MARKETING EVALUATION IN AUTOMOBILE SECTOR- EVEHICLE

Submitted by –

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ABSTRACT

This study provides an overview of the electric vehicle (EV) market, including the technology, energy storage, and charging methods. It highlights that the adoption of EVs can greatly reduce issues such as dependence on oil and environmental pollution. However, despite the presence of dynamic advertising laws in many jurisdictions, the acceptance of EVs is still in its early stages. The study also features images of various types of EVs including hybrid electric cars, plug-in hybrid vehicles, fuel-cell electric cars, and electric hybrid vehicles. Overall, the study aims to provide a comprehensive understanding of the EV market and its potential for addressing environmental and energy concerns. Each category's topology and accompanying technologies are explained. Power train designs, charger converter topologies, and battery technologies have all been updated. This study aims to explore the potential benefits of electrifying mobility in addressing issues such as energy security, increasing the use of clean energy in transportation and enabling a sustainable energy transition. It is a practical solution to address the problems caused by climate change. The study also provides information on charging regulations and procedures and their impact on the grid. Additionally, it examines other environmental issues such as regional noise and air pollution emissions, as well as emissions throughout the vehicle's lifecycle. The empirical investigation of this study focuses on the marketing assessment of electric vehicles in the global automobile industry. Overall, the study aims to provide a comprehensive understanding of the challenges and opportunities for the widespread adoption of electric vehicles and its impact on sustainability and the environment.

INTRODUCTION

As the Indian automobile market continues to grow, electric vehicles (EVs) are emerging as a viable option for improving air quality, promoting alternative energy sources, and driving economic growth. The Indian government is aware of the need to explore sustainable transportation solutions in order to reduce dependence on foreign energy sources, decrease emissions, and mitigate the negative environmental impacts of transportation, such as global warming. By taking proactive measures to explore climate change, it is possible to reduce carbon dioxide emissions in the environment and contribute to overall goal of creating a more sustainable future. The government can do this by implementing policies such as tax rebates, financial incentives, and regulations to encourage the production, sale and adoption of electric vehicles and developing infrastructure.

Fossil fuels are being used much less frequently for energy production, vehicle propulsion, energy consumption reduction, and carbon sequestration protection. The use of electric vehicles (EVs) could help cut back on carbon dioxide emissions. The three nations with the largest populations are China, India, and USA. They are also a major player in the auto sector. However, China dominates the global market for electric vehicles with a share of more than 50China now has the greatest market share for electric cars, accounting for more than 50% of worldwide sales, according to the Society of Indian Automobile Manufacturers. Europe and the United States of America are in second and third position, respectively, with around 25% and 15% market share. Despite being the world's sixth-largest commercial vehicle producer, India has had little effect on the electric car industry. However, since the Indian government acknowledges the need to research sustainable transportation solutions and establish laws to encourage the use of electric cars, India's market share in the electric vehicle industry is likely to grow in the future.

India is the industry leader for internal combustion vehicles. It is the world's largest manufacturer of tractors and two-wheelers. India is the second-largest bus manufacturer in the world. It is also the third-largest producer of heavy trucks and the sixth-largest vehicle manufacturer in the world. This shows that India has a good possibility of dominating the world market for electric vehicles. Original equipment manufacturers, vehicle companies, start-ups, and related service providers must thoroughly analyze the industry in order to fully realize its potential.

The electric vehicle is one of the best environmentally friendly alternatives to vehicles with internal combustion engines (EV). Understanding how the public will react to EV-related, fiscal and non-fiscal policy actions is crucial for the successful penetration of EVs. Even though many measures are being taken to encourage the adoption of EVs in developing countries like India, their market share still pales in comparison to that of conventional vehicles. In order to find out more, a case study employing a questionnaire survey was conducted in a typical Indian village. Different attitudinal traits were examined using structural equation modelling (SEM) to determine how they affected people's inclinations to purchase electric automobiles. According to the study's results, factors connected to attitudes Various variables impact the desire to acquire an electric vehicle (EV). A favorable assessment of these variables may boost the likelihood of purchasing an

EV. For example, potential customers are more likely to have a favorable attitude regarding EVs and intend to acquire one if they feel they offer environmental and economic benefits, or if they are affected by the opinions of friends and family who have purchased EVs. However, things like barriers which are perceived, policy characteristics, its perceived utility and simplicity of use all delay EV adoption. The adoption of EVs is shown to be more favorable among short-distance travelers, people with lower incomes, people with greater levels of education, and people who are more experienced driving conventional cars.

