect EVs to add 200,000 units to the passenger vehicle market this year. This will double the EV share of total car sales to 4% by the end of 2025.

Major Product Segments



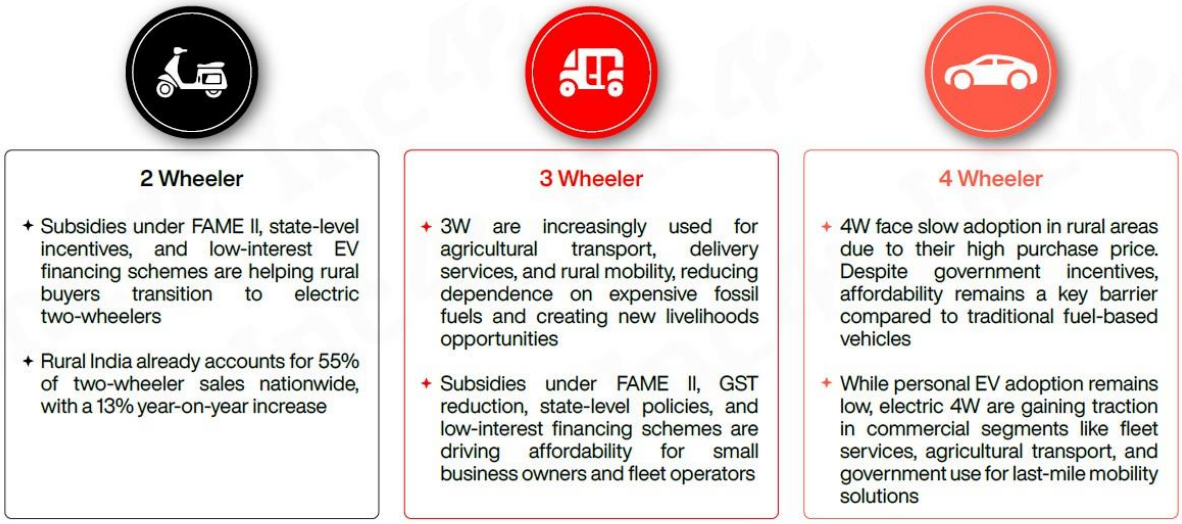
Future of the Electric Vehicle Market

The electric vehicle market is expected to grow at a compounded annual growth rate (CAGR) of 43%, reaching 932,000 units by 2030. Of this, 61% of the demand is expected to come from electric SUVs. In comparison, EV sales in 2024 were modest at 107,000 units, while approximately 4.3 million cars, including sedans and SUVs, were sold across India.

Notable Government Initiatives in EV market

The government has launched important initiatives like the National Electric Mobility Mission Plan (NEMMP) and the Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) programs, aiming to electrify public transportation as well as two and three-wheeled vehicles. The government also aims for 30% of new vehicle sales to comprise of EV by 2030.

Accelerating EV Adoption in Rural India: A Comparative Analysis Of 2W, 3W,4W



Source: Inc42 Analysis

Challenges Faced by the Indian EV Market

Despite these efforts, EV adoption challenges remain, including high vehicle costs, inadequate charging infrastructure and supply chain issues.

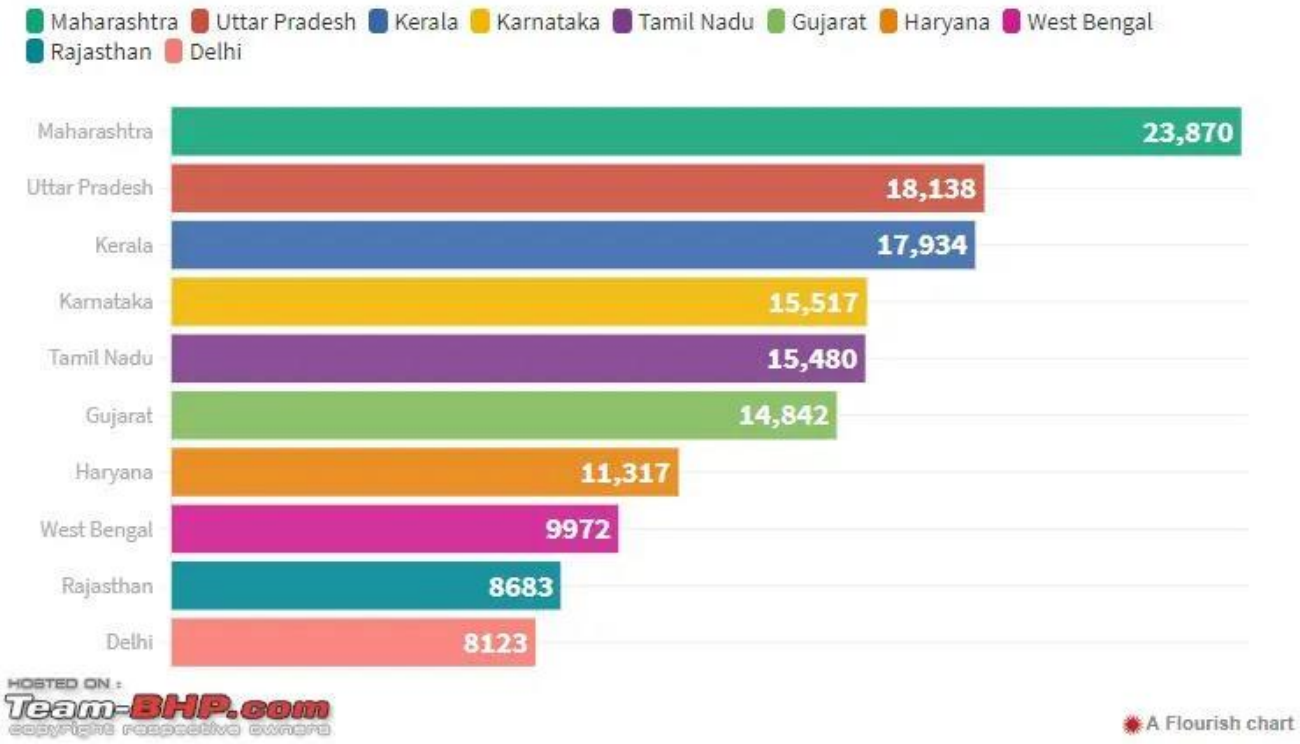
1. **Patchy distribution, range anxiety:** Most charging stations are clustered in urban centres, leaving rural areas and highways bereft of charging options. This creates range anxiety for potential EV buyers, limiting travel choices.
2. **High costs, low returns:** Setting up charging stations, especially fast-charging ones, requires significant investments. Land acquisition, equipment installation, and grid upgrades add to the costs. This can become a roadblock for private players to scale.
3. **Lack of awareness:** Public awareness about EV charging options and their benefits remain limited. Addressing knowledge gaps through awareness campaigns and accessible information can encourage wider adoption, leading to a greater demand for charging infrastructure.
4. **High vehicle costs:** 4W adoption remains limited due to high upfront costs compared to ICE models and an underdeveloped charging infrastructure. Also, in the 3W passenger vehicle segment, EV penetration remains at 5%–7%, hindered by high costs and alternative options like CNG

However, domestic players such as Tata Motors and Hero Electric are now investing in the EV space. Moreover, with India's large market potential, skilled workforce and renewable energy resources, the country is well positioned to overcome these barriers and become a significant player in the global EV landscape.

Key Players and Primary Investors in the Electric Vehicles Market

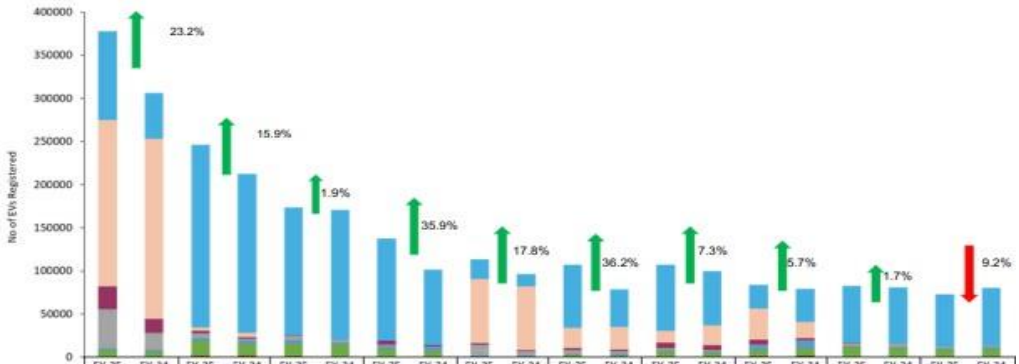
- Tata Motors
- Baja Auto
- Hyundai Motor
- Hero MotoCorp
- Mahindra

The Top 10 states in terms of Car Sales for Sep 2020 is as shown –



- For FY 2024-25, electric vehicle sales in India exceeded 2 million units - 20,37,831 units.
- The major states that contributed to this sum are Uttar Pradesh (18.52%), Maharashtra (12.08%), Karnataka (8.52%), and others mentioned above.
- The 10 states mentioned above contributed to 73.7% of all electric vehicles sold in the country during FY 2024-25.

