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INTENTION TO PURCHASE E-VEHICLES: THE MEDIATION ROLE OF CONSUMPTION VALUES

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ABSTRACT: The automotive industry has witnessed a growing trend of electric vehicle (EV) adoption in recent times, with developed and developing nations alike embracing this new technology. Scholars and academicians are progressively investigating the factors that impact the acceptance of electric vehicles. Owning and driving an electric vehicle (EV) can be considered a pro-environmental behaviour because EVs produce significantly less air pollution and greenhouse gas emissions than traditional gasoline-powered vehicles. Individuals who are environmentally conscious are more likely to recognize the negative impacts of environmental pollution and take steps to address it. Additionally, the perceived value of consumption has been found to be an essential determinant of electric vehicle purchase intention. The objective of this research is to analyze how the purchase intention of electric vehicles is affected by pro-environmental behaviour and perceived consumption value, which acts as a mediator variable. The study surveyed 372 customers across three cities in Gujarat using a questionnaire-based survey and analyzed the data using structural equation modeling. The outcomes of the research will be valuable for electric car producers and executives as they endeavor to enhance consumer knowledge of environmental concerns and effectively advertise electric cars.

KEYWORDS

e-vehicles, pro-environmental behaviour, perceived value, purchase intention

Introduction

The automotive industry has witnessed a growing trend of electric vehicle (EV) adoption in recent times, with developed and developing nations alike embracing this new technology. India has set ambitious targets for EV uptake, aiming to have 30% of privately owned cars, 70% of commercial vehicles, and 80% of two and three-wheelers to be EVs by 2030 (Mint, 2022). Consequently, the electric vehicle market in India is expected to grow significantly, with an estimated compounded annual growth rate of 94.4% between 2021 and 2030 and a projected value of \$152.2 billion by 2030 (Malik, 2021). As a result, there has been an increase in research aimed at identifying the factors that influence individuals' intention to purchase EVs.

This study employs the theory of perceived value to explore the factors that influence the purchasing behavior of electric vehicles (EVs). The theory of perceived value posits that an individual's decision to purchase a product or service is influenced by their perception of the benefits and drawbacks of the product or service in comparison to available alternatives. In the context of EVs, this study aims to identify the factors that shape a person's perceived value of purchasing an EV and how these factors influence their intention to buy one. Such factors may include the vehicle's performance, fuel efficiency, and environmental impact, price relative to conventional gasoline vehicles, range, charging infrastructure availability, and government incentives or regulations. Additionally, intangible benefits, such as social status or prestige associated with owning an EV, and personal values and beliefs about the benefits of EVs, such as reducing carbon emissions or supporting sustainable transportation, may also shape an individual's perceived value of buying an EV.

The current study aims to fill a gap in the literature by examining the influence of perceived consumption value on the intention to purchase electric vehicles in the

state of Gujarat, India. Although previous studies have examined various aspects of EV purchasing behavior, the connection between perceived consumption value and purchase intention has not been thoroughly investigated. By examining this relationship, the study aims to provide a more comprehensive understanding of EV purchasing behavior in an area that has not been previously explored.

The paper is organized in the following manner: The second section delves into the theoretical foundation and research design, and includes the formation of hypotheses. The third section describes the methodologies applied in the study. The fourth section presents and evaluates the findings. The final section summarizes the research, and offers perspective on its limitations, implications, and opportunities for future studies.

Conceptual framework and research hypotheses

Consumption Value Theory

The theory of Consumption Value (CVT) was adopted as the primary theoretical framework for understanding consumer attitudes and behaviors towards e-vehicles. The concept of perceived value, a well-researched topic in the field of marketing, has been demonstrated to be a crucial predictor of consumer attitudes and behaviors (Baek & Oh, 2021; Kotler & Armstrong, 2021). It posits that customers tend to purchase products that they perceive to have the greatest value (Sheth, Newman, & Gross, 1991).

