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FACTORS AFFECTING CONSUMER SWITCHING BEHAVIOUR FROM INTERNAL COMBUSTION ENGINE, VEHICLES (ICEVS) TO ELECTRIC VEHICLES (EVS) IN PAKISTAN: A CASE STUDY ON THE AUDI E - TRON

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ABSTRACT

The purpose of this research paper was to test the factors affecting consumer switching behaviour from Internal Combustion Engine Vehicles to Electric Vehicles in Pakistan. Consumer switching behaviour is one of the most thoughtful aspect for every organization. One of the many variables that influence consumer switching behaviour, is innovation. The components related to electric cars taken into consideration for this study included the fuel costs, technology, infrastructure, government regulations and green transportation. Primary as well as secondary sources were utilized to collect data. The primary data was collected through close-ended questionnaire, from a sample of 210 consumers of automobile sector. Secondary data was gathered from previous research available on to the topic of this study. The data analysis revealed that electric cars had a major influence on consumer switching behaviour from internal combustion engine vehicles. All five components of electric vehicles had a significant impact on consumer switching behaviour. Recommendations were also made for manufacturers to take advantage of electric vehicles to produce automobile models that were updated and electric.

***Keywords**: Consumer Switching Behaviour, Internal Combustion Engine Vehicles, Electric Vehicles, Fuel Costs, Technology, Infrastructure, Government Regulations, Green Transportation.*

INTRODUCTION

Background of the Study

The current research explicitly discusses upon the impact of independent variables related to electric vehicles on the car manufacturers of Pakistan. There

could be many factors that could impact the buying behavior of consumers shifting from internal combustion engine vehicles to electric vehicles, but the following variables have been selected for my current study: Fuel Cost, Green Transportation, Technology, Infrastructure, and Government Regulations.

All-electric luxury crossovers that straddle the line between the current and the future are the 2021 Audi E-tron and E-tron Sportback. Although their all-wheel-drive battery-powered powertrains offer up to 222 miles of approximate EPA driving range and foreshadow the demise of internal-combustion engines, their refined driving styles and serene interior spaces are close to those currently occupying showrooms in non-electric Audi models. These familiar features and their conventional exterior designs make the E-trons look less innovative than the Jaguar I-Pace and Tesla Model X luxury EV rivals. Although the E-tron and E-tron Sportback 2021 have shorter driving ranges than the Jaguar or Tesla, Audi claims that this more pragmatic approach would make it easier for consumers to move from conventional gas-fed models to all-electric vehicles.

SCOPE OF THE STUDY

In today's automobile market of Pakistan, there is a high competition; so launching a completely upgraded version of a vehicle for Audi here will be a great challenge. This study is being carried out to figure out the factors affecting consumer switching behaviour from Internal Combustion Engine, Vehicles (ICEVs) to Electric Vehicles (EVs) in Pakistan: focusing on the Audi E- Tron in specific.

OBJECTIVES

1. To determine the impact of Electric Vehicles on Internal Combustion Engine Vehicles (ICEVs).
2. To analyse the impact of Fuel Costs on Internal Combustion Engine Vehicles (ICEVs).
3. To examine the impact of Technology on Internal Combustion Engine Vehicles (ICEVs).
4. To determine the impact of Infrastructure on Internal Combustion Engine Vehicles (ICEVs).
5. To examine the impact of Government Regulations on Internal Combustion Engine Vehicles (ICEVs).
6. To investigate the impact of Green Transportation on Internal Combustion Engine Vehicles (ICEVs).

RESEARCH QUESTIONS

1. What is the impact of Electric Vehicles on Internal Combustion Engine Vehicles (ICEVs)?
2. What is the impact of Fuel Costs on Internal Combustion Engine Vehicles (ICEVs)?
3. What is the impact of Technology on Internal Combustion Engine Vehicles (ICEVs)?
4. What is the impact of Infrastructure on Internal Combustion Engine Vehicles (ICEVs)?
5. What is the impact of Government Regulations on Internal Combustion Engine Vehicles (ICEVs)?
6. What is the impact of Green Transportation on Internal Combustion Engine Vehicles (ICEVs)?

HYPOTHESES OF THE STUDY

The research hypotheses for the study are:

H1: Electric Vehicles have a significant impact on Internal Combustion Engine Vehicles (ICEVs).

H2: Fuel Costs have a significant impact on Internal Combustion Engine Vehicles (ICEVs).

H3: Technology has a significant impact on Internal Combustion Engine Vehicles (ICEVs).

H4: Infrastructure has a significant impact on Internal Combustion Engine Vehicles (ICEVs).

H5: Government Regulations have a significant impact on Internal Combustion Engine Vehicles (ICEVs).

H6: Green Transportation has a significant impact on Internal Combustion Engine Vehicles (ICEVs).

REVIEW OF THE LITERATURE

Consumer Switching Behaviour

If you look at porter's analysis of five forces, industries such as the automotive industry seem particularly resistant to the challenge of fresh entry and upstart. While industry innovation does not always need new entrants (incumbents can and will always innovate whenever they can), new entrants often view and accept industries in a completely different way. Yet it is more difficult to reach those sectors that has the potential to impact performance in

a sector. If there are high barriers to entry, then you don't see new entrants, and you don't see creativity. It's actually that what drives creativity is a fresh entrant (Stringham, Miller, & Clark, 2015; Gilal, et al., 2020).

Electric Vehicles

Electric vehicles are lacking behind a resupplying system and a supply and facility system as opposed to gas-powered vehicles. An introduction of an electric automobile relates to in front of linkage ways related to electric vehicles, like the requirement for fresh re-charging pumps related to the refilling pumps that gasoline driven automobiles previously have and great obstacles to admission to fix issues using the language of possible maritime failure, like the great permanent prices of implementing innovative technologies and structure manufacturing capacities which are by this time open to incumbents (Stringham, Miller, & Clark, 2015; Memon, et al., 2021).

