Consumer Perception Towards Adoption of Electric Vehicles – An Exploratory Study on the City of Amritsar

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Abstract

A new technology is always perceived to be better than existing technologies in the market. New technology offers relative advantages and makes significant impact on adoption of green technology. The current study uncovers the dimensions of choices of electric vehicles and its perception in the perspective of consumers. The analysed data is collected using the quantitative analysis method with questionnaire survey as an instrument from 107 respondents residing in Amritsar city. Most of respondents have driving skills and most of them either hold a valid driving license and others have applied for. The paper offers insights about the knowledge and opinions of consumers on selection of electric vehicle brand. Taking into account the findings the extracted dimensions of consumer perception are Design, Environment Friendly and Safety. These dimensions are engaged with price of vehicle, Durability, elegance, design, energy efficiency, accident safety, maintenance cost, segment and driving range respectively to document how it impacts the perception of consumers. Consumers are analytical towards initial pricing of the vehicle. The study shows consumers prefers most affordable model as their first choice and prefer hatchbacks over SUVs.

Keywords: Green Technology, Electric Vehicles

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Introduction:

There is continual debate underway about adoption of environmentally friendly life styles. The sale of passenger vehicles has seen a phenomenal growth during last two decades. Mostly vehicles run on traditional fuels such as petrol and diesel. With the increase in environmental awareness, consumers are looking for environmentally safe mobility options. Electric vehicles are most advocated as first option among them. Indian electric vehicle industry has seen manifold increase in sales during last few years. Electric vehicles have advantageous effects in reducing CO2 emissions and noise pollution while providing the same comfort in individual mobility. This study investigates the main determinants that impacts the decision of the consumer in purchasing electric vehicle. The study is conducted in Indian Market context which is noticeable behind the electric vehicle market worldwide and it provides insights into the buying patterns and perception of Indian consumers.

Review of Literature

The adoption of electric vehicles could be a potential means to cut Carbon Dioxide emissions by passenger cars (EV). The trick to these new car technologies' effective wide-scale spread is consumer perception and readiness to shell out money. (Will et al., 2016) seek to sum up and investigate how drivers of vehicles in the six nations France, Germany, Italy, Poland, Spain, and United Kingdom consider electric cars, how versed they are in the fundamentals of the electric car concept. It is vital to know the anticipated behaviours of consumers if one is to review the possible adoption of these new car categories. (Will et al., 2016) concentrate at describing and analysing how drivers in the six countries Italy, Poland, France, Germany, Spain, and United Kingdom consider electric cars, how known they are with the electric car concept and its main features. Understanding probable customer reaction is essential to assess the potential adoption of these new vehicle categories. (Graham-Rowe et. al., 2012) performed a qualitative analysis of reaction towards electric vehicles, based on semi-structured interviews carried out on 40 UK drivers (20 males, 20 females; age 24–70 years) after seven-day period of using a battery electric car. (Krause et. al., 2013) explores consumer awareness of plug-in electric vehicles (PEVs) and the regulations now in effect that support the adoption and purchase of PEVs. Multivariate models are created and employed to assess the parameters that influence consumer interest in the two primary groups of PEV technologies, Battery Electric Vehicles (BEV) and Plug-in Hybrid Electric Vehicles (PHEV), based on an analysis of consumer theory(Krause et. al., 2013). Based on a discrete choice experiment carried out throughout Germany among 711 potential car buyers,

