MAJOR RESEARCH PROJECT

ON

IS INDIA READY FOR ELECTROMOBILITY? A STUDY TO UNDERSTAND THE INTENTION TO PURCHASE ELECTRIC VEHICLES

Submitted By

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2K21/DMBA/97

Under the Guidance of

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CERTIFICATE

This is to certify that **Ms. Rhythm Dua**, has completed the project titled **"Is India ready for electromobility? A study to understand the intention to purchase electric vehicles"** under the guidance of **Dr. Sonal Thukral** as a part of Master of Business Administration (MBA) curriculum of Delhi School of Management, New Delhi. This is an original piece of work and has not been submitted elsewhere.

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DECLARATION

I, **Rhythm Dua,** student of Delhi School of Management, Delhi Technological University hereby declare that the project dissertation report on **Is India ready for electromobility? A study to understand the intention to purchase electric vehicles"** submitted in partial fulfillment of the requirements for the award of the degree of Master of Business Administration (MBA) is the original work conducted by me. I also confirm that neither I nor any other person has submitted this project report to any other institution or university for any other degree or diploma. I further declare that the information collected from various sources has been duly acknowledged in this project.

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EXECUTIVE SUMMARY

The automotive sector contributes significantly to emissions and environmental issues. In an effort to address these problems, electric vehicles (EVs) have been introduced as an alternative to conventional vehicles. EVs utilize electricity stored within the batteries to power their electric motors, leading to lower greenhouse gas emissions and CO_2. As the usage of EVs continues to grow in Indian cities, it is essential to understand customer attitudes and acceptance towards these eco-friendly vehicles. The purpose of this study is to examine the various factors that influence Indian customers' willingness to adopt EVs in order to gain an improved comprehension of the Indian EV market.

This study is structured into five main sections. Firstly, the introduction highlights the current scenario of EV adoption in India. Secondly, a comprehensive overview of the literature is presented to identify significant concepts and gain an in-depth knowledge and understanding of the research area. Thirdly, the research methodology is described, which involves a descriptive research design supported by a cross-sectional configuration. Fourthly, the data collected from a survey is analyzed using IBM SPSS to identify patterns between variables. The study revealed the impact of technology, social influence, economic/price benefit, government incentives, environmental concern, infrastructure accessibility, and attitude towards intention to adopt EVs with attitude having a mediating role to some extent. Finally, the study is concluded with recommendations and conclusions drawn from the findings obtained through data analysis, which can aid policymakers and stakeholders in promoting EV adoption in India.

The Indian market is still in the early stages of incorporating EVs, and there have been only a few studies conducted on Indian customers to comprehend their inclination toward adopting this new technology. This study aims to bridge this gap by identifying the critical factors that influence customer adoption intentions for EVs.

TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION

1.1 Background

Our planet is seriously threatened by the problem of climate change. In a recent UN report on climate change, the transportation sector was ranked third in terms of the amount of greenhouse gas (GHG) emissions, contributing 14% of all GHG emissions (UNCCS, 2019). Among transportation, road transport accounts for nearly 75% of all emissions. Urbanization and access to motor vehicles are increasing globally, which is expected to further accelerate the rise in GHG emissions. Studies predict that transportation-related GHG emissions will double from their current levels by 2050.

For a long time, the world has heavily relied on fossil fuels to power transportation. However, in response to environmental concerns, electric vehicles have been introduced as a replacement for conventional automobiles (Patyal, 2020). Electric vehicles (EVs) were initially rare with only 0.078 million sales globally in 2010 (Rietmann et al., 2020). But, as technology has improved and costs have reduced, their adoption has increased significantly. Governments have also promoted EVs by providing incentives and setting emissions standards. By 2021, the adoption of EVs had spread widely, with global sales reaching 660 million, leading to improved air quality and reduced traffic congestion in cities. (Ko & Shin, 2023).

1.1.1 State of electric vehicles in India

Despite one of the lowest motorization rates in the world, India's transport sector is rapidly growing due to rising urbanization and income, resulting in domestic vehicle sales increased by approximately 4% annually between 2011 and 2020. Unfortunately, this growth has led to an alarming increase in GHG emissions, with road transport being the primary contributor. Addressing this pressing issue requires the urgent adoption of cleaner technologies, with EVs being considered as a potential solution. Both the Indian government and automakers acknowledge the importance of promoting EVs as a means of overcoming the environmental and economic challenges associated with conventional vehicles.

Figure 1.1: Need for India to shift its mobility strategy

Source: Niti Aayog

The pace of EV adoption in India is promising, and current developments indicate it's gaining steam. Though only a mere 600,000 electric cars were present in India in 2020, it is believed that this figure will skyrocket to 30 million by 2030. Factors like technological advancements, heightened environmental concerns, and governmental initiatives are all underscored as driving forces behind this surge (Dutt, 2023). The Indian government's policies, in particular, have been one of the primary catalysts for the growth of EVs in India. The Indian government has taken a number of steps to reach its goal of 30% of all vehicles on the road being electric by 2030. (R. Kumar et al., 2021). These policies encompass incentives for EV buyers and the development of charging infrastructure. The timeline of actions taken by policymakers and regulators is illustrated in figure 1.2.

Figure 1.2: Initiatives by policymakers and regulators to promote electric vehicle adoption: A timeline

Source: Niti Aayog, e-Amrit

Although numerous attempts have been made to accelerate EV adoption in India, several lingering issues still require resolution. The exorbitant price tag attached to EVs in comparison to conventional automobiles remains a significant hurdle. Even with FAME's (Faster Adoption and Manufacturing of Hybrid and Electric Vehicles) subsidies, the overall cost of EVs is still beyond the reach of lower-income brackets, rendering them less accessible. Additionally, a lack of adequate charging infrastructure in numerous parts of the nation is a major obstacle in the path of EV adoption.

Despite facing numerous hurdles, the future of EVs in India appears promising. With the steady advancement of technology, a decline in EV battery costs, government support, and a growing environmental consciousness among customers, EV adoption in India will likely see a significant increase in the coming years. As the EV market expands, it benefits not only the environment but also promotes a more sustainable and resilient transportation industry. A recent report by Bain & Company predicts that India's EV value chain revenue pool could grow to $76-100 billion by 2030, with a profit pool of $8-11 billion. This indicates that India's EV market shows great promise and the potential to generate substantial revenue and profits.

1.1.2 Analyzing India's electric vehicle industry using PESTEL framework

The PESTEL analysis is a strategic tool employed for evaluating the external macro-environmental aspects that impact a business or an industry. It comprises the examination of the following factors:

- Political
- Economic
- Social
- Technological
- Environmental
- Legal

By understanding these factors, businesses can develop strategies to mitigate risks and capitalize on opportunities. Figure 1.3 presents the PESTEL analysis of India's EV industry.

Figure 1.3: PESTEL analysis of India's electric vehicle industry

Source: Own analysis

1.2 Problem statement

To investigate whether India is ready to embrace electromobility as a viable means of transportation and to explore the factors influencing customers' intention to adopt electric vehicles.

1.3 Objectives of the study

- To comprehend the current state of the Indian electric vehicle market and assess its viability.
- To examine the impact of political, economic, social, technological, environmental, and legal factors on the electric vehicles industry in India.
- To identify the factors that prompt customers to purchase an electric vehicle.
- To suggest measures for policymakers, automakers, and other stakeholders to encourage the usage of electric vehicles in India.

1.4 Scope of the study

The scope of the study is to examine the current state of India's readiness for electric mobility and to comprehend the factors that influence customers' intentions to purchase electric vehicles. These factors include:

- Technology
- Social Influence
- Economic/Price Benefit
- Government Incentives
- Accessibility to Infrastructure
- Environmental Concern
- Attitude

The study entails surveying a representative sample of the Indian population of metropolitan cities to determine their inclination toward electric vehicles. Based on the results, the study offers recommendations for policymakers, industry players, and other stakeholders on how to encourage the widespread adoption of electric vehicles in the country.