Vehicle is significant in this part. Price affordability and driver comfort play a vital role in electric vehicle introduction. Tricycle producers have previously discovered methods of handling batteries created locally. The implementation of EVs can be considered by cities that face the biggest test of making environment clean and admission to transport. It is clear that a large portion of the electric vehicle situation has to be developed nation-wide, but states could also perform a significant part in the evolution to electric vehicles. While the demand for electric vehicles is yet in the developing phases of growth, businesses and communities across the globe are ready to rethink. Electric vehicles possess the ability to minimize or at minimum adequate the rise in energy prices, resulting in higher overall electricity demand (Pandey, Manocha, & Saini, 2020).

Fuel Costs

It is simpler and less costly in the long run to buy and operate electric vehicles. EV comprises few elements than a traditional petrol car that makes electric vehicles significantly cheaper for maintenance than petrol. As electric vehicle does not comes with an engine and have fewer parts, like traditional vehicles, they do not generate noise. As a result, it helps to decrease emissions from sound. Additional benefit of EVs is that, compared to fossil fuel cars, they deliver a much smoother ride with greater acceleration (Pandey, Manocha, & Saini, 2020; XiMei, et al., 2016).

Although electric cars do not inherently decrease overall fossil fuel consumption or emissions, they have the potential to do so, especially if lower

emission sources such as nuclear power become more widespread. The well-to-wheel electricity emission equivalents differ depending on how electricity is produced and when one draws from a grid, and the storage of electric car batteries also has the ability to draw from the grid at non-peak hours or to use intermittent energy sources such as wind or solar more effectively (Stringham, Miller, & Clark, 2015).

Technology

It is known that engine power does not have a huge impact when dealing with solely electric vehicles; the implementation of modern car technology relies on improved driving range and availability of charging stations as well as successful policy incentives (Bahamonde-Birke & Hanappi, 2015).

Each technology is delivered with its pros and cons. Let's take a look at the other side of electric cars, then. It take between 30 minutes (with a fast charge) and 24 hours to charge the Electric vehicles, depending on the battery capacity and the motors. It would take about six hours if the car has to be fully charged. A problem that further affects the efficiency of electric cars is the shorter battery life. The inadequate supply of raw materials, which raises battery costs, is another important issue (Pandey, Manocha, & Saini, 2020).

Infrastructure

Private investors are less likely to make huge investments until there is a considerable rise in demand for these vehicles. Consumers, on the other hand, are often hesitant to purchase an Electric Vehicle Plug (PEV) unless they feel they will find a suitable charging station (Pandey, Manocha, & Saini, 2020).

Government Regulations

Several governments, including Japan and members of the European Union, have adopted policies encouraging electro mobility along this path, ranging from the construction of charging networks to free or reduced price access to express lanes and parking facilities (Bahamonde-Birke & Hanappi, 2015).

Green Transportation

As well as government guidance, both the coming shortage and the negative environmental effects of fossil fuel resources are pushing the automotive industry to concentrate on alternative, more powerful and safer driving force technologies. Moreover, a growing number of stringent regulations on CO2 emissions, followed by rising fuel prices, have contributed to a major shift in the perception of some characteristics of vehicles. Consumers are calling

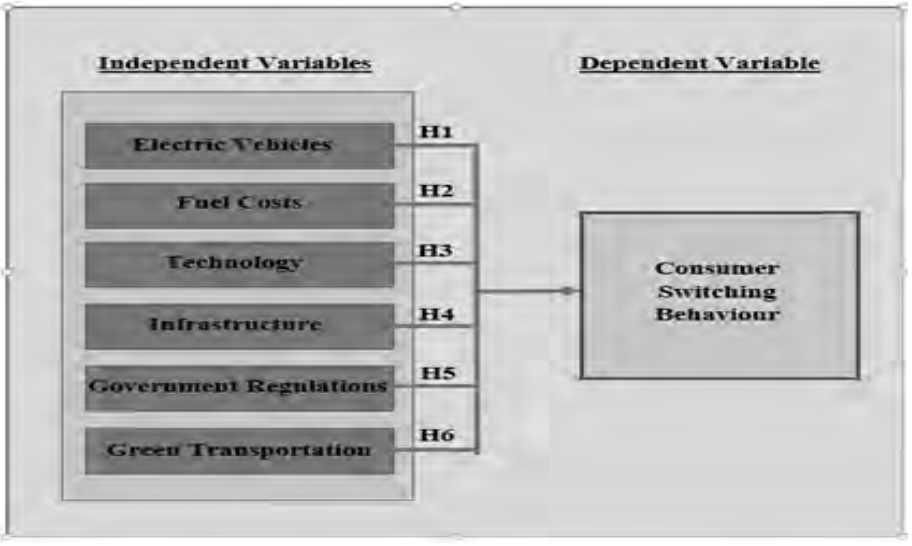
for lower emissions, more fuel efficient and smaller vehicles, and the general public. This change in attitude has not only led to major shifts in market share, but has also favored more productive technologies. The introduction of electric vehicles, however, is not only motivated by economic benefits, but also by people's environmental concerns. Although some scholars have questioned the efficacy of electro mobility in reducing CO2 emissions, some studies indicate that a positive attitude to the environment appears to increase the willingness to pay for electro mobility. (Bahamonde-Birke & Hanappi, 2015).

METHODOLOGY

The closed-ended questionnaire prepared on Google Forms was distributed among the customers of the automobile sector in Karachi, Pakistan to see the factors that have an influence on their switching behaviour from internal combustion engine vehicle to electric vehicle. The study a quantitative analysis used a deductive approach and, since it described the principle in depth, it was considered explanatory. The population size of the study was 210 and the sample comprises of customers of different automobile brands available in Sindh, Pakistan. The demographic of this research focused on adult customers who could purchase an automobile or already possessed it. Both, males, and females were respondents of this research. The sampling technique used was convenience sampling because the data was gathered upon the convenience of the researcher.

