



**MMK: ACE**  
**SMT.MITHIBAI MOTIRAM KUNDNANI:**  
**ACCOUNTANCY COMMERCE ECONOMICS**

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*STUDENT'S SPECIAL ISSUE*

*PROF.CA KISHORE PESHORI*  
*(PRINCIPAL)*

*Dr. AASHISH S. JANI*  
*(EXECUTIVE-EDITOR)*

**FROM THE DESK OF THE EDITOR...!**

After Covid-19 the education world has been changing very fast with drastic major changes in the research dimensions. UGC and MHRD have launched many virtual platforms with online depositories, e-books and other online teaching/learning materials. Combination of the traditional technologies' with mobile/web technologies to a single platform with depositories would enhance better accessibility and flexibility to education.

The main objectives of NEP 2020 clearly define the pivotal role in catalysing interdisciplinary /multi-disciplinary research culture at UG level.

Students' research at undergraduate and post graduate level is the key to success towards real life education. Implementation of this student centric research requires establishment of the Academic Bank of Credits (ABC), a national level facility which will be a bank for academic purposes with students as academic account holders. A minimum of 20 credits of the 160 credits in four years undergraduate degree programmes will be earned via research activities according to guidelines prepared under NEP 2020.

Further, it will encourage and make it possible for all students to open an academic bank account to commute credits to award any degree/research fellowship/certificates.

The ability to integrate classroom knowledge with practical problems is important to decide research problems of the real world and to provide realistic solutions for the same. Four years Undergraduate bachelor's degree programme objectives are clearly defined in these directions. This calls for developing research experiences in students and developing system of offering real life research projects with keen interest towards pursuing realistic research projects. Here role of research organisations, higher institutions or research centre can support research internships as providers.

Keeping such ideas in mind, I feel humbled to bring out the Third students special Issue of our reputed E-Journal "MMK: ACE", including research papers for the first time from students' community at various undergraduate, post graduate and Doctoral level Programmes of our College. This volume develops the fact finding empirical approach among students community at higher education.

I extend my sincere gratitude to the Management of H.S.N.C. Board and our respected Principal Prof. Dr. CA Kishore Peshori for their constant support and motivation towards a strong Research foundation.

Finally, a big thank you to the Peer-reviewers and Publishing House for helping us in publishing this E-Journal. I invite feedback and suggestions from our Readers, Researchers and Academicians for further improvement in our E-Journal "MMK: ACE".

*Dr. Aashish S. Jani  
Vice-Principal & Executive Editor*

**PRINCIPAL'S MESSAGE...!**

Dear Members of the Academia,

It brings me immense joy and pride to witness the continued growth of SMT. M.M.K. College, especially in the realm of research, as evidenced by the expansion of our esteemed Research Centre in Commerce (Business Policy & Administration) and the recent approval in Accountancy.

I extend my heartfelt gratitude to the dynamic editorial team, led by Dr. Aashish Jani, Vice Principal, for their unwavering commitment and dedication to advancing the cause of research at our institution. Their tireless efforts have played a pivotal role in steering our academic community toward the frontiers of knowledge.

In the spirit of our rich cultural heritage, I am pleased to include a Sanskrit shloka in this research endeavour, symbolizing the fusion of tradition and progress in our scholarly pursuits:

“चरैवेतिचरैवेति...”

***“Keep Walking, Keep Walking”***,

The present focus on student-centric research in this Third edition of MMK: ACE is indeed a commendable initiative taken at the opportune moment. It reflects our collective commitment to nurturing the research acumen of our students, a vital aspect of our academic mission.

I express my sincere appreciation to the Research Committee, whose proactive approach has not only fostered the development of new faculty but has also provided a platform for meaningful research at both undergraduate and postgraduate levels. The previous volumes of MMK: ACE have been well-received by the academic community, and I am confident that this edition, emphasizing student research, will further elevate our standing.

