

## Electric Vehicle Market – India

Electric vehicles (EVs) have gained substantial traction in India in recent years, owing to government schemes, environmental problems, and technological advances. Here's a quick rundown of India's electric vehicle landscape:

- **Government Support:** The Indian government has put in place a number of policies and incentives to encourage the use of electric vehicles. They include financial incentives, tax breaks, and EV purchasing subsidies. The government has also set lofty goals for electric transportation, intending to make electric vehicles account for 30% of all car sales by 2030.
- **Charging Infrastructure:** The growth of charging infrastructure is critical for EV adoption. Efforts are being made in India to develop a strong charging network throughout major towns and roads. To meet the changing needs of EV users, public charging stations, as well as home and workplace charging options, are being erected.
- **Electric Vehicles:** Electric vehicles are making inroads into the Indian market. Numerous automakers have introduced electric vehicles to meet the growing demand for environmentally friendly and sustainable transportation. The government's emphasis on electrifying public transit, such as buses and taxis, has aided in the adoption of electric vehicles.
- **Future Prospects:** The future of electric vehicles in India is bright. The government's sustained backing, falling battery costs, and developments in charging infrastructure are projected to hasten EV adoption. Furthermore, the incorporation of renewable energy sources for charging and the rise of electric mobility as a service (eMaaS) are expected to impact India's transportation future.

Overall, India is experiencing a huge move towards electric mobility, which is being pushed by government initiatives, environmental consciousness, and changing consumer tastes. Electric vehicle adoption in India has enormous promise for decreasing pollution, reducing reliance on fossil fuels, and building a sustainable transportation ecology.

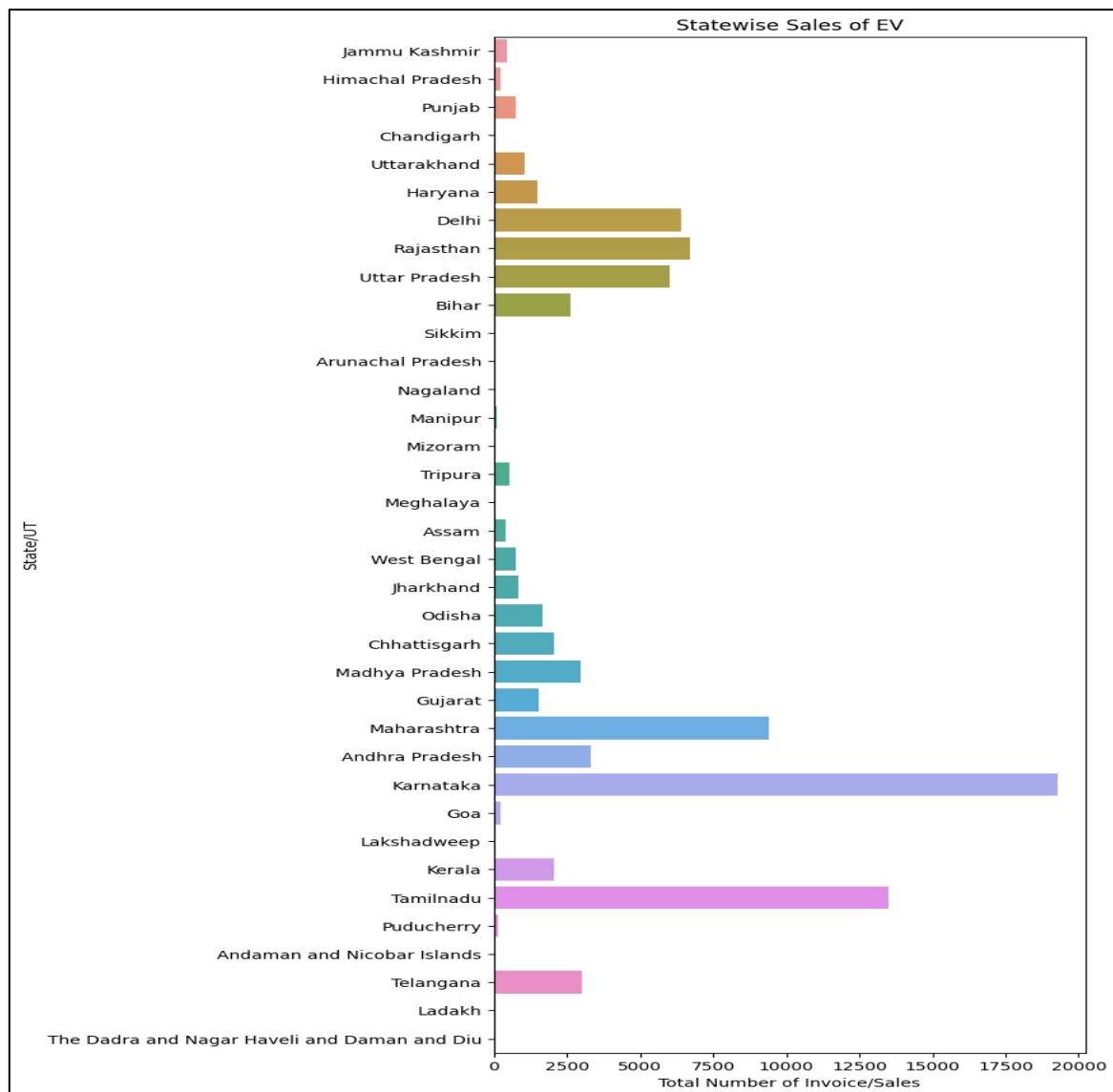
In comparison to the worldwide industry, India's electric vehicle (EV) market is still in its early phases. Here's a quick comparison of India's EV market to the rest of the world:

