

## International Journal of Applied Business and Economic Research

ISSN : 0972-7302

available at <http://www.serialsjournal.com>

© Serials Publications Pvt. Ltd.

Volume 15 • Number 1 • 2017

## Electric Vehicle: The New Economic Opportunities in Coming Decades

Yashpal Malik<sup>1</sup>, Anu Prashant<sup>2</sup>, Nirupama Prakash<sup>3</sup> and Ajay Kapoor<sup>4</sup>

<sup>1</sup> Research Scholar, Amity Institute of Social Sciences, Amity University Sector 125, Noida, Uttar Pradesh, India, E-mail: [malik.yashpal@gmail.com](mailto:malik.yashpal@gmail.com)

<sup>2</sup> Assistant Professor, Amity Business School, Amity University Sector 125, Noida, Uttar Pradesh, India. E-mail: [aprashaant@amity.edu](mailto:aprashaant@amity.edu)

<sup>3</sup> Director, Amity Institute of Social Sciences, Amity University Sector 125, Noida, Uttar Pradesh, India, E-mail: [nirupama.prakash@gmail.com](mailto:nirupama.prakash@gmail.com), [nprakash@amity.edu](mailto:nprakash@amity.edu)

<sup>4</sup> Pro-Vice Chancellor (International research Engagement & Development), Swinburne University of Technology, Hawthorn VIC 3122, Australia, E-mail: [Akapoor@Swin.Edu.Au](mailto:Akapoor@Swin.Edu.Au)

**Abstract:** Transport is one of the critical components to fulfill the demands of our routine life. Transportation permits economic development to take place because it's a basic prerequisite for human beings. As the economic conditions are gradually improving in Indian scenario, it is feared that contribution of emissions by vehicular pollution in the environment may increase in the near future, especially by the road transport system. In recent years, the Electric Vehicle (EV) industry has gained attention across the globe because of various reasons such as growing consumption of petroleum products and their adverse impact on health and climate change. To understand the EV potential among Indian consumers, a study with 125 working professionals have been completed in Delhi area. It has been highlighted in the study that, the EV industry depends on various external and internal issues, such as "vehicle performance, their limitations, consumer preferences, the regulatory environment, the price and availability of gasoline". Study highlights that Indian consumers are hesitant for giving premium amount to EVs but they believe that things will change in coming decades in transport sector and Electric Vehicles is going to create new economic opportunities in the areas of public and private investments along with more job opportunities in the world. Professional shared that there should a good budgetary provision by the government for research & development in electric vehicles and associated areas. Such allocations will open new economic opportunities for manufactures, battery operators and electric part suppliers.

**Key words:** Electric vehicle, Premium, Economic Issues, Vehicle Characteristics, Transport Sector, willingness to pay

### INTRODUCTION

Two major problems currently confronting the world are the energy crisis and growing environmental pollution. Energy consumption in the world is increasing faster as compared to previous years. It is estimated

that the existing petroleum oil and natural gas reserves will only last the next few decades. The transportation and decentralized power generation sector depend to a large extent upon petroleum products, particularly on petrol and diesel. The growth of the transportation sector is also increasing significantly especially because of growing use of technology in the automotive industry. Now, people are able to afford personal vehicles in developing and under-developed countries as well.

Thus, the demand for petroleum accelerates the demand for crude oil petroleum products as well as their cost. This has forced policy makers to introduce Alternate Energy Transport system to the world.

Various influential characteristics which are derived from the above studies highlights that policy initiatives are going boost the sales of electric vehicles in the coming years. These are some of the possible measures which can affect the sales of EVs -

1. **The cost of batteries is expected to drop significantly:** Tesla is working on a battery model which will reduce the cost of the EV batteries significantly. Presently the average cost of EV battery varies between \$US250-400/kWh which is going to come down to \$US100/kWh in the near future (Vorrath, 2015).
2. **Apple is likely to launch electric cars** - Apple is likely to launch an electric car in the near future. Morgan Stanley says that if Apple joins the EV game, it would transform the industry landscape considering Apple's scale, innovation and integration capability (Vorrath, 2015).
3. **Progress is expected to happen around the range/charging issues** - Another important barrier to EV mass uptake is that even after undertaking a lot of research and development for increasing the driving range of EVs, most electric vehicles are still unable to surpass 100 miles i.e. 160 km per charge. However, according to Morgan Stanley, Tesla and GM are planning to launch models with driving ranges of more than 200 miles (320km). More progress will be made in the coming future about the range and charging issues (Vorrath, 2015).

