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Impact Of Rising Fuel Prices on EV Sales in India

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Abstract - There is rising levels of air pollution all over the world and especially India has 6 cities in 10 most polluted cities in the world (1). The Indian government has expanded the market for Electric-Vehicles by bringing in schemes like FAME (Faster Adoption and Manufacture of Electric (Hybrid) Vehicle As per FAME -22 Scheme both direct subsidy to Electric two wheel purchases and battery charging is provided. Added to it the rising Fuel prices has further pushed the world towards a faster EV adaptation. The Russia-Ukraine war, COVID-19 & cartelization by OPEC countries were some of the concerns too. India suffers from a huge current account deficit which is majorly contributed by the Import bills of crude oil. (25% of India's import is of crude oil costing about US$ 119billion and India's CAD for current year is $13.4 Billion). To avoid this problem of dependence on crude oil, the Government of India is pushing for a faster EV adoption using schemes like FAME-II. With rising demand for EVs, Automobile sector in India is now focusing more on EV production. In this paper the area of focus will be towards the rise in EV sales in India with respect to rise in Fuel prices year on year. This paper looks into the relationship between fuel prices and Auto sales and using innovative Fibonacci series make sales growth forecast for Electric 2 wheelers.

Index Terms - About four, placed in alphabetical order, key words or phrases that are separated by commas (e.g., Camera-ready, FIE format, Preparation of papers, Two-column format). Italic for the label "Index Terms"; otherwise, regular font.
Key words: Automobile sector, FAME, OPEC, Import bills, Current account deficit

I. INTRODUCTION

India imported $119bn worth of crude oil in (2021-2022) and is the third largest importer of crude oil in the world after USA & China. Domestic production of crude oil in India is about 28 MT (against our requirement of about 300 MT per year). India imports almost 85.5% (2021-2022) of its crude oil from other -the top 3 are Iraq, Saudi Arabia, UAE. Present days more and more crude is imported from Russia. In India, about 55% of retail costs of Petrol and diesel are taxes levied by both State and Central Governments. The Government also saw this problem as an opportunity and introduced subsidies on EVs through the FAME scheme. But there also problems plaguing the EV industry such as

- Semiconductor Chip Shortage, Due to the global chip shortage, the supply chains for producing automobiles have been highly affected. Not only EVs, the entire Automotive Industry is reeling under this distress. This is impacting the delivery time for automobiles. Although it's resolved for time being, future risks persist.
- Battery Range Issues, this is one of the main problems still why many people shy away from buying an EV. The battery requires over 5 hours of charging and there are lesser Battery charging points. Solutions like battery swapping still need to be standardized.

II. LITERATURE REVIEW

Sanjana. Opined that in view of pollution levels, Electric vehicles are inevitable. (2). James B. Bushnell, concluded from his studies spatially disaggregated data sets of new EV registrations in California, that gasoline prices have far more impact on demand for EV's rather than the Electricity prices (3). MARIANNE KAH observed that while passenger vehicles constitute merely one fourth of total gasoline demand, they receive more attention from Government and Press. Although the demand for oil with rise in EV's would reduce, not all forecasters have consistent view on the extent of reduction (4). Maksim Belenkiy describes an export model wherein consumers can differentiate different automobiles by the distance they can travel per dollar of fuel, and showed that overall demand for vehicles falls as crude oil prices rise (5). Mandar Patil et al worked out that in Mumbai roads TCO of Electric vehicles (in comparison with petrol, Diesel and CNG) are cheapest @ Rs.11.37. (6). Ushma Ghosh, based on analysts consensus, projects that soaring oil price would reduce oil imports by Rs.1 Lakh crore and increase sales of EV's(7) Vaibhav Pratap Singh et al, envisages by 2030, to realize Government of India Nitiayog ambitions, 102 million units of EV sales and 158 GWh of Battery capacity and over 29 lakhs of public chargers (8). India's present production capacity of 2 wheelers (including Electric) is 21.03 million unit (9).

III. OBJECTIVES

- To study the impact of fuel prices on the Electric Vehicle market in India.
- To study the government norms and policies with respect to the EV industry.

IV. RESEARCH METHODOLOGY

- Secondary Data
- Sources of Data

V. LIMITATIONS OF THE STUDY

The study is focused on the Indian market only

- The data gathered from secondary sources.
- The study period is short.

VI. DATA ANALYSIS & INTERPRETATION

- Crude Oil

International crude oil prices are both unstable and continuously increasing. They also vary from region to region as seen in Table – 1. Table 2 shows that consistently the growth rates of EV 2 wheelers had outpaced their fuel based counterparts.Figure 1 shows that over 2 year period petrol price has nearly doubled, thus increasing the total ownership costs for fuel driven vehicles.

