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Environmental accounting and sustainable development : a study in some small and medium enterprises industrial estates of Assam, India.

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Abstract

The cause of serious effects and concern on the global environmental quality is the development of the urban environment through rapid industrial growth backed by increased and varied consumer preferences. Besides temperature, the urban environment affects many other climatologically parameters detrimental to life in planet. Saying this, Kamrup District is showing growth of small and medium industries which may impact on the environment leading ultimately to shrinkage of the spatial bases of diverse micro and macro ecosystems. The study is a multidisciplinary approach towards the understanding of coexistence of industry, pollution and its effects on environment and sustainability. Therefore the paper attempts to locate the manufacturing SMEs in Amingaon and Bamunimaidan Industrial estates in Kamrup district which may be correlated to ecology due to simultaneous release of large amounts of toxic liquid, solid and gaseous waste into the environment. These problems give rise to a host of complicated situations needing immediate attention and sustainable management. The study accounts for the application of environmental parameters and environmental accounting on balancing environment and industrial growth. It deals with sustainability of manufacturing organizations that can have positive impact on the society. To achieve such objective the study is carried out through distribution of structured questionnaires to all manufacturing enterprises with a comprehensive literature review.

Keywords: small and medium industries, environment, wastes, sustainability.

1. Introduction

In simple language environment means our surroundings which constitutes living and non living organisms. The environment provides us resources which supports our life on the planet. The range of environment includes the bodies we live, physical structure, institutions and industry, politics , language and cultural practices which we communicate, flora and biophysical elements and processes. Environment is indispensable in every aspects of life . All living and nonliving organisms depend and survive on the environment and derive living organisms acquired from the environment. Air, water, soil, food etc are gained from the environment. Human beings use natural resources for the development of their standard of their life and they also standardize their quality by using the different sectors of environment. Survival of flora and fauna are also dependent on the environment. Therefore, environment is used by living organisms in all the process such as survival, reproduction, growth and development.

Now a days environment is in the verge of losing their sustainability due to air pollution caused by variety of factors, acid rain , hazardous chemical, deforestation etc. Climate change is also the emerging issue affecting the whole planet as well as the environment. A major portion of such chemicals are released into the air by manufacturing processes of industries.

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1.1 Environmental accounting and Sustainable Development

Environmental accounting is the method of measuring the performance of the organization in relation to specific parameters. Therefore the role of environmental accounting is significant in any manufacturing organizations. The idea is to maintain global environmental standards which is at stake . It has been established that climate change has impacted on life in planet. The Intergovernmental Panel on Climate Change (IPCC), the scientific advisory body to the United Nations Framework Convention on Climate Change (UNFCCC), has estimated that global emissions reductions of 25–40% of 2000 levels are needed if global temperature fluctuations are to be maintained within a range of 2^{o}C, a level which is generally accepted to sustain life without any irreversible damage. In such circumstance environmental accounting enhances desirable corporate performance and simultaneously increases marketability of its products. "Asia, the world's largest continent—home to 60% of the world's population and accounting for more than 30% of the world's land surface—faces numerous ecological challenges, including widespread deforestation, severe atmospheric pollution, marine and freshwater degradation, rapid industrialization, and innumerable threats from climate change".

Therefore environmental accounting: is useful for both the internal and external users because through it they can receive the information of environmental impact on organization. It can reduce the environmental impact related to environmental loads and wastes emission resulting from business organization. Environmental accounting also provides useful information regarding the decisions for environmental cost, value of investment, value and level of production etc and helps to measure the environmental impact of every process of organization and operation on the air, water, land, worker's healthy and safety measure and the whole society. The result of environmental accounting is to help the management to develop its environmental strategy for making a greener corporate culture. Through proper measurement, recording and communication, environment accounting leads to indicate the effectiveness of the system. Environmental accounting facilitates proper reporting of the results of environmental practices by the company and such result is communicated to the internal and external users of the organization, which leads to enhance corporate image of the organization.

