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"CONSUMER BUYING BEHAVIOUR TOWARDS ELECTRIC VEHICLE IN INDIA: TRENDS, INFLUENCES AND CHALLENGES."

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ABSTRACT

The research paper is focused on the study of Consumer buying behaviour along with their perceptions towards electric vehicles in India today. Automakers are planning to produce thousands of vehicles per year but the purchase decisions are based on the factors that customer experience internally and externally where they think twice before purchasing a vehicle. One of the main reasons for this change is rapid increase in the rate of fuel and increase in environmental pollution. Electrical Vehicles are environmentally friendly and offer lot of other advantages over the conventional vehicles. Despite the government enacting electronic vehicle policies, the current market penetration of electronic vehicles is very low. In this study an effort has been made to identify the various challenges of electric vehicles and to analysis and review the government incentives to penetrate growth of electric vehicles in India. As empirical findings are calculated using survey with 200 respondents in various towns of Himachal Pradesh. Primary data is collected through structured questionnaire interaction with the customers who wanted to purchase the Electric Vehicles in future. The secondary data is being collected through different websites and publications. Due to increasing trend of electric vehicles it becomes really important for us to figure what are the areas where electrical vehicles are lacking or what are the areas where it is perfect. The electric vehicles market recorded a volume sale of 24.8 million units in 2023 and is expected to grow at a CAGR of 10.9% during the forecast period (2022-2030).

Keywords: Electric Vehicles, Buying Behaviour, Consumer Perception, Trends, Consumer.

1. Introduction

India is a one of the largest manufacturers of automotive products worldwide and has a unique innovation towards the automation on vehicles. As part of innovation the India is setting up new trend in the field of electrifying the vehicles which could reduce the dependency on combustion vehicle as combustion vehicles tend to require more fuel which could impact on environment as combustion vehicle has aggressive response in the form high emission which results in carbon dioxide smog in the environment.

1.1 History of EVs

It is worth mentioning that the first electric vehicles were developed in the early 19th century when, in 1832, Scottish inventor Robert Anderson invented the first crude electric carriage. However, it wasn't until the second half of the 19th century that some of the first practical electric cars were built. As the EVs were easier to drive than steam-powered and gasoline-powered cars, in the latter half of the 19th century, the EVs acquired popularity in the United States for driving in the city. However, due to multiple factors like better roads, the discovery of Texas crude oil, lower fuel prices, better combustion engines, Ford's mass production of cheaper vehicles and other factors, the use of EVs started to decline in the 1920s. Due to the soaring oil prices in the 1960s and environmental concerns after the 1990s, EVs evinced interest from researchers, policymakers, and the public.

1.2 Adoption of EVs in India

Although the adoption of the electricity vehicles industry in India is still at a nascent stage in India, it is rapidly growing. As per the data provided by the Ministry of Road Transport and Highways, Government of India, to the Parliament in 2013, only 53,387 electric vehicles were registered in the country however, as of August 2023, the number increased to 28,30,565. The latest Economic Survey underlines that India's automotive industry will play a critical role in the transition towards green energy. It is estimated that the country's EV market is expected to grow at a compound annual growth rate (CAGR) of 49% between 2022 and 2030 and that the annual sales of EVs in 2030 may cross one crore units, leading to the creation of five crore direct and indirect jobs by 2030.

VAHAN serves as the flagship e-Governance application under India's National Transport Project, a Mission Mode Project launched in 2006. The VAHAN portal's primary objective is to automate RTO (regional transport office) operations nationwide, including vehicle registration, permits, taxation, and enforcement processes. Meanwhile, the Economic Survey of India 2023 had forecast a robust 49 percent compound annual growth rate (CAGR) in India's domestic electric vehicle market between 2022 to 2030, with an estimated 10 million annual sales by 2030. Projections indicate that the EV industry is set to generate approximately 50 million direct and indirect employment opportunities within the next seven years. In 2023, The major players in the Indian electric vehicle market are listed below. the domestic EV market was dominated by Tata Motors (72 percent), followed by MG Motors (10.8 percent) and Mahindra (9 percent), with the top selling models being Tiago, Nexon and Tigor from Tata Motors, the MG ZS, and Mahindra XUV400. This is followed by Citroen's eC3 EV at 3.5 percent market share.

