

Hybrid Electric Vehicles as Replacements for Conventional Cars

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Introduction

Hybrid vehicles provide an efficient alternative to conventional vehicles in the auto industry. The use of hybrid electric vehicles has increased in the world due to efficiency and technological advancements. The technology offered in hybrid vehicles is capable of replacing the conventional cars. Diverse sets of hybrid cars are available in America that offer a range of benefits to consumers. The major benefit associated with the Hybrid Electric Vehicles (HEV) is reduced costs and carbon emissions. Hybrid vehicles improve fuel efficiency and performance of the vehicle. Hajderi and Paco (2017) define HEV as an “engine that works with conventional or alternative fuels and an electric motor that uses energy stored in a battery.

Extra power provided by the electric motor creates the possibility of a smaller engine, resulting in better economy of fuel without sacrificing performance” (HAJDERI and PACO). Hybrid vehicles exhibit differences when compared with conventional vehicles, while prominent benefits include HEV being effective in the reduction of air pollution due to no carbon emission. In terms of usability, HEV is a better choice compared to conventional vehicles that consume massive amounts of fuel. The society will be unable to fulfill its energy requirements due to oil depletion. The limited battery life of the HEVs poses challenges for its acceptance in the vehicle industry. Earlier forecasts predicted that HEV sales and use would increase after 2020 as batteries became cheaper and vehicle range improved; this should be read as a historical projection, not a current forecast.

The present study aims at assessing the practical aspects of hybrid electric vehicles and their capability to replace conventional vehicles. The purpose of the study is to explore the benefits associated with HEVs that make them more appropriate choices for future consumers. It highlights the key benefits, such as reduced fuel consumption and carbon emission, as visible strengths, making HEVs better than conventional vehicles. The study assesses the future market for HEVs and their survival in the conventional vehicle industry. The paper studies the role of cost reduction due to the declined oil consumption on vehicle industry. It also uncovers the benefits such as low carbon emission making HEV's better choice for future consumers. The present study suggests HEV as an effective solution to overcome environmental problems, including carbon emission and global warming (Liao, Molin and Wee).

1.1 Objectives Of The Study

- To assess the benefits associated with hybrid vehicles.
- To determine if HEVs are capable of replacing conventional vehicles in the future.
- To identify the costs associated with HEVs.
- To determine the impact of HEVs on carbon emission.
- To explore if the benefits associated with HEV make it a better choice.

1.2 Hypothesis

- Hybrid vehicles offer benefits to the consumer that make them a better choice.
- HEVs are capable of replacing conventional vehicles in the future.
- The benefits of low carbon emission and low costs make HEV a better choice.

1.3 Methodology

The present study relies on the empirical evidence obtained from scholarly databases. The analysis of benefits depends on the articles and journals highlighting the strengths and usability of hybrid electric vehicles. The empirical evidence provides a comparison of HEVs and other conventional vehicles. Through assessment of the costs and environmental benefits, the literature on HEVs helps in identifying their role in the vehicle industry (Hajderi & Paco, 2017). The study used search engines, including Google Scholar and other credible sources such as JSTOR and Science Direct. By entering relevant keywords, identification of relevant articles and journals was possible (Liao, Molin and Wee).

1.4 Ethical Issues

The research adopted the standards of ethics to avoid ethical issues including plagiarism. Proper referencing is used to avoid the inclusion of copied content in the study. The study considered the consent of the participants to avoid conflict. Honesty and integrity are useful in avoiding misrepresentation of information (Reynolds and Kandlikar).

1.5 Limitations

The study uncovers the gap in the literature related to HEVs and highlights the need for assessing the realistic role of hybrid electric cars in the vehicle industry. The present study will provide information about the usability and benefits of HEV to future researchers.

Key terms: hybrid vehicles, efficiency, low carbon emission, and environment protection.

1. Findings of the study

2.1 Empirical Evidence

Hajderi and Paco (2017) studied the usability and role of hybrid electric vehicles in the vehicle industry. The empirical evidence reveals the effectiveness of hybrid vehicles and identifies their potential to replace conventional vehicles. Driving fuel saving remains the visible advantage of the HEV as it consumes only 38% of fuel in the city and 20% on the highway when compared to the fuel consumption of the conventional vehicle. The in-built design of the engine makes HEV cars more fuel efficient resulting in low carbon emission. The costs faced by the driver of a HEV are two times smaller compared to the conventional vehicle. Evidence suggests that the cost of fuel per mile is 0.05 to 0.07 dollars. In the case of conventional vehicles, the cost per mile is recorded as 0.10 to 0.15 dollars. The findings of the study reveal that HEV is a better choice compared to the conventional vehicle in terms of performance and efficiency. Consumption of less fuel makes HEV more efficient as it eliminates environmental pollution (Hajderi & Paco, 2017).

