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Consumer Adoption Trends of Electric Vehicles: A Secondary Data Analysis of Global Markets

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Abstract: Increased Carbon Dioxide (CO2) emissions and environmental pollution are some of the major problems caused by over dependency on fossil fuel vehicles. Currently electric vehicles are considered as a solution to these problems. According to the Paris Agreement, governments around the world have set ambitious targets to reduce greenhouse gas emissions, which include decarbonizing transport. Moreover, although global Electric vehicle sales accounted for nearly 18% of total vehicle sales in 2023, the rate of adoption is not uniform, and consumer preferences remain shaped by socio-economic, cultural, and policy-driven factors. This study presents a Consumer Adoption Trends of Electric Vehicles: A Secondary Data Analysis of Global Markets. This study is conducted by using secondary data from various reliable sources like International Energy Agency, U.S. Department of Energy and market reports. The findings of the study indicate the importance of electric vehicle and it has been considered as the future vehicle. Moreover, analysis underline the important role of charging points, infrastructure and government policy towards electric vehicles. The findings from the study will be useful to manufactures, stakeholders and policy makers.

Keywords: Electric vehicle: Incentives & Policies of Government: Charging Infrastructure: Consumer Intention: Consumer adoption: Trends of Electric vehicle

Introduction:

Over the past two decades, the global transportation sector has been undergoing a major transformation driven by environmental, economic, and technological factors. The rising issues of air pollution, global warming, and exhausting fossil fuel resources compel us to shift towards a sustainable solution. In accordance with the Paris Agreement, Nations of the world have decided to achieve targets in reducing greenhouse gas emissions and making the decarbonization of transport a top priority. Electric vehicles are pivotal in achieving global sustainability goals and mitigating climate change (UN DESA, 2024). As a cleaner alternative to Internal Combustion Engine (ICE) vehicles, electric vehicles powered by lithium-ion (Li-ion) batteries significantly reduce carbon emissions and

reliance on fossil fuels. In 2022, electric vehicles prevented over 50 million tonnes of CO_2 emissions (IEA, 2024). Over-dependency on fossil fuels and urgent need for eco-friendly transportation are driving the global shift towards electric vehicles. Almost one sixth of global emissions are attributed to road transport, which is decarbonised by electric vehicle. Carbon dioxide emissions cause significant effect on climate change and global warming, increase the greenhouse effect and have an impact on global climate change. Compared to fossil fuel vehicles, electric vehicles are considered as future transportation solution, as a carbon-neutral alternative when powered by renewable energy sources. They play a crucial role in reducing the environmental impact of traditional combustion engine vehicles. An electric vehicle can be defined as an automobile that uses electricity or electric power for the internal combustion of engine. This study is conducted to identify the consumer adoption global trends towards electric vehicle

Statement of the Problem

The exponential growth of electric vehicle has emerged as a vital solution to reduce the over-dependence on fossil fuels, reduce global warming, and sustainable mobility is becoming more prevalent. Apart from this, adoption of electric vehicles will be different from country to country and vary widely across global markets such as China, Europe, the United States, and India. Developed countries will be more benefited as a result of high awareness of consumer towards electric vehicle, availability of charging points and strong policies and incentives provided by the government. While the developing countries will face problems like limited acceptance of electric vehicle by consumer, lack of adequate infrastructure and high upfront cost. These disparities create an uneven global landscape, raising questions about the underlying factors that influence adoption trends.

Additionally, Global sale of electric vehicle accounted for almost 18% of total vehicle sales in 2023, the rate shows an uneven adoption, preferences of consumer remain shaped by socio-economic, cultural, and policy-driven factors. It is very important to understand the adoption of electric vehicles by using secondary data. It helps to identify growth opportunities, challenges and issues, and strategies can be developed to intensify the worldwide shift to electric mobility. The year 2023 shows an alarming increase in the sale of electric car globally and reaches to 14 million units, which indicates a 35% increase from 2022 and showing a positive trend when compared to 2018, which was just 2%.

Objective

- To analyze the global trends in electric vehicles adoption
- To compare consumer adoption patterns across major markets and identify regional differences.

