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An empirical analysis on electric passenger car adoption among customers in Kerala

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Abstract---Passenger cars are the indispensable transportation vehicle by the family passengers. Passenger cars become so much popular because of its conveniences, comfort and flexibility etc. In the modern society where, people look for more convenient, versatile, freedom and ease of mobility, prefer private transportation method than public transportation which again made the passenger car more popular for the everyday activities like commuting to work, leisure pleasure trip and attending functions, shopping etc. Varied nature of customers' demands varying requirement in passenger cars like varying in its size from hatchback to spacious sedan, from basic purpose of mobility of passengers to Multipurpose passenger cars. Passenger cars should be equipped with the facilities which enables it to navigate the diverse terrains and road conditions, different life styles and family life cycle, purpose of the commutation etc. Thus, Car manufactures are taking keen interest to adopt latest technologies

and features to provide the maximum comfort, safety and performance to customers.

Keywords---Indian passenger car market, Electric passenger cars, Awareness level, Needs, Preferences.

1. Introduction

The current everchanging and fast paced world due to the paramount changes in the socio-economic conditions and life styles; personal mobility having fastness, freedom, flexibility in the travel schedule become the most essential in the daily life of individuals. Now a days personal mobility dictates the productivity and quality of life; in all the walks of life and sectors like, education, entertainment, access to work, trade etc. The expanding Urbanisation also paves the way for increasing personal mobility.

Passenger Cars become an inevitable mode of transportation because of its convenience and comfort in the personal mobility. Based on the customer preferences it comes under various categories like Hatchback, Sedan, SUVs, Coupes etc. Passenger Car Market is flooded with various Manufacturers and brands so that Customers can choose a car which is of their cup of tea. With the advancement of technology, manufacturers are competing in terms of introducing most fuel efficient, high performing, customised and most sustainable passenger cars which reshapes the driving experience.

1.1 Indian Passenger Car Market:

In spite of the less developed road conditions, traffic congestions in cities, environmental concerns, the demand for Passenger Cars show an upward trend. The increasing pace of urbanisation, rising income and favourable outlook for the transportation sector etc, make the Indian passenger car market more attractive. Indian market is having domestic players like Maruthi Suzuki, Tata Motors, Mahindra and Mahindra and International players like Hyundai, Honda, Toyota etc. Innovations in fuel efficiency, safety features and environment friendly vehicles are the prominent leading factors for the Manufacturers in the Market. The passenger cars not only serve the personal mobility of the individuals, but also it has a its economic impact in the Country like Export and import, job opportunities in the manufacturing, retail and service sectors, cost of living of the people etc. It is estimated that the passenger car market will generate 22.6 bn US Doller in the financial year 2024. As per the SIAM statistics, Passenger Cars sales have reached around 17,50,000 in the financial year 2022-23 and Export attained around 6,50,000 units in the financial year 2022-23.

1.2 Electric Passenger Cars

Electric Passenger cars are not a new phenomenon; it had its presents in the market from 1800 onward. But the convenience, fuel efficiency and technological advancement in the Internal combustion engine propelled passenger cars; reduced the charm of Electric passenger cars. Electric passenger cars are now

gaining momentum as a cleaner, safer, fuel efficient and sustainable passenger transportation all over the world. Based on the India government initiative, Kerala Government is also drafted its Electric Vehicle Policy in the year 2019.

