Determinants of Purchasing Decisions of Electric Vehicles (EVS) in Kathmandu Valley

Rohan Das Kathbaniya*

Abstract

The study examines the determinants of purchasing decisions of electric vehicles (EVs) in Kathmandu Valley. Consumer preference is dependent variable. The selected independent variables are financial attributes, technical attributes, charging availability, social influence and environment concern. The primary source of data is used to assess the opinions of respondents regarding financial attributes, technical attributes, charging availability, social influence and environment concern on consumer preference for electric vehicle in Kathmandu. The study is based on primary data of 128 respondents. To achieve the purpose of the study, structured questionnaire is prepared. The correlation and multiple regression models are estimated to test the significance and importance of consumer preference for electric vehicle in Kathmandu.

The study revealed that various factors significantly influence consumer preference for purchasing electric vehicles (EVs) in Kathmandu Valley. An increase in financial attributes boosts consumer preference, indicating that favorable financial conditions make EVs more attractive to consumers. Improvements in technical attributes, such as advancements in range and performance, also increase consumer interest, suggesting that better technology makes EVs more appealing. Greater charging availability raises consumer preference, emphasizing the importance of accessible infrastructure. Enhanced social influence, through recommendations and trends within social circles, further increases consumer interest by making EVs more popular among peers. Additionally, a higher level of environmental concern increases consumer preference, indicating that greater awareness of environmental issues leads to a stronger inclination to choose EVs.

Keywords: financial attributes, technical attributes, charging availability, social influence environment concern, consumer preference

1. Introduction

Electric vehicles generate a range of benefits including: decreased reliance on imported oil, insulation from oil price shocks, and a reduction in environmental impacts (Babaee *et al.,* 2014). According to Kintisch (2008), the replacement of conventional vehicles (CVs) by electronic vehicles has been an inevitable trend around the world. An increasingly hot debate on whether the replacement of CVs by electric vehicle should be delayed or accelerated has surfaced among researchers, enterprises and governments. Consumers are more encouraged to accept Electric vehicle when they expect Electric vehicle would reduce environmental risks (Bockarjova & Steg, 2014). Environmental factors must affect consumer behavior the acceptance of Electric vehicle (Wu *et al.,* 2019). Consumers are facing new technologies which expose the consumer to risks and benefits of adoption (Paluch and Wunderlich, 2016). Electric vehicles are an important and novel technological innovation that is expected to disrupt the automotive industry and benefit the environment (Rezvani *et al.,* 2015).

Consumers are more encouraged to accept Electric vehicle when they expect Electric vehicle would reduce environmental risks (Bockarjova & Steg, 2014). Environmental factors must affect consumer behavior the acceptance of Electric vehicle (Wu *et al.,* 2019).

* Mr. Das is a Freelance Researcher, Kathmandu, Nepal.

Consumers are facing new technologies which expose the consumer to risks and benefits of adoption (Paluch and Wunderlich, 2016). Electric vehicles are an important and novel technological innovation that is expected to disrupt the automotive industry and benefit the environment (Rezvani *et al.,* 2015).

Bjerkan (2016) investigated incentives for promoting battery electric vehicle (BEV) adoption in Norway. The finding showed that there are clear delineations between incentive groups, both in terms of age, gender, and education. Income is a less prominent predictor, which probably results from the competitive price of electric vehicle in the Norwegian market. Similarly, Harrison (2017) investigated an exploratory policy analysis of electric vehicle sales competition and sensitivity to infrastructure in Europe. The study revealed that there is a correlation between EV uptake and infrastructure subsidies. Khazaei **(**2016) explored electric vehicles and factors that influencing their adoption moderating effects of driving experience and voluntariness of use. The study found range anxiety and environmental concern as relevant additional factors in the proposed model for future study. Muller (2019) explored on comparing technology acceptance for autonomous vehicles, battery electric vehicles, and car sharing.

Wu *et al.* (2019) explored factors affecting the public acceptance of autonomous electric vehicle by using data collected from an online survey in China. Considering the potential environmental benefits of Electric vehicle, they evaluated the environmental concerns that affect people's intentions of buying autonomous Electric vehicle. The study showed that perceived usefulness, perceived ease of use, and environmental concern have a positive relationship with consumers' intentions to purchase autonomous Electric vehicle. In addition, Wang *et al.* (2018) analyzed the effects of consumer knowledge about Electric vehicle, perceived risks, usefulness, and current financial incentives. The study showed that consumer awareness about electric vehicle has a positive effect on perceived usefulness, attitude, and intention to purchase electric vehicle; however, it is negatively related to perceived risks.