- **Market Size:** The worldwide EV market dwarfs that of India. Countries including as China, the United States, and a few of European countries have witnessed widespread EV adoption as well as a more mature sector in terms of quantity sold and infrastructure development.
- **Government Policies:** Many countries throughout the world have put in place strong government policies and incentives to encourage EV adoption. Norway, for example, has achieved a phenomenal rate of EV penetration due to hefty subsidies, tax breaks, and infrastructural expenditures. While implementing measures such as the FAME plan, India is currently developing a complete framework to boost EV use.
- **Charging Architecture:** Developed countries have made significant investments in charging infrastructure connections, including as public and fast-charging stations. In comparison to India, where charging infrastructure is still being developed, this infrastructure is more prevalent and widely accessible.
- **manufacture and invention:** Global markets, particularly China and the United States, have a strong presence in the manufacture and invention of electric vehicles. Chinese manufacturers lead the worldwide EV industry, and other foreign automakers are investing in electric car research and development. India is still in the early stages of developing a robust EV manufacturing ecosystem, with both domestic and foreign manufacturers progressively entering the market.
- **Consumer Adoption:** While electric vehicle use in India is rapidly increasing, it remains low in comparison to countries with more established markets. Consumer adoption is slowed by factors such as high upfront prices, restricted model availability, and range anxiety. Countries with higher EV adoption rates, on the other hand, have seen greater general acceptance and passion for electric vehicles.