2. Literature Review:

Anil Khurana, V. Ravi Kumar and Manish Sidhpuria in their article titled “A Study on the Adoption of Electric Vehicles in India: The Mediating Role of Attitude”; analysed the electric vehicles adoption in India. They got responses from 214 respondents out of 450 sample size. They have analysed perception about economic factors, social influence, Environmental concern, self-image and Behavioural intention to understand the mediator in the adoption of Electric vehicles. They have used Structured Equation Modelling (SEM) to analyse the data. **Som Sekhar Bhattacharyya and Shreyash Thakre** has written an article titled “Exploring the factors influencing electric vehicle adoption: an empirical investigation in the emerging economy context of India” in 2020. Authors conducted a semi-structured interview technique to understand the factors influencing electric vehicles adoption in India. The authors identified 11 key factors such as charging technologies, selection dilemma, switching intention of consumers, Electric vehicles technology, Consumers psychological and technological preferences etc. **Mishra.S; Verma S; Chowdhury S; Guar A; Mohapatra s; Dwivedi G; Verma P.A** in their article titled “Comprehensive Review on Development in Electric Vehicle Charging station infrastructure and Present Scenario of India” reviewed the infrastructure needed for EV charging, types of EVs and charging stations, locational aspects like optimal location, operations management, Development of fast charging, Ultra-fast charging Battery Swapping stations to reduce Battery Charging time, management of Queues in charging stations, and technological aspects. They used tools like Genetic Algorithm and Multi-stage stochastic integer programming to arrive at conclusion. **Sonali Goel, Renu Sharma and Akshay Kumar Rathore** has analysed the Electric Vehicles scenario in India and barriers and challenges in the adoption on Electric Vehicles in India in their article titled “A review on barrier and challenges of electric vehicle in India and Vehicle to grid optimisation”. In their article they addressed barriers from the perspectives of market, technical policy and infrastructure. Under market they have analysed barriers in terms of Vehicle servicing, high capital cost, consumer perception, raw materials for batteries; under technical perspective Battery lifespan/efficiency, driving range of electric vehicle, charging time, safety requirements of electric vehicle, Environmental impact under the perspective of Infrastructure charging infrastructure, Battery recycling etc. **Mr. Omkar Tupe Prof. Shwetha Kishore and Dr. Arlope John Vieira** has written a research paper on “Consumer perception of Electric Vehicles in India”. In this paper they described the important factors affecting purchase of electric vehicles in India from taking data from 212 sample respondents. They tried to collect information about reasons for selecting an Electric vehicle like reducing the dependency on fossil fuels, publicity, reduction in carbon emission, performance, incentive from Government, cost of ownership etc. and Drawbacks of electric vehicles like lower number of charging stations, power delivery, limited choice, recharging time etc. they used chi-square test to test the hypotheses. **Pretty Bhalla, Inass Salamah Ali and Afroze Nazneen** in their Article titled “A study of Consumer Perception and

Purchase Intention of Electric Vehicles” analysed the various factors that influences the purchase of electric cars in terms of Environmental concerns, Cost of Vehicles, Comfort, Trust, Technology, Infrastructure and Social acceptance. They have selected 247 respondents using Purposive random sampling of owners of fuel cars. They used Correlation Analysis for the analysis of data. Based on the study they suggest to invest more on making social acceptance of electric vehicles, by creating more infrastructural facilities, more thrust on technology and create trust.

3. Statement of the Problem

The Government of India launched a National Electric Mobility Mission Plan 2020 in 2013. Under the mission, in March 2015, the Scheme for Faster Adoption and Manufacturing of Hybrid& Electric Vehicles in India: FAME India; was launched for two years under Phase-I, which was subsequently extended up to March 31, 2019. Further, in 2017, the Centre launched the EV@30 campaign to set a collective aspirational goal for all Electric Vehicles Initiative (EVI) members to have EVs contribute to 30 percent of all vehicle sales by 2030.

There are many players in the EV segment in India. In the car segment, Mahindra Electric, Toyota, Maruti Suzuki, Tata Motors etc. have their models. In the two-wheeler segment, Hero Electric, Ather Energy, and Ampere are some of the key players. Despite these initiatives, pure electric vehicle penetration (in 2017) remained quite low in India. This was largely driven by critical hurdles like high upfront purchase price of EVs, non-existent public charging infrastructure, and low levels of investments in EV manufacturing.

