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From The Desk of the Editor-in-chief...

"Environmental pollution is not only humanity's treason to humanity but also a treason to all other living creatures on earth!" — Mehmet Murat ildan

Presently the ecological degradation, unsustainable manoeuvring of biological productivity and an inequitable regime of intellectual property right(IPR) are shaking the foundations of agriculture and bio-safety in the country of ours. The monopolizationof agriculture under World Trade Organisation's (WTO) framework of TradeRelated Aspects of Intellectual Property Right (TRIPS) and Exclusive MarketingRight (EMR) resulted in an unequal treatment to Indian sovereignty over biological and agriculture resources. The promises of Blue Box (direct payment to farmerunder production limiting programmes) and Green Box (benefits to agricultureand rural community, stockholding for food security, domestic food and investment, subsidies agricultural input subsidies for low income resource poor families) -

social safety clauses for developing countries under WTO agreement have also proved short lived euphoria in the scenario where most of the farmers end up their lives because of shortage of food . The saga of legal qualms around patenting of haldi (turmeric), basmati, neem, karela (bitter gourd), kalajira (black cumin), and bhindi (lady finger) clearly spells widespread bio-colonisation by the developed countries. Equally pernicious is the influx of multinational companies (MNCs) in the arena but result was that still our farmers commit suicide or rarely earn their two meals a day as lot is needed to be done to eliminate the middleman intervention in transactions.

The perfectly admirable task of improving the ease of doing business in India was also taking too long to show dramatic results and hardly made for histrionics at public meetings.

Though India's position in the World Bank's Ease of Doing Business has certainly improved since 2014 but it continues to languish at a rank of 130 among 190 nations (World Bank, 2017). Possibly, realising that the hard grind of governing a country was not enough to enthuse the committed .

A dramatic gesture was needed to surprise the world . And, certainly, in the days that immediately followed the announcement of demonetisation, whoops of joy and enthusiasm filled the air. The question was will the euphoria at the discomfiture of those with black money that was initially experienced, by the poor and the middle class continue despite the immense hardship and imperilled livelihoods?

In the beginning the great Indian cash crunch posed a threat to smooth economic working, myriad businesses echoed the need for an infrastructure to support the new mechanism for their daily functioning, but this was because the cash to GDP ratio of India stood at 10.6% in 2016.

People criticized that the running of the economy requires an astoundingly large paper currency flow which has a cost associated with it. This fact was highlighted by a study of Tufts University, The Cost Of Cash In India. According to the study the cash operations cost India about 21,000 crore annually. Demonetization, which was originally aimed to extract liquidity from the economy to unearth black money, has worked as a catalyst in accelerating the move from a cashdriven economy to a cashless economy. The lack of cash has brought digital payments and e transactions to the forefront; e-wallets, e-banking, Aadhaar payment app etc. and we proudly say yes our economy is cashless where not only big corporate giants but small vendors are making virtual payments it has helpedus to eradicate paper waste and save the environment for future. The drive to cashless economy is intact a manifestation to watch "Swachh Bharat Abhiyaan".

I have an ardent hope that you will enjoy reading all the articles in the current issue and will revert with your valuable comments.

Best Wishes

Dr. Sanjeev Bansal
Editor-In-Chief
Amity Journal of Energy & Environment Studies

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Managing Garbage of The Digital World

Noble Vinayan* **Priya Verma**** **Arpit Gupta*****

It is a concrete fact that with the huge increase in usage of Information & Communication Technology (ICT) devices to eliminate the digital divide, there is also an threatening growth of digital waste world-wide. There is a urgent requirement for e-waste management since e-waste constituents might lead to severe environmental damage and health risks , when crude, unprofessionalmethods are applied for the retrieval of important components. It is also required to encourage recycling of all important and valuable material from e-wastes to preserve the natural resources.

Keywords: Digital, Information and Communication Technology (ICT), e-governance, India, Information Technology, Government, E-Waste, Electronic, Risks

INTRODUCTION

E-waste is defined as "waste electrical and electronic equipment, whole or in part or rejects from their manufacturing and repair process, which are intended to be discarded" whereas electrical and electronic equipment has been defined as 'equipment which is dependent on electrical currents or electro-magnetic fields to be fully functional'. Today, most of the developing countries are suffering with the problem of rapidly increasing e-waste and they have to have new and effective e-waste management systems for end of life Information and Communication Technology (ICT) products to avoid the threat on the environment and the mankind.

The rapid growth of Information and Communication Technology (ICT), the technological changes and frequent innovations are resulting in shorter life span of Information and Communication Technology (ICT) product and equipment. Moreover in the developing countries the amount of imported unused Electrical and Electronic equipment (EEE) is uncontrolled. Therefore, the volume of e-waste has drastically increased in developing as well as the developed nations. At the same time, it is encouraging that every country, along with going for the development in the Information and Communication Technology (ICT) sector, is also working for 'Going Green' by taking care of issues such as efficient use of natural resources, sustainable recycling of e-waste, minimization of e-waste, and development of products with minimum use of hazardous substances.

Electrical and electronic equipment (EEE) are developed from valuable as well as hazardous materials and if at end of life of EEE, these hazardous materials are not disposed of scientifically it may cause severe damage to the environment and public health. The presence of heavy metals (like: Arsenic, Lead, Cadmium, Barium, Nickel, Zinc Sulphide, Lithium, Mercury, etc.) and other toxic substances like Polychlorinated biphenyls (PCB) etc. may cause extreme harm to the environment, if not disposed of in an environment friendly manner.

International Telecommunication Union (ITU) has accepted the fact that the regulations in many developing countries to cover the areas of Waste Electrical and Electronic Equipment (WEEE) are inadequate as they exclude key topics and key stakeholders like the informal sector. The collection, recycling, recovery and associated activities of e-waste management by the informal sector having little or no knowledge about techniques, precautions etc, cause more damage to their health and environment.

Environmental sustainability can be defined as " the ability to maintain the qualities that are valued in the

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physical environment by the use of design for environment principles, efficient use of non - renewable resources, efficient and environmentally sound recycling and use of renewable resources as much as possible", in order to have a sustainable policy to handle e-waste in an environment friendly manner, it is thus extremely important that the policy of e-waste disposal and the regulatory aspects should be stringent as well as rational.

EFFECTS OF E-WASTE ON HUMAN HEALTH AND ENVIRONMENT

E-waste is highly complex to handle because of its composition. It is made up of multiple components some of which contain toxic substances that have an adverse impact on human health and environment if not handled properly that is if improper recycling and disposal methods are deployed. Therefore, there is a need for appropriate technology for handling and disposal of these chemicals.

Basel Convention characterizes e-waste as hazardous when they contain and are contaminated with mercury, lead, cadmium, polychlorinated biphenyl etc. Wastes containing insulation or metal cables coated with plastics contaminated with or containing lead, coal tar, cadmium, Polychlorinated Biphenyl (PCB) etc. are also characterized as hazardous wastes.

Precious metal ash from printed circuit boards, glass waste from cathode-ray tubes, LCD screens and other activated glasses are also categorized as hazardous wastes. Effects of some of the prime hazardous components in of e-waste are mentioned below:

MANAGEMENT OF E-WASTE

There is no unique or ideal model for e-waste management in developing countries, each of which has its own specific environmental, social, technological, economic and cultural conditions.

Environmentally sound management of WEEE recognizes three Rs, which are,reuse, recycle and reduce. The objective would be toreuse till functioning of electronic equipment by someone else,recycle those components that cannot be repaired and reduce the generation of e-waste through smart manufacturing and maintenance.

A smart e-waste management system for developing countries have to assess the e-waste situation, recognize that e-wastes are a complex mixture of hazardous and non-hazardous substances and materials and need to define the integral e-waste management system taking into consideration the EEE market penetration , life cycle of ICT equipment, financing mechanisms etc.

S.No.	Hazardous components	Effect of Hazardous components of e-waste
1	**Arsenic**	Can affect skin and can decrease nerve conduction velocity. Chronic exposure to arsenic may cause lung cancer and sometimes be fatal.
2	**Lead**	May affect kidneys, reproductive systems, nervous connections. May cause blood and brain disorders, sometimes may be fatal.
3	**Barium**	Can affect heart muscle.
4	**Chromium**	Candamage liver, kidneys and may cause asthmatic bronchitis and lung cancer.
5	**Beryllium**	May cause lung diseases.
6	**Mercury**	Affects the central nervous system, kidneys and immune system, it impairs foetus growth. May cause brain or liver damage
7	**Cadmium**	May cause severe pain in the joints and spine. It affects the kidneys and softens bones.
8	**BFR (Brominates flame retardants)**	Can harm reproductive and immune systems, may cause hormonal disorder.
9	**Chlorofluorocarbon (CFC)**	May affect the ozone layer. It may cause skin cancer in human and genetic damage in organisms.
10	**Polychlorinated Biphenyl (PCB)**	May cause cancer in animals, can affect the immune system, reproductive system, nervous system, endocrine system . PCBs persistently contaminate in the environment and cause severe damage .
11	**Polyvinyl Chloride (PVC)**	PVC contains upto 56% chlorine and when burnt, produces Hydrogen chloride gas which in turn produces hydrochloric acid that is dangerous to respiratory system.
12	**Dioxin**	These are highly toxic to animals and can lead to malfunction of foetus, decreased reproduction and growth rates, affect immune system.

The main aspects to be taken into account when framing ICT waste management guidelines for developing countries are:

- Policy and regulations covering import and export of EEE and WEEE in accordance with the rules of each country and with international legislation
- Responsible information system to have data on ICT equipment in market, disused EEE management and WEEE management and to have control on the monitoring and future planning
- Defining responsibilities of prime stake holders at the level of government, supply chain, consumers of ICT equipment and entities for disposal of waste
- Promoting employment and training for the informal sector engaged in recycling and recovery of the materials.
- Extended producer responsibility (EPR) where the manufacturer's responsibility for its ICT equipment extends throughout the various stages of that equipment's life cycle with internalizing the cost of managing the equipment at the end of life

INDIAN SCENARIO FOR E-WASTE MANAGEMENT

Last few years India has emerged as one major IT hub and the consumer electronic market has grown in an exponential rate. According to Manufacturers Association of Information Technology (MAIT) the Indian PC industry is growing by 25% compound annual growth rate. Study reports that in 2007, 2.2 million computers were made obsolete and 14 million mobile handsets replaced.

The e-waste generated was estimated to be 332,979 tonnes out of which 144,000 tonnes was recyclable and actually e-waste recycled was 19,000, tonnes. The e-waste processed contained 7000 tonnes of TV and 12000 tonnes of computers. It was also estimated that around 50,000 tonnes of e-waste was generated through import besides 332,000 tonnes generated domestically.

Developed countries find it profitable to send e-waste for reuse/ recycling to developing nations because of economic disparities e.g. cost of recycling of a computer in US is $20 whereas in India it is $2. So the import of e-waste to India has got enough chance to jump high. In India, there are 10 states that contribute to 70% of the total e-waste generated in the country, whereas 65 cities generate more than 60% of the total e-waste.

In India, Ministry of Environment and forests (MoEF) is responsible for environmental legislation and its control. The main bodies active in e-waste management in India are CPCB, SPCBs, Gtz and industry associations such as MAIT. These organizations are working under the guidance of MoEF. CPCB (Central Pollution Control Board) had set up a task force in 2007 to analyze the different aspects of e-waste covered in various environmental legislations in India and had drafted measures for environmentally sound management of e-waste.

In the beginning of 2008, the CPCB released measures for environmentally sound management of e-waste, which apply to all those who handle e-waste. These guidelines are first policy framework dealing specifically with prevention, management, treatment, recycling, and disposal of e-waste in India. The policies framed, provide guidelines for manufacturers, customers, generators, collectors, recyclers, transporters, dismantlers, and enforcement agencies and prescribe procedures for handling e-waste in an environmentally efficient manner. Apart from adoption of environmentally sound technologies, they include international standards and practices like restriction on hazardous substances (RoHS) in EEE

Concerns/ Challenges in e -waste management

Following are the some of the major issues that need attention while handling e-waste:

- The data for information on e-waste is estimation and there is a problem in finding information on imports of e-waste. Most studies have concentrated on devices like mobile, computer and TVs while the domestic appliances also contribute to a considerable proportion of e-waste. There is a need to have credible data covering wide range of products across sectors.

- Waste collection, transportation, processing and recycling is dominated by the informal sector. The sector is well networked and unregulated. There are serious issues regarding leakage of toxins into the environment hampering workers' safety/ health.
- There is a requirement for establishment of collection channels for e-waste from the generator to the recycler. Presently as the standards are not followed by the collectors (mainly the informal sector), the environmental, health and safety norms are hampered. The formal sector having large infrastructure and high operational cost finds difficulty in competing with the informal sector.
- The informal sector needs specific attention to be handled properly considering the socio economic condition so that the solutions for environment friendly management of e-waste are found to be rational for the stake holders
- There is a lack of fund and capacity in Government for monitoring and enforcement of the regulations
- Awareness regarding the hazards of e-waste is low because of structural deficiency in implementation of policies, poor literacy and poverty of an important major stake holder (informal sector)
- The e-waste management system is mostly manual and low tech and the 'take back' by producers is limited to few IT equipment and few formal collection centres. There is lack of effort from producers that results in limited implementation of EPR. In absence of accountability and penalty criteria in the regulation, it is difficult to monitor the EPR activities.

