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SPILLOVER EFFECT OF AUTOMOBILE SECTOR IN INDIA

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Development is a multidimensional process of change involving politics, sociology, Economics, and Legislation. Meanwhile, Economic growth is accelerated by Industrialization, which is a tuning factor for rapid economic development of any country. The increased production of consumer goods and service and capital goods and services resulted the increasing standard of living, specifically in accessing the development of transport service. Transport is the service sector comes under the 'Aids to trade` as indigenously, but presently aids to mobility of resources adding the value to the land by its method. Automobile sector made a tremendous change in the life style of human being, Particularly in their mobility .Ancestors used to walk and reach from one destination to other destination which provides a healthy exercise too for their physical fitness, Now increasing automobile production and usage, People lost their walking attitude even for small ten to twenty minutes walking distances and depending two wheelers, three wheelers, even four wheelers in their daily routine life. The Automobile industry's production of 4077 vehicles in 1950-51 reached 13,895,364 vehicles in 2009-10. The supply side of vehicles increased, it's meant that the demand for the vehicle Utilization also increased by Indian Population.

There are two sides for any developmental activities. The increased trend of automobile production and its utilization (domestic sales as a proxy) is an alarm to air pollution, traffic congestion, loss of physical activities (like walking, running) etc., Now the domestic marketed surplus is also increasing, and ultimately export shown a positive trend in present India. Hence, the author made an attempt to study the negative spillover effect of auto mobile utilization in India, specifically the growth of automobile utilization and its impact on environment.

Seema Sharma (2004) made an attempt to examine the productivity performance of the Indian Automobile Industry. The period of study was 1990-91 to 2003 – 04. The author utilized the growth accounting approach for measuring total factor productivity (TFP); which is based on the indices of output and input. The author concluded that resources are underutilized, that growth of input was higher than output. The researcher obtained the total factor productivity growth as difference between the rates of growth of real product and real factors input. Productivity of Automobile industry had a downfall in the years 1993-94 to 1994-95, which express that resources have not been utilized efficiently. This downswing was recovered in 1995-96

till 1997-98. But another downswing in 1998-99, which is continued till the end of 2003-04, with a negative total factor productivity growth rate. It meant that automobile industry could not perform well on total factor productivity account.

Roopesh Kaushik (2009) examined the performance and prospects of the Indian Automobile sector. The period of the study was form 2001-02, to 2005-06. The exponential growth model and co-efficient of variation was utilized and found that there exists variation high means a huge spurt in the demand for their vehicles.

Raj Kumar et.al., (2009) analysed the growth of Indian automobile sector in the period of 2001-02 to 2006-07. The study found that the liberalization induced the growth, and the globalization affected the sector in all the areas of manufacturing, sales and personal, Rand and financing.

Rupanwita analysed about the "Environment sustainability Index for Indian status. In that paper the author tried to measure the Environment sustainability index for to make a sound decision by policy makers. The author collected the data from 28 status, and ESI scores for status are calculated. The status are then grouped into several categories based on the scores status in the greener category have managed its natural resources stock judiciously, on the other hand, status in lower categories indicate that they have depleted the stock of natural resources and has accumulated waste and pollution. The author concluded that none of the status are currently on a sustainable trajectory.

Kamat and etal described about the Air pollution as slow poisoning, "The authors discussed about the development and the other side of Bombay City. The development of Bombay Slowly become as the most polluted. The authors conducted pollution related studies at the K.E.M Hospital Mumbai. The results have correctly evaluated and confirmed about the correlation to the pollution on damage to human health. The authors suggested that, there will have to be a strong desire to manage or shift hawkers to separate zones and control pedestrian movement so as to reduce pollution levels. This is necessary as traffic stagnating locally builds up levels of Co, aldehyde, hydrocarbons and particulate matter. This has been shown to increase prevalence of bronchitis respirator infections and coronary heart disease.

Sivarajan depicted about the consumption pattern of energy and carbon emission in India. In that article, the author made an attempt to relate the carbon emission and the consumption of different analysis and the result shown that of consumption of all energy sources significantly influence emissions and the model explanatory level is highly good as 99 percent the variable shown a positive sign, which explained that an increase in consumption of any bind of energy source will be an increase in carbon emission. The author suggested to think solar, wind, biogas and emission and improved energy efficiency investments.