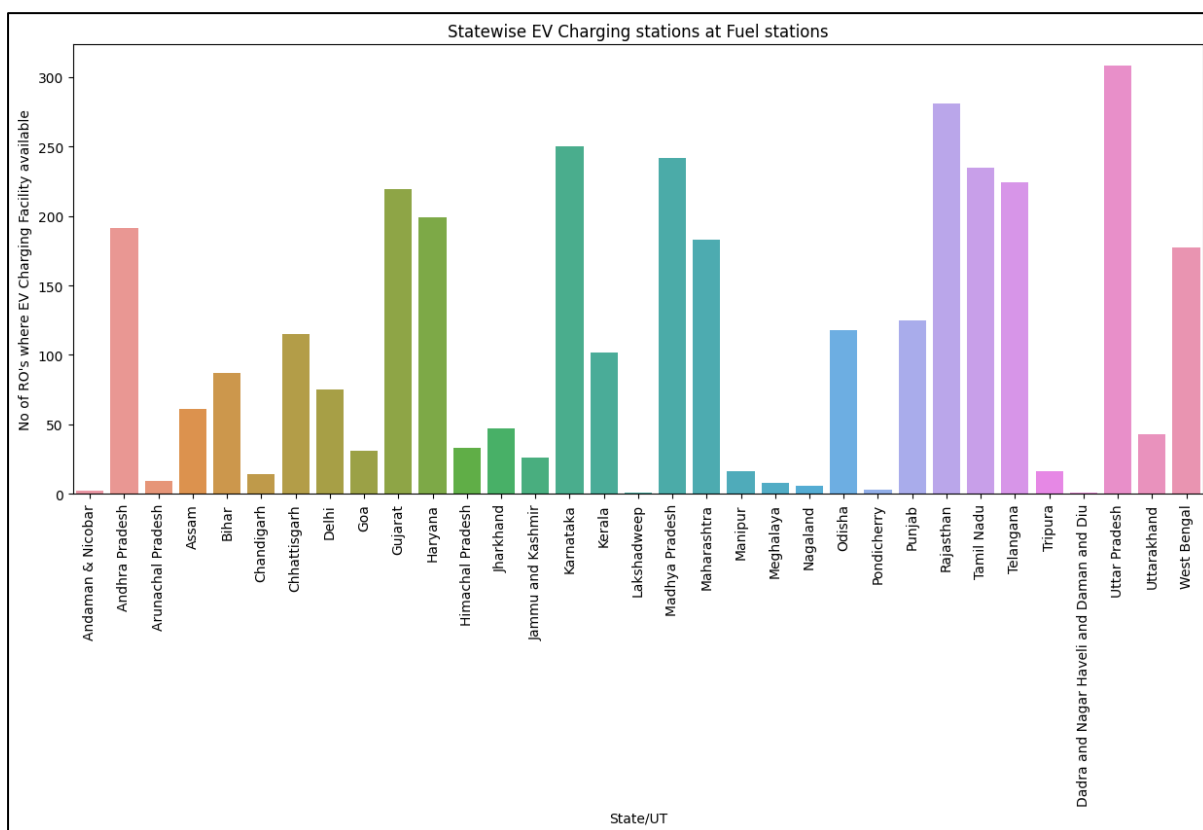
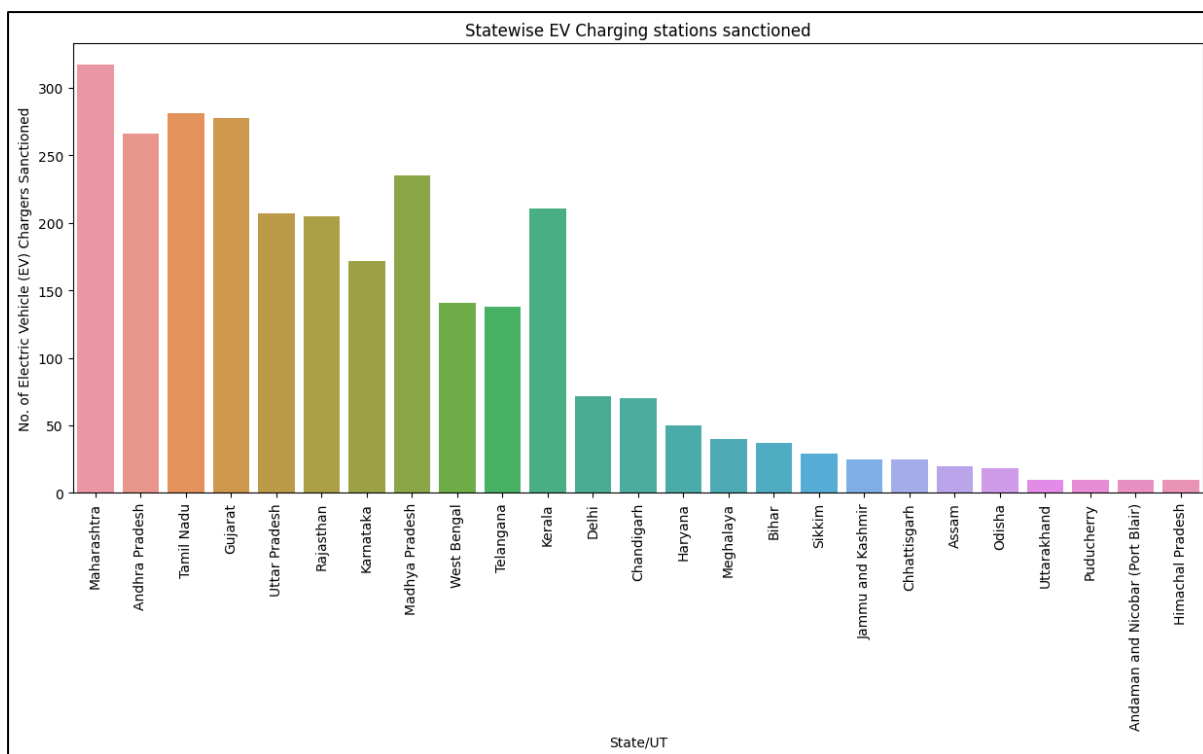
While India's EV market is smaller and less developed in comparison to the worldwide market, the government's efforts, increased consumer awareness, and emphasis on extending charging infrastructure point to considerable growth in the future years. As technology advances and costs fall, India has the potential to catch up and play a larger role in the global EV industry.

