“Insights on electric vehicle adoption: Does attitude play a mediating role?”

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INSIGHTS ON ELECTRIC VEHICLE ADOPTION: DOES ATTITUDE PLAY A MEDIATING ROLE?

Abstract

Vehicles are classified as a mobile source of pollution worldwide. This problem is compounded in countries like India, where the population is enormous, and the number of automobiles increases quickly. To overcome this issue, governments and individuals must adopt electric vehicles and maximize the use of eco-friendly vehicles. However, the adoption of electric vehicles in India is gradual. One of the reasons is the attitude towards traditional and electric vehicles. This study's primary objective is to determine how attitude influences the adoption of electric vehicles. The topic is vital since the attitude provided by numerous studies influences the intention to buy anything. This study considered one dependent variable (electric vehicle adoption) and one mediating variable (attitude) along with five independent variables. The data collection method was straightforward, and the sample size was 366 respondents. Exploratory factor analysis (EFA), structural equation modeling (SEM), and mediation analysis were used to analyze the data. All adopted constructs were trustworthy, with average variance extracted exceeding 0.55, composite reliability exceeding 0.75, and factor loadings exceeding 0.70 for most. The model fit indices were also found to be significant on several parameters. Among all other variables, only financial incentives affect electric vehicle adoption. In other circumstances, opinions did not influence customer uptake of electric vehicles.

Keywords attitude, charging infrastructure, environment, adoption, electric vehicles, structural equation modeling (SEM)

JEL Classification D11, L62, Q56

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INTRODUCTION

Environmental safety appears to be gaining momentum in India, both among the government and the populace. Vehicles, on the other hand, are considered mobile sources of pollution. Approximately one-sixth of worldwide greenhouse gas emissions are attributed to fossil fuel use in transportation, accounting for the vast bulk of urban air pollution (Qian & Yin, 2017). The increased use of fossil fuel-based vehicles has a negative impact not only on the environment but also on the health of people, causing many fatal diseases. However, the adoption of electric vehicles (EVs) has been identified as a potentially effective means of reducing carbon emissions from the transportation sector (Wang et al., 2017). The Indian government has implemented multiple policies to address this issue, including the National Electric Mobility Mission Plan (NEMMP). These policies are intended to accelerate the adoption and production of electric vehicles. Several automobile manufacturers in India have also recently announced significant investments in the manufacturing of electric vehicles and the availability of easy credit to customers to accelerate the adoption of electric vehicles. This will contribute to the continued availability of electric vehicles, resulting in a rise in their adoption. It is undisputed that electric vehicles will dominate transportation in the future, which will lead to e-mobility. The e-mobility service providers, charging infrastructure, driving range,

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financial incentives, social image, and people's attitude toward environmental protection all play a role in determining electric vehicle adoption. Global automakers are eyeing India's market due to its high growth potential and low manufacturing costs compared to other developing economies. Therefore, the focus of the government and automobile companies is to ease the various aspects that cause the popularization of EVs by providing the charging infrastructure, financial incentives, environmental awareness, and other numerous aspects that will help in bringing e-mobility. The existing literature on the adoption of electric vehicles indicates not a few but several multi-dimensional factors that contribute to EV adoption.

Some of the factors studied can be summed up as availability of charging infrastructure, financial and non-financial incentives, environmental concerns, social influence from peers, self-image, pricing, attitude, ease of convenience, etc. (Adnan et al., 2017; Khurana et al., 2020; Kley et al., 2011; Sourkounis & Einwächter, 2011; Werther & Hoch, 2012). However, among other factors, the most significant cognitive human characteristics, namely, attitude toward something, play an amicable role in determining whether to go for something. The attitude is the cognitive resonance of belief regarding whether the EV is good or bad for the environment and other aspects influencing the EV adoption decision (Khurana et al., 2020; Wang et al., 2017). As a result, the current study is designed to determine whether the attitude influences other variables in purchasing electric vehicles. Although numerous variables may significantly impact consumers' EV adoption behavior, prior research indicates that the effects of attitude are typically indirect and occur through specific mediating processes (Dash, 2021; Khurana et al., 2020; Schuitema et al., 2013). According to available evidence, when other positive variables influence consumers' attitudes toward sustainability, they are more inclined to express their notions with behavioral intentions (Li et al., 2017). Few studies, however, have studied the effect of adoption determinants on consumer attitudes about EV adoption. This paper continues the investigation of attitude as a mediating mechanism – that is, an individual's judgment of an event's good and bad aspects (Morgan & Hunt, 1994) in the context of other factors influencing consumers' intention to embrace EVs. Investigating mediating mechanisms could substantially impact the understanding of the role of numerous multi-dimensional variables on electric vehicle adoption. Moreover, to examine the role of attitude as a moderating factor in electric vehicle adoption, the following threefold objectives guided this study:

- to ascertain the pattern of adoption of electric vehicles across demographic variables;
- to elucidate the factors that contribute to the adoption of electric vehicles;
- to examine the function of attitude as a moderating factor in EV adoption.

