

# ENVIRONMENTALLY CONSCIOUS CONSUMERS AND ELECTRIC VEHICLE ADOPTION BEHAVIOUR: MODERATING ROLE OF PERCEIVED ECONOMIC BENEFIT

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## ABSTRACT

*The automotive industry in India needs a reduction in carbon dioxide emissions and energy consumption that pushes the industry, researchers, and policy-makers to focus on the spread in electrically driven plug-in Electric Vehicles (EVs). EVs are part of the environment friendly product group and are thus subject to all of the influences that inspire or discourage their adoption by the people. Therefore, the environmental attitude, environmental concern and other socio-psychological factors influence the formation of attitude towards EVs. The purpose of this paper was to examine the influence of these factors on consumer's attitude towards EVs which, according to Theory of Reasoned Action, further influence the adoption behaviour towards EVs. This paper also examines the moderating role of perceived economic benefit on the attitude and adoption of EVs relationship. Data were obtained from a survey of 402 individuals. The respondents were selected purposively based on their intention to buy a new car in the coming one year. A conceptual model was proposed to understand the relationship among various socio-psychological constructs and moderating role of perceived economic benefit. Confirmatory factor analysis (CFA) and structural equation modeling (SEM) were applied to analyse and test the hypothesised relationship among constructs including moderation effect. The results of the study reveal that social influence and has little influence on attitude towards EVs, while environmental concern, past green behaviour, awareness of EVs and consumer environmental attitude have a positive influence on attitude towards EVs. Moreover, perceived economic benefit moderated the relationship between attitude towards EVs and EV adoption behaviour. Further the comparison of results with previous researches has been discussed. Finally, we addressed the further scope of the study and management impacts.*

**Keywords:** Environmentally Conscious Consumers, Electric Vehicle Adoption Behaviour, Environment Concern, Perceived Economic Benefit, Attitude Towards Evs, Environmental Attitude.

## INTRODUCTION

The fast urbanization and continuously increasing number of vehicles are causing monstrous traffic confusion, yet additionally undesirable air pollution for the most urban areas around the world. Transport is the most troublesome in causing environment degradation in numerous urban communities and offers in excess of 10% of India's carbon discharges. Environmental pollution is a significant issue for India, as the investigation by 2018 of the World Health Organization (referenced in the Center for Science and the Environment) report that India

is home to 14 of the twenty most-polluted urban areas around the world (Mishra & Malhotra, 2019).

Environmental degradation is a worldwide problem at present. One of the main culprit for air pollution is poisonous emission from internal combustion engines which use fossil fuels. Electric vehicles (EVs) are marketed actively around the world to alleviate the impact on internal combustion engine pollution and resolve environmental issues. Concerned governments have started various schemes and incentives to shift the people from their conventional vehicles to EVs. By 2030 the government of India had pleaded for '*E-Vehicles Only*' on the road (Machleit et al., 1993; Dhawan et al., 2017; Khurana, 2019). The high prices of an electric vehicle, the scarcity of charging facilities, duration and distance discomfort, have been found to be significant barriers for customers by previous research (Kumar & Jha, 2020).

The EVs can potentially provide an alternative to an active fuel-based transport system worldwide. Its growth and its deployment have been growing rapidly over the past decade. Reports suggest that global electric passenger cars have passed over 5 million in the year 2018. Electric mobility is constantly growing. In fact, the shift from convention fossil fuel vehicle to EVs has been done only in few niche markets. However, a variety of conditions have joined forces over the last ten years to create accessibility to the consumer market for electrical mobility (Juyal et al., 2018).

The automotive industry needs a reduction in carbon dioxide emissions and energy consumption that pushes the automotive, researchers, and policy-makers to focus on the spread in electrically driven plug-in EVs. (Gnann et al., 2018). The number of Electric vehicles on the road could exceed 220 million in 2030 as a result of growing attempts to achieve emissions goals and other environmental objectives, such as the EV30@30 scenario (*Global EV Outlook 2018 – Analysis - IEA*; Vardhini, 2019). A major environmental concern has been posed by the widespread dependency of vehicles on fossil fuels as the primary mode for transport (Agarwal, 2019). In India only car emissions accounts for almost 51 percent of total carbon emissions, compared to up to 80 percent for urban areas (Balakrishnan, 2019). Widespread adoption of EVs can help alleviate concerns such as environmental degradation, global warming and dependence on fossil fuels (Liao et al., 2017). While the economies are evolving, India has a long way to go in terms of mass adoptions of EVs which can subtly play a major role. The ever-rising price of crude oil is a growing concern for the country. Alternatively EVs could be India's silver bullet (*Electric Vehicles: ecosystem opportunities and challenges for manufacturers, policymakers and startups*) for securing energy future and reducing the carbon emission of its automobile sector. An aggressive introduction of EVs backed by a strong personalized policy can reduce India's fuel dependency on crude oil. Still, amid strict regulatory policies and emission requirements, the overall market penetration for EVs is fairly limited. Governments around the world have introduced and facilitated mass development programs and EV adoptions. As per India's Niti Ayog, such factors encourage India to introduce an EV strategy that ensures diligently that India's EV program is compatible with the global scale, when major economies tend to take drastic measures to electrify vehicles. The growth opportunities of India generate the capacity in some areas to establish leadership in EV. In that way, the government will support a roadmap that begins with the dynamics and initiatives of its automotive industry unique to India that builds on global relevance and implementations (Juyal et al., 2018).