2. LITERATURE REVIEW

(P. K. Dash, 2013) Potential Need for Electric Vehicles, Charging Station Infrastructure, and Challenges for the Indian Market: by Praveen Kumar and Kalyan Dash: India could invest in small scale reinforcements to control load concerns locally rather than attempting a massive overhaul. The practise of charging should be encouraged. Place, population, traffic density, and safety should all be carefully planned. Before putting in place a large-scale charging infrastructure, thinking about it will be very important and the importance of blending of activities. It is crucial in the domains of energy and transportation. Various inventive methods are used to achieve development goals. Drivers of electric automobiles, for example, are offered a financial consumer incentive through regulations and initiatives. tax credits, purchasing subsidies, low tolls, free parking, and access to limited interstate lanes are just some of the options available. will contribute to the market's expansion and will really help India in taking a big step towards becoming Electric Vehicle centric country

(Anable & Morton, 2016)concentrated on understanding consumer response to EVs by evaluating whether consumer innovativeness relates to the expressed preference towards EVs. He defined consumer innovativeness as a consumer's innate and revealed willingness to accept new items with different or more sophisticated features and functionalities. The technical specifications of electric vehicles differ significantly from those of vehicles powered by internal combustion engines.

(Pretty Bhalla, 2018) A Study of Consumer Perception and Purchase Intention of Electric Vehicles: Pretty Bhalla, Inass Salamah Ali, Afroze Nazneen: Environmental concerns, cost, comfort, trust, technology, societal acceptance, and infrastructural availability all influence car selection. These arguments have been put to the test in both conventional and electric vehicles. They believe that these elements have a direct impact on an individual's vehicle choice. They discovered that EV producers and governments must invest more in social acceptability of the car by expanding infrastructure and emphasising technology to build trust. According to the findings, the general public is fully aware of the environmental benefits. The government and manufacturers share responsibility for investing in car manufacturing.

(Tornekar, 2020)stated the eight possible reasons for the slow growth of EVs in India. He mentioned charging time, price of an EV, range depending on battery capacity, charging infrastructure, limited life of batteries, fear of new technology, government incentives, lack of advertisements, and awareness campaigns as the obstacles to EVs growth in India.

2.1 Objectives Of The Study

- To study the awareness about electric vehicles in Himachal Pradesh.
- To know the factors influencing customers to purchase electric vehicles.
- To know the factors affecting customers to purchase electric vehicle.
- To study government initiatives taken to promote electric/hybrid vehicles.
- To identify the challenges of electric vehicles in HP as well as in whole India.

2.2 Research Methodology

To understand the consumer behaviour regarding Electric vehicles in Himachal Pradesh, we have undertaken a descriptive study through a survey by forming a self-constructed questionnaire considering the research objective. A Likert five-point scale ranging from strongly agree to strongly disagree been used to collect a quick response from the respondents. The research design used for the study is descriptive. The total population size is indefinite. The sample size used for study is 200. The researcher adopted the convenient sampling technique in selecting the respondents for the sample. The data collected through questionnaires has analysed using simple mathematical percentage method, ranking analysis, chi-square and pie chart method.

2.3 Scope Of The Study

The scope of the study is to know the "Consumer buying behaviour towards electric vehicles in various towns of HP, this study it mainly focuses on consumer awareness, factors influencing purchasing of the electric vehicles and adoption of electric vehicles instead of stock vehicles. Electric vehicles (EV) are the future, not only for transportation but also Electric Vehicles which could save energy and protect environment which is an important part of strong smart grid and will be the trend of automotive industry in the future. This study helps to know the adoption rate as compared to combustion vehicles in day-to-day life of the customers.

2.4 Limitations of the study

The output of this study is applicable only to HP as well as whole India's population. The customers responses are not accurate as they are biased and collected from various town of Himachal Pradesh. Customers doesn't want to spend their quality of time spending to answer the questionnaire.