Kudos to the editorial team for curating diverse themes that delve into various facets of the Economy and Education sector. I extend my appreciation to the Course Coordinators, specialized students, academicians, research guides, and scholars whose valuable contributions have enriched the content of this journal.

I applaud the continuous efforts of the editorial board in cultivating and promoting a robust Research Culture across all multidisciplinary programs. Your dedication is instrumental in inspiring our faculty and students to embrace the role of researchers and critical thinkers.

As we embark on this intellectual journey through the pages of MMK: ACE, I wish the entire team the very best. May the ideas shared in this volume pave the way for positive outcomes and catalyze many more students and teachers to embark on the rewarding path of research and scholarly exploration.

With warm regards,

***Prof. Dr. CA Kishore Peshori***  
***(Principal)***

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# A Study on Consumer behavior towards buying Electric Vehicles in KDMC

MMK: ACE VOLUME 3: PAPER NO.08

<sup>1</sup>Dr. Vishal R. Tomar  
Research Guide

Smt. M.M.K College of Commerce and Economics,  
Mumbai, Maharashtra, India

<sup>2</sup>Jyotsana Suraj Agarwala  
Research Scholar

Smt. M.M.K College of Commerce and Economics,  
Mumbai, Maharashtra, India  
Assistant Professor Vedanta College, Vitthalwadi

## Abstract:-

### ➤ *Purpose:*

The main purpose of this paper is to understand the buying behavior of consumers towards electric vehicles and to recognize the important parameters affecting consumers' Electric vehicle purchasing decisions in KDMC.

### ➤ *Design/Methodology/Approach:*

The study was conducted in Kalyan Dombivli Municipal Corporation in Thane district Maharashtra and data were collected using Random sampling. The sample size is 51 respondents. The Chi-square test is used to measure the impact of the income level on consumer buying behavior of electric vehicles and factor analysis is done to measure the factors that positively and negatively impact the buying decision of consumers towards electric vehicles.

### ➤ *Findings:*

Research shows that there is no impact on income level on consumer buying behavior of the electric vehicle and there are several factors that positively as well as negatively impact the customer buying decisions of electric vehicles.

### ➤ *Research Limitations:*

This study is a pilot study. The sample size selected is less and its generalization or representation may not be done. The study is restricted by time and financial constraints Further study needs to be collected to get a better insight into the research problem. Therefore, more investigation is required before making any broad judgments.

**Keywords:-** Electric Vehicle, Consumer Buying Behavior.

## I. INTRODUCTION

During the last few decades, the world has faced many environmental issues like climate change, global warming etc. All the countries all over the world have started contributing their efforts towards safeguarding the environment. The automobile industry has been the fastest-growing industry in the world. India is one of the emerging

countries in the automobile industry. India is a country with the third-largest road network in the world. Road travel seemed to be a preferred choice in India with over 60 % of the population using personal or shared vehicles to commute. Conventional vehicles are a major cause of global warming and environmental air pollution. All types of vehicles produce dust from brakes, tires, and road wear. The average diesel vehicle has a worse effect on air quality than the average gasoline vehicle. But both gasoline and diesel vehicles pollute more than electric vehicles.

Governments started using fiscal policies, such as road tax, to discourage the purchase and use of more polluting cars. Green tax is imposed while re-registering the vehicle after 15 years of use to make people discontinue the use of polluting vehicles and encourage them for fuel-efficient and less polluting vehicles. Fuel taxes may act as an incentive to produce more efficient, less polluting, vehicles and the development of alternative fuels. High fuel taxes or cultural change may provide a powerful incentive for consumers to buy lighter, smaller, fuel-efficient cars, or to not drive. (Transport policy). The FAME India Scheme is an incentive scheme for promotion of electric and hybrid vehicles. It aims to promote electric mobility and gives financial incentives for enhancing EV production and the creation of electric transportation infrastructure.