While there are many segments of EVs involved such as private cars (Individual customer passenger cars, multi-utility vehicles, sports-utility vehicle), government vehicle fleet, commercial vehicle fleet, most EVs policies and strategies are directed towards how well the

needs and possible behaviour of individual EV buyers are understood and resolved. Indeed, regardless of how well the technology and collective channel are established, the ultimate decision is primarily the responsibility of the future EV buyer (Michael Raymond Byrne, 2001). All possible EV manufacturers indeed understand this. In the midst of Government's contribution in promoting and boosting the sales of EVs, the people's willingness to buy EVs is also important (Sethna, 2015). EVs are part of the environment friendly product group and are thus subject to all of the influences that inspire or discourage their adoption by the public (Malik & Singhal, 2017; Wolff & Medlener, 2019). Previous researches have suggested that various socio-psychological factors such as buyer's value orientation, environmental concern, awareness of EVs, social influence, environmental attitude, perceived economic benefit, past green behaviour contribute to the formation of attitude towards environmentally friendly products such as EVs which further leads to the adoption behaviour (Michael, 2001; Khare & Sadachar, 2017; Malik, et al., 2017; Globisch, et al. 2018; Dash, 2019; Kester et al., 2019; Khurana, 2019; Sharma & Joshi, 2019; Sovacool et al., 2019; Wang et al., 2020; Kumar & Jha, 2020). The key objective of the present study was to examine the effect of above-mentioned socio-psychological factors on the attitude towards EVs and further to understand the relationship between attitude towards EVs and the adoption behaviour, for the private car users. The ultimate purpose was therefore to obtain further knowledge which has not previously been obtained and to help close the potential gap in the adoption of EV sector in India in the private car user segment.

## LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Buyers who are concerned about the environment and all their actions are based on the philosophy and conscience environment protection are considered as green consumers (Roberts, 1996) and may be identified as one who emphasizes the fact that goods which are not harmful to the environment should be bought or used (Kumar et al., 2019). Preceding research on green consumers based their effort to minimize environmental resources use (Jansson et al. 2010). This so-called "*green behaviour*" applies not only to its reducing behaviour, but also to increasing the efficacy of energy consumption. (Gandhi & Sheorey, 2019); (Akehurst et al., 2012). An example can be found in the acquisitions and the use of a less polluting vehicle such as EVs with some extra spending. Previous studies have also confirmed that the environmentally friendly behaviour of people is influenced by various factors depending upon the utility of the product or services they possess (Malik, et al., 2017; Dash, 2019; Gardner & Stern 2002). Previous research focused on elements such as environmental literacy, increasing information and action as determinants of environmentally friendly behaviour, i.e. readiness to implement or procure environmentally-friendly technologies or goods such as EV (Kinneer et al, 1974; Gandhi & Sheorey, 2019; Khurana, 2019).

Environment friendly consumers' research employs the theory of planned behaviour (TPB) to assess the implications of social norms on consumers' environmental attitudes (Kalafatis et al., 1999). The decision to buy environmentally sustainable goods was motivated by reference beliefs and social norms. Shaw et al., (2000) have applied to the Theory of Reasoned Action (TRA) the importance of perceived behavioural control and self-identity on sustainable consumption ((Khare & Sadachar, 2017). However, some reports have shown that social standards have an effect on green purchasing. For example, Kim & Chung (2011) checked TPB principles and past consumer experience in order to buy green personal care goods. Consumers' attitudes to green products is affected by environmental concern, awareness and previous experiences with other organic products (Malik & Singhal, 2017).

## **Environmental Concern (EC) In Formulating the Consumer's Attitude towards Evs**

Environmental concern is characterized as the understanding and desire of a person to resolve environmental issues. Previous studies have suggested that environmental benefits have a substantial influence on market adoption. Kahn (2007) found that the environmentally-friendly citizens prefer to take EVs, which are endorsed by (Pierre et al., 2011). People determined to conserve the planet and preserve energy display greater intent for support. The likely EV buyers are environmentally conscious users. As stated in a market survey from Germany, environmental advantages are primary determinants for embracing EVs (Peters & Duetschke, 2014). The acceptance of EVs decreases existential hazards and has a significant effect on the adoption of EVs as established by (Sang & Bekhet, 2015). Moreover, sustainable development, which was a significant motivator (Beck et al., 2016), was a major influence in the interest of customers. Several studies have explored the environmental concern and its influence on green choices (Bang et al., 2000). Persons with a stronger understanding and concern for the environment may have great respect to environmentally sustainable things such as EVs (Dash, 2019). Moreover, multiple scholars have investigated this link between environmental concerns and consumer behaviour and found that it promotes the creation of attitudes towards green goods such as EV (Malik et al., 2017; Dash, 2019; Chen & Chai, 2010). The hypothesis suggested is then the following:

*H<sub>1</sub>: Environmental concern (EC) is positively related to consumer's attitude towards EVs. (ATEV)*

## **Social Influence (SI) In Formulating the Consumer's Attitude towards Evs**

Social norms and social identification may act as behaviour indicators. These features were developed in line with the interpersonal influence propensity by (Bearden et al., 1989). Interpersonal influence was a characteristic that defined an individual's ability to adapt, control and associate with societal expectations (Bearden et al., 1989). We may call it as Social influence (Khurana, 2019). It encompasses peer pressure, arbitrary expectations, peers and cultural impact as a term. Persons request the acceptance of their acts from family members and associates. The viewpoints of family or friends impact the decisions of customers and customers pursue a social acceptance using goods that are appropriate to those whose viewpoints matter (Nysveen, 2005; Carley et al., 2013). Thus, social influence is the basis of certain deeds (Chen & Tung, 2014). Influence of attitude, as reported by Aksen et al. (2013), affects the choices made by an individual within their social network; this impact is a core driver of EV promotion. As the Rasouli & Tommermans (2016) studies verified, the influence of relevant others is important for approval by a person. The study introduces the next hypothesis:

*H<sub>2</sub>: Social influence (SI) is positively related to consumer's attitude towards EVs. (ATEV)*

## **Past Green Behaviour (PGB) in Formulating the Consumer's Attitude towards Evs**

Health concern and ecological perceptions were important motivators for organic food purchases. A study done by Chen (2009) identified important insights into ecological behaviour (Khare, 2017). It has also been found by (Chen, 2009) that past green behaviour influences individual's purchase intention on another environmentally friendly product. Their buying decisions can be more affected and their intention to pay for sustainable goods or services will be improved (Zhao et al., 2014). In continuation, it was important to have knowledge of eco-

friendly goods, environmental awareness, environmental attitudes and faith in the eco-friendly brands. Similarly, past experience with was expected to affect the purchasing preference of environmentally friendly vehicles (EVs) (Barber et al., 2009). Hence, we propose the following hypothesis;

*H<sub>3</sub>: Past green behaviour (PGB) is positively related to consumer's attitude towards EVs (ATEV).*

### **Consumer Environmental Attitude (CEA) In Formulating the Consumer's Attitude towards Evs**

Individuals who follow an eco - friendly approach consider that the ecological problems are increasing exponentially and this is the high time that they need to behave responsibly and their actions are going to impact the environment. (Malik & Singhal, 2017; Lee, 2009). This is consistent with the Cognitive Consistency theory (Festinger, 1957); (Ahmad et al., 2015); (Schlegelmilch, et al., 1996), which suggests that people involved in environmental matters are inclined to take actions to eliminate them. However, several experiments have factually demonstrated that individuals who are eco-friendly are more inclined towards eco-friendly activities and are willing to buy goods which are safe for the environment (Kilbourne & Pickett, 2008; Mostafa, 2007). Hence, we postulate the following hypothesis,

*H<sub>4</sub>: Consumer Environmental Attitude (CEA) is positively related to consumer's attitude towards EVs (ATEV)*

### **Awareness of Evs (AEV) In Formulating the Consumer's Attitude towards Evs**

In previous literary works, past awareness or experience about a commodity has been established in both parental and usage stages as a legitimate source of individual comparisons (Cheron & Hayashi, 2001). They are not based on certain realities that can be impartially measured. Market provision / attitudes to EVs can be regarded as an integral element in encircling product awareness (Egbue & Long, 2012). Customer knowledge and hence awareness about EV can come from an individual's attention to a mainstream advertisement or through interaction with the people who have already purchase EV (Le Hebel et al., 2014). This could include collecting information on prices, upkeep, convenience, benefits from government in the form of subsidies and infrastructure for EVs (Bennett & Vijaygopal 2018). In addition, product information supports the consumer acceptance decision (Brucks, 1985). Hence, we postulate the following hypothesis;

*H<sub>5</sub>: Awareness of EVs (AEV) is positively related to consumer's attitude towards EVs (ATEV)*

### **Link between Consumer's Attitude towards Evs (ATEV) and Adoption Intention (AI)**

The environmentally sensitive behaviour of consumers and the use of green products was widely included in several studies. Schligelmilch et al. (1996) claimed that Environmentally friendly attitude is a crucial factor in shaping the intention to purchase a green product. The pertinence of attitude variables in the understanding of customer behaviour concerning the environment was also verified by another Roberts' (1996) research. Kassarian (1971) demonstrated the purchase of bio-fuel devices by the people was mainly due to their concern for the degradation of air quality. In a German survey the positive attitude of consumers towards green product was found to lead them to make then willing to purchase environmentally sound

goods (Mostafa, 2007). Intriguingly, positive feelings towards any commodity are closely related to tendencies to purchase. Hini et al. (1995) also found a strong association in their analysis of adoption decision between an individual's attitude towards a commodity and his intention to purchase. Hence, we postulate the following hypothesis;