There are many definitions of sustainable development, but definition by World Commission on Environment and Development in 1987 is significant. It defines Sustainable Development as the "development meets the needs of the present without compromising the ability of future generations to meet their own needs." Social, environmental and economic progress are all attainable within the limit of the earth's natural resources. Sustainable development is when we use the resources to meet our needs but to pressure the environment while doing so. Sustainable Development is about maintain a balance between economic activity and the environment. It includes a proper balance between economic, social and environmental needs. The eighteenth-century Saxon forestry and mining official Carlowitz (1713) invented sustainability: Timber scarcity in Europe made Carlowitz look for similarity between forest growth and harvest of timber so as to establish a regular and sustained utilization own translation. Von Carlowitz also emphasized the right to food and livelihood, not only of the contemporary poor but also of posterity; this is indeed a call for intra- and inter generational equity – key concerns of sustainable development. Two centuries later, the World Conservation Strategy propagated "sustainable development" as conservation of natural resources (IUCN *et al.,* 1980).Ecologoal principles refers to maintaining the carrying capacity of ecosystem. Carrying capacity means the number of people a territory can sustain with its ecological services and development refers the long, healthy and fulfilling lives of natural resources. (IUCN *et al.,* 1991, p. 18*).*

Ecological principles refers to maintaining the carrying capacity of ecosystem. Carrying capacity means the number of people a territory can sustain with its ecological services and development refers the long, healthy and fulfilling lives of natural resources.The principles of sustainable development refers to the fulfillment of human needs like clean air and water, shelter, education and satisfying employment. Environmental issues are also very important such as ecological integrity through reduction of waste, careful control over resources and protection of diverse species and ecosystem. Sustainable development focus on involvement of local people in the development and local solutions of environmental and development problems. There are two sustainability in the literature one is weak sustainability and another one is strong sustainability. Operationally, weak sustainability is used. Sustainable development refers

the maintenance of natural stock, land resources and ecosystem. If any development deplete the natural capital then that development is not sustainable.

1.2 Environmental accounting and sustainable development in small and medium industries

In developing countries like India, small and medium scale industry plays an important role in creation of employment , resource utilization, income generation and increase the growth of economy. These industries are more labor intensive than large organizations. However, definition of small scale industry is different from country to country and from one time to another in the same country because of the pattern , stage development, government policy and administrative set up of that country. Every country uses different parameters in defining small scale industry. In India they are defined in terms of capital investment and installed plant and machinery as per the Micro Small and Medium Industries Act of 2006. Prior to that small industry definition was employment based. One of the important definitions of small scale industry was by , the Fiscal Commission, Government of India, New Delhi,1950 which defined one which is operated with hired labor usually 10-50 hands. Fixed capital investment is another parameter of defining the industry and by using this parameter differentiation between small and large scale industry can be done. The limit of investment is raised by Government continuously. In the European Union, small means up to 49 employees. In Canada , the US and Mexico, the definitions vary by sector to sector and number of employees (a man of 500 employees is the most common cut off point)or gross annual income.

Many small scale industries affect the environment through consuming more energy, generating more waste and polluting per unit output. Most of industries are burn fossil fuel and the residual waste emit greenhouse gases. The dumping of wastes by the industries in water bodies cause harm to the marine life and also damage the ecosystem. Rapid and unplanned industrialization causes the main degradation of the environment. The use of natural resources machinery and large production permanently damage the whole ecosystem. The process of effect starts from the deforestation. In earlier times, forest trees are cleared for the use of production and when trees are cleared, the wildlife in the forest also become uprooted. The lack of trees is the main problem of carbon emissions. Forest would help emit oxygen and also refresh the levels of healthy gases in the air, water. The factories have not only polluted the air but also polluted the land and water. Carbon emissions is the primary issue of global warming. As the temperature rises glaciers are melting and oceans are rising. More plants and animals are threatened due to global warming. Though the Industrialization has positive impact on the world economy but this revolution have been damaging the world environment by depleting natural resources, land, water pollution, human health problems, carbon emissions.