(Hackbarth et al., 2013) examine consumer perception for alternative-fuelled vehicles (AFVs) in connection with European energy efficiency and clean air legislation, and also an ambitious electric mobility goal of the German government. (Hackbarth et. al., 2013) predicts potential consumers' readiness-to-pay (WTP) and contingent variation (CV) for improvements in vehicle purchase price, refuelling infrastructure, CO2 emissions, fuel cost, driving range and governmental incentives, hereby accounting for diminishing marginal returns for some of the attributes and taking taste differences in the population into account. The number of electric vehicles (EVs) in use is still minimal. (Rezvani et. al., 2015) present a detailed analysis of the factors that encourage and hinder consumer adoption of plug-in electric vehicles (EVs), as well as a summary of the theoretical stances that have been applied to comprehend customer intentions and EV adoption behaviour. Adoption of electric vehicles (EVs) at Larger scale may eliminate oil dependency, environmental pollution and global warming. (Liao et. al., 2021) provides an extensive review of studies on consumer preferences towards EV, aiming to provide information to policy-makers and give direction to future research. Environmental issues almost entirely carry the potential for a rapid rise in the use of electric vehicles (EVs). (Pamidimukkalaet. al., 2023) gives a hint that the only important hurdle facing the greater use of EVs are technical in nature. In last few years, electric two-wheeled vehicles including electric bicycles and electric motorcycles have been extensively used in Vietnam. Based on the Theory of Planned Behaviour (TPB) of Ajzen (2005); Ajzen and Sheikh (2016), the main aim of is to discover the factors which affects the attitude to and intention of high school students in Hanoi city towards usage of electric vehicles and their affected level. To decrease consumption of energy and environmental pollution, the Chinese government is regularly promoting the adoption of electric vehicles (EVs). (Huang and Ge, 2019) studied electric vehicle development in Beijing. They conducted a questionnaire-based survey from March to April of 2018 involving potential consumers in Beijing. Other works of influence includes (A potential option to reduce passenger vehicle CO2 emissions is the deployment of electric vehicles (EV). Consumer perception and readiness to purchase these new electric vehicle technologies lies at the heart of its successful large-scale penetration.

Objective of the study

1. To examine the perception of consumers towards the electric passenger vehicle.

2. To uncover the dimensions in buying behaviour of consumers that impacts the decision of consumers.

Research Methodology

Data has been collected from Amritsar City of Punjab (India). It represents the traditional geographical division of Majha. The respondents comprise people from different demographic profiles. Respondents were approached on non-random basis as per the convenience to study the perception of consumers towards the passenger electric vehicles. As the driving of vehicles requires valid driving license, the respondents of age of above 18 are approached and most of the respondents either hold a valid licence to drive or has applied for the same and some does not hold a license to drive at the time of submission of response.

Sample of the Study

Total 137 questionnaire were distributed and 114 respondents submitted their response and 7 responses were rejected due to insufficient information. Hence 107 responses were analysed. Out of 107 respondents 54.2% respondents were male and 45.8% are females. 70.01% respondents hold valid driving license and 7.5% have applied for the same.

Research Instrument

A structured and pretested questionnaire was used to collect the data. In order to measure the perception of consumers. The construct suggested by Ghasri et.al. (2019) has been used in this study. In the measurement component, variable which are not possible to measure directly (for example: perception towards design, social image and safety) are measured using Likert scale questions in this study. The indicators used in study are five-point scales regarding the level of agreement with statements.

Individuals are further asked to choose among the options given to them in reference to the imaginative buying situation. The respondents were asked to rate the various brands such as Tata, Morris Garage, and Hyundai as per their perception.

Data has been analysed using descriptive statistics and exploratory factor analysis. EFA is generally used in multivariate statistics to discover the underlying structure of large set of variables. Factor analysis is a statistical tool that reveals patterns of relationships between data. It's often utilised to discover latent factors that account for observed variable correlations. The intent is to lessen the total number of indistinct (latent) variables, referred to as factors, in an

attempt to minimise the dimensions of the data. The factors represent the variance which is common among the observed variables.

The process of factor analysis involves Data Collection, factor Extraction, factor rotation and interpretation. In Marketing research Exploratory Factor analysis is used to study the perception and preferences of consumers towards products or services by taking the base of their responses to the survey based questionnaire.

Principal component analysis technique is used to extract factors. This technique is used to identify the underline dimensions of the data. Total three components are extracted using principal component analysis technique. Factor rotation is a technique applied to boost the interpretability of extracted factors along with varimax rotation. It aims to provide clear factor structure. Varimax rotation makes interpretation easier because the factors will remain uncorrelated to each other. It provides effective results.

The suitability of data collected from the respondents is examined using Kaiser-Meyer-Olkin (KMO). KMO evaluates the adequacy of the sample size and strength of the relations among variables. The value of KMO ranges from 0 to 1. The value closer to 1 indicates the more suitability for factor analysis and vice versa.