Segment-wise sales in Top EV states in India | FY 24-25



	UTTAR PRADESH		MAHARASHTRA		KARNATAKA		TAMIL NADU		BIHAR		MADHYA PRADESH		RAJASTHAN		DELHI		KERALA		TELANGANA	
	FY-25	FY-24	FY-25	FY-24	FY-25	FY-24	FY-25	FY-24	FY-25	FY-24	FY-25	FY-24	FY-25	FY-24	FY-25	FY-24	FY-25	FY-24	FY-25	FY-24
e-2W	102579	53622	211905	183961	148304	150194	118836	87402	23063	14383	73451	43370	76243	62671	27242	38270	65887	65201	60350	66925
e-Rickshaw	193036	208333	3926	5096	19	51	4	2	74426	74027	23451	26626	14077	23184	36160	18890	0	8	7	2
e-Cart	26441	16056	2594	1724	268	210	4455	1735	1769	1151	2019	1649	6278	5659	5570	2153	127	76	26	14
e-3W Pax (L5M)	45855	20495	6030	2753	5466	3191	1481	430	12325	5214	4937	2969	2267	1446	1170	433	3703	4233	2672	1350
e-3W Goods (L5N)	1484	1481	2541	3039	3745	2283	3479	4018	1004	953	478	1965	1062	1327	4855	8547	540	776	1078	1756
e-4W	7860	5818	17134	14140	14599	13544	8532	6983	963	729	2717	1965	6649	5154	6980	8895	11927	10485	8291	9739
e-Goods Carrier	205	646	1097	1021	459	375	862	646	93	28	152	138	344	181	542	468	189	131	203	264
e-Bus	43	0	924	638	731	591	5	0	0	0	50	45	11	9	967	1327	35	95	179	126
e-Others	62	1	109	40	33	27	45	133	1	1	3	17	32	32	2	3	7	14	0	0
Total	377565	306452	246260	212412	173624	170466	137699	101349	113644	96486	107258	78744	106963	99663	83488	78986	82415	81019	72806	80176
% Annual Growth	23.2%		15.9%		1.9%		35.9%		17.8%		36.2%		7.3%		5.7%		1.7%		-9.2%	

Source: Vahan Dashboard Data (Apr 2024-Mar 2025) as per 1378 out of 1479 RTOs across 35 out of 36 state/UTs and Telangana Regional Transport portal (Apr 2024-Mar 2025). Low speed 2W data not included.

1. Uttar Pradesh continues to generate the highest electric vehicle sales. The majority (51.12%) of electric vehicles sold in the state were e-rickshaws, followed by e-2Ws, accounting for 27.16% of the state's EV sales. e-Bus sales in the state was at 43 units for FY 2024-25.
2. Maharashtra saw promising EV sales with 2,46,250 units in FY 2024-25. e-2Ws accounted for the majority of sales in the state (86.05%) of all EVs sold in Maharashtra, followed by e-4Ws with a 6.95% share of the pie. 8.34% of all e-2Ws sold in Maharashtra were electric. Of all the states in India, Maharashtra ranks the highest for e-2W sales with 2,11,905 units, i.e. 17.5% of all e-2Ws sold in India and e-4W segment with 17,134 units, i.e. 14.79% of all e-4Ws sold in India, respectively.
3. Karnataka ranks 3rd with sales of 1,73,624 EVs, of which 85.4% (1,48,304 units) are e-2Ws. Karnataka is the second-highest e-2W-selling state in the country. 11.3% of all 2Ws sold in Karnataka in FY 2024-25 were electric. The state also ranks second in e-4W sales with 14,599 units after Maharashtra.
4. Delhi holds the highest EV penetration for the e-bus segment i.e. 40.22% in FY 2024-25, i.e. over 40% of buses registered in Delhi were electric.

The Indian consumer landscape

India's consumer landscape is undergoing a remarkable transformation, driven by demographic changes, economic growth, and evolving aspirations. The shift toward premiumisation reflects deep socioeconomic trends as consumers transition from prioritising value-for-money to embracing quality, innovation, and aspirational products.

The rising middle class and disposable income

The middle-class population in India is typically defined as households with an annual income between US$ 5,875 (Rs. Five lakh) and US$ 35,252 (Rs. Thirty lakh), characterised by discretionary spending and aspirations for better living standards. India's middle class has emerged as a major economic force, propelling growth in consumption and shaping market trends. As per recent studies, India is expected to become the third-largest consumer economy globally by 2030, with consumer spending projected to reach US$ 6 trillion from US$ 2.4 trillion in 2022.

A recent survey reveals strong interest among Indian consumers in new energy vehicles (NEVs), with 83% of respondents indicating their readiness to choose NEVs exclusively for future purchases by the end of this decade. The expanding middle class, which is expected to dominate consumption patterns, has emerged as a key driver of this upward trend. Improved rural income levels, driven by advancements in agricultural productivity and government welfare programs, have further bolstered this growth, reducing income disparity.

Given that a sizable section of the general population is still value-conscious, **pricing sensitivity** is one of the key issues. However, this also gives companies a chance to create tiered goods and creative pricing schemes. Businesses can reach aspirational customers who are eager to pay more but are wary of high price points by launching reasonably priced luxury EVs or smaller premium versions.

Problem Statement

To analyse the Electric Vehicle product and consumer market in India using Segmentation as well as Regression analysis and come up with a feasible strategy to enter the market, targeting the segments most likely to use Electric vehicles.

Datasets Used

We have used 2 datasets in this study to analyse different variables:

1. Electric vehicle sales-by state-in India (Kaggle): (96845 rows, 8 columns)
2. Indian automobile buying behaviour study 1.0: (99 rows, 13 columns)

Analysis and Approaches used for Segmentation

1. **Clustering**: Clustering is an unsupervised machine learning technique used to group similar data points based on their features. It does not rely on predefined labels, making it ideal for exploring structure in unlabeled datasets. Algorithms like K-Means, DBSCAN, or Hierarchical Clustering identify patterns by measuring distances or densities among data points. Clustering is commonly applied in customer segmentation, pattern recognition, and anomaly detection tasks.
2. **Random Forest**: Random Forest is a supervised learning algorithm that combines the output of multiple decision trees to improve predictive performance. It builds each tree using random samples and a subset of features, making the model robust and less prone to overfitting. The ensemble approach allows it to handle both classification and regression problems effectively. Random Forest also provides insights into feature importance, which is useful for interpretation.
3. **Logistic Regression:** Logistic Regression is a supervised learning algorithm used for binary or multi-class classification tasks. It models the probability of a categorical outcome based on input features using the logistic (sigmoid) function. Unlike linear regression, its output ranges between 0 and 1, making it ideal for predicting the likelihood of class membership. Logistic Regression is widely used due to its simplicity, interpretability, and effectiveness in problems like spam detection, customer churn prediction, and medical diagnosis.
4. **XGBoost**: XGBoost (Extreme Gradient Boosting) is a powerful and scalable machine learning algorithm widely used for structured data tasks. It builds decision trees sequentially, with each new tree aiming to correct the errors of the previous ones using gradient descent. XGBoost includes regularization techniques that prevent overfitting, making it highly accurate and reliable. Due to its speed and performance, it is frequently used in competitive ML environments and industry applications.

