

**COMPARATIVE ANALYSIS OF TATA MOTORS TO
OTHER PASSENGER VEHICLE COMPANIES**
(ESPECIALLY THE STUDY ON KEY ENVIRONMENTAL FACTORS & ECO-FRIENDLY FACTORS IN INDIA)

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ABSTRACT

The Earth's temperature is rising every year & as per the studies which have been conducted in last 50 years, the major reason or cause to this rising temperature is the rising level of Greenhouse gases in the atmosphere like Methane, Carbon dioxide(CO₂) etc. The major contributor to such rising Greenhouse gases level is the Automobile Sector. The 5 Companies namely Tata Motors, Chevrolet, Volkswagen, Hyundai & Skoda from the Automobile Sector have been taken for conducting the study. A Comparative analysis of these 5 selected Companies in terms of their Production, Sales figures, Annual Service Cost being charged from their customers for their vehicles, eco-friendly features in cars, the Green Initiatives which have been taken by them in their processes & the compliance of their vehicles with the Bharat Stage Emission Standards etc. Have been done. It was concluded from the study that TATA MOTORS provides the maximum benefits of Safety features with a reasonable price & charges the nominal cost as well for the maintenance of its vehicles. Moreover, it has been manufacturing the vehicles in compliance with the latest BS-IV norms & has been taking up Green Initiatives actively in its Production Processes, Technology & Products etc. But the Automobile Sector as a whole needs to work on more in cutting down their energy usage, making use of Cleaner & Greener Processes, upgrading the vehicles to BS-VI norms & improving the technology of their engines to completely eliminate the pollution level from the Atmosphere. Moreover, the Automobile companies should try their best to provide the Greener Products to its customers with a reasonable price.

KEYWORDS: Green House Effect, Emission Standards, Safety Concerns, Service Cost, Green Initiatives.

Introduction

We have heard many times that Earth is going to destroy, Earth is going to come to its end & everything from Earth will get vanish. And all this is because of the rising level of Global Warming. Today, the rising level of Global Warming is of great concern for the customers, manufacturers, Government & the general public too. Global warming can be defined as the rise in the temperature level of Earth's surface considering land & water as well as the temperature level of the atmosphere too. As per the observation conducted in the period of last 50 years, this rising level of Earth's temperature & atmosphere is basically due to the rising level of Greenhouse gases in the air such as carbon dioxide (CO₂), methane, ozone & water vapor. Such Greenhouse gas creates the Greenhouse effect & can be produced either naturally or via human activities.

Greenhouse Effect

Greenhouse effect can be defined as the untrapped heat which has been radiated back to the Earth's atmosphere by its surface & goes on accumulating in the atmosphere which keeps on adding to the Earth's temperature level. In other words, the higher the level of Greenhouse gases in the

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atmosphere, the more will be the Earth's temperature level. The Human activities that are contributing to Greenhouse effect:

- Burning of fossil fuels like coal, petroleum for running vehicles, machinery etc.
- Nitrous oxide(NO_x) emissions released from the usage of synthetic fertilizers in agricultural activities, management of livestock manure.
- Harmful gases released by the Automobile & Transportation sector in the atmosphere. The drastic changes that have taken place in the Earth's temperature level & still occurring could lead to spreading of many skin & health related diseases, droughts, floods, storms etc. Among the human activities, the Automobile & the Transportation Sector is contributing majorly to the Pollution level in the environment. Though Automobile Sector is contributing a lot more towards the growth & development of our country which could be seen from the Literature review like M.Vatsal & et al(2016) found that Automobile Sector marked as the 4th largest exporter for passenger cars in Asia in year 2009. Moreover, Madhuranjan Vatsa & et al (2016) remarked in his journal namely "Analysis of Green Marketing Trend in Passenger Car Segment of Indian Automobile Industry" that Automobile Sector of India produced more than 3.7million passenger vehicles in year 2010 thereby becoming World's 2nd fastest growing market in passenger car industry .Furthermore, India's Automobile Industry & Commercial vehicles manufacturing industries sustained 6th Position in world having production of more than 3.9million units in year 2011 (Oica.net.,bsmotoring.com).