CONCLUSION

ITU has agreed to the way that there is no unique or ideal model for e-waste management in developing countries, each of which is characterized by its own specific environmental, social, technological, economic and social conditions.

With a view to bridge the computerized divide, there is exponential development in the use of Electrical and electronic equipment(EEE) thus there is disturbing effect on environment and human health when the ICT wastes are not disposed of scientifically. There is an emergent need to implement the existing policies and guidelines in line with the international principles and practices for a healthy e-waste management system.

Government policies ought to encourage the reuse of EEE planning to minimize and recycle Waste Electrical and Electronic Equipment (WEEE). The Extended Producer Responsibility(EPR)do need to have clear regulations to mandate the 'take back' movement of companies entirely.

There is a clear need to have proper data system through standardized mechanisms. Eco-design can have a positive effect in reducing the rate of WEEE generation, encouraging the management of e-waste and recovery of materials, achieving cost reductions.

In Indian context, Ministry of Environment and Forests in the E-waste (Management and Handling-Rules, 2011) has clarified about the Reduction in the use of dangerous substances (RoHS) in the manufacture of electrical and electronic equipment where attempt is made to get ensured that new electrical and electronic equipment does notcontain Lead, Mercury, Cadmium, Hexavalent Chromium, poly-brominated biphenyls (PBB) or poly-brominateddiphenyl ethers (PBDE) which is to be achieved inside a period of three years from the date of commencement of these rules.

MoEF is likewise advancing the 3R Concept (Reduce, Reuse and Recycle) for Hazardous Waste ManagementMoEF has additionally defined the responsibilities of Central Pollution Control Board(CPCB)and State Pollution Control Board(SPCB) who are going about as checking authorities in respect of management of e-waste in India. Briefly the principle elements of CPCB are:

- Coordination with State Pollution Control Boards.
- Preparation of Guidelines for Environmentally Sound Management of e-waste.
- Conduct assessment of e-waste generation and processing.
- Recommend gauges and specifications for processing and recycling e-waste.
- Documentation and assemblage of information on e-waste.
- Conducting preparing and awareness program.
- Enforcement of reduction being used of dangerous substances (RoHS).

- Incentives and certification for green design/items.

The collection, storage, transportation, segregation, refurbishment, disassembling recycling and transfer of e-waste is likewise defined by the guidelines issued by the Central Pollution Control.

The DoT guidelines in the direction "to develop a hearty and secure state-of-the-workmanship telecommunication network giving seamless coverage special concentrate on provincial and remote areas for crossing over the advanced divide" have likewise specific regulations for the environmental and health issues emerging from the telecom network. The remuneration for reception of green approach and incentive for use of renewable energy sources can be one functional and sustainable method for overseeing e-waste in Indian socio social environment. By advancing the use of energy efficient equipment and renewable energy technologies, and furthermore receiving measures for reduction of carbon impression, the concern for e-waste is additionally addressed in direction of long haul maintainability.

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Ocean Pollution and its Various Hazards – An Overview

Jatin Narang* **Rahul Lalwani****

The contamination in an ecosystem causing harmful impact on the organisms in that ecosystem is called pollution. It can be done by changing the growth rate and reproduction of plants or animal species, or by human interfering for their comfort, health or property values. The term contamination or pollution also includes any physical modification that alters the energy and radiation flow in an environment.

Keywords: Oceanpollution, environment, marine pollution, ecosystem, disposal system, pollution, emissions, spilling.

INTRODUCTION

Sewage disposal into the ocean has come a long way from the time when there was indiscriminate dumping of wastes. The alarming ocean pollution that resulted from such practice has, in most places, been virtually eliminated in recent years. Today disposal is a carefully controlled operation based on extensive engineering research and design. However, up until 10 years ago it was the usual practice to discharge sewage effluent from the end of a pipe or submarine outfall in a single large stream. The buoyancy of such a flow was so strong in relation to its mixing rate that the effluent plume would invariably rise to the surface and spread as a surface current. Pollution of the shoreline was likely when onshore currents occurred.

Objective

- To describe the various hazards caused by ocean pollution.
- To get the knowledge of how the ocean pollution is calculated.
- To define the solutions that are used to resolve the problem of the ocean pollution.

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Ocean pollution vs Marine pollution?

Marine pollution or Ocean pollution is defined by the Group of Experts on the Scientific Aspect of Marine Pollution (GESAMP), as part of the basic framework of the UN Convention On the Law of the Sea (UNCLOS) 1982 (Article 1.4), is: "the introduction by humans, directly or indirectly, of substances or energy into the marine environment resulting in such deleterious effect as harm to living resources, hazard to human health, hindrance to marine activities including finishing, impairment of quality for use of sea water, and reduction of amenities."

How is it caused?

In Fig. 2 and Table 1 we show the relationship between shallow cloud cover and the presence of aerosols in all four geographical zones analyzed separately for each of the 3 months of this study. Cloud resolving models predict an increase in strati form cloud cover with an increase in the aerosol concentration. However, cloud properties also change because of variation in large-scale atmospheric circulation that may also affect aerosol concentrations. For example, regions of low atmospheric pressures are convergence zones that tend to accumulate aerosol and water vapour and generate conditions favorable for cloud formation. To untangle the effect of aerosol and large-scale meteorology on cloud properties, weuselinear multipleregression. Note that the aerosol indirect effect can not beuntangled with high degree of confidence until regional models can predict cloud evolution with high precision. Here we are mainly trying to eliminate the influence of large-scale meteorological parameters that can impact simultaneously both aerosol concentration and cloud development, generating false correlation between them. The regression analyzes the dependence of the measured cloud properties (cover, droplet effective radius, and optical thickness) on:

(i) MODIS measurements: aerosol optical thickness (AOT) and total perceptible water vapor (indicator of convergence);

(ii) National Center for Environmental Prediction (NCEP) generated meteorological fields that include air temperature at 1,000 hPa, temperature difference of 850 and 1,000 hPa and 750–1,000 hPa, winds at three altitudes (1,000, 750, and 500 hPa), broad-scale vertical motion at 850 and 500 hPa based on the continuity equation, sea surface temperature, equivalent potential temperature difference between 500 and 950hPa, and lowstatic stability, where the differential is defined as a finite difference between 850 and 950 hPa. The logarithm of the AOT is used to reduce nonlinearity in the regression. Logarithmic dependence is expected from cloud condensation theory, and it was found to be appropriate here. Nonlinearity in the relationships among the parameters may reduce the efficiency of the multiple regressions.

Fig. point source and nonpoint source pollution

Fig1. Classification of pollution forms.

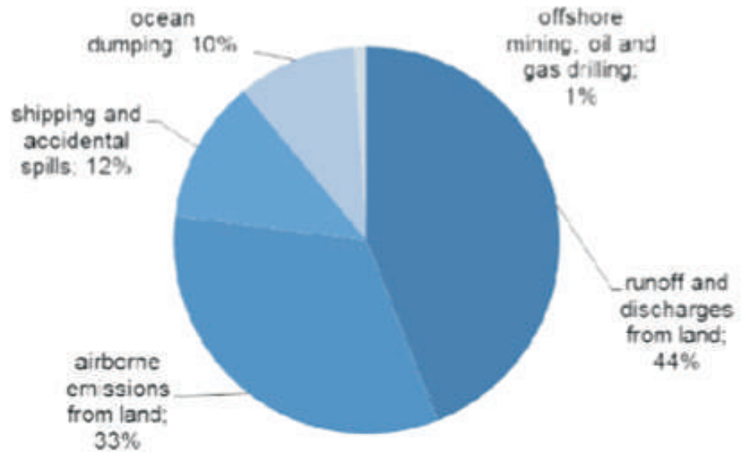


Fig 2. Share of Difference sources of Ocean pollution

The pollution in the ocean and seas are originated from four distinct sources, which are:

- Through runoff and disharges form land,
- Airborne emissions from the land,
- Shipping and accidental spilling,
- Ocean dumping

The percentage of these activities is shown in the pie chart of Fig 2

Lastly, there are the large chunks of plastic that are being dumped along the coast, in rivers, etc…. Once they arrive in the ocean, they float along on the oceanic gyre which concentrates this kind of debris in the different oceans. This waste material is the main killer of life in the ocean and may take up to 450 years to be degraded.

How to measure the pollution an analysis?

Analysis of the Satellite Data uses the MODIS data on the Terra satellite to measure the daily aerosol column concentration and its correlation to the1° latitude and longitude grid. Simultaneous observations of aerosols in cloud-free regions of the grid box and clouds in the cloudy regions of the grid box are possible (see http:modisatmos.gsfc.nasa.gov). Aerosol non homogeneity has a spatial scale of 50–400 km, allowing the 1° resolution study. MODIS measures the aerosoloptical thickness, (in cloud-free, sun-glint-free conditions),representing the aerosol column concentration, which we use as a surrogate for the concentration of aerosol that interacts with the cloud layer. MODIS also measures the following cloud properties: cloud cover, optical depth, liquid water content, cloud top effective radius, and cloud top pressure. The 1° latitude and longitude data were classified as shallow water clouds if the average cloud top pressure is higher than 640 hPa and all of the clouds in the given grid box and in its surrounding neighboring pixels are water clouds (noise).The average cloud top pressure of the shallow clouds is 870 hPa, corresponding to 1,200 m. For the region impacted by smoke, 53% of the 1° grid boxes were classified as shallow clouds (see Table 1). This percentage corresponds to 107 km2 with average of 50 daily observations during the 3 months of investigation. For the region impacted by dust it corresponds to 106 km2 of observations (see definition of the studied region in Table 1). Results during June through August, smoke, dust and pollution aerosols are confined to separate latitude belts of the Atlantic Ocean, allowing separate analysis of their effect and the effect of pure marine air on the prevailing clouds (see Table 1). Fig. 2 shows the longitudinal distribution of changes in the shallow cloud cover and in the effective radius (Reff) from clean to aerosol-lade conditions. The fraction of the shallow clouds decreases from east to west because of transition from shallow to convective clouds. The largest changes in cloud

Table 1. Results of the analysis for four regions in the Atlantic Ocean

Region	Dominant aerosol	Fraction of region	Shallow cloud cover	Range of AOT	Mean AOT	Δcl-aer	&cl-aer	% change in R_{eff}	% change in LWP	Change in CLTP, hPa	Radiative effects (W/m²) due to ΔN_c	ΔN_c + ΔLWP	ΔN_c + ΔLWP + &cl	Total forcing TOA	ΔAbs
30°N-60°N	Pollution	0.17	0.07	0.03-0.19	0.102	0.20 ± 0.06	0.19 ± 0.03	−12 ± 10	6 ± 34	−39 ± 20	−1.0	−1.1	−4.5	−8.0	0.7
5°N-30°N	Saharan dust	0.26	0.11	0.03-0.46	0.174	0.36 ± 0.12	0.25 ± 0.04	−12 ± 13	9 ± 34	−66 ± 13	−0.7	−0.9	−6.8	−14.0	0.7
20°S-5°N	Biomass burning	0.53	0.29	0.03-0.43	0.152	0.31 ± 0.07	0.31 ± 0.04	−32 ± 3	−21 ± 8	−55 ± 11	−1.5	−1.0	−9.5	−11.3	2.9
30°S-20°S	Marine	0.47	0.27	0.02-0.24	0.085	0.45 ± 0.10	0.45 ± 0.04	−19 ± 7	35 ± 22	−72 ± 18	—	—	—	—	—

Columns from left: location; dominant aerosol; fraction of the region classified as shallow clouds; shallow cloud fraction; range of the AOT in the analysis (5th, clean, and 95th, hazy percentile), mean value; Δcl-aer, change in the cloud cover from the clean and hazy conditions; &cl-aer, partial change in the cloud cover associated with aerosol by the multiple regression; % change in the cloud effective radius (R_{eff}) from the clean and hazy conditions; % change in the cloud liquid water content (LWP); change in the cloud top pressure (CLTP). For each value the variability among the three months of analysis (June-August) is given. The average radiative effects due to change in the aerosol optical thickness from the base oceanic value of 0.06 associated with the following: increase in cloud droplet concentration (ΔN_c) due to reduction in R_{eff}; + change in the column cloud water content (ΔLWP); + change in the cloud cover (&cl); + direct aerosol radiative effect at the top of the atmosphere (TOA); ΔAbs, absorption of sunlight by aerosol. Note that the sum of the last two columns is the total aerosol radiative forcing at the surface. The radiative effect was calculated as half of the effect for solar zenith angle of 60° only for 1° latitude grid boxes characterized as shallow clouds. The uncertainty in the aerosol measurements from MODIS is ≈10%, cloud fraction ≈3%, and cloud effective radius 20%. The 95th percentile confidence limit of the multiple regression is 4–8% off the stated values. The overall error in the radiative effects calculations is therefore ≈20%. Absorption computations depend on the validity of the assumed single scattering albedo with uncertainty of 50%. No calculations are given for the marine region, because the average AOT is too close to the baseline value.

cover are observed in regions with high aerosol concentrations near the continental sources. The cloud liquid water path (LWP) increases in all but the biomass burning zone, in agreement with theory.In the smoke zone the LWP decreases. The satellite data show a systematic increase in the shallow cloud coverage as a function of the aerosol concentration across the Atlantic Ocean for all four aerosol types (see Table 1). For a given value of cloud fraction (0.30), the spatial coverage of shallow clouds extends 2,000 km further to the west for heavy smoke or dust in comparison with the clean conditions.