1.5 Research gap

This study aims to investigate the factors that impact the intention to adopt EVs in India, which is an under-researched area. The study explores the influence of factors such as technology, social influence, economic/price benefit, government incentives,

infrastructure accessibility, environmental concern, and attitude toward the intention to adopt EVs. The goal is to identify key predictors that could influence the intention to adopt EVs and bridge the gap in research in the Indian market, which is still in its early stages of incorporating EVs.

This study adds to the body of literature by investigating and evaluating previously underemphasized factors that affect the adoption of EVs in the Indian context. This study is structured into five main sections. Firstly, the introduction highlights the current scenario of EV adoption in India. Secondly, a comprehensive overview of the literature is presented to identify significant concepts and gain an in-depth knowledge and understanding of the research area. Thirdly, the research methodology is described, which involves a descriptive research design supported by a cross-sectional configuration. Fourthly, the data collected from a survey is analyzed using IBM SPSS to identify patterns between variables. Finally, the study is concluded with recommendations and conclusions drawn from the findings obtained through data analysis, which can aid policymakers and stakeholders in promoting EV adoption in India.

CHAPTER 2: LITERATURE REVIEW

Degirmenci and Breitner (2017) This study delved into the effects of price value, environmental performance, and range confidence on peoples' desire to purchase electric vehicles. The outcomes showcased that environmental performance is a crucial factor when it comes to making purchase decisions. This study underscores the significance of implementing ecologically sustainable principles in marketing approaches, highlighting the visibility of pricing and range within the whole decision-making process. In the long run, this study provides valuable insights into the elements that lead to the customers' intention of purchasing EVs along with the increasing concerns about preserving the planet for tomorrow.

Bhalla, Ali and Nazneen (2018) This study found that people's opinions on buying electric vehicles are heavily influenced by environmental concerns and trust in technology. Challenges to wide-scale adoption include cost, infrastructure, and social acceptance. To increase electric vehicle sales in India, manufacturers and the government should prioritize improving social acceptance by building more charging stations and focusing on trust-building technologies.

Govindarasu and Venkatesh (2019) As per this study, transitioning to EVs completely by 2030 is a challenging task, especially for developing nations like India dealing with population growth, inadequate infrastructure for EVs, and safety concerns. To electrify the nation's vehicles, the government, industry, and customers must collaborate despite working independently. All sectors must be committed and prepared to tackle the challenges ahead to achieve this significant feat. The revolution demands both government and industry prioritize achieving a pollution-free environment and promoting the use of clean energy.

Kumar and Padmanaban (2019) India is struggling to transition its transportation industry from conventional internal combustion engine (ICE) vehicles to electric vehicles (EVs). To overcome this challenge, a comprehensive plan needs to be put in place involving extensive research, development, and implementation. The Indian government must keep up with global progress in EV technology and make regular,

adaptable changes to policies like FAME. Enhancing the energy efficiency of EVs and establishing a battery ecosystem to support businesses and start-ups producing battery packs and cells should be a top priority. To address the anxiety around EV range, setting up proper charging infrastructure and exploring swapping options is also important. Crucial measures to generate demand for EVs include converting all government buses to electric and providing tax benefits to private EV owners.

Mishra and Malhotra (2019) In this study, researchers aimed to investigate the factors that affect the purchase intention of Indian customers towards electric vehicles (EVs). The results revealed that the performance features of EVs have a strong positive impact on purchase intention. Moreover, the study found that environmental concern is significantly and positively associated with purchase intention. Although the cost of ownership has a positive relationship with purchase intention, it was not statistically significant. Surprisingly, both social influences and financial advantages were found to be non-significant. Additionally, the study discovered that infrastructure support negatively affects purchase intention and was also found to be non-significant.

Bansal and Goyal (2020) This study delved into the demand for electric vehicles in India and the technologies that are presently available in the market or might be incorporated there. In the subsequent years, the electric vehicle (EV) trend is expected to rise in popularity, with government and industry support, embracing it as a feasible substitute for conventional vehicles. The current air pollution spikes make it imperative for India to adopt innovative technologies that can abate pollution levels in metropolitan areas. The recent entry of electric taxis by online cab booking services has accelerated the progress towards this objective. Electrifying public transportation is an efficient and realistic approach to introducing EVs to Indian roads rather than solely emphasizing private vehicles. India's EV market may experience a significant boost with the electrification of two-wheelers, which dominate vehicle sales in the country. Despite facing obstacles, both the government and industry are taking measures that signal strong efforts to position India as a global leader in EVs soon.

Khurana, Kumar and Sidhpuria (2020) This study examined the factors that impact the uptake of electric vehicles (EVs) and concluded that while perceived economic benefits boost positive attitudes, they don't directly influence the willingness to adopt

EVs. Environmental concerns and social influence were found to be partial indicators of behavioral intention and had a significant impact on people's attitudes towards EVs. Self-image was deemed a stable predictor of behavioral intention and impacts both attitude and the EV adoption rate. The study also reveals that attitude significantly predicts behavioral intention. To encourage greater EV adoption, all stakeholders, including government agencies, car dealerships, and manufacturers, must work together to promote the positive attributes of EVs, such as their ability to reduce toxic emissions.

Sarode and Sarode (2020) This study indicates that India's electric mobility technology arrived relatively late compared to other countries, and many people find adjusting to it challenging. The main reason is the limited range of current battery technology and the shortage of charging stations. Despite the automobile industry's battery-swapping solution, it also has its limitations. In addition, Indian consumers typically prefer affordable daily-use cars, which makes electric vehicles less appealing due to their high cost and limited range. Although the government encourages green energy by promoting electric vehicles, the limitations of this technology in India have had little effect. There exist multiple misconceptions and persevering myths touching on electric mobility technologies, including fallacies such as deeming the use of such vehicles in areas prone to heavy rains or floods as insecure. These erroneous beliefs perpetuate the slow adoption of electric vehicles in India.

Tupe, Kishore and Johnvieira (2020) The escalating fuel prices and dwindling fossil fuel reserves in India indicate the need for a switch to eco-friendly vehicles, such as electric vehicles (EVs), as suggested by this study. The government is putting effort to boost foreign investment and production of EVs. Despite people's environmental consciousness, the high cost of EVs deters their adoption. The establishment of appropriate charging stations and infrastructure is essential to raise customer trust in EVs and encourage their popularity. The triumph of India's EV industry depends on collaborative efforts between the government and manufacturers to construct the necessary infrastructure and promote an EV-friendly atmosphere.

Dash (2021) The fundamental aim of this study was to scrutinize and analyze the multiple factors involved in the adoption or acceptance of eco-friendly electric

vehicles in India. It investigated a statistically significant relationship between environmental concern, familiarity with EVs, subjective norms, and attitudes toward electric vehicles. Moreover, findings indicated that attitude played a crucial role in the decision-making process regarding the adoption of EVs and resulted in a substantial variation in adoption choices.

Ali and Naushad (2022) The purpose of this study was to pinpoint the top factors that drive the uptake of electric vehicles. The study employed various independent variables ranging from financial incentives, social reinforcement, charging infrastructure, environmental concern, and pricing, with electric vehicle adoption as the dependent variable. The study's outcomes revealed that pricing had a notable impact on the electric vehicle adoption rate.

Srivastava, Yallatti, and Vijay (2022) Electric vehicles possess a multitude of benefits that could potentially overhaul the automobile industry. Nevertheless, although heralded as the future of transportation, the electric vehicle market still encounters several obstacles necessitating the intervention of governing bodies, research, and policy changes. In a push to exclusively transition to electric cars by 2030, the Indian administration is implementing numerous measures to upgrade the country's electric car infrastructure and flexibility. These initiatives are anticipated to promote the adoption of electric vehicles and enhance India's overall electric vehicle ecosystem.