2.2 Benefits Of Hybrid Vehicles

Karim and Shahid (2017) explored the usability and benefits of [hybrid electricity cars](#) in the US automobile industry. The study identifies the central advantage of the vehicle as a transformation from a single source of energy to multiple sources. Sophisticated mechanical and electrical systems offered by HEV provide environment-friendly options to consumers. The study proposes the conversion of fuel-based conventional cars to solar-electric hybrid cars. The study identifies the potential benefits of HEV, allowing consumers to save fuel, cost and environmental protection. HEV is an effective solution to control pollution resulting from carbon emissions. In terms of cost and usability, HEV can replace conventional vehicles (Karim and Shahid). Empirical evidence on the performance of HEV depicts its presentation as a mid-term solution to the low emission and high mileage vehicles.

The comparison of engine performance and mileage coverage depicts that HEV can cover more distance with less fuel consumption. However, literature recognizes HEVs as low-pollution cars that are more suitable for the current vehicle industry (Rapier). The perceived benefits of the HEV depend on the technical and environmental image. The basic function that provides leverage to the HEV is the technology enhancement, allowing it to store energy in a battery compared to the conventional vehicle's storage of fuel. Combining efficient combustion engines with batteries enhances the performance of the HEV. Batteries also provide supplementary engine power that allows speed recovery (Chanaron and Teske).

The evaluation of markets for HEV depicts its growth in the US vehicle industry. The major states of America allow HEV registration, including Florida, California, Texas and New York. The market share of

hybrid cars is big in the developed countries. The share of the hybrid cars shrinks in the developing countries. The market shares of hybrid cars will improve in developed countries like the US in the next few years. The literature identifies that the market shares of HEV will improve until 2030. Rising fuel prices in the vehicle industry depict the possibility of increased HEV demand in the future. Growing environmental concerns due to global warming and carbon emission makes HEV more feasible for the industry.

HEV provides environment-friendly solutions to the people that convince them to switch to the new and safe technology. People in society are more likely to adopt HEV due to their proactive role in society. The modern combustion technology for the engine offered by HEV relies on high-precision gasoline injection, resulting in reduced fuel consumption. Evidence suggests that HEV technology is efficient in the reduction of fuel consumption as it lowers the generation of carbon dioxide and nitrogen. Regenerative braking is an additional feature that provides an edge to the HEV technology compared to conventional vehicles. Braking in stop-and-go traffic leads to enhanced efficiency (Reynolds and Kandlikar).

Improved energy storage adds to more efficiency of HEV in comparison to conventional vehicles. Regenerative braking accelerates the performance, leading to high-energy capacity and efficient release of energy. HEVs rely on batteries that are made up of nickel-metal-hydride, which is relatively heavy. Lithium batteries offer lighter batteries that are more efficient in energy saving. Fuel efficiency makes HEV more reliable and efficient for the vehicle industry as it eliminates the issues of energy waste or consumption of fossil fuels. Fuel efficiency makes HEV capable of replacing conventional vehicles. Empirical evidence suggests that HEV is a better alternative to the old traditional vehicles that consume more energy and fuel. HEV provides cost-effective solutions to people as it allows them to save fuel and money. Tax breaks also offer advantages to the purchasers of hybrid cars. The international policy of environmental protection allows people to buy hybrid cars. Incentives for the buyers include savings, discounts and tax rebates. Lighter weight and smaller gas engines provide more efficient solutions to consumers. Improved equipment and reliability involved in HEV make it a better alternative to conventional vehicles (HAJDERI and PACO).

2.3 Future Prospects And Demand Of HEV

The data obtained from the vehicle industry of the United States reveals that the consumption of oil is significantly high in the transportation department. The total consumption of oil in the transport department is 70%. The increased reliance of the country on fossil fuels depicts the need for curtailing oil consumption. The hybrid electric vehicle provides an advantage to the industry as it reduces the consumption of oils. HEV is also efficient in attaining economic development. Reduced energy spending and a decline in oil imports create economic opportunities for the country. The comprehensive analysis of the vehicle industry in America reflects the benefits of HEV (Karim and Shahid).

Liao, Molin and Wee (2016) explore the future prospects of HEV in the global vehicle industry. The literature on the HEV depicts the demand for hybrid vehicles will increase in the future. The state's role in the promotion of HEV due to the perceived environmental and cost benefits provides a wider scope for the conversion of the conventional vehicle industry to the hybrid industry. The prospects suggest strong promotion policies adopted by governments for the purpose of increasing HEV consumption (Liao, Molin and Wee).