The Indian government has also recognized the importance of electric vehicles and launched a program in 2013 named "National Electric Mobility Mission Plan (NEMMP) 2020". It aims to achieve national fuel security by promoting electric vehicles (comprising electric two-wheelers, electric three-wheelers, battery vans, hybrid vehicles and electric bicycles) and infrastructure to support EV growth as a solution to the growing problem of urban pollution ("National Electric", 2015).

The Indian government recognizes the potential for the electric vehicle to address transport issues and has a desire to implement the technology to ease congestion in urban areas. Some of the targets set for reducing carbon emissions are:

- Reduction of the use of liquid fuel by 7 to 8 million tons by 2020
- Reduce vehicle emissions (CO<sub>2</sub>) by 1.5% by 2020

The government plan has set out targets to be met by 2020 as below:

- India to be a major global player by 2020 in the electric vehicle area,
- Provide employment to 25 million people by 2016 in the automotive sector,
- Production of 6 to 7 million electric vehicles (incl. all types) on the road by 2020,
- Expected 4 to 5 million are to be two-wheeled electric vehicles,
- To reduce dependence on oil imports for the transport sector,
- To create automotive "Centre of Excellence" hubs to promote EVs throughout India

## LITERATURE REVIEW

Some researchers have classified important attributes used by consumers for evaluating vehicles such as, “purchase price, fuel cost, range between refueling/recharging, availability of fuel/recharging opportunities, vehicle performance (e.g., acceleration, top speed), single versus multiple fuel capability, and environmental performance (e.g. vehicle emissions)” (Golob *et al* 1993; Greene 1996). Others have generalized these into fewer categories such as monetary, non-monetary, and environmental (Potoglou and Kanaroglou 2008; Adler *et al* 2003; Bunch *et al* 1993). Most of the studies (Brownstone *et al.* 2000; Gordon and Sarigöllü 1998; Golob *et al.* 1997; Bunch *et al.* 1993) have presented conditional, multinomial, or nested logit models for choosing EV. EVs included in these models comprise “electric vehicles, LPG vehicles, hybrid electric vehicles, CNG vehicles, methanol vehicles and unspecified alternative fuel vehicles”. Few of the studies revealed that compared to traditional vehicles, a lower emission rate will increase the associated individual’s chance of selecting EVs, suggesting that at least a niche market and environmentalists will accept the innovative attribute of EVs (Kahn 2006; Gulati & Kandlikar, 2010; Akerlof & Kranton 2000). Fuel availability and fuel flexibility will both have a positive effect on selecting EVs (Ramadhas 2011).

It has emerged from the existing literature reviews that demographic, socio-demographic and environment related variables influence the stated preferences for EVs. (Train 1986; Brownstone *et al* 2000; Potoglou and Kanaroglou 2008; Caulfield, Farrell & McMahon, 2010; Ziegler, 2012). In a number of studies reviewed by Khan (1986), Madre (1990), Dargay and Dermot (1999), a range of variables was found which can have a considerable effect on aggregate demand of automobile ownership. The monetary variables include “income or discretionary income, income index, gross national product (GNP), per-capita income, and household income, related to cost (price, cost index of motoring, transportation consumer price index, and private transportation expenditure), related to land use urbanized area and population density or proportion of population in urbanised area), demographic characteristics (number of employees, size of the household, proportion of population coming from specific age, and economically active population) and other variables (automobile stocks, annual transit trips per capita within the area)” {Khan 1986; Madre 1990; Dargay and Dermot 1999}.

Potoglou and Kanaroglou (2007) simplify these attributes into 3 main categories:

- Financial
- Non-financial, and
- Eco-friendly

### Financial attributes

Nixon & Saphores (2011) explained that financial attributes are universally observed in “stated-preference studies” which include “vehicle buying price, fuel cost, and maintenance cost”. There were few other benefits which were discussed such as “tax encouragements or sponsorships, free parking, and commute costs, involving access to express lanes”. The purchase price for the vehicle and its ongoing costs are the key factors which can drive the growth of EV industry (Nixon & Saphores, 2011).