Perceived value is a complex and multifaceted concept that can mean different things to different individuals (Zeithaml, 1988). Zeithaml (1988) defines perceived value as a consumer's assessment of the benefits and drawbacks of a product or service relative to its cost. This concept relates to a customer's assessment of what is reasonable, proper, or warranted in relation to the perceived cost of an offering (Bolton & Lemon, 1999). Perceived value is the equilibrium between the benefits or advantages that a consumer receives from a product and the perceived costs, which include not only monetary expenses but also non-monetary expenses such as effort, time, and emotional stress that customers may incur during the process of evaluating, obtaining, and utilizing a product (Komulainen, Mainela, & Tähtinen, 2013; Kotler & Armstrong, 2021; Oliver & DeSarbo, 1988).

Various academics and researchers have proposed several typologies of value, but for understanding

consumer behavior towards e-vehicles, this study employed the perceived value typology presented by Sweeney and Soutar (2001), called the PERVAL scale. This scale is composed of three distinct dimensions of value, namely, functional value, emotional value, and social value. The subsequent sections of the paper detail these values with respect to purchase of EV and hypotheses formulated in the framework.

Functional value

The functional value of a product is an essential aspect that pertains to the perceived benefits or usefulness that customers can derive from it. It significantly influences the purchase intention and actual buying behavior of consumers (Forsythe, Liu, Shannon, & Gardner, 2006; Han, Wang, Zhao, & Li, 2017; Sheth, Newman, & Gross, 1991). When it comes to electric vehicles (EVs), the functional value can be seen as the balance between the higher initial cost of EVs compared to traditional vehicles and the long-term cost savings resulting from government incentives, fuel efficiency, and reduced maintenance costs. While electric vehicles (EVs) may have a higher upfront cost compared to traditional gasoline-powered cars, there are several factors that can make them a more cost-effective choice in the long run. For example, many governments offer financial incentives to encourage the purchase of EVs, which can help offset their higher purchase price (Gallagher & Muehlegger, 2008; Langbroek, Franklin, & Susilo, 2016). Additionally, EVs are typically more fuel-efficient than traditional cars, which can help to reduce long-term fuel costs (Lane & Potter, 2007). In addition, Jena (2020) found that maintenance costs for EVs may also be lower than for traditional cars. Given the aforementioned factors, it can be reasonably postulated that the intention to adopt EVs is positively influenced by perceived functional value. Therefore,

H1: Perceived functional value has a positive influence on the intention to adopt EV.

Social values (SV)

Social value, or the extent to which owning a product can help individuals interact with others and improve their social self-concept, can also play a role in consumers' decision to purchase electric vehicles (EVs) (Belk, 1981; Fennis & Pruyn, 2007; Sweeney & Soutar, 2001). Many consumers may be motivated to purchase EVs because they believe it will help them project a positive image to others, particularly if they believe that their efforts to reduce pollution through purchasing an EV will be publicly recognized or praised. Research has shown that

this sense of social approval can influence consumer behavior (Bhat, Verma, & Verma, 2022; Griskevicius, Tybur, & Van den Bergh, 2010). Based on this discussion, it can be reasonably postulated that the intention to adopt EVs is positively influenced by perceived social value.

H2: Perceived social value has a positive influence on the intention to adopt EV.

Emotional values (EV)

Emotional value, which refers to a product's capacity to evoke emotions or affective responses in consumers, is a significant factor that influences consumer decision-making (Sheth et al., 1991), particularly when it comes to purchasing electric vehicles (EVs). According to Schulte, Ree, and Carretta (2004), consumers often have specific psychological needs that they are looking to fulfill when making a purchase, and these needs can play a significant role in determining which products they ultimately choose. In the case of electric vehicles (EVs), consumers may be looking to meet a range of psychological needs, such as the desire to be environmentally conscious, the need for a sense of social approval, or the desire to experience certain emotions while driving. The emotional benefits of "green" consumption, such as feeling good about doing something that is environmentally friendly, can be a powerful motivator for customers. Additionally, driving an EV can provide a sense of joy and comfort that may add to the overall emotional value of the car. Having an understanding of these fundamental psychological requirements can aid in comprehending why certain consumers may have a higher tendency to embrace electric vehicles (EVs) compared to others. Therefore, it can be speculated that perceived emotional value can positively influence the adoption of EVs.

