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Shifting Gears: Insights into Electric Vehicle Adoption and User Satisfaction in Southern Kerala, India

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ABSTRACT

This study examines how consumers in Kerala, India, think about EV adoption and satisfaction levels with conventional automobile ownership. The research indicates a significant preference for electric vehicles (EVs) among youthful, educated men, especially in the two-wheeler market controlled by companies such as Ather and Ola, based on a thorough examination of demographic characteristics and vehicle preferences. Due mostly to reduced operating costs and government incentives, long-time drivers of conventional vehicles are switching to electric vehicles (EVs). In comparison to economic issues, environmental concerns are less influential in shaping decisions, despite their importance. Particularly in terms of financial gains and operational efficiency, the results point to increased levels of satisfaction among EV users. In addition to outlining opportunities and challenges in fostering widespread EV adoption, this report highlights Kerala's changing sustainable transportation scenario.

Key words : *Electric Vehicles (EVs), Conventional Vehicles, Vehicle Adoption, Cost Efficiency, Environmental Concerns, Consumer Preferences, User Satisfaction, Technological Adoption, Market Trends, Sustainability*

Introduction

It is vital and timely to investigate the social, economic, and environmental aspects of adopting electric vehicles (EVs) instead of conventional cars in the modern day when sustainability and innovation coexist. Internal combustion engines (ICEs) changed transportation when they were developed in the late 19th century. These engines replaced horse-drawn carriages as vehicles that could carry passengers or cargo (Encyclopedia Britannica, n.d.). The widespread manufacture of automobiles, such as the Ford Model T in 1908, increased transportation accessibility globally and had a huge impact on society, economy, and culture (Ford, 1922; World Economic Forum, 2021). Nonetheless, a significant portion of air pollution and greenhouse gas emissions are caused by the transportation industry. 24% of the world's CO2 emissions in 2015 came from the transportation sector alone, with road transportation accounting for 75% of these emissions (International Energy Agency [IEA], 2017). The environmental concerns are exacerbated by the low fuel efficiency (~20–25%) and harmful gases (CO_2, NOx, CO, SOx, and unburned hydrocarbons, or CxHy) released by ICE-powered vehicles (IEA, 2017).

With the introduction of EVs, the automobile industry has undergone a radical change, moving away from conventional fossil fuel-powered cars and toward more environmentally friendly and sustainable substitutes. Electric motors and cutting-edge battery technology power EVs, which have several advantages over internal combustion engines (ICEA, 2020). These benefits include lower greenhouse gas emissions, cheaper running costs, and increased energy efficiency. With longer driving

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ranges, quicker charging times, and more extensive infrastructure for charging, technological developments have further enhanced electric vehicles (EVs), boosting their viability for consumers around the world. Conventional cars continue to dominate the market despite these developments because of their familiarity, price, and well-established infrastructure. The lack of infrastructure for charging EVs, customer preferences, and range restrictions are some of the obstacles to their mainstream acceptance (Breetz and Salon, 2018).

Because of its detrimental effects on the environment, the take-make-dispose method of the linear economic model makes it unsustainable (Johansen, *et al.*, 2022). With its focus on recycling, waste reduction, and resource efficiency, the circular economy presents a viable substitute. Achieving sustainable development objectives and reducing the effects of climate change depend on this approach. Innovative solutions that can drastically cut carbon emissions are needed to move toward a circular economy, such as smart houses and hybrid plug-in electric cars (Abdallah and El-Shennawy, 2013).

With a beginning in 1834, electric cars have a lengthy history. Despite their early popularity, they began to diminish with the introduction of internal combustion (IC) engines and the accessibility of inexpensive oil. In the 1970s, growing oil prices and environmental concerns sparked a renewed interest in electric vehicles (EVs) (Anderson and Anderson, 2010). Electric motors in modern EVs are fuelled by a variety of sources, including renewable energy. These motors are equipped with storage batteries, drive motors, and power electronics converters. EVs have drawbacks such as a restricted driving range and inadequate charging infrastructure, despite their benefits like high efficiency and cheap operating costs. Federal and state tax incentives as well as fee rebate programs to lower the purchase price for customers have been used in the US to encourage the adoption of BEVs (Bjerkan, *et al.*, 2016). Similar patterns are seen throughout the world, and several legislative initiatives are being put in place to encourage the adoption of EVs. Since the first conventional automobile was sold in Bombay (now Mumbai) in 1897, the automotive sector in India has expanded steadily and risen to become a significant contributor to GDP, employment, and industrial progress. Similar to this, despite early cultural and geographic limitations, the desire for conventional cars has grown in Kerala as a result of better infrastructure, growing incomes, and shifting lifestyles. Promoting sustainable transportation options and influencing the future of the automotive industry in the area requires an understanding of the economic, environmental, and sociological effects of EV adoption (Cevrioglu, 2022).

