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Electric Cars for Sustainability: An Empirical Study on its Awareness and Perception in Chennai District, Tamilnadu

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ABSTRACT

Electric Cars(E-Cars) though branded as Environment Friendly and Eco-Labelled product in the Market its awareness is found very less; Its contribution towards Sustainable Development Goals (SDG) is found very minimal. India has been ranked as the 3rd most Air Polluted Country in the world, as per 2024 Reports and E-Vehicle adoption is viewed as prime solution by Indian Government to shield against Major Environmental threats i.e., Air Pollution, Air Contamination, decreased Air Quality and to achieve SDG by 2030. Objectives: To Study Awareness & Perception towards E-Cars & SDG; To List how E-Car adoption helps to attain 12 SDG. Methodology: Empirical study conducted among 440 Chennai Consumers. Findings: 60.45% of Chennai Consumers are unaware of E-Car and 82.95% are unaware of SDG – its Existence, Eco-Benefits & Government Initiatives (www.niti.gov.in) irrespective of their Gender, Age, Education and Employment. E-Cars are perceived as Luxury Product due to its High Price & Technical Features.

***Keywords**: Electric Cars, SDG, Air Pollution, Environment, Awareness and Perception.*
***JEL Classification:** Q53, Q54, Q55, Q56, O14*

Introduction

Transport Industry plays a vital role in the growth of a nation. India is identified as the 4th largest manufacturer of Automobiles in the world (5.9 million Vehicles Manufactured in the Year 2024) and 5th Largest Car Manufacturer in the World (4.8 million Cars Manufactured in the Year 2024). Conventional Fuel engine Vehicle causes Air Pollution and endangers human life on earth and threatens environment. Thus, sustainable transportation is much essential to save Planet Earth and its living creatures. Hence, Electric Vehicles (EV) is viewed globally as alternate transportation for highly populated Country like India. But, adoption of E-Vehicles particularly, Electric Car adoption in India is very slow and minimal far behind the requirement. Additionally, Electric Car adoption in mass scale makes India to achieve majority of United Nation's identified 17 Sustainable Development Goals.

Indians are very conservative by nature. Apart from cost, Indians are very reluctant and hesitant to adopt this new mode of Transportation and has different perspective, outlook and opinion towards Electric Cars. In spite of Government Initiatives to promote E-Cars through Incentives and Subsidies very minimal % of Indians opt for this new mode of transportation. Harsh reality is that, less than 1% of Vehicles in India are only Electric; Remaining 99% are still Fuel vehicles in Indian Roads.

Need for the Study

Electric Cars has gained momentum in recent past due to the entry of International Brands like Tesla and VinFast have recently entered the Indian Market in July 2025. Air Pollution, Air Contamination, decreased Air Quality and to reduce Green House Gases is one amongst Major Environmental problem threating the world particularly India due to its high population and increased fuel vehicles. Adoption of

Electric Vehicles is identified as best alternative to save India from Eco-danger. But, its awareness (very minimal); Perception (not much favourable) and transformation from Fuel Cars to Electric Cars is very slow in India. Hence Awareness & Perception of People towards Electric Car needs to be studied.

Types of E-Vehicles

- E-Scooters (Two -Wheelers)
- E-Autos (Three Wheelers)
- E-Cars (Four Wheelers)
- E-Trucks (Delivery Trucks & Vans)
- E-Buses (Public Transport, Company Buses)

Type of Battery used for E-Vehicles

- **Battery Electric Vehicles (BEV):** Fully Powered by electricity
- **Hybrid Electric Vehicles (HEV):** Engine designed to operate in both Petrol & Battery.
- **Plug-In Hybrid Electric Vehicles (PHEV):** Battery is charged using external Socket no relevance with petrol engines when used.
- **Fuel Cell Electric Vehicle (FCEV):** Electrical energy is produced from Chemical Energy.

Government Initiatives to promote Electric Vehicles in India

- **EMPS 2024** (Electric Mobility Promotion Scheme) w.e.f. 1st April 2024 till 31st September 2024.
- **FAME India Scheme** Phase -II (Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles) w.e.f. 1st April 2019 to introduce Electric Buses (670 E-Buses) in Public Transportation and installing Charging Stations (241) under the Scheme.
- **PM E-DRIVE** (PM Electric Drive Revolution in Innovative Vehicle Enhancement). The scheme will be implemented w.e.f. 1st October, 2024 till 31st March, 2026.
- Indian Government **Mission towards Green Economy** as it targets 30% of its transport should be electric powered **by 2030**.

