



FACTORS INFLUENCING THE ADOPTION INTENTION OF PASSENGER ELECTRIC VEHICLES: A CONCEPTUAL FRAMEWORK

Vishal Krishnan M*

Dr. Haridayal Sharma**

Ph.D. Research Scholar, PG & Research Department of Commerce, Dwaraka Doss Goverdhan Doss
Vaishnav College (Autonomous), Arumbakkam, Chennai – 600 106, India.

Assistant Professor & Research Supervisor, PG & Research Department of Commerce, Dwaraka Doss
Goverdhan Doss Vaishnav College (Autonomous), Arumbakkam, Chennai – 600 106, India.

ABSTRACT

The adoption of electric vehicles in the country is of very much significant for the growth of automobile sector in the country. The objective of this research paper is to understand the factors influencing the adoption of passenger electric vehicles among Indian consumers through a conceptual framework model. From this conceptual framework model we can understand that price, value activation, personal innovativeness, government policies, schemes and incentives and the environmental concern are some of the significant influencing or the motivating factors concerned with electric vehicle adoption in the Indian context. Hence it is being suggested that, the government and the concerned authorities must frame favorable schemes, policies and also provide adequate incentives for the effective adoption of electric vehicles in the country which automatically favors the transition towards electric mobility which positively encourages the growth of auto sector.

Keywords: Electric Vehicles, Price, Government policies, India, Conceptual framework

Introduction

The world's population is currently 7.5 billion people. Climate change, unsustainable population expansion, flora and fauna extinction, oil and energy shortages, and a myriad of other issues are wreaking havoc on our planet. As a result, rapid attention to global enhancement and living is required. Sustainable living is a mode of life in which humans reduce or limit their use of the earth's natural resources while also living in harmony with and respect for the planet's natural ecosystem and cycles. The Sustainable Development Goals were formed at the United Nations Summit on Sustainable Development in 2015 to address major environmental, economic, and political concerns around the world.

The National Electric Mobility Mission Plan 2020, announced by the Indian government in 2013, aims to enhance hybrid and electric car manufacturing in the country by 2020, with a goal of producing seven million electric vehicles. The government of India's Faster Adoption and Manufacturing of Hybrid and Electric Vehicles scheme has bolstered this endeavor by offering demand-side incentives. Private vehicle companies have responded by investing in research and development and expanding their E-Vehicle manufacturing facilities.

Global automakers are spending extensively in research and development for electric vehicle technologies in India, with the government offering to fund up to 60% of research and development costs for the development of low-cost indigenous electric technology. The government's backing for electric vehicles in India is expected to transform the country's position. The goal of this research article is to use

a conceptual framework model to analyze the elements impacting the adoption of passenger electric vehicles among Indian consumers.

The objective of this research paper is to understand the factors influencing the adoption of passenger electric vehicles among Indian consumers through a conceptual framework model. This research paper will be beneficial to the manufacturers of passenger electric vehicles such that they will be able to understand the factors that would influence the adoption intention of passenger electric vehicles among the consumers and design it according to the needs and wants of the consumers. This study will also help the concerned ministries, authorities and the government to understand the significance of the policies, schemes and incentives in deploying the passenger electric vehicles in the market. As a result, the governmental authorities will be able to effectively and efficiently frame the policies, rules and regulations required for the infusion of passenger electric vehicles.

Objective of the study

The objective of this research paper is to understand the factors influencing the adoption of passenger electric vehicles among Indian consumers through a conceptual framework model.

Factors influencing the adoption intention of passenger electric vehicles in India – A Literature review

The impact concerned with environmental, price and range was contrasted to purchase intention of electric vehicles. It was found that environmental factor had the largest influence when compared to price and range when considering the purchase of electric vehicles (Degirmenci, Kenan & Breitner, 2017). The status concerned with cognitive aspects of the consumers, perception regarding the product and incentive policies framed towards the adoption of electric vehicles was analyzed by (X. Huang & Ge, (2019) through the Theory of Planned Behavior. It was reported that attitude, perceived behavioral control, cognitive aspects concerned with the status of the consumers and the incentives policies framed had a significant effect on the purchase intention of the consumers in Beijing.

X. Zhang et al., (2018) examined the effect of perceived economic benefits, perceived environmental benefits and perceived risk on the purchase intention of the consumers towards electric vehicles. The results showed that perceived economic benefits, perceived environmental benefits and perceived risk had a dominant effect on the purchase intention of the consumers towards electric vehicles. The role played by the government policies and the awareness of the consumers towards making purchase decisions concerned with regard to electric vehicles was analyzed by Shetty et al., (2020). It was reported that government policies, awareness of the consumers and knowledge impacted the purchase decision of the consumers. The consumer's perception about the pricing and willingness to pay premium for electric vehicles was examined. The results showed that the price range between \$ 22,000 to \$27,5000 was accepted by consumers and also the consumers had no willingness to pay premium for electric vehicles (Larson et al., (2015).