CONCEPTUAL FRAMEWORK

Figure 1: Conceptual Framework



ANALYSIS AND RESULTS

The results of the analytical tests performed on the gathered data were presented here. These tests began with the demographic distribution of the collected sample, followed by the reliability analysis of the data collection instrument. In addition, to determine the influence of the independent variables on the dependent variable, correlation and regression analysis were carried out. The sample size of this data is 210 customers from Sindh, Pakistan who purchase the automobiles. The results then generalize to the entire population of Pakistan who are buyers of automobiles.

Demographic Analysis

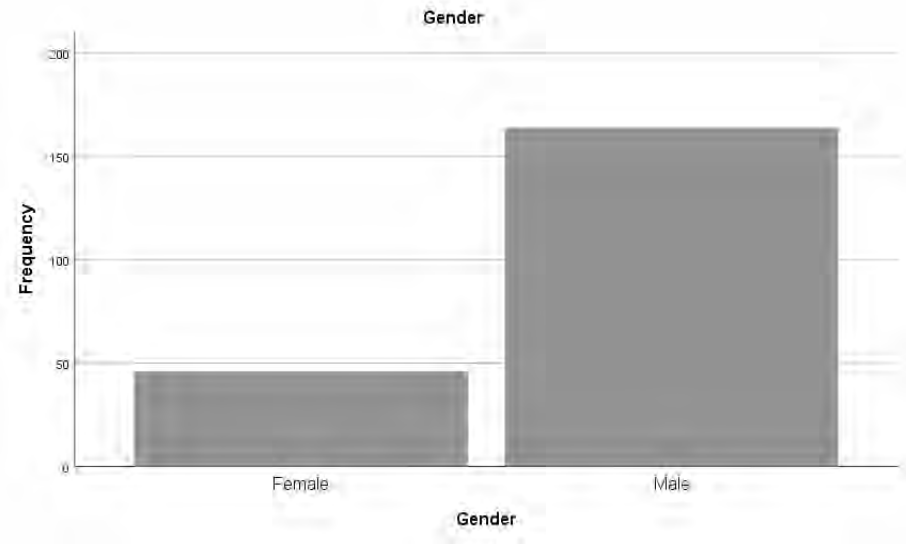
The sample is classified according to categories such as gender, age, educational background, occupation, and family monthly income. Table 1 below indicates the distribution of the sample according to the respondents' gender.

Table 1: Gender of the Respondents

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	46	21.9	21.9	21.9
	Male	164	78.1	78.1	100.0
	Total	210	100.0	100.0	

Figure 2: Gender of the Respondents



The above table shows that out of a total of 210 respondents selected for the study, 164 of them were males, comprising of 78.1 percent, and 46 of them were females, comprising of 41.9 percent. The results of the survey shows opinions from both the genders. Further, the data is graphically represented in Figure 2 above.

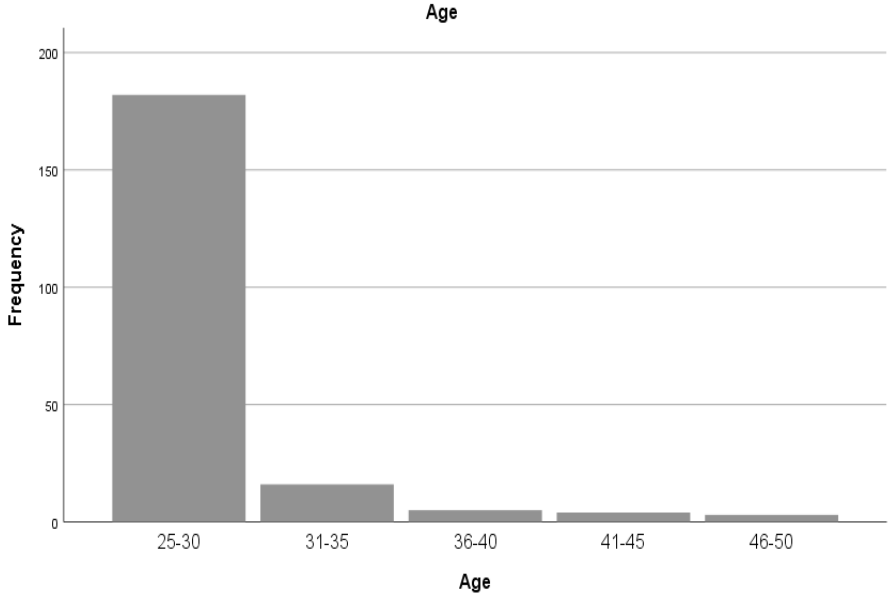
Table 2 shows the distribution according to the respondents' age bracket.

Table 2: Age of the Respondents

Age

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	25-30	182	86.7	86.7	86.7
	31-35	16	7.6	7.6	94.3
	36-40	5	2.4	2.4	96.7
	41-45	4	1.9	1.9	98.6
	46-50	3	1.4	1.4	100.0
	Total	210	100.0	100.0	

Figure 3: Age of the Respondents



The results show that respondents aged between 25 and 30 years comprised of 86.7 percent, being the majority, whereas those between the ages 31 and 35 years comprised of 7.6 percent; those aged between 36 and 40 years were 2.4 percent, whereas those between ages 41 and 45 years comprised of 1.9 percent and seniors aged over 46 years comprised of only 1.4 percent of the total sample. Further, the data is graphically represented in Figure 3 above.

Table 3 indicates the distribution of the sample based on the respondents' educational backgrounds.