Table 1: Age Group of Respondents

Age Group	No Of Respondents	Percent	Cumulative Percent
18-26	43	40.2	40.2
27-33	27	25.2	65.4
34-42	21	19.6	85.0
43 and above	16	15.0	100.0
Total	107	100.0	

As seen from table 1, Out of 107 respondents. 43 respondents were young and belongs to the age group of 18 to 26. Which forms 40.02% of total respondents. 27 respondents are of 27 to 33 years of age. And contribute to 25.02% in total respondents while 21 respondents were found to

be between the age group of 34 to 42 which is 16% of total sample. And only 16 % individuals reported their age of 43 and above. Major size of sample represents young population which makes this study more valuable.

Table 2: Gender of Respondents

Gender	Frequency	Percent	Cumulative Percent
Male	58	54.2	54.2
Female	49	45.8	100.0
Total	107	100.0	

Table 2 explains gender distribution among respondents. Out of 107 respondents 58 respondents were male and 59 were female. Which contributes to 54.2% and 45.8% respectively.

Table 3: Education Level of Respondents

Education level	No of Respondent	Percent	Cumulative Percent
Ph.D.	10	9.3	9.3
Master's	52	48.6	57.9
Bachelors	30	28.0	86.0
12th	13	12.1	98.1
10th	2	1.9	100.0
Total	107	100.0	

Table 3 Explains education level of respondents. 86% of sample population is either bachelor degree holder or above, out of which10 respondents holds PH.D. which is 9.3% of total sample and 52 respondents are Master Degree holders which is 48.6% of total sample. 14% respondents are educated only up to 12th standard or below.

Table 4: Work status of Respondents

Work Status	Frequency	Percent	Cumulative Percent
Full- Time Employed	48	44.9	44.9
Part time employed	10	9.3	54.2
Businessman	8	7.5	61.7
Student	38	35.5	97.2
Unemployed	3	2.8	100.0
Total	107	100.0	

Table 4 clarifies the work status of total 107 respondents. As per the response submitted by respondents, out of 107, 54.02 % i.e. 58 were employed. Out of 58, 48 were employed full time and 10 were doing part time jobs. 8 respondents were businessman and 38 were currently pursuing their studies. Only 3 respondents declared themselves as unemployed.

Table 5: Gross Household Annual Income

Annual income in Lacs	Frequency	Percent	Cumulative Percent
0 - 2.5	36	33.6	33.6
2.5 – 5	34	31.8	65.4
5.0 – 7.5	17	15.9	81.3
More Than 7	20	18.7	100.0
Total	107	100	

Out of 107 respondents, 36 respondents with is approximately 33.6%, earns between 0 to 2.5 lacs annually, 34 earns between 2.5 lacs to 5 lacs annually. The results show 65.4% sample population have household income of less than or equal to 5 lacs per annum. 17 respondents reported their income more than 5 lacs but less than 7.5 lacs. While only 20 respondents have annual household income of more than 7.5 lacs per annum.

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Table 6: Status of IT Return

Yes or No	Frequency	Percent	Cumulative Percent
Yes	58	54.2	54.2
No	49	45.8	100.0
Total	107	100.0	

Respondents were also asked if they file their annual income tax returns. Out of 107 respondents, 58 agreed in yes while 49 respondents stated that they do not file their Annual Income tax Returns.

Table 7: Statistics of respondents holding Driving License

Status of Active DL	Frequency	Percent	Cumulative Percent
Yes	75	70.1	70.1
No	24	22.4	92.5
Applied For	8	7.5	100.0
Total	107	100.0	

Respondents were enquired if they have a valid driving license. 75 out 107 respondents i.e. more than 70%, reported that they have a valid driving license, and 24 respondents currently don't have a licence to drive, while 8 respondents have applied for driving license with the authorities.

Table No 8: No. of Vehicles in Household

No of Vehicles	Frequency	Percent	Cumulative Percent
1	16	15.0	15.0
2	47	43.9	58.9
More than 2	43	40.2	99.1
None	1	.9	100.0
Total	107	100.0	

Out of 107 responses received, more than 99.1% respondents hold at least one vehicle in their household. And only 1 respondent have no vehicle to their name.

