EV Market /Segment Analysis

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Introduction

An EV, short for electric vehicle, operates either partially or entirely on electric power. These vehicles boast reduced running costs due to fewer moving parts, and they offer significant environmental benefits by minimizing or eliminating the use of fossil fuels like petrol or diesel. While some EVs previously utilized lead-acid or nickel-metal hydride batteries, modern battery electric vehicles predominantly rely on lithium-ion batteries. These batteries are preferred for their extended lifespan and exceptional energy retention, boasting a mere 5% self-discharge rate per month. Despite advancements, challenges persist, notably concerning thermal runaway in lithium-ion batteries, which has led to incidents like fires or explosions in models such as the Tesla Model S. Nonetheless, strides have been taken to enhance the safety of these batteries.

Problem Statement

The aim of this project is to conduct Exploratory Data Analysis (EDA) on a dataset concerning Electric Vehicles (EVs) in order to extract valuable insights and reveal significant patterns. The dataset encompasses a wide array of attributes related to electric vehicles, encompassing:

- Various types of EVs
- Utilization patterns across different states of India
- Price ranges of different EV models
- Battery capacity and performance metrics
- Charging infrastructure availability and charging times

This comprehensive dataset offers a rich source of information for uncovering trends and understanding the landscape of electric vehicle usage and characteristics.
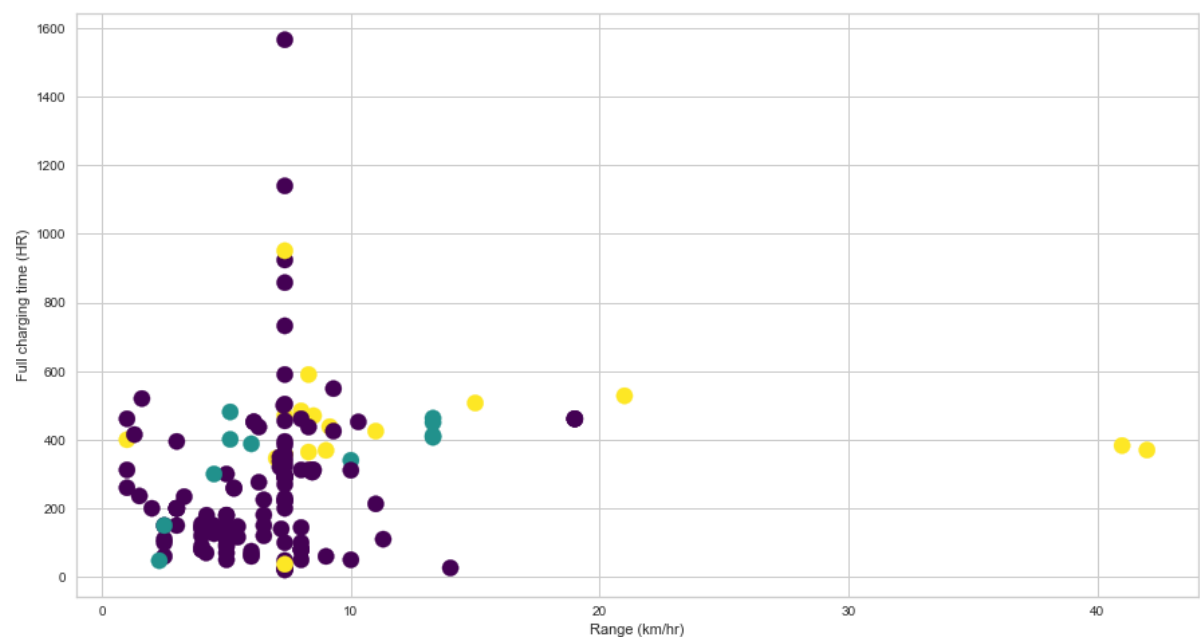
Results