In 2015 the Ministry of Heavy Industries and Public Enterprises launched FAME to incentivize the production and promotion of eco-friendly vehicles including EV and hybrid vehicles. The scheme is proposed for establishing charging infrastructure. Electric cars have low running costs due to fewer moving parts to maintain, and they are also highly environmentally friendly because they utilize little to no fossil fuels (petrol or diesel). While some electric cars used lead-acid or nickel-metal hydride batteries, lithium-ion batteries are now the industry standard because they have a longer lifespan and are better at retaining energy, with a monthly self-discharge rate of just 5%. Despite this improved efficiency, these batteries are still subject to thermal runaway, which has resulted in fires or explosions in the Tesla Model S, despite attempts to enhance battery safety. An electric vehicle, such as an electric car, requires one or more electric motors powered by a battery pack to accelerate and drive. Depending on the kind of EV, the electric motor(s) may assist or completely power a



conventional internal combustion engine (ICE). When we talk about electric vehicles, we usually refer to three types: hybrid electric vehicles (HEV), plug-in hybrid electric vehicles (PHEV), and battery electric vehicles (BEV).

➤ *The Objective of the Study*

- To understand the buying behavior of consumers towards electric vehicles.
- To recognize the important parameters affecting consumers' Electric vehicle purchasing decisions.

➤ *Problem Statement*

The growth of electric vehicles is very slow in India, and not many electric vehicle industries are coming to India for setup. Consumers are not having much knowledge about electric vehicles. Consumers who already have conventional vehicles are not willing to switch to electric vehicles because of certain negative aspects.

- Electronic vehicle is the best alternative to safeguard the environment.
- Electronic vehicle is the best alternative to the conventional vehicle which cause global warming and air pollution.
- The FAME India Scheme is an incentive scheme for the promotion of electric and hybrid vehicles.
- Electronic vehicles have low running costs, are environment friendly and are better at retaining energy due to Lithium-ion batteries.

## II. LITERATURE REVIEW

Ranjan I, Mondal S (Rajan, 2022) In this paper reviews previous studies on consumer buying behavior to understand the art from the previous research manuscript and recommend future research. The authors conducted a description and content analysis to understand the demand for electric vehicles in the market. The consumer perception towards the petrol and diesel hikes and in exchange prices of vehicles with an electric vehicle, pollution caused by internal combustion engines and want to protect the environment. In this paper researchers also mentioned the environment and its concern. Academicians can use it to understand research on better infrastructure, awareness campaigns, and promotional activities for electric vehicles will surely help this industry penetrate the Indian automobile market.

Ram A (Ram 2020) In this paper stated that implementing the strategy base on priority to create a level of awareness about Eco-friendly government and Automobile industries must launch a campaign to give people awareness of using electric vehicles and their benefits. It is also required to create adequate quality infrastructure for fast charging stations for easy use and maintenance of Electric vehicles in India. Academicians can use it to understand research better i.e. Lack of charging infrastructure is one of the major factors for creating a negative perception of Electric Vehicles among consumers and manufacturers. So,

the government's major focus should be on the development of charging infrastructure. Fast- charging batteries must be brought in as people don't like waiting for a long period of time which is a major reason why they don't prefer Electric vehicles. Design vehicles which are having similar power and performance levels to that of combustion engine vehicles.

Tupe O, Kishore S, Johnvieira A (Tupe 2020) In this paper it is stated that with the depletion of fossil fuels and constant hikes in fuel prices, there is a need for the energy transition in vehicles in India. Govt has taken initiative to fight pollution levels by promoting EVs and giving subsidies on purchases. To boost its production, Govt has eased the FDI norms. Various emerging brands are launching EVs in India. The Government and manufacturers should join their hands to build the infrastructure and create a positive environment for EVs. Respondents are willing to consider EVs as their future purchase option if proper infrastructure is available. The initial cost of purchase, less number of charging stations, and the time required to recharge the battery is creating limitations in boosting consumer confidence.