METHODOLOGY

This paper is an attempt to understand global trends in electric vehicle adoption and to compare consumer adoption patterns across major markets (China, Europe, United States, and India) and identify regional differences. Hence the

population of the study consists of global electric vehicles adoption data covering sales, market share, charging infrastructure, and consumer adoption patterns across key regions. Hence the population of the study consists of global electric vehicle adoption data covering sales, market share, charging infrastructure, and consumer adoption patterns across key regions. Secondary data which is collected from number of electric vehicles sold annually. market share of EVs vs internal combustion engine (ICE) vehicles, growth in charging infrastructure and consumer adoption indicators from secondary survey data are used for the study. The aim of this study is to analyze global consumer adoption trends of electric vehicles using secondary data, with a focus on identifying regional differences across China, Europe, the United States, and India, and to evaluate the key factors influencing EV adoption such as policies, infrastructure, and consumer preferences. Electric vehicles constituted about 18% of all new car sales in 2023, up from 14% in 2022 a strong upward trend compared to just 2% in 2018.

Growth of Global trend of Electric vehicle

To measure the growth of Global trend of electric vehicles, five variables bearing the growth characteristics are considered;

Annual Electric vehicle Sales (Units Sold)

- The sale of electric car globally indicates the overall growth of the electric vehicle market and trace the sales of annual electric vehicle globally, which helps to identify the rate of market acceptance and adoption.

Electric vehicle Market Share (%)

- This reflects the percentage measure of total annual electric vehicles sales and shows the perception towards electric vehicles in comparison to internal combustion engine (ICE) vehicles.

Charging Infrastructure (Number of Public Charging Points)

- Charging infrastructure indicates the availability of public charging points

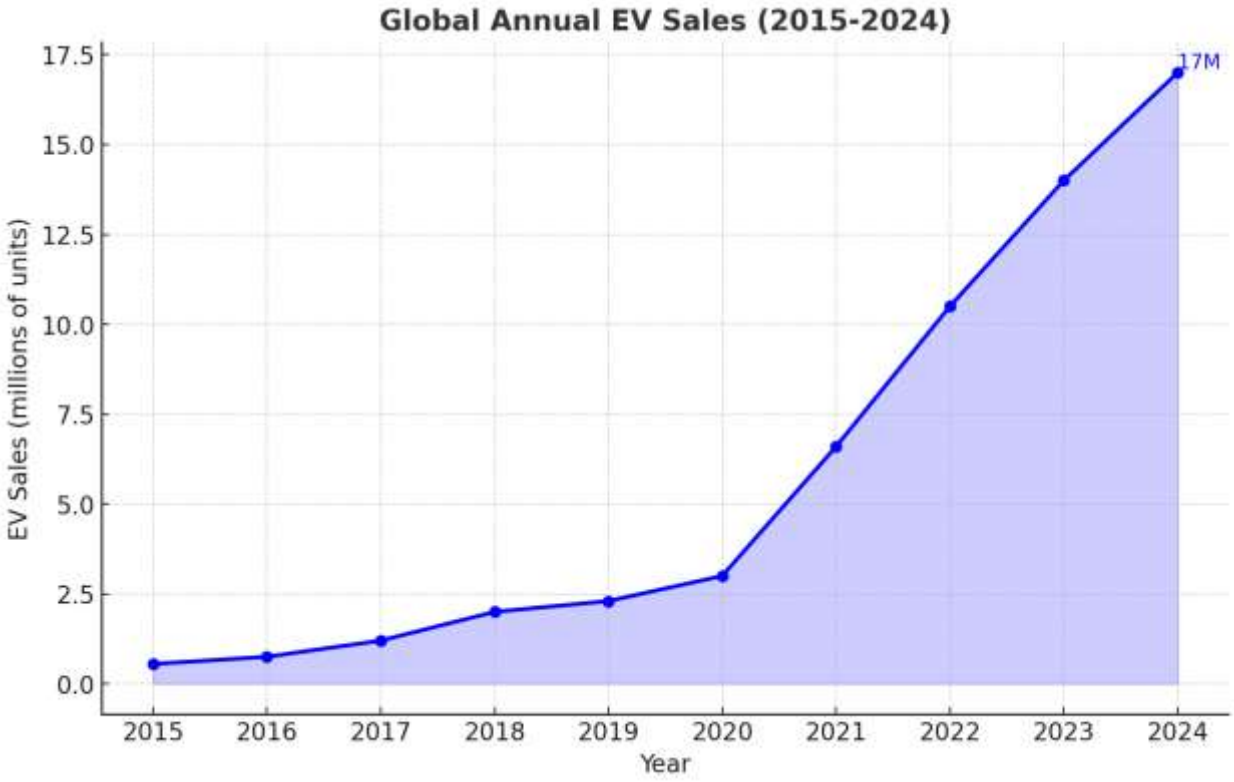
Government Incentives & Policies (Monetary Support/Policy Index)