The current study first discusses the literature review conducted to ascertain the research gap in detail. The following section shows the methodology employed. Next, the paper discusses the analytical results obtained. Finally, the conclusion, managerial implications, and future scope of the study are presented.

1. LITERATURE REVIEW AND HYPOTHESES

The adoption of electric vehicles (EV) seems to be one of the most important means to reduce pollution levels and promote sustainability. Electric vehicles can help reduce pollution and help countries' economies become cleaner and eco-friendlier (Adnan et al., 2017). Customers now readily realize the human costs and harmful impact of fossil fuel automobiles. However, the adoption of electric vehicles is not merely based on a customer's environmental awareness, choice, and preference (Adnan et al., 2017; Dash, 2021). EV adoption is influenced by various factors, including economic policies, government support, environmental benefits, psychological needs of people, and demographic factors (Chu et al., 2019; Dash, 2021; Naushad, 2018; Schuitema et al., 2013). However, the most crucial thing that influences one's decision to go for an electric vehicle is their attitude (Chu et al., 2019; Khurana et al., 2020). Attitude is translated into positive and negative vibes towards something to go for (Khurana et al., 2020).

Nevertheless, a few factors have emerged as highly common among others that help form a positive attitude towards the adoption of EVs.

Government financial and non-financial incentives have proven to be the most effective way to encourage the adoption of electric vehicles for transportation (Bjerkan et al., 2016; Quak et al., 2016). A low taxation rate on electric vehicles, flexible policies that encourage rapid adoption, and other financial incentives can also help accelerate the adoption of electric vehicles (Hertzke et al., 2018; Jin et al., 2014). However, Bjerkan et al. (2016) and Khurana et al. (2020) have shown that financial incentives contribute to the formation of attitudes towards the adoption of EVs than anything else. It indicates that people are more likely to adopt electric vehicles if they believe that the concerned product is less expensive. It is difficult for corporations to maintain an affordable price without incentivization (Mersky et al., 2016; Quak et al., 2016). Therefore, it is crucial to understand the impact of financial incentives on attitude formation for adopting EVs.

The next factor that influences EV adoption is adequate charging infrastructure. Adequate infrastructure is critical in determining the adoption of electric vehicles and encouraging customers to purchase one (Adepetu et al., 2016; Javid & Nejat, 2017; Mersky et al., 2016). When customers decide to purchase an electric vehicle, their focus remains on readily accessible and easy-to-use resources and technology for recharging their vehicles (Funke et al., 2019; Jin et al., 2014). The cost-effectiveness and ease of access to charging infrastructure are powerful motivators for switching to EVs (Bjerkan et al., 2016; Khurana et al., 2020). Nonetheless, the public charging infrastructure encourages early adopters/users to switch to electric vehicles (Kumar & Alok, 2020). The advanced infrastructure not only motivates but also shapes an attitude favorable to EV adoption (Khurana et al., 2020; Schuitema et al., 2013). The ease with which charging infrastructure can be accessed influences attitudes toward EV adoption (Melliger et al., 2018).

Social reinforcement also seems to influence EV adoption. It is a term that refers to the effect that family, friends, and relatives have on a customer's purchasing behavior. Customers consider the likes and dislikes of their family members before making a purchase. Naturally, customers prefer to purchase socially acceptable products (Ali & Naushad, 2021; Venkatesh & Davis, 2000). When customers make an electric vehicle purchase, they will consider these factors. As a result of growing public acceptance of electric vehicles, customers will be more likely to adopt them. Customers anticipate expressions of gratitude from friends, relatives, and family members for the products they purchase. It motivates and encourages them to continue purchasing these products in the future (Chen & Tung, 2014). Social reinforcement plays a significant role in adopting electric vehicles (Axsen et al., 2013). Customers' purchasing behavior and intentions are influenced by social reinforcement (Ali et al., 2020). Moreover, it helps shape the right and positive attitude towards the adoption of electric vehicles (Kim et al., 2014; Rasouli & Timmermans, 2016).

The highly appreciated variables for EV adoption are environmental protection concerns (Quak et al., 2016). Environmental concern is the awareness about emerging environmental problems and their potential consequences for the planet. Environmental concern also reflects a customer's commitment to environmental stewardship and his importance on environmental issues when making a purchase. Numerous studies confirm that socially responsible customers' purchasing decisions are influenced by environmental concerns (Khan et al., 2020). Environmentally conscious consumers place a premium on environmentally friendly products and are more likely to purchase electric ones (Schuitema et al., 2013). Additionally, numerous surveys found that environmental issues play an essential role in the purchase of electric vehicles (Peters & Dütschke, 2014). Finally, the environmentally friendly personal attribute contributes significantly to the formation of positive attitudes towards EV adoption (Schuitema et al., 2013).

When customers make a purchase, they are more concerned with price, and they view price as a critical factor in determining the quality of a product. Customers face budget constraints due to their limited purchasing power (Green et al., 2014). Therefore, customers seek affordable

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products that are also environmentally friendly. They are more likely to purchase a product if the benefits outweigh the cost (Turrentine & Kurani, 2007). This is especially true in the case of electric vehicle adoption, which is quite costly. Customers may be deterred from purchasing electric vehicles due to their high cost. Cost is the primary consideration in emerging economies like India when deciding whether to adopt an electric vehicle (Lieven et al., 2011).