It was mentioned by authors Gallagher & Muehlegger (2011) in their report that tax incentives provided by states are correlated with the adoption level of hybrid vehicles. Coefficients related to “income tax

credits and sales tax waivers” were examined and it was concluded that incentives are linked to the sale of hybrid vehicles. Based on various estimations, it was concluded that “sales tax waiver of the mean value (\$1,037) is associated with over thrice the effect of an income tax credit of mean value (\$2,011)”. Based on the values associated with incentives, it was estimated that waivers related to sales tax can boost the sale of hybrid vehicles by ten times. The authors also found that access related to “single-occupancy” is less correlated with adoption of EVs. However, prices of petrol are significantly correlated with the sale of hybrid vehicles. “For high fuel-economy hybrids, they have estimated that the cross-price elasticity of demand with respect to retail petrol price is 0.86”. (Gallagher & Muehlegger, 2011).

### **Non-financial attributes**

For EV, non-financial attributes such as “vehicle range between refueling (or recharging, in the case of electric vehicles), accessibility of fuel or recharging locations, and vehicle performance (e.g., acceleration, top speed)” are the reasons mentioned in most of the literature related to stated preferences. Other non-financial attributes are considered including “dual-fuel capability, refueling time, boot space limitations” for storage related issues, and the number of existing EVs in the consumer’s geographical region. Findings suggested that for adopting EVs, range and kind of fuel availability are key limiting factors, after monetary concerns. Even though consumers understand the environmental benefits of EVs and generally have an optimistic attitude toward them, they are unwilling to give up average features of conventional vehicles (Ewing and Sarigöllü, 1998). Likewise, in the study of EV preferences among Southern California residents, it was noted that the importance of vehicle range for EV is significantly less than that of a conventional gasoline-powered vehicle (Bunch *et al.*, 1993).

Cao (2004) highlighted that post the energy crisis of 1973 in the U.S., the government is putting in all efforts to control the energy consumed by the transportation department and has introduced several policies to reduce energy use. Some such initiatives were “reducing individuals’ dependence on personal vehicles, and promoting higher average fuel vehicles”. However, these policies were not very effective because there was a mismatch of needs among policy formulators and individuals. As a result, the sale of light duty trucks which includes SUVs and minivans increased post-1988. On the other side, the Energy Policy Act of 1992 encouraged the use of EVs to cut the dependence on oil import and preserve it for coming generations (Cao, 2004).

### **Eco-friendly attributes**

Nixon & Saphores (2011) mentioned in their report that people are getting worried about growing air pollution and its impact on climate, especially because of burnt particles of fossil fuels. Electric vehicles have an advantage compared to conventional vehicles because they don’t pollute the environment. Most of the studies related to the EV industry deal with the importance of eco-friendly attributes but provide negligible evidence which can influence the decision of the consumers. Most of the time, eco-friendly attributes are overshadowed by financial and non-financial attributes. However, a recent study involving drivers in Hamilton, Ontario (Canada) revealed that eco-friendly attributes are considered and do have a significant impact on their purchasing decision. It was revealed that “the likelihood of choosing an EV was found to be greater if pollution levels were 90 percent less than today’s levels (significant at  $p < 0.05$ )”. However, it is visualized that if electric vehicles reach 75 percent of the current emission level (Emission

Level of 2011), the demand for hybrid or EV is expected to decrease in the future. So, caution will be required for doing a translation of coefficients for eco-friendly attributes, because social responsibilities might not influence customers to purchase eco-friendly vehicles. (Nixon & Saphores, 2011).