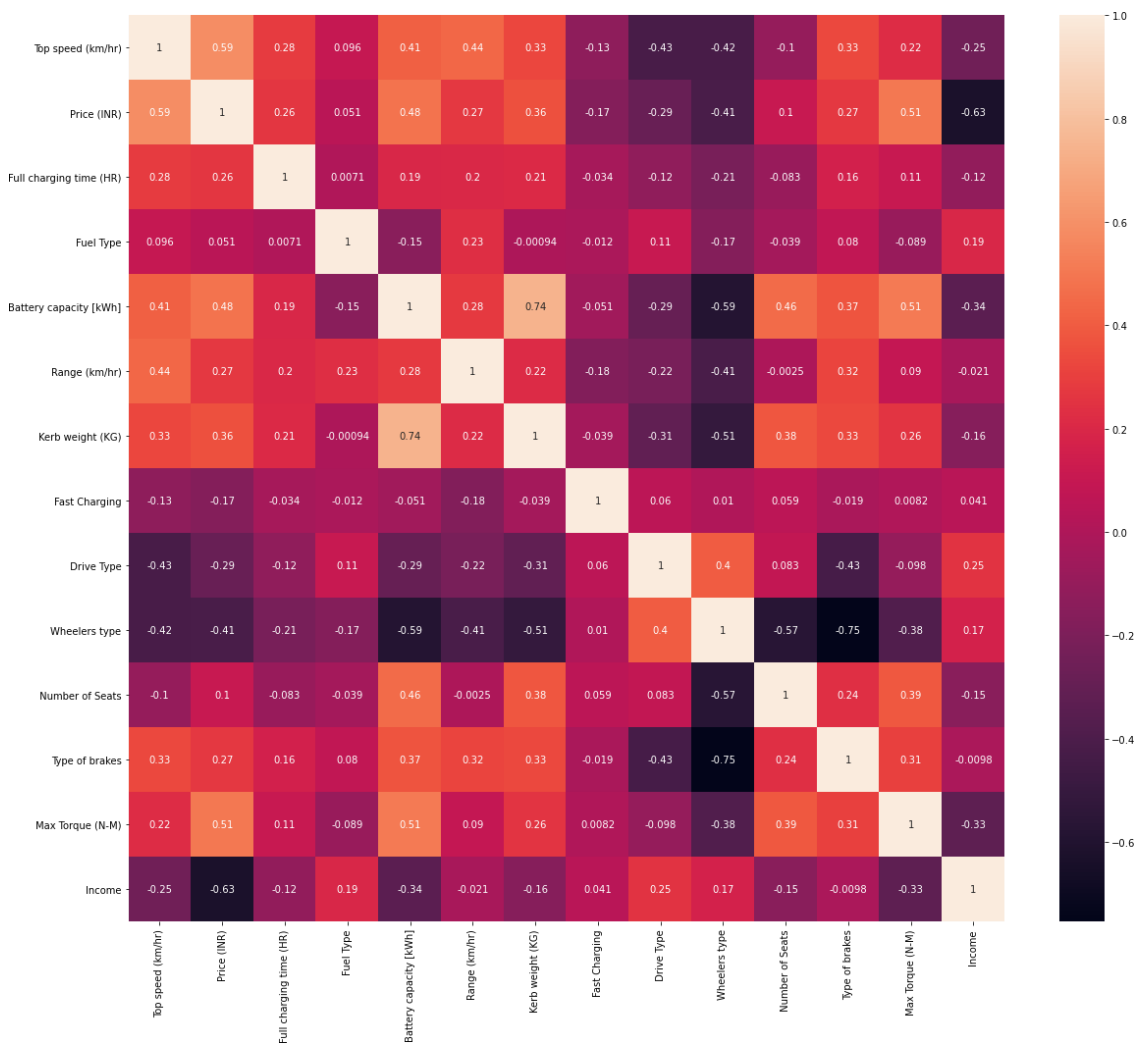- Scalability of EV in recent years compared to that in 2020 and 2021