This study explores the adoption of electric vehicles (EVs) from several angles, with a particular emphasis on the Indian market, worldwide trends, and a thorough examination of user demographics and behavior. It seeks to offer a comprehensive grasp of the variables driving the transition to electric vehicles and the effects of this change on various societal groups.

The research's main objectives are first described, which is then followed by a Description of the methodology and the technique used to collect and process the data. After that, it provides a summary of global EV sales trends, providing information on patterns of global growth. After that, the emphasis turns to the Indian market, where adoption rates and governmental regulations are studied. An overview of the body of literature gives background information and emphasizes earlier studies in this area. The core of the paper is the analysis and inferences section, which includes subsections on the demographic profile of EV users, factors driving the shift towards EVs, a comparison of fuel types and purchasing costs, mileage efficiency, vehicle usage duration, revenue comparisons for taxi drivers, user satisfaction levels, and reasons for transitioning to EVs. Finally, the paper concludes with a summary of key findings and recommendations for future research and policy development.

The study is to compare the cost-benefit of EVs with conventional vehicles, analyze the trend of increasing EV consumption based on a variety of distributive variables, and evaluate user satisfaction and the benefits of EVs over conventional vehicles. The study also aims to determine the primary drivers of EV adoption in Kerala and investigate the potential impact of environmental concerns on the switch to EVs.

Methodology

The study examines the advantages of electric cars (EVs) over conventional automobiles by assessing several elements that impact each type of vehicle. It evaluates consumer happiness, lists EVs' advantages and disadvantages, and indicates both EV

technology's progress and opportunities for improvement. To ascertain which vehicle type delivers greater consumption benefits and the contributing elements for each, the study also looks at the rising trend of EV production and consumption. The study uses a non-probability sampling technique called snowball sampling because there are comparatively fewer EV users than users of conventional vehicles. Data is gathered directly from EV users who have been referred by other users. The study concentrates on four districts in Kerala: Palakkad, Malappuram, Thrissur, and Kozhikode. Despite the lesser number of EV users in these regions, the snowball sampling method collects relevant data with good efficacy. To do the comparison analysis and develop a useful conclusion, the technique includes a sample of 106 EV consumers. To obtain adequate results and fulfil the study's objectives, the analysis makes use of the proper tables and graphs.

Global Trend in sales of electric Vehicles

Global EV sales have significantly increased, indicating a trend toward more environmentally friendly modes of transportation. Global EV sales exceeded 3.2 million units in 2021, according to the International Energy Agency (IEA), which represents a significant turning point in the shift to electric mobility. Due to breakthroughs in battery technology, growing consumer environmental awareness, government incentives, and the growth of the charging infrastructure, EV sales have expanded at double-digit rates yearly over the previous ten years (IEA, 2017). In response, top manufacturers are releasing a wider variety of EV cars, giving buyers a wide range of options (Christidis and Focas, 2019).

An extensive overview of the uptake and expansion of electric vehicles (EVs) in a few chosen nations between 2010 and 2023 may be found in the table below. The three main components of this aggregated statistics are the number of new electric cars sold each year (A), the percentage share of electric vehicles now in use (B), and the percentage of EVs among newly sold cars(C). This multifaceted methodology makes it possible to analyse the trends

Table 1. Global Trend in sales of electric Vehicles
*Different columns represent the following
Column A - Number of new electric cars sold
Column B - The Percentage of electric vehicles sold to total vehicles sold
Column C - The Percentage Share of Electric Cars Currently in Use