Additionally, the initial purchase price is a significant factor to consider (Lane & Potter, 2007). When customers decide to purchase an electric vehicle, financial concerns always take precedence (Lebeau et al., 2013). Price is one of the significant factors that makes a remarkable difference in attitude towards EV adoption (Dash, 2021).

The most intriguing aspect of the current study is the consumer attitude toward EV adoption. Attitude is a term that refers to how one perceives a situation, an object, or a class of objects. It refers to one's beliefs, thoughts, and opinions. Attitude is the consistent response of an individual to a product, brand, or service (Eagly & Chaiken, 2007). Consistently favorable responses to a product or service indicate that customers value it and intend to purchase it in the future. An attitude is composed of three components: cognitive, affective, and behavioral (Khurana et al., 2020). Customers believe that electric vehicles are environmentally friendly and contribute to the country's clean and green image.

Furthermore, the affective dimension of attitude concerns interpersonal relationships and societal expectations. Interpersonal relationships influence the development of a favorable attitude toward a particular product or service indirectly (Ertz et al., 2016). Concerns about the environment and safety contribute indirectly to developing a favorable attitude toward electric vehicles (Moons & De Pelsmacker, 2012). Attitudes play a significant role in determining whether or not a product is adopted (Naushad, 2018). Hence, attitudes influence the intention to adopt electric vehicles indirectly (Wang et al., 2017).

Understanding consumers' behavior is essential for market development. The factors that positively contribute to the purchase of any product must be exploited, while negative aspects must be avoided. Research on EV adoption found many available components influencing consumers' buying decisions. Although numerous variables may have a significant impact on consumers' EV adoption behavior, prior research indicates that the effects of attitude are typically indirect and occur through specific mediating processes (Khurana et al., 2020; Ertz et al., 2016; Kim et al., 2014; Lebeau et al., 2013). According to the available evidence, when other positive variables influence consumers' views about sustainability, "they are often more willing to interact their beliefs with behavioral intentions" (Li et al., 2017). Furthermore, numerous previous studies have explored different factors affecting EV adoption, especially when environmental concerns are at their peak and every government wants rapid adoption of EVs. EV adoption in India is increasing slowly but not at a desirable rate. It is mainly concentrated in urban areas of India. So, it's important to look into the factors that make people want to use electric cars. This way, the main factors can be used to speed up the use of electric cars.

Following are the hypotheses for the present study:

H_1 *Attitude has a mediating impact on the relationship between financial incentives and electric vehicle adoption.*

H_2 *Attitude has a mediating impact on the relationship between charging infrastructure and electric vehicle adoption.*

H_3 *Attitude has a mediating impact on the relationship between social reinforcement and electric vehicle adoption.*

H_4 *Attitude has a mediating impact on the relationship between environmental concern and electric vehicle adoption.*

H_5 *Attitude has a mediating impact on the relationship between price and electric vehicle adoption.*

Figure 1 illustrates the proposed model based on the literature review and the hypothesis framework.

