REVIEW ARTICLE

E-WASTE MANAGEMENT: AN EMERGING ENVIRONMENTAL AND HEALTH ISSUE IN INDIA

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ABSTRACT

Electronic waste or e-waste is one of the rapidly growing problems of the world. E-waste comprises of a multitude of components, some containing toxic substances that can have an adverse impact on human health and the environment if not handled properly. In India, e-waste management assumes greater significance not only due to the generation of its own e-waste but also because of the dumping of e-waste from developed countries. This is coupled with India's lack of appropriate infrastructure and procedures for its disposal and recycling. Putting the onus of recycling of electronic wastes (e-waste) on the producers, the Ministry of Environment and Forest (MoEF) has for the first time notified e-waste management rules (2011). This review article provides the associated issues and impact of this emerging problem, in the light of initiatives in India.

Keywords: E-waste, environmental hazards, recycling yards, information and communication technology

INTRODUCTION

Electronic and Electrical waste, popularly known as e-waste products, do not decompose or rot away.[1] The information and communication technology (ICT) sector in the last twenty years or so in India has revolutionized life of one and all, ratcheting a viral effect on electronic manufacturing industries leading to phenomenal growth in terms of both, volume and applications. Digital development has become the new mantra having its all engulfing footprints everywhere. The booming usage of electronic and electrical equipments has created a new but very dangerous stream of waste, called **"electronic-waste**", or simply known as **e-waste**. With the presence of deadly chemicals and toxic substances in the electronic gadgets, disposal of e-waste is becoming an environmental and health nightmare. E-waste is now one of the fastest growing waste streams. Every year, hundreds of thousands of old computers, mobile phones, television sets and radio equipment are discarded, most of which either end up in landfills or unauthorized recycling yards. [2]

According to Basel Action Network executive director Jim Puckett recycling companies might not be as honest about what they are doing with your old electronics in US, about 80 percent of that material, very quickly, finds itself on a container ship going to a country like China, Nigeria, India, Vietnam, and Pakistan where very dirty things happen to it.[3]

Solid waste management, which is already a mammoth task in India, is becoming more complicated by the invasion of e-waste, particularly computer waste. E-waste from developed countries finds an easy way into developing countries in the name of free trade further complicating the problems associated with waste management.[4] Article highlights the associated issues and impact of this emerging problem, in the light of initiatives in India.

E-WASTE IN INDIA

According to a MAIT report, India in 2007 generated 380,000 tonnes of e-waste from discarded Computers, Televisions and Mobile Phones. This is projected to grow to more than 800,000 tonnes by 2012 with a growth rate of 15 %.[2] Maharashtra generates the most waste from electrical and electronic equipments in the country. Pune, along with Mumbai, are among the top 10 cities generating E-waste .The total electronic waste generation in Maharashtra is more than 20,270.6 tonne, out of which Navi Mumbai accounts for 646.48 tonne, Greater Mumbai 11,017.06 tonne, Pune 2,584.21 tonne and Pimpri-Chinchwad 1,032.37 tonne. The estimate includes 50, 000 tonnes of such e-waste imported from

developed countries as charity for reuse, which mostly end up in informal recycling yards either immediately or once the re-used product is discarded. The authorized e-waste recycling facilities in India capture only 3% of total e-waste generated; the rest makes its way to informal recycling yards in major cities like Delhi, Mumbai and Bangalore.[5]As per UNEP, "currently, the available data on e-waste arising is poor and insufficient and estimation techniques are required for extension of known data to regional-global coverage. United Nations University's estimations indicate that current e-waste arising across the twenty seven members of the European Union amount to around 8.3 – 9.1 million tons per year; global arising are estimated to be around 40 million tons per year."[6]

IMPACTS OF E-WASTES

The disposal of e-waste is a particular problem faced in many regions across the globe. Environment and human health is affected by e-waste. E-waste takes up space in the communities it invades and can be very harmful to humans and animals. It is of concern mainly due to the toxicity and carcinogenicity of some of the substances if processed improperly.

E-waste is much more hazardous than many other municipal wastes because electronic gadgets contain thousands of components made of deadly chemicals and metals like lead, cadmium, chromium, mercury, polyvinyl chlorides (PVC), brominated flame retardants, beryllium, antimony and phthalates. Long-term exposure to these substances damages the nervous systems, kidney and bones, and the reproductive and endocrine systems, and some of them are carcinogenic and neurotoxic. Primitive recycling or disposal of e-waste to landfills and incinerators causes irreversible environmental damage by polluting water and soil, and contaminating air.