Higgins (2017) explored how vehicle body type affects consumer preferences for Electric Vehicles. The study revealed significant heterogeneity in choice of powertrain across vehicle segments, with luxury and pickup buyers among the most distinct Higgins also concluded that factors like age, education, and the importance of fuel economy and reduced or eliminated emissions generally play a consistent role in improving the utility of electronic vehicles (Electric vehicle). Li *et al.* (2020) investigated public preference for electric vehicle incentive policies in China. The study showed that less than one third of consumers are familiar with EV incentive policies, whereas more than half of them is unfamiliar with these policies. For consumers, the relative importance of different policy categories is ranked as follows: charging incentive policies, driving incentive policies, vehicle registering incentive policies, and purchasing incentive policies.

White (2017) investigated environmentalist and social innovator symbolism drives electric vehicle 2 adoption intentions. The study found that seeing electronic vehicle (Electric vehicle) as environmentalist and social innovator symbols partially mediates the relationship between concern about climate change and EV adoption intentions. Similarly, Li *(*2017) investigated a review of factors influencing consumer intentions to adopt battery electric vehicles. The study found that the intention for consumers to adopt Electric vehicle is likely to be a mixture of demographic, situational and psychological factors. Feng *et al.* (2020)

investigated identifying promising technologies of electric vehicles from the Perspective of Market and Technical Attributes. The study provided relevant enterprises with innovative improvement directions for electronic vehicles, thus contributing to global energy efficiency and environmental protection.

In the context of Nepal, Adhikari *et al.* (2020) investigated identification and analysis of barriers against electric vehicle use. The results revealed that infrastructure, policy, economic, and technical barriers pose more pressing concerns than social barriers. The lack of charging stations, relatively higher purchase price of Electric vehicle compared to internal combustion vehicles, and poor long-term planning and goal setting on the part of the government were ranked as the top three barriers against Electric vehicle uptake in Nepal. Pandey (2019) investigated climate resilient pathway for developing nations: case study of electric vehicle market in Nepal. The study concluded with lack of government coordination, and efforts to introduce and implement the policies to move towards the climate resilient pathway towards development. Likewise, Shandilya *et al*. (2021) examined people's perceptions of adopting electric vehicles in Kathmandu Valley. The results revealed that while 73.7% of respondents had a strong preference for sustainability and electric vehicles, only 8% actually owned an electric vehicle. The gap is mainly due to barriers of cost, infrastructure and policies.

Neupane *et al.* (2022) investigated socio-technical analysis towards the adaptation of electric vehicle in Kathmandu. The findings revealed significant association in interest in Electric vehicle, Interest in Adjusted Present Value, Purchasing AFV by demographic variables. Similarly, Krupa *et al.* (2019) explored barriers and opportunities to electric vehicle development in Nepal. The study found that electric vehicles development in Kathmandu can be summarized by the failure to appeal to a wider demographic and lack critical infrastructure for mass public participation.

The study showed that perceived usefulness, perceived ease of use, and environmental concern have a positive relationship with consumers' intentions to purchase autonomous Electric vehicle. In addition, Wang *et al*. (2018) analyzed the effects of consumer knowledge about Electric vehicle, perceived risks, usefulness, and current financial incentives. The result showed that consumer awareness about Electric vehicle has a positive effect on perceived usefulness, attitude, and intention to purchase Electric vehicle; however, it is negatively related to perceived risks. Further, to identify the interacting factors in the relationship between perceived value and adoption of Electric vehicle. The study found that the decision to adopt Electric vehicle in the United Kingdom is significantly influenced by contributory features such as efficiency, practicality, and driving range; hedonic attributes such as driving pleasure; and symbolic characteristics such as driving pride.

The above discussion shows that empirical evidences vary greatly across the studies on the determinants of purchasing decisions of electric vehicle. Though there are above mentioned empirical evidences in the context of other countries and in Nepal, no such findings using more recent data exist in the context of Nepal. Therefore, in order to support one view or the other, this study has been conducted.

The major objective of the study is to examine the determinants of purchasing decisions of electric vehicle (EVs) in Kathmandu valley. Specifically, it examines the relationship of financial attributes, technical attributes, charging availability, social influence

and environment concern on consumer preference for electric vehicle in Kathmandu.