LITERATURE REVIEW

The marine environment and the river environment can be easily monitored by the applications which are wireless sensors. Planet Earth comprises of 70% of ocean, this does not include the rivers and the lakes that we have as a critical part to our well-being. The use of non-renewable resources has been increased drastically over the years, for which the search of the oil reserves is going deeper and deeper into the water bodies. The transportation of the crude oil and the oil products across the globe is done with the help of large tankers. This at times results into oil spill, which pose a serious threat to the economy of the world. Due to such large amount of oil being transported the quality spilled annually is also very large. It is estimated that 4.5 million tons of oil is spilled in a year. The biggest contribution done to the ocean pollution is done by the tankers that travelling beyond the oceans i.e., roughly 45%. The other sources that caused the same problem is the land based sources such as the urban waste and industrial discharges, which reach the ocean through rivers. Keeping a check on the marine environment is very difficult as well as costly to the humans. It causes drivers to keep a regulatory check for hours including the other facilities they require. They need to work on the days when the weather won't be supporting them. Due to the technological advancement humans have come up with the wireless network models for the underwater status checking here the Autonomous Underwater Vehicles (AUV), Unmanned Undersea Vehicle (UUV) and Buoys are used to extract the data and analyses it at the base station.

1. Through runoff from the land

The pollution mainly transport from the land to the ocean via rivers. The different forms of waste material from land are taken up by the river which ends up in the oceans. The most of polluting materials come from the urban areas, and the industrial sewages that are placed in the river and end up meeting the ocean(s). This urban and industrial sewage together with agricultural run-off, does contains high levels of nitrogen and phosphorus, which is essential for any life to being. But these elements are present in ocean at very limited concentration to allow for abundant organismal growth. A content of nutrient-rich water from land can therefore upset any balance in the aquatic ecosystem in

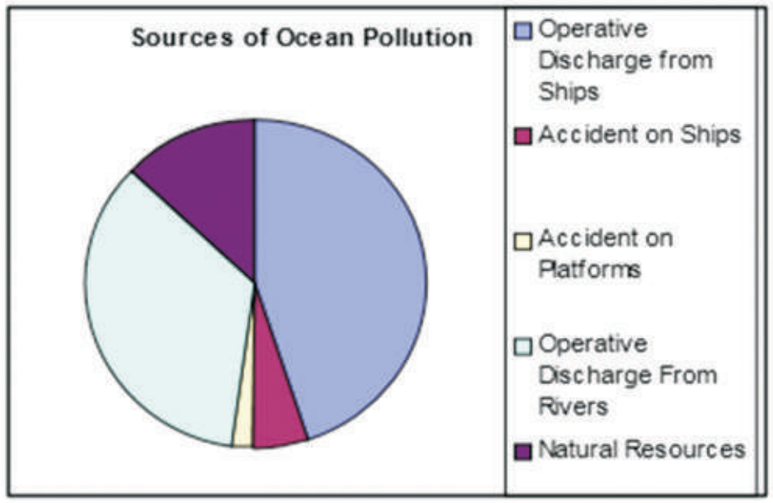


Fig 3: Source of Ocean Pollution

coastal areas. Due the rise in the level of nitrogen and phosphorus, the microalgae populations finds themselves at a very low level of restrained in their growth. This often result in so called algal blooms; which is massive growth if the unicellular algae in the sea. The dead are easily mineralized in water and same happens with the unicellular algae. Their remains are then decomposed/ mineralized by bacteria, which thereby consumes much more oxygen than they require, making the water beneath becomes anaerobic. Resulting into the death of any fish or any invertebrate life there. So the sewages cause such a distortion to the balance of marine ecosystem.

There is another runoff from dust particles coming from metal ore and metal mines, washing away in the rivers. The metabolism of plants and animals are then affected by these metals. According to the US Environment Protection Agency (EPA), more than 40% of watershed contains metals in the western continental of US, of which large portion ends up in the oceans.

2. *Airborne emissions from the land*

Airborne emission or the atmospheric pollution is another way for polluting the ocean. The light dust fractions and debris are taken by the wind and blown towards the ocean. A large number of dust particles carrying metal traces lands up into the oceans and hence pollute the same.

The secondly, atmospheric pollution that effect the oceans environment are the greenhouse gases. These gases are slowly and steadily warming the earth and hence increasing the temperature of oceans. Not only this, there is increase in the concentration of carbon-dioxide (CO2) in the atmosphere which results in the acidification of the ocean. The engine vehicles use combustive gases which gives the output as sulphur-dioxide (SO2) and nitrogen-dioxide (NO2). These gases are the most dangerous gas that result in the production of acid rain.

3. *Shipping and accidental spilling*

Shipping is an activity that effect the ocean environment in two ways, first, the engine of the ship as well as the incineration of the garbage produces carbon-dioxide, sulphur-dioxide and nitrogen-dioxide, which adds to global warming and to the acid rain formation. Secondly, the cooling system of the ship is operates on many harmful and flammable gases. The escape of these gases builds up the chlorofluorocarbons (CFCs) which is very harmful as it depletes the ozone layer of the earth.

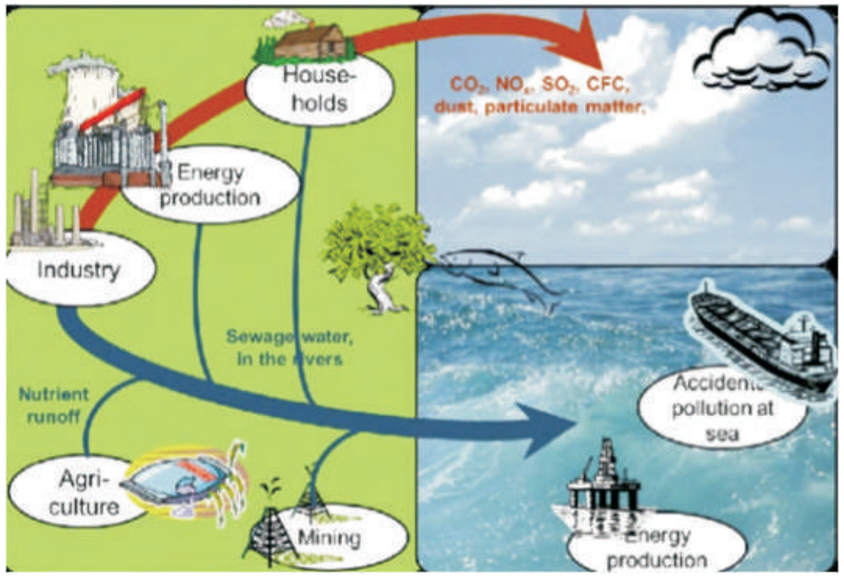


Fig 4. Inputs of pollution into the marine environment

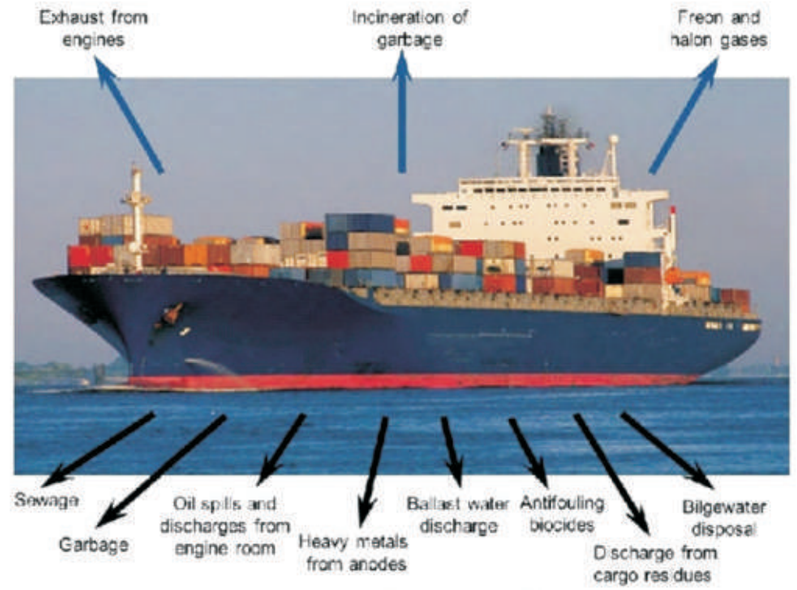


Fig 5. Shipping and Accidental Spilling

Most of marine pollution is simply by accident: When it comes to the amount of pollution that goes into the water, it needs to be said that most of it is simply by accident. As there are a good number of international regulations that forbid express dumping of all different kinds of waste above certain levels. For example, garbage has to be either delivered to shore or burnt in incinerators onboard. Incineration is prohibited in special area. The quantitatively largest aquatic form of accidental pollution caused by the maritime sector is also the one that has been highlighted the most: oil spills. As crude oil consists of a wide range of different hydrocarbon molecules with different molecular weight and properties, it is not easy to give a concise view of the total damage that is done by an accidental spill. Apart from the highly visible heavy oil that covers the water, the animals and the shores, a large number of lighter components are present as well. These lighter components are likely to do even more damage in the long run, as they are stored in the adipose tissue of different animals in the food chain. Examples of these lighter components comprise the monocyclic and polycyclic aromatic hydrocarbons, which are difficult to clean up, and bound to cause cancer and other health problems after a few years of continuous exposure.

Biological contamination, the risk for biological contamination is most tricky to contend with. To start with, when ballast water is taken up, it is bound to contain a number of microscopic life forms, such as algae and larval forms of invertebrates that belong to the specific region the ship resides in. When the ballast water is pumped out, possibly even after a few weeks, organisms may end up thousands of kilometres away from the region where they belong.

Similarly, there are the organisms that attach themselves to the ship hull in a process called biofouling. Calcareous fouling organisms (protected by a calcium-enforced exoshell) include barnacles, bryozoans, molluscs, polychaetes and tube worms. Examples of non-calcareous (soft) fouling organisms are seaweed, hydroids, algae and bacterial biofilms. Together, these organisms form fouling communities on all kinds of maritime objects. Roughly 90% of the species that are transported unknowingly does not survive the transition to a new habitat. The remaining 10% is able to stay alive and happens to be seen now and then. They cause no harm whatsoever. 1% of the transported species, however, is able to establish a firm presence in its new home. These are called exotic species, or, with a more popular term, “aquatic hitch hikers”. About 10% of these exotics even end up threatening the normal ecological processes around them, chasing the local (endemic) organisms out of their habitat and niche, taking over the region, spreading new diseases, etc

4. *Deep sea mining*

A last source of pollution is deep sea mining. This process attempts to unearth the deposits of sulfides and important and precious metals (such as silver, manganese, copper, gold and zinc), which are often created near hydrothermal vents, at about 1400–3700 m below the ocean surface. The mining occurs with hydraulic pumps and buckets being taken up and down to reach the ores and transport them to the surface. It should not be surprising that nations and companies turn to the sea to enhance their metal production. Ore mining on land has been going on for decades, if not for centuries, and many mines are being overtaxed already, if not bordering on complete exhaustion. Moreover, the time seems right for an economically viable exploitation of the metal ores on the ocean floor:

- A lot of the necessary technology is available, reducing the risk and the initial investments to be made; e.g. cables to be laid at such a depth, diamond drills available from deep water oil and gas mining
- Also, metal prices are high and still rising, leading to a substantial and certified return on investment.
- And lastly, there is an apparent shift in focus from the international waters (and their highly regulated status) towards the exclusive economic zones, controlled by individual states.

During June through August, the Atlantic Ocean is covered by varying concentrations of several aerosol types, each covering a separate latitude belt. The Southern Tropical Atlantic (30°S–20°S) is dominated by clean maritime air. The region between 20°S and 5°N is a relatively well defined region covered by smoke from biomass burning in Africa. The Northern Tropical Atlantic (5°N–30°N) is under heavy influx of dust from Africa, and the Northern Atlantic (30°N–60°N) is impacted by anthropogenic pollution aerosol from North America and Europe. These aerosols absorb and reflect solar radiation to space,there by affecting the regional atmospheric energy balance. Clouds that form in air laden with high aerosol concentrations tend to contain more numerous but smaller droplets that reflect sunlight and cool the Earth.The smaller cloud droplets reduce the efficiency of droplet growth by collision coalescence, which at least under some conditions reduce precipitation formation and increase cloud lifetime. However, there is a second pathway for aerosols to affect clouds: Smoke, pollution, and dust aerosols absorb solar radiation, heat the atmosphere, and reduce evaporation from the surface. As a result, smoke over the Amazon or pollution

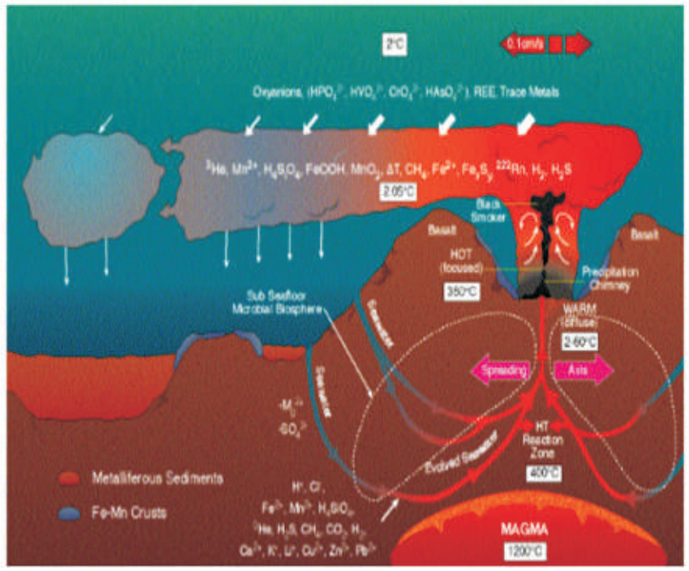


Fig 6. Deep Sea Mining

aerosol over the Indian Ocean can inhibit cloud formation.This "semi direct effect" was initially predicted global warming effect, but recent studies questioned this conclusion. Cloud-resolving models show that absorbing aerosols located above stratified clouds can strengthen the temperature inversion, thus increasing the moisture and liquid water content of the cloud layer. Here we present observations of yeta strongereffect of aerosols on clouds and climate, namely, a substantial increase in shallow cloud coverage due to high aerosol concentrations.