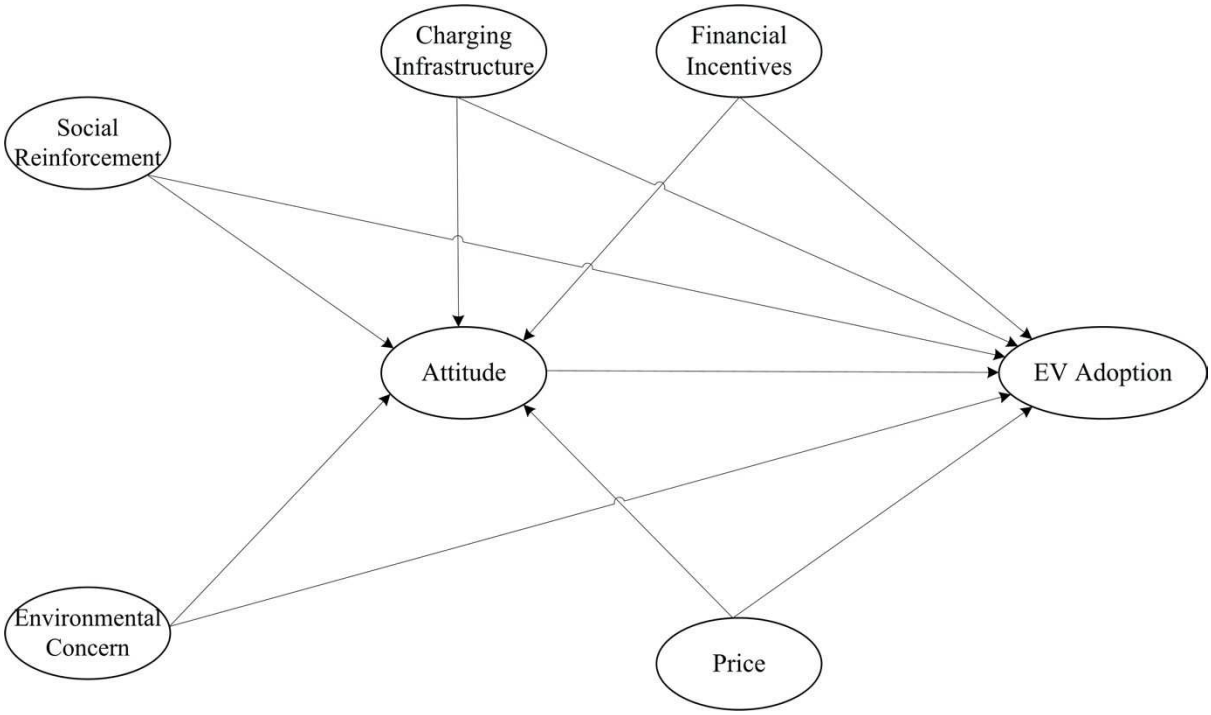

Figure 1. Proposed research model

2. AIMS

The purpose of this study is to investigate the critical determinants of electric vehicle adoption and the mediating effects of attitude on adoption.

3. RESEARCH METHODOLOGY

Data for the current study were collected between February and June of 2021 from Delhi and the National Capital Region in India. The respondents for the questionnaire need to be at least 18 years old and current car owners to participate in this study. A validated tool was used for data collection. The tool has two parts – the demographic characteristics and a set of items about the different variables chosen for this study. There are seven constructs: five independent variables, one dependent variable, and one mediating variable. The constructs chosen are charging infrastructure, environmental concern, financial incentives, social reinforcement, price, electric vehicle adoption, and attitude as a moderating variable. The questionnaire contains 25 questions used to determine the level of adoption of electric vehicles. The random sampling technique was used to collect data, with a large number of questionnaires distributed to the targeted respondents. A large sample size enables the collection of meaningful demographic data and drawing actionable conclusions about the population (Bell et al., 2018). The current study enrolled participants through a simple sampling technique. 450 questionnaires were distributed to targeted respondents via online and offline channels. Unfortunately, a few questionnaires were incomplete, not all the 450 could be used, and the final samples was 366.

Numerous statistical techniques, including correlation, exploratory factor analysis, and confirmatory factor analysis, were used to analyze the data. The analysis was done using IBM SPSS 23 and IBM AMOS 23. Structural equation modeling (SEM) seems appropriate in such studies because the use of confirmatory factor analysis (CFA) SEM is incremental to draw the impact and understand the mediating mechanism specifically. Moreover, SEM is a subset of factor analysis and regression. Hair et al. (2011) claim that SEM is useful for assessing numerous equation theories, their linkages, and the interdependence of research variables. The strong reliability index and validity of the results increase SEM's adaptability in such studies. Additionally, to examine the impact of several explanatory variables on the explained variable, SEM and CFA are used.

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4. DATA ANALYSIS AND RESULTS

This study analyzed data using Excel, IBM SPSS, and IBM AMOS. The data were analyzed using statistical tools like Spearman correlation, EFA, SEM, and mediation analysis. The SEM validation process was followed thoroughly with a two-step process to validate results. The first step validates the measurement model, while the second step validates the structural model through SEM. Initially, an SPSS-based demographic analysis of respondents was conducted.

Table 1. Demographic profile

Variables	Frequency	Percentage
Gender		
Male	233	63.66
Female	133	36.34
Age		
18-30	143	39.07
31-40	120	32.79
41-50	81	22.13
51-60	22	6.01
Marital status		
Single	231	63.11
Married	135	36.89
Income		
Below 10 lakh	326	89.07
More than 10 Lakh	40	10.93
Qualification		
Only diploma/ undergraduate	13	3.55
Bachelor's degree	96	26.23
Master's degree	207	56.56
Others	50	13.66

Table 1 summarizes the respondents' demographic characteristics. Male respondents account for 63.66 percent of the survey participants, while female respondents account for 36.34 percent. In addition, 39.07 percent of respondents are aged 18-30, 32.79 percent are aged 31-40, 22.13 percent are aged 41-50, and 6.01 percent are aged 51-60. Furthermore, 63.11 percent of respondents are single, while 36.89 percent are married. Additionally, 58.74 percent of respondents earn less than three lakhs per year, while 20.77 percent earn between three and five lakhs per year, 9.56 percent earn between five and ten lakhs per year, and 10.93 percent earn more than five lakhs per year. 3.55 percent have earned only a diploma, 26.23 percent have earned a bachelor's degree, and 56.56 percent have earned a master's degree.

4.1. Exploratory factor analysis

EFA was used in this study to reduce the large dataset and uncover the underlying variables. In addition, EFA helps identify the relevant factors for the current study. To determine the data's suitability for analysis, the KMO and Bartlett's tests are used. Table 2 demonstrates the functionality of KMO and Bartlett's test. The KMO value is 0.668, as shown in Table 2, which is considered acceptable. The value of Bartlett's test of sphericity is .000, which is significant and an indication of the sphericity of data.

