



An Investigative Study on Consumer Cognizance towards Electric Vehicles

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ABSTRACT

Electric vehicles are at an early stage of development in India. As the scale of production increases and battery costs decline, the prices of electric vehicles become lower. Providing a purchase subsidy to the consumer directly or through vendors or manufacturers as a discount at the time of purchase can maximize the impact of the subsidy on the consumer's purchase decision. The study addressed the consumer awareness and perception towards electric vehicles since most of the previous studies were made before pandemic. Sample of 150 respondents has been taken in Coimbatore District by adopting snowball sampling techniques. Tools such as percentage analysis, chi-square test, t-test, ANOVA and descriptive statistics have been applied. The study reveals that there is a significance difference among gender and place of residence with respect to awareness about electric vehicles. There is also a significance association between type of family and Preference towards electric vehicle at 5 per cent.

Keywords: Electric vehicles, Battery Cost, Subsidy, consumer awareness and perception.



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INTRODUCTION

Electric Vehicles play an important role in protecting the environment from burning fossil fuels such as gasoline. The gasoline produces harmful greenhouse gases. The electric vehicles are growing faster due to several factors, including cost reduction, technological progress, driving and parking access advantages, policy support and purchase incentives. The global stock of Electric Vehicles (EVs) and its rapid rise has been led by China, US, Japan and also by several European countries. In India, transport electrification is likely to be driven by Light Electric Vehicles (LEVs), consist of two-wheelers (scooters, motorcycles) and three-wheelers (passenger and cargo). Apart from these, cars and Light Commercial Vehicles (LCVs) are also the other key vehicle segments that are being electrified (According to Anders Hove and David Sandalow February 2019)[11]. Electric Vehicles (EV) have been charged in a variety of ways, depending on location and requirement. Similarly, charging infrastructure for EVs is also in various types and designed for various applications. Specifications and standards for EV chargers, also known as Electric Vehicle Supply Equipment (EVSE), differ from one country to another, depending on available EV models in the market and the distinctiveness of the electricity grid (According to NITI Aayog, Ministry of Power *et al*)[3]. There are 3 types of electric vehicle such as Battery Electric Vehicle (BEV), Plug-in Hybrid Electric Vehicle (PHEV) and Hybrid Electric Vehicle (HEV).

A Battery Electric Vehicle (BEV) operates entirely by electric Motor and battery without the support of a traditional internal combustion engine. It must be plugged into an external source of electricity to recharge its battery. Like all electric vehicles, regenerative braking process is used to recharge the Battery Electric Vehicles which use the vehicle's electric motor to aid in slowing the vehicle, and to recover some of the energy normally converted to heat by the brakes. An advantage of battery electric vehicles (BEV) are no emissions, no gas or oil changes, ability to conveniently charge at home, fast and smooth acceleration and low cost of operation (According to Alternative fuels data center)[14]. Plug-in Hybrids (PHEVs) consists of both the electric motor and battery that can be plugged into the power grid to charge the battery and also supports an internal combustion engine that has been used to recharge the vehicle's battery and/or to replace the electric motor when the battery is low. Because Plug-in Hybrids use electricity from the power grid, they often realize more savings in fuel costs than traditional Hybrids Electric Vehicles (HEV). The advantages of Plug-in Hybrids are longer range than BEV, less gas consumption than gas only vehicle, fewer emissions and very simple mechanics. (According to Alternative fuels data center)[14]. Hybrid Electric Vehicles (HEVs) have two corresponding drive systems: a gasoline engine with a fuel tank and an electric motor with a battery. Both the engine and the electric motor can turn the transmission at a time. The transmission then turns the wheels. Hybrid Electric Vehicles cannot be recharged from the electricity grid. All the energy comes from gasoline and from regenerative braking. The advantages of Hybrid Electric Vehicles are longer range than BEV, less gas consumption than gas only vehicle and fewer emissions when compare to gas only vehicle (According to National Highway Travel Survey)[2].

Review Of Literature

According to National Highway Travel Survey (2021), Electric Vehicles (EVs) use electricity as their primary fuel. It improves the efficiency of conventional vehicle designs. All the electric vehicles referred to as Battery Electric Vehicles (BEVs) and Plug-in Hybrid Electric Vehicles (PHEVs). In references, these vehicles are called electric cars, or simply Electric Vehicles, even though some of these vehicles still use liquid fuels in conjunction with electricity. EVs are known for providing instant and a quiet driver experience. According to NITI Aayog, Ministry of Power (MoP), Department of Science and Technology (DST), Bureau of Energy Efficiency (BEE) and WRI India (2021), The handbook provides a detailed approach of the EV charging infrastructure roadmap, moving from an assessment of EV charging requirements to location planning and arranging electricity supply to models of on-ground implementation. This book specifies that Electric vehicles (EV) can be charged in a variety of ways, depending on location and requirement. Specifications and standards for EV chargers, also known as Electric Vehicle Supply Equipment (EVSE), diverge from one country to another, based on existing EV models. NaanJu *et al* (2021) stated that consumers thought electric cars were sophisticated, luxurious, youthful, clean and that technical problems would be





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resolved in the future. The inconveniences of charging and short-distance driving, the expenses and the lack of various dispute settlement measures have been shown to lower the intention to purchase electric vehicles. According to Aparna Menon, Zifei Yang and Anup Bandivadekar (2019) depicts that state governments play an important role in electric vehicle market development by complementing national actions with policies that fit local conditions. It also act as a bridge between national and city governments. To assist state-level policymakers in designing well-rounded electric vehicle policy packages, this study identifies and summarizes international best practices in promoting electric vehicles.