Country/ Year	Norway			United Kingdome			United States			China			European Union			India			**World**		
	A	**B**	**C**	**A**	**B**	**C**	**A**	**B**	**C**	A	**B**	**C**	**A**	**B**	**C**	**A**	**B**	**C**	**A**	**B**	**C**
2010	NA	<1	<1	261	<1	<1	NA	<1	<1	1140	<1	<1	1191	<1	<1	NA	<1	<1	7450	<1	<1
2011	NA	1	<1	1207	<1	<1	17800	<1	<1	5120	<1	<1	7460	<1	<1	NA	<1	<1	49000	<1	<1
2012	4220	3	<1	2570	<1	<1	54000	<1	<1	9860	<1	<1	19500	<1	<1	NA	<1	<1	120000	<1	<1
2013	8240	6	<1	3700	<1	<1	97000	<1	<1	15730	<1	<1	45000	<1	<1	NA	<1	<1	201000	<1	<1
2014	21700	15	1	14500	<1	<1	118000	<1	<1	73000	<1	<1	57000	<1	<1	NA	<1	<1	330000	<1	<1
2015	33900	22	3	29000	1	<1	114000	<1	<1	211000	1	<1	119000	<1	<1	NA	<1	<1	550000	<1	<1
2016	45000	29	4	39000	1	<1	160000	<1	<1	339000	2	<1	119000	<1	<1	NA	<1	<1	760000	<1	<1
2017	62000	39	6	49000	2	<1	194000	1	<1	580000	2	<1	174000	1	<1	NA	<1	<1	1180000	1	<1
2018	73000	49	9	62000	3	<1	360000	2	<1	1090000	5	1	250000	2	<1	NA	<1	<1	2060000	2	<1
2019	79000	56	12	75000	3	<1	325000	2	<1	1060000	5	2	390000	3	<1	687	<1	<1	2080000	3	<1
2020	106000	75	17	178000	11	1	294000	2	<1	1140000	6	2	1050000	10	<1	3143	<1	<1	2980000	4	<1
2021	148000	86	21	310000	19	2	630000	5	<1	3250000	16	3	1770000	17	2	12050	<1	<1	6600000	9	1
2022	156000	89	26	370000	23	3	990000	7	1	5900000	29	5	2100000	21	3	48023	1	<1	10200000	14	2
2023	110000	93	29	450000	24	5	1390000	10	2	8100000	38	8	2450000	22	4	82270	2	<1	13800000	18	3

Source: International Energy Agency. Global EV Outlook
https://ourworldindata.org/electric-car-sales (Compiled by the authors)

and differences in EV adoption around the world in great detail. By looking at these aspects collectively, we can gain a clearer understanding of the steps taken toward the shift to electric mobility, the forces behind these steps, and the obstacles still standing in the way of widespread EV adoption in various geographic areas.

The adoption of electric vehicles (EVs) increased significantly globally between 2010 and 2023, according to the combined data of the above table. While the number of new electric cars sold increased dramatically from 7450 units in 2010 to 13.8 million units in 2023, the percentage of EVs among new automobiles sold worldwide increased from less than 1% in 2010 to 18% in 2023. This is indicative of a larger trend toward environmentally conscious transportation brought about by government laws that encourage it, technical developments, and rising environmental consciousness. The rates of EV adoption in industrialized and developing nations, however, differ noticeably. Norway is in the lead with 93% of new car sales projected to be electric by 2023 thanks to robust infrastructure and incentives. Though at different rates, other developed regions such as the US, the UK, and the EU also exhibit notable growth. However, developing nations like China and India are catching up, with China now leading the world in EV sales.

Driven by large expenditures and supportive policies, China has seen tremendous growth, with EV sales rising from 9,860 units in 2012 to 8.1 million units in 2023. India's EV market, meanwhile, expanded from 687 units in 2019 to 82,270 units in 2023, despite the country's still-low overall EV usage percentage. The percentage of electric vehicles in use worldwide increased gradually from less than 1% in 2010 to 3% in 2023, pointing to a slow but steady transition to electric mobility. The research emphasizes the vital role that policies and infrastructure development play in encouraging the adoption of electric vehicles (EVs), with Norway and China showing the highest rates of adoption because of their well-developed infrastructure and attractive incentive packages. Sustained efforts to improve policy frameworks, consumer acceptance, and infrastructure are crucial if we are to speed up this shift globally. All things considered, the data highlights the noteworthy transition to electric vehicles while also highlighting the necessity of a more consistent and broad adoption.

E Vehicles in India

Similar trends can be seen in statistics from the Indian government's Vahan portal. Sales of EVs increased from 2,443 in 2013 to 999,849 in 2022, with 622,337 electric two-wheelers selling the most in that year. Variations in gasoline costs, environmental concerns, and the EVs' increasing cost-effectiveness are the reasons for this growth. With increasing subsidies from the federal and state governments, India hopes to electrify thirty percent of its transportation needs by 2030.