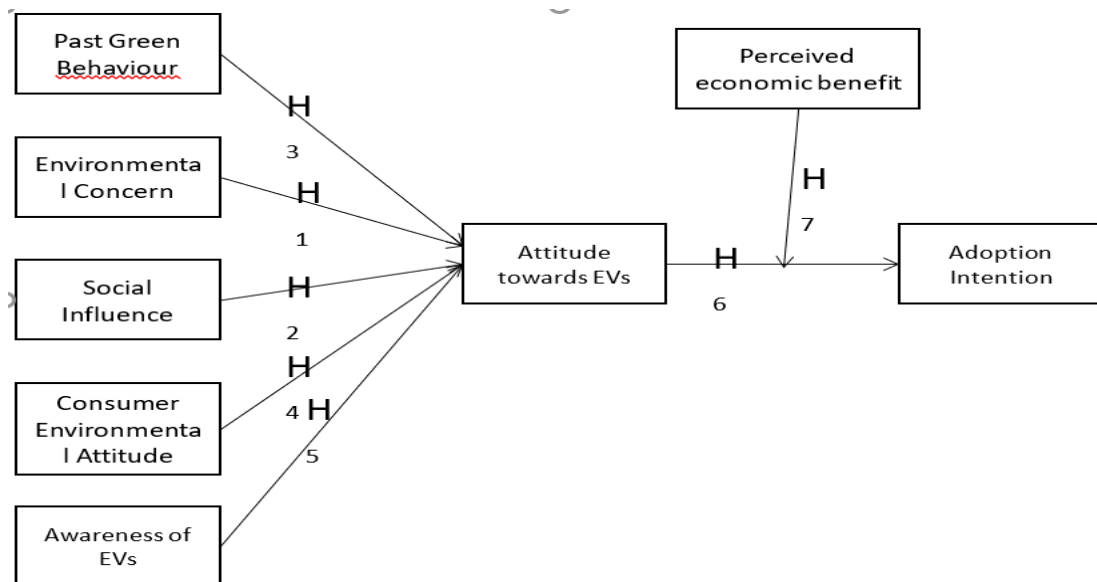
*H<sub>6</sub>: consumer's attitude towards EVs (ATEV) is positively related to consumer's EV adoption intention (AI)*

**Perceived Economic Benefit (PEB) and Evs Adoption Intention (AI)**

In contrast to a comparable traditional car, the high price of EVs is a dwindling factor. Researches showed that the benefits given motivate people to have adoption intention for the EVs. Lower operational and maintenance costs promote EVs acceptance (Odeck & Aasness, 2015). The effects of a gasoline car in USA were examined by Beresteanu & Li (2011) and concluded that tax incentives resulted in an improved acceptance of EVs. Previous observational findings have demonstrated the economic benefits of customers and the ability to use environmentally friendly cars to minimize maintenance expense and increase fuel quality (Mourato et al., 2004). The adoption tends to rely heavily on whether significant monetary advantages, conveniences are present (Said et al., 2003). In general, most customers will choose EVs only if the costs compete with current fuels, and environment factors can continuously be exceeded by price (Bomb et al., 2007). The price is often considered an important factor in deciding automotive acceptance. Hence, we propose that following hypothesis;

*H<sub>7</sub>: Perceived economic benefit (PEB) moderates the relationship between consumer attitude towards EVs (ATEV) and EVs adoption intention (AI).*

**Proposed Conceptual Model and research Objectives**



**FIGURE 1  
CONCEPTUAL MODEL BASED ON THE REVIEW OF LITERATURE AND RESEARCH OBJECTIVES**

A detailed literature analysis found few socio-psychological dimensions that primarily affect the attitude towards EVs. Much of the research on consumer environmental performance, however, applies to either American or Scandinavian people. One of the objectives of the paper is therefore to examine the influence of these socio-psychological dimensions on Indian consumers' attitude and their adoption intention towards EVs. Since PEB may play an important role in adoption intention (Mourato et al., 2004), the second objective of our study is to examine the impact of PEB on the bond between attitude towards EVs and the adoption intention. The literature review has suggested a conceptual model and the final objective is to test the validity of the proposed model as defined in Figure 1.

