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Conference Article

Role of Industries in Sustainable Development

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ABSTRACT

'Agriculture' is known as the base of Indian Economy that contributes a remarkable share in its GDP. It is observed that rural people, who are the main players of agriculture sector, migrate to urban areas with an aim to earn a better livelihood. Industrialization has transformed the structure of whole society. It has influenced the lives of people by providing employment, improving their purchasing power and quality of life etc. It is true that the industries help in economic growth of a country but it is an alarming situation where we must measure that the said growth is sustainable. The latest report of WHO on urban air quality database states that 98% of cities in low and middle income countries with more than 1,00,000 inhabitants do not meet WHO air quality guidelines. According to another report of WHO, Gwalior, Allahabad, Patna, Raipur, Delhi etc. are in the list polluted cities. The present paper aims to discuss the impact of industrialization followed by the need of sustainable development for a better future for all.

1. Introduction

Industry is referred as the production or manufacturing of goods or related services in an economy. Industries are classified into three major groups' i.e. Primary Industry, Secondary Industry, and Tertiary Industry. Primary industries that include Mining, Quarrying, Forestry and Farming etc., extract raw materials from land or sea and normally they deal with the natural resources. Secondary Industry is also referred as manufacturing industry that uses the raw materials for manufacturing another product by manual labor or machines. Tertiary Industry referred as Service Industry, deals with intangible goods. It includes the services like hospitality, counseling, consultation, etc. Higher knowledge based – intellectual services under tertiary industry are further sub-divided into quaternary sector and quinary sector. Quaternary Industry involves the use of high-tech industries and includes services such as information technology, information-generation and sharing, media and research and development etc. Quinary Sector represents the services of top-level management and includes highly paid skills. Fig. 1 presents the different sectors in an economy.

Industries use the natural resources of the environment, provide employment opportunities to the citizens and help in improving their financial position. It is said that, while operating, the industries emit various gases, waste water etc. that could be harmful for the society. The present paper is an effort to study the growth of industries and their contribution in sustainable development.

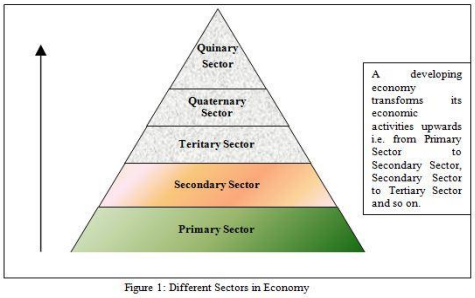

Figure 1: Different Sectors in Economy

Fig. 1 Different sectors in Economy

Sharma and Chaudhry [1] based on their survey found that the main pollution sources in the city were industries. As per the study, general respiratory problems were found to be more prevalent in paper mill zone; and asthma and fever were found to be in higher extent in thermal power plant and sugar mill zone respectively. The most prevalent common and allergy problem in all industrial areas was found to be headache and eye irritation respectively; and the most prominent diseases in present study were found to be asthma, fever and malaria. Garg [2] divided the causes of water pollution into direct and indirect. It is said that in the industrial areas, industrial effluents are the main source of water pollution either surface water or ground water and it is one of the direct causes followed by city sewage that includes wastewater from laundry, dishwashing, urine and faces. He investigated that waste water treatment plants in India are not adequate and suggested to establish sewage treatment plant in every urban settlement. Singare and Dhabarde [3] observed that the majority of the average annual concentration of potentially toxic metals (like Cu, Cr, Pb, Fe and Zn except Ni) were above the maximum tolerable limit set for the discharge of industrial effluents in the inland surface water. It is feared that the existing situation if neglected may cause severe long term damage to the surrounding population as well as to the ecosystem. Ranjith and Pradeep [4] identified major pollution outcome areas in pulp and paper industry. They identified a direct impact of pollution on employee health and on the management of the company economically. It was found that there is a significant relation between pollution and employee absenteeism. Pollution also impacts as inefficient utilization of working hours and physical fatigue of employee. Ahmad and Bano [5] concluded that Repairable Suspended Particulate Matter (RSPM) and Suspended Particulate Matter (SPM) along with the gaseous pollutants (Oxides of Nitrogen and Sulphur Dioxide) are one of the major causes for deterioration of ambient air quality of the city (Firozabad). They recommended for public awareness programme for reduction of automobile pollution. It is further stated that pressure horns to be removed from all vehicles. The study suggested for subsidized public mass transport rather to minimize the use of personal vehicles. Mani and Wheeler [6] mentioned that the continuous, smooth relationship between income growth and environmental performance shows that developing countries are already making social choices which reflect the calculus of benefits and costs. Countries become less polluted as rising income makes a cleaner environment more desirable and affordable. Singh [7] suggested that every citizen of the country must check Green House Gases (GHGs) emissions at their level. Mukerjee [8] discussed that decreasing the exposure to carcinogenic agents is one of the primary preventive measures to reduce the risk of cancer in India. It is said that many non-carcinogenic natural pesticides are available today. People should be

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educated to use those non-toxic agents including biological means to control the pests. India can adopt green industry very easily. Gupta [9] in her working paper estimated monetary benefits to individuals from health damages avoided as a result on reductions in air pollution in the urban industrial city of Kanpur in India. It is observed that a representative individual from Kanpur would gain Rs. 165 per year if air pollution was reduced to a safe level.