This paper focuses on analyzing the growth of EVs in India and the role they play in the automotive industry. In addition, this research will also help to understand the market's need for electric vehicles.

LITERATURE REVIEW

The creation of new energy vehicles (NEVs) is seen as the best technological solution to such issues. This study compares the industrialization rates of the top worldwide nations and analyses the global technological trend. National policies drive the market introduction of new energy vehicles, notably commercial electric vehicles. According to a study conducted by Jiuyu Du and Danhua Ouyang (2017), the subsidy policy has a considerable impact on car powertrain replacement. As a result, the authors propose that present incentive programmers be changed in order to encourage the use of electric vehicles. Financial incentives such as tax breaks, subsidies for charging infrastructure, and rules to stimulate the development and sale of electric cars may be included in these programmes. Governments may improve these regulations to provide a more favorable climate for the adoption of electric vehicles, ultimately driving the transition to a more sustainable transportation industry. The adoption of electric vehicles (EVs) might significantly reduce problems like environmental pollution and reliance on oil. Even though many governments use dynamic advertising policies, Market acceptance of EV is still in its early stages. There are various key areas of consumer intentions for a product — firstly there is adoption intention, purchasing intention, behavioral intention, and utilization intention—were covered by two hundred eleven match- examined research publications published between 2009 and 2019 (Virender Singh, Vedant Singh and S. Vaibhav, 2020). Since 2009, the government of China has sponsored new energy vehicle verification projects and subject several measures to encourage the market's adoption of NEVs, which undoubtedly increased NEV sales but also created a NEV market that was primarily based on subsidies. As a result, the Chinese government chose to gradually reduce NEV subsidies over the following five years (Ning Wang, Huazhong Pan and Wenhui Zheng, 2016-17). Around the world, more and more regulatory measures are being put in place to minimize emissions from the transportation industry. Automobile manufacturers in California are required to cut the greenhouse gas emissions of their parade of vehicles (GHG rules) and sell a rise   percentage of zero emission vehicles due to the state's low emission vehicle requirements, which are among the strictest in the world (ZEV regulations). Manufacturers who violate regulations must incur steep fines. When adjusting to new legislation, customer behaviour is considered along with the co-evolution of powertrain technologies, related infrastructure coverage, offered vehicle types, and offered vehicle types (Grit Walther, 2010). Governments throughout the world support the development of electric cars to reduce dependency on oil, reduce greenhouse gas emissions, and enhance air quality. Over the past several years, annual sales of electric cars have increased rapidly, moving from a few