### **PROBLEM STATEMENT**

The impact of the transportation system on the atmosphere is significant and it contributes to approximately 20%-25% of global emissions. When fossil fuels are directly burnt, it produces the maximum emissions which are almost 97% (Earthineer, 2016). Because of the rapid growth of the transportation sector, it is feared that contribution of emissions in the environment can increase in the near future, especially by the road transport system. There are many problems which are prominent in urban transport, they are:

- **Traffic jams and parking difficulties:** Rodrigue & Notteboom (2016) analyzed that wherever there is a population of 1 million, the cities start facing fully packed traffic jams, especially during office hours (Rodrigue & Notteboom, 2016).
- **Shortage of public transport:** During the peak hours of traffic, most of the public transport is either over-utilized or under-utilized. When public transport is under-utilized, it makes the services financially unviable. (Rodrigue & Notteboom, 2016)
- **High maintenance costs:** Cities whose infrastructure is old are facing the financial pressure of maintaining it. It becomes extremely difficult for them to upgrade the transport infrastructure which involves high costs. (Rodrigue & Notteboom, 2016)
- **Adverse impact on environment:** Vehicular pollution has a serious impact on the environment in urban areas which leads to severe health issues and hampers quality of life (Rodrigue & Notteboom, 2016).
- **Increased accidents and safety related concerns:** In developing countries, the number of accidents has increased because of increased traffic. The accidents also lead to recurring delays. Increase in traffic leads to discomfort in using streets (Rodrigue & Notteboom, 2016).

### **OBJECTIVE**

The main objective of the study was to find out that how the socio-economic characteristics play an important role in determining the critical success factors for fossil fuels and how it is going to impact the upcoming electric vehicle market in metro cities of India in coming decades.

### **STUDY DESIGN**

On the basis of the focus groups and literature review, scales measuring attributes of vehicles important to consumers were developed. Convenience sampling was used to select the organizations and random sampling method was used to select the respondents. 125 professionals from 25 organizations in Delhi-NCR area were interviewed through administered questionnaire.

The questions were asked to know the average daily travel, their income levels, who influences their purchasing decisions, their views on purchasing electric vehicles, what they think about the role of the State and Central Government, important factors for purchasing any vehicle, different types of transport

issues, various reasons which can influence their decisions to purchase an electric vehicle in the future and finally the perception on the premium for electric vehicles.

Apart from receiving information through questionnaire, several focus group discussions were also conducted to validate their views. To capture the sensitivity of consumer preferences, factor analysis was performed to identify the important/least important variables which can drive the growth of Electric Vehicle in coming decades. Univariate, Bivariate analysis and ANOVA (Mann- Whitney U Test and Kruskal-Wallis Test) were also performed to support the findings. With the help of hypothesis testing, several inferences were made based on the statistical evidences.

### DATA ANALYSIS AND FINDINGS

The data was collected from 125 working professionals from Delhi-NCR. This resulted in a sample where 55.5% of respondents were 18 to 30 years old, 36.4 % of respondents were 31 to 60 years old and 6.2% of the respondents were more than 61 years old. However, 1.9% of the respondents didn't disclose their age group.

#### Monthly Income

In the survey, we found that 53.3% shared that they have a monthly income between INR 25,000 – 50,000, 30.8% shared that their income is between INR 50,000 – 100,000, 6% shared that they have income more than INR 1 lakh.

#### Estimated average daily drive

Out of 125 respondents, 15.3% respondents shared that they travel up to 10 km in a day, 29.6% shared that they travel between 11-20 km in a day, 18.8% shared that they travel between 21-30 km in day, 21.4% shared that they travel between 31-60 km in a day, 8.8% responded that they travel more than 60 km in a day. It can be easily interpreted that the percentage of respondents who travels less than 60 km per day is 85.1% (Figure 1). It is clear that this group if motivated properly and given the sufficient services, can think of using electric vehicles.