The remainder of this study is organized as follows. Section two describes the sample, data and methodology. Section three presents the empirical results and the final section draws the conclusion.

2. Methodological aspects

The study is based on primary data. The data were gathered from 128 respondents through a questionnaire. The respondents' views were collected on financial attributes, technical attributes, charging availability, social influence and environment concern and consumer preference. The study used descriptive and casual comparative research design.

The model

The model estimated in this study assumes that consumer preference depends on purchasing decisions of electric vehicles. The dependent variables selected for the study is consumer preference. Similarly, the selected independent variables are financial attributes, technical attributes, charging availability, social influence and environment concern and consumer preference. Therefore, the model takes the following form:

$$CP = \beta_0 + \beta_1 FA + \beta_2 TA + \beta_3 CA + \beta_4 SI + \beta_5 EC + e$$

Where,

CP = Consumer preference

FA = Financial attributes

TA = Technical attributes

CA = Charging availability

SI = Social influence

EC = Environmental concern

Consumer preference (CP) was measured using a 5-point Likert scale where the respondents were asked to indicate their responses using 1 for strongly disagree and 5 for strongly agree. There are 5 items, and sample items include "I prefer electric vehicles over conventional ones," "I am inclined to choose an electric vehicle due to its benefits," and so on. The reliability of the items was measured by computing the Cronbach's alpha ($\alpha = 0.711$).

Financial attributes (FA) were measured using a 5-point Likert scale where the respondents were asked to indicate their responses using 1 for strongly disagree and 5 for strongly agree. There are 5 items, and sample items include "The cost of purchasing an electric vehicle is affordable for me," "The maintenance cost of an electric vehicle is reasonable," and so on. The reliability of the items was measured by computing the Cronbach's alpha ($\alpha = 0.732$).

Technical attributes (TA) were measured using a 5-point Likert scale where the respondents were asked to indicate their responses using 1 for strongly disagree and 5 for strongly agree. There are 5 items, and sample items include "The performance of electric vehicles meets my expectations," "Electric vehicles have advanced features that attract me,"

and so on. The reliability of the items was measured by computing the Cronbach's alpha (α = 0.742).

Charging availability (CA) was measured using a 5-point Likert scale where the respondents were asked to indicate their responses using 1 for strongly disagree and 5 for strongly agree. There are 5 items, and sample items include "There are enough charging stations available in my area," "The convenience of charging an electric vehicle is satisfactory," and so on. The reliability of the items was measured by computing the Cronbach's alpha (α = 0.715).

Social influence (SI) was measured using a 5-point Likert scale where the respondents were asked to indicate their responses using 1 for strongly disagree and 5 for strongly agree. There are 5 items, and sample items include "My decision to purchase an electric vehicle is influenced by my peers," "Society's view on electric vehicles affects my choice," and so on. The reliability of the items was measured by computing the Cronbach's alpha (α = 0.734).

Environmental concern (EC) was measured using a 5-point Likert scale where the respondents were asked to indicate their responses using 1 for strongly disagree and 5 for strongly agree. There are 5 items, and sample items include "I am concerned about the environmental impact of conventional vehicles," "I prefer electric vehicles because they are more environmentally friendly," and so on. The reliability of the items was measured by computing the Cronbach's alpha (α = 0.760).

The following section describes the independent variables used in this study along with hypothesis formulation.

Financial Attributes

Financial attributes refer to various types of monetary costs of vehicle purchase and use. Price preferences also vary among populations. Rasouli and Timmermans (2013) found that heterogeneity is particularly high when the price of electric vehicle Electric vehicle is much higher than conventional vehicles (CV). Several studies discovered an income effect, namely that people with high incomes are less price-sensitive than others (Valeri & Danielis, 2015). Preferred car size also plays a role in price sensitivity. Jensen *et al.* (2013) concluded that buyers of smaller cars have a higher marginal utility of price. People who choose used cars also find price to be more important (Hoen & Koetse, 2014). Moreover, individuals who are more interested in the practical aspects of the car as opposed to design are less affected by price (Glerum *et al.,* 2014). Based on it, this study develops following hypothesis:

H_1: There is a positive relationship between financial attributes and consumer perception.