AUTOMOBIE SECTOR PROVIDED:	EMPLOYMENT TO:	more than 10 million people
One Commercial Vehicle	employment to	13 people
A car Produced	employment to	5 people
3-Wheeler produced	employment to	4 people
2-Wheeler Produced	employment to	1 people

Employment provided by Automobile Sector (Source:Research paper: Analysis of green marketing trend in passenger car segment of Indian automobile industry)

But at the same time, the **increasing harmful activities of Automobile sector is posing threats as well to the Environment:**

- Earlier, the Industrial Emissions & the burning of fuels were the major causes for Global Warming but in the past few years, **the emissions from Automobile Sector is also contributing a lot more towards the rising level of Carbon emissions(CO₂)** & thereby, leading to Global warming. **Automobile Sector's share in total pollution level has rose from 64% in 1990 to 70% in year 2009.** The buses & low commercial vehicles (LCV) are on the topmost in spreading the emission level as per the survey conducted in year 2000.
- Moreover, the growing number of vehicles is also another reason for the rising level of air pollution in environment. As per the data of Central Pollution Control Board (CPCB), **the number of vehicles have rose from 19,152 thousands in year 1990 to 53,100 thousands in year 2000.**
- As per the CPCB reports of year 2010, 76-90% of carbon monoxide is being released from transportation sector in Delhi while 92% of monoxide in case of Mumbai.

Thus, the **automobile and the other companies are required to introduce green technology** in their aims/objectives and planning level.

Comparative Analysis of Tata Motors Versus Other Car Brands: For making the comparative analysis of study of TATA MOTORS with other car brands, the 4 companies that have been chosen are: CHEVROLET, HYUNDAI, VOLKSWAGEN & SKODA. The 6 years data has been taken ranging from year 2011 to 2016. Moreover, the Sedan versions of the cars with their Diesel variants have been taken for conducting the study.

Review of Literature

- **Ashwani Kumar and Dr Subhash Anand (2012):** In this paper , the author has explained the role of motor vehicle in creating air pollution in Delhi .The data has been collected through secondary sources and after applying the statistical tool and techniques. It was analyzed that share of motor vehicles increasing pollution level has increased from 64%to 70% in a period of 1990 to 2009. The higher the number of motor vehicles is leading to higher pollution level in the

city. Moreover, due to introduction of BS II and BS III norms, 4 stroke in 2 wheelers and autos and CNG vehicles by Government. There was a decrease in the carbon emissions and the other emissions tools like nitrogen oxide (NOx), hydro-carbon (HC), carbon mono oxide (CO) etc. The motor vehicles have grown up from 19,152 in year 1992 to 53,100 in year 2000. Delhi lies on the top most in the fuel consumption to the other metro cities. The study was concluded with implementing the laws and norms strictly, encouraging the public transportation among people, timely inspection and maintenance of vehicles etc. are the measure suggested to curb the pollution level.

- **Supreet Kaur (2015):** In this paper, the author analyses that to what extent the Green Marketing concept is being applied in the Automobile sector & how the consumers are reacting to such green marketing strategies in case of automobile sector. Exploratory Research method was used & a sample size of 52 respondents was taken to collect the data. Data was collected through Primary sources like Questionnaire Method, Direct Personal & Indirect Oral Investigation & the secondary sources such as journals, newspapers, annual reports etc. It was concluded that the customers do care for the environment & thus, are ready to go for green vehicles but are not ready to pay the premium price for such vehicles. Moreover, they would prefer green car if they are given some incentives like greater durability, government subsidy, lower purchase & maintenance cost as compared to Traditional cars.

Objectives of the Study

- To study the role and impact of passenger vehicles on environment and identify the impact of key environmental factors on passenger vehicles in India.
- To assess and recognize the need of passenger vehicle's devices to reduce environmental pollution for creating scope of eco-friendly passenger vehicles in India.

Data Collection & Analysis

- **Secondary Data:** Secondary data is the data which has been collected or processed earlier by some agency or persons and is not being used for the first time & includes journals, books, annual reports, publications, internet etc. The data to be used for analysis purposes has been the Audited Annual reports of Tata Motors & other Selected companies & the Websites of Companies as well.