H3: Emotional value has a positive influence on the intention to adopt EV.

Pro-Environmental Behaviour

Consumers' decision to buy electric vehicles (EVs) can be influenced by pro-environmental behavior, which involves purposeful efforts to reduce adverse effects on the natural environment. Prior studies have indicated that people who participate in pro-environmental actions tend to have a greater consciousness of the risks associated with pollution and are more compelled to take action to mitigate it (Dunlap & Jones, 2002) and are more likely to adopt the EVs in comparison to others (Dutta & Hwang, 2021). Additionally, as people's

understanding of environmental issues grows, they may become more likely to adopt green goods and services, such as EVs (Norazah & Norbayah, 2015; Wang, Fan, Zhao, Yang, & Fu, 2016). Several research studies have indicated that customers are willing to pay extra for environmentally friendly products, provided they perceive that these products have a favorable effect on the environment (Erdem, Şentürk, & Şimşek, 2010; Laroche, Bergeron, & Barbaro Forleo, 2001).

Owning and driving an electric vehicle (EV) can be considered a pro-environmental behaviour because EVs produce significantly less air pollution and greenhouse gas emissions than traditional gasoline-powered vehicles (White & Sintov, 2017). This can lead to a decrease in air pollution and a lessening of the effects of climate change. Engaging in pro-environmental behaviour can make an individual feel good about themselves as they are taking actions to protect the environment (Taufik & Venhoeven, 2018). Owning an EV can also be seen as a socially responsible and forward-thinking choice, which may boost an individual's self-esteem. Overall, owning an EV can be an effective way for an individual to improve their self-image by making a positive impact on the environment and feeling good about their personal choices (Bennett & Vijaygopal, 2018). Owning an EV can also provide a sense of self-efficacy, as the individual feels that they are personally making a positive impact on the environment, which can lead to positive emotions such as hope, optimism, and empowerment. Moreover, possessing an electric vehicle (EV) can have a beneficial influence on an individual's emotional value, as it can provide a sense of contentment and gratification that they are contributing towards a positive change for the environment (White & Sintov, 2017). Overall, it can be inferred that pro-environmental behaviour can have a positive influence on the intention to adopt EV and this is mediated by functional, social and emotional values of owning EV. Therefore,

H4: Pro environmental behaviour has positive influence on the intention to adopt EV.

H5: Pro environmental behaviour has positive influence on the intention to adopt EV.

H6: Pro environmental behaviour has positive influence on the intention to adopt EV.

Based on above discussion, the research model is prepared and presented in figure 1.