Fig. 1: Polluted Emissions from Industry

2. Objectives of the study

The main objective of this paper is to study the sustainability of manufacturing small and medium enterprises on environment. Another objective is to study the application of environmental parameters and environmental accounting on balancing environment and industrial growth.

3. Methodology

The survey has covered the whole of Kamrup District of Assam as the universe of study. Non random and judgment sampling have formed the basis of study. A structured questionnaire was used for

collection of primary data. The paper is based on primary data. Primary data was collected from two manufacturing industrial estates of Kamrup district namely Bamunimaidan and Amingaon. Also secondary data was extensively used for meeting the objectives of study. Library visits, supporting literature from relevant sources, research reports, government publications, etc have formed the sources of secondary data.

Survey questionnaire used for collecting primary data

1. What are the products of your industry?
2. Name the ingredients used in the manufacturing process?
3. Have you analyzed the waste products? what are the chemicals discharged into the environment?
4. What is the amount discharged per day?
5. What is the point of origin of discharge?
6. Are you following the norms of maximum permissible limits standardized by pollution board?
7. What are the remedial measures taken by your industry?
8. Are you planning any Ecopreneurship measures in the future when you expand your industry?

4. Results and discussion

Table 4.1 showing Analysis of our study sites in Amingaon and Bamunimaidan

Name of Products	Ingredients used	Waste product	Parameter of waste in and around industry	Amount of discharged/ per day	Point of origin	CPCB Norms followed	Remedial measures	Ecpreneur-ship measure in future
Paint	Binding agent, filling agent, pigments and chemicals	suspended solids, Phenolics, Oil and Grease	pH, BOD, Bio-assay test	High	Amingaon	Yes	N/A	Yes
Mosquito repellent coil	Filler, binder and active	Chemicals, packing materials	High BOD, offensive odours, acidic pH	Moderate	Amingaon	Yes	Effluent treatment plant	Yes
Fabric whitener	Acid violet paste	Strong colour, black liquor,sulphide of sodium	pH, high BOD, suspended solids	Low	Amingaon	Yes	Effluent treatment plant	Yes
Plastic molded furniture	Reprocess poly propile len	Plastic waste, colouring dyes	Colours and odours	Low	Amingaon	Yes	N/A	Yes
Cosmetics	Aqua, streaic acid, glycyrrhiza glabra, perfume,potassium hydroxide,disodium, menthol.	Chemicals, packing materials	Toxic chemicals, Acidity	Moderate	Amingaon	Yes	N/A	Yes
Ayurvedic products(hena, nomarks)	Tumeric , lemon, madayanti, amlaki, methi, bilva, arishtaka	Total solids, toxic organts, metal pollutant, organics	High or Low pH, toxic organics	Low	Amingaon	Yes	N/A	Yes
Pan masala	Betelnut, catechum, cardamom seeds, menthol, sanadalwood and added flavours	Colours, Chemicals	Toxic organics, total solids	Moderate	Bamuni-maidan	No	N/A	Yes

Note : Central Pollution Control Board

Due to pressure on Land, Water and bio resources, there is a continuous impact of various types of human activities on our environment in one form or the other. One sector where anthropogenic signature is clearly evident is the generation and disposal of liquid and solid waste which is more evident in the developed countries. We face problems associated with urban by waste related matters since the increasing population, at about 3.6% every year continues to add pressure on the already poorly service facilities.23 major cities generate an average of 1300 tones of solid waste everyday per city and this works out to about 0.450 kg of waste per person everyday throughout the country. The proportion of degradable and non degradable components will vary from place to place, also generation of liquid waste (waste water) is one of the major problems of highly developed cities and also developing ones like Guwahati city.