Elizabeth and et.al (2010) Studied about "Why do state emissions differ so widely", "In that article the author mentioned as U.S average per capita emissions (CO_2) were 21.2 metric tons of CO_2, compared to 9.0 in the U.K, 5.7 in Sweden, and 4.3 in China. The article analyzed the variation in energy related per capita CO_2 emissions among U.S. States. The data analyses provided that states with lowest per capita transportation and residential emissions are by no means the poorest in the nation: indeed these states are all above the National average in per capita in come.

Transportation accounts for about 1/3 of human caused Carbon dioxide (CO_2) releases in the U.S and 1/4 of human caused CO_2 releases in developing countries like India. Carbon dioxide is a 'green house' gas. Human-made carbon dioxide releases have been accelerating over the last century. Global warming is defined as the increase in the average temperature of the earths near-surface air and oceans, specifically by CO_2 emissions.

Need for the Study

Carbon dioxide was considered as the product of perfect combustion as it is relatively harmless. Carbon dioxide does not have any direct impact on human health, but it contributes much to the Global warming. This green house gas catches the earth heat and promotes Global warming. Carbon monoxide is released as the by-product of normal or incomplete combustion process. This pollutant is formed when the carbon from the fuel is oxidized partially and this by-product has serious impact on the human health. Carbon monoxide affects the oxygen in the blood flow and creates major impact on an individual with heart disease. Hydrocarbon pollutants are formed when the fuel is not completely burned. These unburned hydrocarbons react with nitrogen oxides to form ground-level ozone, which is a major contribution of smog formation. Hydrocarbons creates various health problems such as eyes imitation, respiratory problems, and lung damage. Hydrocarbons are the agents for many urban air pollution problems and also one of the potential causes of career. R.K. Pachauri the Nobal peace prize winner said that climate change threatens to descript economic activity and social stability across the world, the climate crisis is not a political issue it is a moral and spiritual challenge to all humanity. Hence the researcher put an effort to know the negative spillover effect of automobile utilization.

Statement of the Problem

Environment is a public good and it is not easy to protect in the fast growing economy. The present era liberalization privatization and Globalization leads more industries and flow of foreign investments in all sectors specially manufacturing and construction sectors. The small scale industries (2006-07) registered number of units 530552 and Registered number of factories is 0.28 lakhs as per the statistical handbook of Tamilnadu. The increased number of industries and factories is a good growth in Industrialization, it made a positive impact an employment and Net State domestic

product. But in what to human beings efficiency in a positive way or negative way. Human beings, who form the centre petal force for all developmental activities, whom should be protected from water pollution air pollution. Noise pollution, global warming and solid waste in land in stagnant poor sanitation. Since the human health is highly depend on the environment where he/she is living working and visiting. Neither a command economy nor a mixed economy can allocate all resources efficiently to minimize their Negative externality. Infact there are many many examples are exists for government failure related to the environment.

- Beauty of Tajmahal degrade is due to air pollution,
- Traffic congestion in the heart of city Chennai is a common phenomena for daily riders in Chennai.
- Erode dying factories execution even after sealed without government permission, 26/06/09 www.sunnews.com.

So the researcher interested to examine and like to portray negative spillover effect of automobile consumption or utilization in India. This kind of study is an inevitable for the present situation of Global warming and western effect.

Objectives

- To know the growth of Global production domestic and domestic sales of automobile during 2000-01 to 2009-10.
- To describe the CO2 emissions over the period and their impact on social benefit of domestic automobile consumption.

Methodology

The study used the secondary source of data downloaded from society of Indian Automobiles. The domestic sales is considered as a domestic consumption or utilization of Automobiles. The carbon dioxide emissions is calculated and obtained from average of per unit emission for a year multiplied by the total count of vehicles.

Results and Discussions

Global production shown in the Table-1. The Global automobile production helps to understand the production level of India when compared with other nation, as well s helps to predict approximately about the carbon dioxide emissions by assuming. The leading producer emit highly and other countries follows according to their level of production. In that sense, China is the leading producer in 2009, Japan, U.S.A, German, S.Korea, Brazil, and India follows as second, Third, fourth, fifth, sixth and seventh position respectively. So India has a seventh position in automobile production during 2009. India's production is constantly increasing over the period when compared with other nations.

