

An Empirical Study on Customer Awareness and Customer Engagement towards E-Vehicles

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Abstract

Contemporary environmental concerns are thrusting the manufacturing and sales of Electric vehicles. Combination of Indian skilled and semiskilled technological base, a platform of large customer base, and relatively cheaper production and labor cost, has fascinated almost all global electric vehicle manufacturers. The industry strives hard to align their innovation to develop a sustainable business model. One such innovation is electric vehicles which is acquiring a considerable market share across countries. The present study empirically investigates the motives behind users' consumer awareness, purchase intention, customer engagement and word of mouth towards electric vehicles. Primary data is collected through questionnaire and Non-probability sampling & convenient sampling methods are used. Study carried out in Bangalore City and Issued 250 questionnaires to the respondents and received 180 valid responses. The statistical methods used multiple regression and two-way ANOVA. Study found that gender and education have no significant impact on purchase intention both individually and collectively, as these two variables chosen does not have interactive impact and concluded perceived monetary benefits and personnel innovativeness significantly impact the Electric Vehicle awareness and customer engagement.

Keywords: Electric vehicles, behavioral intention, consumer awareness, environmental

Introduction

The over-a-century-old industry is gearing up for transformation. The fuel price spike and therefore the impact of its emission on the environment have involved a change in individual transportation habits. This sector, propelled by combustion engines, is gravitating gradually toward electric vehicles (EVs). An electric vehicle (EV) is one that operates on an electrical motor, instead of an internal-combustion engine that generates power by burning a mixture of fuel and gases. An electric vehicle (EV) is one that operates on an electrical motor, instead of an internal-combustion engine that generates power by burning a mixture of fuel and gases.

Contemporary environmental concerns are thrusting the manufacturing and sales of Electric vehicles. Year 2018 have revolutionized the Indian manufacturer's conception towards Electric Vehicle as best alternatives to the fuel cars (conventional diesel/petrol combustion engine). For example the Nissan Motors are developing 20 new models of EV and various Indian domestic players like Tata Motors, Mahindra & Mahindra, TVS Motors and Bajaj Auto are trying to strongly hold the leverage of high growth period of electric vehicles into their strategic competitive advantages in the market. This new emerging market has led to various strategic alliances

Technology to be used in the upcoming EV is very mature and up trend leading to high distance coverage with efficiency and comfort. (Class, Winter et al 2010). The potential of electric mobility has been studied in recent research from a technical (Werther, Frischknecht, Labeye et al 2011) economic (Kley et al 2011), logistic (Ehrler et al 2012), environmental (Sourkounis et al 2011) and inner-urban (Schaumann, Solarat al 2013) point of view. However, research showed also that there is considerable struggle for electric vehicles to create appropriate markets, at least Public Perception and Acceptance of Electric Vehicles in India. Changing is the trend from acceptance of fuel cars to EV requires a massive propagation and trust building on the electric Vehicle segment. Still, however, there is a strong negativity in acceptance of EV

India's commitment to control pollution and reducing carbon footprint is also increasing. The country prepares to shift towards EVs by 2030. The government desires the car manufacturers to migrate to EV production, which will curtail the oil bill by US\$60 billion, cut emissions by 37% and reduce the dependence on the imports of fuel, thus acting as a shield from vulnerability against crude prices and currency fluctuations.

The government is examining the battery swapping option model to beat the challenges in EV adoption. The swapping model was introduced in Israel and China met with partial success. The challenges are the battery size and

power. These may vary consistent by with manufacturer/models (e.g., MarutiAl to and HondaCity). This complicated situation under this model demands a similar vehicle design to accommodate the same battery, which is difficult to achieve. Another alternative could be battery leasing that could reduce the ownership cost. However, the easy availability of charging points across different places in a city remains a significant challenge yet unresolved.

Electric Vehicles in India

In April 2020, Niti Aayog, the federal think tank, published a report titled "India's Electric Mobility Transformation", which pegs EV sales penetration in India at 70 percent for commercial cars, 30 percent for personal cars, 40 percent for buses, and 80 percent for two- and three-wheelers by 2030. These targets, if achieved, could lead to a net reduction of 14 exajoules of energy and 846 million plenty of CO₂ emissions over the deployed vehicles' lifetime. Electric vehicles sold until 2030 can cumulatively save 474 million plenty of oil equivalents over their lifetime, worth US\$450.87 billion.