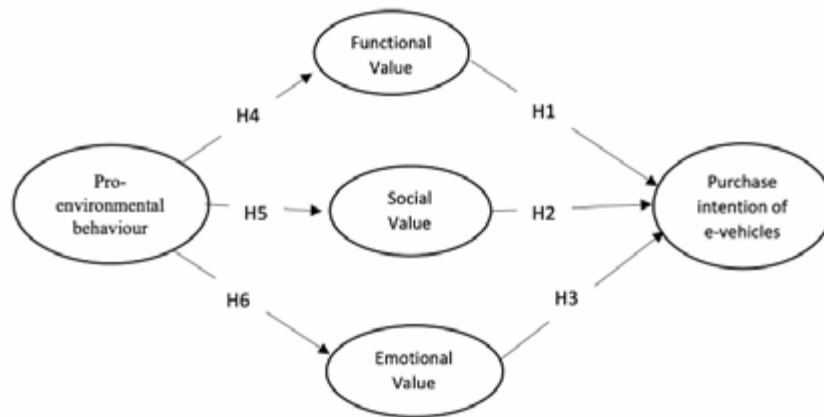


Figure 1: Proposed Research Model

Research Methodology

Operationalization of Constructs

An online survey was developed to gather data to assess the conceptual model and research hypotheses. The survey was divided into three sections for a clear and organized collection of data: demographics, constructs, and purchase intentions. The demographic section is used to gather information about the characteristics of the respondents, such as their gender, age, educational level, and income. This information can be used to understand how these factors may influence the responses to the other constructs of the survey. The second section, which consists of survey items rated on a five-point Likert scale, is used to measure specific constructs of the study. These items quantify the respondents' attitudes or beliefs towards the constructs being studied, such as their willingness to purchase EVs, pro-environment behaviour and their perceptions of functional, social and emotional values of owning an electric vehicle. Finally, the third section may include questions about the respondent's intention to purchase electric vehicles. In this study, the effect of pro-environmental behaviour on purchase intention was examined, with the perceived consumption values acting as a mediating variable. The purchase intention was taken as the outcome being studied, while pro-environmental behaviour was considered as the influencing factor. The survey questions were tailored from prior studies to align with the objectives of the current study.

Samples and Data Collection

Online data collection was done for the study's research question. The data collection occurred for ten weeks from January 2022 to March 2022, whereby the survey

was distributed through various online channels, such as emails and social networks (e.g., WhatsApp, Facebook, etc.). There were 415 survey responses obtained in all. A total of 372 valid responses were selected for the study after 43 responses with missing values were removed.

Table 2 illustrates the profile of the respondents. On average, respondents were male (48.92 percent) and female (51.07 percent), young (less than 40 years of age - 58 percent), had a college degree (85.75 percent), and had an annual income of less than Indian Rupees 10 lacs (90 percent). Detailed results are shown in Table 1.

Gender:	Male = 48.92%; Female = 51.07%
Age:	Less than 20 years = 12.63%; 21-30 years = 19.89%; 31-40 years = 25.27%; 41-50 years = 22.04%; More than 50 years = 20.16%
Education:	Lower than bachelor degree = 14.25%; Bachelor degree = 57.26%; Master degree or higher = 28.49%
Income (monthly):	Less than INR 30,000 = 9.41%; INR 30,000 – 60,000 = 43.55%; INR 60,000 – 90,000 = 37.36%; More than INR 90,000 = 9.67%

Table 1: Demographic profile of sample

Analysis and Results

First crucial analysis was performed to evaluating the measurement model to ensure the validity and reliability of the scales used in the study. This involved assessing the soundness of the measures used in the study and ensuring that they accurately capture the intended theoretical components. Evaluating the measurement model is critical in ensuring that the results of the

hypotheses tests are meaningful. The hypotheses were assessed via structural equation modeling (SEM), utilizing the open-source software R. This approach was taken to ensure that the findings of the study are valid and reliable.

Construct Validity and Reliability of Instruments

First, a reliability test was performed by calculating Cronbach's alpha for each of the constructs adopted in the study. This was done to purify the measurement scale and ensure that the scale measures what it is supposed to measure consistently. All measurement scales of the study, i.e., functional values ($\alpha = 0.946$), social values ($\alpha = 0.890$), emotional values ($\alpha = 0.835$), pro-environmental behaviour ($\alpha = 0.901$) and purchase intention ($\alpha = 0.919$) surpassed $\alpha = 0.70$ reference (Nunnally & Bernstein, 1994) and were used for further investigation.

Next, confirmatory Factor Analysis (CFA) is used to assess the validity of a measurement model by testing whether the observed variables are reliable measures of the underlying latent constructs that they are supposed to represent in the study. When conducting confirmatory factor analysis (CFA), the goodness of fit of the data to the hypothesized model is assessed by comparing the

observed covariance matrix of the measured variables with the covariance matrix implied by the model (Gefen, Straub, & Boudreau, 2000). The goodness of fit of the model was evaluated using several indices. The chi-square fit statistic was 505.154 with 179 degrees of freedom ($p \approx 0.00$). The root mean square error of approximation (RMSEA) was 0.070, which falls within the recommended range of 0.08. The other indices, including the Comparative Fit Index (CFI) at 0.948, Root Mean Square Residual (RFI) at 0.909, Tucker-Lewis Index (TLI) at 0.939, and Normed Fit Index (NFI) at 0.922, all exceeded the commonly used threshold of 0.90, indicating a good fit between the observed data and the hypothesized model (Hair, Anderson, Black, & Babin, 2016). These results indicate that the measured variables are valid and reliable for the study.