Table 3: Education of the Respondents

Education

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Graduate	130	61.9	61.9	61.9
	Higher secondary	1	.5	.5	62.4
	Post Graduate	42	20.0	20.0	82.4
	Undergraduate	37	17.6	17.6	100.0
	Total	210	100.0	100.0	

Figure 4: Education of the Respondents

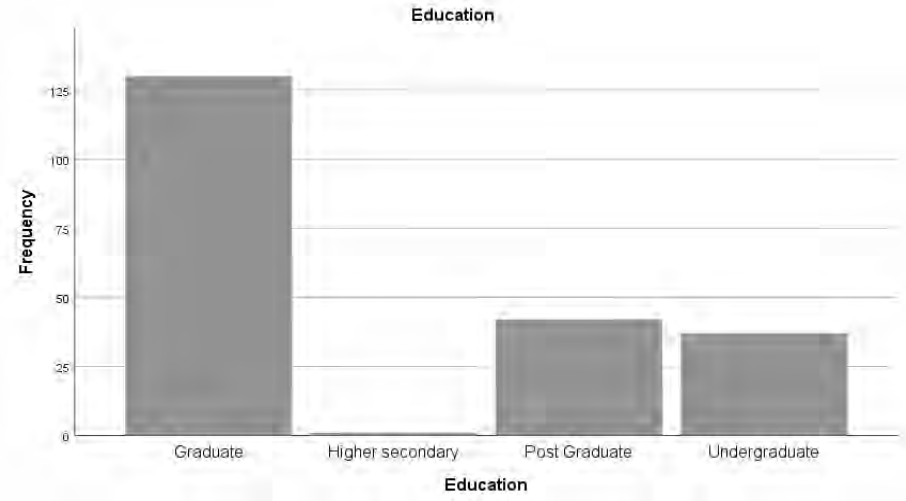


Table 3 represents that 17.6 percent of the respondents were undergraduates, whereas graduates comprised of a majority of 61.9 percent, and 20 percent of them were post graduates. Whereas, 0.5 percent of the total respondents were from high school. The data is graphically represented in Figure 4 above.

Table 4 represents the distribution of the respondents' based on their occupation.

Table 4: Occupation of the Respondents

Occupation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Business	103	49.0	49.0	49.0
	House wife	1	.5	.5	49.5
	Job	39	18.6	18.6	68.1
	Student	67	31.9	31.9	100.0
	Total	210	100.0	100.0	

Figure 5: Occupation of the Respondents

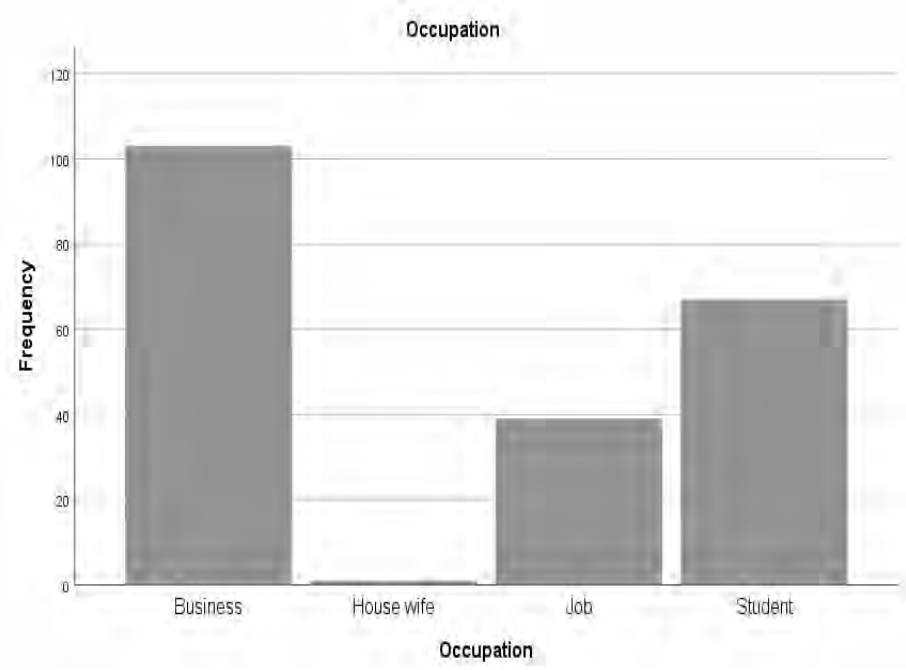


Table 4 represents that 31.9 percent of the respondents were full time students, while 49 percent were business owners, 318.6 percent were full time employees, and 0.5 percent had other occupations. Further, the data is graphically represented in Figure 5 above.

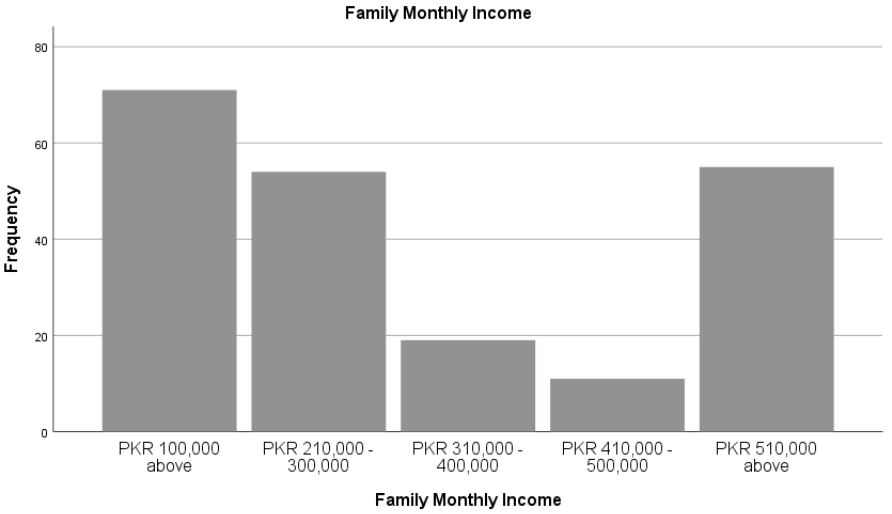
Table 5 provides information on the distribution of the sample according to the respondents' family monthly income.

Table 5: Family Monthly Income of the Respondents

Family Monthly Income

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	PKR 100,000 above	71	33.8	33.8	33.8
	PKR 210,000 - 300,000	54	25.7	25.7	59.5
	PKR 310,000 - 400,000	19	9.0	9.0	68.6
	PKR 410,000 - 500,000	11	5.2	5.2	73.8
	PKR 510,000 above	55	26.2	26.2	100.0
	Total	210	100.0	100.0	

Figure 6: Family Monthly Income of the Respondents



The results show that a majority of the respondents, 33.8 percent had a family monthly income above Rs. 100,000. Those with a family income between Rs. 210,000 and Rs. 300,000 comprised of 25.7 percent of the sample. Those with a family income between Rs. 310,000 and Rs. 400,000 comprised of 9 percent of the sample. Those with a household income between Rs. 410,000 and Rs. 500,000 comprised of 5.2 percent of the sample. Lastly, those with a household income greater than Rs. 500,000 comprised of 26.2 percent of the sample.