Table 1: Car Brands & Price List: (All Diesel Models)

S.NO.	NAME OF CARS :	MODEL:	PRICE (Rs. In lakhs) :
1	CHEVROLET		
(a)	CRUZE	LT	13.95
(b)	SAIL	1.3 LT ABS	8.44
2	VOLKSWAGEN		
(a)	JETTA	2.0L, TDI TRENDLINE	15.96
(b)	VENTO	1.5L, TDI TRENDLINE	9.58
3	HYUNDAI		
(a)	ELANTRA	1.6S	14.96
(b)	SONATA	2.0L MT, EMBERA	13.77
4	SKODA		
(a)	RAPID	1.5 TDI ACTIVE	9.78
(b)	LAURA	1.9L, TDI MT, NEW LAURA ELEGANCE	15.24
5	TATA		
(a)	INDIGO MANZA	CLUB CLASS OF QUADRAJET	8.77
(b)	ZEST	1.3 XTA, AMT QUADRAJET	8.7

Table 1 represents the Comparative Price list of **Tata Motors vs. 4 other brands**, their Sedan version of cars & their diesel models have been taken for the Study. The Brands chosen are **CHEVROLET, VOLKSWAGEN, HYUNDAI & SKODA** lying in the range of ₹8-16 lakhs have been selected. As per the table, **TATA MOTORS** has offered its Indigo Manza club class at ₹8.77 lakhs while its Zest AMT Quadrajet at ₹8.7 lakhs. The **Chevrolet's Cruze** model priced at ₹13.95 lakhs while its Sail 1.3LT ABS brand have been priced at ₹8.44 lakhs. **In case of Volkswagen company, its Jetta's Trendline model** has been offered at ₹15.96 lakhs in the market while its Vento Trendline model

has been priced at ₹9.58 lakhs .**The Hyundai** offers its Elantra 1.6S model at ₹14.96 lakhs & its Sonata at 13.77 lakhs .Furthermore, the Rapid Active model of Skoda has been available in the market at ₹9.78 lakhs while its Laura Elegance at ₹15.24 lakhs.

Table 2: Sales Volume (in Units)

<u>COMPANY'S NAME</u>	<u>2011</u>	<u>2012</u>	<u>2013</u>	<u>2014</u>	<u>2015</u>	<u>2016</u>
1. CHEVROLET						
(a) CRUZE:	8540	5154	2057	1529	868	1025
(b) SAIL :	0	0	15661	7046	4070	2590
2. VOLKSWAGEN						
(a) JETTA:	2772	3146	2272	2199	2010	1307
(b) VENTO:	35671	25822	22290	13033	12550	11401
3. HYUNDAI						
(a) ELANTRA	0	3052	4856	3426	1985	1841
(b) SONATA:	169	371	185	106	0	0
4. SKODA						
(a) RAPID:	2253	22162	14477	12005	11588	9372
(b) LAURA:	5880	3647	1270	0	0	0
5. TATA						
(a) INDIGOMANZA:	76190	62319	29641	27742	24215	17216
(b) ZEST:	0	0	0	16417	24864	25358

Source: <http://www.team-bhp.com/forum/indian-car-scene/183318-2016-report-card-annual-indian-car-sales-analysis.html>

Table 2 describes the sales volume data (in units) of the companies for the 6 year period ranging from 2011-2016. The **Chevrolet's Cruze model** has the downward moving graph in a period of 6 years. It lies at 8,540 units sales in year 2011 & then moved down to 1,529 units in year 2014. It marked further 500 units decrease in period of 2 years and reached to 1,025 units sales in year 2016 whereas its SAIL model launched in year 2013 received a good response initially & made sales of 15,661 units in its first year and 7,046 units in the next year which further decreased to 2,590 units in year 2016.

Volkswagen's Jetta model had face slightly increase & then decrease in its sales volume in 5 years period ranging from 2011-2015. It stood at 2,772 units sales in year 2011 with approx 400 units increment and went upto 3,146 units in next year but thereafter it had a downward moving graph in its sales which marked as 2,272 units in year 2013 to 1307 units in year 2016. Whereas its Vento model had a good number of sales in year 2011 which was marked as 35,671 units but thereafter, it received low response from the customers and its sales started declining which left it with 2,290 units of sales in year 2013 and 11,401 units of sales in 2016.