Review of Literature

Bharathi Motwani and Abhishek Patil, (2019), gave importance to advantages of Electric Vehicle as a new way of transportation having no noise, air pollution and an environmentally friendly way to commute. India being a major market, this study was conducted to check the acceptability of people towards electric vehicle and its effect on automobile industry. The study focuses on people opinion and the awareness about the electric vehicle. Today all vehicle producer in the world have at least one electric vehicle in their product portfolio.

Mishra.S & Malhotra, (2019) identified a potential need for adopting alternative technologies in automobiles such as Electric Vehicles. Study focuses on the role of performance features, financial benefits, environment concerns, social influence, cost of ownership on purchase intention of Indian consumers towards Electric vehicles.

Kupra et al (2014) gave new dimension to elaborating the research from Political scenario by studying 911 residents of USA. He found that the acceptance of EV would increase tremendously by having a political belief, concern for energy independence and climate change. He suggested that tax incentives can further enhance the sales. *Lane and Potter (2007)* studied UK residents, consumers and potential consumers of Electric Vehicle based on theory of planned behavior and value-belief-norm theory. He found that performance, ease of use, safety, reliability, energy efficiency of EV are the main contributors towards increased sale of EV.

Bangwal, D., & Dwivedi, A. (2020) Another research was carried out to better understand the socio-technical nexus of EV barriers to adoption in the Nordic countries. Despite recent technology developments, typical hurdles such as range, pricing, and charging infrastructure persist, according to the qualitative findings and cluster analysis. At the same time, the findings reveal that obstacles are linked closely to customer knowledge and experience.

Sovacool, B. K et al (2020) Another study was conducted to scrutinise the various factors that influence a consumer's adoption of an EV. The results show that the study found that the perceived economic benefit (PEB) is not related to the behavioural intention while environmental concerns and social influence are partial predictors of the BI.

Collins, B. J. (2018) Based on the theory of planned behaviour, another study used consumer cognitive status, product perception, and incentive policy measures to develop a purchase intention influence mechanism model for EVs (TPB). The findings suggest that policy indicators such as attitude, perceived behaviour control, cognitive status, product perception, and monetary incentive policies have a substantial favourable impact on customers' intents to buy electric vehicles in Beijing.

Surya P., (2021) The goal of this study is to determine customer preferences for business models in the context of EV adoption. According to the findings, business model preferences differ depending on the vehicle type: for battery electric vehicles (BEVs), vehicle leasing is the most preferred option, while for conventional cars (CVs) and plug-in hybrids (PHEVs), the traditional business model of full purchase is still preferred.

Van Wee, B. (2018) Environmental concerns, cost, comfort, trust, technology, societal acceptance, and infrastructural availability all influence vehicle choice. These arguments have been put to the test in both conventional and electric vehicles. According to the findings, the general public is fully aware of the environmental benefits. According to the paper, the government and manufacturers share responsibilities for investing in the EV sector.

Objectives of the Study

- To measure awareness on various electric vehicle brands among users.
- To study the influencing factors in choosing electric vehicles.
- To measure the satisfaction towards electric vehicles among users.

Hypothesis

- There is no significance difference between age and education about purchase intention of E-vehicles

Research Methodology

Primary data is collected through questionnaire and Non-probability sampling & convenient sampling methods are used. . Study carried out in Bangalore City and Issued 250 questionnaires to the respondents and received 180 valid responses. The statistical methods used multiple regressionand two-way ANOVA.

Analysis and Interpretation

Reliability Test

Table 1

Reliability Test		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Nof Items
.891	.810	22

In table 1, to examine the reliability of the survey, the study used Cronbach's Alpha coefficient and the scores for the variables were indicated. The survey having a high level of reliability, i.e., higher than 0.70 in line with the abundant literature on scale measurement (Cronbach & Shavelson, 2004), it is possible to conclude that the reliability of the research instruments in terms of their internal consistency is with satisfactory level.

Table 2: Awareness toward e-bike

E-bikes	Very High Awareness	High Awareness	Neutral	Low Awareness	Very Low Awareness	Weight
	5	4	3	2	1	
Ather	74	45	33	28	-	3.86
Ultraviolette	80	88	12	-	-	4.16
Revolt	69	91	5	15	-	4.09
Hero	65	83	12	20	-	3.98
BSA	98	52	15	-	15	4.95
TVS	55	69	35	21	-	3.88
Bajaj	45	76	26	33	-	3.86
Ampere	50	75	25	-	30	3.13

In table 2 Overall, we can see that of the five level of awareness, Ampererated most highly, with an average weighted score of 5 followed by Hero, Ather, BSA, Bajaj, TVS, Ultraviolette and Revolt.