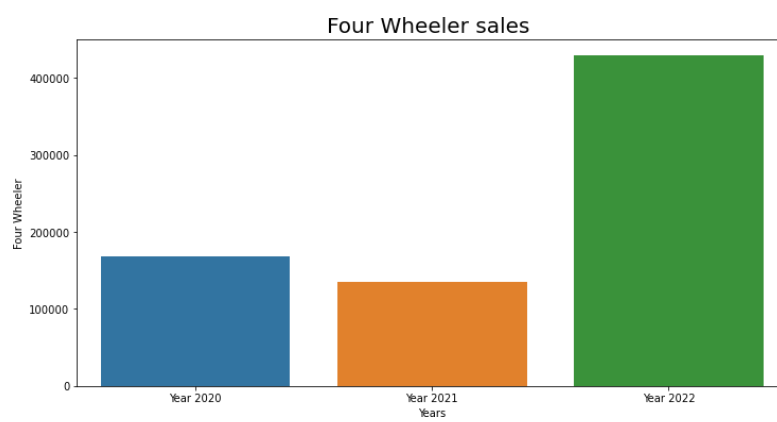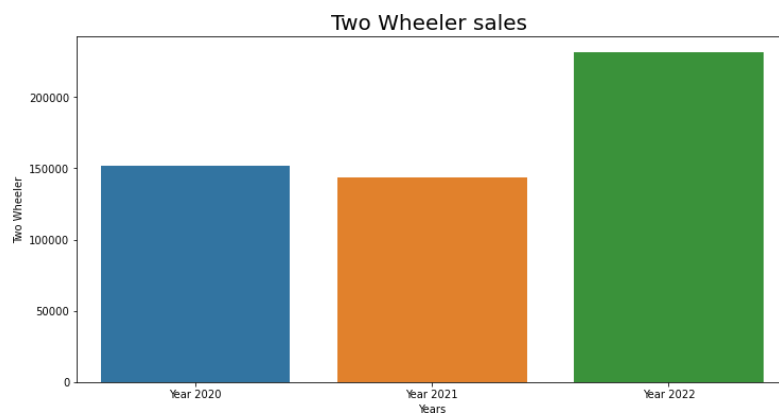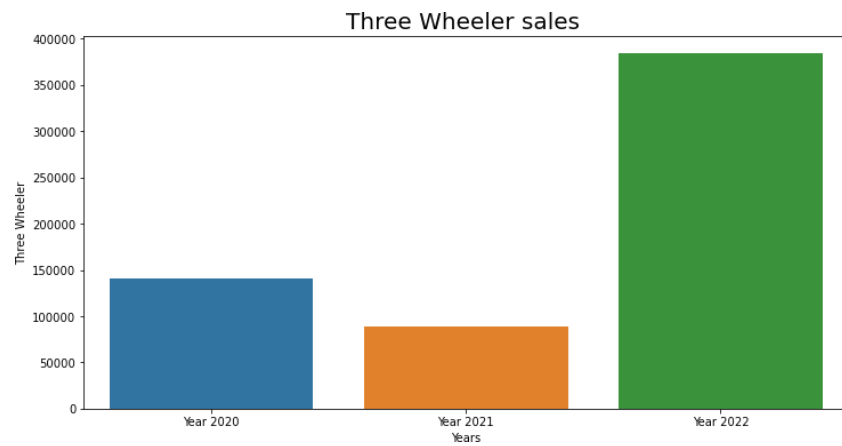