Hyundai's Elantra launched in year 2012 received response of 3,025 units from its customers initially which went upto 4,856 units in its second year but thereafter it could not create that charm on customers and its sales started declining which was 3,426 units in 2014 to 1841 units in 2016. Whereas the sonata model of Hyundai was completely unsuccessful model of company that received hardly 169 units of sales response in year 2011 which went upto 185 units in 2013 and reduced to 106 units in 2014 & thereafter vanished completely from the market.

The **Rapid model of Skoda** made the sales of 2,253 units in year 2011 and then it received a good response in 2012 with sales of 22,162 units. Thereafter, its sales started declining and lowered down to 14,477 units in year 2013 and further reduced to 9,372 units in year 2016 whereas Laura's sales was 5,880 units in year 2011 and had a downward moving graph from 2012 onwards & reduced down to 1,270 units in 2013. After 2013 company took it back from the market with no or zero sales left out.

Tata Indigo Manza had a great response in the market with sales of 76,190 units in year 2011 but its charm somewhere took a downward moving graph and left it with 29,641 units of sales in 2013. Its sales further reduced to 27,742 units in year 2014 to 17,216 units in 2016 whereas its Zest model launched in year in 2014 created a charm in the market a had a rising graph thereby making sales of 16,417 units in its first year which rose to 24,864 units in its second year and finally reached to 25,358 units in 2016.

Table 3: Production Data (In Units)

Companies	2011	2012	2013	2014	2015	2016
Chevrolet	111056	92063	86825	57565	36518	28949
Volkswagen	78178	66860	60405	44210	43156	47323
Hyundai	373709	391276	380002	411456	476001	500537
Skoda	30741	34678	21834	15332	15457	13370
Tata	296698	290428	141685	127118	138244	142962

Source: <http://www.team-bhp.com/forum/indian-car-scene/183318-2016-report-card-annual-indian-car-sales-analysis.html>

Table 4 describes the production data of the selected companies namely **CHEVROLET, VOLKSWAGEN, HYUNDAI AND SKODA** in comparison with Tata Motors for the period from 2011-2016. The production of **Chevrolet's vehicles** seem to be decreasing over a period. As per the Table 3, its production was 1, 11,056 units in 2011 which fell to 86,825 units in 2013 and further to 28,949 units in 2016.

Volkswagen production has also decreased in period of 6 years. It can be interpreted from the table that Volkswagen production in year 2011 was 78,178 units which lowered down to 60,405 units in the year 2013 and further reduced to 47,323 units in year 2016. **Hyundai's production** has increased in 6 years period from 3, 73,709 units in 2011 to 3,80,002 units in 2013 and further rose to 5,00,537 units in 2016.

Skoda's production runs in thousands figures and has also decreased over a period of 6 years. Its production marked as 30,741 units in 2011 which lowered down to 21,834 units in year 2013 and further more decreased to 13,370 units in year 2016. **TATA MOTORS** production figure runs in lakhs and has moved downwards from 296698 units year 2011 to 127118 units in year 2014 and after that it took the rising graph where its production in year 2016 rose up to 142962 units.

Table 4: Pollution Control : Bharat Stage Emission Standards

S.NO.	NAME OF CARS :	EMISSIONS NORMS :
1	CHEVROLET	IV
(a)	CRUZE	
(b)	SAIL	
2	VOLKSWAGEN	IV
(a)	JETTA	
(b)	VENTO	
3	HYUNDAI	IV
(a)	ELANTRA	
(b)	SONATA	
4	SKODA	IV
(a)	RAPID	
(b)	LAURA	
5	TATA	IV
(a)	INDIGO MANZA	
(b)	ZEST	

Bharat Stage Emission Standards also termed as BSES are referred to the emissions standards set by the Government of India that restricts the limit of the air pollutants being released from the Internal Combustion Engine (I.C.) & spark ignition equipment. The **Central Pollution Control Board (C.P.C.B)** set these standards & also sets the timeframe within which they should be implemented. These B.S Standards are based on European Emission norms & were firstly introduced in year 2000 in India. BS-III norms were being followed in entire country since Oct, 2010 but government made it mandatory to have only those vehicles in the market which are in compliance with the BS-IV norms from April, 2017. As per the Table -3, all the car brands taken falls under BS-IV category. In other words, the chosen brands vehicles like **CHEVROLET, VOLKSWAGEN, HYUNDAI & SKODA** & even the **TATA MOTORS** are in compliance with BS-IV norms.