hundred in 2010 to over 500,000 in 2015 and over 750,000 in 2016. The year September 2015, the total global electric market vehicles passed the landmark of 1 million units, and it then quickly increased to 2 million units in January 2017 (Lingzi Jin and Peter Slowe, 2017). For many years, the European car sector has led the globe in technological advancement. The advent of new technology, shifting market dynamics, and the presence of foreign rivals have presented new difficulties for EU vehicle OEMs and suppliers. Asian rivals have a well-established understanding of electric automobiles. This study will examine how policy made for society can promote the development of electric mobility and thereby increase benefits for the EU automotive, Additionally, it will look at the existing situation and what industrial decisions must be taken in the short- and long-term to strengthen the competitive position. (2020-2030) (Prof. Dr. Heike Proof and Dominik Kilian, 2010). The purpose of this article is to identify and evaluate the factors that influence the sustainable production of electric vehicles (EVs) in India. The findings of this study can be used by original equipment manufacturers and service providers in the EV industry to improve their production processes. Furthermore, cultural and sociological issues such as consumer habits and behaviors, cultural perceptions of electric cars, and general EV awareness play an important impact in EV adoption. All of these aspects must be considered in order to identify the hurdles and opportunities to the adoption of electric cars, as well as to establish appropriate policies and strategies to expedite the transition to EVs and assure the transition's long-term success and related 67 variables have been developed. The EU vehicle industry will get further advantages. (Abhijeet K. Dig Alwar, ETL, 2021). Accepting EVs on a large scale will surely help resolve important issues like pollution due to carbon, petrol dependence, and economic growth. This paper offers a comprehensive analysis of the present level of EV maturity and covers some of Pakistan's key adaptation possibilities and challenges. The research shows that governmental financial aid, sociocultural disadvantages, technological challenges, and market costs are some of the major obstacles to the adoption of EVs in the current market. (Rafiq Asghar, Faisal Rehman, 2020). To prevent the most severe effects of changes due to climate, reduction in global carbon dioxide (CO2) emissions is a critical task for humanity. Almost one-fourth % of global energy-related emissions are attributable to the transportation sector, with road travel accounting for about one-fifth of all petroleum use. Although the spread of electric vehicles (EVs) is uncertain because of market restrictions, they might contribute to lowering CO2 emissions. This study looks at electric vehicles (EV), which have a lesser environmental impact, as a potential replacement for personal transportation in Brazil. The study evaluates the potential and problems Furthermore, cultural and sociological issues such as consumer habits and behaviors, cultural perceptions of electric cars, and general EV awareness play an important impact in EV adoption.

All of these aspects must be considered in order to identify the hurdles and opportunities to the adoption of electric cars, as well as to establish appropriate policies and strategies to expedite the transition to EVs and assure the transition's long-term success. (Evaldo Costa, Ana Horta, ETL, 2019-2020). Despite having been around for more than a century, internal "combustion" engine technology has a longer range and lower production costs, therefore electric propulsion was not a practical alternative for transportation. Electric automobiles very recently entered the scene as battery technology developed. The provision of electricity is regarded as a service of general economic interest. The vertically integrated state-owned monopolies that previously controlled the electrical sector prevented it from being subject to the standard rules of competition.