### A. EV Market Segmentation w.r.t. Geography:

The data we used for this analysis consist of records of EV sales, charging stations across different Indian states and UT's, facilities of charging at highways and expressways.

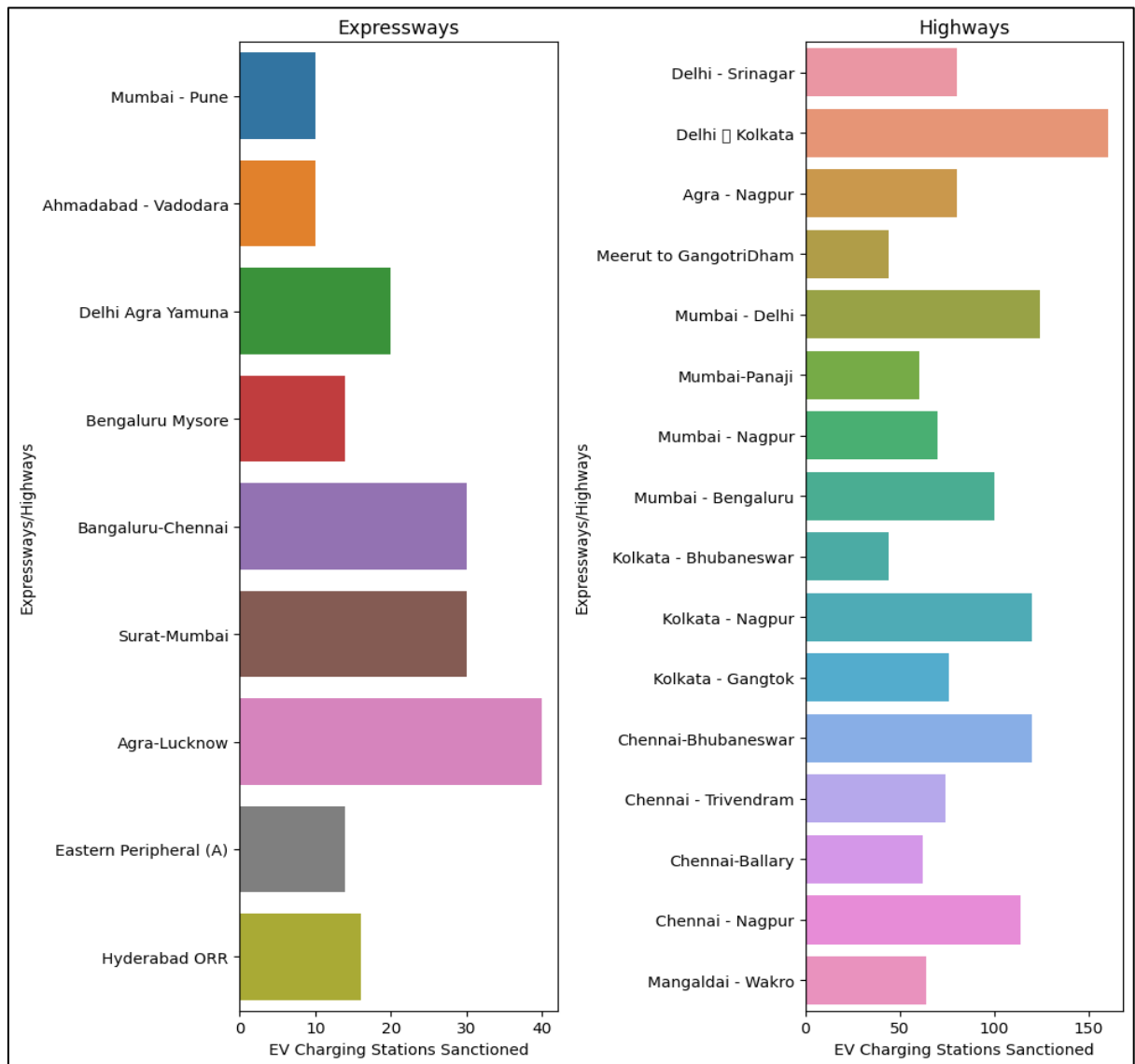


After the analysis we observe that Karnataka, Maharashtra, Tamil Nadu, Rajasthan and Uttar Pradesh and few others are the states with highest sales for the EV's in recent years and among UT's Delhi have shown highest sales.