AWARENESS OF ELECTRIC VEHICLES

With the help of the questionnaire, consumers were asked about their knowledge about Electric Vehicles. A few questions regarding awareness about Electric Vehicles were inquired about in this section, the results of those are presented below.

Table 6: Awareness of Electric Vehicles

Are you aware of Electric Vehicles?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	14	6.7	6.7	6.7
	Yes	196	93.3	93.3	100.0
	Total	210	100.0	100.0	

Figure 7: Awareness of Electric Vehicles

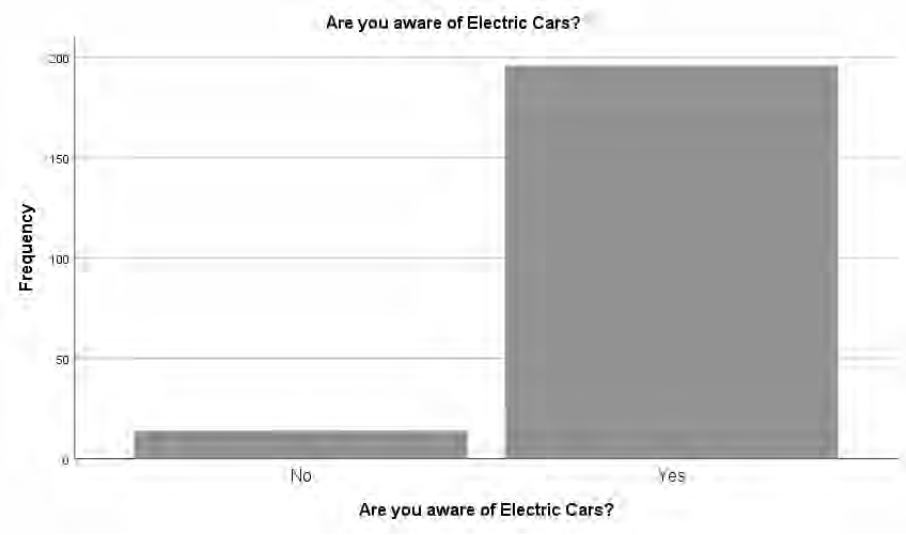


Table 7: Level of Awareness of Electric Vehicles

If yes, indicate your level of awareness about Electric Vehicles

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	High level of awareness	82	39.0	39.0	39.0
	Low level of awareness	45	21.4	21.4	60.5
	Medium level of awareness	83	39.5	39.5	100.0
	Total	210	100.0	100.0	

Figure 8: Level of Awareness of Electric Vehicles

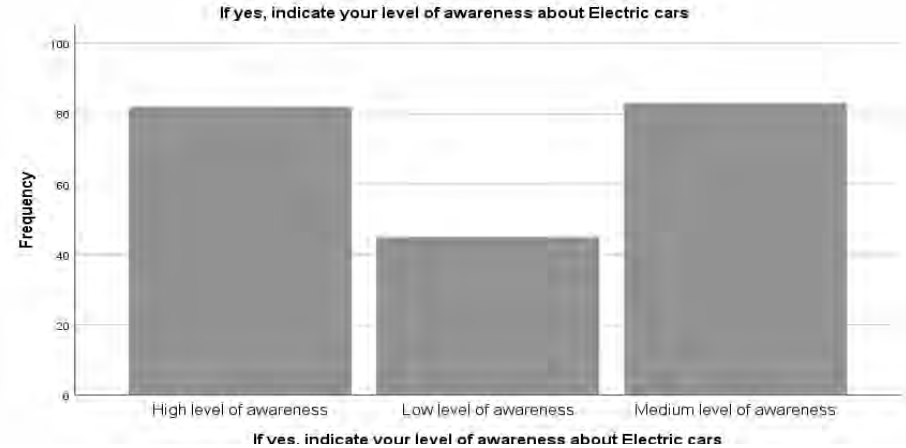


Table 8: Preference of buying Electric Vehicles

Would you prefer buying an electric car instead of an internal combustion engine vehicle?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Maybe	5	2.4	2.4	2.4
	No	69	32.9	32.9	35.2
	Yes	136	64.8	64.8	100.0
	Total	210	100.0	100.0	