Methodology and Coding

1. **Loading Libraries and data**

```
:  import pandas as pd
   import matplotlib.pyplot as plt
   import seaborn as sns
   from sklearn.preprocessing import StandardScaler, OneHotEncoder
   from sklearn.cluster import KMeans
   from sklearn.compose import ColumnTransformer
   from sklearn.pipeline import Pipeline
   from sklearn.impute import SimpleImputer
   from sklearn.decomposition import PCA
```

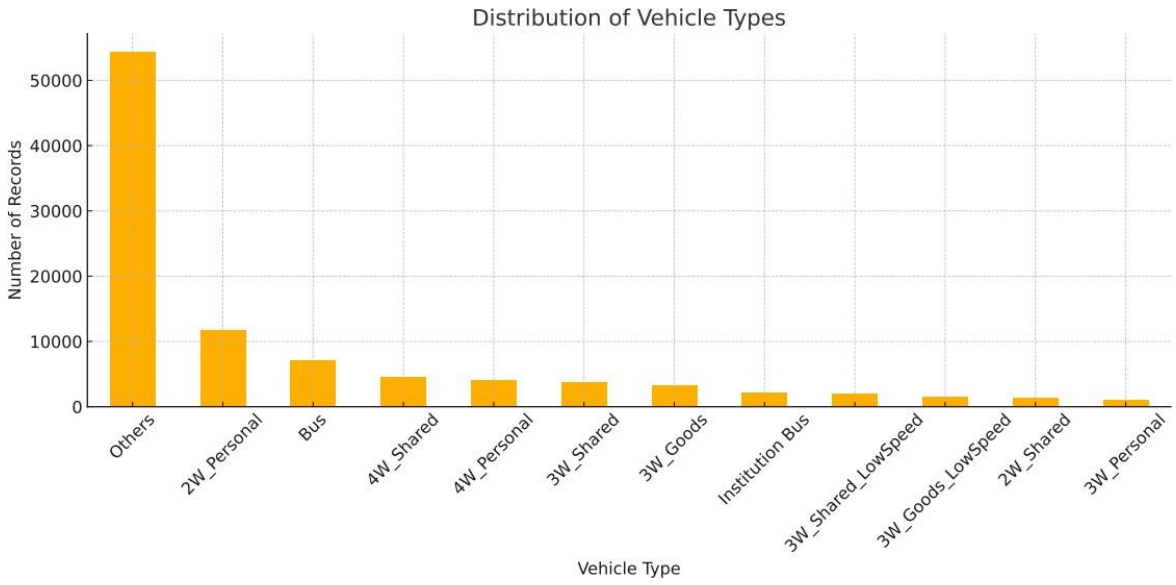
2. **Cleaning and Preprocessing the data**: Checking for missing values, duplicate values, outliers and wrong data types.

3. **Univariate and Bivariate analysis of EV Market**

Distribution of Vehicle Types

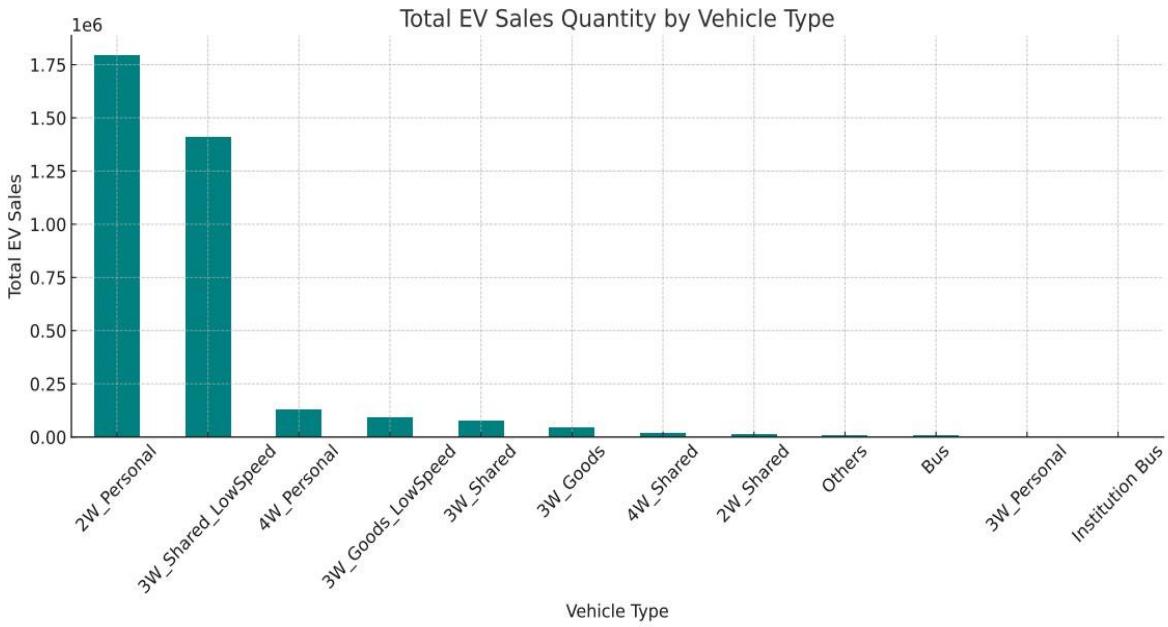
The dataset reveals that the most common vehicle type recorded is labelled as "Others" (54,423 entries). This is followed by:

- 2W_Personal: 11,700 entries
- - Bus : 7,026 entries
- - 4W_Shared : 4,580 entries
- - 4W_Personal: 4,111 entries
- - 3W_Shared : 3,786 entries



EV Sales Quantity by Vehicle Type

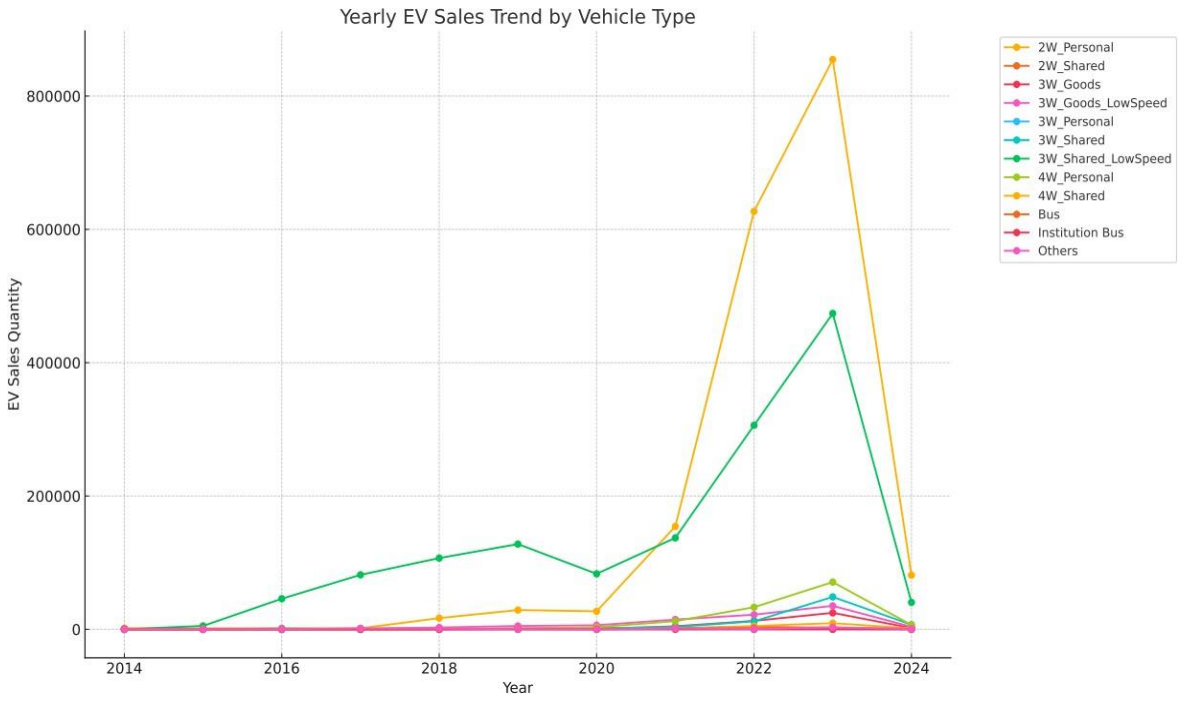
When examining total sales quantity, the results show:



- 3W_Shared vehicles recorded the highest overall sales, suggesting their popularity for public transport or ride-sharing.
- 2W_Personal and 4W_Personal vehicles also contributed significantly to total EV sales.
- Buses and Goods carriers (3W_Goods and 3W_Goods_LowSpeed) showed modest adoption, likely constrained by infrastructure and policy support.