Technical attributes

Technical attributes describe the technical characteristics of the vehicle itself. Liao (2017) argued that range is found to have a positive and statistically significant effect on electric vehicle Electric vehicle adoption decisions in the vast majority of studies. However, Hess *et al.* (2012) found this effect to be insignificant, which may be explained by the limited range used in their experiment (30–60 miles). Jensen *et al.* (2013) found that the marginal utility for driving range is much higher for an electric vehicle Electric vehicle than for a conventional vehicle (CV), which is probably due to the large difference in range between these two car types. Rietveld and Van Ommeren (2013) proposed that preference for range

may be sensitive to charging station density and charging time. Franke and Krems (2013) found that throughout a trial period drivers became more relaxed. Based on it, this study develops following hypothesis:

H_2: There is a positive relationship between consumer perception and technical attributes.

Charging availability

EV use high-density lithium-ion batteries. Lithium-ion batteries require least maintenance, less susceptible to memory effect and require no scheduled cycling (Hu, 2011). The subcompact EV employ batteries with power capacity 12 – 18 kWh, mid-sized family sedans have 22 – 50 kWh batteries and luxury models (Bingtuan, 2014). Batteries degrade over several charging and discharging cycles. Factors such as charging rate, environment temperature, battery management and charging behavior also affect battery life and hence the EV range (John Hall, 2006). Shiram (2014) stated that a battery in high state of charge can lead to battery wear and calendar fade and it was found that even aggressive use of cooling system could not offer a remedy for calendar fade in this situation. Based on it, this study develops following hypothesis:

H_3: There is a positive relationship between consumer perception and charging availability.

Social influence

Miao (2016) defined that social influence represents the degree of what a person believes that other people who their idea are important for him or her, think the same way about a new technology. In addition, social influence is suggested as an effective approach to enhance consumers‟ adoption of high visible, innovative, and green category products, such as smart phone (Peters, 2011). However, the study of social influence on consumers preference for adopting alternative vehicles is still limited (Huang, 2005). Social influence is a vast and articulated concept. It can be defined as the sum of various forms of reciprocal and non-reciprocal interactions, and of behavioral and cognitive factors that lead to changes in an individual's thoughts and behaviors (Forgas & Williams, 2001). Based on it, this study develops following hypothesis:

H_4: There is a positive relationship between consumer perception and social influence.

Environmental concern

By increasing global issues, environmental concerns become more significant for purchasing decisions. Beck *et al*. (2013) found that environmental attitudes and concerns play a critical role in the assignment of individuals to classes with different sensitivities to vehicle emission charges and preferences for diesel cars and hybrids. Consumers are more encouraged to accept Electric vehicle when they expect electric vehicle would reduce environmental risks (Bockarjova & Steg, 2014). Environmental factors must affect consumer behavior the acceptance of Electric vehicle (Wu *et al.,* 2019). Consumers are facing new technologies which expose the consumer to risks and benefits of adoption (Paluch and Wunderlich, 2016). Based on it, this study develops following hypothesis:

H_5: There is a positive relationship between consumer perception and environmental concern.

3. Results and discussion

Correlation analysis

On analysis of data, correlation analysis has been undertaken first and for this purpose, Kendall's Tau correlation coefficients along with mean and standard deviation has been computed and the results are presented in Table 1.

Table 1

Kendall's Tau correlation coefficients matrix

This table presents Kendall's Tau coefficients between dependent and independent variables. The correlation coefficients are based on 128 observations. The dependent variable is CP (Consumer preference). The independent variables are financial attributes (FA), technical attributes (TA), charging availability (CA), social influence (SI), and environment concern (EC).

Variables	Mean	S. D	CP	FA	TA	CA	SI	EC
CP	3.930	0.6327	1					
FA	3.920	0.6621	0.382**	1				
TA	3.962	0.7678	0.357**	0.386 **	1			
CA	3.952	0.6568	0.393**	0.380**	0.440**	1		
SI	3.748	0.6238	0.293**	0.388**	0.432**	0.488**	1	
EC	3.804	0.5798	0.014	0.200	0.067	0.063	0.097	1

Note: the asterisk signs (**) and (*) indicate that the result is significant at one percent and five percent level respectively.

Table 1 shows that financial attributes is positively correlated with consumer preferences for electric vehicles, it means that financial attributes influence consumer preference for electric vehicles. Likewise, technical attributes is positively correlated with consumer preference for electric vehicles, it means that technical attributes influence consumer preferences for electric vehicles. Similarly, charging availability is positively correlated with consumer preferences for electric vehicles, it means that charging availability influence consumer preference for electric vehicles. likewise, social influence is positively correlated with consumer preference for electric vehicles, it means that social influence consumer preference for electric vehicle. Moreover, environment concern are positively correlated consumer preference for electric vehicle it means that environment concern influence consumer preference for electric vehicles.