## **Research Methodology and Scale Development**

To measure the socio-psychological dimensions, a descriptive research design was adopted wherein the empirical method of research was applied. To test the hypotheses and validity of the proposed model, SPSS 21.0 and IBM AMOS 21.0 used. Since the constructs were modified as per the Indian conditions and circumstances, expert opinions (from industry and academic institutions) were also taken for content and face validity of the scales and were modified accordingly. Further, first order confirmatory factor analysis is applied in order to test the construct validity (convergent and discriminant). Structural equation modeling was applied to test the validity of the proposed model and to test the proposed hypotheses including moderation effect of PEB. As the population targeted for the study was Delhi NCR (National Capital Region) who satisfy the following conditions (requirements for the elements of sample);

1. Over and above the age of 20 years
2. who have planned or have intention to buy a car in the next 9 months?
3. must be a resident of Delhi NCR

Purposive sampling technique was applied under non-probability sampling category wherein only those people were contacted who have come to see a car at various car showrooms (Sales points) situated at various cities including Delhi, Gurgaon, Faridabad, Noida, Ghaziabad and Sonipat. However, previous studies in the same area have chosen car owners as their respondents (Jansson et al., 2010). We approached those people who were planning to buy a car irrespective of whether they own a car or not. As we believe that potential buyer's response are closely influenced by their purchase intention and they were supposed to be more involved in the response criteria. The car manufacturers chosen were; Maruti Suzuki Ltd., Ford Motors., Tata Motors, Mahindra & Mahindra, Hyudai Motors and Kia Motors. A total of 440 people were contacted personally out of which 38 did not fill the questionnaires completely and were rejected at the analysis stage. Data was collected during the month of February 2020 - August, 2020.

## **Questionnaire**

A standardised questionnaire is built based on studies carried out in the past and our knowledge of the subject. In order to measure the socio-psychological dimensions of people, standardised scales were adopted from previous researches which were modified as per Indian conditions. A pilot study was also done wherein a questionnaire was administered on 30 potential buyers of cars. The scales in the questionnaire were further modified based on the feedback of pilot study respondents. Expert opinions (from industry and academic institutions) were also taken for content and face validity of the scales and were modified accordingly. First

part of the questionnaire covered the demographic attributes of the respondents and second part consisted of statements related to their respective constructs. The constructs and their sources are provided in Table 1. The responses were captured on a seven-point Likert Scale where 1 represents '*strongly disagree*' and 7 represents '*strongly agree*'. The reason to opt seven point was to give more room to decide their most correct opinion regarding agreement level to a particular statement. However, PEB was also measured in seven-point Likert scale, but for analysis purpose it was further categorized to '*low PEB*' and '*high PEB*'.

<b>Table 1</b>			
<b>CONSTRUCTS AND THEIR SOURCES</b>			
S. No.	Construct	Items/Statements	Source(s)
1	Environmental Concern (EC)	EC1- Plants and animals have as much right as humans to exist.	Kim (2005), Dunlap et al. (2005)
		EC2- We are approaching the limit of the number of people that the Earth can support	
		EC3- Mankind is severely abusing the environment.	
		EC4- The earth is like a spaceship with only limited rooms and resources.	
		EC5- When humans interfere with nature, it often produces disastrous consequences	
		EC6- The balance of nature is very delicate and can easily be upset.	
2	Past Green Behaviour (PGB)	PGB1: I share my green products experiences and information with my friends	Zhao et al., (2014), Kumar & Ghodeswar (2015)
		PGB2: I buy green products even if they are more expensive than non-green products	
		PGB3: I strive to learn as much as possible about environmental issues	
		PGB4: I learn about environmental products from my friends	
3	Social Influence (SI)	SI1. People will react positively when they see an electric vehicle on the road	Khurana et al., (2019), Chen & Tung (2014)
		SI 2. I think I am more likely to adopt an electric vehicle if my friends and relatives adopt it.	
		SI 3. People whose opinions are important to me find electric vehicles good	
		SI 4. Possessing an electric vehicle would be a status symbol for me.	
4	Attitude towards EVs (ATEV)	ATEV 1: I am favourably inclined to switch to an electric vehicle.	Khurana et al., (2019)
		ATEV 2: Driving an electric vehicle will be a wise decision.	
		ATEV3: It makes sense to use an electric vehicle instead of a conventional vehicle	
5	Awareness of EVs (AEV)	AEV1: I have little knowledge of EVs	(Dash, 2019)
		AEV2: I am not familiar with EVs	
		AEV3: I have little experience of EVs	
6	Consumer Environmental Attitude (CEA)	CEA1- I believe that use of environmentally friendly products by me will help in reducing wasteful use of natural resources.	Valle et al. (2005), Lee (2009), Ahmad et al., (2015)
		CEA2- I feel good about myself when I use environmentally friendly products.	
		CEA3- I think environmental protection is meaningful exercise.	
		CEA4- I feel sad when I see how much the natural environment is spoiled.	
		CEA5- I believe that use of environmentally friendly products by me will help in reducing pollution and also help in improving the environment.	