On many levels 2019 can be considered as a year of positive developments and synchronisation for India's evolving Electric Vehicle Industry. The year began with bang for EV players with the government's approval for Rs. 10,000-crore programme under the FAME-II scheme for promotion of electric and hybrid vehicles in the month of February. The scheme, which came into effect on 1st April 2019, is aimed to encourage faster adoption of electric and hybrid vehicles by way of offering upfront incentive on purchase of electric vehicles and also by way of establishing necessary charging infrastructure for Electric Vehicles.

A handful of states like Kerala, Karnataka, Maharashtra, Andra Pradesh, Uttar Pradesh, and Tamil Nadu, managed to put a policy in place in order to give some certainty to electric vehicle manufacturers. According to a recent Market Intelligence Report by BIS; the electric vehicle market, battery market, and charger market are expected to witness CAGRs of 53.64 per cent, 58.86 per cent, and 59.58 per cent, respectively during 2019-2030.

As per the National Electric Mobility Mission Plan 2020 of India, Indian consumers are sensitive to cost, incentives and subsidies as effective levers to increase the adoption of Electric Passenger cars. The study among the industry also ratifies the low adoption rate for Electric vehicles in the India is due to high prices, low performance, lack of Infrastructure and low awareness.

Central Government has set an aspiration goal of EVs to contribute a 30 percent of all vehicles by 2030 through its EV@30 policy. As per the latest report only

around 12 Lakh EVs are plying on the Indian Road. Based on Central Government Policy, Kerala Government also took initiative to draft its' own Electric Vehicle policy and targeted 1 million EVs on road by 2022. But based on the latest report only 39,450 EVs are plying on the roads in Kerala.

Even though the market for Electric two-wheelers, three wheelers and public transportation shows a positive signal, the sales of Electric passenger cars are not up to the mark as predicted. At this juncture, this study tries to Uncover the Customer Perspective on the Electric Passenger Car adoption in Kerala.

4. Research Objective

- 1) Understanding the awareness level of customers about the Electric passenger cars
- 2) To know the needs and preference for Electric passenger cars among customers

5. Research Methodology

5.1 Hypothesis:

1. H0: There is no solid relationship among respondents from different districts, Residential status, Gender, age, Education, occupation and awareness level about Electric Passenger cars.
H1: There is solid relationship among respondents from different districts, Residential status, age, Education, occupation and awareness level about Electric Passenger cars.
2. H0: There is no solid relationship among respondents' awareness level about Electric passenger cars and its adoption
H1: There is solid relationship among respondents' awareness level about Electric passenger cars and its adoption
3. H0: There is no solid relationship among respondents from different districts, Residential status, Gender, age, Education, occupation and factors affecting for the adoption of Electric passenger cars
H1: There is solid relationship between respondents from different districts, Residential status, Gender, age, Education, occupation and factors affecting for the adoption of Electric passenger cars.

Both first hand data and Secondary data was used in this study. First hand data was collected from 100 potential customers in the Districts of Thrissur and Thiruvananthapuram of Kerala state by using structured questionnaire. 50 samples are drawn from both districts for the study. Secondary data is drawn from websites, journals, books etc. Data was collected in the first quart er of 2024.

5.2 Sample

The Electric Passenger cars are highly priced cars compared with ICE cars. So, in order to find out the potential customers, Researcher identified the house holds having APL non priority Ration card holders. As per Kerala Government, APL Non-Priority card holds are having high economic well-being.

