



CONSUMER BUYING BEHAVIOUR TOWARDS ELECTRIC CARS

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ABSTRACT

Electric vehicle are vehicles that are either partially or fully powered on electric power. Electric vehicles have low running costs as they have fewer moving parts for maintaining and also very environmentally friendly as they use little or no fossil fuels (petrol or diesel). The objectives of paper to determine consumers perception and expectation towards electric cars in India cities. The research was carried with survey approach and 422 samples of data collected in the month of Jan-Mar, 2022 with Non-Probability Sampling Method. Further by statistical tools, Smart PLS and SPSS it is found that the people have perception of set of drawbacks challenges in quality and also impact of advertisement, which talks about benefits of EV.

The Drawbacks are time to charge battery, a smaller number of models, unavailability of charging station and distance travel for one full charge. The Quality towards battery backup charging duration, speed & pickup of vehicle. While the Benefits spoken are environment friendly less maintenance and easy driving.

Keywords: EV, EV quality, Consumer perception, consumer expectations, EV drawbacks

INTRODUCTION

An EV is a shortened acronym for an electric vehicle. EVs are vehicles that are either partially or fully powered on electric power. Electric vehicles have low running costs as they have fewer moving parts for maintaining and also very environmentally friendly as they use little or no fossil fuels (petrol or diesel). The emergence of metal-oxide-semiconductor (MOS) technology led to the development of modern electric road-vehicles. The MOSFET (MOS field-effect transistor, or MOS transistor), invented in 1959, led to the development of the power MOSFET by Hitachi in 1969, and the single-chip microprocessor in 1971. MOSFET power converters allowed operation at much higher switching frequencies, made it easier to drive, reduced power losses, and significantly reduced prices, while single-chip microcontrollers could manage all aspects of the drive control and had the capacity for battery management. Another important technology that enabled modern highway-capable electric cars is the lithium-ion battery, invented by John Goodenough, Rachid Yazami and Akira Yoshino in the 1980s, which enabled the development of electric cars capable of long-distance travel.

Higher Efficiency

Electric cars have higher energy efficiency than fossil-fuel-burning models. A vehicle's energy efficiency is the amount of energy it gets from a fuel source. Battery-powered electric vehicles are known to benefit from an energy efficiency of up to 62 percent, which simply means that a high amount of electric energy is converted into the power source of the vehicle. In comparison, fossil fuel- powered vehicles do not have an energy efficiency of more than 21 percent.

Zero tailpipe emissions

One of the biggest advantages of electric cars is zero tailpipe emissions. This is a huge advantage as EVs lead to a sizeable cut in vehicular pollution. However, it's worth mentioning here that before one calculates the pollution a car causes, it's essential to know the source of electricity that was used for charging the batteries. An electric car battery charged through electricity produced in a thermal plant pretty much defeats the purpose of the EV.

High performance and low maintenance

A characteristic of electric cars is that they produce the maximum torque right from the word go. What this means is that the driver benefits from a strong surge of pulling power as soon as he steps on the gas. This makes the EVs a lot of fun as they offer their users with a very strong acceleration as compared to an ICE- powered vehicle of a similar category. Electric cars are also quite easier to maintain as they have less number of moving parts. However, this also depends on the market where a particular EV is sold. In the scenario, EVs have just started getting noticed, and as technology would get cheaper only with increased adoption, maintaining an EV could even turn out to be slightly more expensive than a regular car.

Electric Cars Travel Less Distance

Most petrol and diesel cars on sale in the country offer a driving range of anywhere between 500-700 km on a full tank. On the other hand, even the best of electric cars sold in India won't clock more than 400 km on a single charge. What makes it even worse is the range anxiety. With a really limited number of charging stations available in India, the drivers of electric cars subconsciously stay anxious about running out of battery power without a charging station in sight. Hence, electric cars are less suitable for long road trips.

