

FACTORS AFFECTING THE PURCHASE OF ELECTRICAL VEHICLES SPECIAL PREFERENCE TO KARNATAKA

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ABSTRACT

The future of the Indian automotive sector lies with electric automobiles. The advancement in battery technology, charging infrastructure, and increasing demand for EVs by customers made India the third-largest automobile market in EVs globally in terms of sales, ahead of Germany and Japan. The Indian government has launched many promotional initiatives over the past ten years to aid in the acceptance of electric vehicles (EVs) in the nation, such as tax incentives for EV owners, the building of public EV charging infrastructure, and so forth. Government promotional schemes like FAME I & II made a significant increase in the number of buyers of EVs in the country. The goal of the article is to investigate the various aspects that influence a consumer's adoption of an EV and to study the level of EV acceptability in Karnataka based on current trends. The study's objective is to identify the key factors affecting Karnataka's acceptance of electric vehicles. The study of the data gathered indicates that, given the advantages of using electric vehicles, such as fuel economy, lower carbon emissions, power performance, ease of operation, and independence from foreign oil. The findings demonstrate that the acceptance of electric vehicles depends on the price of the vehicles, the availability of charging infrastructure, and government subsidies.

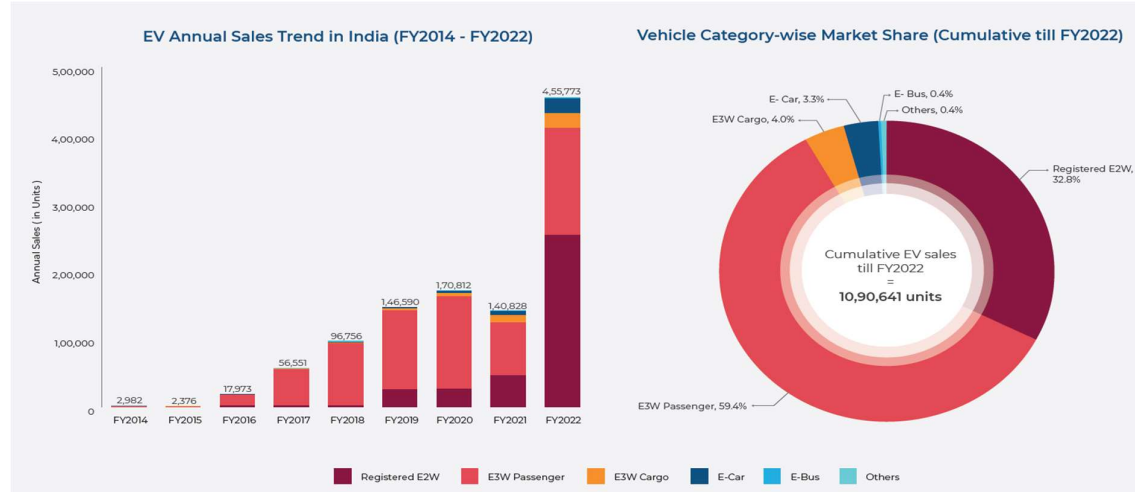
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INTRODUCTION

The nearly 100-year-old automobile industry is getting ready for upheaval. Due to the rising cost of fossil fuels and the damaging effects of their emissions on the environment, individual transportation habits must alter. The industry, which has always been propelled by internal combustion engines, is gradually transitioning to electric vehicles (EVs). Transportation is essential to modern living, but the traditional combustion engine is gradually getting older. Gasoline and diesel-powered vehicles emit a lot of pollution, thus fully electric vehicles are quickly replacing them. Completely electric vehicles (EVs) have zero exhaust emissions, making them much better for the environment. You may take part in the change that electric vehicles are bringing about a quarter of the world's GHG emissions come from transportation, and this number is significantly higher for urban air pollution. The combined effects of fossil

fuel emissions have two effects. In addition to harming the health of billions of city dwellers worldwide, poor air quality in cities also accelerates climate change (Aswani et al., 2018).

Vehicle Category-specific EV Sales: As of the end of FY2022, India had sold 10,90,641 EVs overall. As the yearly EV sales surpassed 4 lakh vehicles in FY2022, registered electric two-wheelers (E2W) accounted for more than 55% of the market share, followed by passenger electric three-wheelers (E3W P) with around 35% of the market. (Sponsors, n.d.)