6. Result and Discussion

For the purpose of statistical analysis following tools has been utilised

1. Garret Ranking Method
2. One Way ANOVA

Descriptive Analysis

Table 1 District Wise Classification of Respondents

	Recurrence	Percentage	Valid Percentage	Cumulative Percentage
Thrissur	50	50.0	50.0	50.0
Trivandrum	50	50.0	50.0	100.0
Total	100	100.0	100.0	

Primary Data

Table 2 Classification of Respondents based on Gender

	Recurrence	Percentage	Valid Percentage	Cumulative Percentage
Men	77	77.0	77.0	77.0
Women	23	23.0	23.0	100.0
Total	100	100.0	100.0	

Primary Data

Table 3 Classification of Respondents based on Occupation

	Recurrence	Percentage	Valid Percentage	Cumulative Percentage
Private Employee	44	44.0	44.0	44.0
Govt. Employee	12	12.0	12.0	56.0
Self-Employed	16	16.0	16.0	72.0
Agriculturist	2	2.0	2.0	74.0
Business	8	8.0	8.0	82.0
Professionals	10	10.0	10.0	92.0
Retired/Pensioners	8	8.0	8.0	100.0
Total	100	100.0	100.0	

Primary Data

Table 4 Fuel used in the Cars

	Recurrence	Percentage	Valid Percentage	Cumulative Percentage
Patrol	68	68.0	68.0	68.0
Patrol & Electric	9	9.0	9.0	77.0
No Car	7	7.0	7.0	84.0
Diesel	7	7.0	7.0	91.0
CNG	4	4.0	4.0	95.0

Electric	4	4.0	4.0	99.0
Patrol & Diesel	1	1.0	1.0	100.0
Total	100	100.0	100.0	

Primary Data**Table 5 Usage of the car**

	Recurrence	Percentage	Valid Percentage	Cumulative Percentage
Daily Use	55	55.0	55.0	55.0
Trips/Travelling	38	38.0	38.0	93.0
No Car	7	7.0	7.0	100.0
Total	100	100.0	100.0	

Primary Data**Table 6 Respondents' Awareness Level about Electric Passenger Cars**

	Recurrence	Percentage	Valid Percentage	Cumulative Percentage
Highly familiar	19	19.0	19.0	19.0
Familiar	37	37.0	37.0	56.0
Somewhat familiar	44	44.0	44.0	100.0
Total	100	100.0	100.0	

Primary Data**Table 7 Sources of Information about Electric Passenger Cars**

	Recurrence	Percentage	Valid Percentage	Cumulative Percentage
Advertisement	60	60.0	60.0	60.0
Friends/Family	28	28.0	28.0	88.0
Electric Car Owners	12	12.0	12.0	100.0
Total	100	100.0	100.0	

Primary Data**Table 8 Media sources of Information about Electric Passenger Cars**

	Recurrence	Percentage	Valid Percentage	Cumulative Percentage
Social Platforms	54	54.0	54.0	54.0
T. V	24	24.0	24.0	78.0
Many	18	18.0	18.0	96.0
Personal Interaction	4	4.0	4.0	100.0
Total	100	100.0	100.0	

Primary Data

Table 9 Respondent heard Electric car Company Name

	Recurrence	Percentage	Valid Percentage	Cumulative Percentage
Tata	54	54.0	54.0	54.0
Many	32	32.0	32.0	86.0
Hyundai	8	8.0	8.0	94.0
BMW	4	4.0	4.0	98.0
Kia	2	2.0	2.0	100.0
Total	100	100.0	100.0	

Primary Data**Table 10 Respondents' opinion about Electric cars will satisfy the Travel purpose**

	Recurrence	Percentage	Valid Percentage	Cumulative Percentage
Strongly Acknowledge	8	8.0	8.0	8.0
Acknowledge	54	54.0	54.0	62.0
Neutral	28	28.0	28.0	90.0
Decline	10	10.0	10.0	100.0
Total	100	100.0	100.0	

Primary Data**Table 11 Sourcing influencing need and expectation for Electric passenger cars**

	Recurrence	Percentage	Valid Percentage	Cumulative Percentage
Verbal word from Family/Friends	57	57.0	57.0	57.0
Self-Interest	24	24.0	24.0	81.0
Through Advertisement	17	17.0	17.0	98.0
Past Buying Experience	2	2.0	2.0	100.0
Total	100	100.0	100.0	