Table-1 Global Automobile Production (1970-2009)

Country	1970	1980	1990	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Argentina	220	282	100	339	235	159	169	260	319	432	545	597	513
Australia	474	575	384	347	319	343	413	411	395	330	335	329	227
Belgium	272	929	385	1033	1187	1057	909	900	926	918	834	724	537
Brazil	416	1165	915	1681	1817	1791	1827	2317	2531	2611	2977	3216	3183
Canada	1159	1373	1796	2961	2532	2629	2553	2711	2688	2572	2579	2082	1491
China	Na	Na	Na	2069	2334	3286	4444	5234	5708	7189	8882	9299	3790
France	2750	3378	3769	3348	3628	3601	3620	3666	3549	3169	3016	2569	2048
Germany	3842	3879	4977	5526	5691	5469	5507	5569	5758	5819	6213	6046	5209
India	86	114	364	801	814	895	1161	1511	1639	2019	2254	2332	2633
Italy	1854	1610	2121	1738	1579	1427	1322	1142	1038	1211	1284	1024	843
Japan	5289	11043	13487	10140	9777	10257	10286	10511	10799	11484	11596	11576	7934
Mexico	193	490	821	1935	1841	1804	1575	1577	1684	2045	2095	2168	1561
Netherlands	Na	113	151	267	238	231	215	247	181	159	138	132	76
S.Korea	Na	123	1322	3114	2946	3147	3178	3469	3699	3840	4086	3827	3512
Spain	536	1182	2053	3032	2849	2855	3029	3012	2752	2777	2889	2542	2170
Sweden	Na	298	410	301	289	276	323	340	339	333	366	308	156
Turkey	Na	50	350	430	270	346	533	823	879	988	1099	1147	870
U.K	2098	1313	1566	1814	1685	1823	1846	1856	1803	1648	1750	1649	1090
U.S.A	8284	8010	9780	12799	11425	12279	12115	11989	11947	11264	10780	8693	5709
U.S.S.R	922	2199	2040	1205	1251	1219	1279	1386	1354	1508	1660	1790	722
Others	131	284	319	190	174	168	212	311	520	531	703	527	412
Total	28526	38399	47210	58374	56304	58994	60663	64496	66482	69223	73266	70520	61715

Source: International Organization of Motor Vehicle Manufactures (OICA) (http://oica.net/category/production-statistics)

Table-2 Global Carbon Dioxide emission

S.No	Country	Emission (million metric tones carbon equivalent)	Share of Global total (percent)
1.	US	1614	212
2.	China	1405	18.5
3.	Russia	468	6.2
4.	Japan	348	4.6
5.	India	312	4.1
6.	Germany	230	3.0
7.	Canada	161	2.1
8.	UK	159	2.1
9.	South Korea	139	1.8
10.	Italy	132	1.7
	All other countries	2627	34.6
	Global total	7596	100.0

Source: Energy information Association, International Energy Annual, Washington D.C 2006.

The table-2 depicts about the carbon emission, from all sources like liquids, Natural gas, and coal. In 2006, united states was the leading nation in carbon emission, China was the follower as second largest carbon emission in the world as on 2006. But, the production of automobile in 2009 shown that china took the first position, which might be increase the level of its carbon emission too.

Table-3 highligths the types of pollutants from different sectors in Capital of India and reflects the significant share of the transport sector in the same.

Table-3 Sectoral contribution to emissions in Delhi (tones/day)

Pollutant	Transport	Power	Industries	Domestic	Total
TSP	13(10%)	50(37%)	60(44%)	12(9%)	138
SO_2	11(6%)	121(68%)	35(20%)	12(6%)	179
NO_X	157(49%)	143(44%)	20(6%)	3(1%)	323
HC	810(76%)	8(1%)	128(12%)	117(11%)	1063
CO	310(97%)	2(<1%)	6(2%)	2(<1%)	320

Apart from the concentration of vehicles in urban areas, other reasons for increasing vehicular pollution include the types of engines used, age of vehicles, poor road conditions, outdated automotive technologies, poor fuel quality and traffic congestion resulting from clumsy traffic management systems.

Air quality profile

In order to determine the air quality status and trends, assess health hazards, disseminate air quality data, and to control and regulate pollution, the CPCB (Central Pollution Control Board) initiated a nation wide framework of NAAQM (National Ambient Air Quality Monitoring) in 1984 with 28 stations at 7 cities. Presently, the network has 290 monitoring stations in 92 cities and towns throughout the country (CPCB 1998). The pollutants being monitored are mainly SPM (Suspended Particulate Matter), SO_2 (Sulphur dioxide) and NO_x oxides of nitrogen. SPM is one of the most critical pollutants in terms of its impact on air quality and is also the most common pollutant across all sectors. The ranges of SPM concentration (annual average) in the major metropolitan cities in India are shown in Table-3.