To examine convergent validity in this study, factor loadings, average variance extracted (AVE), and composite reliability were tested. As shown in Table 2, results showed that composite reliability (CR) was greater than 0.70, indicating a high level of consistency (Hair et al., 2016). Factor loadings were above the recommended value of 0.5 and AVE values exceeded 0.6, which established convergent validity (Fornell & Larcker, 1981; Hair et al., 2016). Given the number of indicators, the measurement quality was good for all indicators used in the study.

Items	Factor Loadings	AVE	CR	Cronbach's Alpha
Functional Value (FV)		0.816	0.945	0.946
FV1	0.890			
FV2	0.893			
FV3	0.959			
FV4	0.865			
Social Value (SV)		0.677	0.890	0.890
SV1	0.844			
SV2	0.897			
SV3	0.798			
SV4	0.732			
Emotional Value (EV)		0.638	0.835	0.835
EV1	0.860			
EV2	0.682			
EV3	0.852			
Pro-Environmental Behaviour		0.572	0.901	0.901
PEB1	0.739			
PEB2	0.724			
PEB3	0.774			
PEB4	0.710			
PEB5	0.792			
PEB6	0.746			
PEB7	0.828			
Purchase Intention (INT)		0.797	0.919	0.919
INT1	0.860			
INT2	0.944			
INT3	0.875			

Table 2: Confirmatory factor analysis results and Cronbach's alpha

Hypotheses Testing

After testing the measurement suitability, the path coefficient of the structural model was estimated using the laavan package of open source software R. Results of the same are shown in Table 5. Verification of the research model confirmed that the overall fit of the model meets the appropriate level ($\chi^2/df = 3.61$, $p < 0.001$; CFI = 0.924; NFI = 0.898; TLI = 0.913; RMSEA = 0.084). Therefore, the research model is considered appropriate.

The results showed that variables of perceived consumption value i.e., functional value ($\beta = 0.313$, $p < 0.01$), social value ($\beta = 0.213$, $p < 0.01$), and emotional value ($\beta = 0.270$, $p < 0.01$) positively affect purchase intention of e-vehicles. Therefore, H4, H5, and H6 are supported. Similarly, pro-environmental behaviour positively affect variables of perceived consumption values - functional value ($\beta = 0.792$, $p < 0.01$), social value ($\beta = 0.848$, $p < 0.01$), and emotional value ($\beta = 0.534$, $p < 0.01$). Therefore, H1, H2, and H3 are supported.