The Indian electric vehicle (EV) market is expanding quickly, as evidenced by notable achievements and rising adoption rates. Sales of electric vehicles (EVs) reached 23,37,761 units in FY2023. At 60% and 29% of the market, respectively, electric two-wheelers (E2Ws) and passenger electric three-wheelers (E3Ws) led the way. The top-selling states were Gujarat, Rajasthan, Karnataka, Maharashtra, and Uttar Pradesh. Notable spikes include a 126% increase in E3W sales, driven by Mahindra & Mahindra, and a 210% increase in E2W sales, led by Ola Electric, Hero Electric, and Okinawa Autotech. Tata Motors led the 150% growth in e-car sales, while PMI Electro Mobility topped the 62% increase in e-bus sales. Important players also emerged in the battery pack and charge point industries. Despite being in its early phases, the EV market is expanding quickly; in 2021, 330,000 units were registered, a 168% rise from 2020. The demand for personal mobility, environmental consciousness, rising gas prices, and the incentives offered by the FAME II program are important growth factors. Tamil Nadu, Karnataka, and Uttar Pradesh are the top three states for EV registrations, with Maharashtra having the greatest sales of passenger cars. It is anticipated that by 2027, EV sales will account for 39% of all automobile sales, mostly due to the electrification of delivery services and e-commerce. E-vehicle adoption is essential to lowering India's carbon emissions (which account for 7% of world emissions) and ICE vehicle pollution (which accounts for 40% of India's pollution), despite obstacles including insufficient charging infrastructure, which is expected to increase from 1,742 to 100,000 stations by 2027. The objectives of state-level EV policies are to facilitate this shift, improve air quality, and lower oil imports. By 2030, investment in the electric vehicle (EV) sector is predicted to reach USD 20 billion, up from USD 6 billion in 2021. This might result in the cre-

ation of 10 million direct and 50 million indirect employments.

Kerala has demonstrated its commitment to sustainable transportation in the face of increased environmental concerns and legislative support, as evidenced by the state's swift adoption of electric cars (EVs). Kerala has created a favorable atmosphere for the adoption of EVs by promoting consumer education and developing charging infrastructure, despite obstacles like range anxiety and upfront expenditures (Hao *et al*., 2016; Emanovic, *et al.*, 2022). Thanks to advantages like closer travel lengths, more accessible home charging stations as a result of increased electrification, and encouraging government initiatives, Kerala came in second place to Maharashtra in terms of EV sales in 2023, accounting for 13.2% of all vehicle sales. Automakers like Tata and MG have observed that Kerala's EV adoption is further supported by high fuel prices and widespread usage of solar energy. They attribute this to rising consumer awareness and cheaper operating costs driving demand. Kerala, together with Gujarat and Karnataka, wants to spearhead India's shift to electric vehicles (EVs) to lower reliance on fossil fuels, enhance air quality, and hit aggressive EV usage objectives (Raj, 2023).

Review of Literature

Extensive research has been conducted into the technological, environmental, and economic implications of electric vehicle (EV) adoption in light of recent advancements in EV technology. To provide a thorough understanding of the factors driving EV adoption, the methodology used to assess their influence, and the opportunities and problems presented by the transition to electric mobility, this session synthesizes major findings from diverse research.

Using life-cycle analysis, Yang *et al.* (2021) evaluated the emissions of CO2 and other pollutants related to ICEVs, BEVs, and PHEVs in China, taking into account the phases of manufacturing, use, and disposal. To evaluate electric cars, Hussain *et al.* (2023) developed innovative analysis techniques based on Aczel–Alsina aggregation tools and complicated spherical fuzzy information. Mauler *et al.* (2021) used a variety of research techniques, such as expert interviews and learning curves, to perform a meta-analysis of 53 studies on the costs of EV batteries. Leontief (1936) established the I-O model, which has been used to examine how businesses interact in response to shifts in supply and demand to study energy and environmental challenges, including electric vehicles (EVs). The purchase cost, experience, environmental concerns, legislative incentives, and charging infrastructure are among the factors influencing the adoption of BEVs that have been found by econometric analyses, such as those conducted by Rezvani *et al.* (2015) and Coffman *et al.* (2016). The adoption of BEVs is also influenced by macro-factors such as fuel prices and unemployment (Jenn *et al*., 2013; Mersky *et al*., 2016). Studies by Karplus *et al.* (2020) and *Schmelzer et al. (2018)*, which highlight the significance of carbon intensity in power generation and the social costs and benefits of EVs, demonstrate how CGE models have been used to examine the environmental implications of EV adoption. Comprehensive evaluations of the factors driving BEV adoption are, however, limited by the fact that many studies lack behavioral realism and concentrate only on certain cost aspects.

Studies have also looked into new technology developments and legislative approaches to encourage the use of EVs. To encourage BEVs, Breetz and Salon (2018) and *Langbroek et al.* (2016) stressed the importance of subsidies and incentives. The environmental advantages and difficulties of EVs were covered by *Schill (2010)* and Doucette and McCulloch (2011), the latter of whom pointed out geographical differences in PHEV efficacy. Poullikkas (2015) and García and Miguel (2012) both emphasized how consumers view high upfront costs and how government incentives can help. Research on personal electric vehicles, such as that done by *Zagorskas and Burinskiene* (2019) and Pisu and Borza (2019), supports the development of infrastructure and hybrid models. The adoption of electric vehicles (EVs) in India and the technological difficulties associated with integrating EVs with the grid were studied by Khurana (2019) and Das *et al.* (2020). Dynamic storage solutions were suggested by *Paviæ et al.* (2020) to improve the infrastructure for charging, while *Fulton* (2020) examined the effectiveness and performance of different vehicle types, emphasizing the significance of government policy. Agarwal *et al.* (2022) investigated the integration of EVs with renewable energy sources, while Arseni (2021) and Carrara *et al.* (2021) provided policy proposals for EVs and e-PMVs. In their respective analyses of V2G technology and EV depreciation, Greaker *et al.* (2022) and *Schloter* (2022) emphasized

