**Analysis Report on EV vehicles why it is most suitable to create the early market in accordance**

**By**

**Madhavendra Singh**

**GitHub Link:** [**https://github.com/madhav-18/EV-market-segmentation**](https://github.com/madhav-18/EV-market-segmentation_Startup_City)

**LinkedIn Id:** [www.linkedin.com/in/madhavendra-singh-1a68a2229](http://www.linkedin.com/in/madhavendra-singh-1a68a22298)

**Electric Vehicle (EV) Market Segmentation Report**

**Introduction**:

The electric vehicle (EV) market has experienced rapid growth and evolution in recent years, driven by increasing environmental awareness, advancements in technology, and government incentives. As the market expands, understanding the various segments within it is crucial for stakeholders, including manufacturers, policymakers, investors, and consumers. This report aims to provide insights into the segmentation of the electric vehicle market as of August 2023.

**Market Segmentation**:

The EV market can be segmented in various ways based on different criteria. Some of the key segmentation factors include vehicle type, range, price, geography, and customer preferences.

**Vehicle Type**:

Battery Electric Vehicles (BEVs): These vehicles run solely on electric power, with no internal combustion engine. They are emission-free and have gained significant popularity.

Plug-in Hybrid Electric Vehicles (PHEVs): PHEVs have both an electric motor and an internal combustion engine. They can be charged from an external source and offer a limited all-electric range.

**Range:**

Short Range EVs: These vehicles typically have a range of up to 150 miles (240 km). They are suitable for urban commuting and short-distance travel.

Mid-Range EVs: These vehicles offer a range between 150 to 300 miles (240 to 480 km), catering to a wider range of travel needs.

Long Range EVs: EVs with ranges exceeding 300 miles (480 km) are considered long-range. They appeal to consumers with longer commutes and road trip aspirations.

**Price**:

**Affordable EVs**: These are entry-level EVs priced competitively with their internal combustion engine counterparts, making them accessible to a broader range of consumers.

**Mid-Range EVs**: Positioned between affordable and luxury segments, mid-range EVs offer a balance between features and price.

**Luxury EVs**: High-end EVs with advanced features, premium materials, and performance capabilities. They often come with a higher price tag.

**Geography**:

Global Markets: EV adoption has grown across the world, with different regions showing varying levels of market penetration.

Regional Trends: Certain regions, such as Europe and China, have seen higher EV adoption due to supportive policies, charging infrastructure development, and consumer interest.

**Customer Preferences**:

Urban Commuters: EVs with shorter ranges are popular among urban residents who have relatively short daily commutes and access to charging infrastructure.

Suburban Families: Families often prefer mid-range EVs that offer sufficient range for daily activities and occasional trips.

Enthusiasts: Performance-oriented individuals seek luxury or high-performance EVs known for their acceleration and advanced features.

**Market Trends**:

Diversification of Offerings: Manufacturers are introducing EVs in various segments to cater to different customer needs, resulting in a more diverse product lineup.

Charging Infrastructure Development: The availability of charging stations, both fast chargers and standard chargers, is expanding, alleviating range anxiety and encouraging EV adoption.

Government Policies: Supportive policies such as incentives, subsidies, and emissions regulations continue to influence EV adoption rates in different regions.

Technological Advancements: Improvements in battery technology and manufacturing processes are extending the range of EVs and reducing production costs.

**Step 1: What type of EV’s is provided by the company?**

Battery Electric Vehicles (BEVs): These vehicles run solely on electric power, without an internal combustion engine. They are emission-free and have gained significant popularity. BEVs are mentioned as one of the primary vehicle types in the EV market.

Plug-in Hybrid Electric Vehicles (PHEVs): PHEVs have both an electric motor and an internal combustion engine. They can be charged from an external source and offer a limited all-electric range. PHEVs are mentioned as another vehicle type in the EV market.

**To whom the EV will sell?**

• The target customer segment for the electric vehicles (EVs) will primarily consist of individuals who express a willingness to adopt EVs in the future. This determination is based on the analysis of the data.

• The next key factor in identifying the target customer segment for the electric vehicles (EVs) will be based on people's reviews and their inclination towards replacing their existing petrol or diesel vehicles with electric ones. This consideration is vital in understanding the potential market for EV adoption.

