EV Market Segmentation

-Puja Rajput

Introduction: The automotive industry in India has long been dominated by non-electric vehicles. The popularity of fossil fuel-based vehicles is attributed to their affordability, low maintenance costs, and the widespread availability of petrol and diesel infrastructure. However, electric vehicles (EVs) are now gaining traction in India. Major automotive brands like TATA, Mahindra, and international companies are introducing unique EV products. Our research and analysis have led us to develop a specific range of products for our startup, allowing us to compete with established automotive companies and provide affordable EV options to the Indian public.

Market Info:

a) **General Usage Info:** The Indian EV market varies significantly by state, depending on factors including demographics, income levels, regulatory landscape and urbanization. The state of Uttar Pradesh, for instance, with one of the lowest urbanization rates, has seen a significant uptake of electric two-wheelers.

- Challenges Ahead: Despite its potential, the Indian EV market faces challenges such as affordability, charging infrastructure expansion, and addressing consumer concerns like range anxiety. These issues require ongoing attention and innovative solutions.
- Promising Trajectory: The electric vehicle market in India is on a promising trajectory, with robust government support, increasing consumer awareness, and a growing infrastructure. This sector is poised for substantial growth in the coming years

b) **Battery Info**:

Lead-acid batteries currently dominate the market but demand for Lithium-ion battery models is expected to grow rapidly under government incentives and demand from bike and scooters. Current and desired driving range of different EV categories in India set by Government of India is presented in the following table.

Category	Battery Capacity (KWH)	Energy Consumption(kwh/km)
E-bike	1.2	0.016
2 WLS	2.2	0.025
2 WCS	3.0	0.030
2 WHP	4.6	0.035

Electric Cars	40	0.157

Electrode Materials: The choice of electrode materials significantly impacts the battery's longevity. Different materials exhibit varying levels of stability and durability over time.

Charge and Discharge Cycles: The number of charge and discharge cycles a battery undergoes affects its overall lifespan. Frequent cycling can lead to gradual degradation.

Charging Speed: The rate at which the battery is charged also matters. Rapid charging generates more heat and stress, potentially accelerating wear and tear.

Operating Temperature: The temperature during operation plays a crucial role. Extreme temperatures (both high and low) can harm the battery chemistry and reduce its effectiveness.

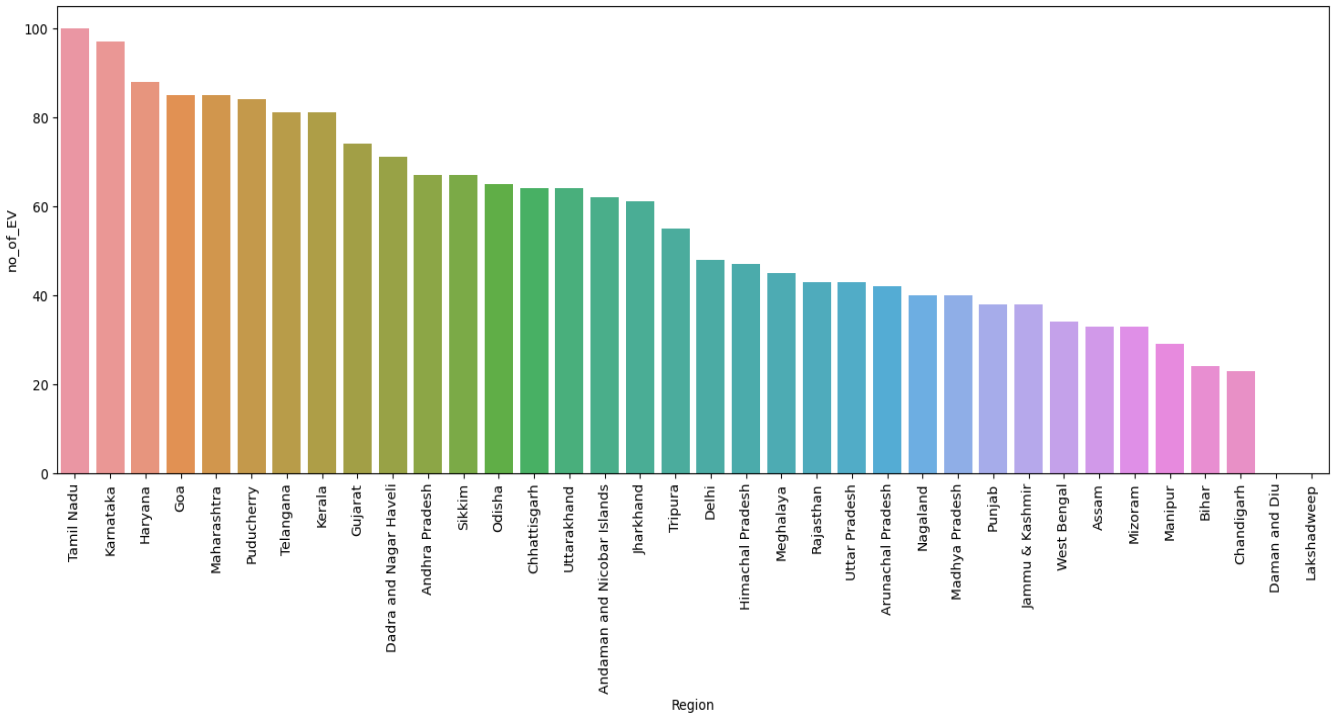
Reducing Greenhouse Gas Emissions: By handling retired EV batteries appropriately, we can minimize their environmental impact throughout their life cycle. This includes responsible disposal, recycling, or repurposing to prevent harmful emissions.