Table 5:- Safety Concerns

Carbrands: → Basis: ↓	Chevrolet Cruze sail	Volkswagen Jetta vento	Hyundai Elantrasonata	Skoda Rapidlaura	Tata Indigo zest
Anti-Lock Braking System (ABS) :	✓✓	✓✓	✓✓	✓✓	✓✓
Air Bags: Passenger:	✓✓	✓✓	✓✓	✓✓	✓✓
Driver:	✓✓	✓✓	✓✓	✓✓	✓✓
Rear-Seat Belts:	✓✓	✓✓	✓✓	✓✓	✓✓
Crash Sensor:	✓✓	✓✓	✓x	✓✓	x✓
Navigation System:	xx	xx	xx	xx	✓✓

When Safety concerns are being talked about, there are numerous number of safety concerns attached with vehicles. A customer must ensure these concerns in a vehicle while making a buying decision of a vehicle as his or her life is very important & precious. As far as our study is concerned, it is not possible to cover all of the safety concerns, So have taken the preferable ones such as ANTI LOCK BRAKING SYSTEM(A.B.S), AIR BAGS (DRIVER & PASSENGER), REAR SEAT BELTS , CRASH SENSOR & last but not the least NAVIGATION SYSTEM.

Table No.6 presents the Companies providing the different Safety concerns in their vehicles. As per table, **TATA MOTORS' INDIGO MANZA & ZEST MODELS** possess the 4 concerns in them ie ABS, driver & passenger air bags , rear seat belts & Navigation system too but its Zest model is making available the crash sensor while its Indigo Manza model does not provide the same. The Table indicates that both **Chevrolet's Cruze & Sail model** possess ABS, both driver & passenger air bags , rear seat belts & the crash sensor but do not provide the Navigation System .In case of **Volkswagen** as well its **Jetta & Vento** model provides the ABS , air bags of both driver & passenger , crash sensor & rear seat belts but do not provide the Navigation System. **Hyundai's Elantra & Sonata models** do provide ABS, driver & passenger air bags & rear seat belts but its Elantra model provides the Crash Sensor whereas its Sonata model does not provide the same. Navigation system again is not there in either of the models. **Skoda's Rapid & Laura models** provide all the 4 concerns namely ABS, driver & passenger air bags , rear seat belts & crash sensor but Navigation system is missing in both the models .

Table 6: Service Cost of Cars

S.NO.	NAME OF CARS :	AMOUNT(₹)
1	CHEVROLET	
a.	CRUZE:	17,766
b.	SAIL:	2710
2	VOLKSWAGEN	
a.	JETTA:	10,398
b.	VENTO:	10,569
3	HYUNDAI	
a.	ELANTRA:	2786
b.	SONATA:	4575
4	SKODA	
a.	RAPID:	8,576
b.	LAURA:	11,966
5	TATA	
a.	INDIGO MANZA	5511
b.	ZEST:	5323

SERVICE COST includes the cost charged for changing oil, filtering the oil & fuel , oiling of brakes & clutch , coolant expenses & service charge etc. Table No. 7 represents the annual service cost charged with respect to their car brands. The annual service cost in case of **TATA INDIGO MANZA** is ₹5511 which is an average maintenance cost of 6years taken while it is ₹ 5323 in case of its **Zest model** .The **Chevrolet's Cruze** annual service cost is also an average maintenance cost of 6years taken which came out to ₹17,766 while it is ₹ 2710 in case of its Sail brand.The **Volkswagen's** Service cost includes the cost for its engine oil , filtering oil, air , fuel , windshield washer, pollen filter etc which is estimated as ₹10,398(average of 6 years) in case of Jetta & ₹10,569 in case of Vento.The **Hyundai's service cost** is estimated as ₹2786 while of its Sonata brand taken average of 8 years came out to be ₹ 4575.**Skoda's** Rapid charges ₹ 8576 as annual service cost while Laura charges ₹11,996 (average of 10 years).

