

Electronic Waste: A Growing Concern in Today's Environment: Survey

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Abstract: Electronic waste or e-waste is one of the most popular growing issues of the world. The term e-waste is for the collection of old discarded computers, TVs, Refrigerators,, radios – basically any electrical or electronic appliance that has reached its end-of-life. While e-waste contains both valuable materials such as gold, palladium, silver and copper, it also contains harmful metals like lead, cadmium and mercury. In the absence of suitable techniques and protective measures, recycling e-waste can result in toxic emissions to the air, water and soil and pose a serious health and environmental hazard. In India, e-waste is mostly generated in large cities like Delhi, Mumbai and Bangalore. In these cities a complex e-waste handling infrastructure has developed mainly based on a long tradition of waste recycling. But the problem is that these recycling processes are extremely harmful and have negative impacts on the worker's health and the environment. There is no generally accepted definition of e-waste, in most cases, e-waste comprises of relatively expensive and essentially durable products used for data processing, telecommunication or entertainment in private households and businesses. Public perception of e-waste is often restricted to a narrower sense, comprising mainly of end-of-life information and telecommunication equipment and consumer electronics. The world is consuming more and more electronic products every year. This has caused a dangerous explosion in electronic scrap containing toxic chemical and heavy metals that cannot be disposed of or recycled safely. So the concept is that how this e-waste should prevent fully recycled so that there should be prevention on environmental damage. E-waste is assuming serious proportions in India and urgent steps need to be taken to mitigate this problem. The present study focuses on the effect of usage, dumping and recycling of the electronic waste on the natural environment.

Key Words: E-waste, environmental challenges, developing countries, India, recycle, reuse.

1. Introduction

In the last years, there is an increasing acknowledgment of our impact on the environment due to our lifestyle, while the need to adopt a more sustainable approach concerning our consumption habits emerges as of particular significance. This trend regards industrial sectors affecting the consumption habits and, especially, electronic industry where the short life cycles and the rapidly developing technology have led to increased e-waste

volumes. The majority of e-waste elements are led to landfills. However, their partial recyclability, due to their material composition along with the unavoidable restrictions in landfills, has led to the development of retrieval techniques for their recycling and re-use, highlighting the significance of e-waste recycling, not only from a waste management aspect but also from a valuable materials' retrieval aspect.

Electronic waste or E-waste is one of the fastest growing solid waste streams around the world today. According to the studies conducted in the European Union, e-waste is growing at a rate of 3-5% per annum or approximately three times faster than other individual waste streams in the solid waste sector (Schwarzer et al., 2005). Rapid uptake of information technology around the world coupled with the advent of new design and technology at regular intervals in the electronic sector is causing the early obsolescence many electronic items used around the world today.

2. ELECTRONICS: THE GROWING INDUSTRY

Asian production has continued to thrive, surpassing \$200 billion in 2000 and accounts for more than 20 percent of total production worldwide. Asian production of electronics is to a large extent export-driven. But investment was focused to serve the personal computer industry, cellular telephone production, as well as fulfillment of fast-growing domestic demand for consumer and industrial electronics. This has encouraged the manufacturing base for continued expansion. China India, Brazil and other developing countries are playing an increasing role in the IT market. IT related industry is expected to grow 11% in 2006. In the last five years (1995-2000), the Indian IT industry has recorded a CAGR (Compounded Annual Growth Rate) of more than 42.4 per cent, which is almost double the growth rate of IT industries in many of the developed countries. Over the decade the industry has developed more than 150 major hardware players, supported by over 800 ancillary units and small time vendors engaged in sub assemblies and equipment manufacturing. All this has increased the installed base to more than 5 million PCs and as on December 31, 2000, the penetration rate to more than 5 PCs per 1,000 people.