Table 2. KMO and Bartlett's test

Kaiser-Meyer-Olkin measure of sampling adequacy		.668
Bartlett's test of sphericity	Approx. Chi-Square	2,610.349
	df	300
	Sig.	0.000

The questionnaire initially contains 27 items organized into seven constructs. Then, two items were deleted based on the exploratory factor analysis due to their low factor loading. Finally, only 25 items were subjected to additional analysis.

4.2. Reliability and validity of the constructs

The standardization of a research questionnaire is a critical indicator of its quality. The ability of a scale to produce consistent results quantifies its reliability, indicating the scale's internal consistency when used in data analysis. The internal consistency of a scale is determined using Cronbach's alpha. A Cronbach's alpha value of greater than 0.6 is considered adequate for the reliability of a scale (Hair et al., 1998). Conversely, validity helps to produce accurate results. The average variance extracted (AVE) statistic helps determine the validity of a scale. As a general rule, any value greater than 0.5 for AVE is considered satisfactory. Table 3 shows that, except for electric vehicle adoption, all constructs have a Cronbach's alpha value greater than 0.6, indicating that the scale used to measure the construct has a high degree of reliability.

Furthermore, each item has a factor loading of greater than 0.6, reiterating the scale's validity.

Additionally, each of the constructs used in this study, i.e., "financial incentives, charging infrastructure, social reinforcement, environmental concern, and price," has an AVE value greater than 0.5, indicating that the scale-measuring construct has a high level of validity. Table 3 summarizes the constructs, factor loading values, Cronbach's alpha values, and AVE and CR values.

Table 3. Reliability and validity

Variables	Indicator	Loading	Cronbach's alpha	AVE	CR
Financial incentive	Fin2	.789	0.763	0.58	0.85
	Fin3	.759			
	Fin4	.705			
	Fin5	.792			
Charging infrastructure	Infra1	.749	0.724	0.55	0.83
	Infra2	.739			
	Infra3	.733			
	Infra4	.738			
Social reinforcement	SO1	.823	0.767	0.59	0.85
	SO2	.793			
	SO3	.712			
	SO4	.752			
Environmental concern	Envi1	.814	0.783	0.6	0.86
	Envi2	.806			
	Envi3	.706			
	Envi4	.768			
Price	Pri1	.788	0.743	0.66	0.85
	Pri2	.767			
	Pri3	.872			
Attitude	ATT1	.781	0.788	0.7	0.87
	ATT2	.877			
	ATT4	.847			
Electric vehicle adoption	EVA1	.698	0.563	0.52	0.76
	EVA2	.785			
	EVA4	.669			

4.3. Discriminant validity

Discriminant validity measures how distinct constructs are from one another used in data analysis. It is critical to quantify because each construct must quantify a distinct dimension (Hair et al., 2016). The discriminant validity is determined against the square root of AVE to the correlation of latent variables (Fornell & Larcker, 1981). The square root values of the AVE must be greater than the correlation coefficient. Therefore, the square root values of AVE are greater than the correlation values, as illustrated in Table 4. This demonstrates that the prime consideration for discriminant validity is satisfied (Hair et al., 2016).

Table 4. Discriminant validity (Fornell-Larcker criterion)

SN	Variables	1	2	3	4	5	6	7
1	Attitude	0.49	–	–	–	–	–	–
2	Adoption	0.01	0.27	–	–	–	–	–
3	Financial incentives	0.01	1.000**	0.34	–	–	–	–
4	Charging infrastructure	−0.01	−0.05	−0.05	0.3	–	–	–
5	Social reinforcement	0.07	−0.09	−0.09	0.02	0.35	–	–
6	Environmental concern	−0.09	−0.09	−0.09	0.01	−0.09	0.36	–
7	Price	0.03	0.00	0.00	0.01	0.09	−0.03	0.44

4.4. Model fit

In structural equation modeling, the first step is to determine the model's overall fitness. The measurement model in SEM depicts the relationship between observed and latent variables (Kline, 2006; Weston & Gore Jr, 2006). It would be ideal to include all indexes in the AMOS output when determining the model's fitness, but it does not seem plausible. Due to the lack of a standardized method for determining a model's fitness, it is considered acceptable to use a variety of indices.

Table 5. CFA results indicators

Indicators	Standards	Results	Outcome
CMIN/df	< 0.5	1.731	"Acceptable"
Comparative Fit Index (CFI)	0.8-0.9	.922	"Acceptable"
Goodness of Fit Index (GFI)	≥ 0.9	.917	"Acceptable"
Adjusted Goodness of Fit Index (AGFI)	≥ 0.80	0.894	"Acceptable"
Parsimonious Normal Fit (PNFI)	> 0.5	0.708	"Acceptable"
Root Mean Square Error of Approximation (RMSEA)	< 0.08	0.045	"Acceptable"

The CMIN/df, CFI, GFI, AGFI, and PNFI were all used in this study. Each CFA value is within the recommended range. Therefore, CFA analysis does not suggest that the research model as a whole should be altered.