- Incentives and policies provided by the government in the form of subsidies, tax rebates, and supportive regulations, also have an important role in the adoption of electric vehicles

Consumer Adoption Indicators (Survey-based Preference/Acceptance Rates)

- Helps to identify the intention and perception of consumers towards the purchase of electric vehicles, often analysed by surveys done by organizations.

Table 1: Global Annual Electric Vehicle sales



This chart provides a clear growth trend of electric vehicles. There is a slow growth in Global annual electric vehicle sales from 2015 to 2019.After that, electric vehicle shows a Spectacular growth progress between 2019 and 2024. Sales Expanded progressively from about 0.5 million units in 2015 to 2.3 million units in 2019 showing the adoption of Electric vehicles globally. A sharp increase can be seen from 2020 with sales jumping to 3 million units and further accelerating to 6.7 million units in 2021. From 2021 onwards, the market experienced rapid expansion, reaching 17 million units by 2024. Overall, the data reflects that electric vehicles are becoming a market leader in the global automobile industry.

Table 2: Comparison of Market Share of Electric vehicles And Internal Combustion Engine (ICE) Vehicles.

Year	**Electric Vehicle share (%)**	**ICE Share (%)**	**Notes**
2020	4.60%	95.40%	Initial stage of adoption, ICE still leading.
2021	9%	91%	Electric vehicles sales nearly doubled compared to 2020.
2022	14%	86%	Strong growth, especially in China & Europe.

2023	18%	82%	Electric vehicles approached 1 in 5 cars sold globally.
2024	22%	78%	Over one-fifth of global sales now Electric Vehicles

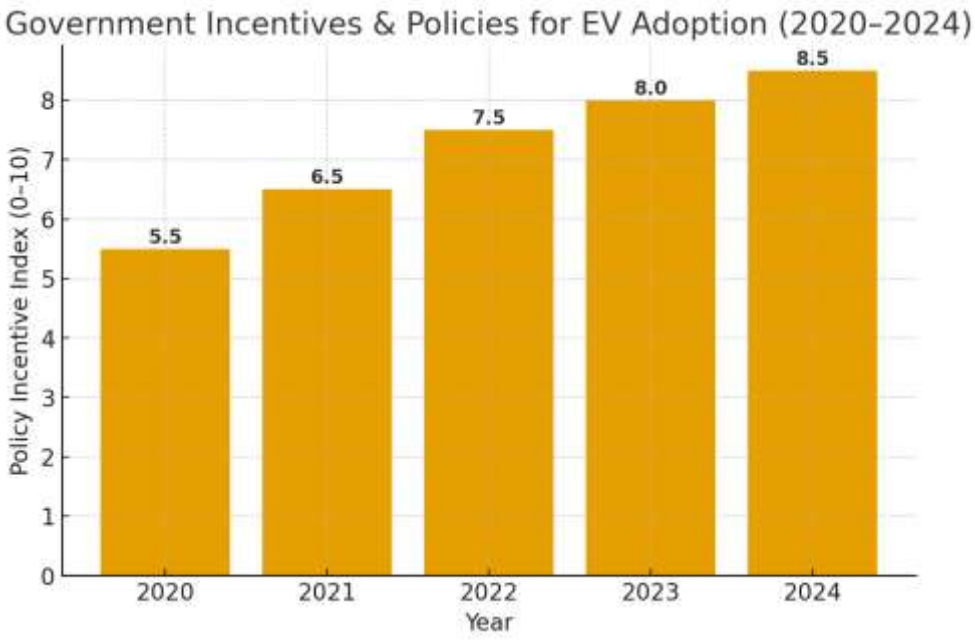
This table highlights the market share of electric vehicles and ICE vehicles. During 2020, ICE vehicles market share is high with 95.40% and electric vehicle share is only 4.60%. But in 2021 onwards, Electric vehicles market share is doubled and it reaches to 9%. And in 2022and 2023 Electric vehicles shows strong growth in China and Europe and can see the acceptance of electric vehicles globally. In 2024 Electric vehicles market share offers one fifth of global sales and ICE sales dropped to 78%. This progress reflects a positive trend towards Electric vehicles in the automotive market.