Vehicle charging profiles can take on a variety of forms. Some may be more likely to occur, but there is a lot of uncertainty because it depends on how drivers move around and how their vehicles need to be charged (C. Camus, T. Farias, ETL, 2011). This assessment assesses the technological preparedness of the various BEV technology components and identifies those areas where significant technological advancement is anticipated. Investigated are technological and economic challenges related to the advancement of BEVs. Current "BEVs" should be more affordable than other low-carbon vehicles on the market, which necessitates the development of new business models. As concerns about the security of the oil supply and the depletion of oil reserves remain acute, combined with the impacts of climate change brought on by greenhouse gas emissions, Europe is looking quickly at alternatives to conventional road transport systems. The fleet of Light Duty Vehicles might become independent of oil and decarbonize with the aid of Battery Electric Vehicles (BEVs), which are seen as a promising technology. However, it still has a way to go before it achieves widespread societal acceptance and meaningful market penetration (Amin Mamou Zadeh Andwari, Srithar Rajoo, ETL, 2015-2017). Government initiatives to adoption EV are made protect the environment because they are more environmentally friendly and conserve resources. Adoption of electric cars has the potential to significantly improve air quality. Financial incentives from the government, industry growth, and market demand patterns are all major variables influencing people's decisions to purchase electric vehicles. Government incentives, such as tax breaks, can make electric car purchases cheaper for customers, promoting their adoption. Industry developments, such as increased charging infrastructure and battery technology advancements, can also make electric vehicles more practical and comfortable for consumers. Finally, increased market demand for electric cars has the potential to generate a positive feedback loop, making them more accessible, inexpensive, and appealing to customers. All of these variables, when combined, have the potential to accelerate the transition to electric cars, lowering emissions and improving air quality. A very profitable and successful technique for promoting the use of electric vehicles is to offer both financial and non-financial incentives. To reach the government's aim of raising the market share of electric vehicles to 30% by 2030, measures that are appealing to both the market and customers must be implemented. These policies include a flexible regulatory framework, tax breaks, and other financial incentives that will make electric vehicles more accessible to potential users. Such incentives will assist to reduce the financial burden of acquiring electric vehicles, making them more accessible to a wider range of individuals. Furthermore, the government may assist in the construction of charging infrastructure, which would boost customer trust in the dependability of electric vehicles, hence encouraging adoption. During the Eighth Clean Energy Ministerial in 2017, the Electric Cars Initiative (EVI) announced an EV campaign with the objective of raising the market share of electric vehicles in all EVI member countries to 30% by 2030. The EVI is a worldwide partnership of states, international organizations, and industry participants striving to accelerate the adoption of electric vehicles and charging infrastructure in order to reduce reliance on fossil fuels and address climate change. The 30% aim is intended to contribute to the larger goal of lowering global greenhouse gas emissions and expanding the use of renewable energy in transportation. People from higher social strata and those who uphold modern values are more likely to purchase electric vehicles. "Travel demand, knowledge of the environment, living circumstances, and shopping" (Prof. Rajesh, Dr. Raja Siochana, ETL, 2022). One of the finest environmentally friendly alternatives to automobiles powered by internal combustion engines is the electric

vehicle (EV). Understanding how the public will react to Electrical Vehicle -related, fiscal policy and non-fiscal policy actions is crucial for the effective penetration of EVs. Even though there are several programmers aimed at promoting the use of EVs in wealthy countries like India, their market share is still negotiable in comparison to conventional cars. (Bino I. Koshy, 2020- 2021). Customers and producers in the automotive industry have benefited from hydrogen and fuel cells during the past three decades (FCs). Automakers' main goal may be summarized as lowering consumption of fuel and releasing pollutants while increasing range constraints, efficient energy, and incorporation of contemporary technologies. Additionally, electric vehicles are referred to as cars that have electric propulsion systems added to them. In addition, researchers and manufacturers are concentrating BEVs store electricity in a battery pack and use it to power an electric motor, which drives the vehicle. The batteries can be recharged by plugging them into an external power source, such as a charging station. FCEVs, on the other hand, use hydrogen gas stored in a fuel tank to power an electric motor. The hydrogen is combined with oxygen in a fuel cell to generate electricity, which powers the vehicle. The only byproduct of this process is water vapor (Bahattin Tanc, Kadir Aydin, 2018-2019). The sources of a few key raw minerals are a significant ethical concern for the industry for electric vehicles. Amnesty International and other groups have brought up a few concerns about the extraction of raw materials, such as the exploitation of child labor in the Democratic Republic of the Congo (DRC) is a significant issue when it comes to mining cobalt, which is a common component in lithium-ion batteries. In 2016, Amnesty International accused certain major battery manufacturers of purchasing cobalt from Congo Dongfeng Mining, a company known for using child labor in its mining operations (CDM), and that CDM had obtained its cobalt from regions where child labor is a common practice. Along with these assertions, there is clear evidence that child labor has been used in other cobalt mines in the Democratic Republic of Congo (DRC). A 2012 UNICEF report revealed that 40,000 children were working in mines in the southern Katanga region of the country. Unfortunately, the use of child labor in DRC's cobalt mines continues to this day. According to reports from 2019, child labor is still prevalent in these mines employed in the cobalt mining process for the manufacture of electric automobiles (Jonathan Welling, Stuart R. Coles, ETL, 2021). The growth of the transportation sector is a significant contributor to this, since there are millions of gasoline-powered automobiles on the road today that produce carbon dioxide both during the day and at night. One method to fix these flaws and create a more sustainable economy is to drive green technology automobiles rather than gasoline-powered ones. There is a growing understanding that electrification and the possibility to "decarbonize" this industry are significant since they assist in lessening the heavy reliance on fossil fuels and minimize carbon emissions. With the introduction of electric vehicles, the automobile industry has reached a whole new level with less dependency on fossil fuels and more fuel economy (Yew-Ngin Sang, Hussain Ali Bekhet, 2014). PEVs are still in the initial stages of entering the market. However, currently approximately more than 2.1 million PEVs in use globally. In comparison to internal combustion of engine vehicles, PEVs have lower power consumption, greenhouse gas emissions, and urban air pollution (ICEVs). Policymakers are eager to increase the adoption of plug-in electric vehicles (PEVs) due to factors such as air quality, energy security, and economic opportunity. To promote the growth of PEV markets, various financial incentives have been implemented by policymakers, with values ranging from $2,500 to $20,000 per vehicle (Scott Hardman, Gil Til, ETL, 2017). There is a need for unified approaches to measure the labor demand and supply because