Yearly Trend of EV Sales by Vehicle Type

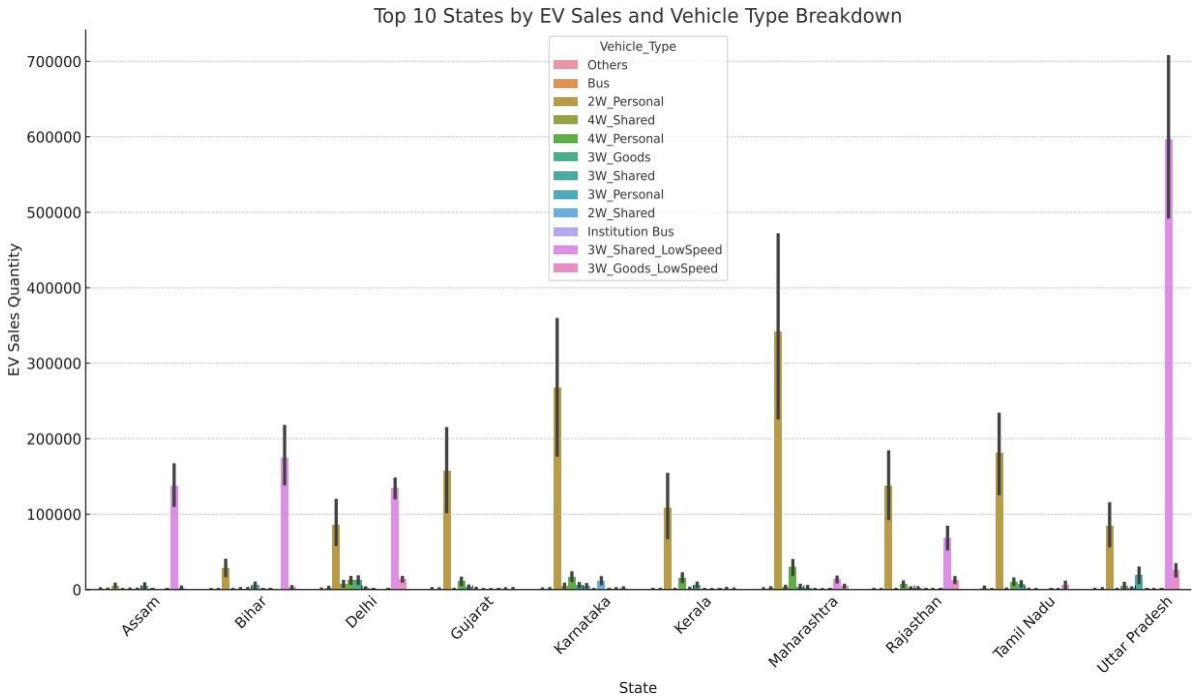
EV sales have risen steadily from 2014 to 2024. In particular:



- Sales surged notably post-2018, with a steep increase from 2020 onward.
- Personal vehicles (especially 2W and 4W) showed rapid growth in recent years.
- Institutional Bus sales peaked around 2022, potentially due to government fleet electrification programs.

State-wise Sales Distribution

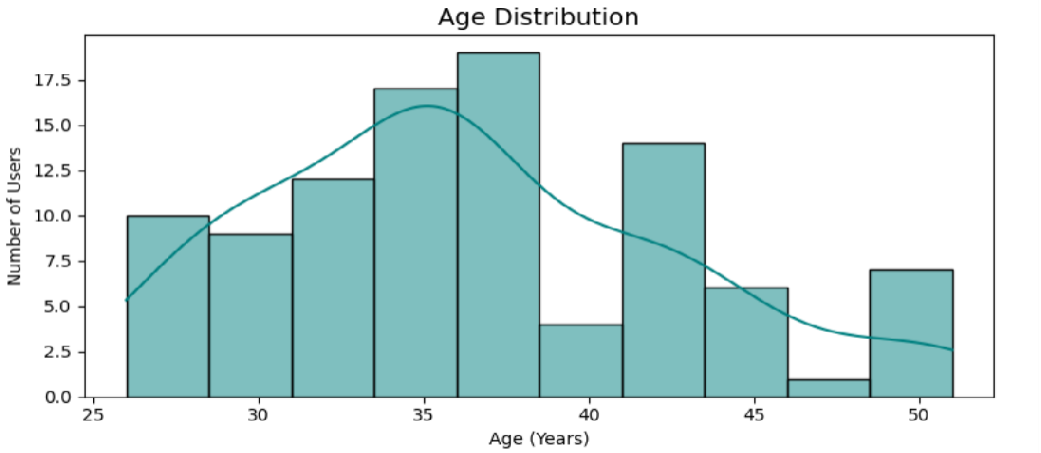
Among the states:



- Maharashtra, Uttar Pradesh, Karnataka, and Delhi consistently lead in EV sales.
- Different states favour different vehicle types. For example:
    - Karnataka and Delhi show high adoption of 2W and 3W shared vehicles.
    - Uttar Pradesh leads in 3W_Goods and shared low-speed variants.

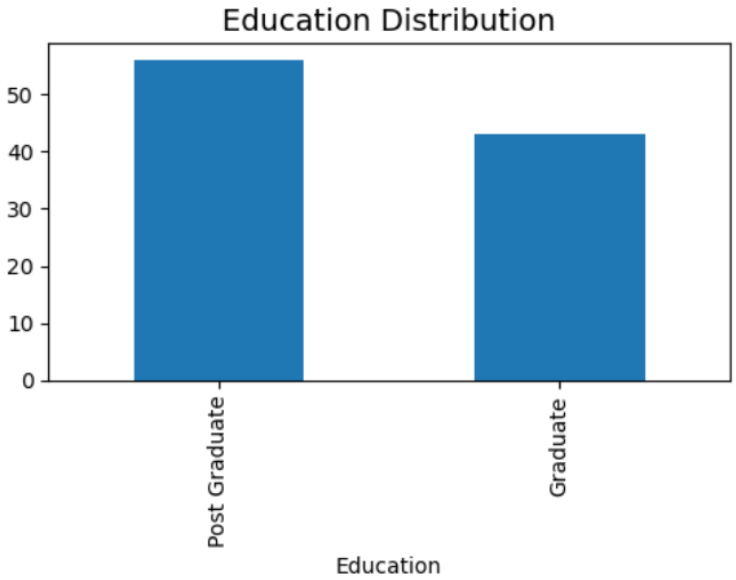
4. Univariate and Bivariate analysis of Consumers

Age



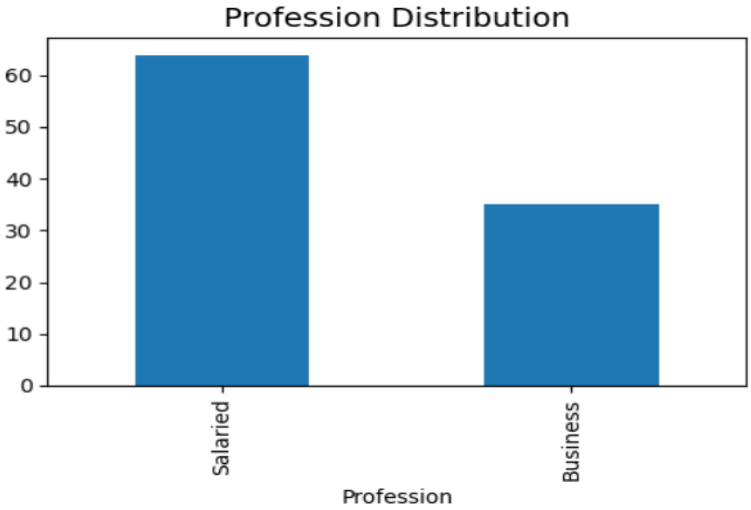
- The consumers' age ranges from 26 to 51 years.

Education



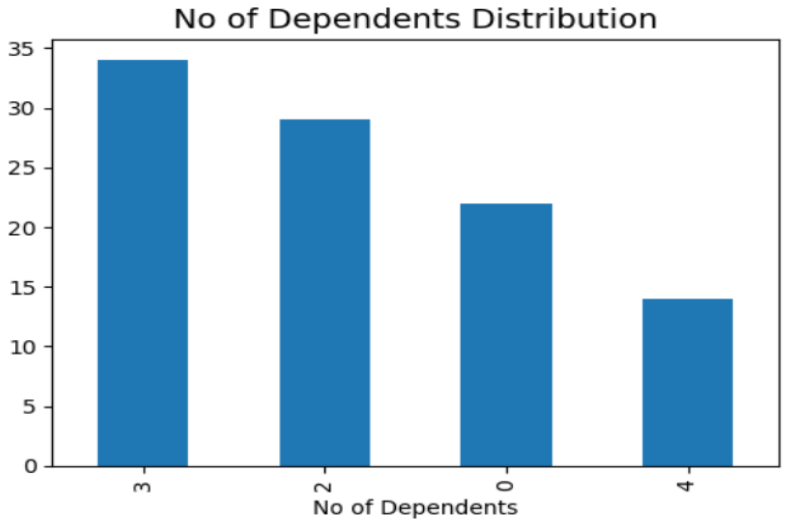
- There are more postgraduates than graduates among the sample of consumers.