Table 1 - Price of petrol in India as on 31st July 2022 are as follows:

City	Today price	Yesterday price
New Delhi	₹ 96.72	₹ 96.72
Kolkata	₹ 106.03	₹ 106.03
Mumbai	₹ 106.31	₹ 106.31
Chennai	₹ 102.63	₹ 102.63
Noida	₹ 96.76	₹ 96.76
Bangalore	₹ 101.94	₹ 101.94
Hyderabad	₹ 109.66	₹ 109.66
Bhubaneswar	₹ 103.19	₹ 103.01
Jaipur	₹ 108.08	₹ 108.62
Lucknow	₹ 96.48	₹ 96.57

Table 2 - The sales of two wheelers and average petrol price in India:

Sl. No	Year	Sales of two wheelers	Sales of EV two wheelers	Petrol Price (Average)
1	2015	15980000	20000	60
2	2016	16460000	23000	65
3	2017	17590000	54800	66
4	2018	20200000	69012	75
5	2019	21180000	152000	72
6	2020	17420000	167000	85
7	2021	15120000	137000	105
8	2022	-	-	110

DATA SOURCE: Statista, FADA, SIAM, IOCL

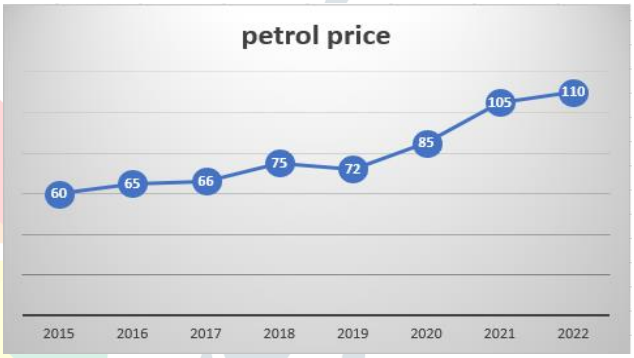

Table 3 - Correlation between Sales of 2 wheelers and Petrol Price

CORRELATION BETWEEN EV SALES & PETROL PRICES		
	SALES OF EV TWO WHEELERS	PETROL PRICE
SALES OF EV TWO WHEELERS	1	-
PETROL PRICE	0.706758827	1

Computing Source: Correlation found using MS-Excel.
Table – 3 shows a strong correlation between petrol prices and EV sales (0.76)

VII. FAME-Scheme:

Faster Adoption and Manufacturing of Hybrid and Electric Vehicles was launched by the Ministry of Heavy Industries & Public Enterprise to give a boost to development of Electric vehicles.

- FAME India is a part of the National Electric Mobility Mission Plan.
- Subsidy can be claimed by 2-wheelers,3-wheelers, Electric and Hybrid cars and Electric Buses under the scheme.

It is being implemented in 3 ways:

- By Establishing Charging Stations
- By Incentivizing buyers
- By publicizing benefits of Electric Vehicles

Due to this Demand for petrol and diesel is expected to reduce, creation of new jobs in the automobile sector, reduction in pollution-induced health problems.

FAME-India Scheme Phase-I:

Under Phase-I of FAME-India scheme, the Government has supported about 500 charging stations to establish electric vehicle charging stations in the country. Out of about 500 charging stations sanctioned under phase-I of FAME-India scheme about 230 charging stations have been installed. Further, Energy Efficiency Services Limited (EESL) under the Ministry of Power has deployed 65 public charging stations for EVs in the country.

Under phase 2 of FAME as on 09 Aug 2021, Government has targeted to subsidize another 10 lakhs 2-wheel e vehicles Apart from increasing the subsidy from Rs10,000 to Rs. 15,000 per kwh. All these means more impetus to EV sales.

Analysis of future projections of EV sales:

Normally any newer technology follows typical "S" curve growth pattern, which has either linear or near static phase followed by sharp exponential phase and tapering off before decline. Positives which encourage EV growth are Government subsidy under fame 1 and 2, which constitutes about 10% of vehicle cost, rising fuel prices, and all-round favorable ecosystem which has many manufacturers, setting up of charging points and innovations in battery technologies as quick charging, longer mileage etc. Negatives could be due to battery safety issues or other unforeseeable problems as long-term effects are revealed only after a long period of use.

Projections of future growth are calculated on the basis of 20%,80% and 168% CAGR Fibonacci series and S curve on piece wise linearity. The limitations of all these models is that they cannot capture the peak and so later years data may be overestimated. Fibonacci series which predicts the natural un hindered growth, predicts sales of 15 million EV 2 wheelers which amounts to approx. 80% CAGR. And obviously sales of EV can come only at the cost of sales of fuel-based vehicles. Hence by 2030, we can expect EV 's to constitute 75% of total 2 wheelers.

VIII. CONCLUSION

- The sales of EV two wheelers is increasing continuously from 2015 to 2021.By Fibonacci and S curve analysis, CAGR
- The sales of conventional fuel driventwo wheelers is decreasing from 2019 comparatively.
- The petrol prices is increasing continuously over the taken period and the correlation between time and petrol price is positive is around 0.7. This could furthur propel the EV sales.

Scope for future work: This study just looks into electric 2 wheeler EV sales. Perhaps, 3 wheelers, public transport buses and personal cars can also be studied.

0.14	2021	0.14	0.14	0.14
0.14	2022	0.168	0.252	0.3752
0.2352	2023	0.2016	0.4536	1.005536
0.5152	2024	0.24192	0.81648	2.694836
1.0304	2025	0.290304	1.469664	7.222162
1.9208	2026	0.348365	2.645395	19.35539
3.8416	2027	0.418038	4.761711	51.87245
7.6832	2028	0.501645	8.57108	139.0182
15.3664	2029	0.601974	15.42794	372.5687
30.7328	2030	0.722369	27.7703	998.4842
61.4656	2031	0.866843	49.98654	2675.938
Fibonacci		20%	80%	168%

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