

EV Market Segmentation: Charging Station Across Nation

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1. Executive Summary

The report aims to provide insights into the Indian Electric Vehicle (EV) market to aid in the strategic decision making process for entering the market. The analysis primarily focuses on charging station data and will inform the selection of target segments and locations for market entry.

2. Introduction

The Electric Vehicle market in India is experiencing rapid growth driven by various factors including government incentives, environmental concerns, and technological advancements. However, successful entry into this market requires a thorough understanding of customer segments and strategic planning.

3. Analysis of Charging Station Data

Dataset 1: Charging Station Analysis

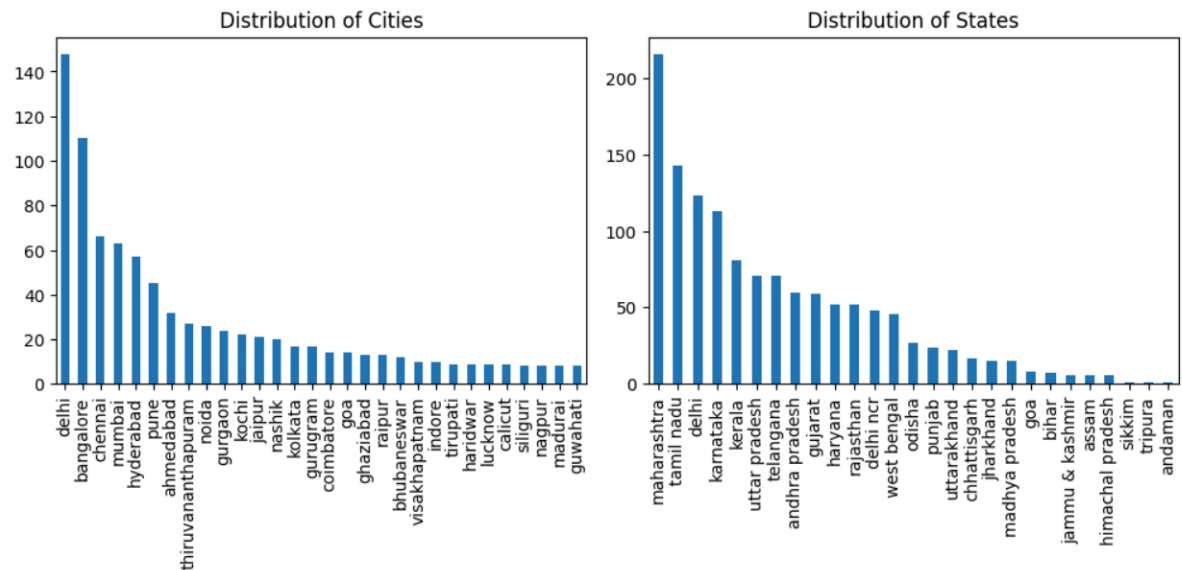
index	name	state	city	latitude	longitude	type
0	Neelkanth Star DC Charging Station	haryana	gurugram	29.6019	76.9803	12.0
1	Galleria DC Charging Station	haryana	gurugram	28.4673	77.0818	12.0
2	Highway Xpress (Jaipur-Delhi) DC charging station	rajasthan	behror	27.8751	76.276	12.0
3	Food Carnival DC Charging Station	uttar pradesh	khatauli	29.3105	77.7218	12.0
4	Food Carnival AC Charging Station	uttar pradesh	khatauli	29.3105	77.7218	12.0
5	Krishna Hansraj Hotel Una DC charging station	himachal pradesh	una	31.4668	76.2568	12.0
6	SG Jabli DC Charging Station	himachal pradesh	kasauli	30.879	76.9948	12.0
7	SG Jabli AC Charging Station	himachal pradesh	kasauli	30.879	76.9948	12.0
8	SG Karnal DC Charging Station	haryana	karnal	29.7379	76.9756	12.0
9	SG Karnal AC Charging Station	haryana	karnal	29.7379	76.9756	12.0