Table 9: Own Parking Space

Yes or No	Frequency	Percent	Cumulative Percent
Yes	91	85.0	85.0
No	16	15.0	100.0
Total	107	100.0	

Parking space is common issue nowadays. Traffic congestion and inflation in real estate creates difficulty in parking spaces for vehicles. 91 out of 107 respondents have their own parking space, while 16 respondents reported that they have no space to park vehicles of their own. They will have to rent out a place for parking or will park outside of residential premise such as roads. The rented parking space will make it difficult to charge an electric vehicle as a set up is required to charge electric vehicles.

Results and Findings

Results and the findings of the study are explained below.

Table 10: Exploratory Factor Analysis of Consumer Perception towards Electric Vehicles

Factor Name	Variables	Factor Loadings	communalities
Design	More Prestigious	0.732	0.633
	Elegant Design	0.700	0.619
	Durability	0.621	0.587
	Suitable for intercity travel	0.498	0.415
	Suitable for intracity travel	0.800	0.643
	Low operating cost	0.822	0.719
Environment Safety	Environment Friendly	0.865	0.780
	Energy Efficiency	0.797	0.728
Safety	Car to Car Accident	0.922	0.895
	Car to Pedestrian accident	0.888	0.876

Exploratory Factor Analysis (EFA) with varimax rotation explored three factors (with one or more eigen value) solution, for electric vehicles (KMO=0.811) means sample is adequate enough to apply factor analysis.The table shows Rotated Component Matrix obtained using Principal Component Analysis with varimax rotation in relation with Consumer perception towards

electric vehicles. The Exploratory Factor Analysis (EFA) shows three factors or Dimensions of Data which are Design, Environmental Safety and Safety.

The Design Dimension is Supported by Six variables which include prestigiousness Of Electric Vehicle, Design, Durability, Suitability for intercity and Intracity Travel and lower operating cost. The statements show noteworthy loadings (0.732, 0.700, 0.621, 0.498,0.800 and 0.822) and makes us believe that respondents closely associate themselves with prestigiousness and design of electric vehicles. And trust the durability of electric vehicles.

We have strong results to believe that consumer will choose electric vehicle for inter city and intra city travel. Respondents also believe that electric vehicle are pocket friendly.

The dimension of environmental safety is supported by variables of Environmentally Friendly and Energy efficiency and have loading value of 0.865 and 0.797 respectively. Respondents perceive electric vehicles as environmentally safe and energy efficient which is indicated by high loadings.

The third factor is represented by variables of Car to Car accidents and Car to pedestrian accident. This represents perception of consumers towards safety in electric vehicles. Respondents believe that electric vehicles will reduce the accidents and ensure safety of passengers supported by high loadings 0.922 and 0.888 respectively.

Overall, the factor analysis conducted on consumer perception towards electric vehicles revealed various factors with can affect their attitudes and preferences.

Table 11: Selection of alternatives in imaginative situation

Description	Frequency	Percent	Cumulative Percent
Tata Tiago	52	48.6	48.5
Mahindra XUV	42	39.3	87.7
MG GS	13	12.3	100.0
Total	107	100	
Total	107	100.0	

Respondents were given imaginary situation in which they have to choose from given alternatives where only specifications of products such as segment of vehicle i.e. sedan or SUV, cost per kilometre, total cost of vehicle and market shares of vehicles were given to them and models and brands were kept confidential. Results suggested that 48.6% respondents preferred option 1 which refers to sedan namely Tata tiago and it is one of the entry level electric vehicle

in Indian market. Tata currently offer Tata Tiago, Tata Tigor, Tata Nexon and Tata Punch in electric vehicle segment in Indian markets. The price of tata electric vehicles starts from 8,69,000 Approximately.

Tata Tiago is cheapest from the lineup and is offered in many variants and offered a minimum range of 230 km. And tata has a dominating role of 72% in Indian passenger electric vehicles industry.