SOLUTIONS FORMULATED

How to control the pollution?

Sewage disposal systems

Generally, sewage disposal systems involve collection, treatment, and dispersion. All water used in man's activities ultimately must be returned to the water environment, unless evaporated. In large metropolitan areas domestic sewage and industrial wastes are collected by a system of sewers to central locations where the treatment and ultimate disposal can be closely controlled by engineers. It is interesting to note that one of the difficult problems of air pollution is that it is impractical to collect "used" air on a community-wide basis for treatment and disposal; instead we must impose directly on the con- summer (such as the owner of an automobile) some responsibility for control of air pollution. Strict rules prohibit industries from dumping in- to the sewers any highly obnoxious wastes which would have an adverse effect on either the ocean or the treatment plant operation. Furthermore, storm water must be excluded because it would grossly overtax the sanitary sewer system. For example, the daily mean flow of 308 million gallons collected by the County Sanitation Districts is equivalent to only 0.03 inch in water depth per day distributed over the drainage area. When it rains several inches in one day, the storm runoff may be tens of times larger than the flow which can be taken in the sanitary sewers. It is unfortunate that many Eastern cities have sewers that allow the sanitary sewage to become mixed with the storm run-off, and to over- flow into the natural watercourses whenever sewage treatment plants cannot handle the huge flows.

Ocean disposal

To plan a new system for ocean sewage disposal the engineer must start by considering the water quality standards to be met in the ocean environment- including maximum allowable bacteria concentrations, maximum increase in turbidity,

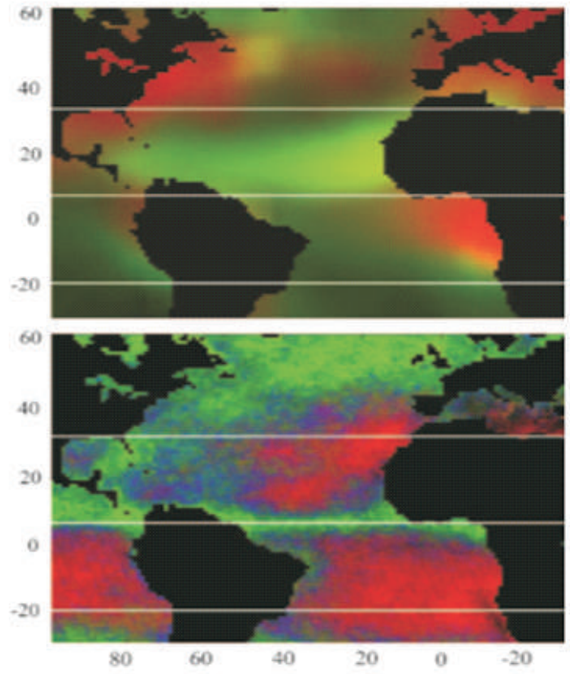


Fig 7. Spatial Distribution of aerosol and clouds over the atlantic ocean from moderate resolution

limitations on any grease, absence of odours, minimum dissolved oxygen, absence of floating or suspended solids of recognizable sewage origin, or any other aesthetically unacceptable condition. The State of California, for example, has many detailed and strict requirements related to all of the foregoing characteristics; nonetheless, huge quantities of sewage effluent may be dispersed from properly controlled outfall systems without pollution. Usually only primary treatment of sewage and industrial wastes is required, as in the case of the two large Los Angeles systems and the new San Diego sewerage system. Such treatment includes screening; sedimentation for removal of settles able solids, floatable solids, and grease; and chlorination if required for control of bacteria and viruses. The City of Los Angeles and the City of San Diego do not have to chlorinate at all to meet the rigid bacterial requirements of the state, while the County Sanitation Districts chlorinates its effluent only for a few days in the winter when the stratification in the ocean disappears. In all cases the dilution of the effluents with seawater is so great that all the other standards are very easily met after just the primary treatment. The solids or sludge collected in the treatment plant are subjected to anaerobic decomposition in large digestion tanks, where sludge is reduced to a relatively stable humus-like liquid material of very fine particles in suspension. There is insufficient demand for all the digested sludge as fertilizer, so it is often pumped to the ocean also, either through a separate small outfall (as for the City of Los Angeles) or mixed with the sewage effluent (as by the County Sanitation Districts). In neither instance has the build-up of deposits the bottom been progressive, because organisms and currents cause a gradual disappearance or assimilation into the natural bottom sediments. The turbulent diffusion of the sewage effluent occurs in 2 stages. 1st there is the jet or fume mixing near the diffuser pipes, which is controlled by the nature of the manmade diffuser

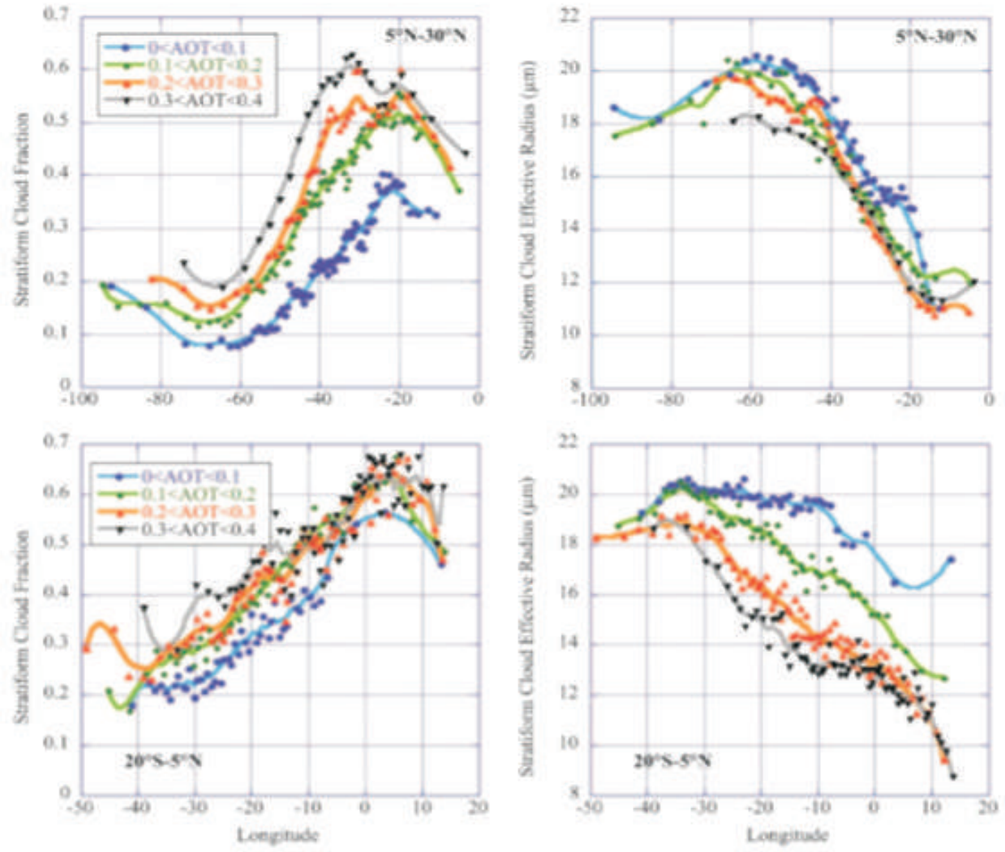
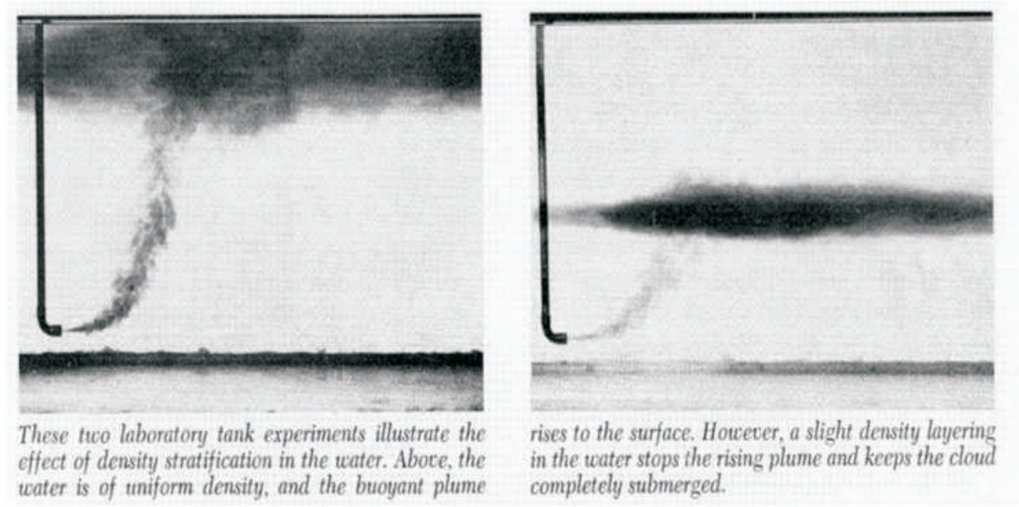


Fig 8. Longitudinal dependence of the shallow cloud fraction and droplet effective radius fro the northern tropical atlantik with dust instrusions and southern tropical atlantic with smoke instusion.



These two laboratory tank experiments illustrate the effect of density stratification in the water. Above, the water is of uniform density, and the buoyant plume rises to the surface. However, a slight density layering in the water stops the rising plume and keeps the cloud completely submerged.

Fig 9.Effecr of density stratification

pipes, which is controlled but her nature of the manmade diffuser. 2nd is the moment of the diluted sewage "cloud" by the ocean turbulence. For the greatest security unit is good practice to achieve as much manmade mixing as feasible right at the diffuser and to avoid depending too heavily on the natural dispersive mechanism of the ocean, which are more difficult to predict analytically and statically. Diffuser pipes are oriented, within allowable and spacing of ports is based on consideration of the behavior of the buoyant jets discharged from the ports. The port diameters are selected to make the "inside" hydraulics of the diffuser correct for a good manifold.

Effect of density stratification

A remarkable change in the flow pattern occurs where there is a slight gradation of density in the ambient fluid, caused by temperature and salinity changes with depth. In the ocean the stratification is almost always hydro dynamically stable, with warmer layers at the top. In the laboratory, the ambient salt water is stratified by filling the tank very slowly with thin layers of progressively decreasing salt content at the same temperature; the "staircase" variation of density is soon smoothed into a uniform gradient by molecular diffusion.

CONCLUSION

There have been two significant advances in techniques of sewage disposal into the ocean. First, the natural density stratification of the ocean has been used to great benefit in keeping waste discharges submerged in the lower layers of the ocean. Second, very large multiple-jet diffusers have been successfully designed and operated without clogging or mal-distribution of flow. Diffusers greatly increase the dilution of sewage effluent with seawater, and dilutions of 200 parts of seawater to one part of sewage effluent are now commonly achieved. It is only by this new technique of using a large number of small, widely-spaced jets that full advantage can be taken of the slight but definite density stratification patterns in the ocean

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Ways to reduce plastic waste after demonetization - An innovative idea

Riddhi Jain* **Tabeen Shah****

Plastic is not all about degrading environment or creating nuisance it has certain advantages if we try to utilize it judiciously we can even help to reduce this plastic waste. Advantages of plastic are : Extreme versatility and ability to be tailored to meet very specific technical needs, Lighter weight than competing materials, reducing fuel consumption during transportation, Extreme durability, Resistance to chemicals, water and impact, Excellent thermal and electrical insulation properties, Relatively inexpensive to produce. Human mind is filled with exceptional ideas on how we can protect ourenvironment.

Recently the news of demonetization in India lead to a huge worry in the minds of environmentalist regarding increased plastic money waste which will cause damage to the environment if not looked at proper time. As demonetization is the act of stripping a currency unity of its status as legal tender. The old currency must be retired & replaced with a new currency unit.

This paper talks about an innovative idea which can be used by the Indian Government to reduce plastic waste. Innovation is all about change of a thing established for something new. One of the suggested ideas is how we can recover the discarded plastic from consumer so that it can be reuse and recycled and the second one talk about a MobileApplication.