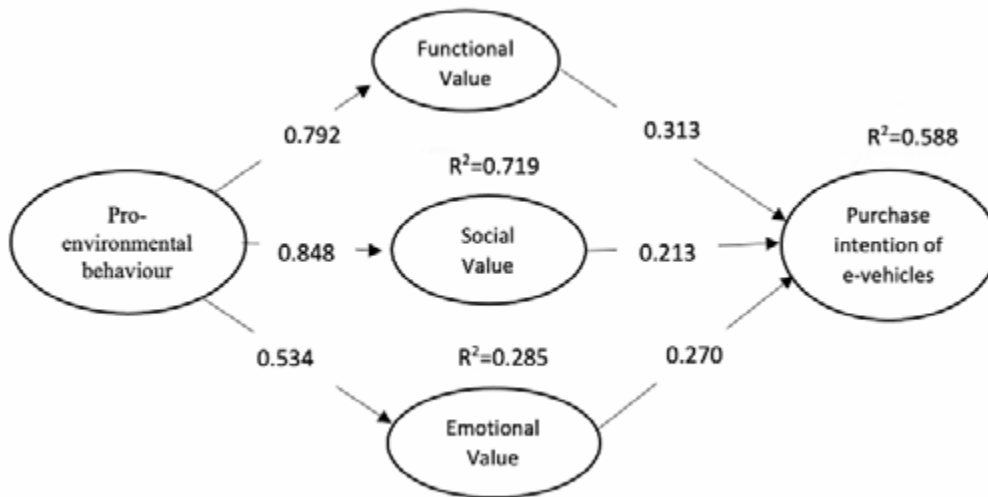


Figure 2: Result of path model

Discussion and Conclusions

This research study stands out as one of the few that focuses on exploring the factors that impact customers' inclination to buy electric vehicles in Gujarat, India. The objective of this study was to create and evaluate a research model that scrutinizes the correlation between customers' pro-environmental behavior and their intentions to purchase electric cars. Furthermore, the study aimed to investigate whether the consumption values, which comprises functional, social, and emotional values, plays a mediating role in this relationship. The study revealed that pro-environmental behavior has a positive impact on customers' intentions to buy electric vehicles, and this correlation is influenced by consumption values. These findings are significant as they integrate consumption value theory's concepts into the existing literature on electric vehicle purchase behavior.

From a managerial perspective, the findings of this study provide manufacturers and marketers of electric vehicles with a better understanding of consumer purchase behavior. The research provides valuable

insights that can help promote the adoption of electric vehicles in developing economies like India. By identifying the significant role of pro-environmental behavior and consumption values in shaping purchase intentions, policymakers and marketers can develop targeted strategies that appeal to these factors. For instance, campaigns promoting the environmental benefits of electric vehicles, emphasizing the functional, social, and emotional value of owning an electric vehicle, and providing incentives for customers who opt for electric vehicles can be effective in encouraging adoption. These insights can inform the development of policies and marketing campaigns that effectively promote the adoption of electric vehicles in developing economies such as India. Additionally, the study suggests that pro-environmental behaviour is positively associated with electric vehicle adoption, so manufacturers and marketers may want to consider ways to appeal to environmentally-conscious consumers. Overall, the research offers valuable insights for manufacturers and marketers looking to increase electric vehicle adoption in India and other developing economies.

This research provides valuable insights and conclusions, but it is important to acknowledge some limitations of the study. The study was only conducted in Gujarat, India, and therefore, the findings may not be generalizable to other regions or countries. Future researchers are encouraged to expand the scope of the research by recruiting participants from other locations to provide a more comprehensive and definitive study. Therefore, the findings of this research should be interpreted with caution when generalizing to other contexts.