- Charging Stations in Different States of India
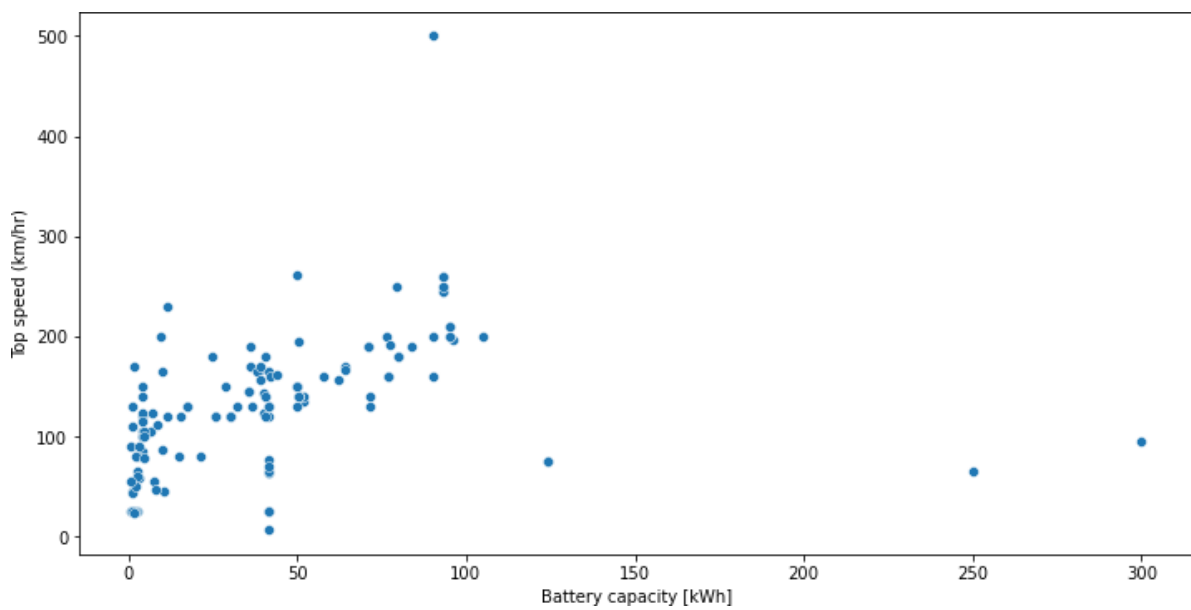