Table 7: Green Initiatives Taken by Tata Motors & Other Brands

Chevrolet	Volkswagen	Hyundai	Skoda	Tata
<ul style="list-style-type: none"> Reduced energy usage by more than 30% CO₂emissions also by 30 % in between period of 2005 & 2010. Made use of energy efficient lighting & HVAC (heating ventilating and A/c system) In period of 10 years of 2000-2010 ,it was able to reduce waste through global operations by 43 %. Its 30 manufacturing plants were able to save more than 7,75,000 metric tons of co2 emissions which saved energy cost of 50 millions dollars. 	<ul style="list-style-type: none"> The Pune plant of Volkswagen carried out a: Think BLUE Factory Programme in year 2015 which led to reduction in environmental impact by 20.6% in manufacturing process. 26.1% reduction in carbon emissions. 27.5% reduction in energy consumption. Replaced tube lights by Led 11.7% reduction in VOCemissions(VolatileOrganic Compounds) due to optimization of paint processes in paint shops Aiming to reduce the environmental impact by 45 % by the year 2025. 	<ul style="list-style-type: none"> Received the green award for year 2016-17 for making sustainable and environment friendly marketing operation by Tamil nadu government .green initiatives taken were LED lamps ,RO plants, RTO systems(regenerative thermal oxidizer) etc . Introduced a new concept of eco friendly hybrid car namely Hyundai BLUE –WILL that has dual engine – electric engine and IC engine. Hyundai's Sonata hybrid car contains the lithium polymer battery that is smaller in size & is efficient too. 	<ul style="list-style-type: none"> Introduced its "GREEN FUTURE PROGRAMME" in 2018 that aimed at making optimal utilization of resources efficiently & sustainability. Aims to lower the wastage & emissions level by 25% from each & every product. Skoda Octavia Green Lineis the 1st car to be manufactured under this program. Green Product,Green Retail & Green Factory are themes of Green Future Program. 	<ul style="list-style-type: none"> Wind solar hybrid system taken as an initiative Company's Dharwad Plant. Research projects like revolution, REHEV & range – e are being taken to electrify sedan & all terrain vehicles. Usage of Iternative Sources of energy such as solar, wind & natural gas that has lead to reduction in carbon emissionsfrom the plants. Usage of Advance equipments to check the emission amount & how to control it Cleaner engines have been introduced. Transformation of Electrical heating into LPG heating in case of Endogas generators.'

Findings & Results

- As per Table 1 it represents that **Tata motors cars (Indigo Manza & Zest)** when compared to other car models price is having the lowest price despite of taking the topmost models of its cars & provides with the **majority of safety concerns** at such reasonable prices which are **affordable to the middle class families** with the majority of features in it. Moreover, Tata lies at the **2nd position in the production of vehicles** which could be interpreted from production Table 4& its Zest and Indigo Manza model are the most likely cars amongst all the car models & have received the tremendous response from the customers as it could be seen from Table 2 having the highest sales amongst all other brands. Tata's Zest when launched in year 2014 received a good response from the customers & had a rising graph thereafter with an increment of 55% over a period of 3 years.
- As per Table 2 , it can be interpreted that Chevrolet's Cruze sales has decreased by 88% in a period of 6 years& its Sailmodel sales has decreased by 83%from 2013 to 2016.Volkswagen's Jetta sales has decreased by 18% from 2011 to 2013 while by 43% decreased from 2013 to 2016& its Vento model sales has decreased drastically by 38% from 2011 to 2013 while by 49% decreased from 2013 to 2016.Hyundai's Elantra model sales rose initially by 59% in its 1st year from 2012 to 2013 while it fell down drastically by 62% from 2013 to 2016& its Sonata model had a very low response in the market & thereby, had a 37% decrease in its sales from year 2011 to 2014 & then got completely vanished from the market.Skoda's Rapid showed a tremendous increase of 543% in its sales from 2011 to 2013 while faced the decrease in sales thereafter by 35.2% from 2013 to 2016& its Laura model sales faced a drastic decrease in their sales by 78% in 3 years period to from 2011 to 2013 & then was taken away from the roads by the company due to its low performance. Tata Indigo Manza received a great response from the customers in year 2011 but faced a drastic decrease of sales by 61% from 2011 to 2013 and further reduced by 42 percent from 2013 to 2016& its Zest model launched in year 2014 received a good response initially and had a 55% increase in its sales in 3 years period from 2014 to 2016.
- Hyundai's Sonata has the least number of sales amongst all the other selected companies & did not receive much response from the customers in the market and even the Skoda's Laura faced the same situation due to which the company stopped producing it further and withdrew it from