Key words: plastic waste, recollection, reuse, recycle, mobile application, demonetization and innovation.

INTRODUCTION

"It is the greatest of all mistakes to do nothing because you can only do little" Do what you can.

Plastic is the most dangerous substance for our plant. As its major worry is of disposal of used plastic which we call as plastic waste. With disadvantage its has certain advantages as it is extreme versatility and ability to be tailored to meet very specific technical needs, Lighter weight than competing materials, reducing fuel consumption during transportation, Extreme durability, Resistance to chemicals, water and impact, Excellent thermal and electrical insulation properties, Relatively inexpensive to produce. For environmentalist and the government the worry is not the recycling of scrap plastics by manufacturers as it has been highly successful and has proven economical, but recovering discarded plastics from consumers is more difficult.

Due to demonetization the use of digital plastic money has increased as mostly the majority of Indian carries two or more credit or debit cards. Further we have our DL, UID card etc in our pockets. Let's try to club all the plastic money into a mobile application so that everyone is free from the plastic cards and environment is free from the plastic waste. Now when it comes to how can we collect this waste from the customer what we can do is if we cut the card into two so that the security issue does not arise and sell it to the scrap dealer along with other plastic waste and earn certain e-money which can be used as day to day transaction. This will make our environment free from the plastic waste.

PROPOSED IDEAS

Evidence can be drawn as the success of recycling is limited by the development of successful strategies for collection and separation. Recycling of plastics is desirable because it avoids their accumulation in landfills. While plastics constitute only about 8 percent by weight or 20 percent by volume of municipal solid waste, their low density and slowness to decompose makes them a visible pollutant of public concern. Recycling and re-utilization of waste plastics have several advantages. Recycling and re-utilization of waste plastics lead to a reduction of the use of virgin materials and of the use of energy, thus also a reduction of carbon dioxide emissions. Economically, in some cases, plastics recycling may be profitable. However, a number of factors can complicate the practice of plastics recycling, such as the collection of the plastics waste, separation of different types of plastics, cleaning of the waste and possible pollution of the plastics. A further complicating factor is the low-value nature of most of the products that can bemanufactured from recycled plastics. Reusing plastic is preferable to recycling as it uses less energy and fewer resources.

Issues relating to plastics – There are about 50 different groups of plastics, with hundreds of different varieties. All types of plastic are recyclable. So a proposed idea of e-business for recollection of the plastic waste is:

- Why don't we Exchange the used plastic bottle and containers for money by collecting the used plastic and measuring them using a weighing machine. Then as per the weight the customer is given points which can be used in place of money. Here the cost of investment is less as compared to the output in form of protecting the environment. We just need a carriage car and few scrap dealers who have the weighing machine and land where we can collect the waste as we will have dealer ship with companies who are already using the recycling technique as the challenge is of recollecting the used plastic waste which we are solving for them. We need to fix the amount for which it is exchanged and we are ready to use. We need to go for tie-ups with grosser stores so that the customers can use their points. The points are used as legal tender so these will be approved by the government so that the points are authentic and trust worthy. What we are doing is we have combined the idea of batter system and Scrap dealer into and entrepreneurial idea. And the waste collected will be reused, recycled and this way plastic waste can be reduced. We will go for dealership with those companies who are using Chemical or feedstock recycling tool to recycle the plastic waste. Feedstock recycling is describes as a range of plastic recovery techniques to make plastics, which break down polymers into their constituent monomers, which in turn can be used again in refineries, or petrochemical and chemical production. A range of feedstock recycling technologies is currently being explored. These include: (i) Pyrolysis, (ii) Hydrogenation, (iii) Gasification and (iv) Thermal cracking. Feedstock recycling has certain advantage as it has greater flexibility over composition and is more tolerant to impurities than mechanical recycling, although it is capital intensive and requires very large quantities of used plastic for reprocessing to be economicallyviable.For example a customer gives 3 gm of plastic which is equal to 1 point and it means Rs.2.50/- so if he submits 12gm of used plastic then he will get Rs.10/- which he/ she can use at any grosser store even he/she can use it in the form of e-money.
- Another innovative idea is of introducing a mobile App. As we are technologically driven people we are highly dependent on it. Now a days we have everything in our mobile which is just a click away so why don't we come up with an app which reduce our plastic waste which we all carry in our pockets (like driving license, debit card, credit card, UID card, PAN card,etc).

Assumption: This app is firstly an authentic government app as it contains all the details of an individual.

To make it more authentic registered member will directly feed information in the device which the Government Officer is carrying where the information is sent to the department and stored with full confidentiality avoiding the chance of getting misused by the officer.

The user data can be made secure by end to end encryption. End-to-end encryption(E2EE) is a system of communication where only the communicating users can read the messages. In principle, it prevents potential eavesdroppers – including telecom providers, Internet providers, and even the provider of the communication service – from being able to access the cryptographic keys needed to decrypt the conversation. The systems are designed to defeat any attempts at surveillance or tampering because no third parties can decipher the data being communicated or stored. The entire process of communication between the user and the Respective government end is coded so as to prevent a third party from accessing the highly confidential information of the user. This feature not only gives privacy to the public but also reduces chances of onlinethefts.

Most end-to-end encryption protocols include some form of endpoint authentication specifically to prevent MITM attacks. For example, one could rely on certificationauthorities or a web of trust.

When we will open the app on our mobile we will have 5 options to select as per our requirement we can choose any one of it. Firstly one option is of driving license and next is of bank and third is of PAN card. I break the traffic red light and I am caught by thepolice officer and he ask for the driving license so what I will do is I will open the app and will click on the driving license and will show it to the officer and then if he wants an copy of it I will email it to him in front of him using the same app on his authentic government site with a acknowledgement attached with it which will contain the purpose of sending the driving license so that it is not misused by anyoneelse.

So we talked about how it will work and how it is secured with reference to an example. Secondly

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Another example in context with the bank or money transaction so here what we can do is have and log in id and a secured password and we can directly transfer the money in the account of the concerned personaccount.

We are using the m-transfer technique and we are also using emails technique with this we are also utilizing what paytm is using these days. Mobile banks and many more such things so we can say a collective collaboration of the entire existing app with the government in one app will make a drastic change in the society and will reduce the plastic waste in our pocket which we carry every day.

The cards are made of varying types of plastic, mostly polyvinyl chloride known commonly as PVC. While PVC is claimed to be one of the more harmful of all the plastics it can be recycled over and over without the need to add more materials in the process. We can recycle the cards by using the Mechanical recycling process. This refers to processes which involve the melting, shredding or granulation of waste plastics. Plastics must be sorted prior to mechanical recycling. Mostly, sorting is done manually. Recently, technology is being introduced to sort plastics automatically, using various techniques such as X-ray fluorescence, infrared and near infrared spectroscopy, electrostatics and flotation. Following sorting, the plastic is either melted down directly and molded into a new shape, or melted down after being shredded into flakes and then processed into granules calledre-granulate.

Terra Cycle (New Jersey) has created a zero waste solution for plastic cards. They use this box to recycle any wallet-sized flexible plastic card usually meant for the purpose of identification or for facilitating commercial transactions. Terra Cycle Zero Waste Boxes allow you to recycle almost every type of waste.

The collected waste is mechanically and/or manually separated into the various forms of plastic that make it up. The separated plastics then undergo extrusion and pelletization tobe melded into new recycled plastic products. Expired, discarded plastic cards such IDs, licenses, credit cards, business cards, gift cards, key cards and so on. Please cut up all cards containing sensitive information before sending. So if in India we use this waste box and can reduce plasticwaste.

OBJECTIVES

To come up with an innovative idea about how can we protect our environment from increased plastic waste caused by Demonetization.

FINDINGS

There are numerous ways to reduce and reuse plastic waste but this paper gave us two ideas which will help us to protect our environment from degradation.

1. An E-Business idea where we are recollecting the used plastic from the customers and then by using chemical or feedstock recycling technique further converting it to be used in various industries like the plastic can be used to make roads. In this we are combining the idea of batter system and scrap dealer into and e-business entrepreneurialidea.
2. An introduction of Mobile Application will reduce the plastic waste in our pockets and will help us to move towards digital India. Making users moree-friendly.

Conclusion

The ideas proposed will help the government to dispose and reduce the plastic waste generated after demonetization. Further it will help the environmentalist to preserve and protect the environment from the plastic waste.

Gaps if any

The challenges we can face during the execution our idea are:

1. Our country doesn't have good internet connectivity everywhere.
2. A large preposition of our population is note-friendly.But these challenges are soon going to disappear as our government is trying to irradiate these two problems.

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Management of Rise in E-waste due to Demonetisation

Kunal Dharna* **Regina Massey****

E-Waste or Electronic Waste refers to the discarded electronic equipment's like mobile phones, office computers, television sets, credit cards, refrigerators etc. We present to you a few ideas to manage the increase in the E-waste generated due to demonetisation

Keywords: E-waste, electronic wallets, non-plastic money, RFIDs, demonetization,

INTRODUCTION

The electronics that are supposed to be reused, recycled or disposed off are the commodities which form the scrap material until they are treated as they are supposed to, so still remain a part of E-Waste. Cathode Ray Tubes (CRTs), that form a major part of television sets and monitors are very difficult to recycle and are hazardous for our environment. This E-Waste has to be treated or else causes toxicity in many of the countries throughout the world by seeping down into the water table and also corroding the soil and polluting the environment.

E-Waste presents a potential security threat also like unerased hard drives, credit card numbers liked with financial data or account information alongwith the records of online transactions which can be accessed by organized criminals can lead to security breaches. These will be prominent in India in the upcoming years mainly due to the recent announcement of demonetisation on November 8, 2016 by our honorable Prime Minister Mr. Narendra Modi. Due to this demonetisation and demoting plastic money, the use of digital payment modes are on a rise. This has its positive as well as negative effects just like other political decisions. The positive effects will be seen in the long run as predicted by our rule makers, but one of the major negative effects will be a sudden surge rise in use of more and more electronic devices and equipments. These include mobile wallets, credit cards, debit cards, rupay cards, cash cards, cashback promotion cards, petrol point cards, and in order to access these electronic wallets or netbanking we need mobile phones, tablets and laptops. Government has launched Unified Payment Access with the means of BHIM application, but still it will require a mobile phone and also to add to all the above cards, another card of our citizenship called the Aadhar Card. So these will be the new replacement of cash in the upcoming years. These are in addition to the existing cards that we need to have like the driving license, voter id card, pan card, passport, aadhar card, plus a few passport sized photographs to be carried along all the time is what is generally recommended. Keeping all these along was already a hassle but now even more cards and mobile devices are to be carried. This will lead to an increased ownership of these electronics and when they will be discarded in future, it will add up piles and piles of E-Waste into the country.

Literature review

The present scenario

We live in an era these days where everybody is becoming more and more technologically advanced. People are running behind gadgets and learning to use all the latest launches. It's not just the learning part where it ends, it's also the aspiration to own and use these gadgets and their gimmicks. The big conglomerates that are making these are also on

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a high gear. These big companies are making huge profits out of the people by selling them the latest technology and all the while increasing the need and demand of these electronic gadgets. In a vast country like India, the digital penetration is not very high. With the launch of services by the likes of Reliance Jio and inexpensive android smartphones by Indian and Chinese companies, the Indian market has seen a surge rise in the sale of mobile phones and electronic devices. People already owning a mobile device too are going for a second phone to enjoy the benefits of these services offered by these companies like free calling or internet, even if these are not highly required. But the problem neither rises there nor ends. All the companies are focused upon how to sell their phones, how to catch the consumer, how to make people buy the gadgets and make huge profits out of them. Companies are focused on creating demands for multiple sim cards per user, multiple mobile phones, multiple gadgets like tablets, smartwatches, laptops, fitness bands, personal computers etc. These machines were created to make our lives simpler, but at some level sometimes it seems to be doing the opposite.

Management of E-waste

The management and understanding of this E-Waste can be done in different ways at 3 different levels. These 3 levels are from each point of our society,

1. At the personal level (as a citizen of India)
2. At the corporate level (major companies Corporate Social Responsibility or CSR)
3. At the government level (at the centre as well as the state)

At a personal level:

What is E-waste at a person level?

The E-Waste can be understood as the electronic items that we use on the daily basis. This includes the use of the various cards and electronic wallets adjoined with identity and finances and for managing the non-plastic money.

Solution

Now one of the ideas that can be implemented for the reduction of all these cards and entities is making one card for all cards. Such an infrastructure already exists in our country in the form of Aadhar Card. The Aadhar Card is one card which holds the identity of every citizen individually. It has biometric signature in the form of fingerprints. It can be used as a single identity with all the details thus eliminating all other identity related and signature related cards. Now as per the case of digital money, the Aadhar Card can be linked to it as well. It has a digital inbuilt access as well a unique identification number, which is also known as the Unique Aadhar Number (or UAN). These digital access and the UAN can be used to link your bank account with the Aadhar and the payments can be made and received directly through the bank accounts. This will eliminate any kind of need for debit/cash/credit cards etc. Also the mobile wallets has the disadvantage that it cannot transfer cross-platform, i.e, a person using Paytm wallet can only transfer funds to another person using Paytm wallet and not to the person using MobiKwik, PhonePe, Freecharge, SBI Buddy or any other wallet. Also, all these e-wallets charge a nominal fee for transferring money from the wallet to bank account, whereas if the Aadhar payment system is launched, then all these problems will be automatically removed. The security of Aadhar is through fingerprints, and added security features like retina scans and manual signatory or facial point recognition system can be introduced at an on-demand basis for the citizens who require them. So, all we need to carry will be one card for all - the Aadhar Card.