Dataset 2: Charging Station Characteristics

index	0	1	2	3	4
uid	STATIC12	STATIC14	STATIC15	STATIC16	STATIC17
name	GensolCharge Pvt. Ltd.	REIL	REIL	REIL	BluSmart
vendor_name	GensolCharge Pvt. Ltd.	REIL	REIL	REIL	BluSmart
address	NDSE Grid, BRPL South Extension	Scada office kalka ji	Ashram Chowk Mathura Road	Nizamuddin Railway station	BSES Bhawan, Nehru Place, New Delhi 110048
latitude	28.568238	28.541995	28.571189	28.588991	28.549427
longitude	77.219666	77.260583	77.259806	77.25324	77.254636
city	New Delhi	New Delhi	New Delhi	New Delhi	New Delhi
country	India	India	India	India	India
staff	unstaffed	unstaffed	unstaffed	unstaffed	unstaffed
payment_modes	Card, E-Wallet, UPI	E-Wallet	E-Wallet	Cash/E-Wallet	Cash/E-Wallet
station_type	charging	charging	charging	charging	charging
postal_code	110001	110001	110001	110001	110001
available	1	1	1	1	1
capacity	15 kW	3.3 kW	15 kW	15 kW	15 kW
cost_per_unit	₹0 per unit	₹0 per unit	₹0 per unit	₹0 per unit	₹0 per unit
power_type	DC	AC	DC	DC	DC
total	2	3	2	4	1
type	BEVC DC 001	BEVC AC 001	BEVC DC 001	BEVC DC 001	BEVC DC 001
vehicle_type	['4W']	['2W', '3W', '4W']	['4W']	['4W']	['4W']

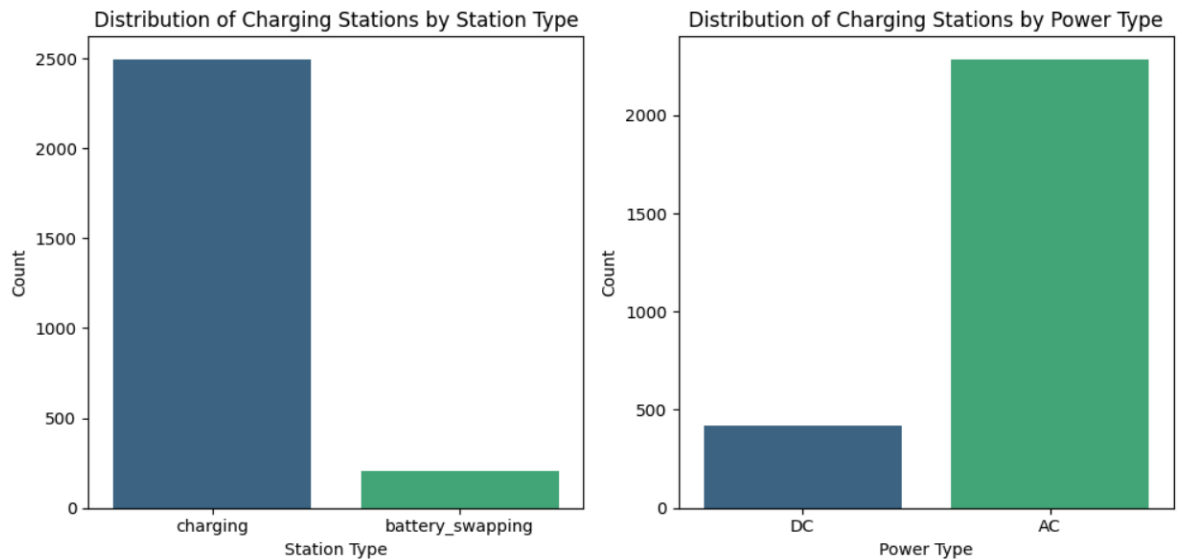
3.1 Geographical Distribution

Visualisation and analysis of charging station distribution across different regions in India.



Delhi boasts the highest number of charging stations across the nation, while the state of Maharashtra leads with the maximum number of charging stations.

3.2 Distribution of Charging Stations type:



3.2.1 Standard Charging Stations vs. BatterySwapping Stations:

Preference for Standard Charging Infrastructure: The barplot reveals that the majority of charging stations are of the standard charging type. This preference suggests that current market dynamics favour traditional charging methods over battery swapping solutions.

Potential Reasons for Preference:

- **Familiarity and Convenience:** Standard charging stations are more familiar to consumers and offer convenience similar to refuelling at traditional gas stations.
- **Infrastructure Compatibility:** EV manufacturers have heavily invested in standard charging infrastructure, making it more widely available and accessible to consumers.
- **Cost Considerations:** Standard charging infrastructure may be more cost effective to install and maintain compared to battery swapping stations, influencing the distribution of charging infrastructure.

