INNOVATION IS A BOON TO THE AUTOMOBILE INDUSTRY (WITH SPECIAL REFERENCE TO TESLA)

DR. (MRS.) GEETHA SIVARAMAN
Associate Professor,
M.U.College of Commerce,
Pimpri, Pune-411 017

ABSTRACT
The Pollution causes damage to the environment. Air pollution affects the life span of the living beings. The Government has imposed restrictions through various acts to control the pollution. There is continuous innovation in the car industry around the globe. Electric car is free from pollution, Tesla is an excellent example.

The secondary data has been collected and analysed to find out production and sales trend. Case study method has been followed. It reveals that there is a good sales turnover and 98% of produced electric passenger cars are sold. People started recognizing slowly the importance of environmentally friendly electric passenger vehicles.

The various models with different comforts should be available to the various income groups of customers to match their emotional and rational buying motives. The availability of battery charging stations will facilitate efficient performance of the passenger vehicles.

Key words: Tesla, Battery car, Automobile, Pollution, Manufacturing, Production, Sales.

Introduction
There are continuous innovations in Models and Engineering in the Automobile Industry. The introduction of Electric Cars is the revolutionary step to overcome the polluted environment.

Tesla Motors is a Benchmark to other battery cars manufactured by other companies, introduced few models to cater to the needs of the various groups of customers. There is a slow and steady response from the prospective customers as the current scenario demand for pollution free vehicles. The Passenger car manufacturers have introduced innumerable models out of which this battery car is an excellent model providing transport with zero pollution.

Hypothesis:
The Electric cars are manufactured as Pollution free vehicles are friendly to the good environment.

Strict regulations to combat pollution made the Producers to innovate the production of Electric Passenger Cars.
Objectives of study

1. To find out the reasons for introduction of Electric Passenger cars
2. To know the production and sales trend of Electric Passenger cars
3. To find out the performance and its utility
4. To find out whether adequate number of Charging stations are available to enable the Electric Passenger cars to get enough recharging for smooth functioning of the electric passenger cars.

Limitations of the study

This study pertains to the electric passenger cars only and it is not related to other types of cars.

Research Methodology

The case study method has been followed.

Tesla, Inc. (formerly Tesla Motors, Inc.), is an American electric vehicle and clean energy company based in Palo Alto, California. The company specializes in electric vehicle manufacturing, battery energy storage from home to grid scale and through its acquisition of Solar City, solar panel and solar roof tile manufacturing.

Data collection and Analysis

Secondary data has been collected from internet, automobile magazines and from company website. Quantitative Analysis is done to find out the production and sales trend. The analysis is done with the help of Moving Average.

Scope of the study

There is a vast scope for extensions of research in this area in various types of vehicles such as. Utility, Multiutility, Light and Heavy Commercial Vehicles.

Problem investigated

Various world-renowned automobile manufacturers in various countries are changing fuel technology due to restrictions enforced by government through various rules and regulations.

Contribution of Knowledge to the society

It creates awareness about the availability of pollution free vehicles which are not harmful to the environment.

Literature review

- An Article titled “Modern Electric Cars of Tesla Motors Company” by O.F. Vynakov, E.V. Savolova and A.I. Skrynnyk.
- “Tesla’s batteries have reached their limit – how they could go further” by Vivek Nair Lancaster University – September 6, 2016.
- “Should Tesla’s autopilot cars be allowed on public roads following accidents?” by Toby Walsh dated July 15, 2016.
- “Tesla’s gamble on its affordable electric car”, an article by Craig Froome, The university of Queensland.
- “Tesla: A successful Entrepreneurship Strategy”. A research paper by Dr. Khamis Bilbeisi, Professor of Accounting at Clayton State University along with Moulare Kesse an Adjunct instructor at Clayton State University.
Pollution caused by Road Transport Vehicles

Air Pollution – Definition: “the emission of any impurity into the air such as smoke, dust, solid particles, gases, mists, fumes, odours and radioactive substances.

The act authorizes the environmental protection agency to set National Ambient Air Quality Standards to regulate the emission of harmful air pollution. In India the environmental protection act of 1986 was enacted by the Government of India under article 253 of the Indian Constitution.

Good environment is possible only if the Discharge of emission standards are followed.

Background of the Company

Tesla’s primary goal was to commercialize electric vehicles, starting with a premium sports car aimed at early adopters and then moving into more mainstream vehicles, including sedans and affordable compacts. In February 2017, Tesla Motors shortened its name to Tesla.

In addition to its corporate headquarters, the company operates multiple large factories for making vehicles and their components.

Tesla Factory, Gigafactory 1, Gigafactory 2, and Giga Shanghai. Tesla’s first assembly plant occupies the former NUMMI plant in Fremont, California. It is known as the Tesla Factory.

