EPH-International Journal of Business & Management Science

A CONTEMPORARY STUDY ON CONSUMER PROSPECTS OF E-MOBILITY HYBRID ELECTRIC VEHICLES IN INDIA: ISSUES AND CHALLENGES

Ms. Upma Choudhary[1*], Dr. Dileep Pawar[2]

[1]Research Scholar at PCET's S.B. Patil Institute of Management Pune
Email id: upma.choudhary@gmail.com
[2]Assistant Professor and Research Guide at PCET's S.B. Patil Institute of Management Pune
Email id: pawardilip937@gmail.com

Article History
Received: *2026-02-08*
Revised: *2026-05-18*
Accepted: *2026-06-28*
Published: *2026-07-27*

Abstract: *Indian automotive industry is experiencing a paradigm shift towards sustainable transport systems; however, there is limited scientific evidence related to the customer behavior toward HEVs despite their increasing relevance. Although BEVs dominate the policies, HEVs can be a good choice in this regard for Indians because of lower fuel dependency but no need for charging infrastructure. In this research, an attempt is made to explore the issues associated with purchase intention and consumer perception of HEVs among 110 individuals from urban areas of Pune city using structured quantitative survey. The validity of constructs was performed using Cronbach's Alpha and Exploratory Factor Analysis by conducting Principal Component Analysis with Varimax rotation (KMO = 0.812). Three factors including Economic & Policy Consideration, Environmental Awareness & Perception and Adoption Barriers contributed to explain 59.4% of the variance in HEV purchase intention ($R^2 = 0.594$, $F = 51.87$, $p < .001$). One-way ANOVA revealed income-based difference in readiness for purchasing an HEV ($F = 9.63$, $p < .001$). As per results, major obstacles include relatively high purchase cost, lack of adequate incentives, uncertainty regarding resale value, and concerns about life expectancy of batteries. It seems appropriate for policymakers to streamline the tax policies related to HEVs, while automobile companies need to promote awareness among potential customers.*

Keywords: *Hybrid Electric Vehicles, Consumer Purchase Intention, Adoption Barriers, Environmental Awareness, Policy Incentives, Sustainable Mobility, India*

Vol. 12 Issue 07 (July 2026)
ISSN: 2208-2190 Pages-49-62
DOI: https://doi.org/10.69980/ymb3rz54

1. Introduction

Indian automotive industry is facing a paradigm shift as a result of growing environmental consciousness, fuel price sensitivity, traffic concerns, and policies of the government with regards to the consumer's decision-making on mobility. While there has been an increase in sales within the passenger car segment, ICEVs have led to concerns around fuel efficiency and sustainability (Society of Indian Automobile Manufacturers [SIAM], 2025). To counter these problems, Indian government has initiated many policies to promote sustainable mobility such as FAME II scheme, BS-VI emission standards, and GST reforms. Nevertheless, despite increased government attention and reduced taxation on electric vehicles, BEVs have also been facing certain challenges with regards to charging infrastructure and higher costs.

In this scenario, Hybrid Electric Vehicles (HEVs) seem to have become the ideal bridging technology for consumers from India. HEVs employ a combination of both an internal combustion engine as well as an electric motor with a self-recharging battery system, allowing them to offer better fuel efficiency without the need for any charging stations (Team-BHP, 2024). According to industry information, there seems to be an upward trend in the purchase of hybrid vehicles in India, with good hybrid sales numbers exceeding the growth numbers seen by BEVs in various market studies (Business Today, 2025). Further, the good hybrid market is concentrated amongst only a few number of producers, with Toyota being cited as the dominant producer in India's strong hybrid cars and SUV market (Autocar Professional, 2025).

Moreover, consumer preference data also highlights the significance of HEVs in the changing Indian automobile industry. According to Deloitte's Global Automotive Consumer Study, a significant percentage of Indian consumers were inclined towards adopting hybrid cars as their next powertrain of choice in a car, whereas, in its later iteration, growing consumer interest was observed in both HEVs and PHEVs combined (Deloitte, 2024, 2025). In addition, a study conducted by McKinsey regarding Indian mobility found that a significant number of Indian consumers still had concerns about the availability of EV charging stations, which emphasized the viability of hybrid cars not dependent on any external charging facilities (Goswamy et al., 2023). Considering the managerial and business implications, the following research question emerges: How do Indian consumers perceive HEVs based on price, fuel economy, government subsidies, environmental considerations, perceived risks, and purchase intentions?

However, despite the rising significance of such a market, there is still an inadequate body of research regarding consumer behavior towards HEVs in India. So far, all studies conducted in India on HEVs have mainly concentrated on plug-in hybrid electric vehicles, studying aspects such as willingness-to-pay, characteristics of vehicles, consumer preferences, and commuter versus non-commuter segments in Kolkata, Delhi, and Delhi-Kolkata comparisons (Bera & Maitra, 2022a, 2022b, 2024; Bera et al., 2024; Sharma et al., 2024). Although these studies offer valuable insights into PHEV adoption, very little attention has been paid to strong HEVs, which do not need to be charged externally.

Hence, it becomes an issue that concerns both academicians and managers. Automakers, dealers, marketers, financial firms, and policymakers need to be provided with better insight about the variables that can determine the purchase intention of consumers towards HEV. Even though some prior studies have found that price sensitivity, perceived economic value, governmental support, environmental awareness, and attitude of the consumers are important determinants of hybrid or electric car use, these relationships have yet to be tested in an Indian Tier-2 city (Bhutto et al., 2022; Chawla et al., 2023; Zamil et al., 2023). It is possible to undertake such a study in Pune since the city can offer an appropriate environment.

The present research aims to explore the purchase intentions for HEVs in an urban population of 110 individuals in Pune, Maharashtra. The various factors related to economics, legislation, environment, perceptions, and demographics have been combined in one empirical model. With the use of Cronbach’s Alpha, EFA, multiple regression analysis, and One-way ANOVA, the key determinants of HEVs adoption have been determined.

1.1 Problem Statement

Sustainable mobility discourse in India has largely favored BEVs, even though HEVs could be considered a more pragmatic option in light of efficiency gains and lack of dependency on external charging facilities. Academics, similarly, have not adequately studied this issue, as HEV-specific consumer studies conducted in India focus largely on the consumer preferences associated with PHEVs in Delhi and Kolkata. Strong HEVs, though relevant to Indian market dynamics, have been inadequately studied.

In addition, existing literature does not adequately explore the effect of economic, policy, environmental, perceptual, and demographic determinants in conjunction as predictors of HEV purchase intention in an Indian Tier-2 city. This presents an opportunity for further research, both for academics and practitioners, especially automotive companies, marketers, and policymakers interested in understanding how consumers view HEVs

Vol. 12 Issue 07 (July 2026)
ISSN: 2208-2190 Pages-49-62
DOI: https://doi.org/10.69980/ymb3rz54

as sustainable mobility solutions. This study attempts to bridge the gap by conducting a quantitative study of urban consumers in Pune.

