

Critical Issues, Opportunities and Experiments in Sustainable Development of Society, Industrial Development, Material, Energy and Environment

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CONTENTS

Sr. No.	Paper Title	Page No.
1	Sericulture as a Livelihood Option in Raigarh, Chhattisgarh Vinod EKKA, Dr. Pratima BAIS	1-7
2	Electric Vehicles for Sustainable Future Dr. R. D. Jeur ,Mr. Ashish Bhasme	8-11
3	Information Scientists, Bibliometrician & Ocumentalist Of Library And Information Science Dr. Sapnarani Shrawan Ramteke	12-13
4	New Trends and Policies in Library and Information Science Dr. Pramod Narayan Alone	14-17
5	Atmanirbhar Bharat: A Way Forward through Sustainable Education and Employment Dr. Ambili Madhu Thampi	18-21
6	A Review: Sustainable development of Biodegradable Polymer Material Dr. Mangesh B. Thakre, Dr. R. P. Chopde	22-27
7	Change In Properties Of Magnesium Oxychloride By Incorporating Wood Dust As An Additive Dr. Meenakshi	28-32
8	Discrimination Against Female Employees In Workplace: A Study Of Women Discrimination In Auto Industry Outlets With Reference To Madikeri Taluk Amrutha M , Divya N T, Gunashree C G	33-38
9	Complete Information of ISBN, ISSN & CCE Dr. Rishi S. Gajbhiye	39-41
10	Internet Uses By Graduate Students Vinaya Keshav Kamble , Dr. Lata.S.Patil	42-44
11	An Introduction To Environmental Chemistry And Green Chemistry And The Difference Between Green Chemistry And Environmental Chemistry Abhishek Kumar, Somesh Shukla Aditi, Chaudhary	45-51

Electric Vehicles for Sustainable Future

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Abstract

Indian transport sector is one of the largest oil consumers. Conventional fuel vehicles consume fossil fuels and produce toxic greenhouse gases which lead to long term adverse effect on human health and our environment. Many states in India are more polluted, specifically air polluted while India is the 5th most polluted country in the World. But now consumers in worldwide are preferring electric vehicles. Electric vehicles are a better option for this because they are non-polluting and have a consistent linear performance. According to European Energy Agency research, driving an electric car emits 17-30% fewer carbon emissions than driving a gasoline or diesel vehicle. In India, people consider energy savings as the primary reason for switching to an electric vehicle. In this paper researchers initially tried to show that, how electric vehicles are demanded. Then state-wise demand, vehicle categories- demand and other sales related data. In India, in connection to encouraging people to use and buy electric vehicles governments are investing in e-vehicles related infrastructure also. Research and development sector also working more actively in this field. At the end, researcher tried to show the relationship between electric vehicles and sustainable future with its advantages.

Introduction:

Pollution has become a key concern in the World. Especially, air pollution is a foremost issue of many countries in the World. Mainly urban areas or cities are more affected by the air pollution. When we talk about India, NDTV highlights IQAir's World Air Quality Report, 2021¹ where this report says that 10 Indian cities are include in top15 most polluted places in the world.

There are various reasons of air pollution and transportation is one of the major reasons. Petrol and Diesel engine vehicles produce CO₂ which contaminate air and affect our environment. A report of Center for Science and Environment (cseindia)² says that, Indian transport sector is largest oil consumer. According to Asian Development Bank total fuel consumption of on-road vehicles in India increased 6 times in 2015 than 2005. It shows that use of oil or fuel in India is increasing massively. Following table shows that, as per the IQAir report- 2021 top most polluted countries in the world in 2021.

Table No. 1: Most Polluted Countries in the World- 2021

Rank	Country Name	Rank	Country Name
1	Bangladesh	2	Chad
3	Pakistan	4	Tajikistan
5	India	6	Oman
7	Kyrgyzstan	8	Bahrain
9	Iraq	10	Nepal

Source: www.iqair.com

The above table indicates that, in the list of top polluted countries in the world majority are Asian countries and important part for us is that our country, which stands on 5th rank in the world. This reality demonstrates that we Indians must think seriously and take proper strategic steps towards control on pollution.