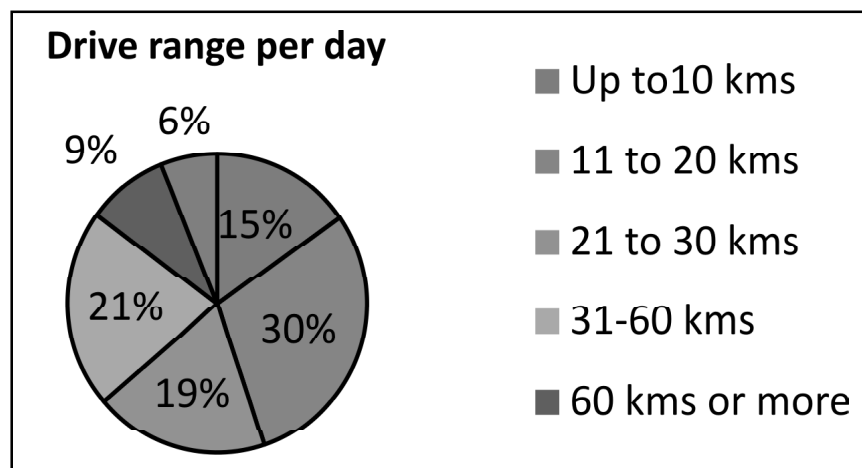


Figure 1: Estimated average daily drive of the respondents

### About new technologies

Out of 125 professionals, 43.4% shared that they will read the reviews and buy if the reviews are favorable, 37.4% shared that they prefer to wait till the new technology is widely accepted and proven. 14.1% shared that they will be among the first ones to purchase the new vehicle.

### Important considerations (for choosing the vehicles)

The respondents disclosed their concerns for fuel efficiency, safety, vehicle power and purchase price. Reliability, vehicle size, expected operating costs, reputation of a particular vehicle, fuel type, vehicle emission and pollution were also factors that are important to them (Figure 2).

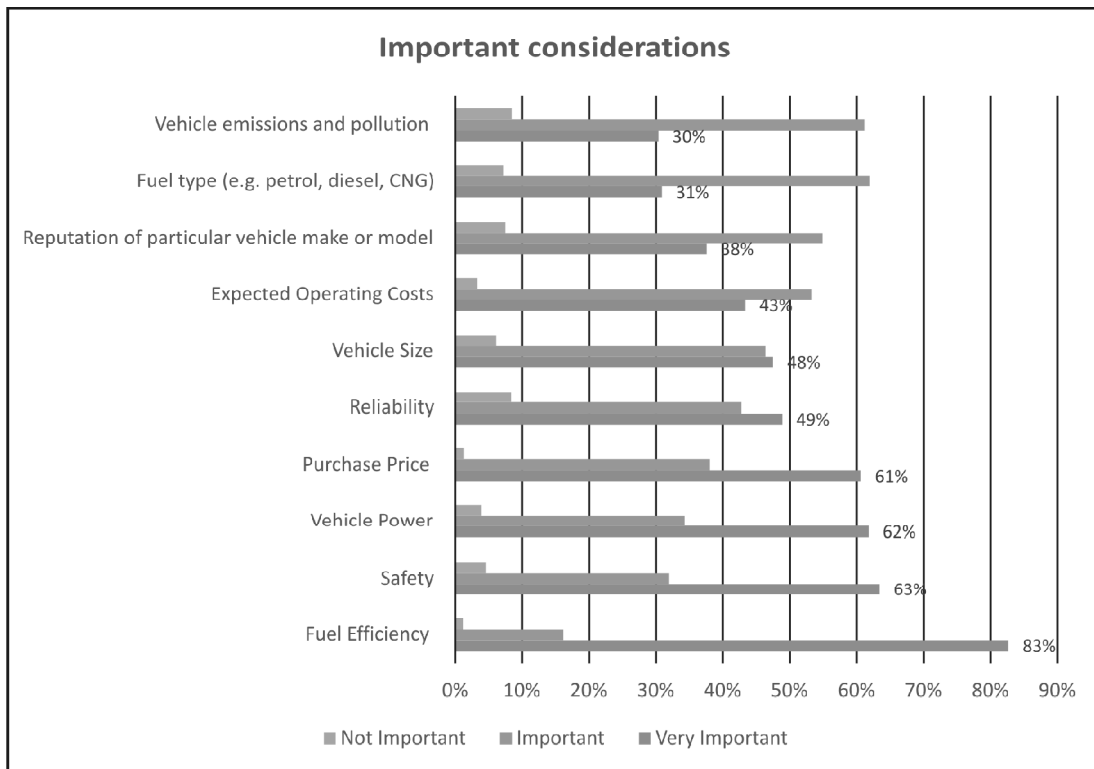


Figure 2: Important factors for choosing vehicles

### Current ownership of electric vehicle

Only 3.7% respondents had an electric vehicle at home, 92.8% do not use an electric vehicle as of now. Respondents said that the price, availability and reliability are stopping them from purchasing an electric vehicle. Traffic is also an issue in metro cities which stops them from going for an electric vehicle.