the market. As per table 4 Hyundai succeeds amongst all other brands in the production of vehicles followed by Tata on 2nd position, with Chevrolet on 3rd, followed by Volkswagen and Skoda on 4th and 5th position respectively

- Tata's production of vehicles has decreased over a period of time by 52% from 2011 to 2016 while Hyundai's production has increased in 6 years period by 34%. The Skoda lies at the bottom level amongst all other brands in the production level and moreover, its production level has decreased drastically by 57% in 6 years period.
- TABLE 5 represents that the vehicles of all the selected brands are updated with BS IV norms & even of Tata motors vehicles namely Indigo Manza & Zest are in with compliance with BS IV Norms issued by CPCB but there is a need to upgrade to BS VI emission norms which would further reduce the carbon emissions level too
- Table 6 indicates that Chevrolet, Volkswagen, Skoda model provides the common safety concern in their Cars such as ABS both driver & passenger Air Bags, Rear seat belts & Crash sensors but do not provides the Navigation System. Both Hyundai & Tata provides the 3 common safety concerns such as ABS, Driver and passenger Air Bag, Rear Seat belts but Tata provides with Navigation system which is missing in Hyundai's vehicles. Moreover, Hyundai's Sonata & Tata indigo Manza do not possess the Crash sensors in them.
- Table 7 depicts Service cost of Cars & the brands like Chevrolet's Sail, Hyundai's Elantra & Sonata, Tata's Indigo Manza & Zest have cheaper & reasonable service rates as compared to other brands but Tata Motors still needs to bring down its service charges as in comparison to Hyundai's models in order to create demand for its products.
- As per the Annual Report of 2011 -12, Tata Motors has been able to achieve 19% reduction in CO₂ from gas and electricity for Jaguar Land Rover & 15 % reduction in water usage for Jaguar Land Rover over previous years. (Source: Annual Report of Tata Motors of 2011-12). As far as technology of engines is concerned, Tata Motors have tried to make them Eco Friendly by taking green measures such as involvement in research projects like RE evolution, REHEV and Range – E etc. that electrifies the Sedan & Terrain vehicles, launched hydrogen fuel Cell bus technology etc. that reduces the carbon emissions in passenger cars etc.

Conclusion

"Tata Motors" has been chosen for the proposed study as the company to be worked upon since it is an Indian Brand and has all its production facilities in India. Since, Tata Motors based in India, it is going to invest all its Profits & return within the Country, for the growth & development of the country. Rest of the companies like Volkswagen, Hyundai etc. are the foreign companies who mostly have their assembling facilities in India but Tata Motors in an indigenous company who has its production facility in India. Tata motors has tried its best in serving the customers with the reasonable price and service cost of its vehicles, safer and eco friendly features in its vehicles, cleaner and greener engines. Tata Motors has been striving constantly to save the environment for which it has been taking up green initiatives in its technology, products & production processes and has even installed the Solar Hybrid system at its Dharwad plant, Bio Gas plant that manages the waste and generates Electricity, conversion of electrical heating into natural gas heating in washing machines etc. Tata motors though providing the majority of safety concerns with the reasonable and affordable range to its customers, but it needs to upgrade its vehicles with BS VI emissions norms in order to further reduce the CO₂ emissions level. Not only one company rather all the companies in the automobile sector need to take up the measures like continuous up gradation of vehicles by changing oil, clearing out 2 stroke engines, increasing the R & D expenditure, compliance with the latest BS norms etc. would lead to reduction in CO₂ emissions and thereby ,would improve the global warming situation.

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