Another management idea at the citizen level can be the introduction of RFID chips per individual with latest security scanners and features. RFID or Radio Frequency IDentification chips uses electromagnetic fields to identify and track the tags automatically. They have special readers that catch the frequency wirelessly. These can carry data of upto around 2000 bytes, and that too is being researched upon to be made reader specific and higher data capabilities with password protected and user authenticated data sharing. These RFIDs can be allocated to the user with only the important specified data and personal information that can replace all the electronics and cards that add to E-Waste.

At the corporate level:

What is E-waste at a corporate level?

All the companies focus on making more and more consumers buy more and more products by them each day. Instead of reducing their consumption of electronics, companies focus on increasing them, so that they can sell their products and earn profits through sales. This generates an enormous amount of E-Waste.

Solution

We can see the example of one of the biggest tech giant in the world, made what it is by Mr. Steve Jobs, the rank one smartphone maker Apple Inc. In the United States, Apple follows this policy of offering its customers big discounts on exchange offers, i.e, as soon as they launch their new model, they ask their customers to bring back the old model and get discount on the new model. By doing this Apple hits two birds with a stone, they enhance their new model sales, and they also do their societal marketing and participate in the Corporate Social Responsibility actively. The old phones that they gather, they recycle and reuse its usable components and treat the waste properly before dumping. Indian companies should also start such schemes and take part in reducing E-Waste in this manner pro-actively.

Another idea for managing the increase in corporate level E-Waste is by introducing just a simple chip, which contain all the useful or necessary data required in the daily life. The simple chip can be mounted anywhere, at the back of your wallet, on your existing mobile phone, or even at the back of your hand. This chip can contain your basic profile as well as your daily routine requirements. It can be personalised as per the requirement of the user. It can add in itself a feature to act as a Metro Card for a user in Delhi, where the protocol for Delhi Metro reader can be added. Also the provision for the daily basic wallet info or money can be added into it for basic expenditure per day based on the personal discretion of the individual. Basic identification information of the individual can be added into it along with security features of password protection or fingerprint scanning etc.

At the government level:

What is E-waste at a government level?

This E-Waste problem has to be seen and managed as an atrocity to the environment. The government has to make sure it is treated properly and not just dumped into earth or water, as it may get poisonous for the environment and people.

Solution

To manage this due to demonetisation they should introduce features or innovations to handle non-plastic money. Other than this they should introduce schemes to motivate people for participation in non-disposal of waste items in a harmful manner. Instead they can offer renumerations and rewards systems for active participation in managing E-Waste.

Government can put up small plants for recycling these wastes and auction them at low prices to raise funds for keeping the operations running. They can organize drives and events like "Best out of Waste" for promoting innovative minds in handling the problems like these and make something productive out of it. People can be offered cashbacks or discounts on government offerings and sellings if they give them the old unused electronics, thus ensuring proper and safe disposal of them.

We can observe how the electronic waste is on a rise now already, and due to the demonetisation effect, it is only going to rise. So few of these steps should be implemented at each and every level now itself, only then we can ensure a low rise in E-Waste, which might even be manageable by our future nation.

" We do not inherit the Earth from our ancestors, We borrow it from our children."

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Environmental Pollution and its Effect on Society

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Pollution refers to the contamination of the earth's environment with materials that interfere with human health, quality of living or the natural functioning of the ecosystems. There are numerous ways of pollution like: water pollution, air pollution, noise pollution and soil contamination, thermal pollution and radioactive hazards. To judge which leads to risk to health is difficult as all are harmful in one way or the otherto the human kind .

We cannot deny the fact that natural resources had been stored virtually untouched in the Earth for millions of years. But since the start of the industrial revolution vast amounts of these resources had been exploited within just a couple of hundred years at unimaginable rates, with all the waste from this exploitation going straight in to the environment (air, water, land) and seriously damaging its natural processes. If seencarefully we can find that fundamental pollution drivers are Globalization, Industrialization and Population growth.Hence we can say that Environmental pollution is "the contamination of the physical and biological components of the earth/atmosphere system to such an extent that normal environmental processes are adversely affected". It takes place when the environment cannot process and neutralize harmful by-products of human activities (for example, poisonous gas emissions) in due course without any structural or functional damage to its system. The carrying capacity of Earth is significantly smaller than the demands placed on it by large numbers of human populations and overuse of natural resources often results in nature's degradation.

This paper provides an evidence-based insight into the status of air pollution in our country and its adverse effects on health and control measures instituted in the major metro cities of the country to countermeasure such hazards.

Keywords: Environmental Pollution, contamination of air, natural resources, Globalisation, Soil contamination

INTRODUCTION

Pollutants and its many forms: Pollutants don't recognize boundaries,. they are transboundary; Many of them can't be degraded by living organisms and therefore stay in the ecosphere for many years; andThey destroy biota and habitat.

Biological Decomposition of Environmental Pollutants: Environmental pollutants are biodegradable and non-biodegradable ones, ·Biodegradable Pollutantsare the ones that can be broken down and processed by living organisms, including organic waste products, phosphates, and inorganic salts. For example, if a pollutant is organic, it can be used by a living organism to obtain energy and other material from carbohydrates, proteins etc. Therefore, biodegradable pollutants are only "temporary nuisances" that can be neutralised and converted into harmless compounds. However, it is important to remember that they can become serious pollutants if released in large amounts in small areas, thus exceeding the natural capacity of the environment to "assimilate" them. **Non-Biodegradable Pollutants.** These are the ones that cannot be decomposed by living organisms and therefore persist in the ecosphere for extremely long periods of time. They include plastics, metal, glass, some pesticides and herbicides, and radioactive isotopes. In addition to that, fat soluble (but not water soluble) non-biodegradable pollutants, ex. mercury and some hydrocarbons, are not excreted with urine but are accumulated in the fat of living organisms and cannot be metabolised.

Generally speaking, there are many types of environmental pollution but the most important ones are:Air pollution&Water pollution, also Soil pollution (contamination).Some of the most notable air pollutants are sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, volatile organic compounds (VOCs) and airborne particles, with radioactive pollutants probably among the most destructive ones (specifically when produced by nuclear explosions).Water pollutants include insecticides and herbicides, food processing waste, pollutants from livestock operations, volatile organic compounds (VOCs), heavy metals, chemical waste and others.Some soil pollutants are: hydrocarbons, solvents and heavy metals.Combustion of fossil fuels produces extremely high levels of air pollution and is widely recognized as one of the most important "target" areas for reduction and control of environmental pollution. Fossil fuels also contribute to soil contamination and water pollution. For example, an oil leak may occur and pollute soil and subsequently groundwater / ocean water.

The use of uranium for nuclear power generation produces extremely dangerous waste that would take thousands of years to neutralize.Common sources of fossil fuel pollution are: Industry:

·Power-generating plants, ·Petroleum refineries , ·Petrochemical plants, ·Production and distribution of fossil fuels, ·Other manufacturing facilities, Transport: ·Road transport (motor vehicles) , ·Shipping industry, ·Aircraft. Fossil fuel combustion is also a major source of carbon dioxide (CO2) emissions and perhaps the most important cause of global warming.

From the findings, the observation is : As per the of World Bank Development Research Group the average total suspended particulate (TSP) level in Delhi was approximately five-times the World Health Organization's annual average standard. In the metro city like Delhi It is estimated that about 3000 metric tons of air pollutants emits every day in Delhi, with a major contribution from vehicular pollution (67%), followed by coal-based thermal power plants (12%). Vehicular pollution is an important contributor to air pollution in Delhi. According to the Department of Transport, Government of National Capital Territory of Delhi, vehicular population is estimated at more than 3.4 million, reaching here at a growth rate of 7% per annum. The PM10 standard is generally used to measure air quality. The PM10 standard includes particles with a diameter of 10 µm or less (0.0004 inches or one-seventh the width of a human hair). These small particles are likely to be responsible for adverse health effects because of their ability to reach the lower regions of the respiratory tract. According to the Air Quality Guideline by the World Health Organization, the annual mean concentration recommended for PM10 was 20 µg/m3, beyond which the risk for cardiopulmonary health effects are seen to increase Major concerns for human health from exposure to PM10 include effects on breathing and respiratory systems, damage to lung tissue, cancer and premature death. Elderly persons, children and people with chronic lung disease, influenza or asthma are especially sensitive to the effects of particulate matter.

Besides these, non-respiratory effects were also seen to be more in Delhi than in rural controls. The prevalence of hypertension was 36% in Delhi against 9.5% in the controls, which was found to be positively correlated with respirable suspended particulate matter (PM10) level in ambient air. Delhi had significantly higher levels of chronic headache, eye irritation and skin irritation.

Several other community-based studies have found that air pollution is associated with respiratory morbidityNumerous studies have reported an association between indoor air pollution and respiratory morbiditySome of these studies have concentrated on children's respiratory morbidityOther studies in children have found similar correlations between particulate matter in ambient air and attention-deficit hyperactivity disorderbetween vehicular air pollution and increased blood levels of lead (a potential risk factor for abnormal mental development in children and between decreased serum concentration of vitamin D metabolites and lower mean haze score (a proxy measure for ultraviolet-B radiation reaching the ground).

Studies that have examined the compounding effect of meteorological conditions on air pollution found that winter worsened the air quality of both indoor air and outdoor air. They also found a positive correlation between the winter weather and rise in the number of patients with chronic obstructive airway disease in hospitals.

There was a relative paucity of studies that measured outdoor air pollutant levels first hand and then tried to objectively correlate them to adverse health effects. However, some studies measured air pollutant levels and found a correlation with health-related events.

WE CAN MAKE A BIG DIFFERENCE

Many great scholars from Charaka to Hippocrates have stressed the importance of environment in the health of the individual. Therefore, all those who play a role in modifying the environment in any way, for whatever reason, need to contribute to safeguard people's health by controlling all those factors which affect it.Every action or inaction of any person has an effect on the environment—be it good, neutral, or negative. By becoming aware and

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Study and year	Variable	Findings
Goyal *et al.*, 2011[6]	Indoor air pollution in classrooms close to heavy traffic roads	Vehicle exhaust emissions are the only significant contributor to indoor concentrations of PM_{25} and PM_{10}
Kumar *etal.*, 2009^	Indoor air lead pollution	Lead loading for floor and interior windowsill samples was 19.7 pg/ft^2 and 75.5 pg/ft^2, respectively
Kumar *et al.*, 2001[8]	Outdoor air	Inhalable particulates in the ambient air increased due to industrial activities up to 320,168 and 546%, and due to commercial activities up to 406, 198 and 140% in Ahmedabad, Mumbai and Delhi, respectively. There was seasonal variation also
Balachandran *etal.*, 2000™	Outdoor air	Coarse PM_{10} - 68.3 ± 17 pg/m^3; fine PM_{10} 71.3 ± 15 pg/m^3. Three major sources were vehicular emissions, industrial emission and soil re-suspension

Source:http://www.who.int/phe/health_topics/outdoorair/databases/en .

Study and year	Variable	Findings
Siddique *et al.*, 2011[20]	Vehicular air pollution effects in children	Ambient PM 10 level was positively correlated with ADHD in children (OR = 2.07; 95% CI, 1.08-3.99)
Rajarathnam *et al.*, 2011[23]	Outdoor air	It was found that every 10 pg/m^3 change in PM_{10} was associated with 0.15% increase in total all-natural-cause mortality
Kumar *el al.*, 2008[15]	Indoor air pollution	Indoor SO_2 NO_2 and suspended particulate effects in children matter levels were high in houses with family history of smoking. Indoor air pollution was associated with respiratory function of children
Kulshreshtha *et al.*, 2008[16]	Indoor air	High levels of indoor airborne pollutants during winter were associated with respiratory problems for women and children.
Jayaraman, 2008[13]	Outdoor air	10 pg/m^3 rise in pollutant level led to statistically significant relative risks (RR) for respiratory morbidity: 1.033 for O_3. 1.004 for NO_2, 1.006 for RSPM
Nidhi *et al.*, 2007[24]	Outdoor air	The relative risks of hospitalization due to respiratory diseases were 1.07-2.82
Kumar, 2007[19]	Indoor air pollution	Indoor SPM level was also significantly effects in children higher in homes of children with a history of respiratory illness
Agarwal *et al.*, 2006[12]	Outdoor air	SPM (r = 0.474; P<0.01) and RSPM (r = 0.353; P<0.05) showed a significant positive correlation with the number of COPD cases. Winter months had higher risk
Pande *et al.*, 2002[25]	Outdoor air	Emergency room visits for asthma, COAD and acute coronary events increased by 21.30%, 24.90% and 24.30%, respectively, due to higher than acceptable levels of air pollutants

doing the right thing, we choose to be part of the solution. Here are some things you can do:-Stop smoking or don't throw your butts on the ground. Cigarette butts are not biodegradable and contain extremely toxic soluble chemicals. One butt thrown on the ground can remain for up to 25 years, leaking chemicals like arsenic, ammonia, acetone, benzene, cadmium, formaldehyde, lead, and toluene into the environment. •Drive an electric or hybrid car or at least one that uses unleaded gasoline. •Keep the car in good running condition to avoid emissions. •Share a ride or carpool. •Choose to walk or ride a bicycle whenever possible. •Never use open fires to dispose of waste, especially chemicals and plastic. •Adopt the 3 Rs of solid waste management: reduce, reuse, and recycle.