State wise the charging facilities are well equipped for Maharashtra, Tamil Nadu, Andhra Pradesh, Gujarat Uttar Pradesh and few others. Other than dedicated charging stations for EV's, state like UP, Rajasthan,

Madhya Pradesh, Karnataka, Telangana and Maharashtra also provide facilities for EV charging at fuel stations, thus investing in such regions will prove to be healthy and feasible market for EV.



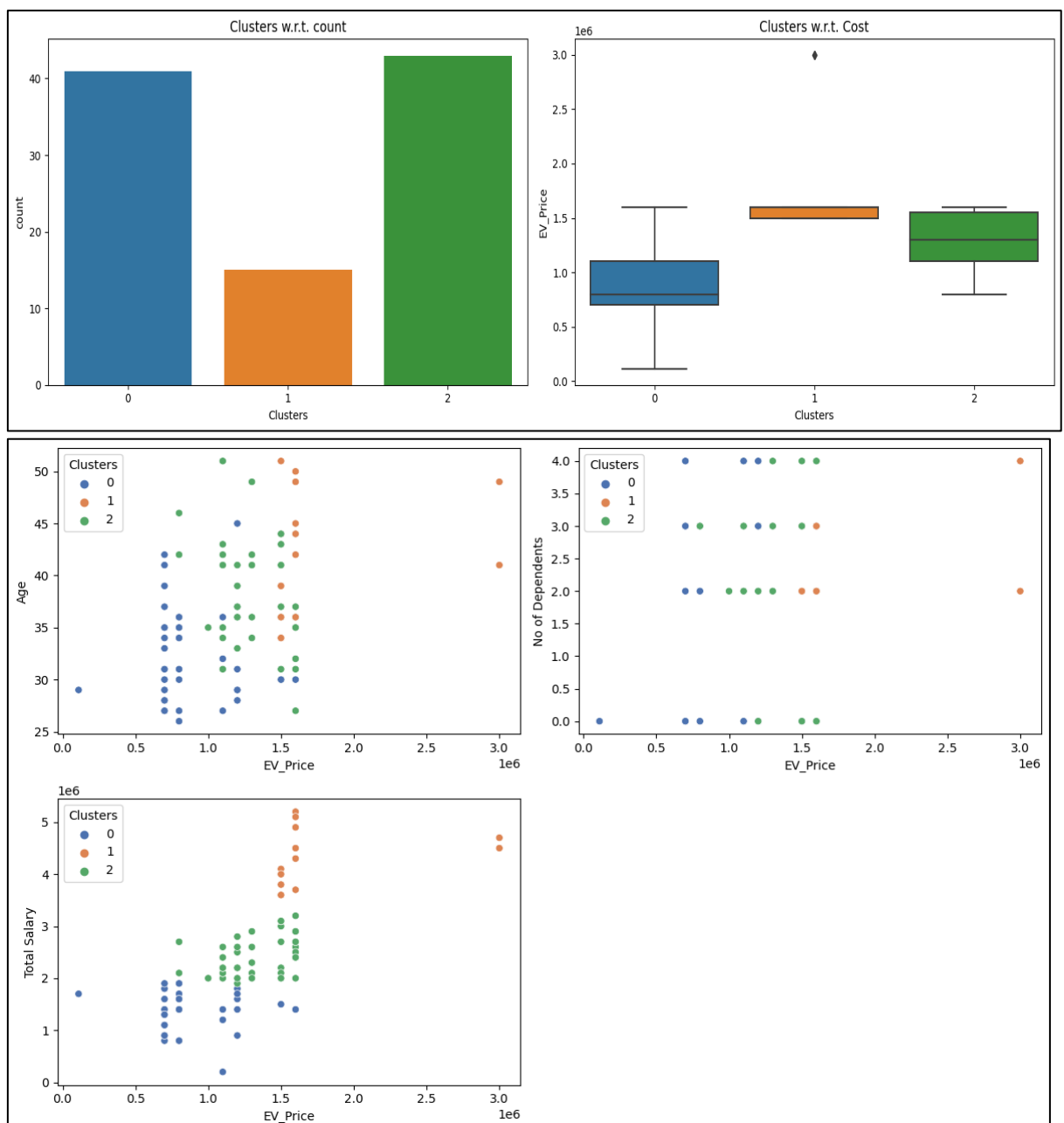
When we consider the charging facilities for EV's while the vehicle is been used for travelling then, we've Expressways and Highways providing such facilities. Majority of the expressways are inter-state whereas highways providing charging facility while traveling across the country.