Primary Data**Table 12 Respondents' Preferred Segment of Electric car**

	Recurrence	Percentage	Valid Percentage	Cumulative Percentage
Hatch Back	60	60.0	60.0	60.0
SUV	30	30.0	30.0	90.0
Sedan	8	8.0	8.0	98.0
Will Not Purchase	2	2.0	2.0	100.0
Total	100	100.0	100.0	

Primary Data

Table 13 Respondents' opinion about E car will be Economical

	Recurrence	Percentage	Valid Percentage	Cumulative Percentage
Acknowledge	80	80.0	80.0	80.0
Decline	10	10.0	10.0	90.0
Impartial	10	10.0	10.0	100.0
Total	100	100.0	100.0	

Primary Data**Inferential Analysis****ANOVA****Table 1 Awareness Level- District Wise**

	Observation	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Thrissur	50	3.80	.782	.111	3.58	4.02	3	5
Trivandrum	50	3.70	.735	.104	3.49	3.91	3	5
Total	100	3.75	.757	.076	3.60	3.90	3	5

Primary Data**Table 1.1 Awareness Level- District Wise**

	Sum of Squared	df	Mean Square	F	Sig.
Between Groups	.250	1	.250	.434	.512
Within Groups	56.500	98	.577		
Total	56.750	99			

Significance Level at 5% and level of independence for (1,98); F value is 3.94. Calculated F value is less than the table value. Hence alternative hypothesis is rejected.

Table 1.2 Awareness Level- Residential Area wise

	Observation	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Rural	41	3.80	.782	.122	3.56	4.05	3	5
Urban	59	3.71	.744	.097	3.52	3.91	3	5
Total	100	3.75	.757	.076	3.60	3.90	3	5

Primary Data

Table 1.2.1 Awareness Level- Residential Area wise

	Sum of Squared	df	Mean Square	F	Sig.
Between Groups	.209	1	.209	.363	.548
Within Groups	56.541	98	.577		
Total	56.750	99			

level of independence (1,98) and Significance Level at 5% 5%, F is 3.94.

Calculated F is less than table value, Hence, alternative hypothesis is rejected.

Table 1.3 Awareness Level- Gender wise

	Observation	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Male	77	3.77	.742	.085	3.60	3.93	3	5
Female	23	3.70	.822	.171	3.34	4.05	3	5
Total	100	3.75	.757	.076	3.60	3.90	3	5

Primary Data**Table 1.3.1 Awareness Level- Gender wise**

	Sum of Squared	df	Mean Square	F	Sig.
Between Groups	.088	1	.088	.153	.697
Within Groups	56.662	98	.578		
Total	56.750	99			

At (1,98) level of independence and at 5% significance Level; F is 3.94. The calculated value of F is less than the table value of F. Hence alternative hypothesis is rejected

Table 1.4 Awareness Level- Age Wise

	Observation	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
31-40 Years	24	3.54	.779	.159	3.21	3.87	3	5
41-50 Years	36	3.81	.786	.131	3.54	4.07	3	5
More than 50 Years	40	3.83	.712	.113	3.60	4.05	3	5
Total	100	3.75	.757	.076	3.60	3.90	3	5

Primary Data**Table 1.4.1 Awareness Level- Age wise**

	Sum of Squared	df	Mean Square	F	Sig.
Between Groups	1.378	2	.689	1.207	.304
Within Groups	55.372	97	.571		
Total	56.750	99			

F value is 3.09 at 5% significance Level for (2,97) level of independence. The calculated value of F is less than the table value of F. Hence alternative hypothesis is rejected.