Table 3: Satisfaction towards factors influencing respondents toward e-bike

Factors	Highly satisfied	Satisfied	Neutral	Dissatisfied	Highly dissatisfied	Weight

	5	4	3	2	1	
Low fuel cost	78	89	13	-	-	5.12
Environmental friendly	120	60	-	-	-	6.89
High performance	89	88	3	-	-	5.02
Less maintenance	150	30	-	-	-	7.01
Easy to operate	78	81	21	-	-	5.12
Cheaper to service	92	85	3	-	-	5.48
Advanced features	35	58	78	9	-	3.94

Table 3, we can see that of the five levels of satisfaction, Less maintenance ranked most highly, with an average weighted score of 7.01 followed by Environmental friendly, Easy to operate, High performance, Cheaper to service, Advanced features and Less maintenance.

Table 4: Overall satisfaction of the respondents towards e-bike

Overall Satisfaction	No of respondents	Percentage
Highly satisfied	80	44
Satisfied	72	40
Neutral	-	-
Dissatisfied	22	12
Highly dissatisfied	6	3

The above table 4 shows that 44% of the respondents are highly satisfied with their e-bike followed by 40% are satisfied, 12% are dissatisfied and 3% of the respondents are highly dissatisfied.

Table 5: Multiple Regressions

Model Summary					
					Change Statistics

Model	R	RSquare	Adjusted RSquare	Std. Error of the Estimate	RSquare Change	FChange	df1	df2	Sig.FChange
1	.613 ^a	.593	.321	1.623	.353	35.129	5	96	.000

In this model, R² of 0.593 implies that the five factors explain about 59% of the variation in purchase intentions of e-vehicles. The other independent variable that has a significant impact on Electric vehicles purchase intention is Personal innovativeness with a significance value of 0.000, which is also less than 0.05. This also is consistent with earlier findings that innovativeness and attitudes regarding the functional performance of EVs significantly affects preferences for EVs.

Table 6: Two Way Anova

Tests of Between-Subjects Effects						
Dependent Variable: ECPI						
Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	
Corrected Model	14.984 ^a	6	3.114	.692	.504	.053
Intercept	1914.101	1	1914.101	395.715	.000	.806
Gender	6.127	1	6.127	1.546	.517	.016
Education	26.102	3	4.417	1.186	.419	.036
Gender*Education	9.511	2	2.156	1.140	.424	.023
Error	521.082	95	2.610			
Total	14514.000	102				
Corrected Total	362.667	101				

a. R Squared = .053 (Adjusted R Squared = .006)

In table 6 shows the significance value of Gender and Education are 0.517 and 0.419 respectively which is greater than 0.05. The aggregate significance value of Gender and Income is 0.424 which is also greater than 0.05. Therefore, gender and education have no significant impact on purchase intention both individually and collectively, as these two variables chosen does not have interactive impact.

Conclusion

E-vehicles are the future of automobile industry. This study brings insight regarding the awareness of electric vehicle brands among users. Very less percentage of users use E-vehicles in India, hence more awareness should be created among the public towards the benefit of using e-bike. Government is taking initiatives to encourage the use of e-vehicles. Proper infrastructure becomes essential for such new initiatives. In country like India which has a huge potential for growth use of e-vehicles would bring a considerable change on the economy. Study found that gender and education have no significant impact on purchase intention both individually and collectively, as these two variables chosen does not have interactive impact and concluded perceived monetary benefits and personnel innovativeness significantly impact the Electric Vehicle engagement.