### Role of State and Central Government

54.4% of the total respondents were in favor of promoting an EV-friendly transport policy both for public and private transport. 30.5% respondents were in favor of only public transport. 13% of the respondents did not find the current policies sufficient to promote the electric vehicle in the market.

### **Premium for electric vehicle**

We observed that people have started thinking about the environment and climate change. They want to contribute to the solution. We asked respondents if they would pay a premium for new technology or electric vehicles. Out of 125 professionals, 27.9% are willing to pay a premium of 10%, 40.8% can pay 15% premium, 26.2% can pay 20% premium. However, 5% refused to pay any premium for this vehicle.

### **Testing of Hypothesis against study objectives**

To support the evidences hypothesis tests were performed. The two type of Hypothesis (Null and Alternate) which were used to determine the relationship between two parameters are mentioned below-

#### ***(A) Age group wise views on replacing of conventional vehicles by EVs***

H0: Age group wise views on replacing of conventional vehicles by EVs are same among all the categories

H1: Age group wise views on replacing of conventional vehicles by EVs are not same among all the categories

Based on the significance level ( $p=.002$ ), we reject the null hypothesis and confirm that the views on replacing of conventional vehicles by EVs are not same across all the age categories. It was observed highest in 18-30 age group.

#### ***(B) Age group wise understanding of EVs***

H0: Age group wise views on understanding of EVs are same among all the categories

H1: Age group wise views on understanding of EVs are not same among all the categories

Based on the significance level ( $p=.408$ ), we retain the null hypothesis and confirm that the understanding of EVs are same across all the age categories.

#### ***(C) Gender wise understanding of EVs***

H0: Gender wise views on understanding of EVs are same among all the categories

H1: Gender wise views on understanding of EVs are not same among all the categories

Based on the significance level ( $p=.123$ ), we retain the null hypothesis and confirm that the understanding of EVs are same across all the gender categories, but the significance is low. Overall males had a better understanding about EVs

#### ***(C) Gender wise willingness to pay the amount for EVs***

H0: Gender wise willingness to pay the amount for EVs are same among all the categories

H1: Gender wise willingness to pay the amount for EVs are not same among all the categories

Based on the significance level ( $p=.735$ ), we retain the null hypothesis and confirm that the willingness to pay the amount for EVs are same across all the gender categories.



**(D) Income wise willingness to purchase the environmental friendly car / EVs**

H0: Income wise willingness to purchase the environmental friendly car / EVs are same among all the categories

H1: Income wise willingness to purchase the environmental friendly car / EVs are not same among all the categories

Based on the significance level ( $p=.867$ ), we retain the null hypothesis and confirm that the willingness to purchase the environmental friendly car / EVs same across all the income categories.

**FINDINGS AND CONCLUSIONS**

125 professionals were surveyed for their views regarding EVs. The key findings are as follows:

1. 92.8% of the respondents who responded to our questionnaire do not own an electric vehicle. It was found that young people can be targeted for this EV technology. Age group of 18-30 will be the perfect age group to target, because of their acceptance level and purchasing power. We found that 55.5% who fall under the age group of 18-30 can become potential customers in the near future. This age group was also found favorable for purchasing the EVs in coming future.
2. People were interested in buying electric vehicles, but they were waiting for its availability in the market. More than 69% of such respondents can be targeted under this segment.
3. There are around 85.1% respondents who do not travel more than 60 km per day. If people are made aware of the EV technology and its driving range, this group can be converted into a prospective buyer's group of electric vehicles.
4. More than 80% of respondents shared that they would like to wait for the new technology to receive favorable customer feedback before purchasing a new vehicle. They prefer to be followers and take a decision about purchasing after the product establishes a good reputation in the market.
5. Most of the respondents shared that fuel efficiency (83%), safety (63%), vehicle power (62%), purchase price (61%) and reliability (49%) are very important, however some of them also shared that vehicle size (46.4%), operating cost (53.3%), reputation (54.9%), fuel type (61.9%), vehicle emission and pollution (61.2%) play an important part in deciding whether to purchase the vehicle.
6. It was analyzed that people are ready to buy an electric vehicle if it can reduce their operating costs. They also shared that it is eco-friendly and reduces the country's dependence on import of fossil fuel.
7. Through this survey, it was found that 95% of people are ready to pay a premium for electric vehicles.