4. ANALYSIS AND INTERPRETATIONS OF DATA

Table.4.1 Demographic Profile of the Respondents

Sr. No. 1	**Gender**	**Frequency**	**Percentage**
	Male	130	65
	Female	70	35
	Total	200	100
2	**Age (Years)**	**Frequency**	**Percentage**
	20-30	80	40
	31-40	72	36
	41-50	44	22
	Above-50	4	2
	Total	200	100
3	**Marital Status**	**Frequency**	**Percentage**
	Married	116	58
	Unmarried	84	42
	Total	200	100
4	**Occupation**	**Frequency**	**Percentage**
	Students	24	12
	Employees/ service	66	33
	Profession	80	40
	Business	26	13
	Others	4	2
	Total	200	100
5	**Income Level (Monthly)**	**Frequency**	**Percentage**
	Below 25000	20	10
	25000-50000	40	20
	50000-75000	84	42
	75000-100000	60	30
	Above100000	12	6
	Total	200	100

Analysis

It has been found that out of 200 respondents, 65 percent are male and 35 percent are female. Majority of the young respondents in the age group of 20-40 years shows more interest in electric vehicles. Both married and unmarried people are aware. People in all the occupation have purchased or like to purchase electric vehicles but employees and professionals are more preferring EVs in HP. Hence From the above date it has been analysed that respondents of high income group prefer more as compare to low income group. Its reason maybe high price of electric vehicles.

Table-4.2

Classification of respondents on the bases of occupation and their mode of awareness & motivation to purchase electric vehicles in hp

Mode of Inspiration	Occupation					Total
	Students	Service	Professional	Business	Others	
Friends & Relatives	5 21	14 21.2%	8 10	10 38%	1 25%	**38** **19%**
Newspapers & Magazine	2 8	10 15.2%	14 17.5%	0	0	**26** **13%**
Pamphlets/Guide books ,	4 17	6 9%	16 20%	0	0	**26** **13%**
Social Media /TV Advertisement	13 54%	26 39.4%	22 27.5%	8 31%	1 25%	**70** **35%**
Agents	0	10 15..2.%	20 25%	8 31%	2 50%	**40** **20%**
Total	**24** 100%	**66** 100%	**80** 100%	**26** 100%	**4** 100%	**200** **100%**

*Others: colleagues etc. ***Source: Primary probe*** $x^2=95.597$

$P< 0.01$

Analysis and Interpretation (Table-4.2)

It is clear from the table-2 that in Himachal Pradesh the main source of awareness or motivation to purchase electric vehicle of various class are, social media & TV advertisements, company agents and their friends and relatives. and followed by newspapers & magazines and colleagues and pamphlets. The friend are the main source of inspiration for the businessmen, professionals and agriculturists in the state. The pamphlets, newspapers & magazines also inspired to employees, professionals and businessmen respectively. The chi-square value is significant at one percent level also supports that the degree of inspiration to purchase electric vehicles significantly varies with the occupation of customers.

Table-4.3

Opinions Of Respondents Regarding Various Factors influenced customers To Purchase Electric Vehicles in HP.

S. NO	Motivating factors	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	TOTAL
1	Environment Friendly	88 44%	48 24%	44 22%	20 10%	-	200 100%
2	Market Trend	56 28%	96 48%	32 16%	16 8%	-	200 100%
3	Convenience of charging at home	36 18%	76 38%	56 28%	32 16%	-	200 100%
4	No Noise Pollution	32 16%	88 44%	24 12%	48 24%	8 4%	200 100%
5	Economical/ Low running cost	80 40%	84 42%	28 14%	8 4%	-	200 100%
6	Perfect Performance	48 24%	80 40%	40 20%	32 16%	-	200 100%
7	Government Subsidies	60 30%	108 54%	20 10	8 4%	4 2%	200 100%
8	Safe & secure	--	32 16%	40 20%	108 54%	20 10%	200 100%
9	Price of EVs	0	30 15%	80 40%	70 35%	20 10%	200 100%

Source: Primary Probe

Interpretation and Analysis (Table No.4.3)