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State-by-state EV sales: Between FY2014 and FY2022, Uttar Pradesh, Maharashtra, Karnataka, Bihar, and Delhi accounted for more than 60% of the market share. Uttar Pradesh, Maharashtra, Karnataka, Tamil Nadu, and Delhi were the top EV-selling states in terms of their share of sales in FY2022. (Sponsors, n.d.).

An effective global strategy to lower carbon dioxide emissions in the transportation industry is the switch to electric mobility. One of the few nations embracing the international EV30@30 movement, which seeks to sell at least 30D new electric vehicles by 2030, is India. This ambitious change requires a reliable and user-friendly network of electric vehicle (EV) charging infrastructure. The development of the charging infrastructure network is being encouraged by a number of enabling regulations that the Indian government has introduced. In order to support its ground spread, this new type of infrastructure must be tailored to India's specific transport ecosystem and stakeholder capacity must be built.. A context-based approach is needed to ensure the efficient and timely deployment of electric vehicle charging infrastructure that meets local requirements and is optimally integrated with power supply and transportation networks (Ramu, 2021).

Between 2020 and 2030, cumulative investment in India's transition to electric vehicles (EVs) might reach INR 19.7 lakh crore (\$266 billion), underscoring the need for EV infrastructure and assets to have higher liquidity and lower cost of capital.. This vacuum may be filled by the recently announced first-loss risk-sharing mechanism, which is coordinated by NITI Aayog and the World Bank. (Randheer Singh et al., 2022).

Review of Literature

The transition to an all-electric motorcycle comes at a price that states cannot afford during such a massive revolution. To enable sustainable development, change is inevitable for a nation like India, but it long in the future. (Ramu, 2021). Since school dropouts have relatively little knowledge of the advantages given by electric cars, education has a substantially greater impact on people's awareness levels in this area. No matter the demographics, potential customers are not aware of the government incentives for the purchase of electric cars. Many believe that compared to other considerations, pricing, and maintenance costs are quite high. (A, 2018).

The average difference was verified in charging time, degree of autonomous driving development, price, and simplicity of maintenance and repair. The difference in importance of purchase motivation according to the group that values performance when selecting a car and the group that does not. This proved that emphasizing the superiority of charging time, autonomous driving, pricing, and ease of maintenance is required to persuade performance-conscious groups to buy electric vehicles.(Kim & Kang, 2022).

The whole electric vehicle sector has been moving steadily in the direction of intelligence, mobility, and interconnection in recent years. Electric vehicles now play a much larger role than just being a mode of transportation due to rising customer demand. To appeal to the shifting market pattern and younger consumers, electric vehicles must advance and innovate. This will be the problem that needs to be solved in the future when the electric vehicle industry enters a new phase of growth.(Shang & Feng, 2019).

Customers' perceptions of electric vehicles and their purchasing patterns are favorable, and this is due in part to the installation of sufficient charging stations, the availability of electricity, connectivity, government incentives, and the assistance and services of banks. According to government policy, it is suggested that existing fossil fuel vehicles be replaced by electric vehicles by 2030. So, to embrace the change in technology and transformation for e-vehicles, and more especially for the passenger automobile market, manufacturers, marketers, lenders, and customers need to make up their minds. In order to comprehend the current environment, the study also sheds light on their research potential in the same sector of e-vehicles.(Sankar & Rajasekaran, 2020).

The study offers early findings that account for 46% of the variation in Malaysian consumers' intentions to use electric vehicles. It also serves as a foundation for subsequent investigation and the inclusion of further factors in EV acceptance studies. To support the findings of the current study, future research should concentrate on samples with a wider cross-section and a more diverse population. Hence, cross-cultural investigations will be required to validate the study's predictions. Another option is to look into EV acceptability using different diffusion models that are already in existence or have been changed. The results could serve as a starting point for additional study to verify and improve a model to explain intents to utilise EVs in Malaysia. Future investigations could also examine the connections between the variables that affect the use of EVs.(Sang & Bekhet, 2015).