**RECOMMENDATIONS**

Although EV industry has attracted a lot of media attention in recent years along with government focus, there are still not many players who can manufacture the EVs as per consumer demand. The authors

provide various recommendations which can be taken up by industry players, government departments and other like-minded people:

### **INFRASTRUCTURE DEVELOPMENT**

- Significant research is required to reduce the charging time of batteries so that people can purchase more electric vehicles in the future. A phased manner approach is required by the government for developing an infrastructure which includes charging stations, better quality of roads and vehicle maintenance related service stations for such vehicles. This will reduce the range anxiety in customers.
- Engineers and automobile manufacturers have to work together to develop a quick charge technique. Recently launched Reva car by Mahindra and Mahindra claims that if the car is charged for 15 minutes, it can travel a distance of 25 kilometers. But for a consumer of a busy city like Delhi, this is a long time. A consumer in Delhi or Mumbai is so busy that he/she cannot afford to wait for 15 to 30 minutes for a quick charge to travel a distance of 25 kilometers.

#### **Providing initial subsidies**

- Infusion of capital support and government subsidies can play a key role in acquiring new customers and establishing the market for electric vehicles in India. Various subsidies such as exemption from local and state tax, waiving the road tax, exemption from toll taxes and parking charges, access to bus lanes etc can push the demand for such vehicles.
- The Government of India in association with the state governments should encourage and motivate Indian automobile manufacturers through incentives, tax exemption or reduction and other modes to innovate and produce electric vehicles.

#### **Introduce more environmentally friendly vehicles**

- Government needs to push the manufacturers to build the electric vehicles as per the needs and expectations of the customers. Greater competition amongst manufacturers will lead to production of cost effective vehicles which will increase the market size and customer base.
- Public transport, specifically buses could be introduced in smaller routes in cities. Electric buses can be utilized as feeder buses.
- There should a good budgetary provision by the government for research & development in electric vehicles and associated areas. Such allocations will motivate the researchers to do extensive research in this area.

### **REFERENCES**

- “In a Nutshell – India’s National Electric Mobility Mission Plan 2020.” [Http://indianautosblog.com/](http://indianautosblog.com/). 21 Jan. 2013. Web. 15 Sept. 2015. <http://indianautosblog.com/2013/01/national-mission-for-electric-mobility-2020-61047>.
- “National Electric Mobility Mission Plan.” [Http://pib.nic.in/](http://pib.nic.in/). March 10, 2015. Accessed September 13, 2015. <http://pib.nic.in/newsite/PrintRelease.aspx?relid=116719>.