Transport is a fundamental requirement of modern life, but the traditional combustion engine is quickly becoming outdated. Above table reveals that 44% of the respondents Strongly Agree, 24% agree with the environmentally friendly nature of Electric vehicles. and 22% of the respondents neither agree nor disagree with this motive to EVs. 48% of the respondents agree and 28% of the respondents strongly agree with the market trend motive.. Busy fuel station during peak hours, and you are getting late to reach your workplace. These problems can easily be overcome with an electric vehicle. Simply plug your vehicle in at your home charger for 4-5 hours before you plan to go. If you are able to get a charger where you park at home, it is very convenient to plan your journeys in advance. 38% of the respondents are agree , 18% strongly agree with the motive of Convenience of charging at home. 28% not respond and 16% of the respondents disagree with this motive. Electric vehicles have the silent functioning capability as there is no engine under the hood therefore the large number of respondents 44% agree and 16% strongly agree about the no noise pollution motive of EVs. The servicing requirements for electric vehicles are lesser than the conventional petrol or diesel vehicles. Therefore, the yearly cost of running an electric vehicle is significantly low. Majority of the respondents 42% agree and 40% strongly agree with the Economical/ Low running cost advantage. Electric vehicles are more efficient, and that combined with the electricity cost means that charging an electric vehicle is cheaper than filling petrol or diesel for your travel requirements. 40% of the respondents agree, 24% strongly agree with the motive that people found Perfect Performance with the advancement of technology, powerful batteries and motors. Registration fees and road tax on purchasing electric vehicles are lesser than petrol or diesel vehicles. There are multiple policies and incentives offered by the government depending on which state you are in. Therefore the majority of respondents about 84% respond are agree & strongly agree with this incentive. 54% of the respondents disagree with this motive that electric vehicles are safe and secure. Only 15% customers agree with the price and high percentage of customers are neutral and disagree. from the above table we found that majority of the motives encourage people to buy an electric vehicle.

5. Government Initiatives & Policy Interventions

Government policies towards electric vehicles (EVs) in India and Himachal Pradesh (HP) are designed to promote the adoption and manufacturing of EVs through a range of incentives, subsidies, and infrastructure development initiatives. Here is an overview of these policies:

- Faster Adoption and Manufacturing of Hybrid and Electric Vehicles (FAME) Scheme*:
  - FAME I: Launched in 2015, focused on demand incentives for electric and hybrid vehicles, pilot projects, charging infrastructure, and technology development.
  - FAME II: Launched in 2019, with a budget of ₹10,000 crore, it aims to support the electrification of public and shared transportation through incentives for electric buses, three-wheelers, four-wheelers, and two-wheelers.
- Introduced to boost domestic manufacturing of advanced automotive technology products, including EVs and their components, with a focus on battery manufacturing.
- Reduction of Goods and Services Tax (GST) on EVs from 12% to 5%.
- Additional income tax deduction of ₹1.5 lakh on the interest paid on loans taken for the purchase of EVs.

Himachal Pradesh has announced its EV policy aimed at promoting electric mobility to reduce pollution and dependence on fossil fuels. The policy includes incentives for the purchase of electric vehicles, particularly for public transport, government vehicles, and private ownership.

- Financial incentives and subsidies for EV buyers.
- Exemptions from road tax and registration fees for EVs.
- Focus on installing charging stations in urban areas, highways, and tourist destinations.
- Plans to electrify the state's public transport fleet, including buses and taxis.
- Introduction of electric buses in major cities and tourist areas to reduce emissions and promote sustainable tourism.
- Initiatives to raise awareness about the benefits of EVs among consumers and stakeholders.

Both the central and state governments in India, including Himachal Pradesh, are actively pursuing policies to accelerate the adoption of electric vehicles. These policies aim to address key challenges such as high upfront costs, inadequate charging infrastructure, and consumer awareness. By providing financial incentives, developing infrastructure, and promoting sustainable practices, the government seeks to create a favourable ecosystem for the growth of the EV market in India.

6. Challenges For Adoption of Electric Vehicles

Electric vehicles (EVs) are hailed to be offering a sustainable and eco-friendly alternative to traditional petrol and diesel-powered vehicles. Thus, EVs hold significant promise for reducing carbon emissions and achieving sustainable transportation in India. Their current popularity has also led to the creation of specific electric vehicle insurance policies to cover these vehicles. However, the widespread adoption of electric vehicles in the country faces numerous challenges. Buyers of electric vehicles (EVs) in India face several challenges, including:

1. High Initial Cost: Electric vehicles typically have a higher upfront cost compared to traditional internal combustion engine vehicles, primarily due to the expensive battery packs.

2. Limited Charging Infrastructure: While the infrastructure is gradually improving, the availability of charging stations in Hilly state Himachal remains limited, especially in rural and semi-urban areas. This leads to range anxiety among potential buyers in state.

3. Range and Battery Life Concerns: Many EVs offer a limited range on a single charge, which can be a significant drawback for those who need to travel long distances. Additionally, concerns about battery degradation over time can deter buyers.

4. Long Charging Time: Unlike refueling a petrol or diesel vehicle, charging an EV takes considerably longer. Even with fast chargers, it can take up to an hour to charge the battery to 80%, which is less convenient for users accustomed to quick refueling.