Table-4 Range of annual averages of SPM in major Indian cities

			Range of annual average of SPM $(\mu g/m^3)$ 1990-98		
S. No	City	Area land use	Minimum	Maximum	Mean of annual averages $(\mu g/m^3)$
1.	Delhi	Residential	300	409	355
		Industrial	341	431	381
2.	Mumbai	Residential	196	327	230
		Industrial	150	276	224
3.	Calcutta	Residential	205	491	327
		Industrial	286	640	434
4.	Chennai	Residential	72	118	99
		Industrial	53	147	123
5.	Bangalore	Residential	60	239	158
		Industrial	99	153	125
6.	Ahmedabad	Residential	198	316	261
		Industrial	201	306	243
7.	Hyderabad	Residential	135	184	158
		Industrial	72	259	153

Source: CPCB 2000a

As against to the maximum permissible limits laid down by CPCB for annual average concentration of SPM in ambient air-70 $\mu g / m^3$ in sensitive areas, 140 $\mu g / m^3$ in residential areas and 360 $\mu g / m^3$ in industrial areas, it is clearly evident that the SPM levels are high in most of the metropolitan cities in India.

The future scenario of air pollution in India has been calculated considering the integrated impact from major contributing sectors, i.e. domestic, transport, manufacturing industries and power. In the absence of a comprehensive emission inventory, projections have been made only for SPM, which is the most common pollutant across all sectors and is critical for air quality in many cities.

- Emissions from the transport sector have been calculated based on projections for a count of vehicles, in line with the projections for growth in population and economic activity.
- Air pollution from the manufacturing sector has been worked out on the basis of emission load per unit of output for some of the resource intensive and highly polluting industries-copper, aluminium, steel, cement, fertilizers, textiles and PVC (Poly-Vinyl Chloride).

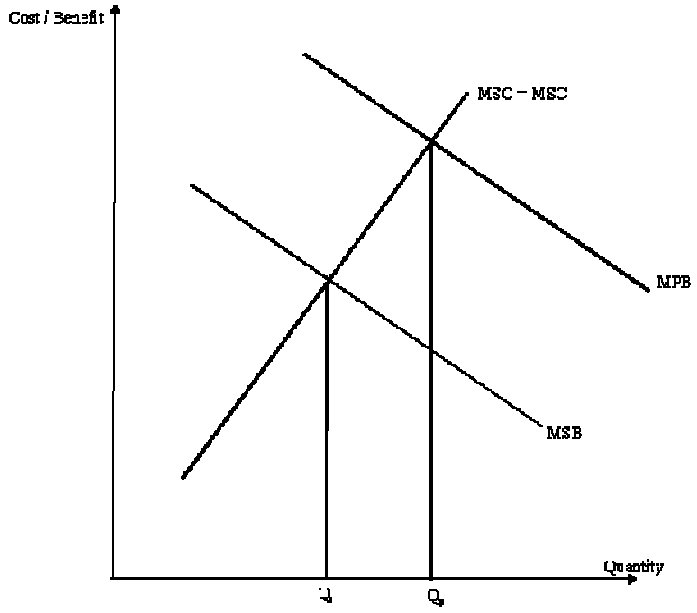
Pollutants from transport utilization are believed to directly affect the respirator and cardiovascular systems. In particular, high levels of Sulphur dioxide and suspended Particulate Matter are associated with increased mortality, morbidity and impaired pulmonary function. The overall effects of vehicular emissions are summarized in Table.4

Table 5 Vehicles emit significant amounts of several pollutants with varying effects as summarized

	Health Effect					Climate Change	
Pollutant	**Direct**	**Indirect**	**Acid rain**	**Eutrophication**	**Visibility**	**Direct**	**Indirect**
CO	X						X
HC	X	X[a]					X
NOx	X	X[a]	X	X	X	X	
PM	X				X	X	
SOx	X		X		X		X

CO = carbon monoxide, HC=Hydrocarbon, NOx = Nitrogen oxides, PM= Particulate matter, SO_2= sulfur oxide, [a]Ozone

Diagramatic explanation of Spillover effect of Transport utilization



People use their different kinds of vehicles a negative externality is imposed on all who breathe in the unhealthy air and suffer from the added congestion and the noise pollution. This negative externality which results from the consumption of the vehicle by their owners. In deciding how much to consume, the consumer (vehicle owner) takes into account only the costs the will incur when he consumes the goods, ignoring the external costs that others will suffer when negative consumption externalities exists marginal social benefit are less than marginal private benefits (MSB<MPB).