Objectives

- To know the demographic profile of the consumers and their preference towards electric vehicles.
- To identify the consumers' perception towards purchase of electric vehicles.
- To analyze the consumers' awareness about the purchase of electric vehicles.

Research Methodology

A structural questionnaire is used to collect the data in the area of Coimbatore District. A sample of 150 respondents has been taken for the study by adopting snowball sampling techniques. Tools such as percentage analysis, chi-square test, t-test, ANOVA and descriptive statistics have been applied to analyze the data.

Analysis And Interpretation

With respect to age group of the respondents it is clear that out of 150 respondents, 130 respondents belong to the age group of 18-25 years. Among them, Majority (64.0 per cent) of the respondents prefer Hybrid vehicle. Most of the female respondents (51.3%) prefer hybrid vehicle, Most of the Under graduate respondents (54.7%) prefer hybrid vehicle, Most of the students (56.7%) prefer hybrid vehicle, 45.3 per cent of the respondents annual income is below 200000 and 60 per cent of the nuclear family prefer hybrid vehicle. In the above table the chi-square result had shown that type of family have as significant association with Preference towards electric vehicle at 5 per cent level. Hence, the null hypothesis has been rejected. Then the null hypotheses have been accepted with respect to age, gender, educational qualification, occupation and annual income of the respondents. From the mean ratings it is inferred from the table-2 that, the high mean rating has been found for the statement 'Electric vehicles are environmentally friendly because they have Zero emissions' (Mean 4.38) followed by the 'Electric vehicles are much quieter (less noise) than other vehicles' (Mean 4.36), 'The cost to charge an electric vehicle is much less than the fuel costs for a petrol or diesel vehicle' (Mean 4.03), 'Electric vehicle technology has improved and they have a better range now' (Mean 4.03), and 'The purchase cost of electric vehicle is same as the cost of petrol or diesel vehicle' (Mean 3.48). Hence, based on high mean rating, it is evident that, most of the respondents have high perception about 'Electric vehicles are environmentally friendly because they have Zero emissions'.

It is observed from the above table that, the mean score (3.80) for "Awareness about different types of electric vehicles launched in our country" is high when compare to other statements followed by "Awareness about the companies that manufacture electric vehicles in India", "Awareness about the various incentives provided by our central and state government for the purchase of electric vehicle" etc., In the above table, the results have shown that gender and Place of residence have a significant variation among the awareness about electric vehicles. Hence, the null hypothesis has been rejected. The null hypotheses have been accepted with respect to age, educational qualification, occupation, marital status, type of family, annual income, number of vehicle owned, own a vehicle, preferred vehicle, electric model preferred and purchase choice of electric vehicle in future.

Suggestion

- There is a lack of charging infrastructure facility; therefore the government should make availability of existing private and public charging infrastructure for the convenience of the electric vehicle users.
- The availability of a range of electric vehicle models across multiple segments and consumer price points is a key factor for the broader adoption of electric vehicles. Therefore proper advertisement is needed to increases the sale of electric vehicle.



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- The state government should identify the electric vehicle development objective and opportunity and understand barriers for electric vehicle in order to promote.
- Governments can motivate electric vehicle production through mandates or incentive programs. The State Pollution Control Boards (SPCBs) in India, under the Air Act of 1981, have the authority to regulate emissions and issue standards for all categories of automobiles.
- Promote businesses to set up electric vehicle and constituent manufacturing enterprises by providing financial incentives such as low-interest or interest-free loans, subsidies, reimbursement of SGST accrued to the state, stamp duty and land registration charge exemptions or discounts, subsidies for setting up effluent treatment plants etc.

CONCLUSION

Innovative and dynamic support is necessary to design and implement an electric vehicle policy that greatest fits the local framework. Apart from improvements in technology, government actions and initiatives have been made for electric vehicles, in order to achieve significant market shares. Electric Vehicles around the world, policy makers have instituted a suite of incentives to encourage buyers to try this new technology. The study has been concluded that, most of the respondents prefer to buy hybrid vehicles and they have high perception score on “Electric vehicles are environmentally friendly because they have Zero emissions” and “Awareness about different types of electric vehicles launched in our country”. Finally it is concluded that there is a significance difference among gender and place of residence with respect to awareness about electric vehicles. There is also a significance association between type of family and Preference towards electric vehicle at 5 per cent level of significance.

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We affirm that the research article is our original contribution and it would not be sent elsewhere for publication.