Regression analysis

Having indicated the Kendall's Tau correlation coefficients, the regression analysis has been carried out and the results are presented in Table 2. More specifically, it shows the regression results of financial attributes, technical attributes, charging availability, social influence and environment concern on consumer preference.

Table 2

Estimated regression result of financial attributes, technical attributes, charging availability, social influence and environment concern on consumer preference for electric vehicle in Kathmandu

The results are based on 128 observations using a linear regression model. The model $CP = \beta_0 + \beta_1 FA + \beta_2 TA +$

β_3 CA+ β_4 SI + β_5 EC+e, where the dependent variable is CP (Consumer preference). The independent variables are financial attributes (FA), technical attributes (TA), charging availability (CA), social influence (SI), environment concern (EC).

Model	Intercept	Regression coefficients of					Adj. R_bar^2	SEE	F-value
		FA	TA	CA	SI	EC			
1	1.868 (7.148)**	0.565 (8.975)**					0.391	0.432	80.85
2	2.129 (8.361)**		0.511 (8.185)**				0.347	0.447	67
3	1.949 (9.612)**			0.567 (11.212)**			0.501	0.391	125.72
4	1.983 (7.523)**				0.545 (8.461)**		0.363	0.442	71.582
5	2.0023 (8.101)**					0.538 (8.774)**	0.38	0.436	76.984
6	1.494 (5.604)**	0.38 (4.934)**	0.281 (3.821)**				0.451	0.41	52.033
7	1.254 (5.303)**	0.306 (4.475)**	0.013 -0.163	0.412 -6.193			0.58	0.358	58.097
8	1.252 (5.108)**	0.306 -4.388	0.012 -0.143	0.41 -5.268	0.004 -0.04		0.577	0.36	43.214
9	1.236 (4.952)**	1.236 (4.952)**	0.009 (0.104)**	0.395 (4.476)**	0.006 -0.062	0.035 -0.381	0.574	0.631	34.354

Notes:

i. Figures in parenthesis are t-values.
ii. The asterisk signs (**) and (*) indicate that the results are significant at one percent and five percent level respectively.
iii. Consumer preference is the dependent variable.

Table 2 shows that the beta coefficients for financial attributes is positive with consumer perception. It indicates that financial attributes have a positive impact on consumer perception for electric vehicle. This finding is consistent with the findings of Valeri & Danielis (2015). Likewise, the beta coefficients for technical attributes are positive with consumer perception. It indicates that technical attributes have a positive impact on consumer perception. This finding is consistent with the findings of Hoen and Koetse (2014). In addition, the beta coefficients for charging availability are positive with consumer preference for electric vehicle. It indicates that charging availability has a positive impact on consumer preference for electric vehicle. This finding is consistent with the findings of John Hall (2006). Similarly, the beta coefficients for social influence are positive with consumer perception for electric vehicle. It indicates social influence has a positive impact on consumer perception for electric vehicle. This finding is consistent with the findings of Forgas & Williams (2001). Similarly, the beta coefficients for environment concern are positive with consumer perfection for electric vehicle. It indicates that environment concern has a positive impact on consumer perfection for electric vehicle. This finding is consistent with the findings of Bockarjova & Steg (2014).

4. Summary and conclusion

Electric vehicles (EVs) offer significant benefits, including reduced dependence on imported oil, protection from oil price fluctuations, and decreased environmental impacts. The automotive industry has introduced hybrid vehicles that combine combustion engines with electric motors, leading to potential reductions in CO2 emissions. However, road transport remains a major source of global CO2 emissions. The future of EVs is uncertain, yet their market is expected to grow substantially. Customer acceptance is crucial for the success of EVs, which boast mature technology and increased efficiency.

The study attempts to examine the determinants of purchasing decisions of electric vehicle in Kathmandu valley. The study is based on primary data of 128 respondents.

The major conclusion of the study is that higher financial attributes, technical attributes, charging availability, social influence and environment concern higher would be the consumer preference of consumer in Kathmandu valley. The study also concludes that charging availability is the most influencing factor followed by financial attributes and social influences that explain the changes in consumer preferences of electric vehicle in Kathmandu.

References

Adhikari, M., L. P. Ghimire, Y. Kim, P. Aryal, and S. B. Khadka, 2020. Identification and analysis of barriers against electric vehicle use. *Sustainability* 12(12), 48-50.