the advantages and difficulties associated with grid-related and economic factors. Szumska (2023) emphasized that to reduce range anxiety and encourage long-distance driving, a strong EV charging infrastructure must be present along EU routes.

Analysis and Inferences

This research paper is intended to compare the cost-benefit of electric cars (EVs) with conventional vehicles, analyse the trend of increasing EV consumption based on a few distributive characteristics, and evaluate the benefits and satisfaction levels of EVs and conventional vehicles. 106 EV consumers provided information, with particular attention paid to their demographics and the motivations for their EV purchases. Using a questionnaire, a comparative analysis was also carried out about the use of conventional automobiles by the same individuals. The analysis's findings and the related debates are shown in the parts that follow.

Demographic Profile

A comprehensive demographic profile of electric vehicle (EV) users is shown in Table 2, which includes important details including age, gender, income, profession, educational attainment, and place of operation. This table gives a broad overview of the many traits of people who have switched to electric vehicles (EVs) and sheds light on the socioeconomic and demographic variables that affect EV usage.

EV consumers' demographic profile provides important insights. The age range of the bulk of users is 18–25 (28.30%), followed by 26–35 (26.41%) and 46–55 (24.52%). In terms of gender distribution, male users make up 94.33% of the total, while female users make up 5.66%. Higher secondary education (30.18%) is the most prevalent educational level, followed by graduates (26.41%) and post-graduates (13.20%). Based on income distribution, the majority of the group (30.18%) earns between $10,000 and $20,000, with a notable representation in other income groups. Users come from a variety of professional backgrounds; the largest groups are employed in private industry (20.75%) and taxi service (30.18%), with students coming in second (16.91%). Geographically, towns account for a large portion of EV users (37.73%), whereas villages account for a smaller percentage (10.37%). The bulk of EV users operate in cities (51.88%). These results show a primarily youthful, male, urban population with a range of incomes and educational backgrounds working in a variety of occupations.

Table 2. Demographic profile of EV Users

Variables	Attributes	Frequency	Percentage
Age	18-25	30	28.30
	26-35	28	26.41
	36-45	18	16.98
	46-55	26	24.52
	56-65	4	3.77
Gender	Male	100	94.33
	Female	6	5.66
Educational Status	Secondary or lower	12	11.32
	Higher Secondary	32	30.18
	Graduate	28	26.41
	Post Graduate	14	13.20
	Other	10	9.43
Income	Below 10,000	24	22.64
	10,000 – 20,000	32	30.18
	20,000 – 50,000	26	24.52
	50,000 - 1 Lakh	12	11.32
	Above 1 Lakh	12	11.32
Profession	Taxi Service (Autorickshaw)	32	30.18
	Private	22	20.75
	Government	14	13.20
	Coolie	14	13.20
	Student	18	16.91
	Other	6	5.66
Place of Operation	Villages (Rural)	11	10.37
	Townships (Suburban)	40	37.73
	City (Urban)	55	51.88

Source: Primary Data

Shift towards E Vehicles

An overview of the types and modes of cars used by respondents is provided in Table 3 below, which contrasts conventional and electric vehicles (EVs). The data includes a breakdown of individual makes and their corresponding frequencies and percentages among EV users, as well as the percentage distribution of two-wheelers, three-wheelers, and four-wheelers among conventional and electric vehicles.

The research indicates that there has been a notable movement in user preference from conventional to electric automobiles. In all categories, two-wheelers account for 52.83% of all vehicles and 50.94% of all electric vehicles. With 16.04% of all EVs sold, Ather and Ola are the most popular brands. When comparing EVs to conventional vehicles (20.75%), three-wheelers make up a larger percentage (30.18%), with Ape Piaggio and Mahindra being

the top two manufacturers. Four-wheelers make up 18.88% of EVs but 26.41% of conventional vehicles, suggesting a slower transition to electric vehicles. With 13.20% of the market, Tata is the most common EV manufacturer in this category.