7	Perceived Economic Benefit (PEB)	PEB 1: I will save on fuel expenses, as running cost should be lower in case of an electric vehicle.	Khurana et al., (2019)
		PEB 2: The maintenance cost for an electric vehicle will be less.	
		PEB 3: Overall cost of owning an electric vehicle will be low due to government incentives (incentives = lower road tax/less insurance premium/cheaper loan)	
8	Adoption Intention (AI)	AI1-I would prefer to purchase a EVs over a non EV.	Dash (2019), Anees et al. (2015), Kim et al. (2013)
		AI2- I would be enthusiastic about the prospect of buying an EV	
		GPI3-I would seriously consider buying an EV	

## ANALYSIS AND RESULTS

To test the convergent & discriminant validity and composite reliability (CR) of the selected scales, first order confirmatory factor analysis was used. A measurement model was developed for eight constructs. All the results were tested given as per the suggestions given by (Fornel & Lacker, 1981). To test the internal consistency of the scales, we used Cronbach's alpha (Nunnally, 1978). Table 2 shows the summary of parameters like average variance extracted (AVE), CR, Factor Loading, Cronbach's alpha, maximum shared variance (MSV) and average shared variance (ASV).

### Measurement Model

To ensure the discriminant validity of the scales of PGB and EC, one item each were dropped resulting into acceptable ranges of various parameters. No statement of any construct had a factor loading of less than 0.7 and all the scales had cronbach's alpha values ranging from 0.713 to 0.869 indicating a good internal consistency (Nunnally, 1978; Malik et al., 2017). The AVE values for all the constructs were ranging from 0.513 to 0.882 which satisfied the minimum acceptable value of 0.5 (Fornel & Lacker, 1981; Malik et al., 2017). As explained by Hair et al. (2007), the discriminant validity of a scale can be ascertained by comparing the Maximum shared variance (MSV) value and Average shared variance (ASV) values with that of AVE value of the same scale. Since the AVE values of the scales are greater than their respective ASV and MSV values, we can go ahead with the scale Table 2. As seen in Table 3, all the fit indices of the measurement model are well within the suggested range.

S. No.	Construct	Items	Standardised Factor Loading	Cronbach's Alpha	Composite Reliability	AVE	MSV	ASV
1	Environmental Concern (EC)	EC1	0.77	0.793	0.900	0.683	0.277	0.250
		EC2	0.81					
		EC3	0.89					
		EC4	0.79					
		EC5	0.81					
2	Past Green Behaviour (PGB)	PGB1	0.80	0.815	0.944	0.757	0.362	0.255
		PGB2	0.83					
		PGB3	0.84					
3	Social Influence (SI)	SI1	0.81	0.822	0.792	0.882	0.535	0.187
		SI2	0.91					
		SI3	0.77					
		SI4	0.81					
4	Attitude towards EVs (ATEV)	ATEV1	0.89	0.841	0.928	0.813	0.004	0.004
		ATEV2	0.81					

		ATEV3	0.91					
5	Perceived Economic Benefit (PEB)	PEB1	0.83	0.906	0.907	0.620	0.556	0.160
		PEB2	0.79					
		PEB3	0.71					
6	Consumer Environmental Attitude (CEA)	CEA1	0.84	0.869	0.943	0.768	0.230	0.092
		CEA2	0.82					
		CEA3	0.83					
		CEA4	0.92					
		CEA5	0.94					
7	Awareness of EVs (AEV)	AEV1	0.74	0.713	0.766	0.771	0.422	0.032
		AEV2	0.81					
		AEV3	0.76					
8	Adoption Intention (AI)	AI1	0.73	0.756	0.756	0.513	0.230	0.113
		AI2	0.68					
		AI3	0.73					

\*Source (Authors' Calculations)

Statistics	Actual Value	Recommended Value
Cmin	1267.63	
Cmin/df	2.510	< 3.00 (Hinkin, 1995; Bagozzi & Yi, 1988)
Goodness of Fit Index (GFI)	0.912	> 0.90 (Hair et al., 2007)
Adjusted Goodness of Fit Index (AGFI)	0.874	> 0.80 (Chau & Hu, 2001)
Normed Fit Index (NFI)	0.923	> 0.90 (Haie et al., 2007)
Comparative Fit Index (CFI)	0.943	> 0.90 (Hair et al., 2007)
Root Mean Square Error of Approximation (RMSEA)	0.052	< 0.08 (Bagozzi & Yi, 1988)

\*Source: Authors' calculations

## Structural Model

Based on the proposed conceptual model as seen in Figure 1, a structural model was prepared. The objectives of this structural model is to evaluate and discuss more about the association of concepts, EC, PGB, SI, AVE and CEA with ATEV and further to comment on the relationship between ATEV and AI. This structural model will also help to assess the moderating role of PEB over the relationship between ATEV and AI. Table 4 displays the values of all the model fit indices used to test the validity of the proposed model. The indices used to test the validity of structural model are; Goodness of Fit index (GFI), Adjusted Goodness of Fit Index (AGFI), Comparative Fit Index (CFI), Normed Fit Index, and Root Mean Square Error of Approximation (RMSEA). Table 4 confirms the model fit indices in the appropriate range ensuring the fit of the model.