Charging Sation by State wise
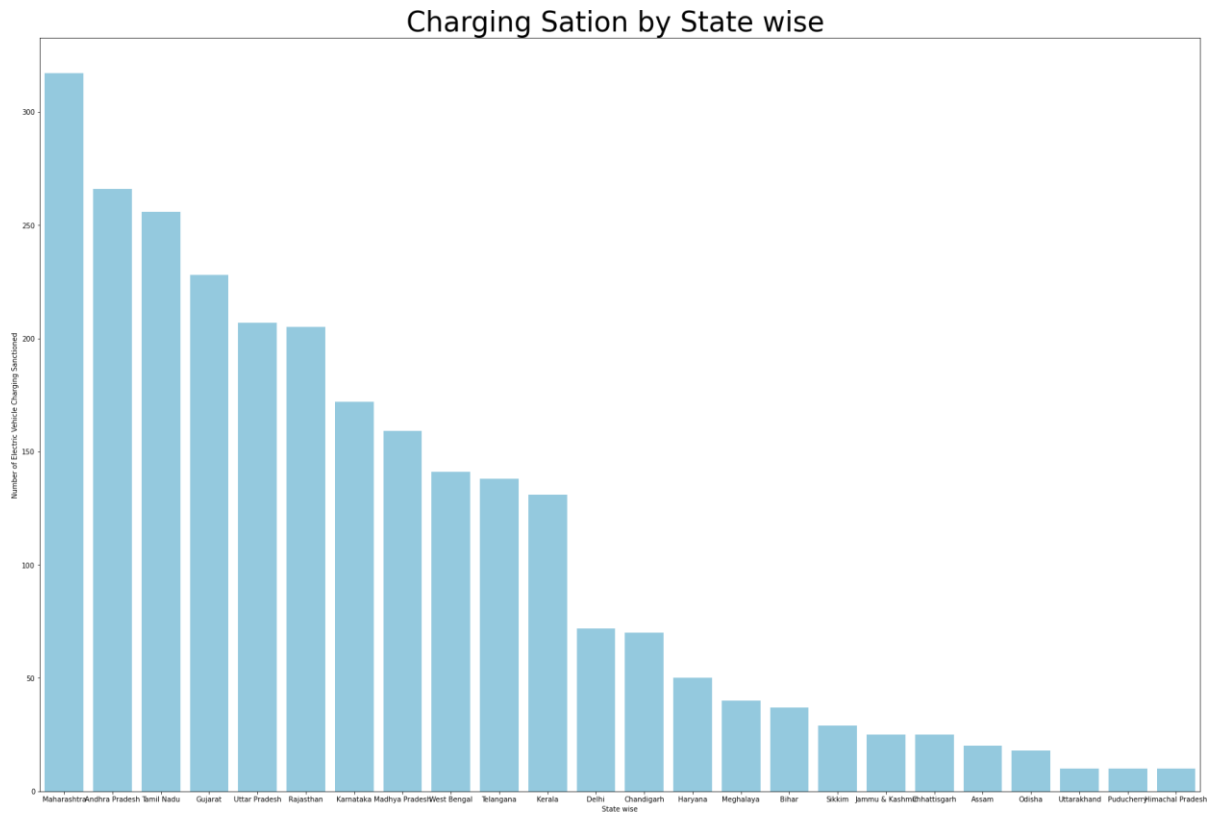
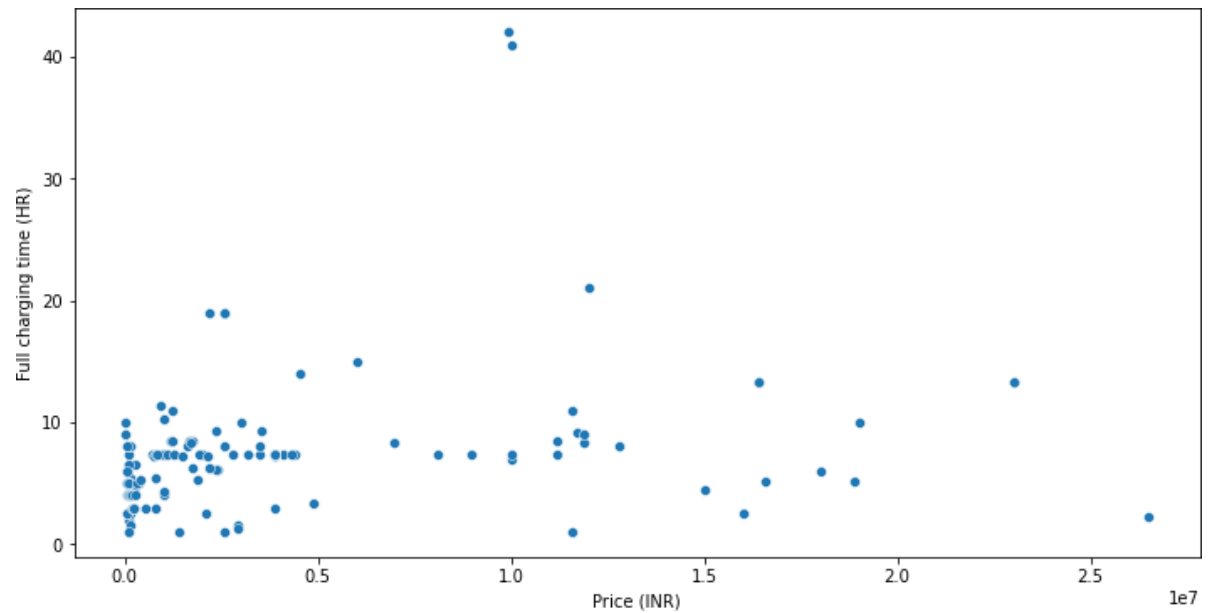- Charging