Table No. 2: Most Polluted Cities in India- 2021

Rank	City Name	State
1	Bhiwadi	Rajasthan
2	Ghaziabad	Uttar Pradesh
3	Delhi	Delhi NCR
4	Jaunpur	Uttar Pradesh
5	Noida	Uttar Pradesh
6	Baghpat	Uttar Pradesh
7	Hisar	Haryana
8	Faridabad	Haryana

¹ www.iqair.com/world-air-quality-report

² www.cseindia.org

Source:

www.hindustantimes.com

The above table shows eight most polluted cities in India. Out of eight cities, four belong to Uttar Pradesh. So, we can say that, Uttar Pradesh is most polluted state in the country. Even in every winter season Delhi also faces the problem of Smog which is nothing but effect of air pollution.

Conventional Fuel Vehicles and their sales:

Burning oil (fuel) being used in transportation produces various toxic gases like, Carbon Dioxide (CO₂), Carbon Monoxide (CO), Nitrogen Oxides (NO_x), Hydrofluorocarbon (HFCs), Sulfur Dioxide (SO₂) and other Green House Gases etc³. which are harmful to the human health and our environment. Financial express provides data of WHO, which states that, polluted air kills around 7 million lives in the world every year, where India alone accounting more than one million deaths. Also, it adds, as many as, 14 of 20 most polluted cities in the world, 14 are in India.⁴ While Center for Science and Environment (cseindia) report also adds that, overall transportation sector in India accounted 15% emission of CO₂ and this emission is increasing with fastest rate at more than 6% per annum. Further this report says use of public transport in India may drop/reduce it from 75.7% in 2001-02 to 44.7% in 2030-31. So, use of private vehicles for transportation purpose will create more carbon in air.

Table No. 3: Sale of Automobiles in India⁵

Year	Unit sale (in No.)	Growth rate (%)
2015-16	2,04,68,971	-
2016-17	2,18,63,281	6.38
2017-18	2,49,81,312	14.26
2018-19	2,62,66,179	5.14
2019-20	2,15,45,551	-17.97
2020-21	1,86,15,588	-13.60

Source: SIAM, siam.in/statistics.aspx

The table no. 3 shows that, sales of automobiles in India (fuel vehicles) from 2015-16 to 2020-21. Sale in 2019-20 and 2020-21 is affected by COVID- 19 so, in these years growth rates is in negative. Also, in these two years sales of electric

vehicles increased in all categories. It means customers are preferring electric vehicles too.

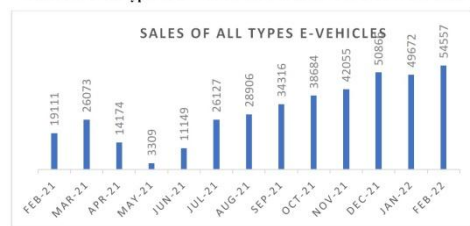
Impact of Air Pollution:

Air Pollution makes negative or adverse effect on human health. It increases the risk of respiratory infections, lung cancer, heart diseases, irritation of the eyes, nose and throat, coughing, chest tightness etc. affected by the air pollution. Acid rain, Eutrophication, Haze, effect of wildlife, Ozone depletion, Crop and forest damage, Global climate changes are the other major effects of air pollution on environment. So, it is clear that polluted air can affect human resources as well as environment too.⁶

Electric Vehicles and their sales-

In the modern time electric engines are using in almost all types of vehicles but the growth of these engines can be traced back to the 17th century (P. Rajiv, 2018)⁷. Our modern world realized the importance of electrical engines in all ways of the life to minimize the effect of other modes of transports to the environmental degradation.

Chart No. 1: All types of E-Vehicles Sales in India- Feb 2021 to Feb 2022



Source: JMK Research & Analytics Report- 2021 and 2022

Electric two-wheelers are more attracting and preferred by modern consumers. More research and development in sports and ultra-modern bikes is trying to target young generation. These electric vehicles are helpful to solve some environmental problems and now they are competing to conventional fuel engine vehicles. Chart no. 1 shows that sales of all types of electric vehicles in India from February 2021 to February 2022. Due to second wave of COVID-19 again affected sales in April, May and June 2021. But if we see average monthly growth rate of last nine months (June 2021 to February 2022) it is 21.8%. Growth rate or monthly sales shows that, customers are preferring electric vehicles in good amount.