Lingamurthy, Pani, and Pachava (2023) This study aimed to understand and mitigate India's challenges in transitioning to electric vehicle-dominated transportation by 2030, despite the growing sales of electric vehicles. However, the displacement of traditional combustion engines is not completed yet. The study aimed to gain insights into the demand for electric vehicles during this transitional phase. The study discovered that numerous people exhibited interest in the shift to electric vehicles, but a risk-averse attitude was also apparent, potentially due to factors like inadequate awareness, range anxiety, and insufficient infrastructure.

Literature Review: Understanding and Findings

The studies indicate that EV adoption in India is influenced by a range of factors like environmental concerns, performance features, technology, price, range confidence, social influence, financial incentives, attitude, and infrastructure. For EVs to be widely embraced, their efficiency needs improvement, a functional battery ecosystem must be established, and charging infrastructure developed. Collaboration is imperative among manufacturing firms, government agencies, dealers, and salespersons, to popularize the benefits of EVs, which include reducing toxic emissions and increasing adoption. India's current efforts to overcome challenges are encouraging, and it could emerge globally as a significant player in the EV industry.

CHAPTER 3: RESEARCH METHODOLOGY

The process of identifying and describing research problems is followed by a systematic and scientific approach to solving them, known as the research methodology. It involves outlining the specific steps taken to address the research problems.

3.1 Research design

The research design is a framework or plan that outlines how the necessary data will be collected, handled, and analysed in a study. It offers a methodical, well-thought-out strategy for solving the research problem. Exploratory and descriptive research designs are the two main categories. Before formulating a specific strategy, exploratory research aims to gain a deeper understanding of the research problem and identify potential courses of action. Analyzing secondary data and carrying out qualitative research are common tasks in this kind of study. Comparatively, descriptive research focuses on outlining the traits of a population or sample and typically collects information through survey and observation methods. Its main objective is to provide an accurate and comprehensive portrayal of the subject being studied.

In this study, a descriptive research design is employed, which is complemented by a cross-sectional configuration. This method allows collection of information from a single sample of population components at a particular time.

3.2 Sampling

To conduct a population study, it is often impractical to include every individual, so researchers opt for a sample selection. Probability sampling ensures an equal likelihood of selecting each element in the population, while non-probability sampling relies on expert judgment rather than chance. In this study, non-probability convenient sampling is used, where expert opinions determined the sampling frame. Data is gathered from individuals/customers aged 18 and above residing in metropolitan cities (114 respondents), with availability and references serving as the criteria for selecting participants within the sampling frame.

3.3 Sources of data

3.3.1 Primary data

A structured questionnaire is employed to collect primary data for this study. This approach allowed for a comprehensive and efficient data collection process, incorporating the opinions of a wide range of individuals. The questionnaire statements are developed based on an extensive literature review and modified to suit the research objectives and area of study. The questionnaire is designed using a 5-point Likert scale, ranging from strongly disagree to strongly agree, with demographic questions included at the start to establish rapport.

3.3.2 Secondary data

Secondary data collection is done through reports of McKinsey & Company, NITI Aayog, scholarly articles, and other relevant databases. In order to propose a conceptual framework, a thorough review of the literature is conducted, and consultations are held with experts and academicians in the field.

3.4 Development of constructs

The variables of the study are as follows:

- Intention to Adopt (AI): This is the dependent variable in the study, which refers to the likelihood or willingness of individuals to adopt electric vehicles as their primary mode of transportation.
- Technology (Tech): This is an independent variable in the study, which refers to the features and characteristics of electric vehicles, such as their design, performance, and functionality.
- Social Influence (Social): This is an independent variable in the study, which refers to the impact of social norms, cultural values, and peer influence on the adoption of electric vehicles.
- Economic/Price Benefit (Eco): This is an independent variable in the study, which refers to the cost associated with using electric vehicles.
- Government Incentives (Govt): This is an independent variable in the study, which refers to the policies and programs implemented by governments to

promote the adoption of electric vehicles, such as subsidies and infrastructure development.

- Accessibility to Infrastructure (Infra): This is an independent variable in the study, which refers to the availability and accessibility of charging stations and other related infrastructure that are necessary for the widespread adoption of electric vehicles.
- Environmental Concern (Env): This is an independent variable in the study, which refers to the individual's level of concern and awareness about environmental issues, such as air pollution and climate change, and how this affects their decision to adopt electric vehicles.
- Attitude (Att): This is an independent variable and a mediating variable in the study, which refers to the individual's overall evaluation and perception of electric vehicles, including their beliefs, emotions, and intentions towards them. Attitude may mediate the relationship between the other independent variables and the dependent variable.

Table 3.1: List of selected constructs

Construct	Type	Questions	References
Intention to Adopt (AI)	Dependent	AI_1: In the future, I intend to purchase an electric vehicle. AI_2: If electric vehicles become prevalent among the majority, I would think about getting one.	Dash (2021)
Technology (Tech)	Independent	Tech_1: Electric vehicles have a shorter driving range compared to traditional vehicles. Tech_2: The limited range of electric vehicles causes anxiety or inconvenience. Tech_3: Due to the limited range of electric vehicles, it is necessary to have easily accessible charging infrastructure in order to make their use more practical.	Degirmenci and Breitner (2017)

Social Influence (Social)	Independent	Social_1: If my family and friends buy an electric vehicle, I might buy it as well. Social_2: Driving an electric vehicle will enhance my public image. Social_3: If I own an electric vehicle, it will impress others.	Khurana, Kumar and Sidhpuria (2020)
Economic/Price Benefit (Eco)	Independent	Eco_1: The high price of electric vehicles is a major reason why people are not buying them. Eco_2: The cost of electric vehicles being similar to that of petrol vehicles would make me more likely to consider purchasing an electric vehicle.	Degirmenci and Breitner (2017)
Government Incentives (Govt)	Independent	Govt_1: Government policies make me believe that electric vehicles will be the trend in the future and encourage me to buy one. Govt_2: The Indian government's financial incentives encourage the purchase of electric vehicles.	Jaiswal, Kaushal, Kant and Singh (2021).
Accessibility to Infrastructure (Infra)	Independent	Infra_1: If the number of charging stations increases, I would consider purchasing an electric vehicle. Infra_2: Given sufficient access to efficient charging stations, I would be willing to purchase an electric vehicle. Infra_3: If there was an electric fuel service station available at every gas station, I would consider buying an electric vehicle.	Mishra and Malhotra (2019)
Environmental Concern (Env)	Independent	Env_1: By using electric vehicles, it is possible to improve the environmental quality. Env_2: In my opinion, electric vehicles are beneficial for safeguarding the environment.	Khurana, Kumar and Sidhpuria (2020)