3.2.2 Distribution of Power Types:

AC Power vs. DC Power: The analysis reveals a notable difference in the distribution of power types, with more stations providing AC power than DC power.

Implications of Power Type Distribution:

- **Compatibility and Versatility:** AC power stations are compatible with a broader range of electric vehicles, including plugin hybrids and slower charging EV models. This compatibility enhances the accessibility of charging infrastructure to a wider consumer base.
- **Need for Faster Charging Capabilities:** The presence of DC power stations indicates a recognition of the need for faster charging capabilities in certain locations. These stations cater to EV owners who prioritise shorter charging times, such as long distance travellers or individuals with limited charging time availability.

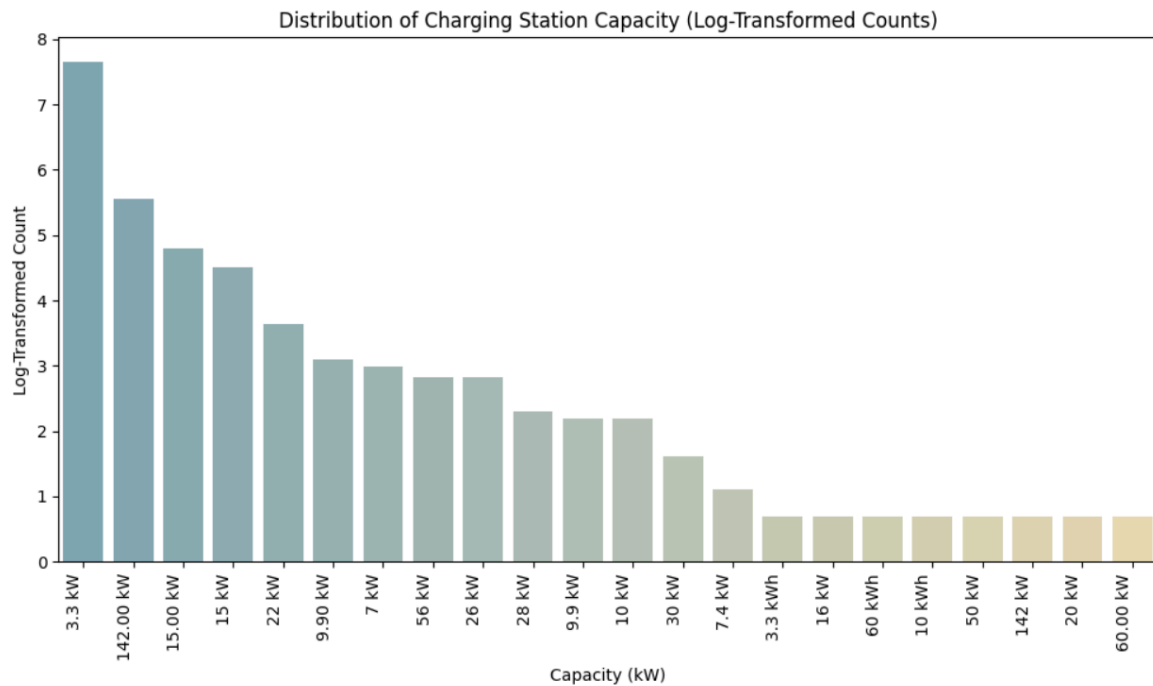
3.2.3 Strategic Considerations based on distribution of charging station type:

Product Development: Insights from the distribution of charging stations can inform the design and development of EV models. Startups may prioritise models compatible with standard charging infrastructure while also considering the demand for faster charging capabilities in certain market segments.

Infrastructure Investment: Understanding the prevalence of standard charging infrastructure vs. battery swapping solutions can guide startups in allocating resources for infrastructure development and deployment. This may involve partnerships with charging station operators or strategic investments in expanding charging networks.

Market Positioning: Startups can leverage insights from the distribution of charging stations to differentiate their offerings and position themselves competitively in the market. This may include highlighting compatibility with existing charging infrastructure or emphasising the convenience and efficiency of alternative charging solutions.

4. Distribution of Charging Station Capacities:



Prevalence of Lower Power Capacities: The bar plot indicates that the majority of charging stations have a capacity of 3.3 kW or lower. This suggests that many charging stations are designed to accommodate lower power requirements, likely catering to smaller vehicles with lower energy demands.