Statistics	Actual Value	Recommended Value
Cmin	1151.35	
Cmin/df	2.35	< 3.00 (Hinkin, 1995; Bagozzi and Yi, 1988)
GFI	0.934	> 0.90 (Hair et al., 2007)
AGFI	0.843	> 0.80 (Chau and Hu, 2001)
NFI	0.901	> 0.90 (Haie et al., 2007)
CFI	0.934	> 0.90 (Hair et al., 2007)
RMSEA	0.050	< 0.08 (Bagozzi and Yi, 1988)

\*Source: Authors' calculations.

Table 5 records the regression weights and their statistical significance. It shows that environmental concern (EC), past green behaviour (PGB), consumer environmental attitude (CEA) and awareness of EVs (AEV) are significantly and positively related to attitude towards EVs (ATEV). While social influence (SI) was found having no significant influence on ATEV. Further, ATEV has a positive significant influence on Adoption intention (AI) of EVs.

S. No.	Relationship		Standardized coefficient	P value	Relationship	
1	EC	---->	ATEV	0.398	0.000	Positive
2	PGB	---->	ATEV	0.521	0.00	Positive
3	CEA	---->	ATEV	0.438	0.000	Positive
4	SI	---->	ATEV	-0.121	0.534	Non-Significant
5	AEV	---->	ATEV	0.327	0.019	Positive
6	ATEV	---->	AI	0.352	0.000	Positive

To test the moderation effect of PEB over the relationship between ATEV and AI, we divided the sample into two categories based on the overall score of PEB construct. Respondents with score less than 4 were categorised as low PEB group and respondents with score more than 4 were categorised as high PEB group in Table 6.

Their standardized regression coefficients (Beta values) were calculated separately for each group and the statistical significance of the difference of two regression coefficients was calculated using 'Danielsoper.com'. t value of more than 1.96 indicated that there was statistically significant difference of two categories of low PEB and high PEB.

Low PEB		High PEB		t value
Regression coefficient	P	Regression coefficient	P	
0.052	0	0.413	0	2.34

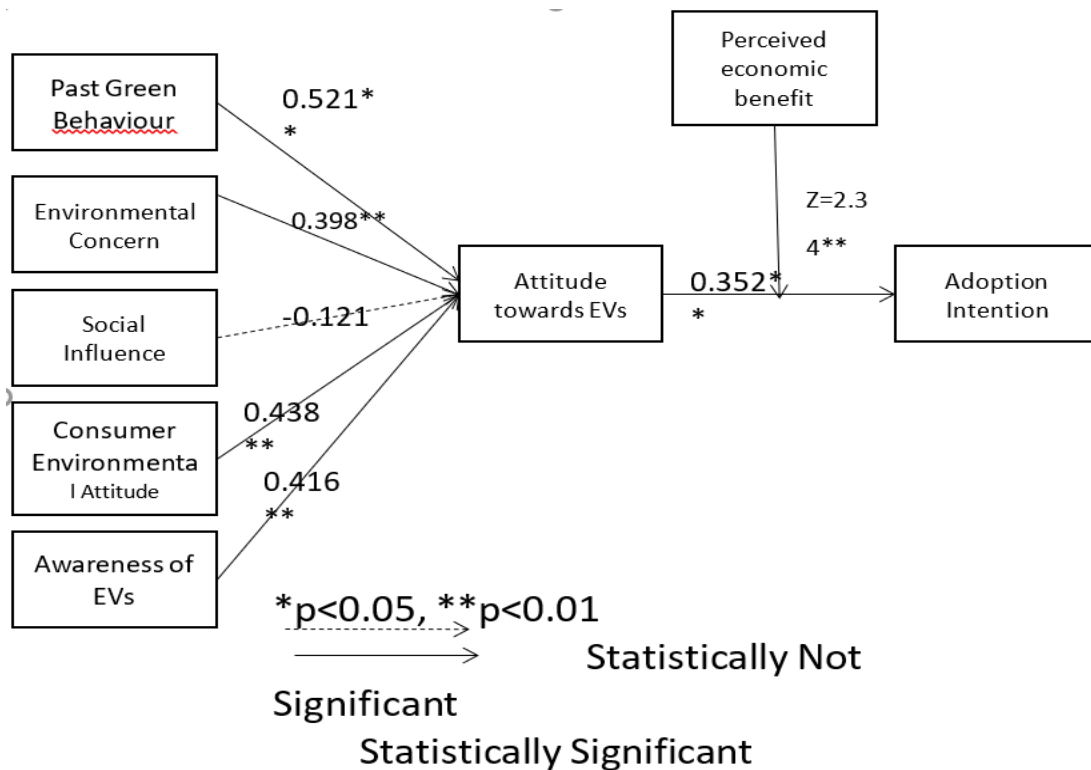
### Hence the Hypothesis

(H<sub>7</sub>) that is Perceived Perceived economic benefit (PEB) moderates the relationship between consumer attitude towards EVs (ATEV) and EVs adoption intention (AI) gets accepted.