Shankar & Kumari, (2019) evaluated the influencing and prohibiting factors towards the adoption intention of electric vehicles. The results showed that attitude, subjective norm, perceived behavioral control, environmental concern and perceived social responsibility had a greater impact on the purchase intention towards electric vehicles. The decision of the consumers towards transition to sustainability values was examined by Aksen & Kurani., (2013). It was found that consumer's decision making towards sustainability oriented values was favorable with their self-concept. The effect of environmental values and willingness to pay for electric vehicles were identified. The results were found that environmental values effected the purchase decision and the product information moderated the effect of value activation on price evaluation (Hahnel et al., (2014).

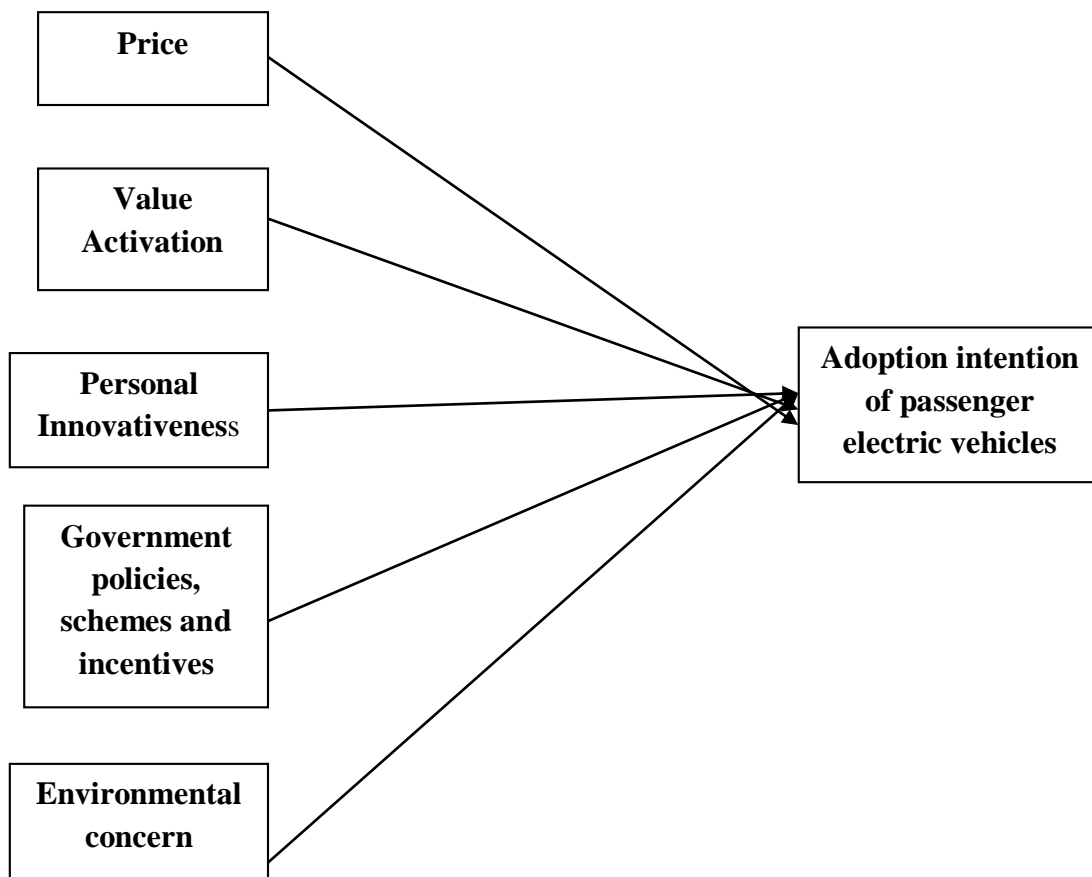
Wu et al., (2019) evaluated the public acceptance towards autonomous electric vehicles by employing Technology Acceptance Model and studied the environmental impact on the acceptance of autonomous electric vehicles. It was revealed that green perceived usefulness, perceived ease of use and environmental concern positively affected the acceptance of autonomous electric vehicles and the environmental concern had a mediating impact on the usage intention of the consumers towards electric vehicles. The policies and the schemes framed by the government towards the adoption of electric vehicles was analyzed by S. Wang et al., (2017). It was found that the policies and the schemes formulated by the government had a significant impact on the adoption intention of electric vehicles. The influencing factors towards the adoption of electric vehicles in India were explored. It was showed that perceived environmental benefits and the financial incentives had a significant impact on the adoption intention of consumers towards electric vehicles (Verma, Verma and Khan, 2020).