1.2 Research Questions

1. RQ1: To what extent do legislative factors such as government subsidies, GST structure, and FAME-related incentives, along with economic factors such as purchase price, fuel savings, and resale-value uncertainty, influence HEV purchase intention among urban Indian consumers?
2. RQ2: What is the relationship between environmental awareness, environmental perception, and consumer readiness to adopt HEVs in the Indian urban context?
3. RQ3: How does HEV purchase intention vary across demographic variables such as income level, age, educational qualification, and vehicle ownership history?
4. RQ4: What are the primary perceived barriers to HEV adoption among consumers who are aware of HEV technology but have not yet expressed definitive purchase intent?
5. RQ5: Which construct dimension — Economic and Policy Factors, Awareness and Environmental Perception, or Adoption Barriers — carries the strongest predictive weight on HEV purchase intention?

1.3 Research Objectives

The study is guided by the following research objectives:

- To examine the influence of legislative and economic factors on HEV purchase intention among urban consumers in Pune, India.
- To analyse the role of environmental awareness and environmental perception in shaping consumer readiness to adopt HEVs.
- To evaluate whether HEV purchase intention differs across demographic groups, particularly income level, educational qualification, and vehicle ownership history.

2. Literature Review

2.1 Global HEV Consumer Behaviour: Theoretical Foundations

The literature on acceptance of HEVs often starts with models that have been used to explain consumer behavior and technology acceptance. The theory explains that purchase intentions are determined by factors such as attitude towards purchase, behavioral control, social norms, value, environmental concern, and perceptions of financial gains. Nevertheless, in developing nations, the relationship between attitude and intention to buy is greatly impacted by the cost factor, policy, and consumers' trust in technology.

As found out in the research carried out by Bhutto et al. (2022) regarding hybrid car purchasing intention, price sensitivity moderated the influence of perceived behavioral control on consumer intentions. The finding is significant because it shows that price acts as a financial constraint but also as a restraint to perceived behavioral control. In their study conducted in Malaysia, Karuppiah & Ramayah (2023) extended the theoretical framework of TPB and established that consumer attitude, subjective norm, and perceived behavioral control influenced hybrid vehicle adoption. Likewise, Ong et al. (2023) used the model of Sustainable TPB combined with UTAUT2 and concluded that perceived economic issues and governmental assistance are essential predictors of behavioral intention.

Further empirical international studies have also indicated that economic and political factors have higher weightage than environmental concern in the adoption of hybrids. According to Zamil et al., monetary value served as an important determinant of consumer attitude towards hybrid electric vehicles, through their utilitarian-hedonic attitude model. Hamzah et al., revealed that Malaysian consumers did not perceive environmental issues as a key factor in adopting hybrid vehicles. Meanwhile, in another study by Guo et al., the authors indicated that tax exemptions served to be much more influential in determining consumer intention to buy a hybrid vehicle as compared to environmental appeals alone. It can be concluded from the above studies that HEV adoption in emerging economies is not only driven by environmental considerations but also other factors.

2.2 HEV and EV Adoption Research in India

However, there has been an increase in the studies carried out in India on hybrid and electric vehicles. Nevertheless, most of the studies conducted in India are either related to BEVs or PHEVs. For instance, Bera & Maitra (2022a) studied the factors affecting the adoption of PHEV attributes by commuting customers in Kolkata, and it was found that attributes of the vehicle and its cost aspects had a significant influence on their adoption. In another study, Bera & Maitra (2022b) identified the Indian consumers' preference for PHEVs and noted the significance of price, technological attributes, and policy support in influencing their choice. In a

Vol. 12 Issue 07 (July 2026)
ISSN: 2208-2190 Pages-49-62
DOI: https://doi.org/10.69980/ymb3rz54

later study, Bera & Maitra (2024) developed an approach for identifying the attributes affecting PHEV adoption.

Other studies focusing on India that have been conducted more recently have widened the scope of PHEV research into metropolises. For instance, Bera Sharma et al. (2024) investigated consumer preferences for PHEVs in Delhi and Kolkata, while Sharma et al. (2024) investigated commuter vs. non-commuter preferences for PHEVs in the same metropolises. These researches are important because they bring out information regarding consumer preferences and willingness to pay for PHEVs, among others. Unfortunately, their concentration is still limited to PHEVs and metropolises.

There are other Indian EV-related studies that can be considered as a basis for the research on HEVs. For example, according to Chawla et al. (2023), various elements affecting consumer preferences and their decision to buy an electric car in India include sustainability orientation, infrastructure readiness, and perception. Ahuja and Raj (2022) analyzed the impact of hybrid electric vehicles in India on society and the economy. Moreover, according to Emiliya and Pandian (2025), urban and educated consumers residing in Coimbatore demonstrated positive perceptions towards hybrid cars. Additionally, Somprakash and Hosur (2023) conducted a comparative study of consumer perceptions regarding electric, hybrid, hydrogen, and fuel-powered cars, and noted that hybrid vehicles could be viewed as a balanced compromise between convenience and eco-friendliness. Usman et al. (2024) provided an overview of contemporary trends related to electric vehicle technologies, highlighting the importance of market conditions in addition to technical solutions in relation to the adoption of alternative powertrains.

One key drawback associated with Indian literature is the fact that there has been no research that has concentrated on studying strong HEVs as much as it has done for BEVs and PHEVs. The earlier studies conducted in India have helped immensely in the comprehension of PHEV preferences as well as adoption, but they fail to address how self-charging HEVs without any external charging facilities are perceived by consumers.

2.3 Perceptual, Economic, and Policy Dimensions of Adoption

As per the research, consumer uptake of HEVs is dependent on several factors including perceptual, economic, and regulatory factors. Environmental consciousness may foster a positive attitude towards the adoption of hybrid transportation systems, although this does not necessarily mean an intention to buy if consumers do not view any economic or functional benefits. According to Mpoi et al. (2022) in their study exploring various factors contributing to EVs, price, infrastructure, policies, environment, and convenience are some of the critical factors impacting consumer adoption. The same applies to the use of HEVs, particularly in underdeveloped countries.

In addition, it is important to state that the economic factors have a great importance with respect to hybrid cars. The expensive price for purchasing, unclear resale price, difficult maintenance, and ignorance about the savings in the future might discourage people from purchasing even when they know about the hybrid cars. At the same time, saving on fuel consumption, lower expenses, reliable car manufacturing company, and government support might encourage people to buy a car. This time, the findings of the study align with those found globally in HEVs.

Another crucial aspect which must be taken into account here is the design of policies. The use of tax breaks, subsidies, and good regulation will play a critical role in fostering consumer trust in alternative modes of transportation. This point is particularly relevant to the Indian context, where BEVs and HEVs are dealt with separately from a policy perspective. As pointed out by the Press Information Bureau (2025), there has always been emphasis on fast adoption and manufacturing of HEVs and EVs through FAME policy initiatives.

2.4 Market and Industry Context

From a market perspective, evidence suggests Indian consumers' growing receptivity towards alternative powertrains, yet their preferences depend on affordability, infrastructural readiness, and reliability. According to Deloitte (2024), some Indian consumers expressed preference toward hybrid powertrains over others for their next purchase; and in Deloitte (2025), consumer interest in hybrid and plug-in hybrids was observed. The aforementioned data implies the significance of hybrids in Indian consumer mobility transitions.