## III. RESEARCH METHODOLOGY

The research is based on primary data. The data is collected through a structured questionnaire. The questionnaire had two parts- demographic questions such as occupation, age, and income. The second part of the questionnaire measures the model variables. A random sampling method is used. The sample size is 51 respondents. The Chi-square test is used to measure the impact of the income level on consumer buying behavior of electric vehicles and factor analysis is done to measure the factors that positively and negatively impact the buying decision of consumers towards electric vehicles.

➤ *Hypothesis:*

- **H (0):** There is no significant impact of income level on consumer buying behavior of Electric Vehicles.
- **H (1):** There is a significant impact of income level on consumer buying behavior of Electric Vehicles.
- **H (0):** There are no significant factors that positively impact the buying decision of consumers toward electric vehicles.
- **H (2):** There are significant factors that positively impact the buying decision of consumers toward electric vehicles.
- **H (0):** There are no significant factors that negatively impact the buying decision of customers toward electric vehicles.
- **H (3):** There are significant factors that negatively impact the buying decision of customers toward electric vehicles.

➤ *Scope of the study*

The study is focused on the consumer buying behavior of electric vehicles. The findings will help to know the consumer mindset towards the electric vehicle and will motivate them towards buying electric vehicles it will also

explore the factors on which companies should focus to increase the demand and sale of electric vehicles.

➤ *Limitation of the Study*

- Geographic limitation
- The research is a pilot study. The sample size is selected less and its generalization or representation may not be done further study needs to collect to get a better insight into a research problem.
- Time, and financial constraints.

➤ *Data Collection*

The data is collected based on primary data through structured questionnaires and secondary data is collected through the reference of Journals, periodicals, magazines, and books.

➤ *Research Test Tools:*

The analysis is done through a chi-square test and factor analysis through SPSS software.

**IV. DATA ANALYSIS AND ITS INTERPRETATION**

Data analysis is described as the process of bringing order, structure, and meaning to the collected data. Data interpretation is the process of assigning meaning to the processed and analyzed data. It enables us to make informed and meaningful conclusions, and implications, infer the significance between the relationships of variables, and explain the patterns in the data.

➤ *Hypothesis Test 1:*

- H (0): There is no significant impact of income level on consumer buying behavior of Electric Vehicles.
- H (1): There is a significant impact of income level on consumer buying behavior of Electric Vehicles.

Table 1 Income Level on Consumer Buying Behavior of Electric Vehicles

	<b>B1</b>	<b>B2</b>	<b>B3</b>	<b>B4</b>	<b>B5</b>	<b>TOTALS</b>
A1	9	4	0	1	---	14
A2	17	4	2	4	---	27
A3	3	1	0	2	---	6
A4	3	0	0	0	---	3
A5	0	0	0	1	---	1
<b>TOTALS</b>	32	9	2	8	---	51
Chi-square	df	P				
11.87	12	0.4562				
Cramer's V=	0.2785					

Source: Researcher's Own Study

The Chi-square is applied & it is validated using Cramer's V used (The tool used is Vassar stats). As per the Chi-square test, the P value is 0.4562.

So, as per the test, the P value is more than 0.05. So, the null hypothesis is accepted. So, there is no significant impact of income level on consumer buying behavior of Electric Vehicles.

➤ *Hypothesis Test 2:*

- H (0): There are no significant factors that positively impact the buying decision of consumers toward electric vehicles.
- H (2): There are significant factors that positively impact the buying decision of consumers toward electric vehicles.

Table 2 Factors that Positively Impact the Buying Decision of Consumers Toward Electric Vehicles.