In the diagram the quantity QP where MPB = MPC but where MSB< MPB. Society on the other hand, maximizes its net social benefit when MSB = MSC, hence they consumers of vehicle user should prefer the quantity of QS, the socially optimal level of output. Hence the over consumption regarding the automobile sectors with respect to growing population certainly leads to an externality against the social benefit. So let the consumers start to think it over when then start for a ride by any kind of vehicle. The shaded area shown the dead weight losses due to over consumption.

What is the Solution

Solution to reduce global warming due to CO_2 emission. The answer is using Bio diesel is one of the solution to reduce global warming. Bio diesel is the name of clean burning alternative fuel, produced from domestic renewable resources, such as Soybeans, Sunflowers, canola, waste cooking oil, or animal fats and Jatropha.

Biodiesel is completely natural, renewable fuel application in almost any situation where conventional petroleum diesel is used. Even though “diesel” is part of its name, there is no petroleum or other fossil fuels in biodiesel. Biodiesel is 100% vegetable oil based and no engine modification is required.

Biodiesel is a renewable fuel made by a chemical reaction of alcohol and vegetable or animal oil, fats or greases. Through a refinery process called transesterification, the reaction removes the glycerin (a by-product that is not good for your engine and used to make soap) biodiesel can be used in any diesel engine in pure form or blended with petroleum diesel at any level. Even a bled of 20% bio and 80% petroleum diesel will significantly reduce carcinogenic (cancer causing) emissions and gases that may contribute to global warming.

Suggestions

- Educate about global warming, irrespective age and literacy level to make on effective changes in daily behavior.
- Use compact fluorescent bulbs, LED bulbs which saves 300lbs of carbon dioxide per year.,
- Use the dishwasher only with full load inorder to save 100lbs of carbon dioxide per year, otherwise do it by hand with minimal water.
- Support of renewable energy and bio fuel can reduce the Global warming and ecofriendly.
- Insulate anything which uses energy to stay a different temperature from its environment, 1000lbs of carbon dioxide per year can be saved by using insulated water heater.
- Use a push mower to mow the lawn and save 80lbs of carbon dioxide per year.
- Use public transportation saves fuel expenses, parking money and time wasted in looking for parking spaces, otherwise ride a bicycle for short-distance.
- Buy a fuel efficient automobile say car save up 20,000 lbs of carbon dioxide per year using a more full efficient.
- Keep the automobilies tires adequately inflated and check the air filter, monthly save 800 pounds of carbon dioxide.

Conclusion

Emissions from automobiles are one of the Greatest contributing agents of air pollution in major cities across the globe, specifically in India. Driving a personal vehicle (Two wheeler or car) is the most polluting activity of most citizens because of their life style. Pollutants like sulphur dioxide, carbon monoxide, formal dehyde, nitrogen dioxide, benzene and policycle hydrocarbon lead. Hence, without looking into social status matter of going by car, two wheeler can use the public transport in daily routine life will be reduce the carbon emissions as well as traffic congestion and save our earth.

Appendix F: Segment –Wise Growth Rate of Automobile Production (2000-10)

(in percent)

Country	1970	1980	1990	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Argentina	220	282	100	339	235	159	169	260	319	432	545	597	513
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Source: Calculated from ACMA.

References

1. Seema Sharma, "Productivity performance of Indian automobile Industry". Productivity, Vol45, No.2, July-Sep, pp 239-244, 2004.
2. Roopesh Kaushik, "Indian automobile sector; Performance and Prospects, "Journal of the Institute for research in social sciences and Humanities, Vol-4, No-1, Jan-June, pp-61-73, 2009.
3. Raj Kumar, Gautam and Sabil Raj, "Growth of Indian Automobile sector in the era of globalization". Indian management studies journal, Vol-31, pp.123-30, 2009.
4. Rupaniwita Dash, "Environmental sustainability Index for Indian status", paper presented in the VIIIth global conference Environmental Education, organized by Indian Environment Society at Goa on Nov 4 – 8, 2009.
5. Dr.S.R.K. Kamat and Dr. A.A. Mahashan, Air Pollution slow poisoning, "Survey of the Environment, page 57-63, 1997.
6. Sivarajan, "Consumption Pattern of Energy and Carbon emission in India" The Indian Economic Journal, Special issue December 2001, pp. 305-311.
7. Elizabeth A.Stanton, Frank Ackerman and Kristein A.Sheeran, "Why do state emissions differ so widely?" www.e3network.org.