In the developed cities, several small scale industries dealing with manufacturing processes discharges highly acidic waters into the nearby regions. In some localities the pH of rain water would be as low as 2 leading mobilization of a number of metals such as Mercury, Cadmium. In such places the metal levels in waste waters of Industrial wells due to uncontrolled industrial discharges have advanced the levels of many metals in the nearby water bodies. Monitoring of ground water in the city of Chennai as also shown high levels of metals (Ramesh *et.al*, 1997). In the ground water a number of localities due to migration of water from contaminated regions.

Water pollution is caused by emission of domestic or urban sewage, agriculture wastes, pollutants, and industrial effluents into water bodies which is the main source responsible for discharge of waste materials. The waste materials of any industrial unit consists of acids, alkalis, toxic , metals, oil, grease, dyes, pesticides and even radioactive materials. Other important pollutants are Polychlorinated Biphenyl Compounds (PCB). Lubricants and hot water discharges by power plants. Industries contribute to more than half of the total water pollution. The industrial effluents contain pollutants like asbestos, phosphates, mercury, lead, nitrates , sulphur, H_2SO_4, oil etc which when unloaded into the water bodies usually dissolve or remain suspended in water. Sometimes they also accumulate on the bottom of the water bodies. In Guwahati city, there are many small scale industries which do not have sufficient capital to invest in pollution control equipments, so industrial water is not treated adequately before discharging it into the river Brahmaputra or the lakes. The total toxicity of this harmful materials have not been discharged properly and studies have been carried out to determine the toxicity only on individual toxic elements. These are the causes of many grave diseases such as diarrhea, cholera, hepatitis, dysentery, and salmonellosis. Many of these pollutants are also carcinogenic while some like Na can cause cardiovascular diseases, Hg and Pb causes nerve disorders chromosomal changes occur due to release of DDT in water. Excessive fluoride in polluted water may damage spinal chord while arsenic is the main cause for damage to the liver, bones, and nervous system.

To quantify and quality the rate of pollution we can use environmental quality indices which according to Mitra Corporation (1972) means tools used to monitor and quantitatively report environmental status and trends based on the specific standard. The indices or an index

Is essentially a fraction which has a numerator and denominator. The numerator is the measurement of the quantity one is interested in and denominator is the standard which we are comparing to when measurement is much less than standard the value of the index is low and there is no problem with pollution.

The parameters used for testing the water quality has been standardized for industrial effluents. They are-

(i) Temperature: Which exerts great control over aquatic communities. The standardized temperature range for industrial effluents has been standardized between 20-25^{0}c.

(ii) Per Value: Which is an indicator of existence of biological life as most of them survive in quite narrow and critical pH values and has been standardized at 5.5.

(iii) Dissolved 0_2: It is essential for aquatic life. Poor water quality as a result of water pollution shows Do less than 2 mg/L.

(iv) Colour of water: It is an important parameter as colourless water indicates clean water. Industrial waste water is high colured.

(v) BOD: It is standardized as 100 mg/L and is essential for aquatic life, while total dissolved solids is limited to 5000mg/L. These are measures of organic pollution to both waste and surface water. High BOD is an indication of poor water quality.

(vi) Turbidity(NTU): May be due to organic and inorganic constituents, Turbid condition may increase the possibility of water borne diseases.

Hence is must not extent the permissible limits.

In India the standard of tolerance units from effluent for arsenic is less than 0.05 mg/L, lead 0.05mg/L cyanide less than 0.2 mg/L. Fluoride less than 1000mg/L and total dissolved solids less than 4000 mg/L.

5. Conclusion

The control of Industrial based water pollution is difficult, but we may try for its prevention and minimization or the problem is going to be worsening day by day. Scientific techniques are necessary to be adopted for the environmental control of catchment areas, of rivers, lakes, ponds or streams. Industrial mask should be based on recycling operations. Treatment plants should be constructed on the large scale. Bioremediation should be developed where plants can be used to recover metal from metal bearing waste waters.

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