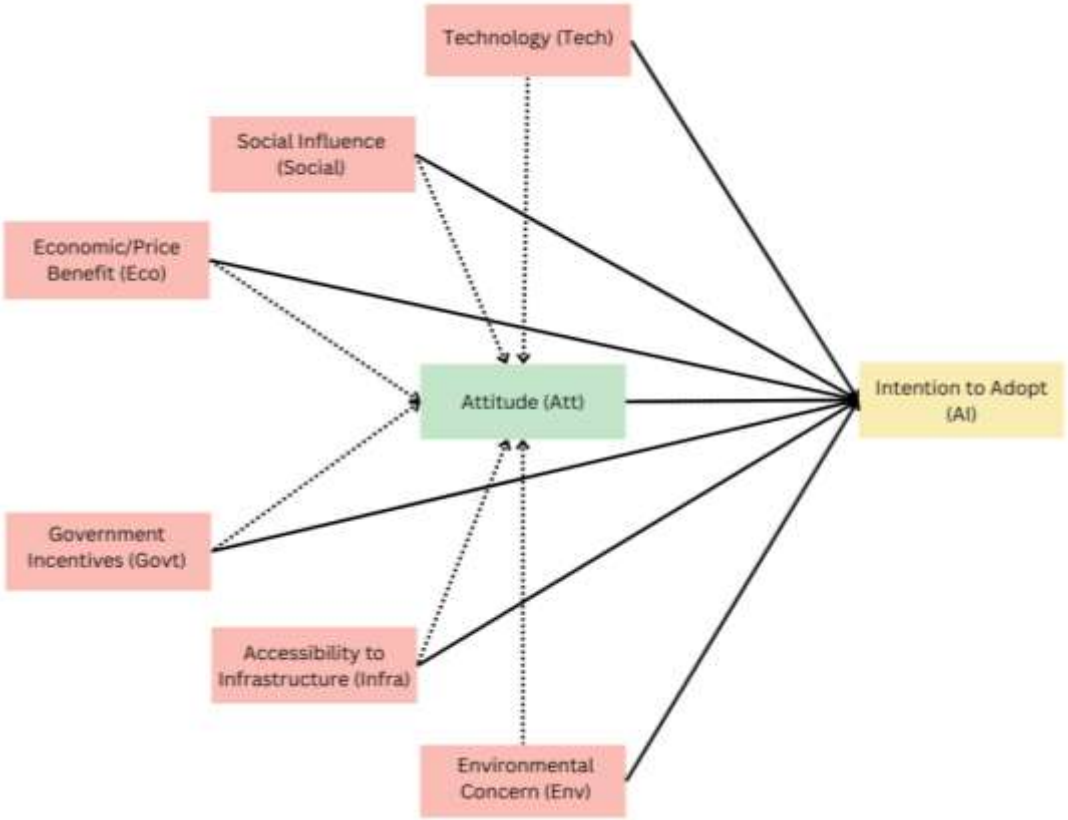
Attitude (Att)	Independent /Mediating	Att_1: I believe that electric vehicles are superior and more efficient compared to traditional vehicles. Att_2: I have a positive attitude toward electric vehicles.	Khurana, Kumar and Sidhpuria (2020)

Source: Own analysis

3.5 Proposed research model

The research objectives and literature review have led to the development of a research model, which is presented in figure 3.1.

Figure 3.1 Proposed research model



3.6 Data analysis

Data analysis involves the cleaning, transformation, and examination of raw data to derive valuable and relevant information that can aid in making informed decisions. In

this study, SPSS is used to conduct data analysis, using various statistical tools to comprehend and draw conclusions.

3.6.1 Statistical tools for data analysis

1. Descriptives: Frequency, mean, and standard deviation.
2. Reliability Analysis: Reliability analysis assesses the constructs used in the study for internal consistency.
3. Sample Adequacy: To determine if a sample is suitable for a particular research study, a sample adequacy test is conducted to assess its size and representativeness. KMO and Bartlett's test is used to assess sample adequacy.
4. Exploratory Factor Analysis: Exploratory factor analysis is used to extract a small number of common factors from a large number of variables.
5. T-test: Independent samples t-test is a statistical technique used to test a hypothesis to determine if there is a significant difference between the means of two independent samples.
6. Regression Analysis: Linear regression is a statistical technique that aims to analyze and model the relationship between a dependent variable and an independent variable.
7. Mediation Analysis: When two variables are related to each other, their influence can be mediated by a third variable. This third variable is called a mediator, and it intervenes in the relationship between the two variables, this can be understood by mediation analysis.

CHAPTER 4: ANALYSIS AND DISCUSSION

Data analysis is a crucial step in the research process, as it involves transforming raw data into meaningful and useful information that can inform decision-making and hypothesis testing. The statistical tools and techniques used for data analysis are descriptives, reliability test, sample adequacy test, exploratory factor analysis, T-test, correlation, regression, and mediation analysis.

4.1 Descriptives

4.1.1 Age (years)

Table 4.1: Age (years)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-25	77	67.5	67.5	67.5
	26-30	18	15.8	15.8	83.3
	31-35	7	6.1	6.1	89.5
	36-40	10	8.8	8.8	98.2
	41-45	2	1.8	1.8	100.0
	Total	114	100.0	100.0	

Source: SPSS output

4.1.2 Gender

Table 4.2: Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	63	55.3	55.3	55.3
	Male	51	44.7	44.7	100.0
	Total	114	100.0	100.0	

Source: SPSS output

4.1.3 Current location

Table 4.3: Current location

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Ahmedabad	2	1.8	1.8	1.8
	Bangalore	3	2.6	2.6	4.4
	Delhi NCR	87	76.3	76.3	80.7
	Himachal Pradesh	1	.9	.9	81.6
	Hyderabad	3	2.6	2.6	84.2
	Kolkata	6	5.3	5.3	89.5
	Mumbai	11	9.6	9.6	99.1
	Noida	1	.9	.9	100.0
	Total	114	100.0	100.0	

Source: SPSS output

4.1.4 Occupation

Table 4.4: Occupation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Business/Self employed	9	7.9	7.9	7.9
	Housewife	1	.9	.9	8.8
	Professional/Job	29	25.4	25.4	34.2
	Student	75	65.8	65.8	100.0
	Total	114	100.0	100.0	

Source: SPSS output

4.1.5 Annual income (Rs.)

Table 4.5: Annual income (Rs.)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Below 10 lakhs	75	65.8	65.8	65.8
	11-15 lakhs	23	20.2	20.2	86.0
	16-20 lakhs	9	7.9	7.9	93.9
	21-25 lakhs	3	2.6	2.6	96.5
	26-30 lakhs	1	.9	.9	97.4
	31 lakhs and above	3	2.6	2.6	100.0
	Total	114	100.0	100.0	

Source: SPSS output

4.1.6 Current ownership of electric vehicles

Table 4.6: Current ownership of electric vehicles

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	100	87.7	87.7	87.7
	Yes	14	12.3	12.3	100.0
	Total	114	100.0	100.0	

Source: SPSS output

4.1.7 Primary source of information about electric vehicles

Table 4.7: Primary source of information about electric vehicles

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Internet	92	80.7	80.7	80.7
	Newspapers	3	2.6	2.6	83.3
	Peer Communication	15	13.2	13.2	96.5
	TV	4	3.5	3.5	100.0
	Total	114	100.0	100.0	

Source: SPSS output

4.1.8 Type of electric vehicle would one like to purchase in the future

Table 4.8: Type of electric vehicle would one like to purchase in the future

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	2 wheeler	35	30.7	30.7	30.7
	4 wheeler	79	69.3	69.3	100.0
	Total	114	100.0	100.0	

Source: SPSS output

4.1.9 Willingness to spend on an electric vehicle (Rs.)

Table 4.9: Willingness to spend on an electric vehicle (Rs.)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Upto 3 lakhs	24	21.1	21.1	21.1
	4-8 lakhs	42	36.8	36.8	57.9
	9-13 lakhs	27	23.7	23.7	81.6
	14-18 lakhs	17	14.9	14.9	96.5
	19-23 lakhs	1	.9	.9	97.4
	24 lakhs and above	3	2.6	2.6	100.0
	Total	114	100.0	100.0	

Source: SPSS output

4.1.10 Most important aspect to consider before purchasing an electric vehicle

Table 4.10: Most important aspect to consider before purchasing an electric vehicle

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Comfort	20	17.5	17.5	17.5
	Environmental protection	7	6.1	6.1	23.7
	Government incentives	4	3.5	3.5	27.2
	Influence from others	3	2.6	2.6	29.8
	Infrastructural convenience	31	27.2	27.2	57.0
	Price	30	26.3	26.3	83.3
	Range	19	16.7	16.7	100.0
	Total	114	100.0	100.0	

Source: SPSS output

4.2 Reliability analysis

Reliability is the measure of internal consistency of the constructs in the study. A construct is reliable if the Alpha value is greater than 0.70 (Hair et al., 2013). Construct reliability is assessed using Cronbach's Alpha in SPSS. The reliability results are summarized in table 4.11.

Table 4.11: Reliability statistics

Construct	Number of Items	Alpha
Intention to Adopt (AI)	2	.827
Technology (Tech)	3	.838
Social Influence (Social)	3	.892
Economic/Price Benefit (Eco)	2	.749
Government Incentives (Govt)	2	.784
Accessibility to Infrastructure (Infra)	3	.907
Environmental Concern (Env)	2	.933
Attitude (Att)	2	.832

Source: Own analysis

The reliability of all the factors is above 0.70.