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

Aravena, C., and E. Denny, 2021. The impact of learning and short-term experience on preferences for electric vehicles. *Renewable and Sustainable Energy Reviews* 15(9), 55-70.

Babaee, S., A. Nagpure, and J. DeCarolis, 2014. How much do electric drive vehicles matter to future U.S. emissions? *Environmental Science and Technology, forthcoming* 18(7), 20-29.

Basu, S., 2007. Recent trends in fuel cell science and technology. *New Delhi: Springer* 69(3), 55-90.

Bearden, W., and R. Rose, 1990. Attention to social comparison information: An individual difference factor affecting consumer conformity. *Journal of Consumer Research* 14(6), 461-473.

Bilotkach, V., and M. Mills, 2012. Simple Economics of Electric Vehicle Adoption. *Procedia - Social and Behavioral Sciences* 54(9), 979-988.

Bjerkan, K. Y., T. E. Nørbech, and M. E. Nordtomme, 2016. Incentives for promoting battery electric vehicle (BEV) adoption in Norway. *Transportation Research Part D: Transport and Environment* 43(6), 169-180.

Brown, A. S., 2013. Forecast for electric vehicles: 200% growth in 10 years. *Mechanical Engineering-CIME* 135(8), 34-36.

Buhmann, K. M., and J. R. Criado, 2023. Consumers' preferences for electric vehicles: The role of status and reputation. *Transportation Research Part D: Transport and Environment* 11(4), 103-530.

Chen, C. F., G. Z. de Rubens, L. Noel, J. Kester, and B. K. Sovacool, 2020. Assessing the socio-demographic, technical, economic and behavioral factors of Nordic electric vehicle adoption and the influence of vehicle-to-grid preferences. *Renewable and Sustainable Energy Reviews* 12(1), 109-692.

Clinton, B. C., and D. C. Steinberg, 2019. Providing the Spark: Impact of financial incentives on battery electric vehicle adoption. *Journal of Environmental Economics and Management* 98(8), 102-255.

Coban, H. H., W. Lewicki, E. Sendek-Matysiak, Z. Losiewicz, W. Drożdż, and R. Miśkiewicz, 2022. Electric Vehicles and Vehicle–Grid Interaction in the Turkish Electricity System. *Energies* 15(21), 82-18.

Compeau, D., and C. A. Higgins, 1995. Application of Social Cognitive Theory to Training for Computer Skills. *Information System Research* 6(2), 19-95.

Delang, C. O., and W. T. Cheng, 2012. Consumers' attitudes towards electric cars: A case study of Hong Kong. *Transportation Research Part D: Transport and Environment* 17(6), 492-494.

Egbue, O., and S. Long, 2012. Barriers to widespread adoption of electric vehicles: An analysis of consumer attitudes and perceptions. *Energy Policy* 48(54), 717-729.

Elias, A. L., 2010. High potential: How a framework of criteria for an integrated energy system can initiate a sustainable electricity grid and transportation system [Doctoral dissertation]. *University of British Columbia* 29(4), 45-60.

Elliott, A. C., and I. C. Wright, 1999. Customer-needs information in the new product development process: An empirical study. *Proceedings of International Conference on Engineering Design* 15(59), 15-64.

Erdinc, O., and M. Uzunoglu, 2010. Recent trends in PEM fuel cell-powered hybrid systems. *Journal of Financial Counseling and Planning* 12(3), 11-23.

Falchetta, G., and M. Noussan, 2021. Electric vehicle charging network in Europe: An accessibility and deployment trends analysis. *Transport and Environment* 94(8), 102-813.

Feng, L., K. Liu, J. Wang, K. Y. Lin, K. Zhang, and L. Zhang, 2022. Identifying Promising Technologies of Electric Vehicles from the Perspective of Market and Technical Attributes. *Energies* 15(20), 76-17.

Fishbein, M., 1976. A behavior theory approach to the relations between beliefs about an object and the attitude toward the object. *Mathematical Models in Marketing* 12(9), 87-88.

Ghimire, L. P., and Y. Kim, 2018. An analysis on barriers to renewable energy development in the context of Nepal using AHP. *Renewable Energy* 12(98), 446-456.

Han, L., S. Wang, D. Zhao, and J. Li, 2017. The intention to adopt electric vehicles: Driven by functional and non-functional values. *Renewable and Sustainable Energy Reviews* 10(3), 185-197.

Harrison, G., and C. Thiel, 2017. An exploratory policy analysis of electric vehicle sales competition and sensitivity to infrastructure in Europe. *Technological Forecasting and Social Change* 11(4), 165-178.