employment characteristics in fields connected to Industry 4.0 and the green economy are changing quickly. The automobile industry's transition to the production of electric vehicles is a key feature of this burgeoning market (EVs). With nearly 2.8 million people employed directly, the automobile industry is one of the largest employers in Europe. But little is known about how this automobile industry's structural change will affect labor markets, particularly in the field of information and communications technology (ICT).

RESEARCH FRAMEWORK AND HYPOTHESIS DEVELOPMENT

H0.1. The demand for vehicles running on petrol, diesel, and electric motors is the same

H0.2. There is no difference in the demand for EV vehicles

RESEARCH METHODOLOGY

This study is mainly based on the data collected from primary sources, which have been gathered using a questionnaire. The questionnaire about the applicants along with the questions.

Collection of samples

The survey technique was employed in this study. The key characteristic of a survey is that it enables the selection of samples from the known population and the collection of a modest amount of data from many people in the population in a standardized manner. The sample size chosen is 250, which includes respondents of various ages between the two distinct age groups—Group 1 is composed of people under the age of 20, and Group 2 is composed of people above the age of 20.

Data analysis

While the independent sample T-test was employed for hypothesis 2, ANOVA-test analysis was utilized to establish the significance of the first hypothesis.

ANALYSIS OF DATA

H0 1: The demand for vehicles running on petrol, diesel, and electric motors is the same.

Vehicle Demand

	Sum of squares	df	Mean square	F	Sig
Between groups	10.570	2	5.285	0.503	0.605
Within groups	2595.030	247	10.506		
Total	2605.600	249			

Table.1 shows the result of the one-way ANOVA test.
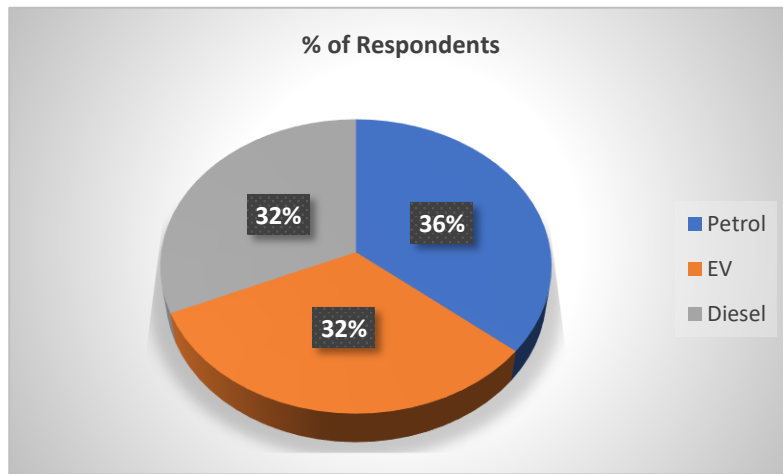
Table.1

Fig.1

The value of sigma in one-way ANOVA is 0.605, it means that the variation in the data is relatively low. As the significance level of one-way ANOVA test is more than 0.05, there is no significant difference in the demand of vehicles running on Petrol, Diesel & EV vehicles.