time as per the Range of the Vehicle
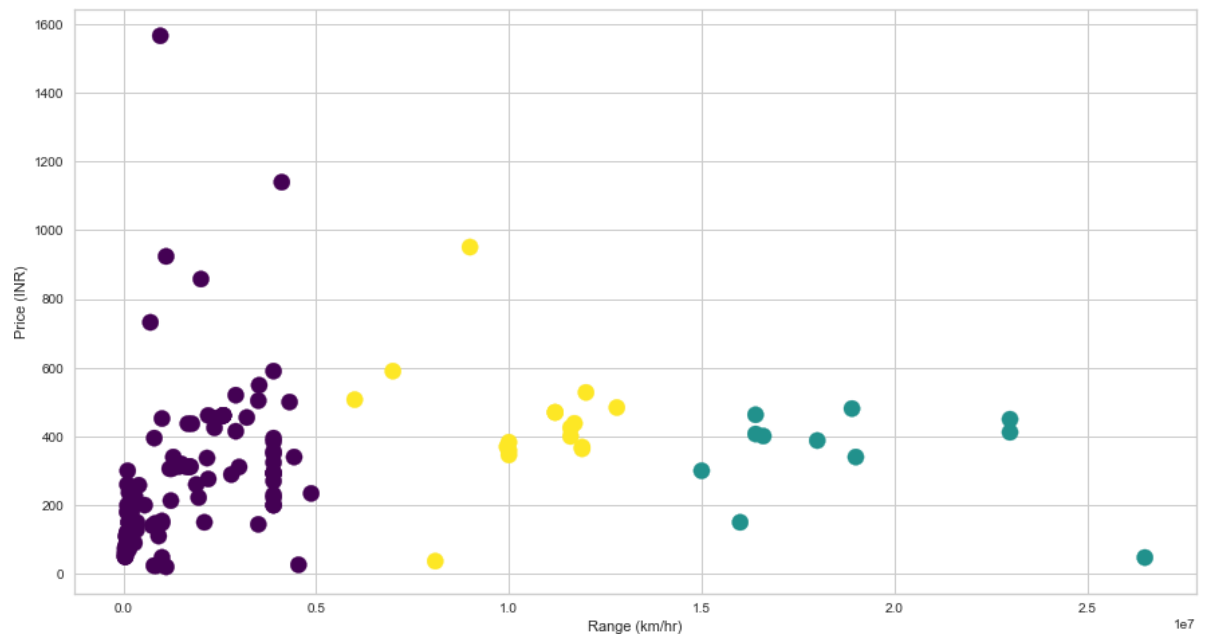
- Heatmap of various attributes