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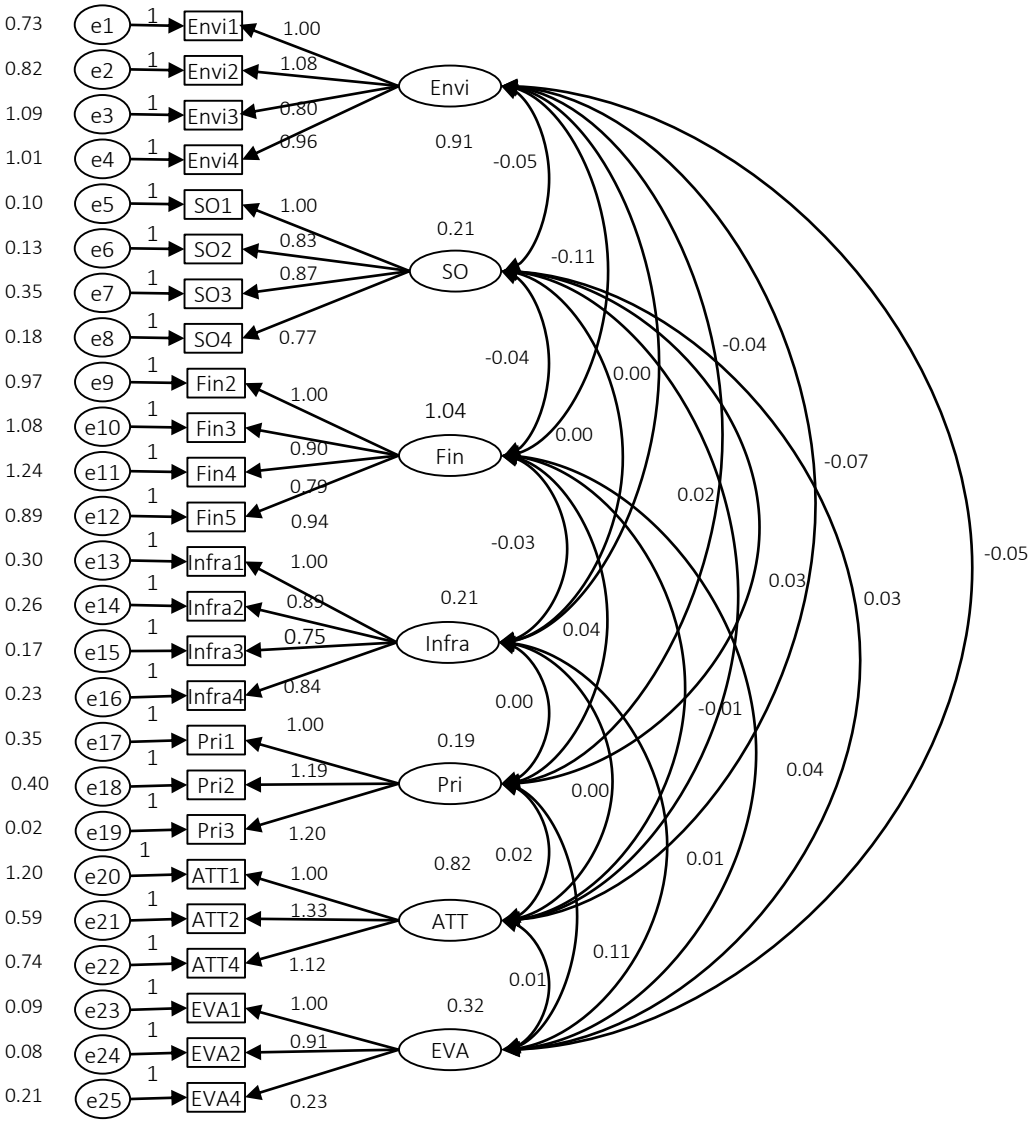

Figure 2. Model fit

4.5. Structural model

Hypotheses are tested using structural equation modeling (SEM). SEM elucidates the relationship between unobserved variables and how one latent variable influences the value of another latent variable directly or indirectly. Even with small sample size, SEM can be performed (Naushad & Malik, 2018; Sarstedt et al., 2019). SEM is useful for complex research models having multiple dependent variables (Hair et al., 2016; Sarstedt et al., 2019). Price had a significant impact on electric vehicle adoption (P > 0.5) (Table 6). The study thus found that only price was a deciding factor in electric vehicles adoption.