References

- Ali, I.; Naushad, M. A Study to Investigate What Tempts Consumers to Adopt Electric Vehicles. *World Electr. Veh. J.* 2022, 13, 26.
- Manickam N. (2017). Challenges of Electric Vehicles from Lab to Road. 2017 IEEE Transportation Electrification Conference (ITEC-India)
- B. K. Talukdar & B. C. Deka, “ An approach to reliability, availability and maintainability analysis of a Plus-In Electric Vehicle”, *MDPI World Electric Vehicle Journal* , Vol. 12, No. 34, pp. 1-17, 2021.
- Singh, V.; Vaibhav, S. A review and simple meta-analysis of factors influencing adoption of electric vehicles. *Transp. Res. Part D Transp. Environ.* 2020, 86, 102436
- Hertzke, P.; Müller, N.; Schenk, S.; Wu, T. *The Global Electric-Vehicle Market Is Amped up and on the Rise*; McKinsey & Company: New York, NY, USA, 2018.
- Basha, S. M., & Ramaratnam, M. S. (2017). Construction of an Optimal Portfolio Using Sharpe's Single Index Model: A Study on Nifty Midcap 150 Scripts. *Indian Journal of Research in Capital Markets*, 4(4), 25-41.
- Krishnamoorthy, D. N., & Mahabub Basha, S. (2022). An empirical study on construction portfolio with reference to BSE. *Int J Finance Manage Econ*, 5(1), 110-114.
- Basha, M., Singh, A. P., Rafi, M., Rani, M. I., & Sharma, N. M. (2020). Cointegration and Causal relationship between Pharmaceutical sector and Nifty—An empirical Study. *PalArch's Journal of Archaeology of Egypt/Egyptology*, 17(6), 8835-8842.
- JagadeeshBabu, M. K., SaurabhSrivastava, S. M., & AditiPriya Singh, M. B. S. (2020). INFLUENCE OF SOCIAL MEDIA MARKETING ON BUYING BEHAVIOR OF MILLENNIAL TOWARDS SMART PHONES IN BANGALORE CITY. *PalArch's Journal of Archaeology of Egypt/Egyptology*, 17(9), 4474-4485.
- Agrawal, D. K. (2022). An Empirical Study On Socioeconomic Factors Affecting Producer's Participation In Commodity Markets In India. *Journal of Positive School Psychology*, 2896-2906.
- Shaik, M. B., Kethan, M., Rani, I., Mahesh, U., Harsha, C. S., Navya, M. K., & Sravani, D. (2022). WHICH DETERMINANTS MATTER FOR CAPITAL STRUCTURE? AN EMPIRICAL STUDY ON NBFC'S IN INDIA. *International Journal of Entrepreneurship*, 26, 1-9.
- DrSanthosh Kumar, V., & Basha, S. M. (2022). A study of Emotional Intelligence and Quality of Life among Doctors in PandemicCovid 19. *International Journal of Early Childhood*, 14(02), 2080-2090.
- Dr. Mohammed Khizerulla1 Ms. Aaminah Firdos2 Ms. Saira Banu3 Mr. Mahabub Basha4”A Study on Emotional Intelligence on the Decision Making by the Employees of Financial Institutions in India”, *Journal of Science and Technology*, Vol. 07, Issue 04, June 2022.
- Jin, L.; Searle, S.; Lutsey, N. *Evaluation of State-Level US Electric Vehicle Incentives*; The International Council on Clean Transportation: Washington, DC, USA, 2014.
- Holms, A.; Argueta, R. *A Technical Research Report: The Electric Vehicle*; Argueta–6-7; The University of California Santa Barbara: Santa Barbara, CA, USA, 2010.
- Siddiqui, T.; Naushad, M.; Farooque, M. A study on Islamic finance as an approach for financial inclusion in India. *Accounting 2021*, 7, 487–496.
- Hardman, S.; Jenn, A.; Tal, G.; Axsen, J.; Beard, G.; Daina, N.; Figenbaum, E.; Jakobsson, N.; Jochem, P.; Kinnear, N. A review of consumer preferences of and interactions with electric vehicle charging infrastructure. *Transp. Res. Part D Transp. Environ.* 2018, 62, 508–523.
- Shaik, M. B. ., , M. K., T. Jaggaiah, & Mohammed Khizerulla. (2022). Financial Literacy and Investment Behaviour of IT Professional in India. *East Asian Journal of Multidisciplinary Research*, 1(5), 777–788. <https://doi.org/10.55927/eajmr.v1i5.514>
- Mohammed, B. Z., Kumar, P. M., Thilaga, S., & Basha, M. (2022). An Empirical Study On Customer Experience And Customer Engagement Towards Electric Bikes With Reference To Bangalore City. *Journal of Positive School Psychology*, 4591-4597.
- Globisch, J.; Plötz, P.; Dütschke, E.; Wietschel, M. Consumer preferences for public charging infrastructure for electric vehicles. *Transp. Policy* 2019, 81, 54–63.
- Pierre, M.; Jemelin, C.; Louvet, N. Driving an electric vehicle. A sociological analysis on pioneer users. *Energy Effic.* 2011, 4, 511–522.
- Schuitema, G.; Anable, J.; Skippon, S.; Kinnear, N. The role of instrumental, hedonic and symbolic attributes in the intention to adopt electric vehicles. *Transp. Res. Part A Policy Pract.* 2013, 48, 39–49.
- Lieven, T.; Mühlmeier, S.; Henkel, S.; Waller, J.F. Who will buy electric cars? An empirical study in Germany. *Transp. Res. Part D Transp. Environ.* 2011, 16, 236–243.