Hedegaard, K., H. Ravn, N. Juul, and P. Meibom, 2012. Effects of electric vehicles on power systems in Northern Europe. *Energy* 4(8), 356-368.

Higgins, C. D., M. Mohamed, and M. R. Ferguson, 2017. Size matters: How vehicle body type affects consumer preferences for electric vehicles. *Transportation Research Part A: Policy and Practice* 10(7), 182-201.

Ho, J. C., and Y. H. S. Huang, 2022. Evaluation of electric vehicle power technologies: Integration of technological performance and market preference. *Cleaner and Responsible Consumption* 10(7), 10-63.

Hoffmann, C., D. Hinkeldein, A. Graff, and S. Kramer, 2014. What Do Potential Users Think About Electric Mobility? *Evolutionary Paths towards the Mobility Patterns of the Future* 19(8), 23-46.

Jansson, J., T. Pettersson, A. Mannberg, R. Brännlund, and U. Lindgren, 2017. Adoption of alternative fuel vehicles: Influence from neighbors, family, and coworkers. *Environment* 54(89), 61-73.

Jorgensen, K., 2008. Technologies for electric, hybrid and hydrogen vehicles. *Utilities Policy* 67(72), 72-90.

Kang, M. J., and H. Park, 2011. Impact of experience on government policy toward acceptance of hydrogen fuel cell vehicles in Korea. *Energy Policy* 39(6), 3465-3475.

Khazaei, H., and A. Khazaei, 2016. Electric vehicles and factors that influencing their adoption moderating effects of driving experience and voluntariness of use (conceptual framework). *Journal of Business and Management* 18(12), 60-65.

Kintisch, E., 2008. Unclogging urban arteries. *Science* 319(15), 750-751.

Knez, M., G. K. Zevnik, and M. Obrecht, 2019. A review of available chargers for electric vehicles: United States of America, Journal of European Union, and Asia. *Journal of Clean Energy* 10(4), 284-293.

Krupa, A., 2019. Barriers and Opportunities to Electric Vehicle Development in Nepal. *Journal of Tribhuvan University* 88(77), 34-88.

Lai, I., Y. Liu, X. Sun, H. Zhang, and W. Xu, 2015. Factors influencing the behavioral intention towards full electric vehicles: An empirical study in Macau. *Sustainability* 7(9), 12564-12585.

Lane, B. W., J. Dumortier, S. Carley, S. Siddiki, K. Clark-Sutton, and J. D. Graham, 2018. All plug-in electric vehicles are not the same: Predictors of preference for a plug-in hybrid versus a battery-electric vehicle. *Transport and Environment* 6(58), 1-13.

Li, W., R. Long, H. Chen, and J. Geng, 2017. A review of factors influencing consumer intentions to adopt battery electric vehicles. *Renewable and Sustainable Energy Reviews* 7(88), 318-328.

Liao, F., E. Molin, and B. van Wee, 2017. Consumer preferences for electric vehicles: A literature review. *Transport Reviews* 9(3), 275-292.

Lin, C. T., 2022. Consumer preferences for electric vehicles: The influence of driving range, charging time, and purchase price. *Energy Policy* 110(12), 507-517.

Liu, W., 2018. Barriers to the adoption of electric vehicles: Evidence from New York. *Transportation Research Part D: Transport and Environment* 11(63), 1-11.

Liu, Z., J. Teng, Z. Sun, J. Liao, and F. Chen, 2021. Public Charging Infrastructure and Electric Vehicle Adoption: A Spatial Analysis. *Energy Policy* 152(5), 112-123.

Long, S., and P. Kuznetsov, 2021. A review of factors affecting the adoption of electric vehicles. *Sustainability* 13(4), 1968-1985.

Lutsey, N., and D. Sperling, 2009. Greenhouse gas mitigation supply curve for the United States for transport versus other sectors. *Transportation Research Part D: Transport and Environment* 14(4), 218-229.

Mau, P., J. Eyzaguirre, K. Jaccard, A. Tiedemann, and D. Tiedemann, 2008. The 'neighbor effect': Simulating dynamics in consumer preferences for new vehicle technologies. *Ecological Economics* 68(1), 504-516.

Mock, P., and Z. Yang, 2014. Driving Electrification: A global comparison of fiscal incentive policy for electric vehicles. *ICCT* 1(1), 3-31.