Table 6. Regression path coefficients results

Regression paths			Estimate	S.E.	C.R.	P
EVA	←	Envi	–0.028	0.035	–0.784	0.433
EVA	←	SO	0.076	0.074	1.026	0.305
EVA	←	Fin	0.022	0.034	0.658	0.51
EVA	←	Infra	0.066	0.077	0.859	0.391
EVA	←	Pri	0.589	0.084	7.001	***
ATT	←	Pri	0.068	0.125	0.542	0.588
ATT	←	Infra	–0.026	0.133	–0.197	0.844
ATT	←	Fin	–0.019	0.058	–0.32	0.749
ATT	←	SO	0.123	0.129	0.956	0.339
ATT	←	Envi	–0.075	0.062	–1.211	0.226
EVA	←	ATT	0.001	0.037	0.014	0.989

Table 7. Mediation analysis

Hypotheses	Path	Direct effect		Indirect effect		Total effect		Hypotheses status
		LL	UL	LL	UL	LL	UL	
H1	Fin → ATT → EVA	1.0000	1.0000	0.0000	0.0000	1.0000	1.0000	Accepted
H2	Infra → ATT → EVA	−0.0659	0.0256	−0.0027	0.0026	−0.066	0.026	Rejected
H3	SO → ATT → EVA	−0.0821	0.0058	−0.0046	0.005	−0.082	0.006	Rejected
H4	Envi → ATT → EVA	−0.184	0.0164	−0.0126	0.0105	−0.185	0.016	Rejected
H5	Price → ATT → EVA	−0.0596	0.0564	−0.004	0.004	−0.059	0.057	Rejected

The CR value of −0.784 1.96 and the P-value of 0.433 > 0.05 in Table 6 indicates no significant relationship between environmental concern and EV adoption. Additionally, no relationship exists between social reinforcement and EV adoption, as the CR value is 1.026 1.96 and the P-value is 0.305 > 0.05. Because the CR value is 7.0011.96 and the P-value is 0000.05, a significant relationship was evident between price and electric vehicle adoption. This demonstrates a positive correlation between price and the adoption of electric vehicles.

4.6. Mediation analysis

The result of the hypotheses testing in mediation analysis indicates that the majority of null hypotheses were accepted because the lower and upper values have different signs, indicating that mediation does not exist for several factors. Attitudes alone act as a moderator in the relationship between financial incentives and the adoption of electric vehicles. Attitude does not affect the relationship between charging infrastructure and electric vehicle adoption, the relationship between

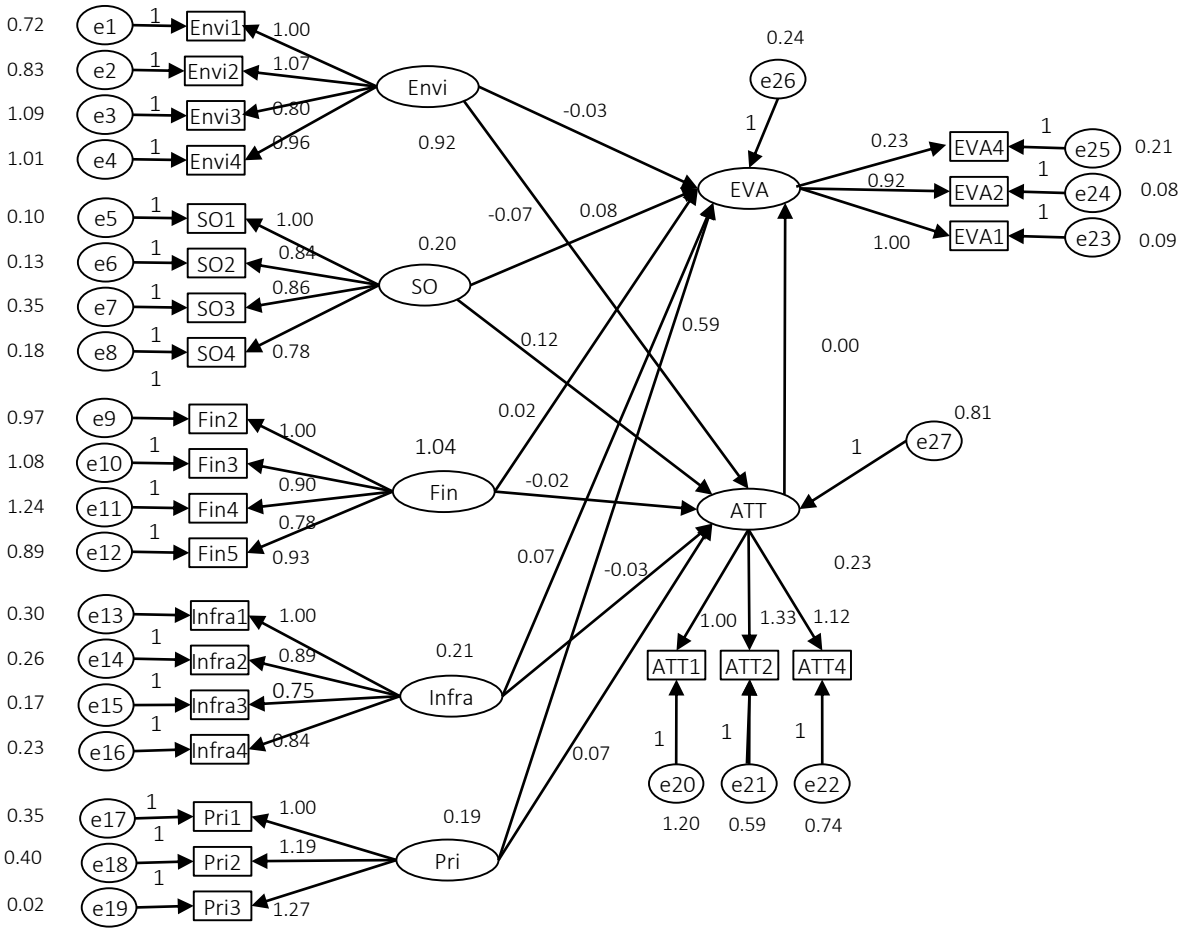

Figure 3. Structural model

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social reinforcement and electric vehicle adoption, the relationship between environmental concern and electric vehicle adoption, and the relationship between price and electric vehicle adoption.