- Lane, B.; Potter, S. The adoption of cleaner vehicles in the UK: Exploring the consumer attitude–action gap. *J. Clean. Prod.* 2007, 15, 1085–1092.
- Jui-Che Tu and Chun Yang: Key Factors Influencing Consumers’ Purchase of Electric Vehicles. *Sustainability* 2019, 2-22.
- He, L.; Chen, W.; Conzelmann, G. Impact of Vehicle Usage on Consumer Choice of Hybrid Electric Vehicles. *Transp. Res. Part D* 2012, 17, 208–214
- Murthy, B. S. R., Manyam, K., Sravanth, K., & Ravikumar, M. (2018). Predicting Bankruptcy of Heritage Foods Company by Applying Altman’s Z-Score Model. *INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH IN TECHNOLOGY (IJIRT)*, 4(12).
- Ahmed, B., Rafiuddin, M., & Zamaan, M. B. (2012). Microfinance-financing agriculture, the need for innovations. *EXCEL International Journal of Multidisciplinary Management Studies*, 2(7), 95-107.
- Mohammed, B. Z., Kumar, P. M., Thilaga, S., & Basha, M. (2022). An Empirical Study On Customer Experience And Customer Engagement Towards Electric Bikes With Reference To Bangalore City. *Journal of Positive School Psychology*, 4591-4597.
- Murthy, B. S. R., Manyam, K., & Manjunatha, M. (2018). A Study on Comparative Financial Statement of Hatsun Agro Product Ltd (With Reference Last Five Financial Year 2013 To 2017). *International Journal for Science and Advance Research In Technology JSART*, 4, 2395-1052.
- Murthy, B. S. R., Manyam, K., Sravanth, K., & Ravikumar, M. (2018). Predicting Bankruptcy of Heritage Foods Company by Applying Altman’s Z-Score Model. *INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH IN TECHNOLOGY (IJIRT)*, 4(12).
- Shaik, M. B., Kethan, M., & Jaggaiah, T. (2022). Financial Literacy and Investment Behaviour of IT Professional With Reference To Bangalore City .*Ilomata International Journal of Management*, 3(3), 353-362. <https://doi.org/10.52728/ijim.v3i3.487>
- Basha, S. M., Kethan, M., & Aisha, M. A. A Study on Digital Marketing Tools amongst the Marketing Professionals in Bangalore City.
- Prakash, M., & Manyam, K. (2018). Changing Paradigms of Service Sector Employment in India. *INTERNATIONAL JOURNAL OF BUSINESS, MANAGEMENT AND ALLIED SCIENCES (IJBMAS)*, 5(1).
- Rajasulochana, D., & Khizerulla, M. (2022). Service Quality In SBI: An Assessment Of Customer Satisfaction On E-Banking Services. *Journal of Positive School Psychology*, 4585-4590.
- Durgaraju, R., & Sekhar, S. C. (2021). A Perspective Research Study on the New Age Currency (The Case of Bit coin Currency System). *International Research Journal of Innovations in Engineering and Technology*, 5(2), 16.
- Sekhar, M. S. C., Ashalatha, D., & Gorkhe, M. (2022). Corporate Governance-Impact on Financial Performance of Selected ITCompanies in Bengaluru City. *Journal of Contemporary Issues in Business and Government Vol*, 28(03).
- Sekhar, S. C. (2020). A Study on Effectiveness of Electronic Banking System. *Sanshodhan*, 9, 8-13.
- Sekhar, S. C., & Radha, N. (2019). Impact of globalization on msme: prospects, challenges and policy implementation on economic growth. *International Journal of Trend in Scientific Research and Development*, 3(6), 536-541.
- Rana, S. (2022). Consumer Awareness And Perception Towards Green Marketing: An Empirical Study In Bangalore City. *Journal of Positive School Psychology* <http://journalppw.com>, 6(5), 4240-4245.
- KHIZERULLA, M., & RAO, T. N. Multiculturalism in Workplace. *International Journal of In and Applied Resea*, 85.