4.3 Sample adequacy

KMO and Bartlett's test is carried out in SPSS to assess sample adequacy. In this situation, the KMO value is 0.752 as per table 4.12, indicating acceptable sample adequacy (Hutcheson and Sofroniou, 1999). Bartlett's test is significant which shows that the correlation matrix is substantially different from an identity matrix.

Table 4.12: KMO and Bartlett's test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.752
Bartlett's Test of Sphericity	Approx. Chi-Square	1401.276
	df	171
	Sig.	.000

Source: SPSS output

4.4 Exploratory factor analysis

Exploratory factor analysis in SPSS is used to extract a small number of common factors from a large number of variables. This is consistent with getting the model as simple as possible. Varimax rotation is used to extract the principal factors. "By rotating the axis, we present that both clusters of variables are intersected by the factor to which they relate most. So after rotation, the loadings of variables are maximized on one factor and minimized on the remaining factors" (Field, 2009). Varimax is used for rotation because it is a generally regarded as a good approach that loads variables into factors, maximises dispersion of loadings within factors, and creates interpretable clusters for streamlined exploration and analysis (Field, 2009).

According to the research practice, statements having cross-loadings or low loadings are eliminated. In this case eight factors are derived which are AI, Tech, Att, Social, Eco, Govt, Infra, Env as shown in table 4.13.

Table 4.13: Rotated component matrix

	Component							
	1	2	3	4	5	6	7	8
AI_1								.681
AI_2								.779
Tech_1			.883					
Tech_2			.864					
Tech_3			.734					
Att_1					.790			
Att_2					.897			
Social_1		.823						
Social_2		.928						
Social_3		.882						
Env_1				.921				
Env_2				.916				
Eco_1							.872	
Eco_2							.771	
Infra_1	.880							
Infra_2	.880							
Infra_3	.781							
Govt_1						.894		
Govt_2						.776		

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.[a]

Source: SPSS output

4.5 T – test

The independent samples t-test is a statistical technique used to test a hypothesis to determine if there is a significant difference between the means of two independent samples. Independent samples t-test is conducted in SPSS to compare the intention to adopt electric vehicles for males and females.

H0: There is no difference in the intention to adopt electric vehicles between males and females.

H1: There is a significant difference in the intention to adopt electric vehicles between males and females.

Table 4.14: Group statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
AI	Female	63	3.6587	.80234	.10109
	Male	51	3.9020	.87761	.12289

Source: SPSS output

Table 4.15: Independent samples test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
AI	Equal variances assumed	.165	.686	-1.543	112	.126	-.24323	.15762	-.55553	.06907
	Equal variances not assumed			-1.529	102.653	.129	-.24323	.15912	-.55883	.07237

Source: SPSS output

The results indicate no difference between female (M=3.6587, SD= 0.80234) and male (M=3.9020, SD= 0.87761), [t(112) = -1.543, p = 0.126 >0.05]. The 95% confidence interval of the difference between means ranged from [-0.55553 to 0.06907] and did not indicate a difference between the means of the sample. Consequently, we fail to reject the null hypothesis that there is no difference between the sample means as per table 4.14 and table 4.15.

4.6 Regression analysis

Linear regression is a statistical technique that aims to analyze and model the relationship between a dependent variable and an independent variable. The main goal of linear regression is to determine the linear equation that most accurately describes the association between the variables. Regression analysis is carried out in SPSS to understand the relationship between the dependent variable and independent variables.

4.6.1 Analyze whether technology has a significant impact on the intention to adopt electric vehicles.

H0: There is no impact of **technology** on the **intention to adopt** electric vehicles

H2: There is a significant impact of **technology** on the **intention to adopt** electric vehicles

Table 4.16: Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.441[a]	.195	.188	.75877

a. Predictors: (Constant), Tech

Source: SPSS output

According to table 4.16, the simple correlation between the independent variable **technology** and the dependent variable **intention to adopt** electric vehicles is represented by an R-value of 0.441. This indicates a weak positive correlation between the two variables. Additionally, the R^2 value of 0.195 suggests that only a small proportion (19.5%) of the total variation in the dependent variable can be attributed to variations in the independent variable.

Table 4.17: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	15.608	1	15.608	27.110	.000[b]
	Residual	64.482	112	.576		
	Total	80.090	113			

a. Dependent Variable: AI

b. Predictors: (Constant), Tech

Source: SPSS output

Table 4.18: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.957	.355		5.515	.000
	Tech	.481	.092	.441	5.207	.000

a. Dependent Variable: AI

Source: SPSS output

Based on the information presented in table 4.17 and table 4.18, it can be inferred that the regression model successfully predicts the dependent variable. The "Sig." column provides information about the statistical significance of the regression model, and if the p-value is less than 0.05, then there is a significant relationship between the independent and dependent variables.

As the p-value in the "Sig." column is 0.000 which is less than 0.05, it can be inferred that the null hypothesis can be rejected. This indicates that there is a statistically significant impact of **technology** on the **intention to adopt** electric vehicles, characterized by a low degree of positive correlation.

4.6.2 Analyze whether social influence has a significant impact on the intention to adopt electric vehicles.

H0: There is no impact of **social influence** on the **intention to adopt** electric vehicles

H3: There is a significant impact of **social influence** on the **intention to adopt** electric vehicles

Table 4.19: Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.198[a]	.039	.031	.82889

a. Predictors: (Constant), Social

Source: SPSS output

According to table 4.19, the simple correlation between the independent variable **social influence** and the dependent variable **intention to adopt** electric vehicles is represented by an R-value of 0.198. This indicates a very weak positive correlation between the two variables. Additionally, the R^2 value of 0.039 suggests that only a small proportion (3.9%) of the total variation in the dependent variable can be attributed to variations in the independent variable.

Table 4.20: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.140	1	3.140	4.570	.035[b]
	Residual	76.950	112	.687		
	Total	80.090	113			

a. Dependent Variable: AI

b. Predictors: (Constant), Social

Source: SPSS output

Table 4.21: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.312	.227		14.589	.000
	Social	.180	.084	.198	2.138	.035

a. Dependent Variable: AI

Source: SPSS output

Based on the information presented in table 4.20 and table 4.21, it can be inferred that the regression model successfully predicts the dependent variable. The "Sig." column provides information about the statistical significance of the regression model, and if the p-value is less than 0.05, then there is a significant relationship between the independent and dependent variables.

As the p-value in the "Sig." column is 0.035 which is less than 0.05, it can be inferred that the null hypothesis can be rejected. This indicates that there is a statistically significant impact of **social influence** on the **intention to adopt** electric vehicles, characterized by a very low degree of positive correlation.

4.6.3 Analyze whether economic/price benefit has a significant impact on the intention to adopt electric vehicles.

H0: There is no impact of **economic/price benefit** on the **intention to adopt** electric vehicles

H4: There is a significant impact of **economic/price benefit** on the **intention to adopt** electric vehicles

Table 4.22: Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.282[a]	.079	.071	.81139

a. Predictors: (Constant), Eco

Source: SPSS output

According to table 4.22, the simple correlation between the independent variable **economic/price benefit** and the dependent variable **intention to adopt** electric vehicles is represented by an R-value of 0.282. This indicates a very weak positive correlation between the two variables. Additionally, the R^2 value of 0.079 suggests that only a small proportion (7.9%) of the total variation in the dependent variable can be attributed to variations in the independent variable.

Table 4.23: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	6.355	1	6.355	9.652	.002[b]
	Residual	73.735	112	.658		
	Total	80.090	113			

a. Dependent Variable: AI

b. Predictors: (Constant), Eco

Source: SPSS output

Table 4.24: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.686	.356		7.541	.000
	Eco	.292	.094	.282	3.107	.002

a. Dependent Variable: AI

Source: SPSS output

Based on the information presented in table 4.23 and table 4.24, it can be inferred that the regression model successfully predicts the dependent variable. The "Sig." column provides information about the statistical significance of the regression model, and if the p-value is less than 0.05, then there is a significant relationship between the independent and dependent variables.