Table 1.5 Awareness Level- Based on Education

	Observation	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Below Matriculation	2	4.00	.000	.000	4.00	4.00	4	4
Matriculation	16	3.88	.719	.180	3.49	4.26	3	5
Higher Secondary	16	3.56	.727	.182	3.17	3.95	3	5
Graduation	42	3.74	.828	.128	3.48	4.00	3	5
Diploma	4	4.25	.500	.250	3.45	5.05	4	5
Post Graduation	20	3.70	.733	.164	3.36	4.04	3	5
Total	100	3.75	.757	.076	3.60	3.90	3	5

Primary Data**Table 1.5.1 Awareness Level- Education Wise**

	Sum of Squared	df	Mean Square	F	Sig.
Between Groups	1.993	5	.399	.684	.636
Within Groups	54.757	94	.583		
Total	56.750	99			

Alternative hypothesis is rejected at 5% significance Level for (5,94) level of independence because the Table value of F is 2.31 and calculated value is less.

Table 1.6 Awareness Level- Occupation Wise

	Observation	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Private Employee	44	3.70	.734	.111	3.48	3.93	3	5
Govt. Employee	12	4.00	.739	.213	3.53	4.47	3	5
Self-Employed	16	3.75	.775	.194	3.34	4.16	3	5
Agriculturist	2	4.00	.000	.000	4.00	4.00	4	4
Business	8	3.75	.886	.313	3.01	4.49	3	5
Professionals	10	3.50	.850	.269	2.89	4.11	3	5
Retired/Pensioners	8	3.88	.835	.295	3.18	4.57	3	5
Total	100	3.75	.757	.076	3.60	3.90	3	5

Primary Data

Table 1.6.1 Awareness Level- Occupation Wise

	Sum of Squared	df	Mean Square	F	Sig.
Between Groups	1.716	6	.286	.483	.819
Within Groups	55.034	93	.592		
Total	56.750	99			

Since the table value is 2.20 at 5% significance level for (6,93) level of independence which is more than the calculated value, Alternative hypothesis is rejected.

Table 2 Awareness Level and Adoption level of Electric cars

	Observation	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Somewhat aware	44	2.95	.861	.130	2.69	3.22	2	5
Aware	37	2.46	.931	.153	2.15	2.77	1	5
Highly Aware	19	2.79	.787	.181	2.41	3.17	2	5
Total	100	2.74	.895	.089	2.56	2.92	1	5

Primary Data**Table 2.1 Awareness Level and Adoption level of Electric cars**

	Sum of Squared	df	Mean Square	F	Sig.
Between Groups	4.984	2	2.492	3.255	.043
Within Groups	74.256	97	.766		
Total	79.240	99			

At 5% Significance Level and (2,97) level of independence; F value is 3.09 which is less than the calculated value of 3.255, e Alternative hypothesis is accepted.

Table 3 Needs for adoption of Electric Passenger cars

Factors affecting Adoption of Electric Passenger Cars	Calculated Garret Score					Grand Total	Average Score	Rank
	Priority 1	Priority 2	Priority 3	Priority 4	Priority 5			
Reaping Economic Advantage	2814	1980	720	136	14	5664	56.64	1
Environmental Aspects	2278	2090	720	340	14	5442	54.42	2
Craze for New technology/Product	1340	880	1800	544	56	4620	46.2	3
Social pressure to go for green products	268	440	540	2244	70	3562	35.62	4

Table 3.1 Factors affecting preference for the Adoption of Electric Cars- District Wise

	Observation	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Thrissur	50	1.66	.798	.113	1.43	1.89	1	3
Trivandrum	50	1.46	.542	.077	1.31	1.61	1	3
Total	100	1.56	.686	.069	1.42	1.70	1	3

Table 3.1.1 Factors affecting preference for the Adoption of Electric Cars- District wise

	Sum of Squared	Df	Mean Square	F	Sig
Between Groups	1.000	1	1.000	2.147	.146
Within Groups	45.640	98	.466		
Total	46.640	99			

Since the calculated F value is less than table value of 3.94 for (1,98) level of independence and at 5% significance level, the alternative hypotheses is rejected.