Objectives of the Study

- To study Chennai Consumers Awareness about Electric Cars – its existence, Benefits to Mankind & Environment.
- To identify the Perception of Consumers towards Electric Cars in Chennai District.
- To measure Chennai Consumers Awareness about Sustainable Development Goals (SDG) – its existence, and government Initiative to achieve it by the Year 2030.
- To List out how Electric Car adoption leads to attainment of Sustainable Development Goals.
- To determine consumers awareness on Central & State Government Initiatives, Incentives & Subsidies to promote Electric Vehicles in India.

Review of Literature

(Ministry of Heavy Industries, 2024) Ministry of Heavy Industry, Government of India to promote E-Vehicles, launched a scheme titled “PM E-DRIVE” (PM Electric Drive Revolution in Innovative Vehicle Enhancement) by Gazette notification S.O. 4259 (E) on September 29, 2024. The scheme is implemented w.e.f. 1st October, 2024 till 31st March, 2026 to provide incentive to 24.79 Lakh E-Vehicles irrespective of whether it is used for commercial, corporate or personal purpose.

(Mukherjee, 2024) The Society of Indian Automobile Manufacturers (SIAM) held its 64th Annual Convention on 10th September 2024 with a strong focus on sustainable mobility. Union Minister for Transport said, Electric Vehicles Sales will be 10 million, generating employment to 5 million People by the year 2030. Special message, Honourable Prime Minister of India emphasized on the need for the Automobile Sector to set an example for others to follow and said, “The road ahead demands that our Progress is rapid while also being sustainable. Working on greener and cleaner mobility is a vital step in this direction”

(Writers, 2024) The 6th Annual World Air Quality Report revealed on March 19, 2024 at Switzerland pointed, India as the third most polluted Country in the world (producing 10 times Air pollution

higher than the WHO annual PM2.5 guideline) in 2023. It also was the home for four Most Polluted cities in the world with Begusarai – Bihar State Capital ranked on top.

(Rekha Attri, 2024) the study is conducted among 518 prospective buyers of new four-wheelers to identify factors influencing Indian Consumers to adopt Electric vehicles. The study highlights the importance of perceived risk in influencing consumer behaviour in the context of new technology.

(Industries, 2024) Government of India announced EMPS -2024 for promotion of electric mobility in the country with an outlay of Rs.500 crore from 1.4.2024 -31.7.2024. This scheme insists on faster adoption of Electric Two -Wheelers and Three – Wheelers and development of EV manufacturing eco-system in the country.

(Tamilnadu, 2023) the main objectives of the policy are to transform Tamilnadu into the preferred destination for EV manufacturing in South – East Asia, to accelerate adoption of Electric Vehicles in Tamilnadu, To Enhance the development of the ecosystem in Tamilnadu and to develop Electric Vehicles Cities in Tamilnadu.

Scope of the Study

- E-Cars are studied in general, and not differentiated based on Brand Name and Price Ranges.
- The study does not differentiate E-Cars based on Battery (Fully Electric, Hybrid etc.)
- The study does not demarcate Electric Cars used for Personal and Commercial Purpose.
- The study is restricted only to Chennai District.

Benefits of E-Cars

No Air Pollution	No Fuel
No Noise Pollution	Low Operating Cost
Easy to Drive	Government Subsidies
Low Maintenance Cost	Eco- Friendly Transport
Trendy & Stylish	Tax Benefits
Socially Responsible Citizens	Free Parking at Metro Stations

Government Incentive & Subsidies

Central Minister for Road Transport & Highways, Government of India shared Indian Government's target for Electric Vehicle (EV) adoption by the Year 2030 is as follows:

- 80% two & three-wheelers in India should be Electric by the Year 2030.
- 30% of private cars in India should be Electric by the Year 2030,
- 70% commercial vehicles in India should be Electric by the Year 2030,
- 40% of buses in India should be Electric by the Year 2030

National Incentives

FAME, or Faster Adoption and Manufacturing of (Hybrid and) Electric vehicles, is India's flagship scheme for promoting electric mobility. Currently in its 2nd phase of implementation, FAME-II is being implemented for a period of 3 years, eff. 1st April 2019 with a budget allocation of 10,000 Cr. The incentives offered in the scheme are:

Table 1.A

Total Approximate Incentives	Approximate Size of Battery
Two wheelers: Rs 15000/- per kWh up to 40% of the cost of Vehicles	**Two wheelers:** 2 kWh
Three wheelers: Rs 10000/- per kWh	**Three wheelers:** 5 kWh
Four wheelers: Rs 10000/- per kWh	**Four wheelers:** 15 kWh
E Buses: Rs 20000/- per kWh	**E Buses:** 250 kWh

Source: e-AMRIT (niti.gov.in)

- **Purchase Incentives**: Direct discount to the users at the time of Purchase.
- **Coupons**: Financial incentive where the amount is reimbursed later

- **Interest Subventions**: Discount offered on the interest rate while availing loan for purchasing Electric Vehicles.
- **Income tax benefit:** Provided as a deduction on the tax payable
- **Scrapping incentives:** Provided upon de-registering old Petrol and Diesel Vehicles **(Source: e-AMRIT (niti.gov.in))**

Tamilnadu State Government Subsidies

E-Vehicles, manufactured, sold and registered in Tamilnadu State complying with FAME II standards are alone eligible for below incentives.

- **Road Tax Exemption:** 100% road tax exemption will be provided till 31.12.2025 for Electric Vehicles.
- **Waiver on Registration Charges**/Fees till 31.12.2025 for Electric Vehicles.
- **Waiver on Permit Fees** will be provided till 31.12.2025 for Electric Vehicles.

Thus, the Government of Tamil Nadu shall seek to provide the initial impetus for driving EV adoption in the State by incentivising commercial vehicles by providing the following incentives till 31.12.2025.

Table 1.B: showing Incentives for EV adoption by TN Govt. till 31.12.2025

Type	Vehicle Category	Incentive based on battery capacity (Rs/KWh	Maximum Incentive (Rs.)	Number of Vehicles (#) to be incentivised per year
Private	e-Cycles*	-	20% of cost up to 5,000	6,000
Commercial	e-2Wheelers	10,000/ kWh	30,000	6,000
Commercial	e-3Wheelers (autos/ Light Goods Carriers)	10,000/ kWh	40,000	15,000
Commercial	e-4Wheelers (Cabs/Goods Vehicles)	10,000/ kWh	1,50,000	3,000
Commercial	e-Buses	20,000/ kWh	10,00,000	300

Source: Tamilnadu Electric Vehicles Policy 2023

Methodology

The study was conducted among 440 Consumers in Chennai City divided into 3 Constituencies i.e., North Chennai, South Chennai and Central Chennai. Under Primary Source - Personal Interviews, Printed Questionnaire and Google Forms was used. **Secondary Source:** Data collected from Government Websites, Journal articles & Newspaper.

Research Design

Empirical Research Design was used for the study.

Sampling Technique

Probability Sampling Technique - Stratified Random Sampling is used.

Sample Size

Data was collected from 440 Consumers in Chennai District.

Statistical Analysis

Collected data are analysed using SPSS 23.

Tables & Interpretations

Table 2.1: Table Showing Consumer Awareness about Electric Cars in Chennai City

S. No	Particulars	No. of Respondents (Out of 440)	Percentage (100%)
1.	Yes, I am Aware about Electric Car	113	**25.68%**
2.	No, I am Unaware of Electric Car	266	**60.45%**
3.	Somewhat I am aware	61	**13.86%**
Total		**440**	**100%**