Profession



- There are more salaried than business class consumers in the sample.

No. of dependents

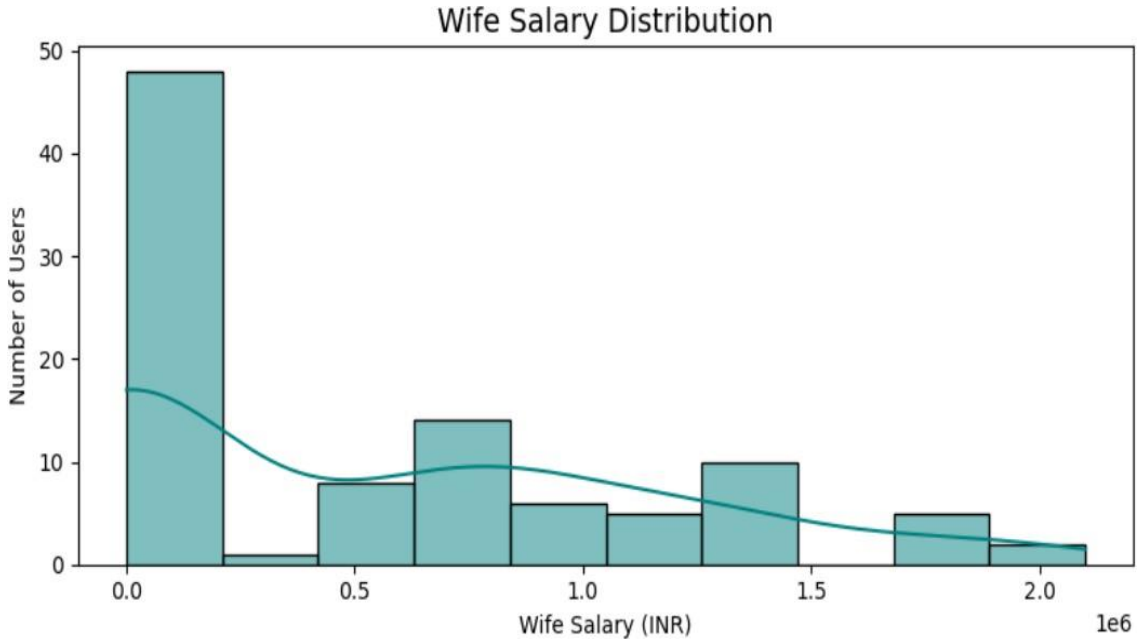


- The number of dependents range from 0 to 4.

Husband's Salary

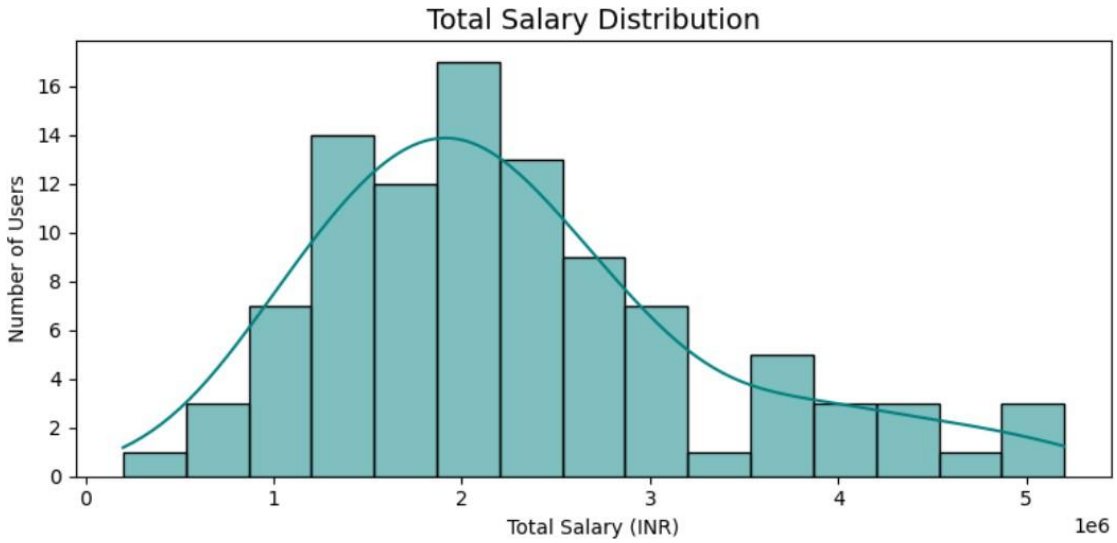
- The husband's salary ranges from INR 2,00,000 to 38,00,000.

Wife's Salary



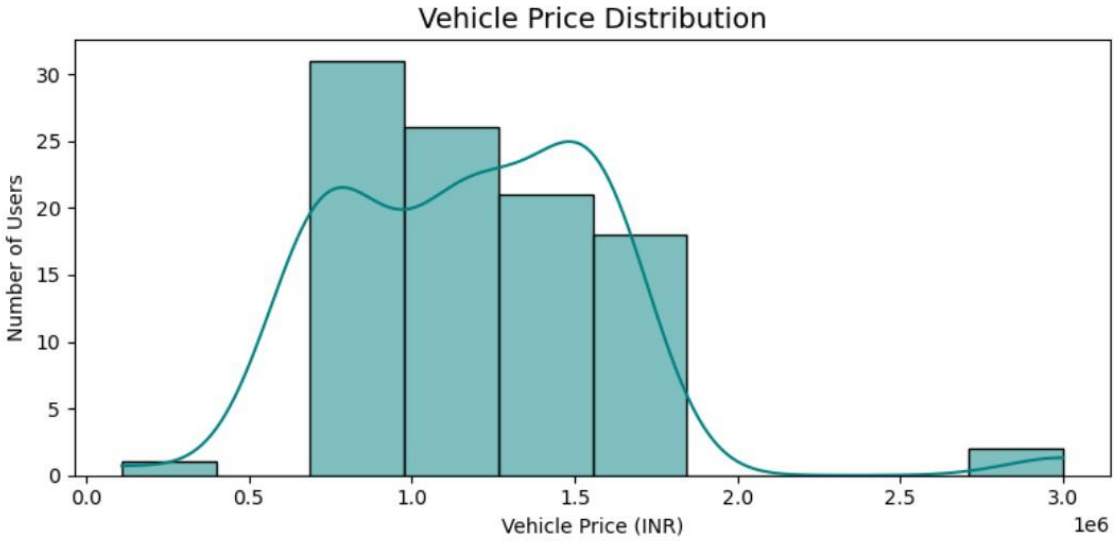
- The wife's salary ranges from INR 0 to 21,00,000.

Total Salary for the Household



- The combined salary of the couple ranges from INR 2,00,000 to 52,00,000.

Vehicle Price



- The price of the vehicle bought by the family ranges from INR 1,10,000 to 30,00,000.

5. Encoding and Scaling the data

```
from sklearn.preprocessing import StandardScaler, OneHotEncoder
from sklearn.compose import ColumnTransformer

# Identify categorical and numerical columns for clustering
demographic_cols = ['Age', 'Profession', 'Marrital Status', 'Education', 'No of Dependents',
                    'Personal loan', 'House Loan', 'Wife Working', 'Salary', 'Wife Salary', 'Total Salary', 'Price']

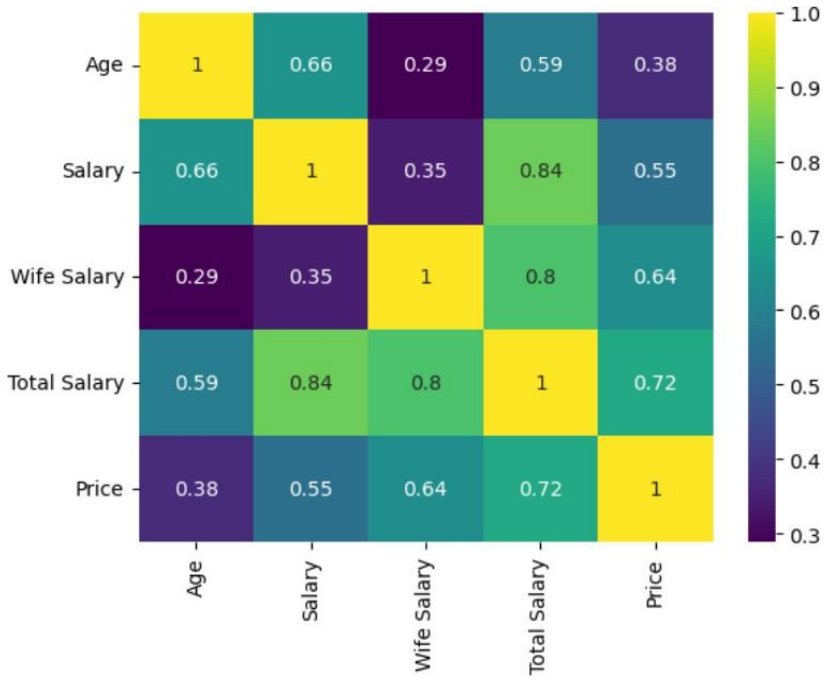
# Separate features into categorical and numerical
categorical_features = [col for col in demographic_cols if df[col].dtype == 'object']
numerical_features = [col for col in demographic_cols if df[col].dtype in ['int64', 'float64']]

# Create a preprocessor using ColumnTransformer
# It will apply OneHotEncoder to categorical features and StandardScaler to numerical features
preprocessor = ColumnTransformer(
    transformers=[
        ('num', StandardScaler(), numerical_features),
        ('cat', OneHotEncoder(handle_unknown='ignore'), categorical_features)
    ])
```