As a result, the alternative hypothesis will not exist because the null hypothesis, according to which there is no discernible difference between the demand for vehicles that operate on petrol, diesel, and EV, is accepted.

The percentage of respondents that choose gasoline, electric vehicles, or diesel for their automobiles is shown in Fig. 1. 36%, 32%, and 32% of respondents, respectively, said they preferred gasoline, electric vehicles, and diesel. The percentage depicted in the pie chart is

comparable and confirms the theory taken.

H0 2: There is no difference in the demand for EV vehicles between the two distinct age groups—Group 1 is composed of people under the age of 20, and Group 2 is composed of people above the age of 20.

Table.2 shows the result of the independent t-test

|		**Independent Samples Test**								
		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Vehicle Demand	Equal variances assumed	0.256	0.613	0.684	189	0.495	0.327	0.478	-0.616	1.271
	Equal variances not assumed			0.683	170.952	0.496	0.327	0.480	-0.619	1.274

Table.2
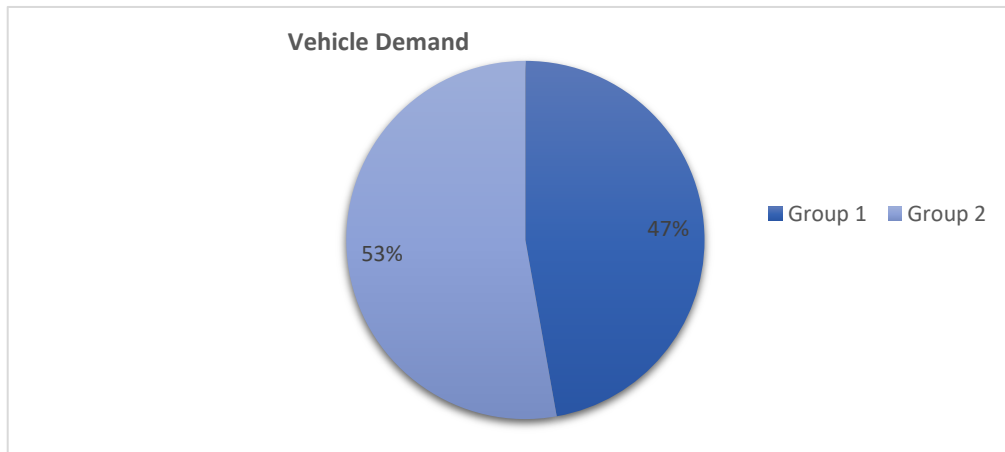
Fig.2

The value of the independent t-sigma test, which is 0.613, demonstrates that the data set is rather small. This suggests that the groups under comparison have relatively similar standard deviations. A low sigma number may suggest a small difference in the means of the two groups being compared, which could make it difficult to reject the null hypothesis.

As a result, the null hypothesis-according, to which there is no difference in the demand for EV vehicles across two different age groups-in which Group 1 is made up of individuals under the age of 20 and Group 2 is made up of adults above the age of 20-is accepted.

We can see the percentage of vehicle demand among Groups 1 and 2 using the pie chart. The demand for EV is 47% and 53%, respectively, in Groups 1 and 2. Both groups have a similar desire for EV, which supports our idea even more.

Conclusion

The present study examines the growth and demand for electric vehicles in Indiaas well as their function in the automotive industry. EVs have a promising future,but there are not enough of them available, and there is not a significant enough demand from individual buyers. We conducted a survey with 250 respondents of various ages to assess the demand for EVs in contrast to fuel-based vehicles anddemand based on age group. In this investigation, a one-way ANOVA test along with anindependent sample t-test have been used. The conclusion reached after studying and evaluating these hypotheses is that there is no substantial difference in the demand for EV vehicles depending on age groups or when compared to fuel-based vehicles because all the null hypotheses are accepted.