Moreover, issues regarding the charging infrastructure add more practical sense to HEV development. As per McKinsey's research conducted by Goswamy et al. (2023), many Indian consumers were open to the concept of electric mobility but were concerned about the lack of public EV charging infrastructure in place. Such an issue provides indirect justification for the need of self-charging HEVs offering better mileage with no external charging needs.

Vol. 12 Issue 07 (July 2026)
ISSN: 2208-2190 Pages-49-62
DOI: https://doi.org/10.69980/ymb3rz54

Industry reports also prove the commercial significance of hybrid cars. Autocar India (2025) states that there was an increase in alternative fuels. Autocar Professional (2025) also notes the dominance of Toyota in India's booming market for hybrid cars and SUVs. Business Today (2025) mentions the high growth in sales of hybrid cars year-on-year, proving that consumer interests are materializing in reality. SIAM (2025) also indicates the increasing automobile market of India, and hence the significance of research in consumer interests in this industry. Team-BHP (2024), which is not a scholarly article, offers useful information from the market point of view about the present and future of strong hybrids in India.

One important comparison is that prior studies in academia have focused on willingness to pay, features of the PHEV, or the adoption of EVs in general. Industry sources, on the other hand, have pointed out that there has been an increase in interest in strong hybrid cars among consumers. This research attempts to bridge the gap between both approaches and empirically analyze the purchase intention of HEVs.

2.5 Research Gap

The reviewed literature reveals the following gaps:

- **Geographic gap:** Existing Indian HEV studies are concentrated mainly in Delhi, Kolkata, and selected metropolitan contexts, while Tier-2 cities such as Pune remain underexplored.
- **Technology-type gap:** Prior empirical work focuses largely on BEVs or PHEVs, with limited attention to strong HEVs that do not require external charging.
- **Integrated-framework gap:** Few studies jointly examine economic, policy-related, environmental, perceptual, and demographic factors as predictors of HEV purchase intention.
- **Business and policy relevance gap:** Existing studies provide limited evidence on how consumer perceptions of price, incentives, resale value, and ownership risk affect HEV market adoption and managerial decision-making.

3. Research Methodology

3.1 Research Design

Quantitative, cross-sectional research methodology was utilized in this study in order to explore the factors that affect the intention of consumers towards purchasing HEVs in Pune city, India. Quantitative research was thought to be appropriate for this study since it involved testing the pre-defined relationships between economic, policy related, environmental, perceptual and demographic factors. The study used deductive reasoning based on consumer behaviour theories and technology adoption theories to develop a set of variables that could be tested statistically.

This research falls under the positivist research paradigm because it employed a structured approach in data collection, numerical measures, and statistical methods in evaluating the hypothesized relationship between variables. Cross-sectional research design facilitated the capturing of consumer attitudes and intentions about purchasing HEVs in one single snapshot of time. Cross-sectional research design is ideal for detecting any correlation between independent and dependent variables, but it cannot establish causality nor can it capture any temporal changes in consumer attitudes.

3.2 Population and Sampling

The target population included consumers residing in urban areas of Pune in Maharashtra, who either owned passenger vehicles at present or were potential buyers of automobiles likely to purchase cars within the next three years. The choice of Pune as the location for study was because the city is a vibrant automobile market where people buy vehicles and have experience with other forms of transport as well.

A purposive sampling method was applied in order to identify individuals who would have a bearing on the process of making decisions about buying an automobile. These criteria included being at least 21 years old, having already purchased a passenger car or expressing the likelihood of acquiring one soon. This allowed for gathering the opinions of people who could make evaluations based on various HEV purchase determinants including cost, fuel economy, maintenance costs, policies, environment, and resale.

Out of the 117 responses that were obtained, 7 were found to be incomplete, and hence they were excluded from further analysis. The remaining number of valid responses was 110. According to Cohen et al., with a view to conducting a pilot reliability study involving Exploratory Factor Analysis, multiple regression analysis, and ANOVA in an exploratory consumer behaviour research, a sample size of 110 is deemed appropriate especially since the focus was on the urban automobile market in India and there were measured constructs. Nonetheless, purposive sampling coupled with a single-city sample reduces the generalizability of the findings to the Indian automobile industry.

Vol. 12 Issue 07 (July 2026)
ISSN: 2208-2190 Pages-49-62
DOI: https://doi.org/10.69980/ymb3rz54

3.3 Data Collection Instrument

The primary data collection tool employed for this study was a questionnaire-based survey. The development of the questionnaire was based on prior research regarding the adoption of HEVs, electric mobility, intention to purchase, environmental awareness, sensitivity to cost, government regulation, and barriers to adoption.

The questionnaire included 45 questions, which were grouped into five major categories. The first category had questions on demographic variables like gender, age, education qualification, income per month, and whether or not the participant had a vehicle. The second category asked questions about consumer awareness and perception towards hybrid electric vehicles. The third category asked about economic and policy-related variables like purchase cost, fuel savings, government subsidies, perceptions of GST, etc. The fourth category was concerned with measuring environmental awareness and perception.

Variables that pertain to awareness, perception, economic considerations, perceived difficulties, and purchase intent were gauged by way of a Likert scale that ranged from 1 = Strongly Disagree to 5 = Strongly Agree. The Likert scale was chosen due to its capability to gauge the degree of agreement on a number of issues.

3.4 Variables and Constructs

HEV purchase intention was the dependent variable investigated in the study. The key independent variables, on the other hand, were classified into three major categories that made up the core of the constructs used. Variables related to Economy and Policies included the perceived price of acquisition, fuel savings, incentives by the government, features of the GST, and affordability.

Knowledge and Environment consisted of knowledge about the hybrid engine technology, environmental benefits, emissions reduction benefits, and appropriateness of HEVs in Indian driving conditions. Finally, Perceived Adoption Barriers included perceptions concerning cost-related barriers, maintenance, battery lifetime issues, uncertain resale values, and consumer ignorance.

Income, age, educational attainment, and past ownership history among other demographic variables were considered to test how purchase intention differs between various consumer groups.

3.5 Data Analysis Techniques

Analysis of the collected data was performed using SPSS software v. 26. The analysis process involved a stepwise statistical analysis method.

Firstly, descriptive statistics and frequency analysis was done to give an insight into the demographic profile of respondents and ownership of vehicles. Secondly, Cronbach's Alpha technique was adopted in measuring the internal consistency and reliability of major constructs. A Cronbach Alpha score of more than 0.70 was accepted to establish scale reliability.

Thirdly, exploratory factor analysis was done using principal component analysis and varimax rotation. The Kaiser-Meyer-Olkin statistic and Bartlett's Test of Sphericity were used to measure the aptness of the collected data to undergo factor analysis. Loadings of 0.50 and above were used as an index of interpretation.

Lastly, multiple regression analysis was done in order to determine the impact of economic and policy factors, awareness and environmental perception, and perceived adoption challenges on HEV purchase intentions. Finally, One Way ANOVA analysis was done in order to determine if there was any difference in HEV purchase intentions by income levels.