39.3% Respondents choose Mahindra XUV 400 by Mahindra and Mahindra. Mahindra and Mahindra 9% market share as of now.

Third option was MG GS by Morris Garage which was chosen by 12.3% respondents.

Table 12: Respondent's Rating for Tata Motors

		Frequency	Percent	Cumulative Percent
Valid	1.0	15	14.0	14.0
	2.0	7	6.5	20.6
	3.0	16	15.0	35.5
	4.0	39	36.4	72.0
	5.0	30	28.0	100.0
	Total	107	100.0	

Respondents were asked to rate Tata Motors as a brand out of 5. 28.4% respondents give 5 to tata motors and 36.4% gives 4 out of 5. It shows majority of respondents trust the brand Tata Motors. While 15%, 6.5% and 14% respondents rated 3, 2 and 1to tata motors respectively.

Table 13: Respondent's Rating for Mahindra and Mahindra

		Frequency	Percent	Cumulative Percent
Valid	1.0	4	3.7	3.7
	2.0	18	16.8	20.6
	3.0	33	30.8	51.4
	4.0	37	34.6	86.0
	5.0	15	14.0	100.0
	Total	107	100.0	

Mahindra and Mahindra is perceived as trustworthy brand among consumers. While rating Mahindra and Mahindra, more than 50 % respondents rated Mahindra and Mahindra for 4 and above. 30.8% rated 3 out of 5 and 16.8% and 3.7% rated it 2 and 1 respectively.

Table 14: Respondent's Rating for Morris Garage

		Frequency	Percent	Cumulative Percent
Valid	1.0	11	10.3	10.3
	2.0	16	15.0	25.2
	3.0	42	39.3	64.5
	4.0	29	27.1	91.6
	5.0	9	8.4	100.0
	Total	107	100.0	

Morris Garage is a reputed brand but while rating in electric vehicle segment only 35.5% respondents rated it 4 or above out of 5. While 39.3% gives it 3 rating and 15% and 10.3% rated in for 2 and 1 out of 5.

Table 15: Respondent's Rating for Hyundai

		Frequency	Percent	Cumulative Percent
Valid	1.0	10	9.3	9.3
	2.0	12	11.2	20.6
	3.0	26	24.3	44.9
	4.0	43	40.2	85.0
	5.0	16	15.0	100.0
	Total	107	100.0	

Hyundai offers Kona electric vehicle in Indian market and it is expected to launch more models in coming time. When asked to rate Hyundai out of 5. 16% rated it as 5, 40.2% rated as 4, 24.3% rated Hyundai 3 out of 5. 11.2% gives it 2 and 9.3% responded as 1 out of 5 for Hyundai.

Conclusion

The purpose of present study is to measure the perception of people of Amritsar as consumers towards passenger electric vehicle. Quantitative techniques were used to analyse the data. Exploratory Factor Technique was applied to data and it is suggestedthat consumer perception towards electric vehicles is positively impacted by multiple factors explored in the study. These factors are related to the design of the vehicle, elegance and premium feel of the vehicle, durability and suitability of vehicle for intercity and intracity travel, prestige of owner, energy efficiency and safety of passengers. It is very much important for policymakers, manufacturers and other stakeholders to understand these perceptions and take this into consideration while developing strategies for how to promote acceptance of electric vehicles in the market. Electric vehicle can be a sustainable mode of transport if the adoption is accelerating by addressing the advantages towards environment and cost effectiveness of these vehicles.

It has also been observed that consumer preferences are more inclined towards Tata Motors as it is the most selected option by sample respondents as shown in Table 11 where more than 48% of respondents chose Tata Tiago as their choice and Tata Motors also hold a strong market share of 72% as reported by cars24.com and other popular websites. Mahindra and Mahindra, and Morris Garage are neck to neck at 9 to 10% each. Tata Motors here seems hard to catch but Indian Market is very much unpredictable. If Suitable products are launch then people take it hand in hand. The market currently lacks infrastructure like charging points. Electric vehicles are very promising solution for environment pollution and CO_2 emission. Market needs more options and model currently and companies are about to launch many vehicles in coming future.