Limitations & Suggestions

- Opportunities and risks: There are increasing odds that the results we acquire will not cover the topic's more comprehensive aspects as we increase the sample size to 250 respondents. Because the sample size was so small, there was a chance of not getting the right answer, which might be one of the report's limitations. The market for automobiles is growing, and the government is also doing its part to educate the populace about the existing and future opportunities that are open to them.

- Limited choice: There are few options for collecting data because the automotive industry's acceptance of electric motors is still in its early stages of development. Many individuals are still unaware of electric vehicles, and they should find out more about the prospects this industry is offering them. As a result, the report's ability to gather data from a large population is limited.

- Industry evolution will take time: The E-motor in the automobile is one of the most transformative forces in the automotive industry, but it is also one of the biggest unknowns. The automobile industry's task will be to avoid drowning in the massive amounts of unstructured data generated by E-motors. If automotive planners want to succeed in the e-motors market, they will need to incorporate big data analytics into their long-term strategy planning. Having the ability to combine and react swiftly to massive data set.

Suggestion: The researcher suggests that further research be conducted, particularly in the automotive industry and the challenges that EVs encounter when trying to spread across the nation. Understanding the many elements influencing the growth of electric vehicles in India will be extremely beneficial for the automotive industry. The government can be very helpful in educating the public about the many advantages of electric vehicles.
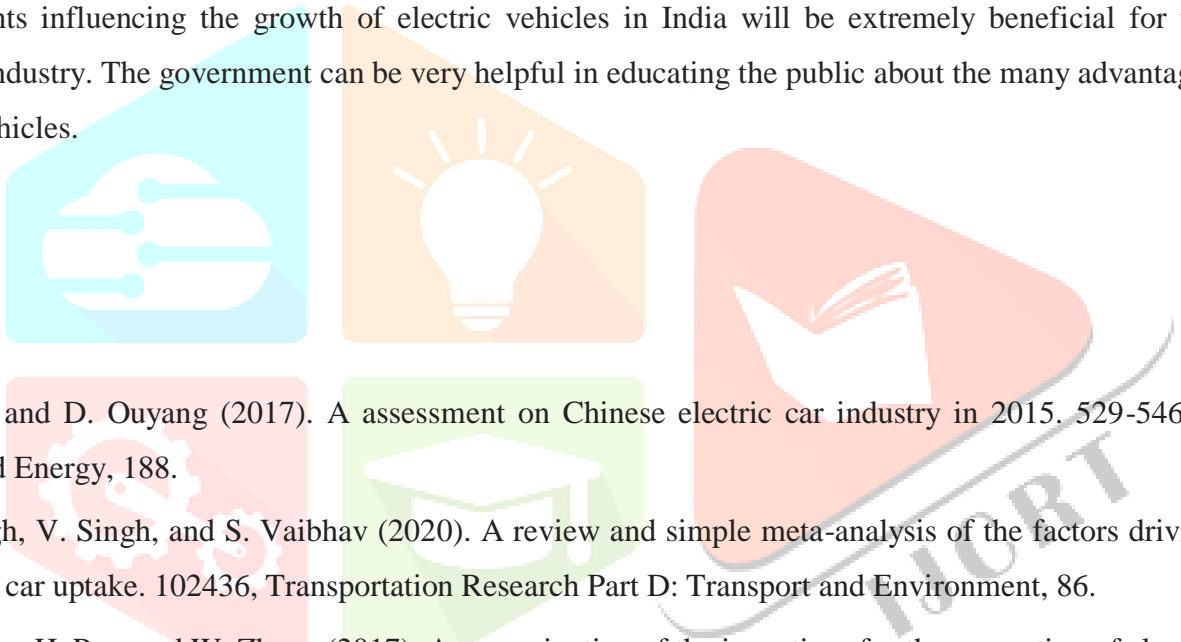
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