- Efficiency of Top Speed with there respective Battery Capacity

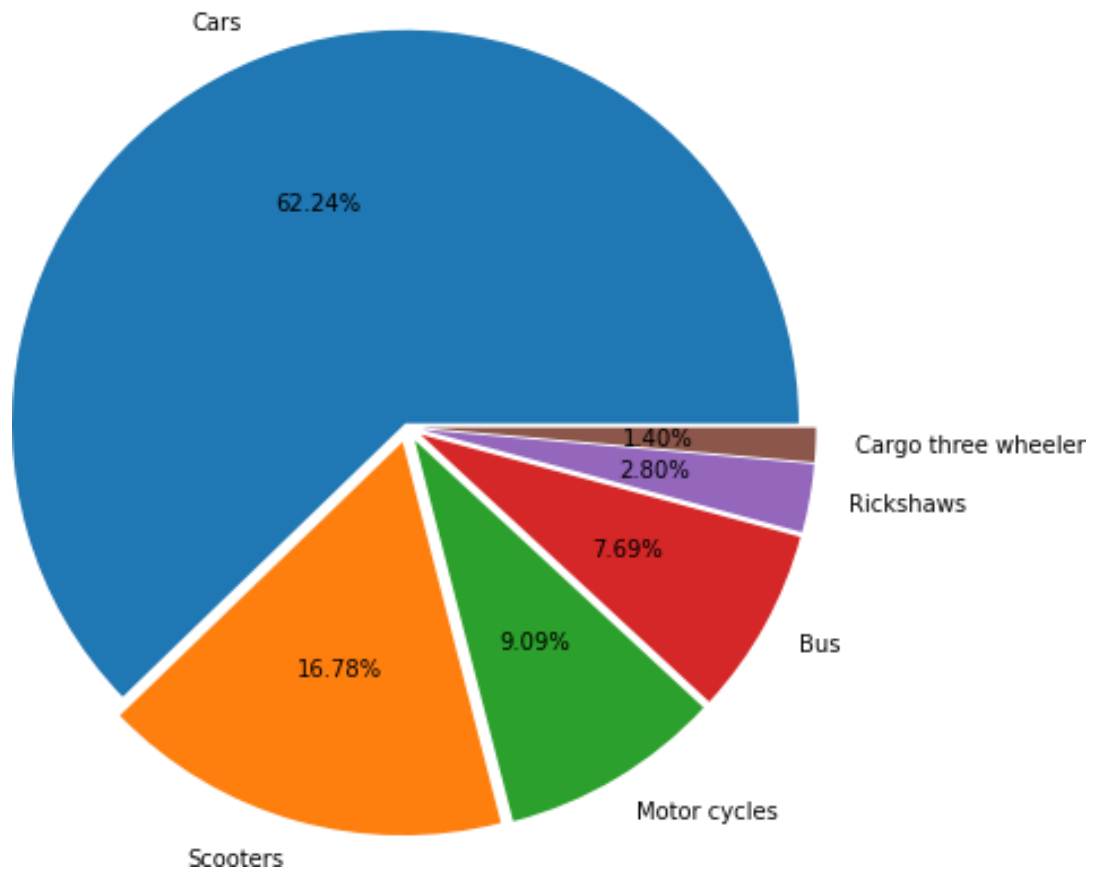- Charging Time pf Vehicles according to there price

- Price of Electric Vehicles according to there Range

Type of Vehicle

Cars — 62.24%
Scooters — 16.78%
Motor cycles — 9.09%
Bus — 7.69%
Rickshaws — 2.80%
Cargo three wheeler — 1.40%

Conclusion

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The adoption of electric vehicles (EVs) in India has witnessed a significant increase over the past five years, primarily due to their enhanced efficiency. Moreover, rising fuel prices have further contributed to a substantial surge in the adoption of EVs, driven largely by their extended range and efficiency.

The global Electric Vehicle Market is anticipated to expand from 8,151 thousand units in 2022 to 39,208 thousand units by 2030, with a compound annual growth rate (CAGR) of 21.7%. This growth is propelled by factors such as the escalating demand for low-emission transportation and government initiatives supporting the use of long-range, zero-emission vehicles through subsidies and tax incentives, compelling manufacturers worldwide to offer electric vehicles.

Governments worldwide are increasing investments to develop EV charging infrastructure and hydrogen fueling stations, alongside offering incentives to buyers. These initiatives create opportunities for Original Equipment Manufacturers (OEMs) to broaden their revenue streams and geographical footprint.

Through segmentation analysis, various consumer segments are identified to influence purchasing decisions. Geographic segmentation considers factors such as the availability of charging stations in different regions, impacting market sales. For instance, consumers residing in areas with more accessible charging infrastructure are more likely to purchase EVs compared to those in regions with limited charging stations. Demographic segmentation focuses on variables like education level, family size, occupation, and income, reflecting how consumers utilize products and services and their willingness to pay. The decision to purchase EVs may vary based on factors such as consumer education, financial status, and the intended use of the vehicle. For example, consumers intending to transport goods across cities or states may prioritize factors like cargo space and maximum range. Lastly, psychological segmentation acknowledges that some consumers prioritize satisfaction when selecting a product, while others prioritize cost-effectiveness alongside other considerations.