Management of e - waste in India: A Swachh Bharat Abhiyaan perspective

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ABSTRACT

The present century can be truly characterized by a single word ‘electronic’, around which our entire economic and non economic system revolves and subsists. It is a sad plight for any nation to seek external motivation in the form of a nationwide campaign to maintain ‘cleanliness’ which is the fundamental requirement for a healthy human existence. Keeping in line with the ‘Swachh Bharat Abhiyan’ initiative of the government of India, commendable efforts have been made to achieve physical and ecological hygiene in the country, though nothing substantial has been done to curb ‘e-pollution’ a menace caused by generation of exorbitant amount of ‘e-waste’. The appropriate disposal and management of this waste is a herculean task for all nations of the world at present, irrespective of their global economic rank pedestal. The paper focuses on development of policy initiatives at governmental level which would aim towards effective management of life threatening ‘e-waste’ and try to mitigate the inherent risks involved. Further, partaking the maxim of PPP (Polluter Pay Principal) the paper seeks to devise programs that would ensure active participation of all ‘e-stakeholders’, which is a pre-requisite for building up of a SSS (Safe, Secure and Sustainable) environment.

Keywords: e-waste, e-stakeholders, sustainable, risk, disaster

INTRODUCTION

The 21st century is aptly termed the digital age, as the present human is living a digital life being dependent on technology for survival, health and luxury. There is no doubt in saying that the electronic industry is one of the largest and fastest growing industry of the world. Every year tons of digital goods get transported over water, land and air to serve utility. The remains of these goods become a multifarious waste matter comprising of various hazardous heavy metals, toxic chemicals, non biodegradable plastics and acids. The e-waste generated is generally disposed off by dumping into deep pits, burning or are exported to recycling units but, a sizeable amount of waste accounting to nearly 75% of total bear uncertainty in their disposal mechanism in form of R.R.R. i.e. getting refurbished, remanufactured and reused. The remaining constitutes the junk that occupy usable space at houses and industries. Unfortunately, the Afro Asian countries have become favorite dumping grounds of toxic electronic goods like leaded glass, circuit boards and mercury lamps etc., for the developed nations, with China and India being the leaders (Basel Action uploaded on 2013). These two countries being labor abundant and economical, the major dismantling processes are undertaken here, which is involved in unscrewing, shedding and burning of tons of junked electronic scrap. The process involves liberation of smoke and dust particles which consist of harmful carcinogens and other perilous chemicals which may cause chronic inflammations, many respiratory and skin diseases. The circuits are burned as a metallurgical process to hunt precious metals such as gold, cadmium etc., the
external coat of which releases carbon particles and smoke which are responsible for causing skin cancer and other lung related diseases (Kevin et al., 2008). The developing nations being favorite dumping spots are vulnerable to the harms inflicted by these toxins due to the prevalent poverty, unemployment and lack of awareness of the ill effects and proper ways of e-waste disposal.

The paper gathers information from Greenpeace technical note 10, 2008 and extracts relevant data from numerous secondary sources like research papers, articles, video documentaries etc., related to the subject. It shall try to study issues regarding, sources of e-waste, commonly used current methods of disposing e-waste, hazardous chemicals, heavy metals and the ill effects of e-waste on environment, and shall try to provide possible solutions for the same.