A study conducted by Greenpeace in 2005 in electronic recycling yards in Delhi clearly indicates the presence of high levels of hazardous chemicals including deadly dioxins and furans in the areas where this primitive recycling takes place.[7] Workers in e-waste disposal sector are poorly protected against the risk of it.

They dismantle e-waste, often by hand, in appalling conditions. About 25,000 workers are employed at scrap-yards in Delhi alone, where 10,000 to 20,000 tons of e-waste is handled every year, with computers accounting for 25 percent of it. Other e-waste scrap-yards exist in Meerut, Firozabad, Chennai, Bangalore and Mumbai.[1]The hazardous substances found in the e-waste includes substantial quantities of lead, cadmium, chromium and flame-retardant plastics. Cathode ray tubes and components with high lead content are considered dangerous to health. Inhaling or handling such substances and being in contact with them on a regular basis can damage the brain, nervous system, lungs, kidneys and the reproductive system Working in poorly-ventilated enclosed areas without masks and technical expertise results in exposure to dangerous and slow-poisoning chemicals. Due to lack of awareness, workers are risking their health and environment as well.[8]

Scientists who have examined Guiyu, China (one of the popular destinations of e-waste recycling activities) have determined that because of the waste, the location has the highest levels of cancer-causing dioxins in the world. Pregnant women are six times more likely to suffer a miscarriage, and seven out of ten kids have too much lead in their blood.3 There is paucity of data on burdens of heavy metal exposure on human body in India. A large number of workers including small children are exposed to different dismantling activities of e-waste. There are no data available about the health implications of these workers. They might be ruining their lives in the lack of appropriate knowledge.

SNAPSHOT OF COMPANY PRACTICES ON TAKE-BACK IN INDIA

The solution to the impending e-waste crisis lies in prevention rather than its management. Recycling of e-waste is beyond the means of a consumer or local government, given its toxic nature. The solution lies with the brand owners or manufacturers of electronic products, which need to bear responsibility for financing the treatment of the own-branded e- waste, discarded by their customers. This is known as the principle of Individual Producer Responsibility (IPR). Legislation embracing Producer Responsibility for e-waste is already in force in the EU, Japan, Korea, Taiwan and some US states. Greenpeace expects responsible companies to treat all their customers globally in the same way and offer take back and recycling services wherever their products are sold – not just in countries where this is a legal requirement

In India some brands have initiated take-back programmes but these are not working as well as they should. Moreover, brand owners should also work towards establishing a robust system of e-waste collection and treatment infrastructure so that e-waste can be collected and recycled in a safe manner. Many brands have no take back service in India, despite many of these same global brands providing a voluntary take back service in countries like the US. The global brands have no take back programme in India, despite some tall claims on producer responsibility, undoubtedly falter on their commitment in India and treat their Indian customers as second-grade clients. These companies indirectly foster the growth of the informal recycling by failing to provide easy and free take back service to ensure responsible recycling.[2]

Despite the absence of any legal binding requirements, Indian brands like HCL and WIPRO are offering voluntary take back and recycling service to their customers. Other brands doing relatively well are Nokia, Acer, Motorola and LGE. Titan Industries, the wristwatch major, does safe disposal of 600,000-

700,000 of its old watches each year as part of e-waste management. [9]

Most of the brands haven't taken any notable initiatives on educating and raising awareness of their customers on the environmental and health impacts of e-waste, as well as its need for customers to bring back/post back their discarded e-products for -recycling. Brands are directly responsible for huge volumes of e-waste generated in India due to their fast developing technology that dramatically reduces the lifespan of an electronic product. Though, they spend millions of rupees on marketing campaigns, celebrity endorsement and advertisement to promote their product.

SOME INITIATIVES REGARDING E-WASTE MANAGEMENT IN INDIA

E-Parisaraa: is the first government-authorized eco-friendly recycling unit which makes full use of e-waste. The plant, which is India's first scientific e-waste recycling unit, aims to reduce pollution, landfill waste and recover valuable metals, plastics and glass from waste in an eco-friendly manner. What makes E-Parisaraa different is that unlike the backyard handling of e-waste, there is no melting involved in the sorting. Notably, it protects data from discarded PCs and guarantees customers' confidentiality**.**

Earth Sense Recycle Private Limited: Earth Sense Recycle Private Limited is the joint venture between the E-Parisaraa Private Limited and M/S. GJ Multiclave India Private Limited, which is a bio-medical waste handling and management company.This company came into existence in the year 2000 and they recycle all types of e-wastes including de-bound assets and other electrical and electronic equipment.