2.4 Consumer Preferences And HEV

Empirical studies on consumer preferences exhibit the profound role of pricing and costs. The reduced energy costs due to reduced fuel consumption have a positive impact on the purchase decision of the consumers. The motivation of consumers plays a vital role in their decision to choose HEV over conventional cars. Behavioral economics explains the main incentive during a purchase decision remains the price of purchase. The consumer theory of preferences states that the consumers choose from the available set of alternatives. Consumer preference theory suggests that the comparison of the cost associated with HEV will increase the chances of consumers' purchase. Reduces fuel consumption and saving due to low energy consumption acts as a primary incentive. HEV offers reduced operating costs due to one-time battery purchase, thus allowing consumers to save money. Increased costs have a negative impact on consumer decision-making. Battery range also has a positive influence on the purchase decisions of individuals in the vehicle industry. The driving range is high in the case of HEV compared to conventional cars, influencing consumer preferences negatively (Liao, Molin and Wee).

2.5 Sale Trends Of HEV In US

The sales of hybrid vehicles increased massively in the United States in the last few years. The sales of electric vehicles reflected an increase of 37% in 2016. The total number of vehicles sold in the year was 159,139. The popular models of HEV sold in America include the Tesla Model S, Tesla Model X, Nissan Leaf, Ford Fusion and Chevrolet Volt. California sets a target of selling 1.5 million hybrid cars by the year 2025. The sales reflected growth of 32% in 2016, depicting the increase in market share compared to the previous years. The global sales depict an increase of 42%, with the selling of 777,497 vehicles. The current statistics indicate a further increase in the sales of HEVs in the country (Rapier). Data suggests that the most common reason for people to buy electric cars is environmental protection. Among total consumers, 87% exhibited a willingness to purchase HEV for environmental concerns, 62% reflected concerns against low long-term costs, and 52% wanted to avail the facility for enjoying technology. The survey of American consumers reveals that they plan to buy hybrid cars (Karim and Shahid).

Conclusion

Hybrid vehicles are capable of replacing conventional vehicles due to the range of benefits that they offer. The use of efficient technology makes HEV a practical replacement for conventional vehicles. The prominent benefits of the new vehicle include fuel efficiency and cost savings. Due to the increased consumption of fuels, conventional vehicles increase pollution resulting from high carbon emissions. Pollution generated from conventional vehicles also contributes to the environmental issue of global warming. The impact of low carbon emissions and concerns related to environmental protection also lead to positive consumer preferences. The decisions of consumers act in favor of the HEV industry, thus increasing its demand in the future. The replacement of the conventional vehicle industry with HEV depends on the factors of cost and fuel efficiency.

The costs of HEV are lower compared to conventional vehicles, which again makes the new technology a better choice for consumers. Although HEV offers a wide range of benefits to the community, its purchase depends on consumer preferences. The study assessed the implications of HEV in society and its usability for consumers. The research relied on the empirical evidence on the benefits of HEV available in scholarly databases. The articles and library resources support the usability of HEV and recognize it as one of the efficient technologies capable of replacing conventional vehicles. Due to environmental destruction caused by increased carbon emissions, the study suggests HEV as an efficient model to replace conventional vehicles.

The study supports the hypothesis as the empirical evidence identifies the effectiveness of HEV. The first hypothesis states that hybrid vehicles offer benefits to the consumer, which makes them a better choice. The scholarly database confirms the role of HEV in cost reduction and fuel efficiency, which makes it a better choice compared to conventional vehicles. The findings reveal that HEV consumers have 38% less fuel in the city and 20% less fuel on the highway, which supports the primary hypothesis of the study. The results also support the second hypothesis, stating that HEVs are capable of replacing conventional vehicles in the future. The increased costs faced by consumers and the inclusion of consumer preferences provide sufficient support for the hypothesis.

Consumer preferences relying on the elements of cost and fuel efficiency make it possible for the industry to replace conventional vehicles. The findings of the literature on HEV depict that HEV has an effective role in the elimination of carbon emissions, supporting the final hypothesis: the benefits of low carbon emission and low costs make HEV a better choice. The results depicting that 87% of the consumers show incentives to purchase HEV for environmental concerns supports the hypothesis. The overall analysis of the empirical evidence proves that HEV is a better choice for consumers. The findings of the study also favor the hypothesis as it highlights reduced oil consumption as a visible advantage. The study identifies the negative impacts of conventional vehicles due to excessive consumption of fuels leading to the problem of oil depletion. The study suggests replacing conventional vehicles with HEVs as it helps reduce fuel consumption, thus eliminating the problem of oil depletion.

Recommendations

The present study represents recommendations for future research as mentioned below;

- Future researchers can conduct an analysis of the costs associated with HEVs and conventional vehicles.
- To conduct a forecast of the HEV's demand in the future and how it could replace conventional vehicles.
- To study how efficient batteries are in replacing fuel consumption and how they can increase the performance of HEVs.
- A thorough analysis of the operational capabilities that make HEV a better model for the automotive industry due to its perceived benefits of environmental safety.
- To study how the state can promote HEV sales and discourage the selling of conventional vehicles in the automotive industry.

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