As the p-value in the "Sig." column is 0.002 which is less than 0.05, it can be inferred that the null hypothesis can be rejected. This indicates that there is a statistically significant impact of **economic/price benefit** on the **intention to adopt** electric vehicles, characterized by a very low degree of positive correlation.

4.6.4 Analyze whether government incentives have a significant impact on the intention to adopt electric vehicles.

H0: There is no impact of **government incentives** on the **intention to adopt** electric vehicles

H5: There is a significant impact of **government incentives** on the **intention to adopt** electric vehicles

Table 4.25: Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.353[a]	.124	.117	.79126

a. Predictors: (Constant), Govt

Source: SPSS output

According to table 4.25, the simple correlation between the independent variable **government incentives** and the dependent variable **intention to adopt** electric vehicles is represented by an R-value of 0.353. This indicates a weak positive correlation between the two variables. Additionally, the R^2 value of 0.124 suggests that only a small proportion (12.4%) of the total variation in the dependent variable can be attributed to variations in the independent variable.

Table 4.26: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.967	1	9.967	15.919	.000[b]
	Residual	70.123	112	.626		
	Total	80.090	113			

a. Dependent Variable: AI

b. Predictors: (Constant), Govt

Source: SPSS output

Table 4.27: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.456	.337		7.288	.000
	Govt	.389	.097	.353	3.990	.000

a. Dependent Variable: AI

Source: SPSS output

Based on the information presented in table 4.26 and table 4.27, it can be inferred that the regression model successfully predicts the dependent variable. The "Sig." column provides information about the statistical significance of the regression model, and if the p-value is less than 0.05, then there is a significant relationship between the independent and dependent variables.

As the p-value in the "Sig." column is 0.000 which is less than 0.05, it can be inferred that the null hypothesis can be rejected. This indicates that there is a statistically significant impact of **government incentives** on the **intention to adopt** electric vehicles, characterized by a low degree of positive correlation.

4.6.5 Analyze whether accessibility to infrastructure has a significant impact on the intention to adopt electric vehicles.

H0: There is no impact of **accessibility to infrastructure** on the **intention to adopt** electric vehicles

H6: There is a significant impact of **accessibility to infrastructure** on the **intention to adopt** electric vehicles

Table 4.28: Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.585[a]	.342	.337	.68570

a. Predictors: (Constant), Infra

Source: SPSS output

According to table 4.28, the simple correlation between the independent variable **accessibility to infrastructure** and the dependent variable **intention to adopt** electric vehicles is represented by an R-value of 0.585. This indicates a moderate positive correlation between the two variables. Additionally, the R^2 value of 0.342 suggests that only a small proportion (34.2%) of the total variation in the dependent variable can be attributed to variations in the independent variable.

Table 4.29: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	27.429	1	27.429	58.337	.000[b]
	Residual	52.661	112	.470		
	Total	80.090	113			

a. Dependent Variable: AI

b. Predictors: (Constant), Infra

Source: SPSS output

Table 4.30: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.456	.309		4.706	.000
	Infra	.592	.077	.585	7.638	.000

a. Dependent Variable: AI

Source: SPSS output

Based on the information presented in table 4.29 and table 4.30, it can be inferred that the regression model successfully predicts the dependent variable. The "Sig." column provides information about the statistical significance of the regression model, and if the p-value is less than 0.05, then there is a significant relationship between the independent and dependent variables.

As the p-value in the "Sig." column is 0.000 which is less than 0.05, it can be inferred that the null hypothesis can be rejected. This indicates that there is a statistically significant impact of **accessibility to infrastructure** on the **intention to adopt** electric vehicles, characterized by a moderate degree of positive correlation.

4.6.6 Analyze whether the environmental concern has a significant impact on the intention to adopt electric vehicles.

H0: There is no impact of **environmental concern** on the **intention to adopt** electric vehicles

H7: There is a significant impact of **environmental concern** on the **intention to adopt** electric vehicles

Table 4.31: Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.357[a]	.127	.120	.78997

a. Predictors: (Constant), Env

Source: SPSS output

According to table 4.31, the simple correlation between the independent variable **environmental concern** and the dependent variable **intention to adopt** electric vehicles is represented by an R-value of 0.357. This indicates a weak positive correlation between the two variables. Additionally, the R^2 value of 0.127 suggests that only a small proportion (12.7%) of the total variation in the dependent variable can be attributed to variations in the independent variable.

Table 4.32: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	10.196	1	10.196	16.338	.000[b]
	Residual	69.894	112	.624		
	Total	80.090	113			

a. Dependent Variable: AI

b. Predictors: (Constant), Env

Source: SPSS output

Table 4.33: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.602	.298		8.746	.000
	Env	.318	.079	.357	4.042	.000

a. Dependent Variable: AI

Source: SPSS output

Based on the information presented in table 4.32 and table 4.33, it can be inferred that the regression model successfully predicts the dependent variable. The "Sig." column provides information about the statistical significance of the regression model, and if the p-value is less than 0.05, then there is a significant relationship between the independent and dependent variables.

As the p-value in the "Sig." column is 0.000 which is less than 0.05, it can be inferred that the null hypothesis can be rejected. This indicates that there is a statistically significant impact of **environmental concern** on the **intention to adopt** electric vehicles, characterized by a low degree of positive correlation.

4.6.7 Analyze whether attitude has a significant impact on the intention to adopt electric vehicles.

H0: There is no impact of **attitude** on the **intention to adopt** electric vehicles

H8: There is a significant impact of **attitude** on the **intention to adopt** electric vehicles

Table 4.34: Model summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.516[a]	.266	.260	.72437

a. Predictors: (Constant), Att

Source: SPSS output

According to table 4.34, the simple correlation between the independent variable **attitude** and the dependent variable **intention to adopt** electric vehicles is represented by an R-value of 0.516. This indicates a moderate positive correlation between the two variables. Additionally, the R^2 value of 0.266 suggests that only a small proportion (26.6%) of the total variation in the dependent variable can be attributed to variations in the independent variable.

Table 4.35: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	21.323	1	21.323	40.637	.000[b]
	Residual	58.767	112	.525		
	Total	80.090	113			

a. Dependent Variable: AI

b. Predictors: (Constant), Att

Source: SPSS output

Table 4.36: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.082	.273		7.626	.000
	Att	.513	.080	.516	6.375	.000

a. Dependent Variable: AI

Source: SPSS output

Based on the information presented in table 4.35 and table 4.36, it can be inferred that the regression model successfully predicts the dependent variable. The "Sig." column provides information about the statistical significance of the regression model, and if the p-value is less than 0.05, then there is a significant relationship between the independent and dependent variables.

As the p-value in the "Sig." column is 0.000 which is less than 0.05, it can be inferred that the null hypothesis can be rejected. This indicates that there is a statistically significant impact of **attitude** on the **intention to adopt** electric vehicles, characterized by a moderate degree of positive correlation.

Table 4.37: Summary of regression results

Hypothesis	Path	p-value	Hypothesis Supported
H2	Technology → Intention to Adopt	0.000	Yes
H3	Social Influence → Intention to Adopt	0.035	Yes
H4	Economic/Price Benefit → Intention to Adopt	0.002	Yes
H5	Government Incentives → Intention to Adopt	0.000	Yes
H6	Accessibility to Infrastructure → Intention to Adopt	0.000	Yes
H7	Environmental Concern → Intention to Adopt	0.000	Yes
H8	Attitude → Intention to Adopt	0.000	Yes

Source: Own analysis

4.7 Mediation analysis

When two variables are related to each other, their influence can be mediated by a third variable. This third variable is called a mediator, and it intervenes on the relationship between the two variables. The direct effect is the relationship between the independent variable and the dependent variable in the presence of the mediator. The indirect effect, on the other hand, flows from the independent variable to the mediator and then to the dependent variable. The total effect is the combined influence of the direct and indirect effects.