4.1 Reasons for Lower Capacities:

- **Residential and Workplace Charging:** Lower capacity charging stations are commonly installed in residential areas and workplace parking lots to provide convenient charging options for daily commuting. These stations are suitable for overnight charging or during extended periods of vehicle parking.
- **Urban Settings:** In densely populated urban areas, where space and infrastructure constraints may limit the installation of high power charging stations, lower capacity stations offer a practical solution for EV owners to top up their vehicles' batteries during short stops or while running errands.

4.2 Recognition of Fast Charging Needs:

- **Presence of Higher Capacities:** Despite the prevalence of lower power capacities, the analysis identifies the presence of charging stations with higher capacities, such as 142 kW. This indicates a recognition of the need to support fast charging capabilities for larger vehicles or to meet the demand for rapid charging in certain locations.

4.3 Implications of Higher Capacities:

- **Support for Larger Vehicles:** Charging stations with higher capacities accommodate larger vehicles, including electric buses, trucks, and high performance electric cars, which require faster charging rates to minimise downtime.

5. Vendor Distribution Analysis:

5.1 Strategic Considerations:

- Market Penetration and Expansion:

Understanding the distribution of charging station vendors can inform strategic decisions regarding market penetration and expansion.

Charging station providers can leverage insights from vendor distribution analysis to identify underserved markets, target specific customer segments, and tailor their offerings to meet the unique needs of different geographic regions.

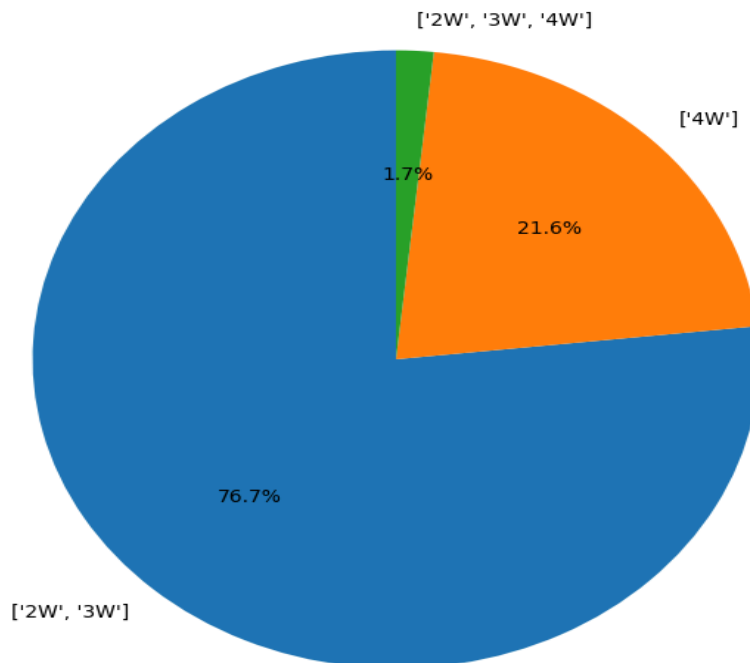
- Partnerships and Collaborations:

Charging station providers may explore partnerships and collaborations with local governments, businesses, and community organisations to enhance their presence in target markets and accelerate the deployment of charging infrastructure.

By aligning their strategies with local stakeholders and market dynamics, charging station providers can strengthen their market position and contribute to the growth of the EV ecosystem.

6. Charging Station Distribution by Vehicle Type:

Distribution of Charging Stations Based on Supported Vehicle Types



Prevalence of Stations for 2-Wheelers and 3-Wheelers:

The pie chart illustrates that the majority of charging stations are built for 2-wheelers and 3-wheelers, accounting for over 77% of the total.

Lower Representation for 4-Wheelers:

In contrast, charging stations dedicated to 4-wheelers constitute just over 22% of the total distribution.

6.1 Implications of Charging Station Distribution:

- **Focus on Smaller Vehicles:**

The distribution underscores a significant focus on catering to the needs of smaller vehicles, such as motorcycles and auto-rickshaws, compared to larger vehicles like cars.

This suggests that charging infrastructure development has prioritised accommodating the charging needs of smaller and more affordable electric vehicles, which are prevalent in urban and densely populated areas.