Statistical significance was evaluated at the 0.05 level, while highly significant results were interpreted at $p < 0.01$ and $p < 0.001$, where applicable.

3.6 Methodological Limitations

While the research methodological approach adopted is suitable for an empirical exploration of research phenomena, it has some limitations that need to be highlighted. Firstly, it employed purposive sampling, which makes the results vulnerable to the problem of selection bias since the subjects were not sampled randomly. Secondly, sampling was only done in Pune and not in any other Tier-1, Tier-2, Tier-3, or rural markets in India, thus making it difficult to generalize the results. Thirdly, the cross-sectional nature of the design made it difficult to assess how purchase intention would change in case of any future changes in HEV price, governmental policy, fuel price, or infrastructure. Fourthly, the data obtained was based on self-reports, which may differ from real-world behavior.

However, despite its constraints, the research approach is an appropriate empirical framework to analyze the purchasing intention of HEVs within the urban consumer milieu in India, providing valuable lessons for business executives, automotive marketers, and policy-makers.

4. Results and Analysis

Vol. 12 Issue 07 (July 2026)
ISSN: 2208-2190 Pages-49-62
DOI: https://doi.org/10.69980/ymb3rz54

4.1 Demographic Profile of Respondents

The respondents' demographics are provided in Figure 1, which highlights the distribution of the survey participants based on gender, age, education, and yearly income. The research was conducted on 110 valid respondents belonging to Pune's urban consumer market.

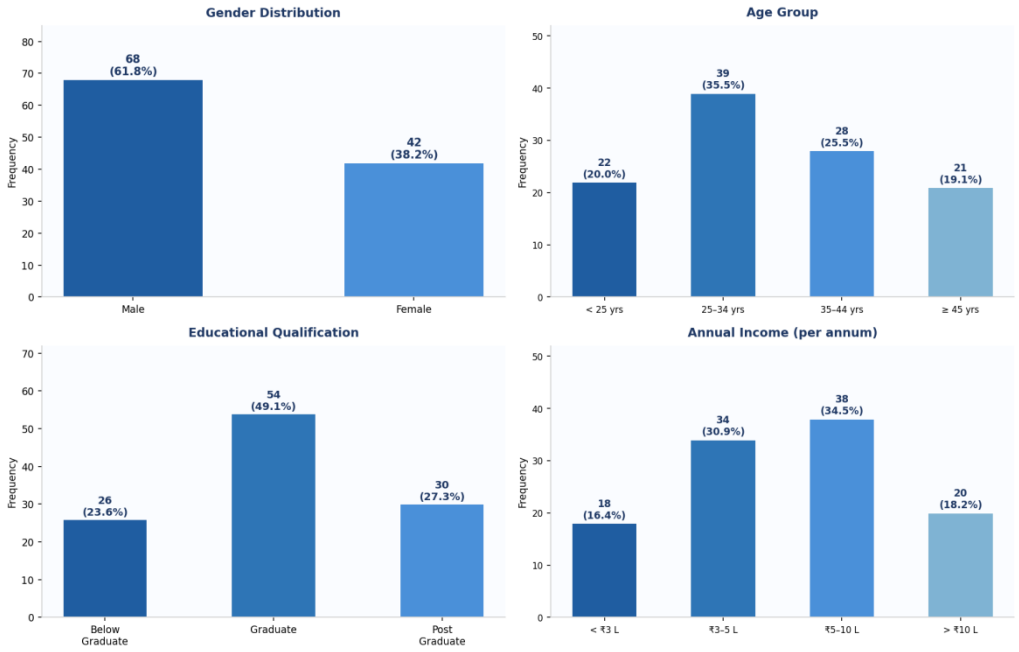


Figure 1. Demographic Profile of Respondents (n = 110).

The sample was heavily tilted towards males with 68 responses (61.8%) from males compared to only 42 responses (38.2%) from females. The largest age group in the sample included respondents belonging to the age range of 25–34 years, comprising 39 respondents (35.5%). This was followed by 28 responses (25.5%) from the age range of 35–44 years, 22 responses (20.0%) from those below 25 years, and 21 responses (19.1%) from those 45 years and above.

In the educational background, the sample mostly consisted of graduates and postgraduates. Graduate respondents comprised the highest number at 54 responses (49.1%), followed by postgraduate respondents at 30 responses (27.3%). Those below the graduate level comprised 26 responses (23.6%). Thus, the sample was relatively well educated and would likely have adequate knowledge regarding hybrid electric vehicle information.

Income wise, the most populated segment of respondents came from the annual income bracket of ₹5–10 lakh, accounting for 38 responses (34.5%). Next came respondents earning ₹3–5 lakh per annum, accounting for 34 responses (30.9%). Above ₹10 lakh per annum respondents contributed 20 responses (18.2%), whereas those below ₹3 lakh per annum constituted 18 responses (16.4%). The income distribution indicates that the sample consisted of middle-income and upper-middle-income urban consumers.

4.2 Current Vehicle Ownership and Mobility Pattern

Vehicle ownership and mobility trends among the study participants are illustrated in Figure 2, considering the three factors mentioned above: the type of existing vehicle, usage trend, and daily travel distance. All of these are crucial for the study since the use of HEVs is dependent on the existing mobility trends.

Vol. 12 Issue 07 (July 2026)
ISSN: 2208-2190 Pages-49-62
DOI: https://doi.org/10.69980/ymb3rz54

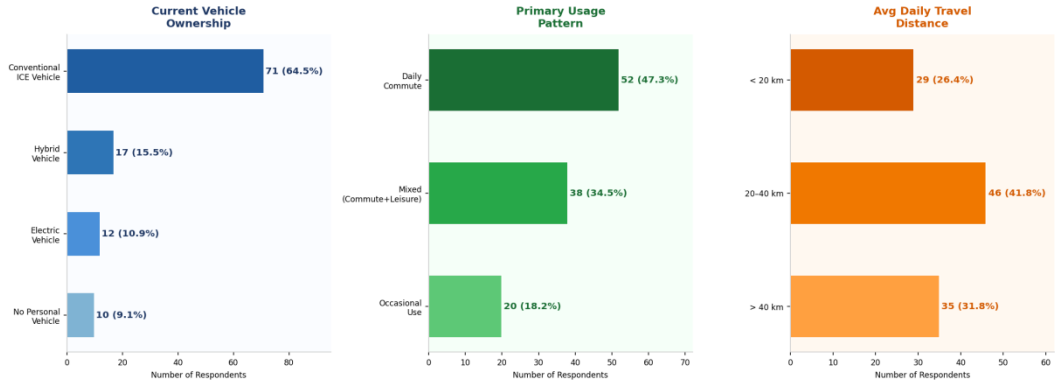


Figure 2. Current Vehicle Ownership and Mobility Pattern.