To investigate the mediating effects of attitude, Hayes Process Macro - Model 4 in SPSS is used, which is a statistical analysis tool that can test mediation effects. In interpreting the results using Hayes Process Macro - Model 4, the focus is on the significance level of the indirect effect and its confidence interval. The confidence interval represents a range of values that the true effect is likely to fall within with a certain level of confidence. If the confidence interval does not include zero, this means that the indirect effect is statistically significant at the specified significance level ($p < 0.05$), indicating that the mediator has a significant role in the relationship between the independent and dependent variables. In contrast, if the confidence interval contains zero, this suggests that the indirect effect is not significant and that the mediator does not play a significant role in the relationship between the independent and dependent variables.

H9: **Attitude** mediates the relationship between **technology** and **intention to adopt** electric vehicles

H10: **Attitude** mediates the relationship between **social influence** and **intention to adopt** electric vehicles

H11: **Attitude** mediates the relationship between **economic/price benefit** and **intention to adopt** electric vehicles

H12: **Attitude** mediates the relationship between **government incentives** and **intention to adopt** electric vehicles

H13: **Attitude** mediates the relationship between **accessibility to infrastructure** and **intention to adopt** electric vehicles

H14: **Attitude** mediates the relationship between **environmental concern** and **intention to adopt** electric vehicles

Table 4.38: Summary of mediation analysis results

Hypothesis	Path	Total Effect	Direct Effect	Indirect Effect	Confidence Interval		Mediation
					Lower Bound	Upper Bound	
H9:	Technology → Attitude → Intention to Adopt	0.4807 (0.0000)	0.3461 (0.0001)	0.1346	0.0227	0.2454	Yes
H10	Social Influence → Attitude → Intention to Adopt	0.1801 (0.0347)	0.0255 (0.7455)	0.1545	0.0590	0.2551	No
H11	Economic/Price Benefit → Attitude → Intention to Adopt	0.2924 (0.0024)	0.1864 (0.0296)	0.1060	-0.0008	0.2170	No
H12	Government Incentives → Attitude → Intention to Adopt	0.3889 (0.0001)	0.3348 (0.0001)	0.0541	-0.0484	0.1788	No
H13	Accessibility to Infrastructure → Attitude → Intention to Adopt	0.5917 (0.0000)	0.4644 (0.0000)	0.1273	0.0441	0.2288	Yes
H14	Environmental Concern → Attitude → Intention to Adopt	0.3181 (0.0001)	0.2057 (0.0057)	0.1124	0.0301	0.2077	Yes

Source: Own analysis

CHAPTER 5: CONCLUSION

5.1 Results

The purpose of the study is to investigate the factors that influence the intention to adopt electric vehicles. It used exploratory factor analysis to identify eight factors (intention to adopt electric vehicles, technology, social influence, economic/price benefit, government incentives, accessibility to infrastructure, environmental concern, and attitude), and the reliability of all the factors is found to be above 0.70, which suggests good internal consistency. To assess the sample adequacy, the KMO and Bartlett's test is carried out, and the KMO value is found to be 0.752, which indicates that the sample is adequate. Furthermore, the study conducted an independent sample t-test to examine the difference in the intention to adopt electric vehicles between males and females. The results of this test shows that there is no significant difference in the intention to adopt electric vehicles between males and females.

The study conducted a regression analysis on the variables of technology, social influence, economic/price benefit, government incentives, accessibility to infrastructure, environmental concern, and attitude. The results showed that all these variables have a statistically significant impact on the intention to adopt electric vehicles. In particular, the study found that accessibility to infrastructure and attitude had a moderate positive correlation with the intention to adopt electric vehicles. It can be inferred that individuals with easier access to infrastructure and a positive attitude towards electric vehicles are more likely to perceive them as a viable alternative to conventional gasoline vehicles and express an intention to adopt them. While the impact of technology, environmental concern, and government incentives on the intention to adopt electric vehicles is positively correlated but to a lower degree than the first two factors due to the complex and multifaceted nature of consumer behavior and decision-making. The study also found that social influence and economic/price benefit are positively correlated with the intention to adopt electric vehicles but to a very low degree. Social influence may have a weaker impact because people's decision to buy a car is often based on personal preferences, lifestyle, and practical considerations. Similarly, while economic/price benefits may be a factor in the decision to adopt electric vehicles, the initial cost of purchasing an electric vehicle may still be relatively high, which may limit its appeal to certain consumers.

The results of the mediation analysis using Hayes Process Macro - Model 4 in SPSS indicate that attitude plays a significant mediating role in the relationship between technology, accessibility to infrastructure, and environmental concern with the intention to adopt electric vehicles. This means that individuals' attitudes toward technology, infrastructure, and environmental concern can influence their intention to adopt electric vehicles. For example, if an individual believes that electric vehicles are technologically advanced and reliable, that there is a sufficient charging infrastructure available, and that electric vehicles are environmentally friendly, they are more likely to have a positive attitude towards electric vehicles, which in turn can increase their intention to adopt them. But attitude does not play a mediating role in the relationship between social influence, economic/price benefit, and government incentives with the intention to adopt electric vehicles. This means that these factors can directly influence an individual's intention to adopt electric vehicles, without being mediated by their attitude toward electric vehicles. For example, an individual may decide to adopt an electric vehicle because of the economic benefits, such as lower fuel costs and tax incentives, without having a positive attitude toward electric vehicles. Similarly, an individual may be influenced by social factors, such as the opinions of their friends or family, to adopt electric vehicles, without necessarily having a positive attitude towards them. Overall, the results suggest that a combination of these factors can influence individuals' intentions to adopt electric vehicles.

5.2 Practical implications

The findings have several practical implications for policymakers, manufacturers, and marketers who are interested in promoting the adoption of electric vehicles.

Firstly, accessibility to infrastructure and attitude play an important role in the intention to adopt electric vehicles. Thus, manufacturers and policymakers can work together to increase the availability of charging stations, which can help reduce range anxiety and increase customer confidence in electric vehicles. They can also work on improving the design and features of electric vehicles to make them more appealing to customers. Additionally, marketers can use targeted advertising campaigns to improve the attitudes and perceptions of electric vehicles.

Secondly, the results suggest that technology, government incentives, and environmental concern positively influence the intention to adopt electric vehicles. Thus, policymakers can provide incentives and subsidies to promote the development and production of electric vehicles, which can help reduce their costs and make them more attractive to customers. In order to advance the technology and functionality of electric vehicles, they can also make research and development investments. Additionally, policymakers can inform and educate the public more about the advantages of electric vehicles, such as lowering air pollution and carbon emissions. The results suggest that attitude mediates the relationship between technology, accessibility to infrastructure, and environmental concern with the intention to adopt electric vehicles. Thus, marketers can focus on improving the attitudes and perceptions of electric vehicles through targeted messaging and branding efforts. They can also leverage social media and other digital platforms to increase positive word-of-mouth and social influence.

Finally, while social influence and economic/price benefit may not have a significant direct impact on the intention to adopt EVs, they can still play a role in promoting their adoption when combined with other factors. Thus, a comprehensive approach that considers multiple factors is necessary to promote the adoption of EVs.

5.3 Limitations

The limitations of the present study provide significant opportunities for further research.

- The study is limited to the perspective of a non-probabilistic convenient sample of 114 respondents residing in metropolitan cities of India.
- The study only measures the intention to adopt electric vehicles and does not investigate whether intention translates to actual adoption.
- The study only considers seven factors (technology, social influence, economic/price benefit, government incentives, accessibility to infrastructure, environmental concern, and attitude), which may not be exhaustive in determining the factors that influence EV adoption.

Due to the limitations of the study, it is advisable to conduct similar studies under different conditions and in different regions to validate the findings.