<b>KMO and Bartlett's Test</b>		
Kaiser-Meyer-Olkin Measure of sampling Adequacy		0.768
Bartlett's test of Sphericity	Approx. Chi-Square	209.17
	df	45
	Sig	0.000

Source: Researcher's Own Study

Table 3 Communalities

	<b>Initial</b>	<b>Extraction</b>
Petrol Diesel Rate	1.000	0.253
No carbon emission	1.000	0.595
Cost-effectiveness	1.000	0.596
Lower maintenance cost	1.000	0.831
Lower running cost	1.000	0.811
Tax and financial benefit	1.000	0.55



Electric vehicle incentive	1.000	0.595
No noise pollution	1.000	0.575
Less waiting period	1.000	0.533
Easy driving mode	1.000	0.447

Source: Researcher’s Own Study

- *Extraction Method: Principal Component Analysis*

Table 4 Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.403	44.03	44.03	4.403	44.03	44.03
2	1.383	13.827	57.856	1.383	13.827	57.856
3	0.955	9.554	67.41			
4	0.861	8.613	76.022			
5	0.713	7.125	83.148			
6	0.505	5.046	88.194			
7	0.458	4.583	92.776			
8	0.329	3.288	96.064			
9	0.215	2.146	98.210			
10	0.179	1.79	100.000			

Source: Researcher’s Own Study

- *Extraction Method: Principal Component Analysis*

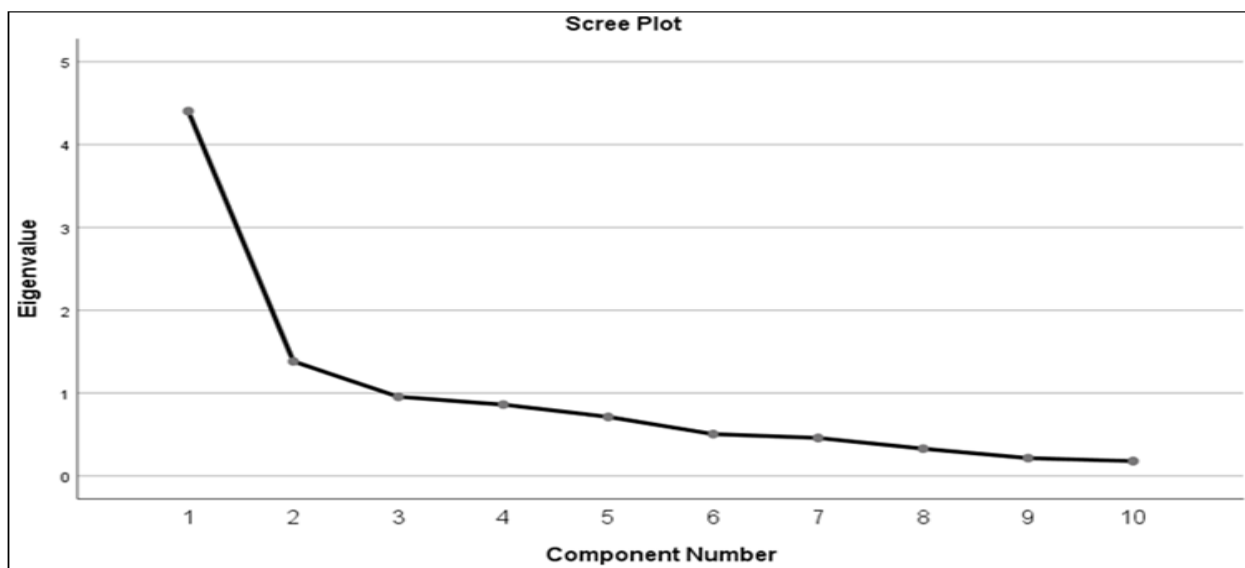


Diagram 1 Hypothesis Testing 2: Extraction Method: Principal Component Analysis

Table 5 Component Matrix<sup>a</sup>

	Component	
	1	2
Petrol Diesel Rate	0.484	-0.136
No carbon emission	0.701	-0.322
Cost-effectiveness	0.606	0.478
Lower maintenance cost	0.699	0.584
Lower running cost	0.646	0.628
Tax and financial benefit	0.696	-0.254
Electric vehicle incentive	0.718	-0.283
No noise pollution	0.737	-0.18
Less waiting period	0.659	-0.314
Easy driving mode	0.654	-0.141

Source: Researcher’s Own Study

- *Extraction Method: Principal Component Analysis*  
6 Component Factor Extracted

In Factor Analysis it is observed that 57% cumulative percentage is present. Scree Plot also proves that the alternative hypothesis (H2) is accepted.