Source: Questionnaire & Google Form

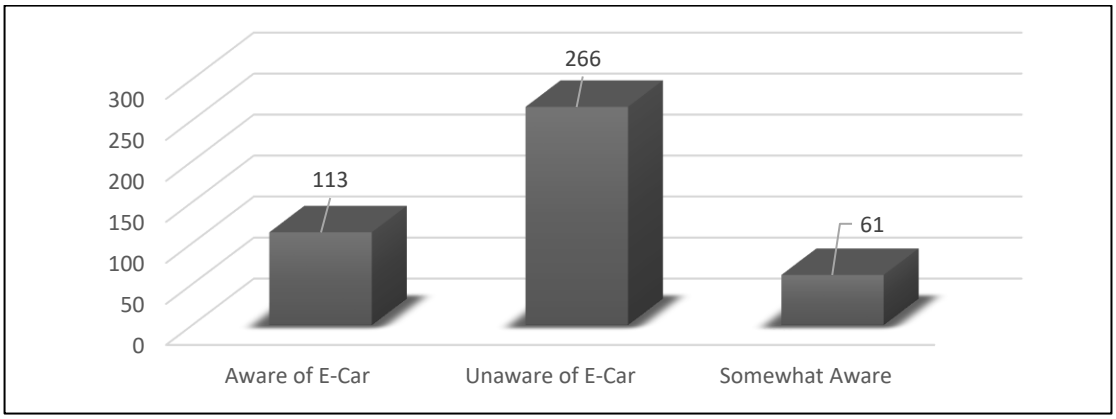

Chart 2.1: Showing Consumer Awareness about Electric Cars in Chennai City

Source: Table – 2.1

Table 2.2: Table Showing Chennai Consumers Perception about Electric Cars

S. No	Particulars	No. of Respondents (Out of 174)	Percentage (100%)
1.	Expensive/ Costly	72	41.38%
2.	Status Symbol	12	6.90%
3.	New Gen Transport	19	10.92%
4.	Pollution Free	47	27.01%
5.	Eco-Friendly Product	24	13.79%
Total		**174**	**100%**

Source: Questionnaire & Google Form

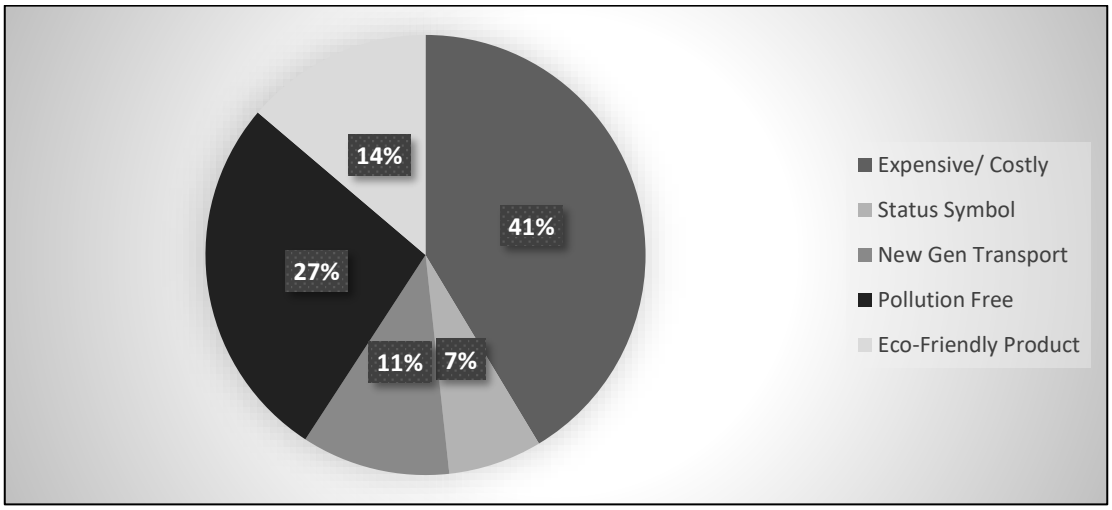

Chart 2.2: Chart Showing Chennai Consumers Perception about Electric Cars

Source: Table 2.2

Table 2.3: Table Showing Chennai Consumers Awareness on SDG Goals

S. No	Particulars	No. of Respondents (Out of 440)	Percentage (100%)
1.	Fully Aware of SDG	48	10.91%
2.	Fully Unaware of SDG	365	82.95%
3.	Somewhat Aware of SDG	27	6.14%
Total		**440**	**100%**