The literatures show that industries are one of the major contributors to global pollution that impacts the whole ecological system. With this background the paper aims:

i. To study the structural growth of Industries in Indian Context,
ii. To study the economic activities that contributes to GHGs Emission,
iii. To study the Condition of Water Resources with respect to growth of Industry.

The study is purely based on review of reports available on the above-said issues. Secondary data used to discuss the matter.

2. Results and Discussion

2.1 Structural Growth of Industries in Indian Context

The word 'development' comprise of economic development and social development. First one refers to financial strength and the later one to social health of people mainly the quality of life. To study the economic development of a nation, Gross Domestic Product (GDP) is one of the indicators. Table 1 presents the statistics of GDP of India.

Table 1 Share to Total GDP at Constant 2004-05 Prices

	Share to Total GDP at Constant 2004-05 Prices						
Financial Year	GDP (in Rs. Crore)	Agriculture and Allied Services (%)	Agriculture (%)	Industry (%)	Mining and Quarrying (%)	Manufacturing (%)	Services (%)
1982-83	8,68,092	34.25	28.72	25.85	3.06	14.33	39.03
1992-93	14,40,504	28.89	24.41	26.77	3.40	14.20	44.05
2012-13	54,82,111	13.95	11.85	27.27	1.98	15.76	58.79

Source : Central Statistical Organisation (CSO)
Databook for PC; 22nd December, 2014

The primary sector basically deals with Agriculture which has a very important role in Indian Economy. With reference to the latest report of IBEF, Dec., 2016 [10] over 58% of rural household depend on agriculture for their livelihood. It is further mentioned that agricultural product is the 4th largest exported principal commodity with a share of 10% of total exports of the country. With reference to UNDP, Human Development Index 2012 of India [11], 47.2% of total employment is in agriculture .With reference to the data presented in Table 1, it is clear that in India the share of 'Agriculture' in Total GDP is gradually decreasing whereas there is a significant growth in the share of Industry and Services. Another study published in 'Statista' - The statistics portal [12], the percentage of workforce in agriculture in India has decreased from 59.8% (year 2000) to 49.7% (year 2013). The percentage of workforce in Industry is increased from 16.1% (year 2000) to 21.5% (year 2013). Similarly the percentage of workforce in Services also shows a gradual increase i.e. from 24.1% (year 2000) to 28.7% (year 2013). Based on these statistics, it can be interpreted that Indian Economy is moving upwards towards development.

Table 2 Global emissions by economic activities

Sl. No.	Economic activities	Activity that generates GHGs	Share in global emissions (Year: 2010)
1	Electricity and heat production	Burning of coal, natural gas and oil for electricity and heat	25%
2	Industry	Burning of fossil fuels for energy, emissions from chemical, metallurgical and mineral transformation process, emissions from waste management activity	21%
3	Agriculture, forestry and other land use	Agriculture and deforestation	24%
4	Transportation	Fossil fuels burned for road, rail, air and marine transport.	14%
5	Buildings	Onsite energy generation and burning fuels for heat in buildings or cooking in homes.	6%
6	Other energy	Emission that is not directly associated with electricity or heat production, such as fuel extraction, refining, processing, and transportation.	10%

Source: EPA (United States Environmental Protection Agency

2.2 Green House Gases and Emissions by Human Activities

With reference to the report of EPA (United States Environmental Protection Agency) [13], the key greenhouse gases emitted by human activities are Carbon dioxide (CO_2), Methane (CH_4), Nitrous (N_2O), Fluorinated gases (F-gases that include hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride) that share 76%, 16%, 6% and 2% respectively of total global greenhouse emissions. The emission of Carbon dioxide (76%) is through i) fossil fuel and industry process (65%) and ii) forestry and other land use (11%). The report spreads light on global emissions by economic activities. Table 2 provides the details. Further, it is observed that the global carbon emissions from fossil fuels have increased by about 90% from 1970 to 2011. China is the top carbon dioxide emitter in 2011 emitting 28% CO_2 followed by United States (16%), European Union (10%), India (6%), Russian Federation (6%), Japan (4%) and the rest 30% emitted by other countries.

2.3 Condition of Water Resources

Water is one of the natural resources which is essential not only for human life but also for Industries. With reference to 'World Business Council for Sustainable Development' (WBCSD 2006), 2.5% of earth water is fresh (but most of it is in frozen form) and 97% (approximately) is sea-water which is undrinkable. The report says that since 1950 there has been a rapid expansion of groundwater exploitation providing: 50% of all drinking water, 40% of industrial water, and 20% of irrigation water. It is further mentioned in the study that 'Industry Use' of water increases with country income – that means high-income country uses high volume of water for industry use as compare to water use for industry by low income country. Another study of 'Food and Agriculture Organization of United Nations' [14] on global water withdrawal by different sectors is presented in Table 3.