• Furthermore, an essential factor to consider in determining the viability of the electric vehicle (EV) market in various cities will be the mean annual salary of the residents in those selected cities, as EVs are generally perceived as being higher in cost compared to traditional petrol or diesel vehicles. This information will provide insights into the affordability and purchasing power of potential customers in different locations.

**Step2. Collecting the data based on Client Requirement**

For the analysis of the electric vehicle (EV) market, a dataset named 'EV\_data.csv'

has been compiled, containing the following factors:

**1. Age:** The age of the individual participant.

**2. City:** The city of residence of the participant.

**3. Education:** The educational background of the participant.

**4. Number of Family Members:** The total number of members in the participant's

family.

**5. Would you prefer replacing all vehicles to Electronic vehicles?:** A yes/no/maybe

response indicating the participant's willingness to replace all their vehicles with

electric vehicles (EVs).

**6. If Yes/Maybe what type of EV would you prefer?:** An open-ended response

specifying the type of electric vehicle the participant would prefer if they are open to

replacing their vehicles.

**7. Do you think Electronic Vehicles are economical?:** A yes/no response reflecting

the participant's perception of the economic viability of electric vehicles.

**8. Which brand of vehicle do you currently own?:** The brand of the participant's

current vehicle.

**9. How much money could you spend on an Electronic vehicle?:** A range indicating

the maximum amount the participant is willing to spend on an electric vehicle.

**10. Preference for wheels in EV:** The participant's preference for the number of

wheels in an electric vehicle (EV), such as 2-wheeler, 4-wheeler, etc.

**Why The Visualization Matters**

1. **Identifying Customer Clusters:** The distinct clusters formed by the points represent different groups of customers with similar characteristics. These clusters are identified using K-Means clustering, a machine learning technique that groups data points based on their similarities.
2. **Understanding Customer Profiles:** The position of clusters along the three axes provides insights into customer profiles. For instance, clusters might represent "High Income, High Spending" customers (in red), "Medium Income, Medium Spending" customers (in blue), "Low Income, Low Spending" customers (in green), and "Medium Income, High Spending" customers (in orange).
3. **Targeted Marketing Strategies:** By understanding customer segments, you can tailor marketing campaigns to resonate with each group. For example, "High Income, High Spending" customers might be interested in luxury EV features, while "Medium Income, Medium Spending" customers might prioritize affordability and practicality.
4. **Product Development:** Insights from this visualization can guide product development. If a significant portion of customers falls within a specific cluster, you can design EV models that cater to their preferences, whether it's advanced technology, budget-friendly options, or specific features.
5. **Pricing Strategies:** Knowing the spending patterns of different customer groups can inform pricing strategies. For instance, if there's a cluster of customers willing to spend more on EVs, you might consider offering premium models at higher price points.
6. **Location-Based Insights:** Although not shown in the visualization, you can extend this analysis to include geographical data. By mapping clusters to specific cities or regions, you can understand where different customer segments are located and tailor the market penetration strategies accordingly.

**Analysis Report:**

Data visualization, particularly through techniques like K-Means clustering and 3D scatter plots, can provide actionable insights that drive the EV startup's success. Understanding customer segments, preferences, and behaviors allows you to make informed decisions, develop targeted marketing campaigns, create relevant products, and optimize pricing strategies. As the EV market continues to grow, leveraging data-driven visualizations will give you a competitive edge and enable you to build a strong and sustainable business in the exciting world of Electric Vehicles.

**Conclusion**:

The electric vehicle market has evolved into a multi-faceted landscape with various segments defined by vehicle type, range, price, geography, and consumer preferences. Understanding these segments is essential for stakeholders to make informed decisions, develop targeted strategies, and contribute to the sustainable growth of the EV market.

* Range of vehicle is proportional to Battery Pack Capacity
* Price of vehicle is proportional battery pack capacity
* EV's which cost less have higher acceleration(0-100 Km/Hr) time in order to maximize range
* High performance EV's have lower efficiency
* Most of the vehicles costing less than 50,000 Euros are Front Wheel Drive
* Most of the vehicles costing over 50,000 Euros are either All wheel drive or Rear wheel drive and have better acceleration