Electric cars take longer to "refuel"

It doesn't take any more than a couple of minutes to completely fill the fuel tank of petrol or a diesel vehicle. On the other hand, even with the availability of fast chargers, it takes at least 30 minutes to achieve an 80 percent charge. Charging through a standard charger can take up to 8 hours to completely replenish the battery. Now, this is something that comes across as a major limiting factor for electric cars. All owners will not only have to install an electric charger at home but even carry a fast charger along on longer trips to ensure quick charging in case the battery runs dry.

Electric cars are more expensive

Currently, the battery packs are among the most expensive parts of any electric car. While battery technology has come a long way in the last few years, and it's predicted that these batteries will cost a lot lesser in the future, in the current scenario, the electric version of any car costs a lot more than the regular ICE- powered version. This has turned out to be a major discouragement for many who wish to purchase an EV but are put off by the high purchase price. Thankfully, the governments of various states are realizing the advantages of having electric cars on the roads and are hence providing subsidies to make them more interest

propositions. However, even after accounting for the subsidies, the EVs end being a pretty expensive proposition.

OBJECTIVES FOR STUDY

- To determine consumers perception and expectation towards electric cars in India
- To study the willingness of consumers to purchase electric cars

LITERATURE REVIEW

Omkar, Shweta and Arloph (2020) in their study we found that consumers are willing to consider EVs as their future purchase option, if proper infrastructure is available and limitation in boosting consumer confidence to purchase EV are Initial cost of purchase, a smaller number of charging stations and the time required to recharge the battery.

BoqiangLin WeiWu (2020) in their study we found that attitude factors such as, price acceptability, government subsidies, vehicle performance, environmental concerns, and demographic characteristics such as gender, age and marital status have significant impact on respondents' willingness to purchase electric vehicles. **Nanthi Suthikarnnarunai (2019)** in this study we found that key factors influencing consumer's purchase intention are Finance factors, Technological factors, Infrastructure factors and Policy Mechanism factors.

Manar Ramadan (2019) in this study we found environmental concerns, subjective norms, cognitive status, incentive policies, and product perception all have significant positive effects on consumers' intentions to purchase EVs **Maqsood H. Shaikh, Aijaz A. Sharma, Ravishankar (2020)** in this study we found that the significant effects of the theory-of-planned-behavior variables and environmental concern on EV technology purchase intention.

The present study provides theoretical contributions and policy guidelines concerning (high vs. low)-sensitivity consumer attitudes toward EV technology that marketers and automobile manufacturers can make use of when designing and strategizing their pricing strategies.

Jason Wai Chow Lee, Yet Mee Lim (2020) in this study we found that attitude towards advertising moderated the relationship between environmental knowledge and electric vehicles purchase intention. In addition, female consumers were found to have higher electric vehicle purchase intention than male consumers.

Laxmi Prasad Ghimire, Prakash Aryal (2021)

The lack of charging stations, relatively higher purchase price of EVs and poor long-term planning and goal setting were ranked as the top three barriers against EV.

RESEARCH METHODOLOGY

Title: Consumer buying behaviour towards electric cars

RESEARCH OBJECTIVE

- To determine consumers perception and expectation towards electric cars in Hubli - Dharwad
- To study the willingness of consumers to purchase electric cars

Research Approach: Survey method

Type of Research: Descriptive

Data Collection Approach

- a) Primary Data: Collecting through prospective customers
- b) Secondary Data: Secondary data was collected with the help of various online websites.