Table 3 Global Water Withdrawal by Sector, around 2010

Continent	Municipal (%)	Industrial (%)	Agriculture (%)
World	12	19	69
Africa	15	4	81
America	14	37	48
Asia	9	10	81
Europe	21	54	25
Ocenia	20	15	65

Source: AQUASTAT database

Table 3 reflects that maximum water withdrawal is for 'Agriculture' followed by Industrial and Municipal purposes. Europe is withdrawing highest share of water for Industrial use followed by America, Oceania, Asia and Africa. Table 4 presents the statistics on water withdrawal in India for different uses.

Table 4 Water withdrawal in India

Category of Water Withdrawal	2000		2010	
	(10^9 m^3/year)	%	(10^9 m^3/year)	%
Agricultural water withdrawal	558.4	91.48	688	90.41
Industrial water withdrawal	10	1.64	17	2.23
Municipal water withdrawal	42	6.88	56	7.36
Total water withdrawal	610.4	100.00	761	100.00
Total water withdrawal per capita (m3/inhab/year)	559.9		602.3	

Source: AQUASTAT database

Table 5 Access to safe drinking water in India

Category of Population	1997	2002	2007	2012	2015
Total population with access to safe drinking-water (JMP) (%)	77.6	82.5	87.4	92.2	94.1
Rural population with access to safe drinking-water (JMP) (%)	72.5	78.4	84.4	90.3	92.6
Urban population with access to safe drinking-water (JMP) (%)	91.3	93	94.7	96.4	97.1

Source: AQUASTAT database

Table 4 shows that total water withdrawal in India has significantly increased. The increase in population might be a reason of it. However, Industrial water withdrawal has also increased.

WBCSD (2006) states that more than one billion people of the world (most of them in Asia), are still without improved drinking water. Further, on a global level, 3,900 children die each day due to dirty water or poor hygiene and 1.8 million people die every year from diarrheal diseases (including cholera). Table 5 presents the data on status of safe drinking water in India.

The data shown in Table 5 presents very impressive figures on accessibility of safe drinking water in India. With reference to web portal worldometers [15], the population of India in the year 1997 was 99, 78, 17, and 250 that has increased to 1,31,10,50,527 in the year 2015. In other words, there is an increase of 31% (approximately) in the population from 1997 to 2015 but the accessibility of safe drinking water has also increased with remarkable share.

2.4 Industries and Sustainable Development

Triple bottom line (TBL) proposed for three Ps (Profit, People and Planet) for the businesses and now, Sustainability Development Goals (SDGs) are targeting for five Ps (People, Planet, Prosperity, Peace and Partnership). Industries use water for their economic activities and discharge the waste water into nearby rivers which is very harmful for the whole society. UN-water [16] states that in developing countries, 70% of industrial waste is dumped untreated into waters where they pollute the usable water supply. It is projected that global water withdrawals to increase by some 55% through 2050. That means there will be probable increase in water pollution too. It is said that 15% of the world's total water withdrawals are used for energy production. This can be reduced by using other methods of energy generation. World Water Development Report 2014 mentions that Hydropower generation is a major water user but most of the water is returned to the river. It is also mentioned that geothermal energy is climate independent and does not produces GHG emissions. It is also suggested that wastewater treatment plants can help in reuse of it. Wastewater contains energy that can be harnessed and utilized. Industries are one of the players of Environment and cannot run its operation in isolation. While operating they must give priority to sustainable profit rather than economic profit maximization.

2.5 Limitations and Future Scope

The paper is discussed on the basis of available secondary data. All the pollutants' emissions by industries not discussed in the paper due to time constraint. There is a further scope to study the disposal of different water effluent by different industries in India and the measures taken by industries to treat the waste water.

3. Conclusion

It is observed that the share of Industries in economic growth of a nation has significantly increased but, the GHGs Emission and Water withdrawal by Industries are the areas where necessary actions are to be taken. National Action Plan on Climate Change (NAPCC) has set eight national missions to achieve the key goals in context of climate change. These missions are: i) National Solar Mission, ii) National Mission for Enhanced Energy Efficiency, iii) National Mission on Sustainable Habitat, iv) National Water Mission, v) National Mission for Sustaining the Himalayan Ecosystem, vi) National Mission for a Green India, vii) National Mission for Sustainable Agriculture, viii) National Mission on Strategic Knowledge for Climate Change. Industries must follow the path of sustainable growth to protect the environment. It is true that Industries run for profit and monetary growth helps in social development too but if Industries reinvest a part of their monetary profit/gain in protecting the environment it will surely lead the world towards sustainability. The companies that fall under CSR Slab (As per Companies Act, 2013), are bound to spend on CSR Activities. But, the companies those are not meeting CSR Spending Requirements, are also harming the environment by releasing GHGs through their manufacturing process. Therefore, the government must take a serious action to form and to implement an environment protection policy on all the manufacturing units (whether they fall under mandatory CSR slabs or not).

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