5. Lack of Model Variety: The Indian market has a limited variety of electric vehicle models, which restricts buyer choice. This is particularly noticeable in the mid-range and luxury segments.

6. Resale Value Uncertainty: There is uncertainty regarding the resale value of electric vehicles due to rapid advancements in technology and concerns about battery life.

7. Limited Service Network: The service and maintenance network for EVs is not as widespread as for conventional vehicles, leading to potential inconvenience and higher service costs in HP as well as in India.

8. Government Incentives and Policies: While there are government incentives for EV buyers, the policies can be inconsistent and vary significantly between states. Buyers often face challenges in understanding and availing these incentives.

9. Public Awareness and Perception: There is a general lack of awareness and understanding of electric vehicles among the public of rural and remote areas of state . Misconceptions about performance, safety, and reliability can deter potential buyers.

10. Financing and Insurance: Securing loans for EVs can be challenging as banks and financial institutions are still catching up with the trend. Additionally, insurance premiums for EVs can be higher compared to conventional vehicles.
Addressing these challenges requires concerted efforts from the government, industry stakeholders, and consumers to create a more conducive environment for the adoption of electric vehicles in India.

7. Suggestions

Promoting electric vehicles (EVs) in India requires a multifaceted approach involving policy, infrastructure, and public awareness. Here are some suggestions to accelerate EV adoption:

- Offer significant subsidies and tax breaks for EV purchases, reducing the upfront cost for consumers.
- Lower import duties on EV components to make manufacturing more cost-effective.
- Reduce the Goods and Services Tax (GST) on EVs and related products.
- Introduce a scrappage policy to provide incentives for trading in old, polluting vehicles for new EVs.
- Invest in a robust network of public charging stations across urban and rural areas.
- Promote the installation of home charging stations through subsidies and simplified regulatory processes.
- Develop battery swapping infrastructure to reduce downtime for EV users.
- Invest in R&D for advanced battery technologies to improve range and reduce costs.
- Encourage local manufacturing of batteries and other critical EV components through incentives and partnerships.
- Launch nationwide awareness campaigns to educate the public on the benefits of EVs, including cost savings, environmental impact, and government incentives.
- Organize EV fairs and test drive events to allow potential buyers to experience EVs firsthand.
- Facilitate collaborations between government and private companies to co-develop charging infrastructure and other EV-related projects.
- Implement stringent emission norms for conventional vehicles to make EVs more attractive.
- Set clear targets and timelines for EV adoption in public transportation and government fleets.
- Facilitate low-interest loans and flexible financing options for EV purchases.
- Encourage leasing programs for EVs to reduce the financial burden on consumers.

By implementing these strategies, India can create a conducive environment for the widespread adoption of electric vehicles, leading to reduced emissions, improved air quality, and greater energy security.

8. Conclusion

The conclusion of a study on consumers' buying motives for electric vehicles (EVs) in India, including Himachal Pradesh (HP), would likely encompass several key findings: Consumers are increasingly motivated by environmental factors. Awareness of climate change and pollution is driving interest in EVs as a more sustainable alternative to traditional internal combustion engine vehicles. The effectiveness of government policies and incentives in promoting EV adoption would be crucial. Tax benefits, subsidies, and incentives for EV purchase, along with infrastructure development like charging stations, play a significant role in consumers' buying decisions. The total cost of ownership, including purchase price, maintenance, and fuel savings, is a significant factor. Consumers are likely motivated by the lower operating costs of EVs compared to conventional vehicles. Improvements in battery technology, driving range, and charging infrastructure influence consumers' decisions. Concerns about range anxiety and charging convenience are critical factors that affect buying motives. Peer influence, societal trends, and increased awareness through media and education about the benefits of EVs impact consumer preferences. The availability of diverse EV models that cater to different consumer needs and preferences, including those from trusted and popular brands, is likely a significant motivator. Specific regional factors, such as the geographical terrain of HP, availability of charging infrastructure, and regional policies, may uniquely influence buying motives in Himachal Pradesh compared to other parts of India. Consumers' perceptions of the reliability and performance of EVs compared to traditional vehicles, including concerns about maintenance and durability,

play a crucial role in their buying decisions. The study would conclude with recommendations for policymakers, manufacturers, and other stakeholders to address these factors effectively to boost EV adoption in India and specifically in Himachal Pradesh.

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