Source: Questionnaire & Google Form

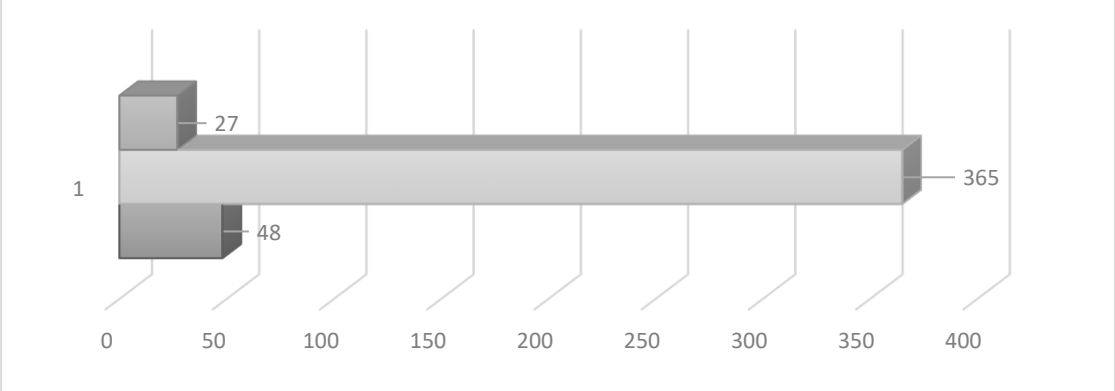

Chart 2.3: Chart Showing Chennai Consumers Awareness on SDG Goals

Source: Table 2.3

Table 2.4: Table showing Reasons for Consumers Hesitation to buy E-Car in Chennai

S. No	Particulars	No. of Respondents (Out of 174)	Percentage (100%)
1.	Poor Advertisement of E-Cars	27	15.52
2.	Not Suitable for Long Rides	36	20.69
3.	Unaware of Charging Stations	29	16.67
4.	Not for Gen X, Gen Y Population	17	9.77
5.	High Priced	49	28.16
6.	Fear of New Features & Technology	16	9.20
Total		174	100%

Source: Questionnaire & Google Form

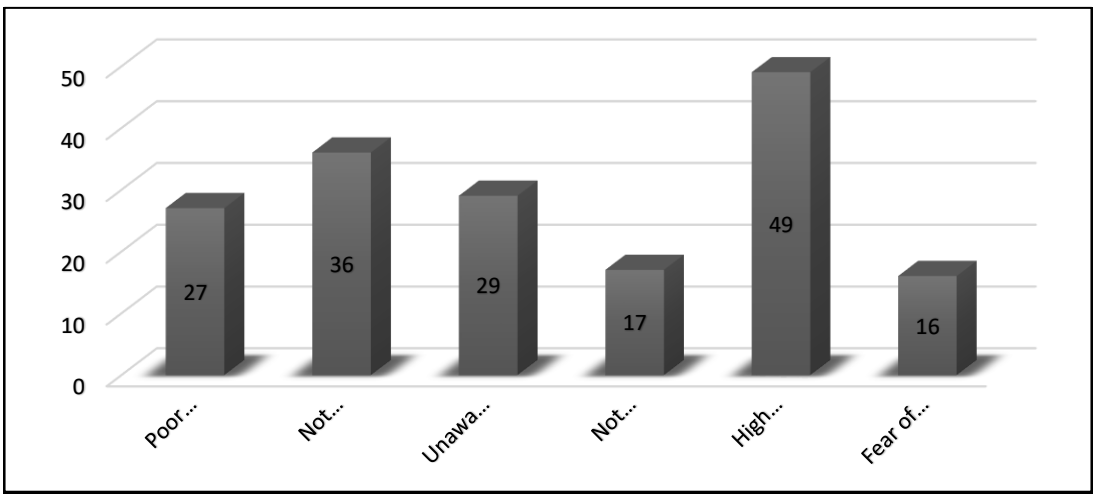

Chart 2.4: Reasons for Consumers Hesitation to buy Electric Cars in Chennai District

Source: Table 2.4

Statistical Analysis and Interpretations

- **Mann-Whitney Test U Test**

H_0: Their exist no significant difference between Gender of the respondents and their Perception about Electric Cars in Chennai.

H_1: Their exist significant difference between Gender of the respondents and their Perception about Electric Cars in Chennai.

Ranks				
	Gender of the Respondents	**N**	**Mean Rank**	**Sum of Ranks**
Perception about Electric Car in Chennai District	Male	119	45.12	5369.28
	Female	55	31.83	1750.65
	Total	174		

Test Statistics[a]	
	Perception on Electric Car in Chennai District
Mann-Whitney U	1278.000
Wilcoxon W	5369.280
Z	-1.334
Asymp. Sig. (2-tailed)	.162
a. Grouping Variable: Gender of the Respondents	

Interpretation: From the output, P value = 0.162 which is greater than 0.05 (5% level of significance), so there is evidence to reject alternate hypothesis and accept Null Hypothesis at 5% level of significance. Thus, their exist no significant difference between Gender of the respondents and their perception about Electric Cars in Chennai District.