REFERENCES

- Ali, I., & Naushad, M. (2022). A study to investigate what tempts consumers to adopt electric vehicles. *World Electric Vehicle Journal*, *13*(2), 26.
- Bansal, H. O., & Goyal, P. (2020, December). Enablers and Barriers of Electric Vehicle in India: A Review. In *2020 IEEE International Symposium on Sustainable Energy, Signal Processing and Cyber Security (iSSSC)* (pp. 1-5). IEEE.
- Bhalla, P., Ali, I. S., & Nazneen, A. (2018). A study of consumer perception and purchase intention of electric vehicles. *European Journal of Scientific Research*, *149*(4), 362-368.
- Dash, A. (2021). Determinants of EVs adoption: a study on green behavior of consumers. *Smart and Sustainable Built Environment*, *10*(1), 125-137.
- Degirmenci, K., & Breitner, M. H. (2017). Consumer purchase intentions for electric vehicles: Is green more important than price and range?. *Transportation Research Part D: Transport and Environment*, *51*, 250-260.
- Dutt, D. (2023). Exploring multi-level interactions in electric vehicle niche evolution in India. *Transportation Research Part D: Transport and Environment*, *114*, 103538.
- Field, A. (2009), Discovering Statistics Using SPSS, Sage publications.
- Govindarasu, A., & Venkatesh, A. S. (2019, December). Electric vehicle vision 2030 challenges and solutions. In *2019 IEEE Transportation Electrification Conference (ITEC-India)* (pp. 1-3). IEEE.
- Hutcheson, G.D. & Sofroniou, N. (1999) *The multivariate social scientist: Introductory statistics using generalized linear models*. Sage.
- Jaiswal, D., Kaushal, V., Kant, R., & Singh, P. K. (2021). Consumer adoption intention for electric vehicles: Insights and evidence from Indian sustainable transportation. *Technological Forecasting and Social Change*, *173*, 121089.
- Khurana, A., Kumar, V. R., & Sidhpuria, M. (2020). A study on the adoption of electric vehicles in India: the mediating role of attitude. *Vision*, *24*(1), 23-34.

- Ko, S., & Shin, J. (2023). Projection of fuel cell electric vehicle demand reflecting the feedback effects between market conditions and market share affected by spatial factors. *Energy Policy*, *173*, 113385.
- Kumar, R., & Padmanaban, S. (2019). Electric vehicles for India: overview and challenges. *IEEE India Informatics*, *14*(139), 2019.
- Kumar, R., Jha, A., Damodaran, A., Bangwal, D., & Dwivedi, A. (2021). Addressing the challenges to electric vehicle adoption via sharing economy: an Indian perspective. *Management of Environmental Quality: An International Journal*, *32*(1), 82–99.
- Mishra, S., & Malhotra, G. (2019). Is India ready for e-mobility? An exploratory study to understand e-vehicles purchase intention. *Theoretical Economics Letters*, *9*(02), 376.
- Pani, A., Lingamurthy, S., & Pachava, V. (2023). Electric Vehicles in India: Understanding the Factors Influencing Consumer Choice.
- Patyal, V. S., Kumar, R., & Kushwah, S. (2021). *Modeling barriers to the adoption of electric vehicles*: An Indian perspective. *Energy, 237, 121554.*
- Rietmann, N., Hügler, B., & Lieven, T. (2020). Forecasting the trajectory of electric vehicle sales and the consequences for worldwide CO2 emissions. *Journal of Cleaner Production*, *261*, 121038.
- Sarode, N. M., & Sarode, M. T. (2020). Current scenario of electric mobility in India and its challenges. *Int J Eng Res Technol*, *9*(8), 510-515.
- Srivastava, V. K., Yallatti, U. S., & Vijay, D. Is India Ready for Electric Vehicles?.
- Tupe, O., Kishore, S., & Johnvieira, A. (2020). Consumer perception of electric vehicles in India. *European Journal of Molecular & Clinical Medicine*, *7*(8), 4861-4869.
- *United Nations Framework Convention on Climate Change*. (2019). Retrieved https://unfccc.int/sites/default/files/resource/Climate_Action_Support_Trends_2019.pdf.

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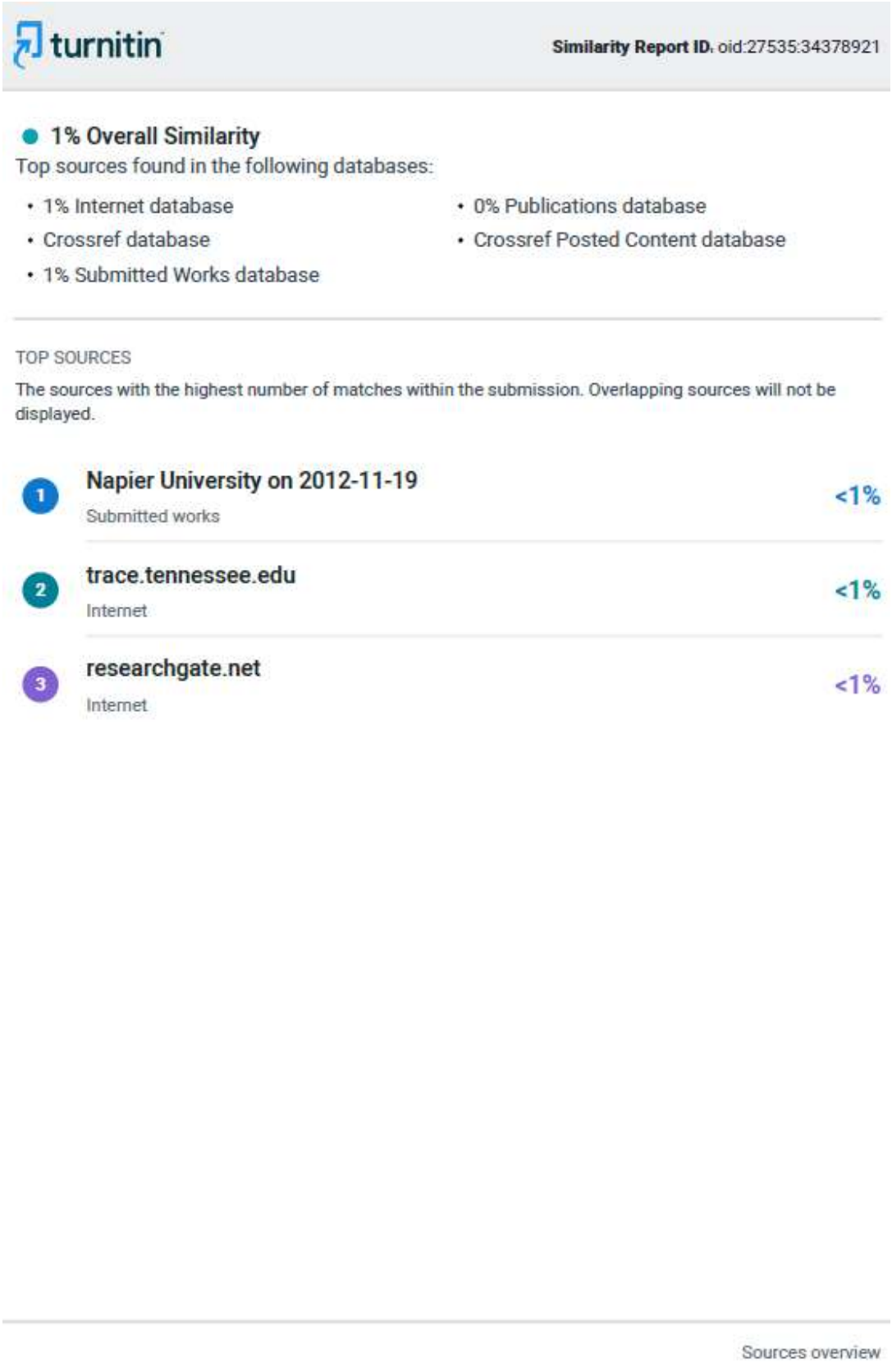

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