The data indicates a wider shift towards sustainable mobility since those who used conventional automobiles in the past have switched to electric vehicles. Particularly in the two- and three-wheeler divisions, this tendency is noteworthy. But the uptake of electric four-wheelers is moving more slowly than expected, suggesting possible obstacles including increased prices and inadequate infrastructure for bigger cars. Overall, the data show that consumers are becoming more and more inclined toward electric vehicles (EVs), with notable progress being achieved in the two- and three-wheeler segments.

Comparison of Fuel Type of vehicle and Purchasing cost

The table that follows shows how consumer preferences vary across different price ranges by comparing the upfront prices and fuel types of conventional and electric cars (EVs). For both conventional and electric vehicles, the data covers the number and percentage of users in each cost group as well as the

Table 3. Type and Mode of Vehicles

Type and Mode	Conventional vehicle	Percentage	E Vehicle	Percentage	Make	Frequency	Percentage
Two-Wheeler	56	52.83	54	50.94	Ather	17	16.04
					Bajaj	7	6.60
					Hero Honda	4	3.77
					Montra	5	4.72
					Ola	17	16.04
					Romai	2	1.89
					Tylos	2	1.89
Three - Wheeler	22	20.75	32	30.18	Ape Piaggio	20	18.87
					Mahindra	8	7.55
					Bajaj	4	3.77
Four - Wheeler	28	26.41	20	18.88	Mahindra	2	1.89
					Maruti Suzuki	2	1.89
					Tata	14	13.21
					Citroen	2	1.89
Grand Total	106	100	106	100		106	100

Source: Primary Data

Table 4. Comparison of Fuel Type and Purchase Cost of Vehicles

Vehicle Purchasing Cost	Fuel Type	Then Number of Users (Conventional vehicle)	Percentage	Current Number of Users of E-Vehicle	Percentage	Difference in percentage
Below 1 Lakh	Petrol	54	50.94	8	7.55	-43.40
	Diesel	0	0			
	LPG /CNG	0	0			
1 Lakh - 3 Lakh	Petrol	14	13.21	70	66.04	35.85
	Diesel	18	16.98			
	LPG /CNG	0	0			
3 Lakh - 8 Lakh	Petrol	6	5.66	14	13.21	1.89
	Diesel	5	4.71			
	LPG /CNG	1	0.94			
Above 8 Lakhs	Petrol	2	7.55	10	9.43	1.89
	Diesel	6	5.66			
	LPG /CNG	0	0			

Source: Primary Data

percentage difference. The comparison emphasizes how much more expensive EVs are initially, which encourages consumers to switch from less expensive conventional cars to more expensive EVs.

Since electric vehicles (EVs) are more expensive than conventional automobiles, the data shows a notable shift in consumer behavior toward higher-priced EVs. Just 7.55% of EV users now choose to drive conventional cars under one lakh, down from 50.94% in the past. This is a 43.40% reduction. This change is most noticeable for people who ride two wheels. EV users have increased significantly to 66.04% in the 1 to 3 lakh price category, compared to 13.21% for conventional petrol vehicles, indicating a 35.85% jump. Compared to conventional vehicles powered by gasoline (5.66%) and diesel (4.71%), the percentage of EV users in the 3 to 8 lakh range has slightly increased (13.21%), representing a 1.89% gain. EV users have increased to 9.43% of vehicles above 8 lakhs, while gasoline and diesel conventional vehicle users have remained constant at 7.55% and 5.66%, respectively, with a 1.89% growth. These changes imply that although EVs are still more expensive initially, people are beginning to accept and like mid- to high-range EVs more than other car models.

Comparison of Mileage

Based on user comments, the mileage of conventional and electric vehicles (EVs) is contrasted in the following table. For both conventional cars measured in kilometers per liter and electric vehicles measured in kilometers per single recharge, the data contains the number and percentage of respondents for each mileage category.

The data indicates notable variations in mileage between conventional and electric vehicles, which is indicative of the sample's heterogeneity-two-, three-, and four-wheel drive vehicles are included. Most users of conventional vehicles (41.51%) report getting between 31 and 40 km/l; fewer respondents (16.98%) report getting between 20 and 30 km/l and between 41 and 50 km/l. On the other hand, the majority of EV users (50.94%) report a mileage of 101-150 km on a single recharge, while a lesser percentage (20.75%) report a mileage of 151-200 km on a single recharge. Remarkably, very few respondents say they recharge more than 251 kilometers (2.83%) or more than 300 km (0.94%). These variations draw attention to the differing mileage capacities of various conventional and electric vehicle types, highlighting the advantages and range re-