**SOURCES OF E-WASTE:**

E-Waste is generated from various sources like the unused cell phones, batteries, C.D’s, music players. Almost all used electronic items are considered as e-waste such as discarded cell phones, cameras, CD players, TVs, radios, fax machines, photocopy machines etc. The capacitor di electrics, hydraulic fluids, transformer oils release polychlorinated bi phenyls, combustion of P.V.C’s etc., release other chlorine compounds which contribute to e-waste. Plastic casings of electronic equipments and compounds as foam use flame retardants, whereas hydraulic fluids, plastic coverings of monitors, plastic used in photocopy films etc. contain triphenyl phosphates which are a major scrap component. Electronic batteries and soldering machines make use of lead oxide which is a heavy metallic gas, it is used in glass in cathode ray tubes and as a stabilizing component in production of poly vinyl chloride. Compounds of other heavy metals such as cadmium are a common ingredient of electric switches, soldering joints, as stabilizers in manufacture of P.V.C., in rechargeable batteries also, cadmium sulphide is used to produce illumination in the interior surface of C.R.T. screens and antimony is used as a flame retardant in plastic manufacturing, lead acid batteries and electric solders. Free carbon radicals are found in toners of printers, beryllium in circuit mother boards and mercury is found in printed circuit boards, switches, relays whereas chromium is used to prevent corrosion in galvanized parts of steel. The toxicity of heavy metals depends upon numerous factors which are - the quantity applied, nature of exposure, chemical species along with the age, gender, genetics, and nutritional status of individuals exposed to them. Due to the high degree of toxicity attributed to them heavy metals such as arsenic, cadmium, chromium, lead, and mercury ranked among the priority metals accounting for concern towards public health since they are associated to be a direct cause of multiple organ damage even with very little exposure, due to which they are considered to be systemic toxicants. Being relatively denser than water, these metals are a major contributor source to water pollution also, thereby endangering aquatic life too. According to the U.S. Environmental Protection Agency and the International Agency for Research on cancer, they are also classified as probable human carcinogens, making them a priority concern when battling with e-waste disposal. The Swachh Bharat Mission has to have e-waste management as its focal point as being the most ignored form of harmful waste, the electronic garbage serves as potent danger to survival of human and other life forms. Various processes like shredding, dismantling, incineration, acid baths etc. involved in manufacturing sector cause major cuts and burns along with their ill effects due to long term exposure. Exposure to many elements produced as an e-waste have dangerous implications in reproduction as exposure to phthalates during pregnancy reduces the ano-genital index in case of a male child, and severely damages liver and kidneys. Compounds of chlorine like the polychlorinated biphenyl accumulates in fish and other aquatic animals affecting tertiary consumers like human beings through biological magnification. These compounds are absorbed through skin or may be inhaled or ingested affecting the central and peripheral nervous system, causing seizures, skin ailments, tumors, suppressed immunity, sperm abnormality and other reproductive disorders. Polybrominated diphenyl ethers are known to have gross bio persistence, and retards the process of brain development in early stages of foetal development when exposed in a prolong manner. Heavy metals such as lead produce irreversible damage in kidney functioning, nervous system, and affects development of brain cells in children. Cadmium is known to have caused hypertension apart from hindering work of calcium deposition and kidneys. Antimony causes dermatitis, adversely affects immunity and respiratory tract and is considered a strongly potent carcinogen according to International Agency for Research on Cancer.
Chromium apart from being a carcinogen, also causes asthma, bronchitis and disrupts formation of D.N.A. In developing countries like India, Ghana, China etc. there is rampant poverty and incidentally these countries are also the most favored dumping grounds of e-waste by the western world. Nearly twenty percent of the population living on the edge of poverty consumes used and discarded electronic goods which increases their vulnerability to the ill effects. A lot of people work as garbage collectors, in dismantling units where they get exposed to the harmful radiation. Due to lack of availability of safe drinking water, people get infected with diseases due to consumption of water polluted with e-waste since water bodies have become a dark muddy stream with scrapped heavy metals along with regular garbage. The polluted water with alkalinity and salinity content much higher than the desired damages the crops as lack of irrigational facilities makes our farmers river lift water for their fields, which further adds to the already lurking acute food scarcity in the country. The metal and acid content in water bodies due to e-waste disposal, makes it unfit for aquatic sustenance thereby destroying our diverse aquatic flora and fauna finally entering the top carnivores through biological magnification. Many small villages situated nearby the vicinity of metropolitan cities have become junk yards of discarded electronic goods, with much loss to their agricultural sector and children suffering from various neurological and physical deformities. Thousands of poor people are engaged in dismantling electronic items or extraction of metals which from which after separating the usable items, burn the remnants spreading toxic smoke causing respiratory disorders. In many other Indian villages such as Seelampur, there exist huge market of junk market where piles of electronic waste are recycled and separated. For example, copper is separated from wires through burning, producing toxic nitrous oxide; acid treatment is done to isolate metals causing various respiratory and skin problems. Recycling a computer in U.S. costs ten times more than recycling the same in India, which makes India a preferred labour destination to the west, increasing exposure of our country to perils caused by pollution of e-waste. In our country itself, nearly 25% of the e-waste is produced in huge metros of Delhi, Mumbai, Bangalore and Chennai spoiling the environment with toxic waste.