Figure 9: Preference of buying Electric Vehicles

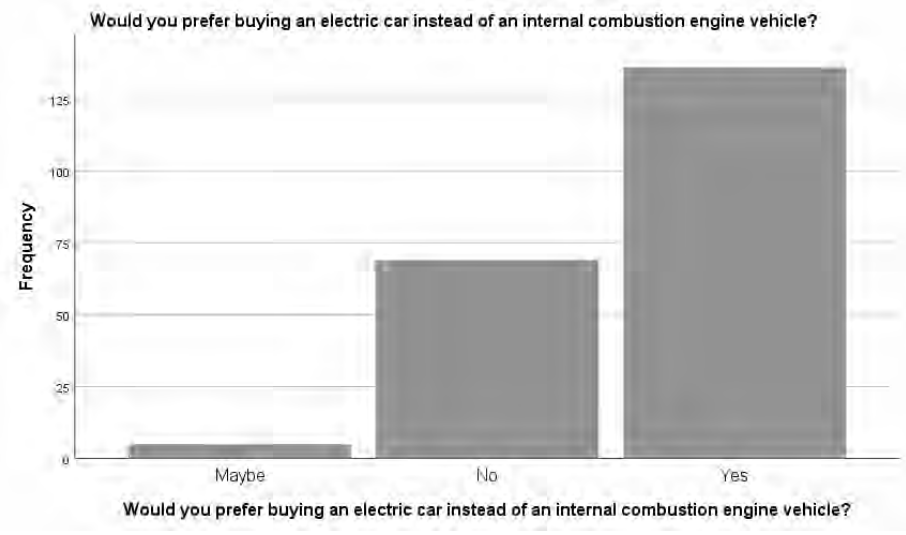
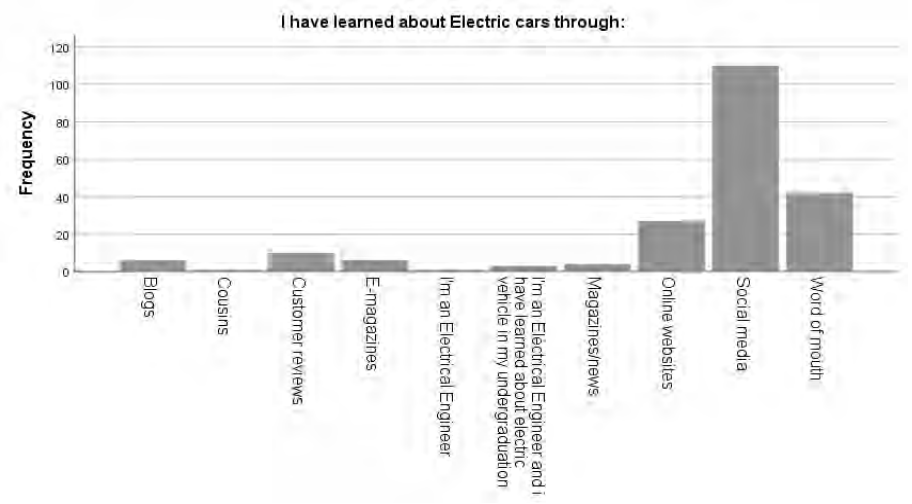


Table 9: Learning about Electric Vehicles

I have learned about Electric Vehicles through

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Blogs	6	2.9	2.9	2.9
	Cousins	1	.5	.5	3.3
	Customer reviews	10	4.8	4.8	8.1
	E-magazines	6	2.9	2.9	11.0
	I'm an Electrical Engineer	1	.5	.5	11.4
	I'm an Electrical Engineer and I have learned about electric vehicle in my undergraduation	3	1.4	1.4	12.9
	Magazines/news	4	1.9	1.9	14.8
	Online websites	27	12.9	12.9	27.6
	Social media	110	52.4	52.4	80.0
	Word of mouth	42	20.0	20.0	100.0
	Total	210	100.0	100.0	

Figure 10: Learning about Electric Vehicles



Based on the above tables and graphs, the level of awareness, consumer preferences and knowledge about the Electric vehicles could be analysed which will help in analysing the results of the tests conducted on SPSS.

RELIABILITY ANALYSIS

For this analysis, this section describes the reliability of the instrument used to collect data. The reliability is assessed before the key data is collected, through the internal accuracy of the data collected as a pilot analysis.

For this purpose, a pilot study sample of 31 respondents was collected and the reliability was measured using the Cronbach's Alpha test done using SPSS software. The results are shown below in Table 10.

Table 10: Reliability Analysis

Variables	Items	Cronbach's Alpha
Electric Vehicles	8	0.697
Fuel Costs	2	0.694
Technology	6	0.740
Infrastructure	3	0.705
Government Regulations	2	0.764
Green Transportation	3	0.884
Consumer Switching Behaviour	5	0.639
ALL VARIABLES	29	0.888

The above table represents the reliability factor loading of each variable of this study along with the cumulative reliability of all variables. Based on the results, the Cronbach's Alpha for "Electric Vehicles" came out to be 0.697 across 8 questions. The Cronbach's

Alpha for "Fuel Costs" was 0.694 across 2 questions. The Cronbach's Alpha for "Technology" was 0.740 across 6 questions. The Cronbach's Alpha for "Infrastructure" was 0.705 across 3 questions. The Cronbach's Alpha for "Government Regulations" was 0.764 across 2 questions. The Cronbach's Alpha for "Green Transportation" was 0.884 across 3 questions. The Cronbach's Alpha for "Consumer Switching Behaviour" was 0.639 across 5 questions. The total number of questions was 29 for which the cumulative Cronbach's Alpha came out to be 0.888. Since all these Cronbach's Alpha values were greater than the threshold of 0.6. It is concluded that the entire questionnaire has internal consistency and is accurate. The research will now proceed into studies of correlation and regression.

CORRELATION ANALYSIS

Correlation analysis is used to measure and determine the strength of a relationship between continuous variables. There are several methods of quantifying correlation values; the investigator will use the Pearson's Correlation model for the current study. This is a numerical measure given by Karl Pearson of the relation between two variables. The correlation coefficient is expressed by the word 'r' and varies between -1 and +1. The association is then verified using the p-value associated with it for meaning. The p-value should be less than 0.05 (5 percent) at a confidence interval of 95 percent, in order to be able to dismiss the null hypothesis associated with the variable. The relationship between all the variables selected for this study is represented by the Pearson correlation matrix below.

Table 11: Correlation Analysis

Correlations

		Electric Vehicles	Fuel Costs	Tech-nology	Infra-structure	Government Regulations	Green Tran-sportation	Consumer Switching Behaviour
Electric Vehicles	Pearson Correlation	1	.494**	.489**	.043	.260**	.283**	.494**
	Sig. (2-tailed)		.000	.000	.539	.000	.000	.000
	N	210	210	210	210	210	210	210
Fuel Costs	Pearson Correlation	.494**	1	.680**	.448**	.622**	.648**	.581**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000
	N	210	210	210	210	210	210	210