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Table.1:Chi-Square Test - Personal Factors Vs Preference towards vehicle

Personal Factors	Hybrid vehicle		Electric vehicle		Total		P-Value	Significance	
	No	%	No	%	No	%			
Age	18-25						0.239	Ns	
	26-35	96	64.0	34	22.7	130			86.7
	36-45	10	6.7	7	4.7	17			11.3
Gender	Male	3	2.0	0	.0	3	2.0	0.571	Ns
	Female	32	21.3	14	9.3	46	30.7		
Education Qualification	School level	77	51.3	27	18.0	104	69.3	0.668	Ns
	Under graduate	11	7.3	3	2.0	14	9.3		
	Post graduate	82	54.7	29	19.3	111	74.0		
	Professional course	13	8.7	8	5.3	21	14.0		
Occupation	Student	3	2.0	1	.7	4	2.7	0.561	Ns
	Business	85	56.7	29	19.3	114	76.0		
	Employee	5	3.3	1	.7%	6	4.0		
	Home maker	18	12.0	10	6.70	28	18.7		
Annual Income	Below 200000	1	.7	1	.7	2	1.3	0.657	Ns
	200000-500000	68	45.3	28	18.7	96	64.0		
	Above 500000	35	23.3	12	8.0	47	31.3		
Type of Family	Nuclear family	6	4.0	1	.7	7	4.7	0.053	*
	Joint family	90	60.0	28	18.7	118	78.7		
		19	12.7	13	8.7	32	21.3		

(Source: computed)(Ns – Not significant, ** - significant at 1 per cent level, * - significant at 5 per cent level)





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Table.2: Descriptive Statistics on Perception towards electric vehicles

Perception towards electric vehicles	N	Minimum	Maximum	Mean	Std. Deviation
Electric vehicles are environmentally friendly because they have Zero emissions	150	1	5	4.38	.766
The cost to charge an electric vehicle is much less than the fuel costs for a petrol or diesel vehicle	150	1	5	4.03	.870
The purchase cost of electric vehicle is same as the cost of petrol or diesel vehicle	150	1	5	3.48	1.128
Electric vehicle technology has improved and they have a better range now	150	2	5	4.03	.781
Electric vehicles are much quieter (less noise) than other vehicles	150	1	5	4.36	.805

(Source: Computed)

Table.3: Descriptive Statistics on awareness about electric vehicles

Awareness about electric vehicles	N	Minimum	Maximum	Mean	Std. Deviation
Awareness about the various incentives provided by our central and state government for the purchase of electric vehicle	150	1	5	3.63	1.071
Awareness about different types of electric vehicles launched in our country (Eg: Ola electric scooter)	150	1	5	3.80	1.087
Policies introduced by our government in order to promote the electric vehicle industry	150	1	5	3.40	1.182
Awareness about the number of recharging outlets in your locality	150	1	5	3.25	1.237
Awareness about the companies that manufacture electric vehicles in India	150	1	5	3.67	1.162

(Source: computed)

Table.4: Socio- economic Profile factors and awareness about electric vehicles

Variables	Group	Mean	S.D	No	t-value	F-Value	Sig
Age	18-25	3.50	.921	130	2.043	1.644	Ns
	26-35	3.93	.946	17			
	36-45	3.53	.231	3			
Gender	Male	3.78	.853	46	2.043		*
	Female	3.45	.937	104			
Occupation	Student	3.49	.922	114	2.043	1.472	Ns
	Business	4.07	.900	6			
	Employee	3.64	.904	28			
	Homemaker	4.40	.849	2			
Educational Qualification	School level	3.23	1.075	14	2.043	1.200	Ns
	Undergraduate	3.55	.884	111			





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	Post graduate	3.64	1.037	21			
	Professional course	4.15	.619	4			
Marital Status	Married	3.69	.914	11	.528		Ns
	Unmarried	3.54	.925	139			
Type of the family	Nuclear family	3.53	.943	118	-.522		Ns
	Joint family	3.62	.853	32			
Place of residence	Urban	3.57	.916	60		2.542	*
	Semi urban	3.34	.984	36			
	Rural	3.80	.840	43			
	Semi rural	3.13	.859	11			
Annual Income	Below 200000	3.51	.876	96		.245	Ns
	200000-500000	3.63	.970	47			
	Above 500000	3.57	1.298	7			
Number of vehicle owned	One	3.63	.872	46		.396	Ns
	Two	3.56	.901	58			
	Three	3.41	1.009	35			
	Four and above	3.62	1.025	11			
Own a Vehicle	Yes	3.25	1.071	13	-1.242		Ns
	No	3.58	.906	137			
Preferred vehicle	Hybrid vehicle (use both electricity and fuel)	3.52	.946	109	-.610		Ns
	Electric vehicle	3.62	.864	41			
Electric model preferred	Scooter	3.50	.860	82		2.199	Ns
	Bike	3.84	.830	33			
	Car	3.41	1.100	35			
purchase choice of electric vehicle in future	Yes I will purchase	3.62	.939	104		1.937	Ns
	No I will not purchase	3.95	.755	4			
	Not sure	3.33	.870	42			

(Source: computed)(Ns – Not significant; * - significant at 5 per cent level)