Maximizing Economic Value: Efficiently managing retired batteries ensures that their economic value is optimized. This can involve repurposing them for secondary applications (such as stationary energy storage) or recycling valuable materials like lithium, cobalt, and nickel.

This strategy aligns with Government of India's target of installing 175 GW of renewable energy capacity by 2022. It is estimated that these batteries can serve as energy banks until they deteriorate to 60% of their initial capacity35 and this extends their economic life by another 10 years.

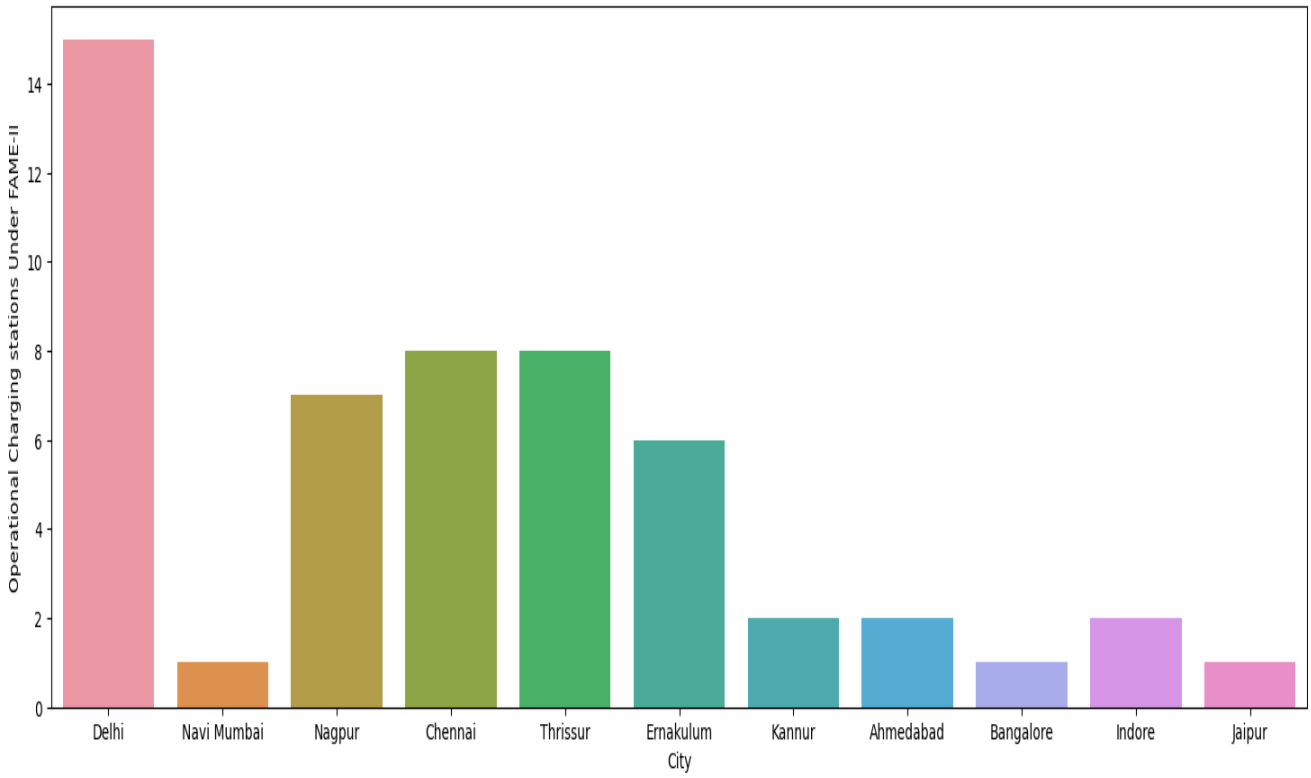
- **Market Analysis -** The
  Indian electric vehicle (EV) market is one of the fastest growing in the world. It is expected to grow at a compound annual growth rate (CAGR) of 94.4% from 2021 to 2030.
- The Indian government is offering several incentives to promote the adoption of EVs, including tax breaks, subsidies, and access to restricted lanes
- The government has set a target of achieving 30% electrification of the country's vehicle fleet by 2030. The EV market in India is expected to be worth around USD 152.21 billion by 2030.
- The government has also announced a production-linked incentive (PLI) scheme for manufacturing electric vehicles and components. The PLI scheme is expected to attract investments of around INR 45 billion (USD 570 million) and create over 75,000 jobs in the EV sector