Factors: No carbon emission, Lower maintenance cost, Lower running cost, Tax and financial benefit, Electric vehicle incentive, and No noise pollution are the positive factors that positively impact the buying decision of

consumers toward electric vehicles.

➤ *Hypothesis Test 3:*

- H (0): There are no significant factors that negatively impact the buying decision of customers toward electric vehicles.
- H (3): There are significant factors that negatively impact the buying decision of customers toward electric vehicles.

Table 6 KMO and Bartlett’s Test

<b>Kaiser-Meyer-Olkin Measure of Sampling Adequacy.</b>		0.791
Bartlett's Test of Sphericity	Approx. Chi-Square	255.319
	df	36
	Sig.	0.000

Source: Researcher’s Own Study

Table 7 Communalities

	<b>Initial</b>	<b>Extraction</b>
Lack of charging station	1.000	0.817
Battery cost	1.000	0.842
Battery Life	1.000	0.731
Vehicle design	1.000	0.848
Lack of brands	1.000	0.734
Initial cost of purchase	1.000	0.768
Battery recharge time	1.000	0.701
Short driving range	1.000	0.794
Lack of awareness	1.000	0.781

Source: Researcher’s Own Study

- *Extraction Method: Principal Component Analysis*

Table 8 Total Variance Explained

<b>Component</b>	<b>Initial Eigenvalues</b>			<b>Extraction Sums of Squared Loadings</b>		
	<b>Total</b>	<b>% of Variance</b>	<b>Cumulative %</b>	<b>Total</b>	<b>% of Variance</b>	<b>Cumulative %</b>
1	4.806	53.397	53.397	4.806	53.397	53.397
2	1.202	13.354	66.75	1.202	13.354	66.75
3	1.008	11.198	77.949	1.008	11.198	77.949
4	0.594	6.602	84.551			
5	0.425	4.723	89.274			
6	0.331	3.674	92.949			
7	0.294	3.262	96.21			
8	0.207	2.297	98.507			
9	0.134	1.493	100			