- Adler, Thomas, Laurie Wargelin, Lidia P. Kostyniuk, Chris Kavalec, and Gary Occhiuzzo (2003). "Incentives for Alternate Fuel Vehicles: A Large-Scale Stated Preference Experiment," Paper presented at the 10th International Conference on Travel Behaviour Research, Lucerne, Switzerland, August 10-15.
- Akerlof, G., R. Kranton (2000). Economics and Identity (Quarterly. Journal of Economics. 115 715–753.
- Brownstone, D., Bunch, D. S., and Train, K. (2000). Joint mixed logit models of stated and revealed preferences for alternative-fuel vehicles. *Transportation Research B*, 34 (5), 315-338.
- Bunch, David S., Bradley, M., Golob, T. F., Kitamura, R., and G.P. Occhiuzzo (1993). Demand for clean-fuel vehicles in California: A discrete-choice stated preference pilot project. *Transportation Research A*, 27 (3), 237-253.
- Cao, X. (2004). The Future Demand for Alternative Fuel Passenger Vehicles: A Diffusion of Innovation Approach. Sacramento, CA: The California Department of Transportation. Retrieved from [http://www.tc.umn.edu/~cao/AQP\\_Cao.pdf](http://www.tc.umn.edu/~cao/AQP_Cao.pdf).
- Caulfield, B., Farrell, S., & McMahon, B. (2010). Examining individuals preferences for hybrid electric and alternatively fuelled vehicles. *Transport Policy*, 17(6), 381-387. <http://dx.doi.org/10.1016/j.tranpol.2010.04.005>.
- Dargay, Joyce and Gately, Dermot (1999). Income's effect on car and vehicle ownership, worldwide 1960-2015. *Transportation Research A*, 33 (2), 101-138.
- David Brownstone, David S. Bunch, and Kenneth Train, "Joint Mixed Logit Models of Stated and Revealed Preferences for Alternative-Fuel Vehicles," *Transportation Research Part B* 34, no. 5 (2000): 315–338.
- Dimitris Potoglou and Pavlos S. Kanaroglou, "Household Demand and Willingness to Pay for Clean Vehicles," *Transportation Research Part D* 12, no. 4 (2007): 264–274.
- Earthineer, (2016). Earthineer | Where homesteaders connect, learn, and trade. [online] Available at: <http://www.earthineer.com/topic/48> [Accessed 10 Feb. 2016].
- Gallagher, K., & Muehlegger, 2011. E. Giving Green to Get Green: Incentives and Consumer Adoption of Hybrid Vehicle Technology. SSRN Electronic Journal. <http://dx.doi.org/10.2139/ssrn.1083716>.
- Golob, T. F., Torous, J., Bradley, M., Brownstone, D., Crane, S. S., and D.S. Bunch (1997). "Commercial fleet demand for alternative-fuel vehicles in California". *Transportation Research A*, 31 (3), 219-233.
- Golob, Thomas F., Kitamura, Ryuichi Mark Bradley, and D.S.Bunch (1993). "Predicting the market penetration of electric and clean-fuel vehicles". *Science of the Total Environment* 134, no. 1-3: 371–381.
- Gordon O. Ewing and Emine Sarigöllü (1998). "Car fuel-type choice under travel demand management and economic Incentives". *Transportation Research Part D* 3, no. 6: 429–444.
- Greene, D.L. (1996). "Survey evidence on the importance of fuel availability to the choice of alternative fuels and vehicles". *Energy Studies Review* 8, no. 3: 215–231.
- Gulati, C. & Kandlikar, M. (2010). "Green drivers or free riders: an analysis of tax rebates for hybrid vehicles". *Journal of Environmental Economics and Management* 60, 78-93.
- Kahn, Matthew E. (2006). "Do greens drive hummers or hybrids? Environmental ideology as a determinant of consumer choice, Institute of the Environment, UCLA, La Kretz Hall, Suite 300, Box 951496, Los Angeles, CA 90095, USA.
- Kenneth Train, *Qualitative Choice Analysis: Theory, Econometrics, and an Application to Automobile Demand*, Cambridge, MA: MIT Press, 1986.
- Khan, A. M. and Willumsen, L. G. (1986). "Modeling car ownership and use in developing Countries". *Traffic Engineering and Control*, 27 (11), 554-560.
- Madre, J. L. (1990). "Long term forecasting of car ownership and car use". In *Developments in Dynamic and Activity-based Approaches to Travel Analysis* (Jones, P., ed.), Avebury, UK, 406-416.
- Nixon, H., & Saphores, J. (2011). *Understanding household preferences for alternative-fuel vehicle technologies*. San Jose, CA: Mineta Transportation Institute, College of Business, San Jose State University.

- Potoglou, Dimitris and Pavlos S. Kanaroglou (2008). “Disaggregate demand analyses for conventional and alternative fueled automobiles: A review”. *International Journal of Sustainable Transportation* 2, no. 4: 234-259.
- Ramadhas, S. Arumugam (2011). *Alternative Fuels for Transportation*, Taylor & Francis, London.
- Rodrigue, J. & Notteboom, T. (2016). *Transportation and Economic Development*. People.hofstra.edu. Retrieved 8 Feb 2017, from <http://people.hofstra.edu/geotrans/eng/ch7en/conc7en/ch7c1en.html>
- Vorrath, S. (2015, August 17). Five things you didn't know about the electric vehicle market. Retrieved September 12, 2016, from <http://reneweconomy.com.au/2015/five-things-you-didnt-know-about-the-electric-vehicle-market-97757>.