Sierzchula., (2014) examined the reasons for effective and early adoption of electric vehicles by fleet managers. It was revealed that technology drivers had a greater impact towards the adoption and the other factors constitute environmental impact, government incentives and public image. The effect of consumer knowledge, perceived risk, perceived usefulness and current incentive policies on the consumer adoption behavior towards electric vehicles was evaluated through developing extended technology acceptance model. It was revealed that consumer knowledge impacted the adoption intention of electric vehicles and perceived risk negatively impacted the attitude, perceived usefulness and the adoption intention of electric vehicles (Wang *et al.*, 2018).

S. Yang *et al.*, (2018) examined the behavior of the consumers towards electric vehicles. It was reported that high price, low performance affected the adoption intention of the consumers towards electric vehicles. It was suggested that increase in comfort and availability of adequate charging infrastructure would enhance the adoption intention of the consumers towards electric vehicles. The influencing factors towards the adoption of electric vehicles was examined by Munshi *et al.*, (2019). It was reported that lack of awareness concerned with the policy incentives was considered to be the barrier towards the adoption of electric vehicles. The effect of consumption value on consumers adoption intention towards electric vehicles was investigated by Han *et al.*, (2017). It was revealed that perceived functional value had a significant impact on the adoption intention of electric vehicles and non-functional value effected the adoption which was mediated by attitude. The impact of economic and information policies on the adoption intention of the consumers towards electric vehicles was examined through consumer network model by J. Li *et al.*, (2020). It was found that both economic and information policies had a greater effect on the adoption intention of the consumers towards electric vehicles.

Bockarjova & Steg.,(2014) examined the factors that helped in overcoming the barriers to adopt pro-environmental actions and the factors which influenced the pro-environmental actions. It was showed that the people like to adopt pro-environmental actions when they perceive the negative consequences of internal combustion engine vehicles and the factors which affect the adoption of pro-environmental actions were monetary and non-monetary costs of electric vehicles and the benefits of internal combustion engine vehicles. Gupta(2013) evaluated the influencing factors for adopting electric vehicles in New Delhi. It was found that price; fuel efficiency and information had greater influence on the adoption intention on the consumers towards adopting electric vehicles.

Conceptual framework of adoption intention of passenger electric vehicles in Indian Context



The most influencing factor which plays a major role in favoring the adoption intention of electric vehicles is “price”. Price is considered to be the financial factor which influences the purchase decision of the consumers. The manufacturing companies of electric vehicles in the market must try to reduce the cost of manufacturing of the electric vehicles such that automatically the price which is fixed for the electric vehicles and is being paid by the consumers would reduce. The government must frame the policies and the schemes in such a way that it will be beneficial for both the manufacturers and the consumers in selling and buying the electric vehicles which favors the transition towards electric mobility.

Value activation is the value which is being created in the form of enhancing the quality as well as the benefit derived out of purchasing the product. The value which is being created for electric vehicles lies in the form of specific vehicle characteristics, pro-environmental value creation, status symbol, self-image or the public image and the financial benefit attained through the adoption. Value creates a favorable mind-set when it is being effectively set up which matches against the needs and requirements of the potential consumers. The value which is being created for electric vehicles forms a major part of the manufacturing process involved. In order to effectively enhance the value activation, the manufacturers involved in the process should produce the products which must influence the minds of the consumers and this must be effectively done with the favorable schemes which are being drafted by the concerned governmental authorities who are responsible for increasing the demand for electric transition mobility.

“Personal innovativeness” refers to the interest of the consumers in quickly adopting to the technology which is being upgraded in the market. The newly built technology must be effective such that the consumers at once they come to know about the latest technology should try to adopt. Personal innovativeness can be coined as a factor which comes under “Diffusion of Innovation” theory. This theory explains how an idea or product develops traction and diffuses (or spreads) through a population or social system over time. People, as a member of the social system, adopt a new idea, behavior, or product as a result of this dissemination. The key to successful adoption is for the user to consider the concept, behavior, or product to be novel or revolutionary. Innovators, Early Adopters, Early Majority, Late Majority, and Laggards are the different types of adapters who adapt new technologies to the market.