Ownership distribution reveals that conventional ICE cars still have higher dominance amongst the participants. Out of the 71 participants (64.5%) had conventional ICE cars, 17 (15.5%) had hybrid cars, 12 (10.9%) had electric cars, and 10 (9.1%) had no personal cars. On the use pattern, 52 (47.3%) of the participants were daily commuters, 38 (34.5%) were mixed-users who used their cars both for commuting and leisure purposes, and 20 (18.2%) were occasional users. The travel distance pattern revealed that 46 (41.8%) participants traveled between 20 and 40 kilometers per day, while 35 (31.8%) traveled more than 40 kilometers per day. Only 29 (26.4%) of the participants traveled less than 20 kilometers per day.

This shows that many of those surveyed travel considerable distances daily as frequent commuters in urban areas. This type of movement is particularly important when considering the use of HEVs since hybrid vehicles are known to be advantageous for individuals who value economy in terms of fuel consumption and reduced costs.

4.3 Awareness and Perception of Hybrid E-Mobility Vehicles

Awareness and perception of consumers were evaluated on the basis of four important statements pertaining to hybrid car technology, eco-friendliness, dependency on fuel, and feasibility on Indian roads. The results obtained have been represented in Fig. 3.

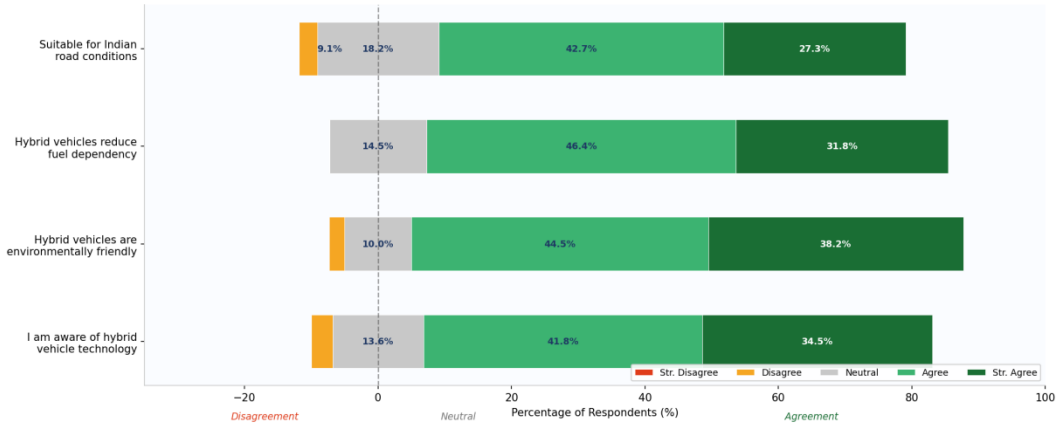


Figure 3. Awareness and Perception of Hybrid E-Mobility Vehicles.

From the results, there is a perceived positivity regarding hybrid e-mobility cars. The results for the statement "I am familiar with hybrid vehicle technology" were that 41.8% were in agreement, while 34.5% strongly agreed. This gives an overall favorable agreement rate of 76.3%. In the case of the statement "Hybrid vehicles are eco-friendly," 44.5% were in agreement, while 38.2% strongly agreed.

Likewise, for the proposition "HEVs decrease fuel reliance," 46.4% were in favor and 31.8% strongly favored it, giving a total of 78.2%. The statement "Favorable for Indian road conditions" was less favored than the previous two, although it still received positive response, as 42.7% agreed and 27.3% strongly agreed to it.

It is clear from the results that the respondents have a good overall image of hybrid technology, particularly when it comes to the environment and reduced fuel dependency. The relative lack of consensus on the question concerning Indian roads indicates that there could be a need for more clarification on how suitable HEVs are for Indian roads.

Vol. 12 Issue 07 (July 2026)
ISSN: 2208-2190 Pages-49-62
DOI: https://doi.org/10.69980/ymb3rz54

4.4 Factors Influencing Purchase Intention of Hybrid Vehicles

The importance of five major factors influencing consumer purchase intention is shown in **Figure 4**, namely brand reliability, purchase price, government incentives, environmental impact, and fuel efficiency.

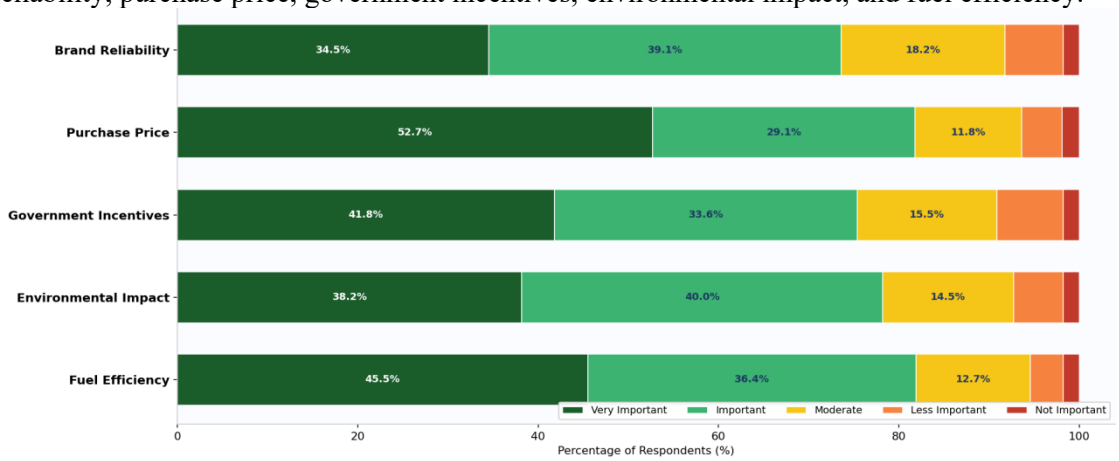


Figure 4. Factors Influencing Purchase Intention of Hybrid Vehicles.

Purchase price turned out to be the strongest predictor variable, as evidenced by 52.7% and 29.1% of participants stating that it is very important and important respectively. Hence, over four-fifths of all respondents found it as a crucial factor in buying HEVs. High importance was also given to fuel economy, which was regarded as very important and important by 45.5% and 36.4% of the respondents respectively.
Government incentives were seen as very important by 41.8% of participants and important by 33.6% of them. The environment was viewed as very important and important by 38.2% and 40.0% of the respondents respectively. Similarly, high importance was attributed to brand reliability, which was stated as very important by 34.5% of the respondents and important by 39.1%.
However, it is evident that the intention of buying HEVs depends on both economic and non-economic factors. The purchase price and fuel efficiency are among the top considerations in the list of consumers' criteria, which indicates the importance of economic factors in making such decisions.

4.5 Issues and Challenges Perceived in Adopting Hybrid Vehicles

The significance of perceived adoption barriers is presented in **Figure 5**, covering high initial purchase cost, limited government subsidies, lack of consumer awareness, maintenance and servicing, and uncertainty regarding resale value.