6. Correlation Matrix

	Age	Salary	Wife Salary	Total Salary	Price
Age	1.000000	0.656442	0.288546	0.587082	0.376661
Salary	0.656442	1.000000	0.347934	0.841545	0.547630
Wife Salary	0.288546	0.347934	1.000000	0.799238	0.635858
Total Salary	0.587082	0.841545	0.799238	1.000000	0.717442
Price	0.376661	0.547630	0.635858	0.717442	1.000000

7. Heatmap



- Both the Correlation matrix and Heatmap show that 'Vehicle Price' is strongly correlated with the Husband's salary, Wife's salary as well as the Total Salary.

8. Demographic profile affecting the Vehicle Price

Groupby analysis of demographic variables with the vehicle price shows that:

- Postgraduate consumers are most likely to purchase higher price vehicles than graduate consumers.
- Salaried consumers are most likely to purchase higher price vehicles than business class consumers.
- Married consumers are most likely to purchase higher price vehicles than single consumers.
- Consumers not having personal and home loans are most likely to purchase higher price vehicles than those having it.

9. Calculating Optimum Clusters with Elbow Method

```
from sklearn.cluster import KMeans
import matplotlib.pyplot as plt

# Determine optimal number of clusters using the Elbow Method
sse = [] # Sum of squared distances of samples to their closest cluster center.
for k in range(1, 11):
    kmeans = KMeans(n_clusters=k, random_state=42, n_init=10)
    kmeans.fit(df_processed)
    sse.append(kmeans.inertia_)

# Plot the Elbow curve
plt.figure(figsize=(10, 6))
plt.plot(range(1, 11), sse, marker='o')
plt.xlabel('Number of Clusters (k)')
plt.ylabel('SSE (Sum of Squared Errors)')
plt.title('Elbow Method for Optimal k')
plt.grid(True)
plt.savefig('elbow_method.png')
```

```
▶ Warning (10)
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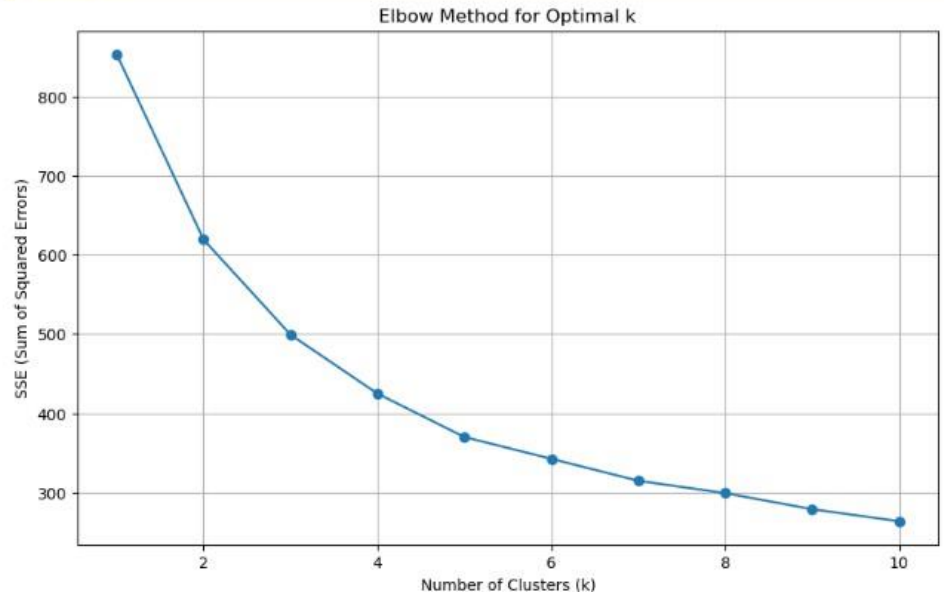


10. Applying clustering

```
from sklearn.decomposition import PCA
import seaborn as sns

# Apply K-Means clustering with the chosen number of clusters (e.g., 4)
n_clusters = 4
kmeans = KMeans(n_clusters=n_clusters, random_state=42, n_init=10)
df['Cluster'] = kmeans.fit_predict(df_processed)
```

11. Reducing dimensionality with PCA

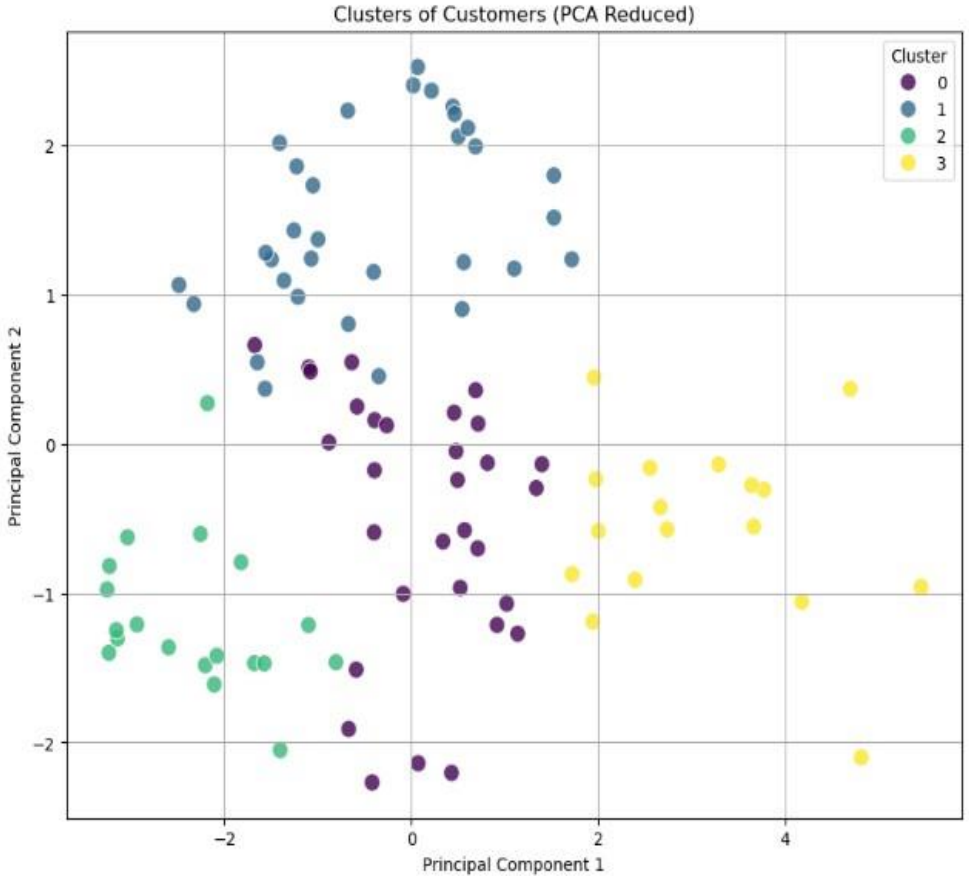
```
# Reduce dimensionality for visualization using PCA
pca = PCA(n_components=2)
df_pca = pca.fit_transform(df_processed)
df_pca = pd.DataFrame(df_pca, columns=['PC1', 'PC2'])
df_pca['Cluster'] = df['Cluster']
```