It is always recommended to Use sustainable, reclaimed, or recycled building materials. Composting leaves and clippings from yard and food scraps from can be used in the kitchen to reduce waste while improving soil. Use the power supplied abundantly and freely by wind and sun. Hang the laundry to dry to minimize the use of gas or electricity and open a window or put on a sweater rather than turning on the air conditioner or heater. In this manner, the use of fuel for transporting goods can be minimized. Look around the house or place of business for ways of conserving water. Use and buy products that are eco-friendly or made with biodegradable materials. Avoid plastic. Always bring a bag to shop. Get rid of the lawn: Plant bee-friendly, drought-tolerant, native plants instead. Plant more trees. They clean the air, provide oxygen,

and beautify surroundings. Take care to properly dispose off pet's waste. Do not litter. Start an anti-litter campaign to educate the community. Even in business, our contribution can impact environmental Say a big "NO" to pesticides and GMOs (genetically modified organisms).

Control measures to be taken

Shutdown of hazardous, noxious industries and hot-mix plants and brick kilns which are killing the nature , introduction of unleaded petrol (1998), catalytic converter in passenger cars construction of flyovers and subways for smooth traffic flow, Environmental awareness campaigns are also carried out at regular intervals.

Industrial Policy

Benefits Accrued as a Result of Control Measures

As the literature revealed since the first act on pollution was instituted, huge progress has been made in terms of human resource, infrastructure development and research capability. Some studies tried to gather evidence for the effectiveness of control measures by comparing pre- and post-intervention health status. The study conducted by the Central Pollution Control Board demonstrated that spending 8-10 h in clean indoor environment can reduce health effects of exposure to chronic air pollution. A recent study found significant improvement in the respiratory health following large-scale government initiatives to control air pollution. It was reported that use of lower-emission motor vehicles resulted in a significant gain in disability-adjusted life-years in Delhi.Another study found significant evidence for reduction in respiratory illness following introduction of control measures.

Most of the studies were ecological correlation studies, which are severely limited in their ability to draw causal inferences. But, considering the context that demanded the research, these were probably the best available designs to produce preliminary and,sometimes, policy-influencing evidences, as any other methodology would be unethical or operationally impossible.

Participation of the community is crucial in order to make a palpable effect in the reduction of pollution. The use of public transport needs to be promoted. The use of Metro rail can be encouraged by provision of an adequate number of feeder buses at Metro stations that ply with the desired frequency. More frequent checking of Pollution Under Control Certificates needs to be undertaken by the civic authorities to ensure that vehicles are emitting gases within permissible norms. People need to be educated to switch-off their vehicles when waiting at traffic intersections. Moreover, the "upstream" factors responsible for pollution also need to be addressed. The ever-increasing influx of migrants can be reduced by developing and creating job opportunities in the peripheral and suburban areas, and thus prevent further congestion of the already-choked cities like Delhi & Mumbai .

CONCLUSION

Although the earth seems to be at brink of catastrophe but still we have a possible way to minimize the degradation. The various pollutants which human activities release into the environment is growing at an alarming a rate. However, a few simple steps can be taken at an individual level to combat it. If we start from this very moment we might be able to live in harmony with mothernature, and this process needs to be started at the earliest possible if we have to .

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Environmental Sustainability : A Comparative Study of Domestic and Foreign Companies

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The sustainability concern for the planet has become the need for the day. With the advent of new technologies, developments and increasing standard of living, pressure on the environment for fulfilling the demand over the regeneration capacity is increasing. Life threatening hazards are inevitable and casting shadow on the whole world. Generally poor and developing economies bear the negative consequences as well as alleged for environment alteration. Keeping this view as a pivot, the present study is an attempt to analyze the importance of environmental sustainability in domestic as well as foreign companies' operating in India. The findings highlight that foreign companies operating in India show significant concern towards environmental sustainability and have better performance compare to their counterpart domestic companies. Furthermore, new technological development isdiscussed that can be adopted by various Indian companies, those have direct links with environment alteration like mining and mineral industry. The study presents number of imperatives for professional, business organizations as well as researchers.

Keywords: Companies; India; Mining and mineral industry; Sustainability.

INTRODUCTION

Nature can fulfil our needs not avarice demands. Rules of the nature govern everyone living in this world, irrespective of its species and variety (Maheshwari& Ganesh, 2006). However, with the development of culture, society and technology, humans started quelling these rules. Now, this avoidance has brought about the perceptible shift in sustainability and survival. Therefore, environment becomes a most discussed topic in Indian as well as global context. As per the Industrial development and growth of the economy is concerned, many issues have always worried the veterans. Among all these issues, environmental sustainability is gaining momentum at every state, every country and at every region.

India is the second most populous country having 1,243.3 million people with 1,505 US dollar GDP per capita (Global Competitive Index, 2014-15). It is one the important emerging economies in the world (Bhasin 2013). Emergence of any economy at the global map is lead by the development and growth pace of that country where industrial, infrastructural, technological development etc are need of the day. Eventually, this development disproportionally burdens the natural capital, environment and society. Today industries become the integral part of the society on which the building of development stands, simultaneously root cause of environment alteration. Some industries like mining, mineral, energy etc bears the largest proportion of altering the eco-system as well society. Sensing the urgency of issue, developed nations have adopted many guidelines, code of conducts etc for industries and other organisations to minimise the harmful impact of their operations on environment. Although, transitional and under developed economies have still not adopted or taken any serious initiative that can really be fruitful at ground level.

Thus, present paper tries to analyse the difference between domestic and foreign companies operating in India on the basis of concern and importance shown toward their environment and sustainability.

REVIEW OF LITERATURE

There is increasing concern of sustainability in research, academics, business and other realms since last decades. Sustainability is the word that cannot mean inmany senses, but in recent time it is basically related to the environment, earth and human life. With the pace growth, we are lagging behind from the balance between environment and development that ultimately affects our ability to

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sustain today as well as tomorrow.

Defining Environmental Sustainability-

Sustainability is now becomes the news of the front page. Various researchers have defined and coined the term environmental sustainability. According to the Morrelli (2011), some authors take sustainability" Ecological Sustainability as a Conservation Concept," and describe environment sustainability as "meeting human needs without compromising the health of ecosystems."

As ISC sustainability report defined this term as, "Environment sustainability requires the design and provision of products and services that incorporate and promote waste minimisation and the efficient and effective use and rescue of resources."

In present study we have taken the diversified perspective sustainability with ecological, social, economical, technical aspects.

Environmental sustainability in the context of Business-

In today's scenario development is all around linked with industrial growth. Industries are totally dependent on raw material provided by society and environment. Nature has limited capacity of regenerating these resources. With the pace industrial development, utilization of all natural capital is over passing the regeneration capacity of nature. Nature is not able to replenish these resources with such speed and eventually the next generating is coming on the red line and bio diversity of the earth is also in danger.

When we talk about the hazardous impact some industries like mining, mineral, energy etc are in front desk. These industries have strongest ecological as well as social impact in terms of sustainability as well as economic development. So that restriction or banning on these industries can't solve the problem and leave the economical development in lurch. Indeed, research and innovation in field of green technology, green chemistry, green building etc can fuel the development with sustainability.

Need for environmental sustainability-

After 20th century, we have seen our planet from the space first time with lots of beautiful clouds, gases, greenery, oceans, soil not human and its activities (Morrelli, 2011). Morrelli (2011) further stated that our planetary system is altering because of mismatch between the human activities and its pattern. Therefore, many life threatening hazards are coming with these changes. Every country, every region, every company is in consternation about the issue of sustainability and survival. Climate change, green house effect, soil erosion, water pollution, noise pollution, loss of bio diversity etc are life hazardous impact of ignored sustainability (IEG report on environment sustainability, 2008).

Globally as well domestically economic development with industrial development is always wrecking the balance of environment and sustainability. As far as developing countries are concerned, they are always alleged by developed countries on the matter of environmental alteration. Now, the time has come when strong heed as well as action become need of the day for developing as well as developed countries to change their policies and practices in such a manner that will bolster the competitiveness as well as positive impact on environment.

RESEARCH OBJECTIVES

With acknowledging the need of sustainability, present study attempts to find out the following research objectives-

1) Extent of importance given to environment sustainability by companies.
2) Comparison of domestic and foreign companies in term of importance given to environment sustainability.
3) Co-relation between financial performance and importance given to environmental sustainability.
4) Comparison of domestic and foreign companies in term of financial performance.
5) New technologies and innovations in the field of environment sustainability.

RESEARCH METHODOLOGY

Content analyses of annual reports are done to find out the importance given to the environmental sustainability. Non probability purposive sampling has been used for the selection of sample. ETIG data base (2012) has been used to identify the foreign as well Domestic companies. An ET 500 company (2012) (Top companies in India) has been used to get the relevant sample size. On the basis of foreign shareholding patterns (Foreign promoters, foreign institutional investors, foreign venture capital) 51 companies are indentified, whose foreign shareholdings are more than 50 percent that are taken as foreign. And to equalise it 51 Domestic companies also included in sample size irrespective of the industries. So that total sample size for this study is 102 (51 foreign companies + 51 Domestic companies i.e. N= 120).

After selection of sample, data is collected through the websites of the respective companies. Annual reports of all companies are downloaded from their official websites. Content analysis method has been used to analyse on the following basis of indicators-

- Sustainability word used (Categorical variable)
- Responsible word used (Categorical variable)
- Any initiative other than CSR (Categorical variable)
- Types of sustainability (Categorical variable)-

  1) Ecological- Plantation, waste management, environment related campaign etc)
  2) Human- (Charity to vulnerable group, old age help, shelter homes, rehabilitation programsetc)
  3) Economical- (Profitability, business sustainability etc)
  4) Technical- (Green technology initiative and other technology related programs etc)
  5) Others/ Many (Natural calamities related programs etc)

RESEARCH HYPOTHESES

H01: There is no significant difference between domestic and foreign companies in terms of importance given to environmental sustainability.

$H_0$1(a): There is no significant difference between domestic and foreign companies in terms of concern towards sustainability.

$H_0$1(b): There is no significant difference between domestic and foreign companies in terms of concern towards responsibility of environmental sustainability.

$H_0$1(c) There is no significant difference between domestic and foreign companies in terms of initiatives taken for environmental sustainability.

$H_0$1(d) There is no significant difference between domestic and foreign companies in terms of types of sustainability.

H02 There is no significant difference between the performance of Indian and foreign companies.

$H_0$2(a) There is no significant difference between domestic and foreign companies in term of percentage change in profit after tax.

$H_0$2(b) There is no significant difference between domestic and foreign companies in term of percentage change in revenue.

DATA ANALYSIS

Collecting, tabulating and performing various test on SPSS data presented as following-

Table 1 (Table 1 about here) indicated that there are total 102 companies (51 foreign companies and 51 Indian companies), in which 86 were form manufacturing sector (37 foreign and 49 Indian) and 16 were (14 foreign and 2 Indian) operating in service sector.

Table 2 (Table 2 about here) depicted that 21.6 percent (11 companies) foreign companies have not used the word sustainability in their annual reports i.e. less than Indian companies, where 37.3 percent (19 companies) were not included such word anywhere in their annual report. In total scenario 29.4 percent companies were not included any sustainability word in their annual reports. Indeed,70.6 percent of the total companies have been found concernedtoward environmental sustainability issues.

Table 3 (Table 3 about here) is all about the responsibility word used in their annual reports. 98 percent (50 companies) of foreign companies have used responsibility word compare to their counterpart i.e. 96.1 percent (49 companies). On the flip side, 2 percent of foreign companies with 3.9 percent of Indian do not use the word responsibility in their annual reports.

Table 4 (Table 4 about here) depicted the status of initiative taken by companies regarding the sustainability other than CSR. 41.2 percent of foreign companies take some initiative for maintaining the sustainability of the environment. On the other hand only 25.5 percent of the Indian companies fall in this category.