Table 3.2 Factors affecting preference for the Adoption of Electric Cars-Residential Status

	Observation	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Rural	41	1.51	.597	.093	1.32	1.70	1	3
Urban	59	1.59	.746	.097	1.40	1.79	1	3
Total	100	1.56	.686	.069	1.42	1.70	1	3

Primary Data**Table 3.2 Factors affecting preference for the Adoption of Electric Cars-Residential Status**

	Sum of Squared	df	Mean Square	F	Sig.
Between Groups	.159	1	.159	.335	.564
Within Groups	46.481	98	.474		
Total	46.640	99			

Alternative hypothesis is rejected at 5% significance level for (1,98) level of independence because of the calculated value of F is less than the table value of 3.94.

Table 3.3 Factors affecting preference for the Adoption of Electric Cars- Gender Wise

	Observation	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Male	77	1.64	.705	.080	1.48	1.80	1	3
Female	23	1.30	.559	.117	1.06	1.55	1	3
Total	100	1.56	.686	.069	1.42	1.70	1	3

Primary Data**Table 3.3.1 Factors affecting preference for the Adoption of Electric Cars- Gender Wise**

	Sum of Squared	df	Mean Square	F	Sig.
Between Groups	1.952	1	1.952	4.281	.041
Within Groups	44.688	98	.456		
Total	46.640	99			

Calculate F value is higher than the table value of 3.94 for (1,98) level of independence at 5% significance level, Hence Alternative hypothesis is accepted.

Table 3.4 Factors affecting preference for the Adoption of Electric Cars- Age wise

	Observation	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
31-40 Years	24	1.38	.647	.132	1.10	1.65	1	3
41-50 Years	36	1.56	.695	.116	1.32	1.79	1	3
More than 50 Years	40	1.68	.694	.110	1.45	1.90	1	3
Total	100	1.56	.686	.069	1.42	1.70	1	3

Primary Data**Table 3.4.1 Factors affecting preference for the Adoption of Electric Cars-Age wise**

	Sum of Squared	df	Mean Square	F	Sig.
Between Groups	1.351	2	.676	1.447	.240
Within Groups	45.289	97	.467		
Total	46.640	99			

For (2,97) level of independence and at 5% significance level, Alternative hypothesis is rejected because the calculated F is higher than the table value of 3.09.

Table 3.5 Factors affecting preference for the Adoption of Electric Cars-Education wise

	Observation	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Below Matriculation	2	1.50	.707	.500	-4.85	7.85	1	2
Matriculation Higher	16	1.69	.704	.176	1.31	2.06	1	3
Secondary Graduation	16	1.75	.775	.194	1.34	2.16	1	3
Diploma	42	1.57	.668	.103	1.36	1.78	1	3
Post Graduation	4	1.50	.577	.289	.58	2.42	1	2
Total	20	1.30	.657	.147	.99	1.61	1	3
	100	1.56	.686	.069	1.42	1.70	1	3

Primary Data**Table 3.5.1 Factors affecting preference for the Adoption of Electric Cars-Education wise**

	Sum of Squared	df	Mean Square	F	Sig.
Between Groups	2.217	5	.443	.938	.460
Within Groups	44.423	94	.473		
Total	46.640	99			

At 5% significance level and for (5,94) level of independence table value of F is 2.31 which is higher than the calculated value, Alternative hypothesis is rejected.