```
df_pca
```

	PC1	PC2	Cluster
0	-3.251470	-0.975925	2
1	-0.389534	0.156933	0
2	0.070229	2.520093	1
3	0.459334	0.207556	0
4	0.525671	-0.964987	0
...	...	...	...
94	-0.804006	-1.463153	2
95	4.696901	0.366940	3
96	0.465174	2.206793	1
97	3.289491	-0.139091	3
98	0.606284	2.112668	1

12. Applying PCA results to clusters to Visualize clusters

```
# Visualize the clusters
plt.figure(figsize=(10, 8))
sns.scatterplot(x='PC1', y='PC2', hue='Cluster', data=df_pca, palette='viridis', s=100, alpha=0.8)
plt.title('Clusters of Customers (PCA Reduced)')
plt.xlabel('Principal Component 1')
plt.ylabel('Principal Component 2')
plt.legend(title='Cluster')
plt.grid(True)
plt.savefig('customer_clusters_pca.png')
```



13. Deriving the income ranges of the clusters

Salary Ranges for Each Cluster (4 Clusters):

Cluster 0: Salary from INR 900,000 to INR 2,200,000

Cluster 1: Salary from INR 200,000 to INR 3,100,000

Cluster 2: Salary from INR 800,000 to INR 2,400,000

Cluster 3: Salary from INR 1,900,000 to INR 3,800,000

Total Salary Ranges for Each Cluster (4 Clusters):

Cluster 0: Total Salary from INR 1,300,000 to INR 3,100,000

Cluster 1: Total Salary from INR 200,000 to INR 3,100,000

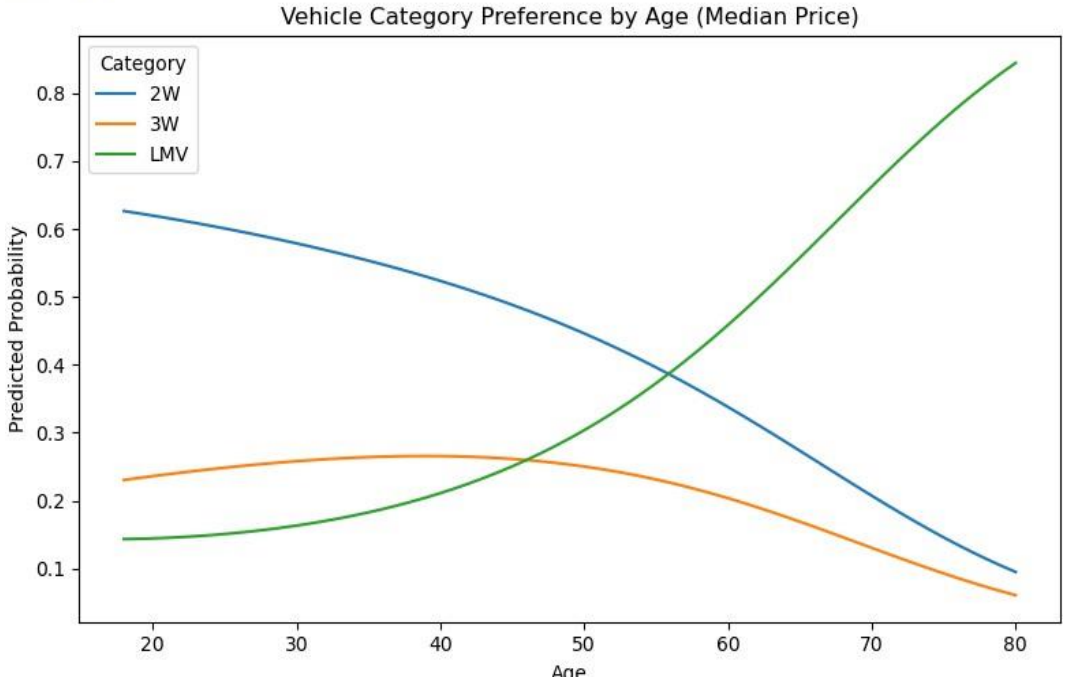
Cluster 2: Total Salary from INR 800,000 to INR 2,400,000

Cluster 3: Total Salary from INR 3,000,000 to INR 5,200,000

14. Deriving the age ranges of the clusters with Logistic regression

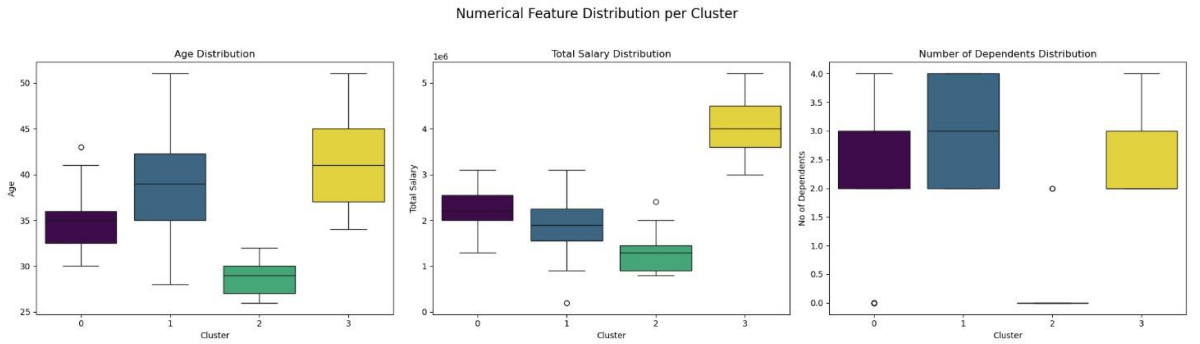
```
=== Age Group Preferences (in %) ===
Category       2W     3W    LMV
AgeSegment
18-25         NaN    NaN    NaN
26-35       51.02  24.49  24.49
36-45       56.10  31.71  12.20
46-55       62.50   0.00  37.50
56+           NaN    NaN    NaN

=== Which age group prefers each category the most ===
2W: 46-55
3W: 36-45
LMV: 46-55
```



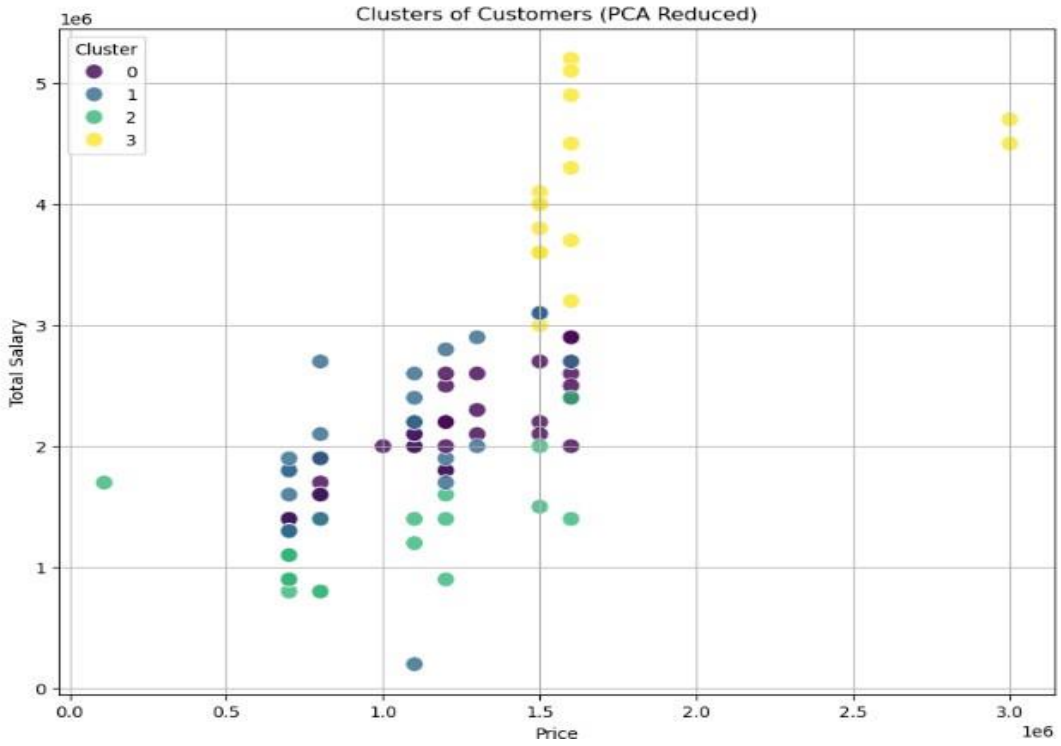
15. Visualizing variations in cluster demographics through boxplots