## FINDINGS AND DISCUSSION

The findings of the study may be divided into two parts. The first part encompasses the hypothesised relationship between various socio-psychological constructs and the attitude towards EV (ATEV). And the second part consists of relationship between ATEV and adoption intention (AI) of consumers and the moderating role of *perceived economic benefit*. Retaining first hypothesis about relationship between *environmental concern* (EC) and ATEV suggests that environmentally concerned and conscious consumer develops a favourable attitude for any green product and interestingly the findings coincide with the findings of various past researches (Khare, 2017; Malik et al., 2017; Dash, 2019; Khurana, 2019; Kumar & Hundal, 2019). The second hypothesis of relationship between *Social Influence* (SI) and ATEV could not be retained

contrary to the past few researches (Dash, 2019; Malik et al., 2017). The difference of results may be attributed to the product category as EVs fall under high involvement product segment. The third hypotheses of relationship between *past green behaviour* (PGB) and ATEV got retained which was in tune with the findings of few previous researches (Sadachar & Khare, 2017; Kumar & Ghodeswar, 2015). Fourth hypothesis regarding the relationship between *consumer environmental attitude* (CEA) and ATEV was also retained in harmony with almost all the previous researches (Khare 2017; Malik et al., 2017; Dash, 2019; Khurana, 2019; Kumar & Hundal, 2019). Fifth hypothesis relationship between *awareness of EV* (AEV) and ATEV had also been retained reinforcing the findings of previous results (Dash, 2019; Bennett & Vijaygopal, 2018). The sixth hypothesis about the relationship between ATEV and adoption intention got retained supporting the theory of reasoned action (TRA) and theory of planned behaviour (TPB) (Ajzen & Fishbein, 1977; Kalafatis et al., 1999). The moderating effect of PEB has already been discussed in previous section. Figure 2 depicts the relationship between variables under study and attitude towards EVs (ATEV).



**FIGURE 2**  
**REVISED CONCEPTUAL MODEL AFTER ANALYSIS**

Results from this study suggest that Indian consumers have an environmental awareness that can be seen in their intention to adopt green vehicles like EVs. The research analyzed the relationship between multiple factors, which had important theoretical and management repercussions for EVs adoption decision. Firstly, the close association between environmental concern and environmental awareness with green product purchasing decisions confirms that a Green Product purchase decision involves a thorough consideration of environmental, human and social impacts of sustainable practices. It also reveals that buyers want to satisfy their

emotional and contextual needs, which shape their purchasing choices. This is expressed in the environmentally conscious lifestyle and importance of environmentally friendly goods to their consumption habits. They can evaluate sustainable goods' environmental aspects to consider how they can be sold in order to satisfy the unique criteria for the target segments. These market-oriented approaches appear helpful in making green vehicle buying choices on customer support to protect the environment and driving their intention to protect the environment. Moreover, past green experience had a significant role in formulating attitude towards green products such as EVs which is governed by their perception and cognitive thinking process (Desmet & Hekkert, 2007).

The second thing that greatly impacts Indian buyers buying choices for green goods like EVs was promoting environmental preservation and driving environmental sustainability, past green experience, company eco-friendliness and social calling. Indian customers strive to understand about sustainable practices, develop and observe sustainable product-related information. To do so, they check their own details and ask from peers about sustainable products. They often encourage the purchasing of products from companies which act in an environmentally friendly way, rather than the purchase of products from those suspected of pollution. They share their knowledge of environmentally friendly products and favour the environmental sustainability initiatives.

### **Managerial Implications**

The study has implications not only for marketing professionals but for the governments and the social bodies as well. The results indicate that customers respect the environment and have a supportive attitude to the environment that contributes favourably to the formation of their response to EVs. The advertisers should then concentrate specifically on the environmental advantages of EVs and convey them to the public. Governments have a duty to increase social consciousness in order to inspire the community to take a positive response to EVs. The research results also indicate that the marketer should reflect on people's functional and emotional needs and link it to their approach to EVs. Marketers must explain that EVs contribute to the environmental protection purpose. Given the strong gap in opinion between the category of respondents with high PEB, marketers should be concentrated on communicating economic advantages of EVs effectively.

### **Limitations of the Study and Further Scope of Research**

The sample was drawn from Delhi NCR which has its own limitations to be generalised for the Indian population. The sampling techniques used in this research are purposive sampling which has the higher probability of biasness. It is a cross-sectional study and not a longitudinal study. The opinion of people changes with the passage of time and gaining newer experiences. Most of the responses were just the perceived notions or intentions which may differ from their actual behaviour. Demographic features of people have not been studied under this study. Features of EVs have not been included in this study. Further study can be done using demographic attributes of people and their relationship with EV adoption behaviour. Other mediating or moderating variables like cost of EVs, infrastructure availability (charging points etc) can be included in the further researches.

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