- **Kruskal-Wallis Test**

H_0: Their exist no significant difference between Awareness on Sustainable Development Goals (SDG) among respondents in Chennai District classified into 3 Constituents.

H_1: Their exist significant difference in awareness about Sustainable Development Goals (SDG) among respondents in Chennai District classified into 3 Constituents.

Ranks			
	Constituents of the Respondents	**N**	**Mean Rank**
Awareness among Respondents about SDG	North Chennai	35	139.98
	Central Chennai	52	141.22
	South Chennai	87	158.82
	Total	174	

Test Statistics[a,b]	
	Awareness among Respondents on SDG
Chi-Square	5.388
df	2
Asymp. Sig.	.082
a. Kruskal Wallis Test	
b. Grouping Variable: Constituents of the Respondents	

Interpretation: From the output, P value = 0.082 which is more than 0.05 (5% level of significance). Therefore, we accept null hypothesis and reject alternate hypothesis at 5% level of significance. Hence, it is concluded that, the awareness level on Sustainable Development Goals in all the 3 Constituents of Chennai District are almost the same.

Findings of the Study

Table 3: showing "Electric Car adoption contributes to SDG Attainment"

S. No	Electric Car contribution to SDG Goals Realization	Sustainable Development Goals (SDG)
1.	Setting up of Electric Car Manufacturing units & Charging Stations in India will • Increase Job Opportunities; leads to Increase in National Income and Increase in Economic Growth. • improved Standard of Living there by reduce % of people below poverty line • Reduce % of people starving for food.	**SDG 8 - Decent Work and Economic Growth:** **SDG 2 - Zero Hunger:** **SDG 1 - No Poverty**
2.	• E-Vehicles adoption is an Innovation in Transport Industry in India. • Setting up Nationwide Infrastructure for charging E-Vehicles. Thus, by EV adoption India moves towards Sustainable Industrialization.	**SDG 9 - Industry, Innovation and Infrastructure**
3.	Improves Air Quality, Decreases Air Pollution to Commendable level, Air Contamination, Decrease in Respiratory Diseases.	**SDG 3 - Good Health & Well-Being**
4.	Domestic Production of Electric Vehicles in India is encouraged through FAME India project. Financial Incentives offered to both Manufacturers and Consumption (Buyers).	**SDG 12: Sustainable Consumption and Production**
5.	E-Vehicle Adoption leads to reduce CO2 Emission, Green House Gases, Ozone Layer Depletion, due to Electric Vehicle Adoption.	**SDG 13 - Climate Action**
6.	E-Vehicles reduce Noise Pollution, Air Pollution creates clean and Safe Cities for people to live in. Eco-Friendly environment creates Sustainable cities.	**SDG 11 - Sustainable cities and Communities:**
7.	E-Vehicle adoption reduces Import of Fossil Fuel, to Generate domestic Production of Clean & Affordable Energy (FAME-II), If Electricity is generated through Solar Panels and Wind Mills.	**SDG 7 - Affordable and Clean Energy**
8.	E-Vehicles are Uni-Sex Product. No Gender Discrimination is found in its Consumption and use.	**SDG 5 - Gender Equality**
9.	Educating and creating awareness among Younger Generation to Understand and address Global Challenges to create Clean, Green & Sustainable Nation.	**SDG 4 - Quality Education:**
10.	E-Vehicles adoption is Globally (Developed, Underdeveloped, Developing) identified as alternate mode of Transportation to Fuel powered vehicles.	**SDG 10 - Reduced Inequality:**

Awareness of Consumers towards Electric Cars in Chennai District

- Majority (61%) of Chennai Consumers are unaware of existence of Electric Cars.
- Chennai being a Metropolitan City; majority (Out of 440 Consumers) only 174 are aware of the existence of Electric Car.
- Major Reason pointed by Chennai Consumers for not preferring Electric Car:
- E-Car not Suitable (21%) for long rides
- It increases Travel Time
- Its Costly (28.16%) compared to Fuel Cars
- Poor Advertisement of E-Cars (15.52%)
- Unaware of Charing Stations (16.67%)
- Not Suitable for Gen X and Y Population (9.77%)
- Fear of In-Built New Features and Technology in E-Car (9.20%)
- About (69.13%) of Consumers in Chennai are unaware of Government (Both Central & State) Schemes, Incentives & Subsidies available for E-Cars.
- Non- availability & Unfamiliarity of EV Battery Charging stations at Prime Location increases Fear among Chennai Consumers.