**Modes of Disposal of E-waste:**

The commonly used modes of disposal of e-waste in India are the acid baths, incineration and landfills. Most of the e-waste is dumped in huge pits called the ‘land fills’ which are huge piles of garbage dump and are correctly described as ‘time bomb’ due excessive accumulation of waste over the time. These huge fills are store house of un used or discarded batteries, plugs, wires, electronic circuits comprising of lead and other heavy metals such as cadmium, copper, mercury, nickel etc. which release toxic gases/ acids leaching on to the environment gradually. These have ill effects ranging over long term which shall affect future generations. Metallurgical processes to extract copper make use of acid bath where the circuit board is kept in acid such as sulphuric acid for 10-12 hours in which copper dissolves, and is then taken out as a precipitate. The remaining solution is mixed with other garbage increasing the pollution. The method is also used in metallurgy of lead and extraction of gold and silver. Incineration involves heating a substance in limited supply or in absence of oxygen which produces ash, charcoal, oil and fumes which pollute the environment. Erotic fumes of polycyclic aromatics and polychlorinated dibenzofurans are produced on heating plastic and P.V.C. which are known carcinogens, the smoke produced also contains minor quantities of oxides of heavy metals such as manganese, antimony, lead and silver. Thus all the commonly used methods of e-waste disposal affect health and well being of those involved directly or in an indirect manner with the e-junk created.

The safest method of managing e-waste is to recycle and re use the electronic goods. Stringent rules need to be made in this regard making it compulsory to wear protective masks and safety gear when working in exposure to e-waste. Traditional methods such as incineration and acid baths of extraction should be avoided as this result in emission of harmful fumes. Practice of using landfill as a dumping ground should be discontinued as it may leach out towards the ground in long term. Proper and safe storage system for disposing e-waste must be implemented until the products are re used. In many states of the U.S.A. government has made it mandatory for electronic goods manufacturers to recycle the products manufactured by them after use. Worldwide there are environmental groups like the Basel Action Network (B.A.N.) and N.R.D.C. which have in consultation with electronic producers have developed a
certification system for recycling, reusing and refining the electronic wastes. The certification ensures that the recycling processes used adhere to ecologically sustainable practices. Both these groups are continuously trying to formulate and implement programmes and standards to ensure minimum e-pollution. The legislations and certifications are important, but to manage e-junk in a country of hundred of crores of electronic good consumers, awareness of appropriate handling and disposing e-waste is important.

CONCLUSION

It can be concluded that through public cooperation and awareness, efficient e-waste management systems can be developed, which is difficult in a populated country like ours where poverty and massive illiteracy are still a challenge. Thus, Indian government needs to play a proactive role in formulation and implementation of environmentally friendly legislations, which shall ensure minimum loss to nature. Licensing of certification shall ensure greater transparency of actions in the e-waste disposal market with ascertainment of correct quantum of waste disposed, so that appropriate and timely actions to manage the waste may be ensured. The environment groups like the B.A.N and N.R.D.C. should come up with stringent practices that would control e-waste movements. The government with aid of environmental groups should organize public awareness campaigns discussing the harmful effects of mishandling heavy metals and regular e-garbage and teach them better and efficient ways of e-waste disposal.

REFERENCES


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