```
# Create box plots to visualize the distribution of numerical features in each cluster
fig, axes = plt.subplots(1, 3, figsize=(20, 6))
fig.suptitle('Numerical Feature Distribution per Cluster', fontsize=16)
#sns.boxplot(ax=axes[0], x='Cluster', y='Age', data=df, palette='viridis')
#axes[0].set_title('Age Distribution')
sns.boxplot(ax=axes[0],  x='Cluster', y='Age', data=df, palette='viridis', hue='Cluster', legend=False)
axes[0].set_title('Age Distribution')
sns.boxplot(ax=axes[1], x='Cluster', y='Total Salary', data=df, palette='viridis', hue='Cluster', legend=False)
axes[1].set_title('Total Salary Distribution')
sns.boxplot(ax=axes[2], x='Cluster', y='No of Dependents', data=df, palette='viridis', hue='Cluster', legend=False)
axes[2].set_title('Number of Dependents Distribution')
plt.tight_layout(rect=[0, 0.03, 1, 0.95])
plt.show()
```



16. Visualizing the Clusters against the Total Salary and Vehicle Price

```
plt.figure(figsize=(10, 8))
sns.scatterplot(x='Price', y='Total Salary', hue='Cluster', data=df, palette='viridis', s=100, alpha=0.8)
plt.title('Clusters of Customers (PCA Reduced)')
plt.xlabel('Price')
plt.ylabel('Total Salary')
plt.legend(title='Cluster')
plt.grid(True)
plt.savefig('customer_clusters_pca.png')
```



- This analysis indicates that the optimum vehicle price can range from INR 6 lakhs to 16 lakhs to target the maximum number of consumers.

17. Predicting vehicle category with the largest market share with XGBoost

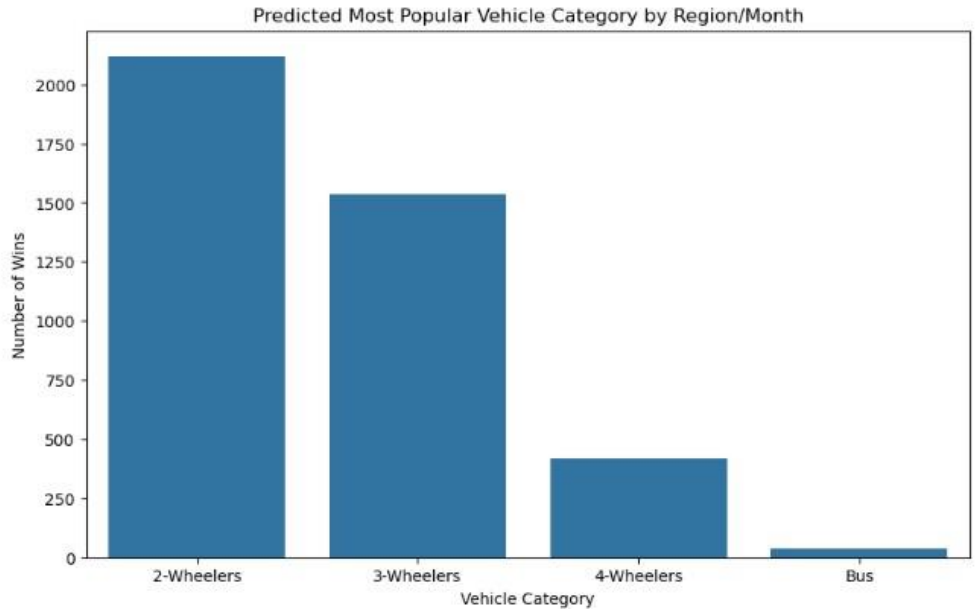
```
# MODEL TRAINING
from xgboost import XGBRegressor

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)
model = XGBRegressor(n_estimators=100, learning_rate=0.1, random_state=42)
model.fit(X_train, y_train)
```

```
# 3. PREDICTION & RANKING
monthly['Predicted_Share'] = model.predict(X)

# Pick top category by predicted share per month-state
best_category = monthly.loc[monthly.groupby(['Year', 'Month', 'State'])['Predicted_Share'].idxmax()]
```

```
# 4. VISUALIZATION
plt.figure(figsize=(10, 6))
sns.countplot(data=best_category, x='Vehicle_Category', order=['2-Wheelers', '3-Wheelers', '4-Wheelers','Bus'])
plt.title('Predicted Most Popular Vehicle Category by Region/Month')
plt.xlabel('Vehicle Category')
plt.ylabel('Number of Wins')
plt.show()
```



Conclusion

This report highlights the increasing adoption of EVs across multiple categories and states.

Key takeaways include:

- A sharp increase in EV sales from 2018 onwards.

- Shared 3-wheelers and personal 2-wheelers dominate adoption so we should enter into manufacturing of both these product categories.

- "Others" category needs refinement for better future analysis.

- Government policy and urban demand are driving EV growth, especially in top-tier states.

Clustering analysis of the data, focusing on demographic variables and vehicle Price, has revealed four distinct customer segments.

Optimal Number of Clusters:

Based on the Elbow Method, we determined that 4 clusters provide the most optimal and interpretable segmentation of customer data.

Detailed Cluster Analysis and Insights:

Here's a breakdown of each cluster's characteristics and the insights derived from them:

1. Cluster 0: Dual-Income, Established Families (Moderate Spenders)

Characteristics: These individuals are typically married (100%), with an average age of 35 and around 2 dependents. They are characterized by a dual-income household, where both partners contribute significantly to the total salary, which is moderate to high. They mostly do not have personal or house loans. Vehicle Price: They tend to purchase vehicles in the mid-to-high price range. Insights: This segment represents established families with stable finances, where both partners contribute to the household income. Their vehicle purchases reflect a balance between affordability and family needs. Marketing strategies could focus on family-friendly vehicles with good features and safety, emphasizing value for money.

2. Cluster 1: Single-Income, High Earners (Practical Spenders)

Characteristics: This group consists primarily of married individuals (100%) around 39 years old, with an average of 3 dependents. They have high individual salaries, but their spouses generally do not work, making them single-income households. This cluster shows a higher inclination towards having personal and house loans. Vehicle Price: Despite their high individual income, their vehicle prices are in the mid-range, lower than their overall earning potential. Insights: These customers are highly dependent on a single income, and existing loan commitments might influence their vehicle purchasing decisions. They might prioritize practical, reliable, and fuel-efficient vehicles over luxury or high-end models, despite their high individual earning capacity. Marketing should highlight durability, low maintenance, and cost-effectiveness.

3. Cluster 2: Young, Single Professionals (Entry-Level Spenders)

Characteristics: This is the youngest segment, with an average age of 28. A significant majority are single (79%) and have very few dependents (average 0.2). They have lower individual and total salaries and generally do not have house loans. Vehicle Price: They purchase vehicles at the lower end of the price spectrum. Insights: This segment represents young, upwardly mobile individuals likely in the early stages of their careers. Their purchasing power is limited, and they might be looking for their first car or an affordable personal vehicle. Marketing should focus on entry-level models like 2W, budget-friendly options, and features appealing to a younger demographic, such as connectivity and style.

4. Cluster 3: Affluent, Dual-Income, Mature Professionals (Premium Spenders)

Characteristics: This is the oldest group, with an average age of 42. They are all married (100%) with an average of 2.5 dependents. This cluster boasts the highest individual and total salaries, with significant contributions from working spouses. They predominantly hold salaried professions. Vehicle Price: They purchase the most expensive vehicles. Insights: This segment represents the most affluent customers with substantial disposable income. They are likely established in their careers and are willing to invest in premium or luxury vehicles. Marketing efforts should target high-end models, emphasizing performance, luxury, and advanced features. Financial offers, if any, might focus on higher loan amounts for premium vehicles. Overall Insights:

Income Structure is Key:

The analysis highlights that not just the total income, but also the structure of income (single vs. dual-income) and the presence of existing loans, significantly influences vehicle purchasing behavior.

- **Life Stage and Financial Commitments**: Age, marital status, and the number of dependents align closely with financial commitments (like house and personal loans) and directly correlate with the price of vehicles purchased. Younger, single individuals tend to buy less expensive cars, while older, married couples with dual incomes purchase higher-priced vehicles.
- **Targeted Marketing Opportunities**: By understanding these distinct segments, automotive companies can tailor their marketing messages, product offerings, and pricing strategies to effectively target each group. For instance, focusing on family features for dual-income families, affordability for young professionals, and luxury for affluent buyers.

Github Links:

https://github.com/deepakIshida/EV_market-segmentation

References

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