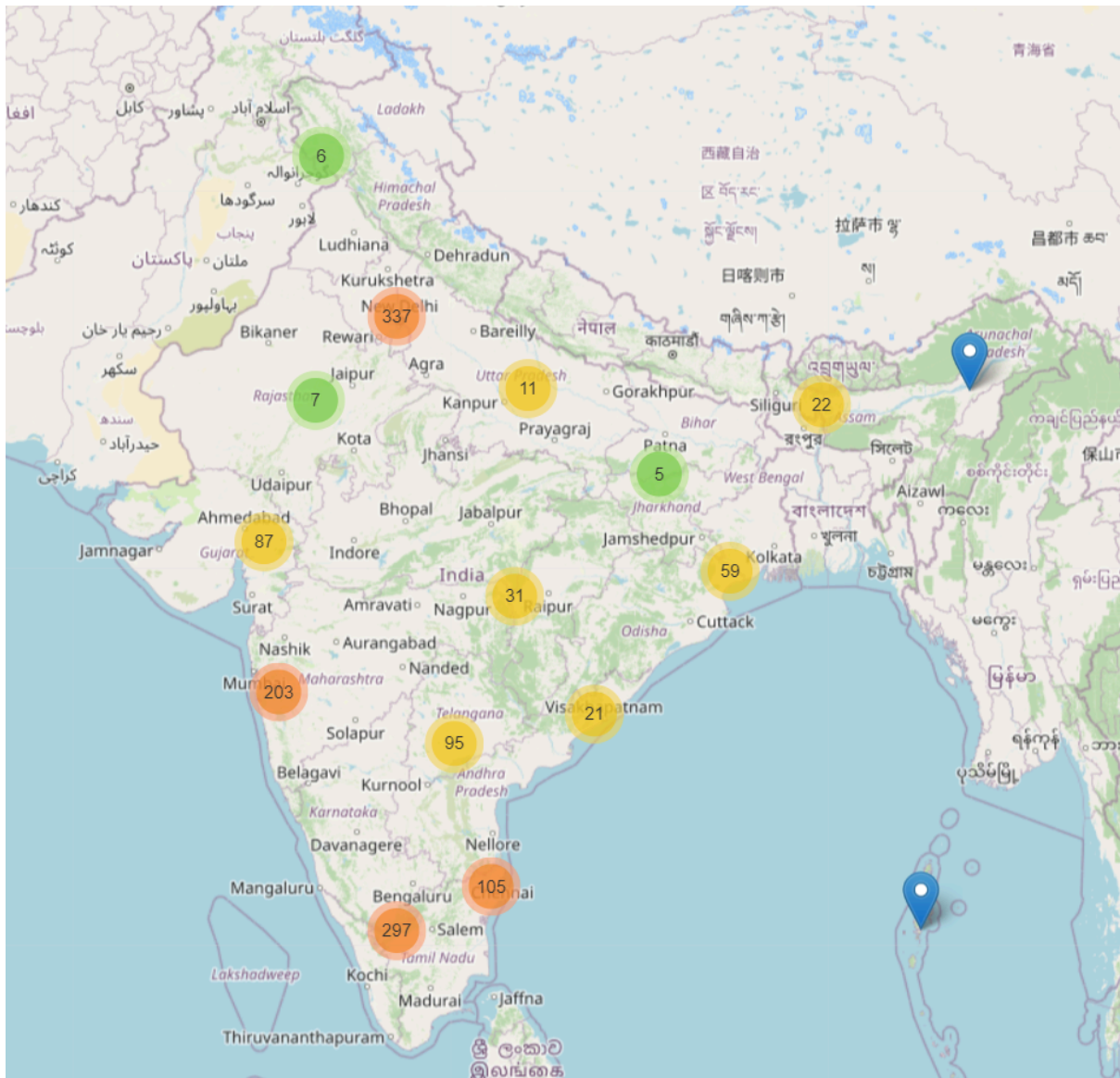
- **Alignment with Market Dynamics:**

The emphasis on charging stations for 2-wheelers and 3-wheelers reflects market dynamics, where these vehicle types are more common and accessible to a broader segment of the population, particularly in urban and peri-urban areas.

Electric 2-wheelers and 3-wheelers are often preferred for short-distance commuting, last-mile connectivity, and commercial transportation, driving the demand for charging infrastructure tailored to these vehicle segments.