The adoption of EVs is growing more slowly than anticipated and has certain challenges. Adoption may need effort from both the government and the general public. It is necessary to identify the enablers that could speed up the promotion of electric vehicles in India. Based on a review of the pertinent literature from the scientific database, we have identified a number of issues in this paper that demand the attention of policymakers and other stakeholders that may

help increase the adoption of electric vehicles in India. Government policies, financial incentives, tax breaks, quick charging times, cost-effectiveness, rapid charging infrastructure, bigger batteries, and more EVs are the contributing elements.(et al., 2023). The most alluring features of ACEVs were discovered to be their potential for environmentally friendly transportation, better accessibility for non-drivers, and decreased driving fatigue. In contrast, respondents said they were most worried about billing problems, legal liability, and vehicle safety. It is implied that significant obstacles to the uptake of ACEVs are battery life, driving range, and charging. Concerns and price detract from the appeal of ACEVs, whereas perceived benefits and accompanying infrastructure upgrades have a positive impact on respondents' desire to use them.(Wu et al., 2020).

Analysing studies on Karnataka's consumers' acceptance of electric vehicles is crucial. In order to gauge their readiness and the variables influencing their acceptance or rejection of electric vehicles, many clients engaged in the research study by answering questionnaires.

Objective of the study

- To comprehend how an EV operates and how it differs from traditional automobiles.
- To comprehend the idea of electric vehicles in the context of a heavily populated, developing nation like India.
- To identify the challenges encountered in India as EVs become more commonplace.
- To make potential recommendations for resolving the issues.
- To comprehend how EVs affect lowering pollution and opening up new prospects.

Data Analysis and Interpretation

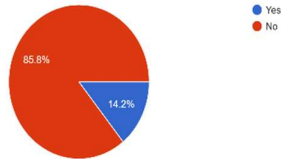
The poll is being conducted to determine respondents' levels of approval for purchasing and operating electric vehicles, hence the approach utilised here is descriptive in nature. Although if people in the twenty first century are more concerned with the environment, it is still crucial to understand the elements that influence whether or not they decide to purchase electric automobiles. This study seeks to identify and assess the elements influencing consumers' readiness to purchase these vehicles. The sample size necessary to adequately represent the entirety of Karnataka was determined to be 270 using the sample size formula. Primary data are being collected, and the study's methodology is quantitative. A well-structured questionnaire was created to record the respondents' perspectives, and a survey was conducted among respondents from four different Karnataka cities; Mysore, Mandya, Hubli and Hassan. The non-probability convenience sampling method of data gathering allowed 275 responses to be recorded.

Information on the sample's age, gender, occupation, and income levels is used in the demographics.

Gender					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	139	50.5	50.5	50.5
	Female	136	49.5	49.5	100.0
	Total	275	100.0	100.0	

The study takes into account the availability of people's income levels, a price range that is within their means, and the availability of battery charging stations. The acceptability of electric vehicles is the dependent variable. Respondents were questioned regarding their present vehicle type and their plan to buy the kind of electric car in the future in order to gauge their level of readiness towards the purchase of electric vehicles.

13. Do you own any electric two wheeler?
275 responses



9. Which fuel type are you considering?
275 responses

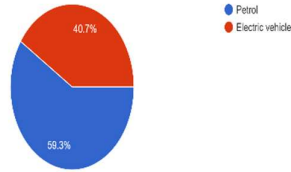


Fig:1 Electric vehicle owned by people

Fig 2: Planning to Buy EVs

The survey found that out of 275 respondents, 39 had EVs while 236 had petrol vehicles. This numbers are expected to rise by a significant amount, reaching 112 EVs and 136 petrol vehicles, indicating that there is a high level of acceptance for electric vehicles and that more people will be willing to buy EVs in the future. Respondents were questioned regarding the advantages of electric vehicles in order to comprehend this massive acceptance. The majority of respondents are willing to buy an electric vehicle because, among other things, they think it is fuel-efficient. They contend that electric vehicles will emit less carbon dioxide, which is necessary given the unstable environmental conditions of today.

Two hypotheses are formed on the basis of study results. They are:

H₀₁: The acceptance of electric vehicles is not reliant on people's annual income.