Sampling Method: Non-Probability Sampling Method, Convenience Sampling

Location: Hubli-Dharwad

Sample size: 422

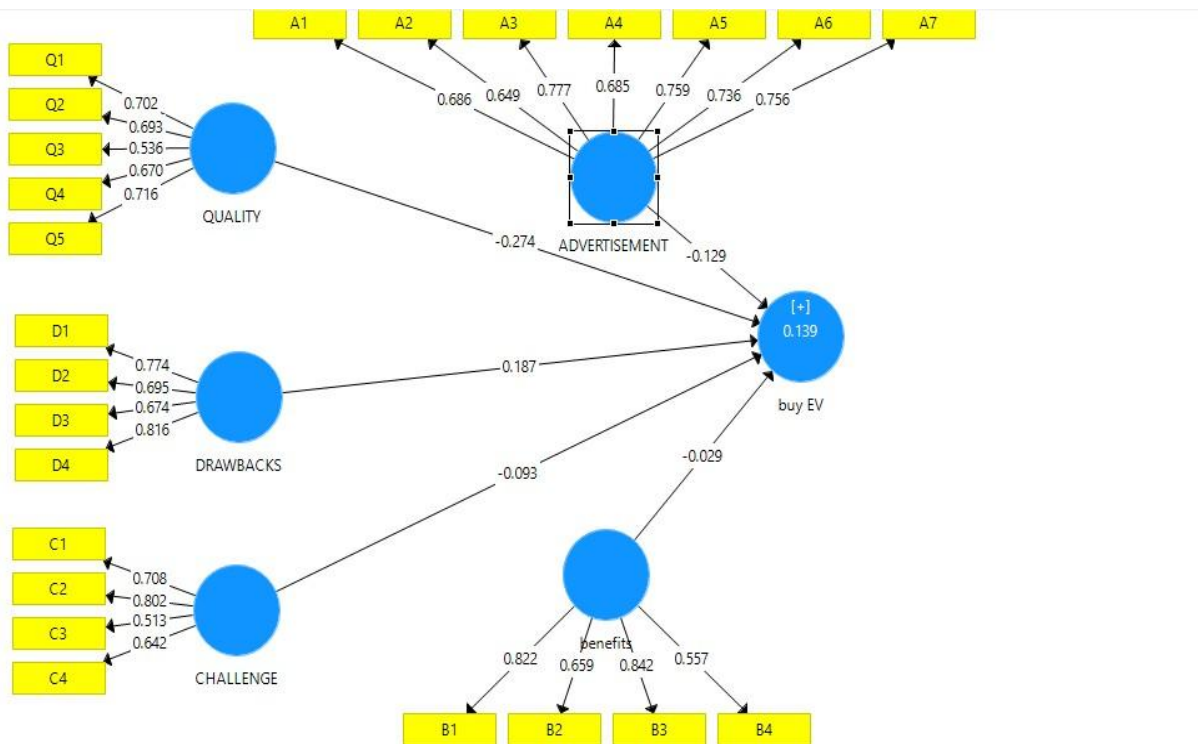
Analytical tools: Smart PLS and SPSS

DATA ANALYSIS

		Frequency	Percent
Age Group	Less than 25	208	49.4
	26-35	133	31.6
	36-45	66	15.7
	46-55	14	3.3
	Total	421	100.0
Gender Group	Male	233	55.3
	Female	188	44.7
	Total	421	100.0
Year Income	Below 3 Lakhs	135	32.1
	3 - 5 Lakhs	219	52.0
	5-10 Lakhs	67	15.9
	Total	421	100.0
Future plan to buy a EV car	Yes	338	80.3
	No	83	19.7
	Total	421	100.0

Interpretation

The demographic profile of table reveals that respondents are from all age groups, hence sample is equally proportional and normal in nature, The sample is equally distributed by male and female samples. We can also observe that respondents of all income levels and they are normally distributed. We have the sample with future EV car plan of about 80%. So, in total the sampling is normal and good data for further data analysis.



People who buy EV cars are about 13.9% (r^2 value), The influence factors are: drawbacks by 18.7%, challenges by -0.93% , quality by -27.4% , advertisement by -1.29% benefits by -0.29% .

1. Drawbacks: Among the drawbacks D1 indicates time to charge battery and it is contributing 77.4%, D2 indicates less number of models and it is contributing 69.5%, D3 indicates unavailability of charging station and it is contributing 67.4%, D4 indicates distance travel for one full charge and it is contributing 81.6%.

2. Challenges: In the challenges C1 indicates Limited driving range and it is contributing 70.8%, C2 indicates High cost and it is contributing 80.2%, C3 indicates lack of service option and it is contributing 51.3%, C4 indicates battery issues and it is contributing 64.2%.

3. Quality: In the quality Q1 indicates model and it is contributing 70.2%, Q2 indicates battery backup and it is contributing 69.3%, Q3 indicates battery charging duration and it is contributing 53.6%, Q4 indicates speed of vehicle and it is contributing 67%, Q5 indicates pickup and it is contributing 71.6%.