Table 5. Comparison of mileage of different types of vehicles

Conventional vehicles			Electric vehicles		
Mileage (Km/litre)	Number of Respondents	Percentage	Mileage (In a single recharge)	Number of Respondents	Percentage
10 -20	18	16.98	51-100	8	7.55
21-30	20	18.87	101-150	54	50.94
31-40	44	41.51	151-200	22	20.75
41-50	18	16.98	201-250	12	11.32
51-60	5	4.72	251-300	3	2.83
More than 60	1	0.94	More than 300	1	0.94

Source: Primary Data

Table 6. Duration of vehicle usage and transition to electric vehicles

Conventional vehicles			Electric vehicles		
Duration (in years)	Number of Respondents	Percentage	Duration (in years)	Number of Respondents	Percentage
0 - 5	27	25.47	Less than 1	58	54.71698
6 - 10	25	23.58	1 - 2	28	26.41509
11 - 15	26	24.53	2 - 3	4	3.773585
16 - 20	19	17.92	3 – 4	4	3.773585
21 - 25	6	5.66	4 – 5	2	1.886792
More than 25	3	2.83	More than 5	0	0

Source: Primary Data

strictions of EVs over conventional automobiles.

Duration of Vehicle Usage and Transition to EVs

Data on the length of vehicle use and the switch from conventional to electric cars (EVs) are shown in the table below. It draws attention to the recent change in customer preferences and the growing uptake of EV technology as long-time conventional car owners switch to relatively new EV usage.

The data shows that most owners of conventional automobiles have had them for a long time—74.53 percent of them have been in use for more than six years. Despite this prolonged ownership, there has been a noticeable and recent change in favour of electric vehicles (EVs), as seen by the fact that 54.72% of EV users have driven their cars for less than a year and another 26.42% for 1-2 years. This suggests that a large number of seasoned drivers of conventional cars are switching to electric vehicles. This shift can be attributed to increasing awareness of the environmental benefits of EVs, advancements in EV technology, and government incentives promoting EV adoption. Additionally, the data suggests that the adoption of EVs is still in its early stages, as none of the respondents have been using EVs for more than five years. The findings highlight a significant trend of conventional vehicle users moving to EVs, reflecting changing consumer preferences towards more sustainable and efficient transportation options.

Revenue Comparison of Taxi Drivers Conventional vs. Electric Vehicles

The monthly income received by auto taxi drivers operating conventional versus electric vehicles is contrasted in the accompanying table. The respondents who switched from conventional to electric automobiles are the subject of this investigation. There are just 32 respondents who drive taxis.

According to the research, auto taxi drivers who use electric vehicles often earn more money each month than those who drive conventional vehicles. Significantly, the proportion of respondents who make between Rs. 35,000 and Rs. 45,000 has increased to 28.13% from 12.50% while driving conventional cars. Moreover, 9.38% of respondents identified a new income level for owners of electric vehicles-above Rs. 45,000-while no owners of conventional vehicles fit into this category. This indicates that auto taxi drivers' incomes have benefited from the use of electric vehicles, most likely as a result of their greater efficiency and decreased running costs.

Comparative analysis of Satisfaction level of Users

The following table compares the satisfaction levels

Table 7. Monthly Revenue Comparison of Taxi Drivers of Conventional & Electric Vehicles

REVENUE (In Rs. /month)	Conventional Vehicles		Electric Vehicle	
	No of Respondents	Percentage	No of Respondents	Percentage
5000 – 15000	14	43.75	7	21.87
15000 – 25000	8	25.00	6	18.75
25000 – 25000	6	18.75	7	21.87
35000 – 45000	4	12.50	9	28.13
Above 45000	0	0	3	9.38
Grand Total	32	100	32	100

Source: Primary Data

Table 8. The Comparative satisfaction level analysis of conventional and E vehicles

Level of satisfaction	When Using Conventional Vehicles		When Using Electric Vehicles	
	No of Respondents	Percentage	No of Respondents	Percentage
Extremely satisfied	10	9.43	10	9.43
Satisfied	56	52.83	62	58.49
Neutral	21	19.81	24	22.64
Dissatisfied	14	13.21	10	9.43
Extremely dissatisfied	5	4.72	0	0.00
Grand Total	106	100.00	106	100.00

Source: Primary Data

of users when they were using conventional vehicles and after transitioning to electric vehicles. This analysis highlights the changes in user satisfaction due to the adoption of electric vehicles.

According to the study, consumers who switched from fuel-injected to electric automobiles are happier overall. There is a noticeable increase in the percentage of respondents who are "Satisfied," going from 52.83% with conventional vehicles to 58.49% with electric vehicles, while the number of respondents who are "Extremely satisfied" stays stable at 9.43%. Furthermore, the percentage of respondents who said they were "Dissatisfied" fell from 13.21% to 9.43%, while the percentage who said they were "Extremely dissatisfied" fell to 0%. This change implies that consumers are generally more receptive to electric automobiles, which raises satisfaction levels.