Table:3 Global Growth of Public Electric Vehicle Charging Points (2019–2024)

Year	**Number of Public Charging Points (Approx.)**	**Notes**
2019	1.5 million	Early adoption phase, concentrated in China & Europe.
2020	2.1 million	Steady growth with policy support in major regions.
2021	2.8 million	Expansion in urban areas and highways.
2022	2.5 million	Base year numbers began doubling afterwards.
2023	4.0 million	Significant jump in China & Europe, 35% growth.
2024	5.0+ million	Over 1.3 million added in 2024 alone; Europe ~1M, US ~200k.

This tables shows the global growth of public electric vehicles charging points from 2019-2024. In 2019 number of charging points are 1.5 million and in 2021 it reaches to 2.8 million. This shows early adoption phase especially in China and Europe where infrastructure, government incentives and friendly regulations towards electric vehicle were strongest. But in 2022 we can see a slight decline to 2.5 million. But in 2023 we can witness installation being doubles reaches to 4 million. And in 2024 more than I million charging points were added and reflecting both advanced and developed markets expanding aggressively

Table 4: Government Incentives & Policies for Electric Vehicle Adoption (2020–2024)



This bar chart shows Government Incentives & Policies for electric vehicle adoption has increased from 2020-2024. In 2020 policy incentive index is 5.5 and in 2024 it reaches to 8.5 highlighting consistent support from government in the form of subsidies, tax credits, charging infrastructure. By 2024, the index reached its highest level , indicating that many countries now have robust and mature policy frameworks to encourage widespread adoption and provide market confidence for automakers and infrastructure developers.

Table 5: Consumer Intent Toward Electric Vehicles: Global Trends

Study / Survey	**Key Metric (Consumer Intent, Willingness, Acceptance)**	**Value / Insight**
TCS Future-Ready eMobility Study 2025	Proportion who are "likely to choose Electric vehiclesas next vehicle"	64% globally The Economic Times
S&P Global Mobility Survey (2023)	Consumers "open to purchasing an Electric Vehicle"	67% S&P Global
McKinsey "Future of Auto Retail" Survey	% considering Battery Electric vehiclesand Plugin Hybrid electric Vehicles; % considering test drives etc.	20% consider considering Battery Electric Vehicles, 22% consider Plugin Hybrid electric Vehicles; 87% insist on test drives ETAuto.com

AlixPartners 2024 Survey	"Very or moderately likely to purchase a Electric Vehicle"	97% in China; 35% in U.S.; 43% in Europe. alixpartners.com

The above table shows consumers intention towards electric vehicle adoption globally. According to survey of The Economic Times, 64% who are "likely to choose Electric vehicles as next vehicle". S&P Global survey reports indicates 67% Consumers "open to purchasing an Electric Vehicle". McKinsey "Future of Auto Retail" Survey highlights 20% consider considering Battery Electric Vehicles, 22% consider Plugin Hybrid electric Vehicles; 87% insist on test drives. AlixPartners 2024 Survey indicates "Very or moderately likely to purchase a Electric Vehicle" 97% in China; 35% in U.S.; 43% in Europe. Global adoption of Electric vehicles is very high and most of the consumers are willing to adopt Electric vehicle

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