Technology	Pearson Correlation	.489**	.680**	1	.357**	.660**	.767**	.751**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000
	N	210	210	210	210	210	210	210
Infrastructure	Pearson Correlation	.043	.448**	.357**	1	.633**	.586**	.441**
	Sig. (2-tailed)	.539	.000	.000		.000	.000	.000
	N	210	210	210	210	210	210	210
Government Regulations	Pearson Correlation	.260**	.622**	.660**	.633**	1	.796**	.601**
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000
	N	210	210	210	210	210	210	210
Green Transportation	Pearson Correlation	.283**	.648**	.767**	.586**	.796**	1	.658**
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000
	N	210	210	210	210	210	210	210
Consumer Switching Behaviour	Pearson Correlation	.494**	.581**	.751**	.441**	.601**	.658**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	
	N	210	210	210	210	210	210	210

***Correlation is significant at the 0.01 level (2-tailed).*

The above table shows the results of the Pearson's correlation analysis performed using SPSS software. According to the results, the correlation coefficient of "Electric Vehicles" on "Consumer Switching Behaviour" is 0.494 with a p-value of 0.000, indicating that there is a significant positive association between the two variables of 49.4%. The correlation coefficient of "Fuel Costs" on "Consumer Switching Behaviour" is 0.581 with a p-value of 0.000, indicating that there is a significant positive association between the two variables of 58.1%. The correlation coefficient of "Technology" on "Consumer Switching Behaviour" is 0.751 with a p-value of 0.000, indicating that there is a significant positive association between the two variables of 75.1%. The correlation coefficient of "Infrastructure" on "Consumer Switching Behaviour" is 0.441 with a p-value of 0.000, indicating that there is a significant positive association between the two variables of 44.1%. The correlation coefficient of "Government Regulations" on "Consumer Switching Behaviour" is 0.601 with a p-value of 0.000, indicating that there is a significant positive association between the two variables of 60.1%. The correlation coefficient of "Green Transportation" on "Consumer Switching Behaviour" is 0.658 with a p-value of 0.000, indicating that there is a significant positive association between the two variables of 65.8%. Based on these results all alternate hypotheses (H_1-H_6) are accepted.

REGRESSION ANALYSIS

In order to evaluate the causal relation between the independent variables and the dependent variable, regression analysis is used. Regression analysis

is used in particular to figure out how much change happens in the dependent variable due to a difference in one predictor, while other independent variables are kept stable.

The analysis is divided into three parts: the first part is the model summary, followed by the ANOVA and the coefficients of regression. Details of these are given below.

Model Summary

Table 12: Regression Analysis: Model Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.796[a]	.634	.623	2.13462

a. Predictors: (Constant), Green Transportation, Electric Vehicles, Infrastructure, Fuel Costs, Government Regulations, Technology

The model description decides the model's fitness. This illustrates how accurately the regression line in the scatter diagram reflects the actual results. The R-square value indicates the potential of the regression line in the dependent variable to account for the total variance.

Based on the results in the above table, the R-square value of 0.634 tells us that 63.4% variance in Consumer Switching Behaviour can be explained by the predicting variables affecting it. The R value of 0.796 shows that there is a high correlation between the observed and predicted values of the dependent variable.

ANOVA

Table 13: Regression Analysis: ANOVA

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1601.006	6	266.834	58.560	.000[b]
	Residual	924.990	203	4.557		
	Total	2525.997	209			

a. Dependent Variable: Consumer Switching Behaviour
b. Predictors: (Constant), Green Trasnportation, Electric Vehicles, Infrastructure, Fuel Costs, Government Regulations, Technology

ANOVA stands for variance analysis. In the dependent variable, the total variance (sum of squares) is bifurcated into the regression sum of squares

representing the variance caused by the independent variables, and into the residual sum of squares representing the variance not caused by the independent variables. In the table above, it can be found that the variance induced by this study's independent variables is a large part of the overall variance. This demonstrates that strong variables are the independent variables selected for this analysis. The df shows the degrees of liberty associated with the variance's source. The total variance has N-1 degrees of freedom; hence it is 209 (N=210). Including the y-intercept, there are seven coefficients in the regression equation. Therefore, the degrees of freedom associated with the regression are 7-1=6. The regression means square value of 266.834 is calculated by dividing the regression sum of squares by the degrees of freedom. Similarly, this is how you measure the residual mean square. The F-statistic is the mean square of regression, divided by the residual mean square. According to the results provided above, the F-value of 58.560 is considerably higher with associated p-value of 0.00, which is less than 0.05. This indicates that the knowledge is statistically important. An F-value that is greater than 4 is usually considered to be statistically important.

Coefficients

Table 14: Regression Analysis: Coefficients

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.425	1.224		5.981	.000
	Electric Vehicles	.190	.045	.222	4.219	.000
	Fuel Costs	.109	.162	.044	6.674	.004
	Technology	.446	.068	.509	6.542	.000
	Infrastructure	.375	.115	.191	3.258	.001
	Government Regulations	.124	.200	.048	5.622	.003
	Green Transportation	.140	.146	.083	6.957	.002

a. Dependent Variable: Consumer Switching Behaviour

The table of coefficients reflects each independent variable's individual effect on the dependent variable. A ß (beta) denotes the regression coefficient, indicating the strength of the independent variable's effect on the dependent variable. According to the results, "Electric Vehicles" has a regression coefficient of 0.190 with "Consumer Switching Behaviour". This means that an increase of 1 unit in "Electric Vehicles" will bring about an increase of 0.190 units in "Consumer Switching Behaviour". The t-value associated

with this relationship is 4.219, which is greater than 2, with a p-value of 0.00, which is less than 0.05. This indicates that "Electric Vehicles" has a significant impact on "Consumer Switching Behaviour".

"Fuel Costs" has a regression coefficient of 0.109 with "Consumer Switching Behaviour". This means that an increase of 1 unit in "Fuel Costs" will bring about an increase of 0.109 units in "Consumer Switching Behaviour". The t-value associated with this relationship is 6.674, which is greater than 2, with a p-value of 0.04, which is less than 0.05. This indicates that "Fuel Costs" has a significant impact on "Consumer Switching Behaviour".

"Technology" has a regression coefficient of 0.446 with "Consumer Switching Behaviour". This means that an increase of 1 unit in "Technology" will bring about an increase of 0.446 units in "Consumer Switching Behaviour". The t-value associated with this relationship is 6.542, which is greater than 2, with a p-value of 0.00, which is less than 0.05. This indicates that "Technology" has a significant impact on "Consumer Switching Behaviour".