³ www.epa.gov.in

⁴ www.financialexpress.com

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<https://www.siam.in/statistics.aspx?mpgid=8&pgidtra il=14>

⁶ Department of Environmental Protection, one winter street Boston, MA 02108.

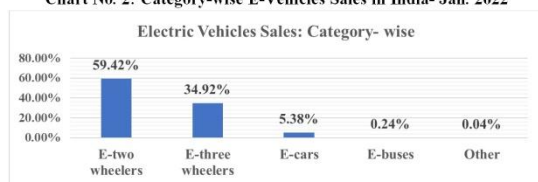
⁷ A Study on the consumer perception towards electric Bike at Vellore district in Tamil Nadu- Rajiv P. (2018)

Table No. 3: Region-wise Registered E-Vehicle Sales in Top 5 State/UTs - Jan. 2022

Sr. No.	State/UT	%
1	Uttar Pradesh	16%
2	Maharashtra	15%
3	Karnataka	11%
4	Tamil Nadu	9%
5	Delhi	8%

Source: JMK Research & Analytics Report- 2022
Table no. 3 shows that, registered electric vehicle sales in top five states and union territories. Uttar Pradesh stands on first rank. These five regions are covered almost 60% of e-vehicles sales in India.

Chart No. 2: Category-wise E-Vehicles Sales in India- Jan. 2022



Source: JMK Research & Analytics Report- 2022

Chart no. 2 shows that, category wise electric vehicle sales in India in January 2022. This chart clearly shows that, out of all types of EV sales most preferable are E-two wheelers. Then e-three wheelers are demanded by the people. That is also confirmed by CNBC TV18⁸. But E-cars are not much popular yet because, there are very less seller of e-cars, less infrastructure, range issue etc.

Relationship between Electric Vehicles and Sustainable Future:

E-vehicles use the energy received from the rechargeable battery which is cheaper than filling petrol and diesel. If we use renewable energy source to charge those batteries then the use of these vehicles will be more eco-friendly. Renewable energy source like solar energy can at least provide good amount of electricity in summer and winter seasons. These electric vehicles don't have more moving parts and they need less servicing requirements than combustion vehicles. So, electric vehicles have lower maintenance cost, which save resources of the World. Our planet having limited fossil fuel stock

and those fuels produce toxic Green House Gases (GHG) which led to long term, adverse effect on human health and our environment. The emission impact of electric vehicles is much lower than petrol or diesel vehicles. Fully electric vehicle does not produce any carbon, but when we talk about electricity production then petrol and diesel vehicles emit almost 3 times more carbon dioxide than the average e-vehicle⁹. With control of air pollution, electric vehicles do not produce noise too. No engines in electric vehicles so they have silent functioning capability and that's why electric vehicles do not create noise pollution.

Conclusion:

The primary advantage of an electric vehicle is its environmental friendliness as compared to gasoline or petrol and diesel-powered vehicles. They are helpful to control air and noise pollution in better extent which has become a serious problem at world level. EVs are easier to operate, you can install EV charging units in our house, porch or in parking place instead of going to a gas/petrol station. EVs surely contribute to achieve the goal of sustainable development or green development. Electric vehicles are also much quieter, and their mileage is now significantly improved with the recent developments in the EV industry, particularly while driving at low speeds in cities and densely populated areas. Government is also creating awareness and encouraging people to purchase electric vehicles. It gives tax benefits and subsidies on purchase of electric vehicles. So, we need to shift from conventional fuel vehicles to modern electrical vehicles. as alternative source of transportation at individual and public level. There are some factors affect to use of electric vehicles, like still infrastructure for electric vehicles (recharge points and longer recharge time etc.) is in development stage, people use conventional electricity for charge their vehicles, compared to fuel vehicles these electric vehicles have low speed so people use them for short distance travel, sometime no noise becomes a reason for accidents etc. However, modern technology and growing research towards embarking upon these shortcomings will unquestionably boost this industry with the positive support of union and state governments

⁸ www.cnbctv18.com (30 July 2020) & www.thequint.com

⁹ https://e-amrit.niti.gov.in/benefits-of-electric-vehicles

and play significant role to achieve millennium goals of sustainable development.

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