Analysis and Interpretation

Three Yearly Moving Average of Production

<table>
<thead>
<tr>
<th>Years</th>
<th>Production 3 Yearly Moving Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>17032</td>
</tr>
<tr>
<td>2016</td>
<td>27974</td>
</tr>
<tr>
<td>2017</td>
<td>33676</td>
</tr>
<tr>
<td>2018</td>
<td>84843</td>
</tr>
<tr>
<td>2019</td>
<td>121731</td>
</tr>
</tbody>
</table>

![Production 3 Yearly Moving Average](chart.png)
Three Yearly Moving Average Sales

<table>
<thead>
<tr>
<th>Years</th>
<th>Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>16886</td>
</tr>
<tr>
<td>2016</td>
<td>25432</td>
</tr>
<tr>
<td>2017</td>
<td>34394</td>
</tr>
<tr>
<td>2018</td>
<td>81721</td>
</tr>
<tr>
<td>2019</td>
<td>122462</td>
</tr>
</tbody>
</table>

Production

3 Yearly Moving Average

<table>
<thead>
<tr>
<th>Years</th>
<th>Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>16886</td>
</tr>
<tr>
<td>2016</td>
<td>25432</td>
</tr>
<tr>
<td>2017</td>
<td>34394</td>
</tr>
<tr>
<td>2018</td>
<td>81721</td>
</tr>
<tr>
<td>2019</td>
<td>122462</td>
</tr>
</tbody>
</table>
Year wise Production and Sales

<table>
<thead>
<tr>
<th>Year</th>
<th>Production</th>
<th>Sales</th>
<th>Difference (Production - Sales)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>51095</td>
<td>50658</td>
<td>437</td>
</tr>
<tr>
<td>2016</td>
<td>83922</td>
<td>76297</td>
<td>7625</td>
</tr>
<tr>
<td>2017</td>
<td>101027</td>
<td>103181</td>
<td>-2154</td>
</tr>
<tr>
<td>2018</td>
<td>254530</td>
<td>245162</td>
<td>9368</td>
</tr>
<tr>
<td>2019</td>
<td>365194</td>
<td>367386</td>
<td>-2192</td>
</tr>
<tr>
<td>Total</td>
<td>855768</td>
<td>842684</td>
<td>13084</td>
</tr>
</tbody>
</table>

- Total Sales divided by total Production, expressed in percentage for five years. 98% of Production have been sold which means that there is a good demand for the electric vehicles.
- During years 2017 and 2019 all produced vehicles have been sold.
- During the year 2015 Sales is slightly lesser than Production by 437 units
- In the years 2016 and 2018 sales is lesser than production by 7625 and 9368 respectively.
Findings

- As of 2019, Tesla sells Model S, Model X, and Model 3 cars. Tesla also sells Powerwall, Powerpack, and Megapack batteries, solar panels, solar roof tiles, and some related products. Tesla global vehicle sales increased by 50% in 2019.
- After ranking third by brand in 2017, Tesla ranked as the world's bestselling plug-in passenger car manufacturer in 2018, both as a brand and by automotive group.
- Tesla acquired two battery companies in 2019, Hibar Systems and Maxwell Technologies.
- In June 2017, Hawaii's Kauai island received a large solar and battery installation.
- In 2014, Tesla discreetly launched the "Destination Charging Location" Network by providing chargers to hotels, restaurants, shopping centers, resorts and other full-service stations to provide on-site vehicle charging at twice the power of a typical charging location. On April 25, 2016, Tesla launched European destination charging, with 150 locations.
- After 11 years in the market, Tesla ranked as the world's bestselling plug-in passenger car manufacturer in 2019.
- Tesla battery life - Tesla battery is under warranty for eight years.

Tesla Competitors

Major competitors for Tesla include traditional auto companies such as Ford Motor Company, the General Motors (GM), Honda Motor Company (HMC).

Conclusion

Pollution free vehicles are good for the environment. Government also put restrictions if there is more pollution in the vehicles. The emission from vehicles are harmful to the society. Therefore, there is regular checking of vehicles for pollution. To meet the current demand, the industries are innovating in many ways like Electric Vehicles. The study reveals that the 98% of the produced vehicles are sold which means that there is acceptance for the Electric Vehicles in the society. It is predicted by the experts that the number of Electric cars will be maximum in future as it is foolproof that the technology meets the expectations of the Government and Society at large.

Suggestion

1. There should be a full-fledged facility for battery charging stations and availability everywhere wherever possible.
2. The awareness should be created about the environmental issues and how it is harmful because of using diesel, petrol, gas or any other means.
3. Continuous availability for charging will give guarantee to the customers.
4. Slowly, the other types of fuels also should be reduced and the usage of electric vehicles should be brought to the knowledge of the society.
5. It should be affordable so that all sections of the society can use the vehicles.
6. Models of the Battery cars should be attractive and the advertisements should spread the message of getting pride in using that battery cars as they are environmentally friendly.
7. Varieties of models can be introduced to cater to the needs of the various sections of the society, starting from low price to high price, ranging from less facility to maximum comfort which also satisfy the status of the emotional buying motives and also the rational buying motives.
8. All spare parts should be available easily at any place and there should be good service on the spot whenever the customer faces problem while using the battery car as good services increase the Brand value of the Electric Passenger cars.

Key words: Tesla, Battery car, Automobile, Pollution, Manufacturing, Production, Sales.
Reference:

- Internet