## B. Customer Segmentation in Electric Vehicle market for India:

To understand the customer sentiments in EV market, we analyzed data that records the EV prices, profession and salary of the customer, their education and marital status. At it seems why does this even matters, but it is the customers behavior and their own research in the EV market that affects their decision on going for an EV or conventional fuel-based vehicle. Other than that, whether the customer is likely to get an EV of personal use or for commercial use and depending upon the need the user will go for may be a 4-wheeler or a 2-wheeler.

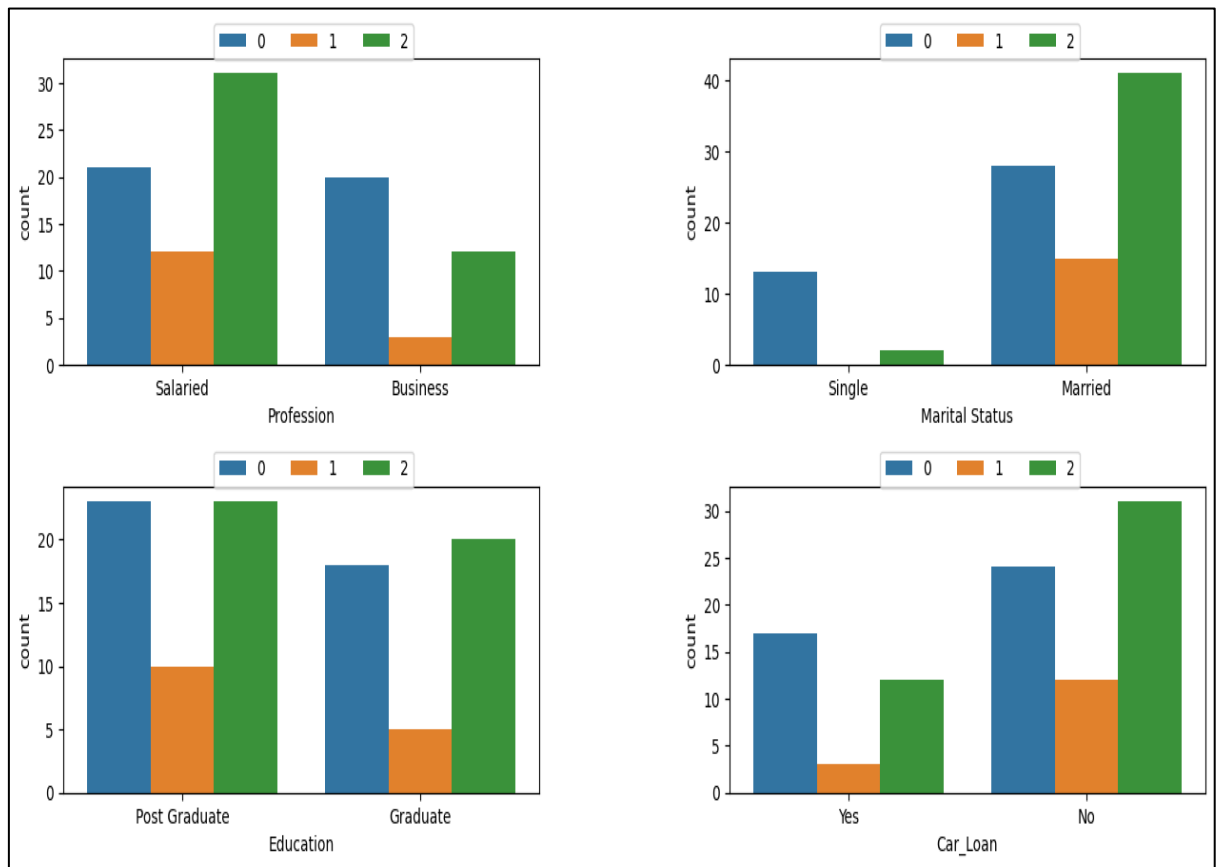


User are more likely to go for an EV with prices falling in the range of 10 to 15 lakhs and people with a salary average of 20 to 30 lakhs are bulk contributor.