Ranking of Reason for the Shift towards E vehicles

The respondents were asked to select five possible reasons for their decision to determine the main driving forces behind the switch from conventional automobiles to electric vehicles (EVs). These included the need for new technology, government incentives and subsidies, cost efficiency (reduced operating costs), social and market trends, and environmental concerns. The ranking of these reasons by 106 respondents is summarized in the following table, which sheds light on the main variables influencing the adoption of electric vehicles.

Cost-effectiveness is the main driver behind the switch to electric vehicles (EVs), according to the statistics, with 45 respondents (42.4%) considering it to be the most significant factor. This suggests a clear preference for EVs over conventional cars due to their lower operating costs. Despite being considerable, environmental issues were typically ranked fourth or fifth, indicating that most respondents did not view them as the most essential aspect. Government subsidies and incentives are also essential; in fact, 27 respondents (25.5%) ranked them as the second most important factor, demonstrating the influence of money support in promoting the use of electric vehicles. With most respondents placing their desire for modern technology in the fourth or fifth place, it seems to be a less important issue. Even if they have an impact, social and market trends were typically placed second or third, suggesting that while they are significant, most users are not primarily motivated by societal influences or market dynamics. Overall, the data points to government subsidies and economic gains as the main forces behind the shift to electric vehicles, with environmental concerns and personal preferences for new technologies coming in second. This is consistent with the finding that the adoption of EVs has led to an increase in the population with better incomes.

Findings and Conclusion

The study offers valuable insights into how people across all demographic categories adapt and are satisfied with electric cars (EVs) in comparison to conventional automobiles. According to a demographic profile analysis, young guys make up the bulk of EV users, with the majority of their ages falling between 18 and 35. This demographic trend highlights a younger generation that is more likely to adopt innovative technologies and eco-friendly modes of transportation. Users' educational attainment reveals a substantial proportion with at least a higher secondary education, suggesting a relationship between EV adoption and educational attainment. Two-wheelers comprise nearly half of all EVs surveyed, making them the most popular vehicle type in the EV market. Three- and four-wheelers are next in line. In the two-wheeler segment, Ather and Ola are the most popular brands; in the three-wheeler segment, Mahindra and Ape Piaggio are leading. The information also shows an interesting pattern in

Table 9. Ranking of reasons for a Shift towards E-vehicle

Sl. No.	Reasons	Ranking of Reasons by Users										Total
		Rank 1		Rank 2		Rank 3		Rank 4		Rank 5		
		No.	%	No.	%	No.	%	No.	%	No.	%	
1.	Environmental Concern	11	10.3	9	8.5	12	11.3	33	31.1	41	38.7	106
2.	Cost efficiency (Lower Running Cost)	45	42.4	31	29.2	17	16.0	7	6.6	6	5.7	106
3.	Government incentives and subsidy	17	16.0	27	25.5	33	31.1	14	13.2	15	14.2	106
4.	Preference for new technology	12	11.3	9	8.5	12	11.3	39	36.8	34	32.1	106
5	Social and market trends	21	19.8	30	28.3	32	30.2	13	12.3	10	9.4	106
	Total	106	100	106	100	106	100	106	100	106	100	

how long respondents drove conventional cars before switching to electric ones- many of them had been driving for more than ten years. Even with this extended use, a sizable majority of EV adopters said they had owned their cars for less than a year, suggesting that even long-time conventional car owners had just started to choose electric cars.

The study identifies various important factors affecting the switch to electric vehicles. The most important of them is the financial benefit, with lower operating costs being cited as the main justification for selecting electric cars (EVs) over conventional ones. The provision of government incentives and subsidies is crucial in encouraging customers to surmount the first financial obstacles linked to electric vehicle purchases. Even though they are important, environmental concerns are ranked lower than economic factors, indicating that people prioritize immediate money gains above sustainability when making decisions. When compared to users of conventional vehicles, EV users often express higher levels of satisfaction; benefits are particularly noticeable in areas such as environmental effects and operational expenses. The shift to electric vehicles has resulted in significant monthly revenue gains for taxi drivers, suggesting that there are wider economic advantages beyond just individual consumers.

The results highlight the increasing adoption of electric vehicles (EVs) due to their favorable economic aspects and the backing of governmental regulations. Addressing financial concerns while maximizing environmental advantages will be essential in promoting the continuing use of EVs as infrastructure develops and technology advances. To promote sustainable mobility solutions and hasten the shift to a greener future, policymakers and market players can benefit greatly from the demographic insights this study offers.

Conflict of Interest: None

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