REFERENCES

Ajzen, I., Fishbein, M., 1980. Understanding Attitudes and Predicting Behavior. Prentice- Hall Inc., Englewood Cliffs, New Jersey.

Ajzen, I., 1991. The theory of planned behavior. Organizational Behavior and Human Decision Processes 50 (2), 179–211.

Ajzen, I., Fishbein, M., 2005. The influence of attitudes on behavior. The handbook of attitudes 173 (221), 31.

Ajzen, I. and Cote, N.G., 2008. Attitudes and the prediction of behavior. Attitudes and attitude Change,13, 289–311.

Ajzen, I. and Sheikh, S. (2016). " Action versus inaction: anticipated affect in the theory of planned behavior": Erratum.

Alalwan, A. A., Dwivedi, Y. K., Rana, N. P., & Williams, M. D. (2016). Consumer adoption of mobile banking in Jordan: Examining the role of usefulness, ease of use, perceived risk and self-efficacy. Journal of Enterprise Information Management, 29(1), 118-139.

Anton O., Steffen Kallbekken (2019). The impact of consumer attitudes towards energy efficiency on car choice: Survey results from Norway. Journal of cleaner production, 214, 816-822.

Ardeshiri, A., Rose, J.M. (2018). How Australian consumers value intrinsic and extrinsic attributes of beef products. Food Quality and Preference. 65, 146–163.

Ardeshiri, A., Sampson, S., Swait, J. (2019). Seasonality effects on consumers' preferences over quality attributes of different beef products. Meat science 157 (November), 107868.

Bass, F. M. (1969). A new product growth for model consumer durables. Management science, 15(5), 215-227.

Beggs, S., Cardell, S., Hausman, J (1981). Assessing the potential demand for electric cars. J. Econometr. 17, 1–19.

Ben-Akiva, M., Walker, J., Bernardino, A.T., Gopinath, D.A., Morikawa, T., Polydoropoulou, A (2002). Integration of choice and latent variable models. Perpetual motion: Travel Behaviour Research Opportunities and Application Challenges, pp. 431–470.

Bühler, F., Cocron, P., Neumann, I., Franke, T., &Krems, J. F. (2014). Is EV experience related to EV acceptance? Results from a German field study. Transportation Research Part F: Traffic Psychology and Behaviour, 25, 34–49.

Caperello, N. D., & Kurani, K. S. (2011). Households' stories of their encounters with a plug-in hybridelectric vehicle. Environment and Behavior, 44(4), 493–508.

Chorus, C. G. (2010). A new model of random regret minimization. European Journal of Transport, Infrastructures and Logistics, 10(2), 181–196

Civilai Leckie; Daniel Rayne; Lester W. Johnson (2021) Promoting Customer Engagement Behavior for Green Brands, Sustainability, pp. 13-15

Cohen, B., Almirall, E., Chesbrough, H. (2014). The city as a lab: open innovation meets the collaborative economy. California Management Review, 3–5.

Electric Vehicle Policy 2018 (Govt. of NCT Delhi, 2018) https://transport.delhi.gov.in /content/delhi-electric-vehicle-policy-2018 (Accessed on 10 June 2019).

Ella Graham-Rowe; Benjamin Gardner; Charles Abraham; Stephen Skippon; Helga Dittmar; R Hutchins; Jenny Stannard (2012). Mainstream Consumers Driving Plug-in Battery-electric and Plug-in Hybrid Electric Cars: A Qualitative Analysis of Responses and Evaluations, Transportation Research Part A-Policy and Practice.

Featherman, M., Jia, S.J., Califf, C.B., Hajli, N., 2021. The impact of new technologies on consumers beliefs: Reducing the perceived risks of electric vehicle adoption. Technological Forecasting and Social Change 169, 120847.

Featherman, M. S., & Pavlou, P. A. (2003). Predicting e-services adoption: a perceived risk facets perspective. International journal of human-computer studies, 59(4), 451-474.

Fishbein, M., Ajzen, I., 1975. Belief, attitude, intention and behavior: An introduction to theory and research. Addison-Wesley, Reading, MA.