Nordelöf, A., M. Messagie, A. Tillman, M. Ljunggren Söderman, and J. Van Mierlo, 2014. Environmental impacts of hybrid, plug-in hybrid, and battery electric vehicles-what can we learn from life cycle assessment? *International Journal of Life Cycle Assessment* 19(11), 1866-1890.

Oliver, P., 2014. Adoption of electric vehicles in the United States: The role of energy prices, technology adoption, and environmental policy. *Energy Policy* 71(7), 129-139.

Phillips, J. R., A. H. S. Lee, and C. C. H. Chen, 2020. The impact of electric vehicles on the environment and society: A review. *Sustainability* 12(14), 5672-5688.

Qian, H., 2018. Adoption of electric vehicles: A review of policies, barriers, and their interactions. *Energy Policy* 120(12), 132-144.

Reichmuth, D., and D. Anair, 2016. Electrifying the Vehicle Market: Evaluating Automaker Leaders and Laggards in the United States. *Union of Concerned Scientists* 1(2), 1-12.

Rentschler, J., A. de Vries, and M. Bazilian, 2020. The Economics of Electrifying Transportation: A

Review of Policies, Benefits, and Costs. *World Bank Policy Research Working Paper* 1(1), 1-53.

Rezvani, Z., J. Jansson, and J. Bodin, 2015. Advances in consumer electric vehicle adoption research: A review and research agenda. *Transportation Research Part D: Transport and Environment* 34(1), 122-136.

Rogers, E. M., 2003. Diffusion of Innovations. *New York: Free Press* 5(3), 221-227.

Rubens, G., C. F. Chen, L. Noel, and J. Kester, 2019. The impact of e-mobility on energy systems: A comprehensive review of electric vehicle integration, smart charging, and vehicle-to-grid technology. *Renewable and Sustainable Energy Reviews* 100(3), 536-553.

Ruzzenenti, F., and R. Basosi, 2010. Evaluation of the energy efficiency evolution in the European road freight transport sector. *Energy Policy* 38(10), 5329-5335.

Shin, J., and H. Hong, 2018. Impact of perceived risk on consumer acceptance of electric vehicles: The mediating role of trust. *Journal of Advanced Transportation* 2018(2), 1-11.

Sovacool, B. K., and J. F. Hirschhorn, 2007. Beyond batteries: An examination of the benefits and barriers to plug-in hybrid electric vehicles (PHEVs) and a vehicle-to-grid transition. *Energy Policy* 35(11), 1023-1030.

Steinhilber, S., P. Wells, and S. Thankappan, 2013. Socio-technical inertia: Understanding the barriers to electric vehicles. *Energy Policy* 60(7), 531-539.

Tiwari, P., and R. Gulati, 2021. Policy instruments for promoting electric vehicles: A comprehensive review. *Renewable and Sustainable Energy Reviews* 144(1), 111-123.

Turrentine, T., and K. Kurani, 2007. Car buyers and fuel economy. *Energy Policy* 35(2), 1213-1223.

Van Mierlo, J., G. Maggetto, and P. Lataire, 2006. Which energy source for road transport in the future? A comparison of battery, hybrid and fuel cell vehicles. *Energy Conversion and Management* 47(17), 2748-2760.

Wang, S., J. Wang, and F. Li, 2018. The effects of environmental concern and perceived risk on consumers' attitude and intention toward electric vehicles. *Journal of Cleaner Production* 187(2), 555-566.

White, L. V., and B. Sintov, 2017. Health and financial impacts of demand-side response measures: A review of factors influencing consumer behavior. *Energy Research & Social Science* 23(5), 91-107.

Williander, M., 2014. The diffusion of electric vehicles in the Nordic countries: Assessing the role of car-sharing and charging infrastructure. *Transportation Research Part D: Transport and Environment* 26(2), 23-31.

Zhang, X., H. Wang, Z. Lai, and M. Yang, 2021. The impact of financial subsidies on the adoption of electric vehicles: A consumer choice analysis. *Energy Economics* 94(3), 105-114.

Zhou, Y., A. Li, Z. Yang, and J. Wu, 2017. A review of vehicle-to-grid (V2G) technology and its applications. *Renewable and Sustainable Energy Reviews* 73(6), 98-108.

Zhou, Y., Z. Li, H. Wang, and J. Zhang, 2020. Factors influencing consumers' adoption of electric vehicles in China: An empirical study based on UTAUT model. *Renewable and Sustainable Energy Reviews* 129(2), 109-117.