Furthermore, our segmentation indicates that just a small number of customers are interested in higher-priced EVs. Other factors such as age and the number of dependents also influence users' EV buying decisions. If the user is between the ages of 25 and 35, they are most likely to opt for an EV priced between 5 and 10 lakhs, whereas if the user is over 40, they are willing to pay between 15 and 30 lakhs on an EV. If the customer is single or has four dependent family members, they are more likely to choose for an EV worth 10 to 15 lakhs. Customers earning more than 30 lakhs are also opting for more expensive EVs. Users' EV buying decisions are influenced by age, number of dependents, and other factors, such as single or four dependent family members. Customers earning more than 30 lakhs are also opting for more expensive EVs.

Our further understanding, unveils other parameters which influences the user's decision on EV that are nature of income i.e., through salary or business. Marital status,



### C. Electric Vehicle Segmentation in Indian Market:

To understand the Electric Vehicles in the Indian market, data with the manufacturer, vehicle style and pricing are analyzed.

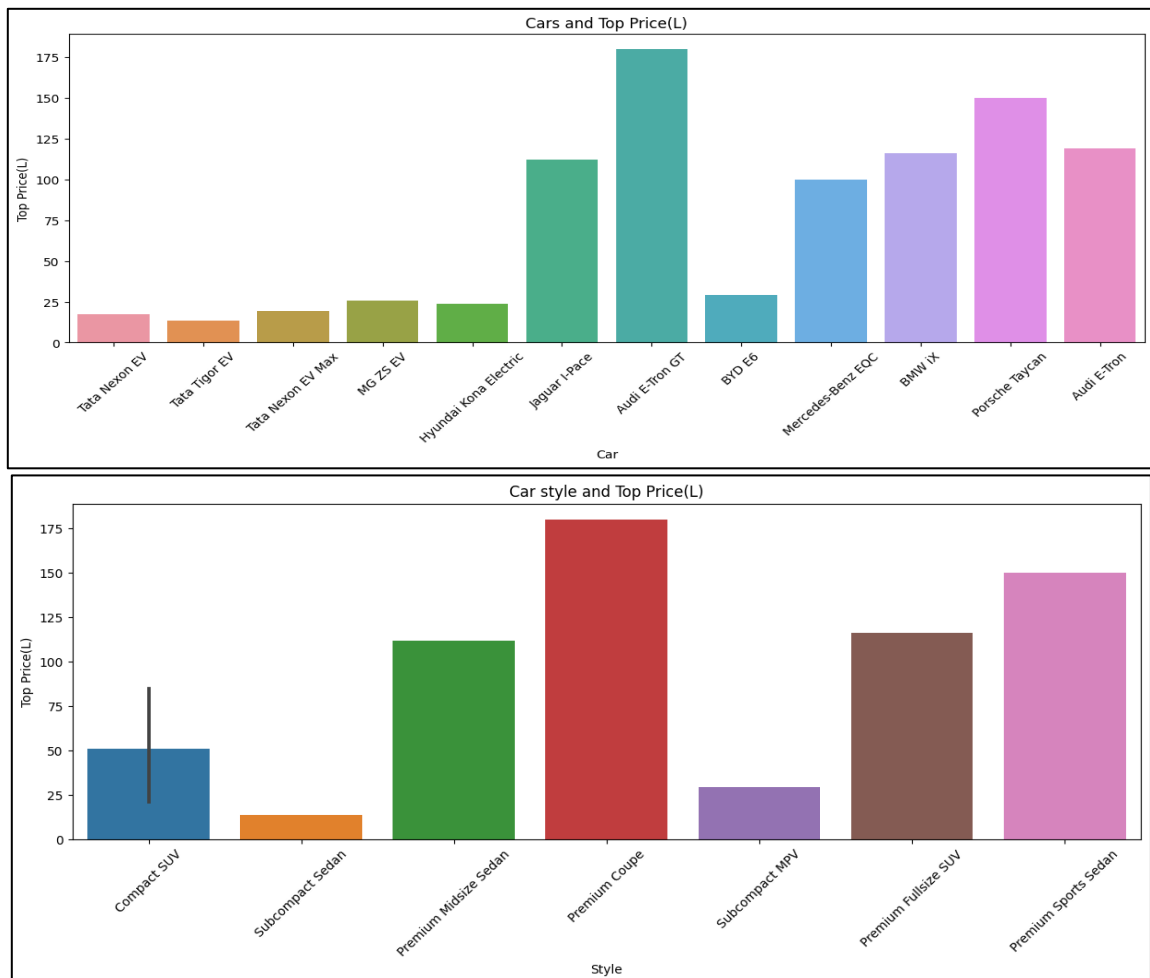
There are several electric vehicle (EV) manufacturers operating in India. Here are some prominent ones:

- **Tata Motors:** Tata Motors is a leading Indian carmaker that has achieved great progress in the electric vehicle sector. They have released electric vehicles such as the Tata Nexon EV and the Tata Tigor EV. Tata Motors also provides electric vehicles to government and business sector organisations.
- **Mahindra Electric** is a division of Mahindra & Mahindra that specialises in electric cars. They sell electric vehicles such as the Mahindra e2o Plus and the Mahindra eVerito. Mahindra Electric is also involved in the development and production of electric vehicle components.