References

- Belk, R. W. (1981). Determinants of consumption cue utilization in impression formation: An association derivation and experimental verification. *Advances in Consumer Research* 8, 170-175.
- Bennett, R., & Vijaygopal, R. (2018). Consumer attitudes towards electric vehicles. *European Journal of Marketing*, 52(3/4), 499-527. doi:10.1108/EJM-09-2016-0538
- Bhat, F., Verma, M., & Verma, A. (2022). Measuring and Modelling Electric Vehicle Adoption of Indian Consumers. *Transportation in Developing Economies*, 8.
- Dunlap, R., & Jones, R. (2002). Environmental Concern: Conceptual and Measurement Issues. 484-524.
- Dutta, B., & Hwang, H.-G. (2021). Consumers Purchase Intentions of Green Electric Vehicles: The Influence of Consumers Technological and Environmental Considerations. 13(21), 12025.
- Erdem, C., Şentürk, İ., & Şimşek, T. (2010). Identifying the factors affecting the willingness to pay for fuel-efficient vehicles in Turkey: A case of hybrids. *Energy Policy*, 38, 3038-3043.
- Fennis, B. M., & Pruyn, A. T. H. (2007). You are what you wear: Brand personality influences on consumer impression formation. *Journal of Business Research*, 60(6), 634-639.
- Forsythe, S., Liu, C., Shannon, D., & Gardner, L. (2006). Development of a Scale to Measure the Perceived Benefits and Risks of Online Shopping. *Journal of Interactive Marketing*, 20, 55-75.
- Gallagher, K., & Muehlegger, E. (2008). Giving green to get green? Incentives and consumer adoption of hybrid vehicle technology. *Journal of Environmental Economics and Management*, 61, 1-15.
- Griskevicius, V., Tybur, J. M., & Van den Bergh, B. (2010). Going green to be seen: Status, reputation, and conspicuous conservation. *Journal of Personality and Social Psychology*, 98(3), 392-404.
- Hair, J., Anderson, R., Black, B., & Babin, B. (2016). *Multivariate Data Analysis*: Pearson Education.
- Han, L., Wang, S., Zhao, D., & Li, J. (2017). The intention to adopt electric vehicles: Driven by functional and non-functional values. *Transportation Research Part A: Policy and Practice*, 103, 185-197.
- Jena, R. (2020). An empirical case study on Indian consumers' sentiment towards electric vehicles: A big data analytics approach. *Industrial Marketing Management*, 90, 605-616.
- Komulainen, H., Mainela, T., & Tähtinen, J. (2013). Customer's Potential Value: The Role of Learning. *Journal of business market management*, 6, 1-21.
- Kotler, P. T., & Armstrong, G. (2021). *Principles of Marketing (Vol. 18 Global Edition)*: Pearson Education
- Lane, B., & Potter, S. (2007). The adoption of cleaner vehicles in the UK: exploring the consumer attitude-action gap. *Journal of Cleaner Production*, 15(11), 1085-1092.
- Langbroek, J., Franklin, J., & Susilo, Y. (2016). The effect of policy incentives on electric vehicle adoption. *Energy Policy*, 94, 94-103.
- Laroche, M., Bergeron, J., & Barbaro Forleo, G. (2001). Targeting consumers who are willing to pay more for environmentally friendly products. *Journal of Consumer Marketing*, 18(6), 503-520.
- Malik, B. (2021). India's EV market to grow by 90% to touch \$150 billion by 2030: Report. Retrieved from <https://www.businesstoday.in/latest/story/indias-ev-market-to-grow-by-90-to-touch-150-billion-by-2030-report-314116-2021-12-01>
- Mint. (2022). Electric Vehicles in India; miles covered and miles to go. Retrieved from <https://www.livemint.com/auto-news/electric-vehicles-in-india-miles-covered-and-miles-to-go-11644845581284.html>
- Norazah, M. S., & Norbayah, M. S. (2015). Consumers' environmental behaviour towards staying at a green hotel. *Management of Environmental Quality: An International Journal*, 26(1), 103-117.
- Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric Theory (3 ed.)*: Tata McGraw-Hill Education.
- Oliver, R. L., & DeSarbo, W. S. (1988). Response Determinants in Satisfaction Judgments. *Journal of Consumer Research*, 14(4), 495-507. doi:10.1086/209131
- %J *Journal of Consumer Research*

- Schulte, M., Ree, M., & Carretta, T. (2004). Emotional intelligence: Not much more than G and personality. *Personality and Individual Differences*, 37, 1059-1068.
- Sheth, J. N., Newman, B. I., & Gross, B. L. (1991). Why we buy what we buy: A theory of consumption values. *Journal of Business Research*, 22(2), 159-170.
- Sweeney, J. C., & Soutar, G. N. (2001). Consumer perceived value: The development of a multiple item scale. *Journal of Retailing*, 77(2), 203-220.
- Taufik, D., & Venhoeven, L. (2018). Emotions and Pro-Environmental Behaviour. In *Environmental Psychology* (pp. 189-197).
- Wang, S., Fan, J., Zhao, D., Yang, S., & Fu, Y. (2016). Predicting consumers' intention to adopt hybrid electric vehicles: using an extended version of the theory of planned behavior model. *Transportation*, 43, 1-21. doi:10.1007/s11116-014-9567-9
- White, L. V., & Sintov, N. D. (2017). You are what you drive: Environmentalist and social innovator symbolism drives electric vehicle adoption intentions. *Transportation Research Part A: Policy and Practice*, 99, 94-113.