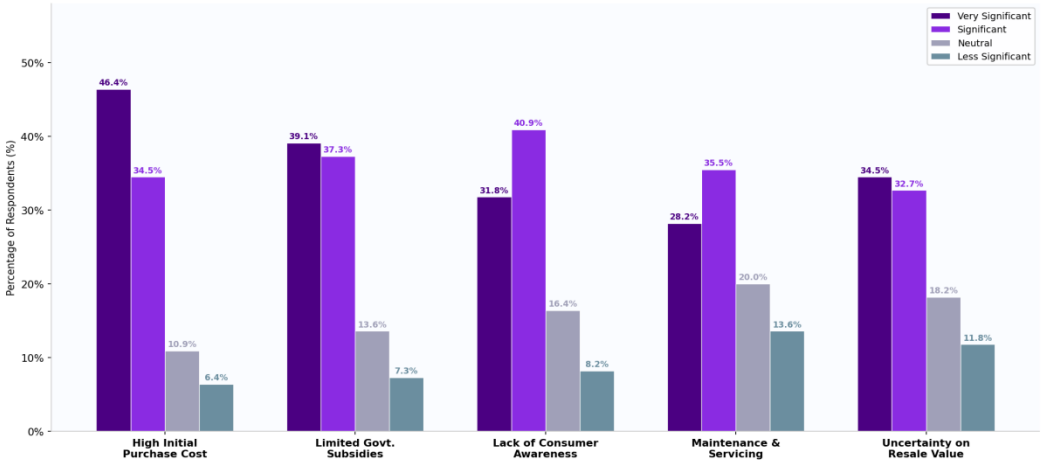


Figure 5. Issues and Challenges Perceived in Adopting Hybrid Vehicles.

The high initial price of acquisition was found to be the most prominent barrier to adoption, since 46.4% of the respondents felt that this factor was very significant and another 34.5% felt that it was significant. Government subsidies were also seen as an important barrier, as 39.1% felt that this factor was very significant and another 37.3% felt that it was significant.

Vol. 12 Issue 07 (July 2026)
ISSN: 2208-2190 Pages-49-62
DOI: https://doi.org/10.69980/ymb3rz54

The lack of consumer awareness was another important issue which 40.9% of the respondents found to be significant and 31.8% found to be very significant. The problem of maintenance and servicing was found to be significant by 35.5% of the respondents and very significant by 28.2%, while the uncertainty regarding the resale value was significant to 32.7% of the respondents and very significant to 34.5% of the respondents.
It is seen that not only does the adoption of hybrid electric vehicles in India need the rationalization of prices and policies but that consumers should also be educated about the matter.

4.6 Reliability Analysis

Cronbach's Alpha was used to measure the consistency of the study variables and is presented in Table 1 below. Reliability testing was performed on the constructs of Awareness and Perception, Economic and Policy Considerations, Challenges Faced, and Purchase Intention.

Table 1. Reliability Analysis of Study Constructs

Construct	Number of Items	Cronbach's Alpha	Result
Awareness and Perception	5	0.842	Reliable
Economic and Policy Factors	6	0.871	Reliable
Perceived Challenges	5	0.816	Reliable
Purchase Intention	4	0.858	Reliable

The reliability coefficient (Cronbach Alpha value) for all the variables was found to be above the threshold level of 0.70, which shows the adequacy of internal consistency. Among all, Economic and Policy Factors were the most reliable with alpha values of 0.871, while Purchase Intention had an alpha value of 0.858.

4.7 Exploratory Factor Analysis

Exploratory Factor Analysis was conducted using Principal Component Analysis with Varimax rotation to identify the underlying factor structure of the study variables. As shown in Table 2, the Kaiser-Meyer-Olkin value was 0.812, and Bartlett's Test of Sphericity was significant, $\chi^2 = 624.37$, $p < .001$, confirming that the data were suitable for factor analysis.

Table 2. Exploratory Factor Analysis: Rotated Component Matrix

Variables	Factor 1: Economic and Policy	Factor 2: Awareness and Environment	Factor 3: Adoption Barriers
High purchase cost	0.781	—	—
Government incentives	0.746	—	—
Fuel savings	0.723	—	—
Environmental benefits of HEVs	—	0.792	—
Awareness of hybrid technology	—	0.768	—
Emission-reduction belief	—	0.741	—
Maintenance concerns	—	—	0.784
Resale-value uncertainty	—	—	0.759
Service-infrastructure gaps	—	—	0.721

Note. Extraction method: Principal Component Analysis. Rotation method: Varimax rotation. KMO = 0.812; Bartlett's Test $\chi^2 = 624.37$, $p < .001$. Factor 1 explained 24.3% of variance, Factor 2 explained 19.8%, and Factor 3 explained 15.3%. Total variance explained = 59.4%.
Three unique factors were identified through factor analysis: Economic and Policy, Awareness, and Adoption Barriers. Each item exhibited high loading values over 0.70, suggesting that each item was highly correlated with its respective factor. The total explained variance value of 59.4% suggests that the three-factor model sufficiently addresses the important dimensions influencing the purchase intention of HEVs.

4.8 Multiple Regression Analysis

A multiple linear regression analysis was done to determine the effect of the three factors on the intention to buy HEVs. HEV purchase intention served as the dependent variable, while economic and policy factors,

Vol. 12 Issue 07 (July 2026)
ISSN: 2208-2190 Pages-49-62
DOI: https://doi.org/10.69980/ymb3rz54

awareness and environmental perception, and perceived challenges served as the independent variables. The results of the regression analysis are shown in Table 3.

Table 3. Multiple Regression Analysis: Predictors of HEV Purchase Intention

Predictor Variables	β Coefficient	SE	t-value	p-value	VIF
Economic and Policy Factors	0.421	0.068	6.19	< .001	1.43
Awareness and Environmental Perception	0.367	0.071	4.12	< .001	1.38
Perceived Challenges	−0.286	0.065	−3.21	.002	1.51

Model Summary. $R^2 = 0.594$; Adjusted $R^2 = 0.582$; $F(3, 106) = 51.87$, $p < .001$.

The regression model accounted for 59.4% variance of HEV purchase intention, showing that the regression model has considerable explanatory ability. Economic and Policy factors have a strong influence on HEV purchase intention; this is followed by Awareness and Environmental Perception. Perceived Challenges showed a negative influence on HEV purchase intention, thus proving that higher challenges reduce HEV purchase intention. Values of VIF were lower than 5, thus there was no problem of multicollinearity.

4.9 One-Way ANOVA: Income Level and Purchase Intention

One-Way ANOVA was conducted to examine whether HEV purchase intention differed significantly across income groups. The income-wise mean scores and ANOVA result are presented in Table 4.

Table 4. One-Way ANOVA: Income Level and HEV Purchase Intention

Income Group	n	Mean Purchase Intention	Standard Deviation
Below ₹30,000 per month	18	2.81	0.74
₹30,001–₹60,000 per month	38	3.42	0.68
₹60,001–₹1,00,000 per month	34	3.91	0.61
Above ₹1,00,000 per month	20	4.18	0.55

ANOVA Result. $F = 9.63$, $p < .001$.

The ANOVA results show a statistically significant difference in HEV purchase intention across income groups. Respondents with higher monthly income reported stronger purchase intention than lower-income respondents. The mean purchase intention increased from 2.81 among respondents earning below ₹30,000 per month to 4.18 among those earning above ₹1,00,000 per month. This confirms that affordability and purchasing power are important determinants of HEV adoption readiness.