"Infrastructure" has a regression coefficient of 0.375 with "Consumer Switching Behaviour". This means that an increase of 1 unit in "Infrastructure" will bring about an increase of 0.375 units in "Consumer Switching Behaviour". The t-value associated with this relationship is 3.245, which is greater than 2, with a p-value of 0.01, which is less than 0.05. This indicates that "Infrastructure" has a significant impact on "Consumer Switching Behaviour".

"Government Regulations" has a regression coefficient of 0.124 with "Consumer Switching Behaviour". This means that an increase of 1 unit in "Government Regulations" will bring about an increase of 0.124 units in "Consumer Switching Behaviour". The t-value associated with this relationship is 5.622, which is greater than 2, with a p-value of 0.03, which is less than 0.05. This indicates that "Government Regulations" has a significant impact on "Consumer Switching Behaviour".

"Green Transportation" has a regression coefficient of 0.140 with "Consumer Switching Behaviour". This means that an increase of 1 unit in "Green Transportation" will bring about an increase of 0.140 units in "Consumer Switching Behaviour". The t-value associated with this relationship is 5.622, which is greater than 2, with a p-value of 0.02, which is less than 0.05. This indicates that "Green Transportation" has a significant impact on "Consumer Switching Behaviour".

Hypothesis Testing

Table 15: Hypothesis Testing

Hypothesis	Path	Co-efficient	t-value	p-value	Accept/ Reject
H1	Electric Vehicles – Consumer Switching Behaviour	0.190	4.219	0.000	Accepted
H2	Fuel Costs – Consumer Switching Behaviour	0.109	6.674	0.000	Accepted
H_3	Technology – Consumer Switching Behaviour	0.446	6.542	0.004	Accepted
H_4	Infrastructure – Consumer Switching Behaviour	0.375	3.258	0.000	Accepted
H_5	Government Regulations – Consumer Switching Behaviour	0.124	5.622	0.001	Accepted
H_6	Green Transportation – Consumer Switching Behaviour	0.140	6.957	0.003	Accepted

Table 15 summarizes the results of the statistical tests performed using SPSS software to test the hypotheses. The results indicate that all 6 hypotheses ($H_1 – H_6$) have been accepted based on their t-values being greater than 2 and the associated p-values being less than 0.05.

DISCUSSION

Consumer switching behaviour is seen as a complex concept and marketing researchers consider it as a challenge that needs to be deciphered. Consumer switching behaviour comprises of information regarding what customers want, why do they want it and why they behave the way they do. Marketers are required to pay significant attention to consumer switching behaviour in order to develop strategies and plan to affect consumer behaviour accordingly. Consumers are considered as the most important factor that influences the success of an organization therefore, more satisfied consumers will lead to a more successful business and lesser switching behaviour.

A major development and growth has been noticed on the manufacturing and selling of electric vehicles. Consumer switching behaviour is highly influenced through new technology and innovation, especially in the automobile sector as customer desperately seek which vehicles are more updated and reliable than others.

CONCLUSION

This study offered a deeper look into electric vehicles and consumer switching behaviour from internal combustion engine vehicles. It considered the facets of electric vehicles to test its impact on consumer switching

behaviour pertaining to the automobile industry. The dependent variable was consumer switching behaviour, whereas the independent variables pertaining to electric vehicles taken into consideration were fuel costs, technology, infrastructure, government regulations and green transportation. The individual impact of every independent variable was tested on the dependent variable. All the hypotheses suggested at the beginning of this research were accepted, revealing that all electric vehicle components have a significant influence over the consumer switching behaviour.

FINDINGS

The growth in the sales of electric vehicles had seen a significant increase over the years mainly due to the technological development and reliance upon technological sources. The variables considered in this research were all considered with reference to electric vehicles.

According to the results, the correlation coefficient of Electric Vehicles on Consumer Switching Behaviour is 0.494 with a p-value of 0.000, indicating that there was a significantly positive association between the two variables of 49.4%. The correlation coefficient of Fuel Costs on Consumer Switching Behaviour was 0.581 with a p-value of 0.000, indicating that there was a significant positive association between the two variables of 58.1%. The correlation coefficient of Technology on Consumer Switching Behaviour was 0.751 with a p-value of 0.000, indicating that there was a significant positive association between the two variables of 75.1%. The correlation coefficient of Infrastructure on Consumer Switching Behaviour" was 0.441 with a p-value of 0.000, indicating that there was a significant positive association between the two variables of 44.1%. The correlation coefficient of Government Regulations on Consumer Switching Behaviour was 0.601 with a p-value of 0.000, indicating that there was a significant positive association between the two variables of 60.1%. The correlation coefficient of "Green Transportation" on "Consumer Switching Behaviour" was 0.658 with a p-value of 0.000, indicating that there was a significant positive association between the two variables of 65.8%. Based on these results all alternate hypotheses (H_1-H_6) were accepted.

RECOMMENDATIONS

Recommendations have been listed and suggested below that are based and focused on the findings of this study. The recommendations elaborate on the improvements that can be brought about in order to influence consumer switching behaviour more positively.

- Marketers should consider technological changes – Since there are technological advances being made globally, the automobile sector has become a part of it too. The successful are those brands which have started manufacturing electric vehicles under their brand names.
- Focus on infrastructure – Due to the increase in purchases of electric vehicles, there should be battery stations installed too in the country, since this will be a requirement within a few years.
- Consider healthy and green environment – Due to an increase in global warming, the environmentalists have been trying to spread awareness on minimum damage to protect the Earth. It will be beneficial for the manufacturers to adopt the eco-friendly model in the manufacturing of vehicles.

IMPLICATIONS OF THE STUDY

This study is presumed to offer a lot of benefits and opportunities for researches and studies that may be carried out in the future, especially considering the increasing importance of both consumer switching behaviour and electric vehicles for the manufacturers as well as the consumers.

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