5. DISCUSSION

The study's primary objective is to quantify the mediating effect of attitude via "financial incentives, charging infrastructure, social reinforcement, environmental concern, and vehicle price" on EV adoption. Moreover, the study also explores how these variables directly affect EV adoption. In drawing the direct impact of the selected variables, the findings confirm the results of earlier studies by Ali and Naushad (2022) and Lebeau et al. (2013). Among other variables, the price was found to have a significant impact on EV adoption. The findings indicate that customers place more importance on price than any other factors when deciding whether to adopt an electric vehicle. It is specifically true in developing countries like India, where people have limited resources, and the divide between the middle and upper class is significant. Therefore, affordability remains a big factor for consumers and a big challenge for producers to make affordable electric vehicles.

As far as the mediating mechanism is concerned, the study found that attitude mediates the electric vehicle adoption decision via financial incentives. It means that customers are enticed to switch to electric vehicles through financial incentives, which resonates with the earlier studies (Egnér & Trosvik, 2018; Gallagher & Muehlegger, 2011; Peters & Dütschke, 2014). However, this study's findings contradict previous research and support the null hypothesis where other variables like charging infrastructure, environmental concerns, and social obligations remain the significant predictors of electric vehicle adoption, e.g., Javid and Nejat (2017), Mersky et al. (2016), Khurana et al. (2021), Khan et al. (2020), and Quak et al. (2020). These factors are imperative as charging infrastructure is critical for the adoption of electric vehicles. Therefore, governments and manufacturers must not ignore and make significant investments in developing robust charging infrastructure, as accessible charging infrastructure encourages customers to purchase electric vehicles (Adepetu et al., 2016; Javid & Nejat, 2017; Mersky et al., 2016).

Furthermore, the study discovered, among other things, that price has a significant effect on electric vehicle adoption. As a result, the public and private sectors must work together to bring the cost of electric vehicles down. Additionally, the study suggests that the primary factor influencing attitudes toward EV adoption is financial incentives, which act as a mediating factor in consumer EV adoption decisions. As a result, the government must maintain financial incentives for manufacturers, which will aid in the development of affordable electric vehicles. Additionally, customers must be incentivized to encourage the adoption of electric vehicles.

CONCLUSION

Electric vehicles are more beneficial to both the customer and the environment. As a result, customers will gradually adopt electric vehicles for transportation purposes. The purpose of this study was to determine the effect of independent variables on the dependent variable "electric vehicle adoption," including financial incentives, charging infrastructure, social reinforcement, environmental concerns, and price. The study's findings indicate that educated and young consumers are more likely to adopt electric vehicles than older consumers. As a result, businesses must target young customers with discounts and credit options. Another finding of this study is that the cost of electric vehicles has a significant impact on a purchase decision. As a result, electric vehicle manufacturers must be cautious with their pricing.

This study has some implications for manufacturers and the government. In India, the adoption rate of electric vehicles is increasing, but it is not yet satisfactory. Governments and manufacturers must provide incentives for electric vehicle purchases. The public is largely unaware of the benefits of electric vehicles. There are reservations about the transition to electric vehicles. The government and manufacturers must address this concern as soon as possible. Government policy can have a significant impact

on electric vehicle adoption. Flexible and favorable policies should be adopted for early electric vehicle adopters. This will encourage additional customers to switch to electric vehicles. The government must provide both financial and non-monetary incentives to manufacturers and consumers.

Price is thus a critical factor in the purchase decision of EV. Customers are incredibly concerned with costs when switching to an electric vehicle. As a result, manufacturers must be cautious with their pricing. Additionally, all stakeholders, including state and federal governments, manufacturers, and customers, are concerned about the environment. The adoption of electric vehicles benefits the environment and aids in pollution control. This will help control a variety of diseases and help the country become cleaner and greener.

This study has limitations in time, resources, and data availability. Respondents are unenthusiastic about filling out the questionnaire, which indicates that completed questionnaires are appropriately completed. In addition, collecting data is an expensive and time-consuming process. Nonetheless, this study makes several recommendations for future research. This study examined the impact of only five independent variables on EV adoption: financial incentives, charging infrastructure, social reinforcement, environmental concern, and price. Future research can incorporate additional independent variables that influence e-vehicle adoption. In addition, future studies can also examine the role of trust or government policies as mediating variables in the adoption of electric vehicles.

AUTHOR CONTRIBUTIONS

Conceptualization: Mohammad Naushad.
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