Table 3.6 Factors affecting preference for the Adoption of Electric Cars-Occupation wise

	Observation	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Private Employee	44	1.39	.655	.099	1.19	1.59	1	3
Govt. Employee	12	2.17	.577	.167	1.80	2.53	1	3
Self-Employed	16	1.63	.719	.180	1.24	2.01	1	3
Agriculturist	2	1.50	.707	.500	-4.85	7.85	1	2
Business	8	1.63	.744	.263	1.00	2.25	1	3
Professionals	10	1.30	.483	.153	.95	1.65	1	2
Retired/Pensioners	8	1.75	.707	.250	1.16	2.34	1	3
Total	100	1.56	.686	.069	1.42	1.70	1	3

Primary Data**Table 3.6.1 Factors affecting preference for the Adoption of Electric Cars-Occupation wise**

	Sum of Squared	df	Mean Square	F	Sig.
Between Groups	6.817	6	1.136	2.653	.020
Within Groups	39.823	93	.428		
Total	46.640	99			

At 5% Significance level and (6,93) level of independence; Table value of F is 2.20. Since the Calculate value is Higher than the table value, Alternative hypothesis is accepted.

7. Findings

All the respondents are APL Non- Priority Ration Card Holders. 77% Respondents are Male and followed by 23% of Female. 44% of the Respondents are from private sector followed by self- employed. **About the Awareness Level of Customers**, Researcher could find out Majority of the respondents (68%) use petrol cars and 4% is having Electric Passenger cars and 9% is using hybrid cars of Electric with petrol. Majority respondents (55%) use the cars daily, while rest is used for trips/travelling. 100% customers are aware about Electric Passenger cars with varying degree. Majority of the respondent came to know about E- Passenger Cars from Advertisement and followed by friends/relatives and Electric car Owners. Social media ranks first with 54% followed by Television Advertisement with 24% for the source of information about Electric Passenger Cars. Most heard Electric car company is Tata (54%) followed by Hyundai (8%) A cumulative percentage of 62% respondents agree that the Electric Passenger Cars will can satisfy their travel purpose while 10% disagree with that. **Based on the ANOVA**; there is no solid relationship between respondents from different districts, Residential status, Gender, age, Education, occupation and awareness level about Electric Passenger cars. Based on ANOVA; there is solid relationship between respondents' awareness level about Electric passenger cars and Its adoption.

The study could reveal the following **Needs and preference** of customers: While need and expectation about Electric Passenger Cars are formed by word of mouth from relatives/friends and advertisement stands at second place. Respondents preferred Electric Passenger Car segments are Sedan with 60% followed by SUV with 30%. 80% respondents opine that Electric Passenger Cars will be Economical while 10% disagree with that. Based on the Garret Ranking Method; The primary consideration for embracing electric cars is to reap economic benefit and environmental concerns only stands at second position. Based on the ANOVA; there is no solid relationship between respondents from different Districts, Residential Status, Age, Education and factors affecting in the adoption of Electric Passenger cars. Based on the ANOVA; there is solid relationship between respondents' Gender, Education and factors affecting in the adoption of Electric Passenger cars.

8. Implications:

India Government and various state Governments are promoting Electric Vehicles for promoting clean environment, for the usage of renewable energy resources and for the sustainable development. But as per the data collected from the respondents; customers give more concern for the economic advantages of E-cars than environmental concerns. So, Government and companies has to think about and take Steps to make Electric passenger cars as a cost-effective alternative and also has to reposition in the minds of the customers for the wider adoption.

9. Scope of the study

In this study respondents were classified by district, Residential status, Gender, age, Education and occupation wise. This study aimed at understanding the awareness level of respondents and assessed its influence on the adoption. It also

tried to understand the need and preference of the potential customers of Kerala toward the adoption of Electric passenger cars. This study tried to include the variables which affects the perception and need in the buying behaviour of respondents. This study will provide insights in to the expectations of respondents which will help to shape the strategies for the wider adoption of Electric passenger cars.

10. Conclusion

To conclude, through an in-depth analysis of consumer attitudes, preferences and readiness level of potential customers is a need of the hour to gain valuable insights that significantly influence in the adoption of E- Passenger Cars in Kerala. The findings of this study are only confined to two districts of Kerala; a broad study about the Kerala Market will contribute practical suggestions for the policy makers, sellers and to various stakeholders.

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