Geographic and Demographic Research



- South India being a Tech Hub is a backbone of EV demands.
- we analyzed those south Indian states has good number of charging stations available.
- Delhi had the highest number of charging stations but still EV popularity is relatively low.
- Other state and region especially West, East and North and Central India has a balanced numbers and competitive demands.
- We did not get any survey information in Daman and Diu and Lakshadweep, so these two regions are not analyzed properly.

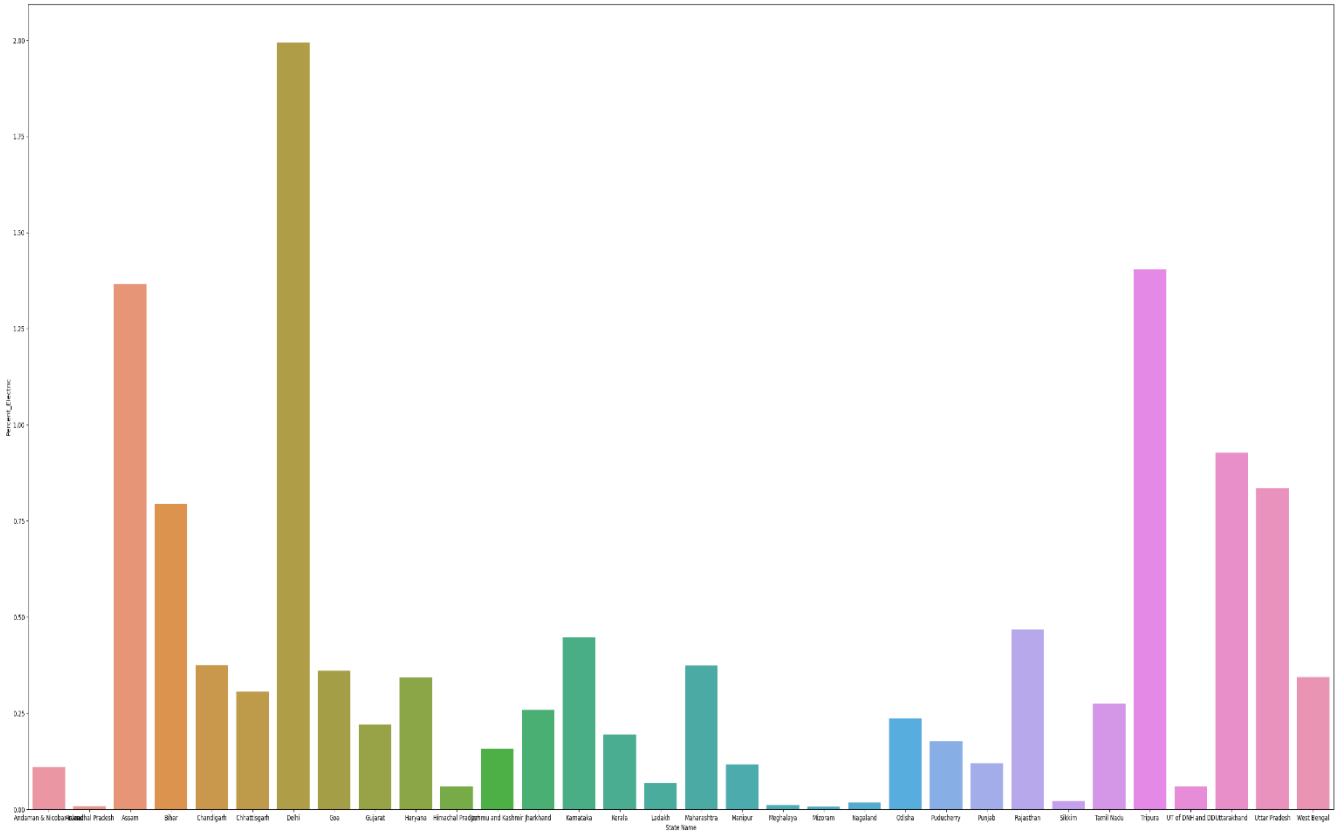
On availability of charging stations, we observed:



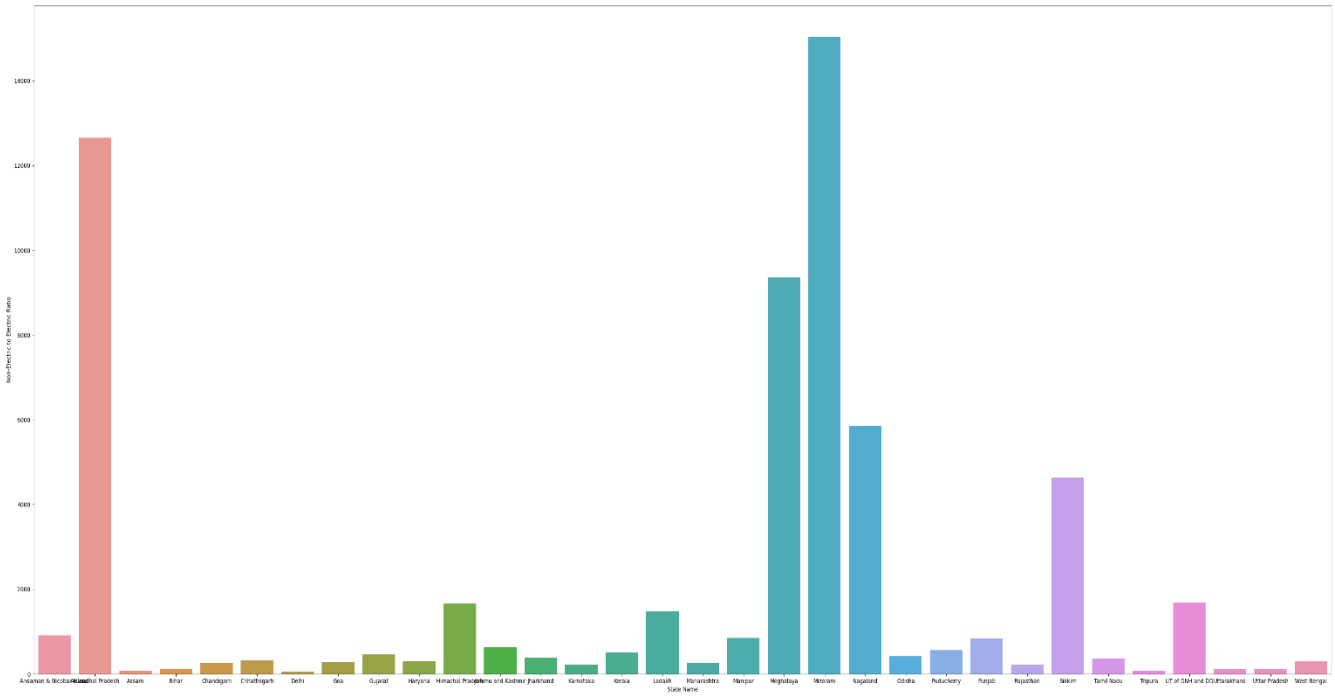
- First observation, only limited number of charging station is available in India as of 2023.
- Delhi has a greater number of charging stations compared to other metro cities.
- South Indian metro cities have balanced number, but still many cities are missing from south India.
- Mumbai being the economic capital of India have only 1 charging station in Navi Mumbai.

Total Market Share of Electric Vehicles [State Wise]:

Here we can see most of the electrical vehicles used in Delhi and Mizoram has the least EV used.



Biggest Untouched Markets:



Conclusion:

- The Indian EV market is growing rapidly. The market size was estimated to be USD 1.45 billion in 2021 and is projected to reach USD 113.99 billion by 2029, growing at a CAGR of 66.52% during the forecast period.
- We analyzed that south India region is more technologically advanced with good availability of charging infrastructure and Electric vehicles becoming more popular. Big Brands who already launched their products and have their manufacturing plants in south India. It is possible that we can create space for our EVs, but it will be very difficult.
- Northeastern states have growing popularity, especially Sikkim, this is a good place for us to create space for our EVs.
- Once our EV popularity grows up, we can target to East Indian states and central Indian states.
- North Indian states are not recommended right now because of the analysis results. People are not buying EVs despite having lots of charging infrastructure.
- In 2021, India sold over 300,000 electric vehicles. The state of Uttar Pradesh is the leading market for electric vehicles in India.