Source: Researcher’s Own Study

- *Extraction Method: Principal Component Analysis*

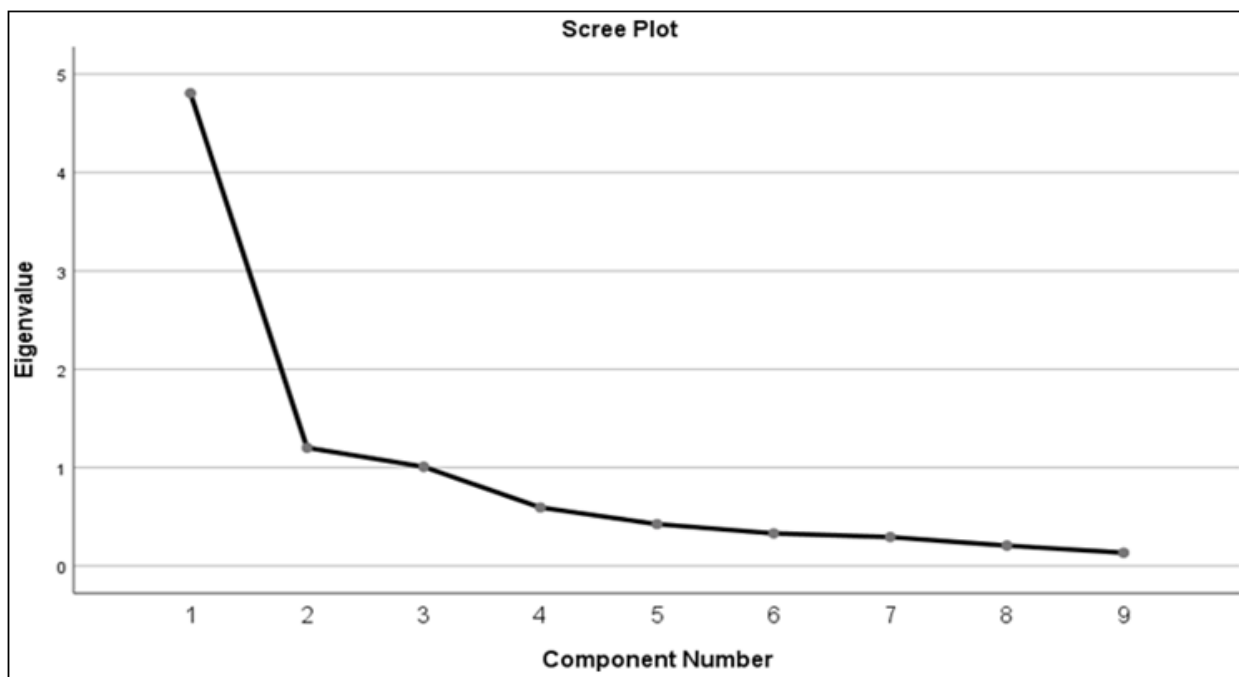


Diagram 2 Hypothesis Testing 3: Extraction Method: Principal Component Analysis

Table 9 Component Matrix<sup>a</sup>

	Component		
	1	2	3
Lack of charging station	0.775	-0.455	-0.097
Battery cost	0.779	0.091	-0.475
Battery Life	0.763	0.133	-0.361
Vehicle design	0.489	0.769	0.135
Lack of brands	0.747	0.416	0.06
The initial cost of purchase	0.741	-0.293	-0.366
Battery recharge time	0.771	0.059	0.32
Short driving range	0.778	-0.17	0.399
Lack of awareness	0.686	-0.295	0.473

Source: Researcher’s Own Study

- *Extraction Method: Principal Component Analysis*  
4 Component Extracted

In Factor Analysis it is observed that 77% cumulative percentage is present. Scree Plot also proves that the alternative hypothesis is accepted.

Factors: Lack of charging stations, Battery cost, Battery recharge time, and short driving range are the negative factors that negatively impact the buying decision of customers toward electric vehicles.

**V. FINDINGS**

➤ *It is Found from the Study that*

- There is no significant impact of consumer income level on their buying behavior of electronic vehicles
- Several factors like no carbon emission, Lower maintenance cost, Lower running cost, Tax, and financial

benefit, Electric vehicle incentive, and No noise pollution are the positive factors that positively impact the buying decision of consumers toward electric vehicles.

- Several factors like lack of charging stations, Battery cost, Battery recharge time, and short driving range are the negative factors that negatively impact the buying decision of customers toward electric vehicles.

**VI. CONCLUSION**

It’s time to move towards electric vehicles as the respondents have answered in the questionnaire. Electric vehicles as a positive action towards climate change. It is very important to use vehicles to safeguard the environment. The government must focus on the advanced version of the technology and the ease of electric charging stations. There is a lack of awareness among the people on electric vehicles more promotional campaigns, better infrastructure will surely bring the best result for the penetration of Electric vehicles in the Automobile industry.

**SUGGESTION\RECOMMENDATION**

- Academicians can use it to understand research on better infrastructure, awareness campaigns, and promotional activities for electric vehicles will surely help this industry penetrate the Indian automobile market.
- The government's major focus should be on the development of charging infrastructure.
- The Government and manufacturers should join their hands to build the infrastructure and create a positive environment for electronic vehicles.
- Company should focus on enhancing the technology which can boost the driving range and reduce the battery recharge time. Government should come up with various subsidized plan which motivates consumers to buy electronic vehicles.

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