H_{a1}: Adoption of electric vehicles depends on people's annual income

Income level					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	< 15000	34	12.4	12.4	12.4
	15000-25000	37	13.5	13.5	25.8
	25000-50000	42	15.3	15.3	41.1
	50000-75000	17	6.2	6.2	47.3
	75000-100000	8	2.9	2.9	50.2
	>100000	11	4.0	4.0	54.2
	0	126	45.8	45.8	100.0
Total	275	100.0	100.0		

Income levels as determined by the Chi-Square Test for acceptance of electric vehicles

Education level * Income level Crosstabulation		
	Income level	Total

		75000-100000	>100000	0	
Education level	no education	0	0	1	1
	Matric	1	0	1	18
	Higher secondary	0	1	6	16
	Graduate	1	3	58	103
	Post graduate	6	7	60	136
Total		8	11	126	274

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	39.622 ^a	24	.023
Likelihood Ratio	41.201	24	.016
Linear-by-Linear Association	7.540	1	.006
N of Valid Cases	274		

The adoption of electric vehicles and income levels are the variables used in a chi square test to examine the aforementioned claim. The above table's Pearson chi square value is 0.023, which is less than the level of significance, or 0.05. Hence, the alternative hypothesis is supported, meaning that the popularity of electric vehicles depends on people's annual income. This indicates that cost-effectiveness is a key consideration for people when deciding whether to purchase a new electric vehicle.

Acceptance of electric vehicles available price range as measured by the Chi-Square Test Value

H₀₁: Electric vehicle acceptance is not reliant on price range.

H_{a1}: Electric car acceptance depends on the price range that is offered.

Income level * Price range Crosstabulation						
Count						
		Price range				Total
		<60000	60000-80000	80000-100000	>100000	
Income level	< 15000	20	6	6	2	34
	15000-25000	16	18	2	1	37
	25000-50000	13	21	5	3	42
	50000-75000	3	7	4	3	17
	75000-100000	1	4	3	0	8
	>100000	6	1	4	0	11
	0	56	45	15	10	126
Total		115	102	39	19	275

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	33.907 ^a	18	.013
Likelihood Ratio	35.607	18	.008
Linear-by-Linear Association	.234	1	.629
N of Valid Cases	275		

The chi square test is used to assess the aforementioned hypothesis, and the Pearson chi square value in the aforementioned table is less than the level of significance, or 0.05. As a result, the alternative hypothesis is adopted, indicating that acceptability is dependent on these automobiles' prices. This indicates that they would buy an electric vehicle provided the initial selling price was reasonable.

Results and Findings

The outcomes of the analysis of the information gathered from individuals with various income levels in Karnataka's major cities are intriguing. The following conclusions are related to some significant elements influencing the amount of customer approval for buying an electric car in the near future:

- Customers with greater incomes are more likely than those with lower incomes to acquire electric automobiles.
- Customers' decisions to purchase electric vehicles are influenced by the cost of the vehicles.
- The acceptance of electric vehicles will increase as there are more charging stations available.
- Government incentives will have a significant impact on how well electric vehicles are received.

This study has revealed certain significant ideas that, if taken into consideration, will undoubtedly lead to an increase in the demand for and acceptance of electric vehicles in the automotive sector. If parking lots with shared electric charging infrastructure are offered with amortised rates, customers have shown interest in electric vehicles. They want the charging stations to be as accessible and widely dispersed as today's gas stations. Although the price of power affects the sale of electric vehicles, customers will be more drawn to these vehicles if they are offered charging times for these vehicles that are nearly as quick as those of petrol stations, up to a maximum of 30 minutes to fully recharge the vehicle.

Conclusion

In recent years, the automobile industry has made strides, particularly in the development of electric vehicles in light of rising global greenhouse gas concentrations. The main barrier to the broad adoption of electric vehicles is multifaceted, in contrast to their advantages. On the one hand, potential buyers of electric car demand sufficient infrastructure for getting their vehicles recharged even in the middle of their voyage, especially in areas where fuel stations are widely available and simple to identify with very little time to refuel the vehicle.

The transition from conventional gasoline vehicles to contemporary electric vehicles will be made in the coming decade thanks to technological breakthroughs, offering clients easy and affordable transportation. It is anticipated that more and more people would be inspired to acquire an electric vehicle through environmental education programmes. Every person can help make the world a cleaner place to breathe by reducing pollution. According to the analysis's findings, electric vehicle prospects are bright as long as consumers' expectations are met.

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