- **Hero Electric:** Hero Electric is a key player in India's electric two-wheeler market. They provide a diverse range of electric scooters and motorbikes to meet a variety of consumer needs and pricing points. Hero Electric operates an extensive nationwide system of dealerships and service centres.
- **Ather Energy:** Known for its innovative solutions, Ather Energy is an Indian electric scooter company. The Ather 450X and Ather 450 Plus, their flagship models, have garnered popularity due to their performance and features. Ather Energy focuses on developing a comprehensive charging infrastructure and providing vehicle software upgrades over the air.
- **MG Motors:** With the MG ZS EV, MG Motors, a subsidiary of the Chinese carmaker SAIC Motor Corporation, entered the Indian market. It is an electric SUV with a reasonable range and features. MG Motors has been actively encouraging electric car usage and is increasing its EV offering in India.

Other major automakers, including as Hyundai, Nissan, and Renault, also have electric vehicle offers in the Indian market. In addition, startups such as Revolt Motors and Okinawa Autotech are building a name for themselves with electric two-wheelers.

With additional businesses joining the market and increasing their electric car portfolios, the Indian EV production landscape is rapidly shifting.



# CONCLUSION

## Past:

Previously, India's electric vehicle (EV) market was small and immature. Limited models were available, and among of the challenges to wider adoption included expensive upfront costs, limited charging infrastructure, and range anxiety. In 2015, the government launched the FAME India scheme to promote electric vehicles and provide incentives for their purchase.

## Present:

In recent years, the Indian EV market has seen substantial growth and development. Several domestic and international automakers have joined the market with electric vehicle and two-wheeler solutions. Electric cars have been introduced by companies such as Tata Motors, Mahindra Electric, and MG Motors, while electric two-wheelers have been released by names such as Hero Electric and Ather Energy.

The government has upped its emphasis on EV promotion and has set an ambitious aim of 30% EV sales by 2030. Incentives and subsidies are being offered to EV purchasers, and charging infrastructure in metropolitan areas is fast expanding. The implementation of GST (Goods and Services Tax) rates that are advantageous to EVs has also made them cheaper.

## Future:

The future of India's EV sector appears bright. The government is taking a variety of steps to boost EV use, such as installing public charging stations, offering financial incentives, and encouraging domestic manufacturing of EV components. The emphasis is not only on automobiles, but also on electrifying public transit, such as buses and two-wheelers.

Several automakers have declared intentions to introduce new electric vehicles in India, demonstrating their belief in the market's potential. As battery technology advances, EV range and performance will improve. Furthermore, declining battery prices are likely to make EVs more accessible in the future years.

Overall, as it works to minimize pollution and reliance on fossil fuels, India is positioned for major development in the electric car industry. The government's initiatives, improving charging infrastructure, and increasing customer awareness are all elements fueling the future growth of India's EV market.

Finally, with the government's assistance and different programs targeted at boosting electric mobility, India's electric vehicle (EV) sector has been slowly increasing. Established automakers as well as startups have entered the market, offering a variety of electric automobiles and two-wheelers. Efforts are being undertaken around the country to extend the charging infrastructure. Incentives and subsidies have been made available to encourage the use of electric vehicles.



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GitHub links:

EV\_Market\_Segmentation:

[https://github.com/jtndr26/EV\\_Segmentation/blob/EV\\_Market\\_Segmentation/EV\\_Market\\_Segmentation\\_on\\_Geographic.ipynb](https://github.com/jtndr26/EV_Segmentation/blob/EV_Market_Segmentation/EV_Market_Segmentation_on_Geographic.ipynb)

Customer Segmentation:

[https://github.com/jtndr26/EV\\_Segmentation/blob/EV\\_Customer\\_Segmentation/Customer\\_Segmentation.ipynb](https://github.com/jtndr26/EV_Segmentation/blob/EV_Customer_Segmentation/Customer_Segmentation.ipynb)

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