5. Discussion

The findings indicate that HEV purchase intention among urban consumers in Pune is shaped primarily by economic and policy-related considerations. It further corroborates previous researches conducted about HEV adoption which indicates that the price effect, economic value, and political forces have major implications for the adoption of HEVs, especially in developing countries (Bhutto et al., 2022; Ong et al., 2023). For example, in this study, the consumers' responses have been significantly influenced by several aspects such as cost of purchasing, fuel economy, incentive programs, and tax policies in terms of cost. It is indicative that the HEVs are not regarded only as eco-friendly automobiles, but also as economic items.

From the management point of view, the above conclusion has important implications for the manufacturers of HEVs, car dealers, and financial institutions which facilitate the transaction process. The manufacturers must market the HEVs based on their Total Cost of Ownership, energy savings, and other long-term benefits besides the environmental aspects. The dealerships should make consumers aware of the differences in running costs and maintenance of the HEVs compared to the Internal Combustion Engine cars and the Battery Electric Vehicles. The banks can also help in promoting HEVs through loans and exchanges at low EMI rates.

Role of policy influence is no less important. Previous Indian researches regarding PHEV use indicated that the price of purchase and incentive policies had a significant effect on customer choice and their Willingness to Pay (Bera & Maitra, 2022a, 2022b; Sharma et al., 2024). Further research in this matter in terms of Pune's consumers proved that economic and policy factors were still the best predictors of HEV purchasing intent.

Vol. 12 Issue 07 (July 2026)
ISSN: 2208-2190 Pages-49-62
DOI: https://doi.org/10.69980/ymb3rz54

From a policy standpoint, this implies that uneven taxation and lack of direct incentive programs may undermine customers' trust towards hybrids.

In addition, environmental awareness and perception had a positive impact on purchase intention, albeit in a less powerful way compared to economic and policy variables. This finding is consistent with earlier research that indicates the impact of environmental awareness in building positive attitudes towards hybrid cars, but may not necessarily drive purchase intentions if cost becomes a concern (Hamzah et al., 2022; Karuppiah & Ramayah, 2023). In other words, individuals might be environmentally aware, but whether or not they would purchase the car depends on its cost and functionality.

The significance of this implication cannot be overstated in terms of its impact on marketing considerations. Car makers need to take care not to separate the green side of their product into an entirely different category in marketing terms. Instead, car makers' green side must be integrated together with the real gains customers can expect to get, including lower costs in terms of fuel consumption, lowered dependency on fuel, reduced emissions, and suitability for urban driving conditions. Positioning needs to integrate sustainability with consumer gains.

The negative impact of the perception of challenges shows that challenges such as a high price of acquisition, uncertainty about resale value, battery problems, and problems associated with servicing can reduce intention to purchase HEVs. This is significant in that it highlights that not only do the challenges exist but that they actually inhibit consumption readiness. The issue of ownership risk, uncertainties regarding charging facilities, and lack of clarity in policies have similarly been studied in EV and HEV literature (Chawla et al., 2023; Mpoi et al., 2022).

For industry stakeholders, this means that consumer education must be more specific and practical. Manufactures should give clear data concerning warranty for the battery, cost of maintenance, availability of the service network, and resale assistance. The dealerships should also educate themselves on how to deal with customer myths regarding hybrid batteries, the need for recharging, difficulties in maintaining, and durability. Resale programs and extended warranties could also minimize risks.

From the analysis using income levels, it is evident that hybrid electric vehicles (HEVs) have more attraction towards individuals with high incomes. In other words, currently, HEVs have more appeal towards individuals with adequate financial ability to acquire these types of automobiles, whereas low and medium-income earners might see them as desirable but inaccessible. The conclusion is vital for companies in marketing strategies, where higher and medium-high income consumers can be attracted through performance and technological features, while medium income earners require affordable approaches.

In summary, The study indicates that the adoption of HEVs in urban Indian settings needs to be viewed primarily from the perspective of commercial and consumer benefit considerations rather than only being an environmental and technical consideration. This study contributes to HEV adoption literature by highlighting the influence that economic benefit considerations, environmental benefit considerations, policies, and minimizing risks have on the intention to adopt. The primary lesson for practitioners and policymakers from this study is that only through combining environmental awareness with affordability and efficiency will HEV adoption flourish.

6. Conclusion

This study concludes that consumer purchase intention toward Hybrid Electric Vehicles (HEVs) in Pune is shaped primarily by economic value, policy support, environmental perception, and perceived ownership risk. The empirical results obtained from a survey of 110 respondents and tested via statistics such as Cronbach's Alpha, EFA, Multiple Regression, and One-Way ANOVA reveal that Economic and Policy Factors emerged as the most significant predictor of HEV purchase intention ($\beta = 0.421$), followed by Awareness and Environmental Perception ($\beta = 0.367$), while Perceived Challenges had a negative impact on HEV adoption readiness ($\beta = -0.286$). The proposed model accounted for 59.4% of the variance in HEV purchase intention ($R^2 = 0.594$), proving that consumers take into account the cost-effectiveness, fuel economy, government incentives, perceptions about the environment, and ownership-related considerations before making their purchasing decisions. In addition, the income-based ANOVA test conducted for HEV adoption readiness reveals $F = 9.63$, and $p < .001$, which means that the likelihood of HEV adoption increases with rising income levels. Academically, the paper contributes to the HEV adoption literature by analysing consumer behaviour beyond BEV-dominant and PHEV-centric papers and adopting an all-encompassing framework based on economic, legislative, environmental, perceptual, and demographic factors in the context of a Tier-2 Indian city. Practically, the results indicate that HEV adoption is not dependent only on environmental awareness, but consumers need to have a clear understanding of economic benefits, ownership details, post-sales services, and risk minimisation strategies. Thus, mainstream adoption of HEVs in India necessitates collective efforts from

Vol. 12 Issue 07 (July 2026)
ISSN: 2208-2190 Pages-49-62
DOI: https://doi.org/10.69980/ymb3rz54

policymakers and the automotive industry by rationalising GST rates for HEVs, offering attractive incentives to promote HEVs with better mileage, providing consistent policy signals, educating consumers, clarifying battery life and warranty terms, creating robust service networks, and launching financing/exchange plans for middle-income consumers.

7. Limitations and Future Research

This study has certain limitations that should be considered while interpreting the findings. The first limitation pertains to the geographical location of the study conducted in Pune. The result of this study may thus fail to reflect the consumers' perspectives from other cities belonging to the categories of Tier-1, Tier-2, Tier-3, or even rural locations in India. Second, since purposeful sampling technique was used, the validity of the study can be questioned as the sample population was not chosen using probability-based sampling technique. Third, the cross-sectional method measures consumers' purchase intention at one point in time, failing to take into account the possible future changes that might take place owing to any alterations in price, cost, and incentives for purchasing HEVs in India. Last but not least, as purchase intention in this study is measured by asking consumers about their purchase intentions, it may not necessarily reflect whether the consumers purchased a car in reality. Future researchers can build upon this framework by extending the study to include more than one city or state and comparing the results between different models of HEVs.