Discussing about the types of initiative taken by companies on environmental sustainability table 5 (Table 5 about here) clearly shows that maximum

Table 1- Types of company * Company is operating in which sector. Cross tabulation

		Company is operating in which sector.		
		Manufacturing Sector	Service Sector	Total
Types of company	Foreign	37	14	51
	Indian	49	2	51
Total		86	16	102

Table 2- Types of company * Sustainability word used Cross tabulation

			Sustainability word used		
			No	Yes	Total
Types of company	Foreign	Count	11	40	51
		% within Types of company	21.6%	78.4%	100.0%
		% within Sustainability word used	36.7%	55.6%	50.0%
	Indian	Count	19	32	51
		% within Types of company	37.3%	62.7%	100.0%
		% within Sustainability word used	63.3%	44.4%	50.0%
Total		Count	30	72	102
		% within Types of company	29.4%	70.6%	100.0%
		% within Sustainability word used	100.0%	100.0%	100.0%

Table 3 Types of company * Responsible word used Cross tabulation

			Responsible word used		
			No	Yes	Total
Types of company	Foreign	Count	1	50	51
		% within Types of company	2.0%	98.0%	100.0%
		% within Responsible word used	33.3%	50.5%	50.0%
	Indian	Count	2	49	51
		% within Types of company	3.9%	96.1%	100.0%
		% within Responsible word used	66.7%	49.5%	50.0%
Total		Count	3	99	102
		% within Types of company	2.9%	97.1%	100.0%
		% within Responsible word used	100.0%	100.0%	100.0%

Table 4 Types of company * Other initiative for environmental sustainability Cross tabulation

			Other initiative for environmental sustainability		
			No	Yes	Total
Types of company	Foreign	Count	30	21	51
		% within Types of company	58.8%	41.2%	100.0%
		% within Other initiative for environmental sustainability	44.1%	61.8%	50.0%
	Indian	Count	38	13	51
		% within Types of company	74.5%	25.5%	100.0%
		% within Other initiative for environmental sustainability	55.9%	38.2%	50.0%
Total		Count	68	34	102
		% within Types of company	66.7%	33.3%	100.0%
		% within Other initiative for environmental sustainability	100.0%	100.0%	100.0%

Table 5 Types of company * Types of sustainability Cross tabulation

			Types of sustainability						
			None	Ecological	Human	Economical	Technical	Many*	Total
Types of company	Foreign	Count	4	5	15	5	2	20	51
		% within Types of company	7.8%	9.8%	29.4%	9.8%	3.9%	39.2%	100.0%
		% within Types of sustainability	50.0%	26.3%	55.6%	29.4%	66.7%	71.4%	50.0%
	Indian	Count	4	14	12	12	1	8	51
		% within Types of company	7.8%	27.5%	23.5%	23.5%	2.0%	15.7%	100.0%
		% within Types of sustainability	50.0%	73.7%	44.4%	70.6%	33.3%	28.6%	50.0%
Total		Count	8	19	27	17	3	28	102
		% within Types of company	7.8%	18.6%	26.5%	16.7%	2.9%	27.5%	100.0%
		% within Types of sustainability	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

*(*Many: Mixed of ecological, human, economical, technical and other aspects of sustainability)*

Table-6 Types of company * Whether company has positive/ negative percentage increased in profit Cross tabulation

			Whether company has positive/ negative percentage increased in profit			
			Decreased profit	Increased profit	Not increased nor decreased	Total
Types of company	Foreign	Count	25	25	1	51
		% within Types of company	49.0%	49.0%	2.0%	100.0%
		% of Total	24.5%	24.5%	1.0%	50.0%
	Domestic	Count	34	17	0	51
		% within Types of company	66.7%	33.3%	0.0%	100.0%
		% of Total	33.3%	16.7%	0.0%	50.0%
Total		Count	59	42	1	102
		% within Types of company	57.8%	41.2%	1.0%	100.0%
		% of Total	57.8%	41.2%	1.0%	100.0%

Table 7- Ranks

Types of company		N	Mean Rank	Sum of Ranks
Percentage change in profit after tax	Foreign	51	59.18	3018.00
	Domestic	51	43.82	2235.00
	Total	102		

Table 8- Test Statistics[a]

	Percentage change in profit after tax
Mann-Whitney U	909.000
Wilcoxon W	2235.000
Z	-2.620
Asymp. Sig. (2-tailed)	.009
Kolmogorov – Smriow Z	3.800
Asymp. Sig. (2-tailed)	.000

a. Grouping Variable: Types of company

Table 9- Types of company * Whether company has increased / decreased percentage change in revenue Cross tabulation

			Whether company has increased / decreased percentage change in revenue		
			Decreased Revenue	Increased Revenue	Total
Types of company	Foreign	Count	3	48	51
		% of Total	2.9%	47.1%	50.0%
	Indian	Count	8	43	51
		% of Total	7.8%	42.2%	50.0%
Total		Count	11	91	102
		% of Total	10.8%	89.2%	100.0%

Table 10- Ranks

Types of company		N	Mean Rank	Sum of Ranks
Percentage change in revenue	Foreign	51	51.05	2603.50
	Indian	51	51.95	2649.50
	Total	102		

Table 11- Test Statistics[a]

	Percentage change in revenue
Mann-Whitney U	1277.500
Wilcoxon W	2603.500
Z	-.154
Asymp. Sig. (2-tailed)	.878

a. Grouping Variable: Types of company

Table 12- Chi-square test for type of companies and environmental sustainability

Chi-square test	Value	df	Sigma
Type of the company X Sustainability word used (See Table 13)	2.022[a]	1	0.042
Type of the company X Responsibility word used (See Table 14)	.343[a]	1	0.558
Type of the company X Other sustainability initiative taken (See Table 15)	2.024[a]	1	0.043
Type of the company X Percentage change (increased/ decreased) in profit (See Table 16)	3.897[a]	2	.143
Type of the company X Percentage change (increased/ decreased) in revenue (See Table 17)	2.547[a]	1	.110
Sustainability word used X Percentage change (increase/ decrease) in profit (See Table 18)	3.256a	2	.196
Responsibility word used X Percentage change (increase/ decrease) in profit (See Table 19)	.839a	2	.657
Other sustainability initiative taken X Percentage change (increase/ decrease) in profit (See Table 20)	1.140a	2	.565
Sustainability word used X Percentage change (increase/ decrease) in revenue (See Table 21)	1.528a	1	.216
Responsibility word used X Percentage change (increase/ decrease) in revenue (See Table 22)	1.633a	1	.201
Other sustainability initiative taken X Percentage change (increase/ decrease) in revenue (See Table 23)	.815a	1	.367
Industry Sector X Sustainability word used (See Table 24)	1.039a	1	.308
Industry Sector X Responsibility word used (See Table 25)	.575a	1	.448
Industry Sector X Other sustainability initiative taken (See Table 26)	.148a	1	.700

Table 13 Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.022[a]	1	.042		
Continuity Correction[b]	2.314	1	.128		
Likelihood Ratio	3.050	1	.081		
Fisher's Exact Test				.128	.064
N of Valid Cases	102				

Table 14 Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.343[a]	1	.558		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	.350	1	.554		
Fisher's Exact Test				1.000	.500
N of Valid Cases	102				

Table 15 Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.024[a]	1	.043		
Continuity Correction[b]	2.162	1	.141		
Likelihood Ratio	2.843	1	.092		
Fisher's Exact Test				.141	.070
N of Valid Cases	102				

Table 16 Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.897[a]	2	.143
Likelihood Ratio	4.298	2	.117
Linear-by-Linear Association	3.665	1	.056
N of Valid Cases	102		

Table 17 Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	2.547[a]	1	.110		
Continuity Correction[b]	1.630	1	.202		
Likelihood Ratio	2.633	1	.105		
Fisher's Exact Test				.200	.100
N of Valid Cases	102				

Table 18 Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.256[a]	2	.196
Likelihood Ratio	3.327	2	.189
Linear-by-Linear Association	.156	1	.693
N of Valid Cases	102		

Table 19 Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.839[a]	2	.657
Likelihood Ratio	.850	2	.654
Linear-by-Linear Association	.640	1	.424
N of Valid Cases	102		

Table 20 Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.140[a]	2	.565
Likelihood Ratio	1.445	2	.485
Linear-by-Linear Association	.293	1	.588
N of Valid Cases	102		

Table 21 Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.528[a]	1	.216		
Continuity Correction[b]	.785	1	.376		
Likelihood Ratio	1.426	1	.232		
Fisher's Exact Test				.293	.186
N of Valid Cases	102				

Table 22 Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.633[a]	1	.201		
Continuity Correction[b]	.111	1	.739		
Likelihood Ratio	1.140	1	.286		
Fisher's Exact Test				.292	.292
N of Valid Cases	102				

Table 23 Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.815[a]	1	.367		
Continuity Correction[b]	.318	1	.573		
Likelihood Ratio	.782	1	.377		
Fisher's Exact Test				.499	.280
N of Valid Cases	102				

Table 24 Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.039[a]	1	.308		
Continuity Correction[b]	.519	1	.471		
Likelihood Ratio	1.117	1	.291		
Fisher's Exact Test				.383	.241
N of Valid Cases	102				

Table 25 Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.575[a]	1	.448		
Continuity Correction[b]	.000	1	1.000		
Likelihood Ratio	1.041	1	.308		
Fisher's Exact Test				1.000	.596
N of Valid Cases	102				

Table 26 Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.148[a]	1	.700		
Continuity Correction[b]	.009	1	.923		
Likelihood Ratio	.146	1	.702		
Fisher's Exact Test				.775	.453
N of Valid Cases	102				

numbers fall in the ecological and many categories. Maximum companies considered every aspect of sustainability rather than only one side of the coin. This distribution also shows that foreign firms used mix of various approach simultaneously for environmental sustainability compare to domestic companies.

Table 6 (Table 6 to 8 about here) clearly depicted that 49.0 percent foreign companies have increased percentage change in profit compare to domestic companies i.e. 33 percent. On the flip side only 49.0 percent foreign companies and 66.7 percent domestic companies have decreased percent change in profit after tax. This table indicate the better performance of the foreign companies over domestic companies but to check the significance level of this result further analysis is required. Data is not normally distributed i.e. why we have performed Mann-Whitney U test for analysing that is difference is significant or not. Mean rank for foreign and domestic companies i.e. 59.18 and 43.82 and test value (U-909.00, Sig value-.000) in table 6.8 (Table 6.8 about here) clearly shows that null hypothesis will be rejected. The difference between domestic and foreign companies in term of percentage change in profit is significant.

Table 9 (Table 9 to 11 about here) shows that 47.1 percent of foreign companies and 42.2 percent of domestic companies have increased percentage change in the revenue. Present distribution does not difference vastly, even mean ranks i.e. 51.05 for foreign companies and 51.95 for domestic companies also shows that there is no significant difference were exist between two. Test statistics (U-1277.5, Sig.value-.878) confirm that null hypothesis will not be rejected and there is no significant difference exists between domestic and foreign companies in terms of percentage change in revenue.

Table 12 (Table 12 about here) is all about the impact of types of companies (foreign and domestic companies), Industry sector (Manufacturing and service sector), financial performance (percentage change in profit and revenue) on the importance and concern given to environmental sustainability. All significant value clearly indicate that null hypothesis will not be rejected and there is no impact of sector, financial performance and has found on concern and importance towards environmental sustainability initiatives of the companies operating in India except two variables these are, sustainability word used and sustainability initiative other than CSR. Null hypothesis is rejected in case of these variables and it can be stated that there is significant difference exist between domestic and foreign companies in term of sustainability word used in their annual report and initiative taken to secure the environmental sustainability. Foreign companies get better position compare to domestic companies **(Table 13 to 26 about here)**.

RESULT AND DISCUSSION

Interpretation of the above data and the qualitative study of various managers from mining and mineral industries reveal the following results-

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RESULT AND DISCUSSION

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Domestic and foreign companies and importance of environmental sustainability-

Table 2 to 4 is all about the comparison of domestic and foreign companies for sustainability, responsibility words used and sustainability initiative other than CSR has been taken. Tables bring forth the finding that foreign companies are in better position compare to domestic companies. Foreign companies are more oriented towards the sustainability of the environment as they take much initiative other than CSR and have integrated the concept of sustainability in their competitive strategy and technological philosophy.

Domestic and foreign companies and types of initiative for environmental sustainability-

When we talk about the types of initiative for environmental sustainability by companies, it was found that many companies especially foreign companies were concerned about social, economical, technical and ecological aspect of sustainability rather than focusing only on one side of the coin. After this category 'Ecological' aspect of the sustainability has found maximum number and domestic as well as foreign both types of companies shows much concern towards this.

Financial performance of domestic and foreign companies-

Percentage change in profit after tax, percentage change in revenue has been taken as indicator of the organisational performance for nullifying the effect of industry type and size as extraneous variables. Tables 6 to 11 indicate that foreign firm have better performance compare to domestic firms in terms of percentage change in profit but no significant difference has been found in percentage change in revenue. Although seeing the percentage figure it can be analyse that foreign companies have little better performance compare to domestic companies.

Impact of sector, types of company, financial performance on environmental sustainability-

Types of companies variable has shown significant relation with sustainability word used and other sustainability initiatives taken. Result clearly state that foreign companies takes more initiatives to secure their environment in which they are operating compare to domestic companies. Even domestic companies less used the word sustainability in their annual report compare to foreign companies. This finding support the fact that developing countries are more concern towards the efficiency and production compare to developed nations. Therefore, companies from transitional economies are less oriented towards securing the environment for negative impact of development.

Technological development for environmental sustainability-

Technology is the application of knowledge for practical purpose. It is most difficult challenge to overcome due to complexity and incompatibility (Prakash et al. 2013) Interviewing the various managers from different industries (Energy, mining, mineral industries etc)it was found that the various reasons that are responsible for low level of concern and initiative by domestic companies towards sustainability is because of the following reasons-

i) Lack of stringent norms related to sustainability.

ii) Less concern on sustainability in efficiency oriented countries.

iii) Faulty implementation of laws and regulations.

iv) Corruption

Although in the present study low level of concern is also because of less voluntary disclosure practices by companies regarding environmental sustainability in annual reports. Indeed, there are some technological developments that can be adopted by companies for better environmental protection-

- Photovoltaics
- Wind turbins
- Bio reactors
- Bio filtration

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