Government policies, schemes and incentives form an important part of creating a favorable atmosphere which paves way for the effective adoption of electric vehicles in the country. The status of adoption of electric vehicles in the country is mostly based on the effective schemes, policies and incentives which are being framed by the concerned governmental authorities. The role of government in creating awareness among the consumers regarding these schemes, policies and incentives is of very much important in engaging the consumers in adopting electric vehicles. The governmental schemes and the policies relating to providing adequate number of public charging infrastructure would definitely increase the adoption of electric vehicles among the consumers in the country. There are number of schemes, policies and incentives which are being provided by different states of the country which encourages the positive adoption of electric vehicles in the market. In 2013, the Indian government unveiled the National Electric Mobility Mission Plan 2020, which aims to increase hybrid and electric car manufacturing in the country by 2020, with a goal of producing seven million electric vehicles. In India, the government's Faster Adoption & Manufacturing of Hybrid and Electric Vehicles scheme has strengthened this effort by providing demand-side incentives. Private car firms have risen to the challenge, investing in R&D and expanding their E-Vehicle manufacturing facilities.

Environmental concern plays a major part in keeping the environment clean and a sustainable place to live. The environmental concern must be provoked in the minds of the consumers such that they become aware about the environmental consequences and are ready to act accordingly to changing environment. The COVID-19 pandemic has increased the knowledge and concerns about environmental issues, according to 97 percent of persons who have acquired an electric vehicle. According to the latest EY Mobility Consumer Index (MCI), more than 9,000 respondents from 13 countries, including 1,000 respondents from India believed that electric car sales were expected to skyrocket in the upcoming 12 months. The environmental concern and green conscience plays a major role among the consumers in creating an environmentally friendly atmosphere by adopting the New Energy Vehicles and transiting their mobility steadily into the form electric mobility.

Conclusion

The current status of adoption of electric vehicles is in its infant stage which calls for increase in the growth rate of adoption of electric vehicles in the country. The effective and smooth transition to electric mobility requires positive attitude of the consumers in adopting these kinds of Alternate Fuel Vehicles which may be possible through the framing of effective and favorable schemes and policies by the concerned governmental authorities of the country. The process of adopting electric vehicles involves various kinds of influencing and inhibiting factors which are responsible for their adoption. The influencing or the motivational factors plays a critical role in creating positive and favorable atmosphere which effects the adoption of electric vehicles in the market. The objective of this research paper is to understand the factors influencing the adoption of passenger electric vehicles among Indian consumers through a conceptual framework model.

From this conceptual framework model we can understand that price, value activation, personal innovativeness, government policies, schemes and incentives and the environmental concern are some of the significant influencing or the motivating factors concerned with electric vehicle adoption in the Indian context. Hence it is being suggested that, the government and the concerned authorities in charge of promotion of electric vehicles in the country must frame favorable schemes, policies and also provide adequate incentives to both the manufacturers and the consumers for the effective adoption of electric vehicles in the country which automatically favors the transition to electric mobility and positively encourages the growth of auto sector.

References

1. Axsen, J. and Kurani, K. S. (2013) 'Developing sustainability-oriented values: Insights from households in a trial of plug-in hybrid electric vehicles', *Global Environmental Change*, 23(1), pp. 70–80. doi: 10.1016/j.gloenvcha.2012.08.002.
2. Bockarjova, M. and Steg, L. (2014) 'Can Protection Motivation Theory predict pro-environmental behavior? Explaining the adoption of electric vehicles in the Netherlands', *Global Environmental Change*, 28(1), pp. 276–288. doi: 10.1016/j.gloenvcha.2014.06.010.
3. Degirmenci, Kenan & Breitner, M. (2017) 'Consumer purchase intentions for electric vehicles: Is green more important than price and range?', *Transportation Research Part D: Transport and Environment*, (465), pp. 106–111.
4. Hahnel, U. J. J. *et al.* (2014) 'What is green worth to you? Activating environmental values lowers price sensitivity towards electric vehicles', *Journal of Environmental Psychology*, 40, pp. 306–319. doi: 10.1016/j.jenvp.2014.08.002.
5. Shankar, A. and Kumari, P. (2019) 'Exploring the enablers and inhibitors of electric vehicle adoption intention from sellers' perspective in India: A view of the dual-factor model', *International Journal of Nonprofit and Voluntary Sector Marketing*, 24(4), pp. 1–15. doi: 10.1002/nvsm.1662.
6. Shetty, D. K. *et al.* (2020) 'Barriers to widespread adoption of plug-in electric vehicles in emerging Asian markets: An analysis of consumer behavioral attitudes and perceptions', *Cogent Engineering*, 7(1). doi: 10.1080/23311916.2020.1796198.