4. Advertisement: In the advertisement A1 indicates television and it is contributing 68.6%, A2 indicates newspapers and it is contributing 64.9%, A3 indicates magazines and it is contributing 77.7%, A4 indicates print ads and it is contributing 68.5%, A5 indicates Facebook and it is contributing 75.9%, A6 indicates Instagram and its contributing 73.6%, A7 indicates twitter and it is contributing 75.6%.

5. Benefits: In the benefits B1 indicates environment friendly and it is contributing 82.2%, B2 indicates high performance and it is contributing 65.9%, B3 indicates less maintenance and it is contributing 84.2%, B4 indicates easy driving and it is contributing 55.7%.

Construct Reliability and Validity

Matrix	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
	Cronbach's Al...	rho_A	Composite Rel...	Average Varian...
ADVERTISEMENT	0.855	0.881	0.884	0.522
CHALLENGE	0.614	0.656	0.765	0.455
DRAWBACKS	0.732	0.745	0.830	0.551
QUALITY	0.704	0.709	0.798	0.444
benefits	0.729	0.799	0.816	0.533
buy EV	1.000	1.000	1.000	1.000

The model is fit with respect to Cronbach's Alpha values which is greater than 0.7 except challenge and quality (0,614) which can be ignored through aggregation.

Rotated Component Matrix

	Component	
	1	2
Model	.780	.320
Battery Backup	.131	.814
Battery charging duration	.741	
Speed of Vehicle	.243	.881
Pick up	.752	.167

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

- a. Rotation converged in 3 iterations.

From above analysis which is done using extraction method with respected to quality of EV cars we find that majority of the people likes Model which is 0.780 and followed by Pick up which is 0.881.

Component Matrix

	Component
	1
Time to charge battery	.757
Less number of models	.735
Unavailability of charging stations	.752
Distance travel for one full charge	.777

Extraction Method: Principal Component Analysis.

- a. 1 components extracted.

From the above analysis to understand the drawbacks of EV cars, it is found that majority of the people feel Distance travel for one full charge (0.777) followed by Time to charge battery which is 0.757.

Component Matrix

	Component
	1
Limited driving range	.783
High cost	.649
Lack of service options	.730
Battery issues	.709

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

With respect to Challenges to purchase an EV cars, we have component matrix table, which reveals that majority of the people feel: Limited driving range (0.783) followed by Lack of service options (0.730) are the major challenges.

Component Matrix

	Component
	1
Television	.763
Newspapers	.697
Magazines	.826
Print Ads	.802

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

Influence of advertisement to buy an EV car are from Magazines (0.826) followed by Print Ads(0.802).

Component Matrix

	Component
	1
Facebook	.826
Instagram	.731
Twitter	.757

Extraction Method: Principal Component Analysis.

a. 1 components extracted.

The influencing of social media to buy an EV car majorly because of Facebook (0.826) followed by Twitter (0.731).

FINDINGS**The Drawbacks**

Social media will influence the buyer with benefits of having EV, though the drawbacks are time to charge battery, a smaller number of models, unavailability of charging station and distance travel for one full charge.

The Quality aspects are expected towards battery backup, quick battery charging, pickup & speed of vehicle. It is proven to be less maintenance, which is the benefit of owning an electric car

The research indicating more than 80% of the sample is planning to buy an electric car in the near future.

SUGGESTIONS

1. There is huge potential market for electric cars in India.
2. Companies can promote their product via magazines and social media, especially Facebook as an advertisement strategy to promote their electric cars
3. Companies should attempt R & D, to increase the battery capacity for more distance coverage for one full charge and battery charging duration

CONCLUSION

We can conclude that the significant more preference of an E-vehicle is visible. Overall, we can say that consumers may prefer other than E-vehicle in future, provided government and/or manufacturers join hands to build cut cost and price of the vehicle and increase the distance travel for one full charge. Advertisements will play a role through magazines and Facebook which may influences to buy an electric car and but yes company has to focus on the development of batteries with higher capacities.

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