References

1. Ahuja, S., & Raj, M. (2022). Social and economic impact of hybrid electric vehicles on environment: An Indian case study. *International Journal of Creative Research Thoughts, 10*(5). https://ijcrt.org/papers/IJCRT2205773.pdf
2. Autocar India. (2025, January 4). *Only petrol car sales decline in 2025; CNG, EV, diesel and hybrid see growth*. https://www.autocarindia.com/car-news/only-petrol-car-sales-decline-in-2025-cng-ev-diesel-and-hybrid-see-growth-438722
3. Autocar Professional. (2025, May). *Toyota rules strong hybrid car and SUV market in India*. https://www.autocarpro.in/analysis-sales/toyota-india-commands-80-share-of-strong-hybrid-car-and-suv-market-126297
4. Bera Sharma, R., Das, D., & Maitra, B. (2024). Consumer attitudes and preferences for plug-in hybrid electric vehicles: A case of Delhi and Kolkata, India. *Case Studies on Transport Policy, 17*, Article 101259. https://doi.org/10.1016/j.cstp.2024.101259
5. Bera, R., & Maitra, B. (2022a). Commuters' willingness-to-pay for the attributes of plug-in hybrid electric vehicle: A case study in Kolkata, India. *Transportation in Developing Economies, 8*, Article 5. https://doi.org/10.1007/s40890-021-00142-3
6. Bera, R., & Maitra, B. (2022b). Assessing consumer preferences for plug-in hybrid electric vehicle (PHEV): An Indian perspective. *Research in Transportation Economics, 91*, Article 101146. https://doi.org/10.1016/j.retrec.2021.101146
7. Bera, R., & Maitra, B. (2024). Methodological approach to obtain key attributes affecting the adoption of plug-in hybrid electric vehicle. *Transportation Research Interdisciplinary Perspectives, 23*, Article 101009. https://doi.org/10.1016/j.trip.2024.101009
8. Bhutto, M. H., Tariq, B., Azhar, S., Ahmed, K., Khuwaja, F. M., & Han, H. (2022). Predicting consumer purchase intention toward hybrid vehicles: Testing the moderating role of price sensitivity. *European Business Review, 34*(1), 62–84. https://doi.org/10.1108/EBR-10-2019-0274
9. Business Today. (2025, December 31). *EV sales soar 76% in 2025; hybrid cars see 83% jump.* https://www.businesstoday.in/industry/story/ev-sales-soar-76-in-2025-hybrid-cars-see-83-jump-508925-2025-12-31
10. Chawla, U., Mohnot, R., Mishra, V., Singh, H. V., & Singh, A. K. (2023). Factors influencing customer preference and adoption of electric vehicles in India: A journey towards more sustainable transportation. *Sustainability, 15*(8), Article 7020. https://doi.org/10.3390/su15087020
11. Deloitte. (2024). *2024 Global Automotive Consumer Study: India findings*. https://www.deloitte.com/in/en/about/press-room/almost-50-percent-of-Indian-consumers-opt-out-of-ice-to-embrace-environment-conscious-hybrid-tech-deloitte-2024-global-automotive-consumer-study.html
12. Deloitte. (2025). *2025 Global Automotive Consumer Study: India findings*. https://www.deloitte.com/in/en/Industries/automotive/perspectives/global-automotive-consumer-study.html

13. Emiliya, W. I., & Pandian, S. K. S. (2025). A study on consumers' perception towards hybrid cars with special reference to Coimbatore city. *International Journal of Scientific Development and Research, 10*(3), 19–27. https://www.ijsdr.org/papers/IJSDR2503019.pdf
14. Goswamy, T., Grausam, A., Mittal, B., Möller, T., Rupalla, F., & Thapar, P. (2023). *Consumers are driving the transition to electric cars in India*. McKinsey & Company. https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/consumers-are-driving-the-transition-to-electric-cars-in-india
15. Guo, Q., Liu, Y., & Cai, L. (2023). An experimental study on the potential purchase behavior of Chinese consumers of new energy hybrid electric vehicles. *Frontiers in Environmental Science, 11*, Article 1159846. https://doi.org/10.3389/fenvs.2023.1159846
16. Hamzah, M. I., Tanwir, N. S., Wahab, S. N., & Rashid, M. H. A. (2022). Consumer perceptions of hybrid electric vehicle adoption and the green automotive market: The Malaysian evidence. *Environment, Development and Sustainability, 24*(2), 1827–1851. https://doi.org/10.1007/s10668-021-01510-0
17. Karuppiah, V., & Ramayah, T. (2023). Modeling hybrid cars adoption using an extended version of the theory of planned behaviour. *Transportation Letters, 15*(7), 780–792. https://doi.org/10.1080/19427867.2022.2091677
18. Mpoi, G., Giourka, P., & Porathe, T. (2022). State-of-the-art review of the key factors affecting electric vehicle adoption by consumers. *Energies, 15*(24), Article 9409. https://doi.org/10.3390/en15249409
19. Ong, A. K. S., German, J. D., Redi, A. A. N. P., Cordova, L. N. Z., Longanilla, F. A. B., Caprecho, N. L., & Javier, R. A. V. (2023). Antecedents of behavioral intentions for purchasing hybrid cars using sustainability theory of planned behavior integrated with UTAUT2. *Sustainability*, *15*(9), 7657. https://doi.org/10.3390/su15097657
20. Press Information Bureau. (2025). *FAME Phase II scheme: Faster adoption and manufacturing of hybrid and electric vehicles in India*. Government of India. https://pib.gov.in/PressReleasePage.aspx?PRID=2102782
21. Sharma, R. B., Majumdar, B. B., & Maitra, B. (2024). Commuter and non-commuter preferences for plug-in hybrid electric vehicle: A case study of Delhi and Kolkata, India. *Research in Transportation Economics, 103*, Article 101415. https://doi.org/10.1016/j.retrec.2024.101415
22. Society of Indian Automobile Manufacturers. (2025). *Auto industry sales performance FY 2024–25*. https://www.siam.in/pressrelease-details.aspx?mpgid=48&pgidtrail=50&pid=579
23. Somprakash, M. P., & Hosur, V. S. (2023). The road to sustainability: An examination of consumer attitudes towards electric, hybrid, hydrogen, and gasoline powered vehicles. *International Journal of Research and Analytical Reviews, 10*(3), 3468. https://ijrar.org/papers/IJRAR23C3468.pdf
24. Team-BHP. (2024). *The present and future of strong hybrid cars in India*. https://www.team-bhp.com/news/present-future-strong-hybrid-cars-india
25. Usman, H. M., Sharma, N. K., Joshi, D. K., Kaushik, A., & Saminu, S. (2024). Recent trends and future prospects in electric vehicle technologies: A comprehensive review. *Kathmandu University Journal of Science, Engineering, and Technology, 18*(1), 1–13. https://doi.org/10.3126/kuset.v18i1.67501
26. Zamil, A. M. A., Ali, S., Akbar, M., Zubr, V., & Rasool, F. (2023). The consumer purchase intention toward hybrid electric car: A utilitarian-hedonic attitude approach. *Frontiers in Environmental Science, 11*, Article 1101258. https://doi.org/10.3389/fenvs.2023.1101258