7. Geographic Focus

- **Geographic Distribution:** The map visually represents the locations of charging stations across different regions, helping stakeholders understand the coverage and accessibility of charging infrastructure.
- **Cluster Analysis:** Using MarkerCluster, you can group nearby charging stations together, revealing clusters of charging infrastructure. This can help identify areas with high concentrations of charging stations, indicating potential market hotspots or areas with high demand for EVs.
- **Market Segmentation:** By overlaying demographic or socio-economic data onto the map, you can analyse the correlation between charging station locations and target market segments. This allows for more targeted marketing efforts and infrastructure investments.



Note: To interact with the map clustering based on location, find the map's html file in the Github link attached below.

8. Target Market Segments

Utilising the Innovation Adoption Life Cycle framework, prioritise regions in India that exhibit early adopter characteristics. These regions are likely to have higher EV adoption rates and can serve as a launchpad for market penetration.

- Urban Commuters:

Rationale: Urban areas with high population density often experience congestion and pollution issues, making them prime candidates for sustainable transportation solutions like EVs.

Evidence: According to census data and urban development reports, major cities in India such as Delhi, Mumbai, Bangalore, and Kolkata have some of the highest population densities in the country. High population density leads to increased traffic

congestion and air pollution, creating a demand for cleaner and more efficient transportation alternatives like EVs.

- Fleet Operators:

Description: Businesses and organisations operating fleets of vehicles for logistics, delivery, transportation, or ride-sharing services.

Rationale: Fleet operators stand to benefit significantly from the adoption of electric vehicles due to lower operating costs, reduced emissions, and potential government incentives.

Strategy: Offer tailored solutions such as fleet electrification packages, charging infrastructure partnerships, and fleet management software to optimize electric vehicle usage and maintenance.

- Commercial Establishments:

Description: Shopping malls, hotels, restaurants, office complexes, and other commercial establishments with parking facilities.

Rationale: Commercial establishments can attract environmentally-conscious customers and enhance their corporate social responsibility (CSR) initiatives by offering EV charging facilities.

Strategy: Collaborate with commercial establishments to install charging stations, offer incentives for EV owners, and leverage branding opportunities to promote sustainable transportation options.

- Shared Mobility Providers:

Description: Companies offering car-sharing, bike-sharing, scooter-sharing, and ride-hailing services in urban areas.

Rationale: Shared mobility providers can reduce urban congestion and pollution by transitioning their fleets to electric vehicles.

Strategy: Form partnerships with shared mobility providers to deploy electric vehicles in their fleets, integrate EV charging infrastructure into their operations, and incentivize users to choose electric options.

- Residential Communities:

Description: Apartment complexes, gated communities, and housing societies with dedicated parking facilities.

Rationale: Residents of residential communities are potential EV owners who require convenient access to charging infrastructure for their vehicles.

Strategy: Work with property developers and homeowners associations to install EV charging stations in residential parking areas, provide education and incentives for EV adoption, and promote community-wide sustainability initiatives.

- Tourist Destinations:

Description: Tourist attractions, resorts, national parks, and recreational areas frequented by visitors.

Rationale: Tourist destinations can enhance visitor experiences and promote sustainable tourism by offering EV charging facilities.

Strategy: Partner with tourist destinations to install charging stations, promote eco-friendly transportation options, and leverage tourism marketing campaigns to raise awareness of EV adoption.

- **Government and Public Sector:**

Description: Government agencies, municipalities, and public institutions responsible for urban planning, transportation, and infrastructure development.

Rationale: Governments play a crucial role in promoting EV adoption through policy incentives, funding support, and infrastructure development.

Strategy: Engage with government stakeholders to advocate for EV-friendly policies, secure grants or subsidies for EV infrastructure projects, and participate in public-private partnerships for sustainable urban development.

Pricing Strategy:

Implement a strategic pricing range for EV products, considering the psychographics of early adopters. Offer competitive pricing while highlighting the long term cost savings associated with EV ownership, including lower fuel and maintenance expenses.

Conclusion:

The analysis of charging station data provides valuable insights into the Indian EV market landscape. By targeting specific market segments, focusing on key geographic areas, and implementing a strategic pricing strategy, the Electric Vehicle Startup can position itself for success in the burgeoning Indian EV market.

Github Link:

<https://github.com/harikrsna23/Indian-EV-market-segment>

Find the datasets, steps performed for analysis and html file of Maps for the clustering of regions in the above link.