Trishyiraya Recycling India Pvt. Ltd (TPL): is the Indian company that offers safe and reliable disposal of e-waste. The Govt. of India as well as the Pollution Control Board has certified the company. It has constant surveillance mechanisms like CCTV Monitors etc.TPL feels proud of its innovative technology that helps recycle E-Waste. Adding feather to its cap is the 'Total Termination Process' that is completely pollution free. There is no contamination of water or air and, no sound pollution either. [10]

Plug-in to eCycling: It is a partnership of Environmental Protection Agency (EPA) and consumer electronics manufacturers, retailers, and service providers that offers more opportunities to donate or recycle - to "eCycle" used electronics. ECycling includes recycling and recovers valuable materials from old electronics which can be used to make new products. It also includes reducing greenhouse gas emission, reducing pollution, saving energy and resources by extracting fewer raw materials from the Earth. Safe recycling of outdated electronic items promotes sound management of toxic chemicals such as lead and mercury and helps others. [11]

In Bangalore city installation of e-bins to ensure safe disposal of e-waste generated at government offices in is set to become a reality shortly. Saahas, the non-governmental organization (NGO) involved in this pioneering effort, plans to hold campaigns in government offices to create awareness about e-waste and the need to dispose it safely [12] and environment-friendly disposal and recycling of e-waste. Toll-free telephone number is provided to get e-waste picked up from home and recycled. [13]

MAIT-The Manufacturers' Association for Information Technology has incubated an Electronics Recyclers' Association (ERA) to organize electronic waste (e-waste) handling in an environment-friendly manner. ERA will initially comprise nine members, of whom six are e-waste processors and three are executive members.[14]

LEGISLATION DEALING WITH E-WASTE IN INDIA

Putting the onus of re-cycling of electronic wastes (e-waste) on the producers, the Ministry of Environment and Forest (MoEF) has for the first time notified e-waste management rules. The e-waste (management and handling) Rules, 2011 would recognize the producers' liability for recycling and reducing e-waste in the country. The rules will come into effect from May 1, 2012.

Personal Computer manufacturers, mobile handset makers and white goods makers will be required to come up with e-waste collection centers or introduce 'take back' systems. "These rules will apply to every producer, consumer and bulk consumer involved in manufacture, sale, and purchase and processing of electronic equipment or components," The ministry is giving the producers of electrical and electronic equipment a breathing period of one year to set up their collection centers.

The rules will come under the Environment Protection Act (EPA). Under the new rules, producers will have to make consumers aware about the hazardous components present in the product.

They will also have to give information booklets to prevent e-waste from being dropped in garbage bins. However, according to the rules, bulk consumers such as enterprises and government will be responsible for recycling of the e-wastes generated by them. The bulk users have to ensure that the e-waste generated by them is channelized to authorized collection centers or is taken back by the producers. They also have to maintain records of e-wastes generated by them and make such records available with State Pollution Control Boards or the Pollution Control Committees.[15]

CONCLUSION

The e-waste is going to become a great challenge for environmentalists and technologists as the rate of growth is much higher than the rate it is disposed, reused or recycled. There is an urgent need for improvement in e-waste management covering technological improvement, operation plan, implementing a protective protocol for the workers working in e-waste disposal and educating public about this emerging issue posing a threat to the environment as well as public health.

RECOMMENDATIONS

Many issues of great concern are likely to be addressed by the forthcoming Act. Therefore, the required observance of the Act provisions in word and spirit by all the stakeholders, as desired, shall surely enable the country to deal with the short term and long term pollution hazards with effective implementation, sustained monitoring and better supervisory practices. However, some seemingly remaining unaddressed or less addressed issues require further consideration of the authorities towards devising the ways and means to ensure formulation of related strategic plans and subsequent necessary field level initiatives.

The first order priority is to identify informal sectors contributing for 95% of e-waste collection and recycling. In addition, there is an urgent need to create a system for absorbing the strong workforce of informal sector into the proposed scheme for scientific recycling. A large number of workers are involved in crude dismantling of these electronic items for their livelihood and their health is at risk, therefore, there is an urgent need to plan a preventive strategy among these workers. Skill enhancement of workers through training facilities and focus on their occupational health must be ensured. It is emphasized here that the producers should make financially liable for generated e-waste as per norms of their safe disposal based on the toxicity of the concerned products. Pollution Control Boards probably require further strengthening of their resources, powers and plans for performing the entrusted tasks with greater zeal through result oriented active enforcement.

Present legislation needs to be transformed to active policies which will pave way for a brighter pollution free future in the country.

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