Ghasri, M., Ardeshiri, A., & Rashidi, T. (2019). Perception towards electric vehicles and the impact on consumers' preference. Transportation Research Part D: Transport and Environment, 77, 271-291.

Graham-Rowe, E., Gardner, B., Abraham, C., Skippon, S., Dittmar, H., Hutchins, R., & Stannard, J. (2012). Mainstream consumers driving plug-in battery-electric and plug-in hybrid electric cars: A qualitative analysis of responses and evaluations. Transportation Research Part A: Policy and Practice, 46(1), 140-153.

Hackbarth, A., & Madlener, R. (2016). Willingness-to-pay for alternative fuel vehicle characteristics: A stated choice study for Germany. Transportation Research Part A: Policy and Practice, 85, 89-111.

https://www.carwale.com/mahindra-cars/xuv400

https://www.mahindraelectricautomobile.com/xuv400.html

Kenneth Lebeau; Joeri Van Mierlo; Philippe Lebeau; Olivier Mairesse; Cathy Macharis (2013) "Consumer Attitudes Towards Battery Electric Vehicles: A Large-scale Survey", International Journal of Electric and Hybrid Vehicles, 5(1), 28-41.

Krause, R. M., Carley, S. R., Lane, B. W., & Graham, J. D. (2013). Perception and reality: Public knowledge of plug-in electric vehicles in 21 US cities. Energy Policy, 63, 433-440.

Liao, P., Tang, T. Q., Liu, R., & Huang, H. J. (2021). An eco-driving strategy for electric vehicle based on the powertrain. Applied Energy, 302, 117583.

Pamidimukkala, A., Kermanshachi, S., Rosenberger, J. M., & Hladik, G. (2023). Adoption of electric vehicles: a state-of-art review. Transportation Research Procedia, 73, 313-320.

Rafia Afroz; Muhammad Mehedi Masud; Rulia Akhtar; Md Ashraful Islam; Jarita BtDuasa (2015). Consumer Purchase Intention Towards Environmentally Friendly Vehicles: An Empirical Investigation in Kuala Lumpur, Malaysia. Environmental Science and Pollution, 22, 16153–16163.

Rezvani, Z., Jansson, J., & Bodin, J. (2015). Advances in consumer electric vehicle adoption research: A review and research agenda. Transportation research part D: transport and environment, 34, 122-136.

TFE Report (2018). The case for Electric Mobility in India. https://www.tfe.energy/ project/the-case-for-electric-mobility-in-India. Accessed at 16/10/2023.

The Economic Times (2014). India has world's largest youth population: UN report. https://economictimes.indiatimes.com/news/politics-and-nation/india-has-worlds- largest-youth-population-un-report/articleshow/45190294.cms. Accessed at 1/06/ 2023.

Venkatesh, V., Davis, F.D., 2000. A theoretical extension of the technology acceptance model: Four longitudinal field studies. Management Science 46 (2), 186–204.

Westin, K., Jansson, J., & Nordlund, A. (2018). The importance of socio-demographic characteristics, geographic setting, and attitudes for adoption of electric vehicles in Sweden. Travel Behaviour and Society, 13, 118-127.

White, L. V., &Sintov, N. D. (2017). You are what you drive: Environmentalist and social innovator symbolism drives electric vehicle adoption intentions. Transportation Research Part A: Policy and Practice, 99, 94-113.

Will, C., & Schuller, A. (2016). Understanding user acceptance factors of electric vehicle smart charging. Transportation Research Part C: Emerging Technologies, 71, 198-214.

World Economic Forum, (2019). How can India transition to electric vehicles? Here's a roadmap. https://www.weforum.org/agenda/2019/10/how-can-india-transition-to -electric-vehicles-heres-a-roadmap/. Accessed at 08/03/2024.

Wu, J., Liao, H., Wang, J.W., Chen, T., 2019. The role of environmental concern in the public acceptance of autonomous electric vehicles: A survey from China. Transportation Research Part F: Traffic Psychology and Behaviour 60, 37–46.

Wu, Y., Zhang, L., 2017. Can the development of electric vehicles reduce the emission of air pollutants and greenhouse gases in developing countries? Transportation Research Part D: Transport and Environment 51, 129–145.