Perception of Chennai Consumers towards Electric Cars

- Majority (41.38%) of Consumers perceive Electric Car is Expensive/Priced High/Costly targeted to Rich Families; which is the major reason stopping from its adoption.
- Major reason for negative perception is; Electric Car is viewed as Luxury Product, hence not suitable for Middle Class & Low-Budget Families.
- Chennai Consumers Perception about Electric Car are:
  - Youngsters perceive it as Fashionable Product, Trendy Vehicle
  - New Product in the Market and
  - Perceived as Next Generation Transport.
  - Rich & Upper Middle-Class perceive as Status Symbol & luxury product.
  - Perception varies according to Gender, Age, Education, Economic Status & Occupation.

Awareness on Sustainable Development Goals (SDG) in Chennai District

- Majority (82.95%) of Chennai Consumers are unaware of SDG (17 Goals) – its Existence and Eco-Benefits.
- Unawareness is common among Chennai Consumers irrespective of their Gender, Age Group, Education, Employment and location.
- Even if aware of SDG; they are not fully aware of its significance to the nation, environment and its association with Electric Cars.
- Majority (93.55%) are not aware of Indian Government Mission for SDG attainment by the year 2030.
- Awareness on the Existence of Exclusive Government Website (www.niti.gov.in) for achieving SDG is almost less than 5% in Chennai District.

Suggestions

- Electric Car Manufacturers can focus more on Budget and Economic Models (Below Rs.5 Lakhs) so, middle income families can financially afford them.
- Sports & Film Celebrities can be used as Brand Ambassadors for Electric Car and to Spread awareness on SDG
- Electric Car Charging stations to be set up at Prime Locations to increase public visibility and to build confidence on them to purchase E-Car.
- Awareness on Electric Vehicles & Sustainable Development Goals (SDG) and its association should be created at Schools & Colleges by inserting it as a part of Syllabus in Environmental Science.
- Awareness Message through social media, Internet and Mobile phones to be created & repeatedly spread among public about Electric Cars & SDG.
- Corporates, Colleges & Workspaces should insist purchase of Eco-Friendly Electric Vehicles and collect parking charges for Fuel Vehicles.
- Repeated Advertisement in Social Medias, WhatsApp, Newspaper (Regional), Television (Cable Channels) and Radio should be given by Electric Car Makers to increase Public Awareness and positive perception that, E- Cars are Enviro-Friendly and available at all price ranges.

Conclusion

Electric Car though viewed as a Product to Control Pollution (Air & Noise) and Environment Friendly Product with other Societal Benefits of using it; Price is the major criterion which stops, prevents and controls people from buying it. Indians are very Conservative and Price Conscious people. India is a Country in which Fuel Car itself viewed as a Luxury Product; Electric Car is viewed as Premium Product meant for Rich class consumers. Irrespective of all ages, Gender and Education background, Price is the major influencing factor which helps them to make Purchase Decision. E-Car manufacturers should produce more Economical and Budget models which is affordable by middle class consumers and is equivalent to prices ranges of Fuel Cars. Unless Government bans the production, sale and use of Fuel powered Cars in India; transformation to Electric Cars will be very slow and minimal.

Awareness about SDG should initially be increased among Young Generation and educated masses. Attainment of SDG should not only be Government Responsibility (Central & State); instead, every Citizen should realise their importance in saving Planet Earth and Conservation of resources for Future Generation. Necessity for Responsible Citizens and Informed Consumers with social Consciousness is the need of the hour to make India attain SDG before the Year 2030.

Limitations to the Study

The study is limited only to Electric Cars in Chennai City. Other E-Vehicles such as E-Scooters, E-Autos, E-Trucks & Delivery Vans and E-Buses are not included for Study purpose. All 17 SDG are studied in general. The Study is restricted only to Chennai District.

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