3. THE PROBLEM OF ELECTRONIC WASTE

Most people are not aware of the potential negative impact of the rapidly increasing use of computers, monitors, and televisions. When these products are placed in landfills or incinerated, they pose health risks due to the hazardous materials they contain. While relatively small increases are currently occurring in the numbers placed in the municipal waste stream, these products are being purchased at a rapidly increasing rate, and many outdated computers are currently in storage in people's basements and closets (Figure 1). In this massive amount of stored electronic waste were to enter the municipal waste stream, the toxins in it could result in severe negative environmental and health impacts. In addition, valuable materials from the computers would be lost due to the lack of effective recycling. E-waste constitutes only 1.5-8 per cent of municipal solid waste, yet it is accumulating at a rate three times that of other solid waste.



Fig 1: Data gather on various Survey

Furthermore, surveys have indicated that much exported US e-Waste is disposed of unsafely in developing countries, leaving an environmental and health problem in these regions [6]. The European Union has legislation requiring manufacturers to put in place e-Waste disposal mechanisms (Wanjiku, [7]). Due to the difficulty and cost of recycling used electronics, as well as, lackluster enforcement of legislation regarding e-Waste exports, large amounts of digital discards are transported internationally from various industrialized countries to certain destinations where lower environmental standards and working conditions make processing e-Waste more profitable [4]. Impacts from those countries, especially Asia, have already been reported. Meanwhile, recycling and disposal of e-Waste are also growing in regions beyond Asia, particularly in certain African countries. Force of an international accord, known as the Basel Convention, has banned

the export of hazardous waste to poorer countries since 1992, but the practice continues as pointed out by Chris Carroll (Woodell, [2, 3]). Commonly, the term “bridging the digital divide” is used when old WEEE are exported to developing countries. They are often labeled as “second-hand goods” since export of reusable goods is allowed. However, EU Commission estimates that anywhere between 25–75 percent of second-hand goods exported to Africa are broken and cannot be reused [20]. On the other hand, most WEEE that do work on arrival only have a short second life and/or are damaged during transportation. On the other hand, illegal disposal sometimes occurs in the name of charitable donation according to United Nations Environment Programme (UNEP). Recently, a report from Toxics Link reveals that 70 percent of WEEE disposed in New Delhi of India was imported from developed countries.

4. STRATEGIES FOR REDUCTION OF ELECTRONIC WASTE

The best option for dealing with E-wastes is to reduce the volume. Designers should ensure that the product is built for re-use, repair and/ or upgradability. Stress should be laid on use of less toxic, easily recoverable and recyclable materials which can be taken back for refurbishment, remanufacturing, disassembly and reuse. Recycling and reuse of material are the next level of potential options to reduce e-waste. Recovery of metals, plastic, glass and materials reduces the magnitude of ewaste. These options have a potential to conserve the energy and keep the environment free of toxic material that would otherwise have been released. It is high time the manufactures, consumers, regulators, municipal authorities, state governments, and policy makers take up the matter seriously so that the different critical elements are addressed in an integrated manner. It is need of the hour to have an “e-waste policy” and national regulatory framework for promotion of such activities. An e-waste policy is best created but those who understand the issues. So it is best for industry to initiate policy formation collectively, but with user involvement. Sustainability of e-waste management systems has to be ensured by improving the effectiveness of collection and recycling systems (e. g. public-private-partnership in setting up buy-back or drop-off centres) and by designing-in additional funding e.g., advance recycling fees.

Problem cannot be solved by only purchasing a few sets of fancy recycling machines from developed countries. Lacking in advanced technology yet rich in labor, India should develop a path for e-waste recycling that is suitable to its current situation; the most important thing at present is to guarantee the

safety of the disassembly and treatment process, while taking full consideration of the environment and worker's health. Such reform, however, would require an overhaul of the country's labor rights structure as well as greater enforcement of environmental regulations. There is an immediate need for collaboration between industry, government, environmental groups, and citizens to solve the problems of ewaste, e-scrap, e-surplus, e-junk, and e-discards. There are two immediate solutions, which must happen through a combination of legislation and voluntary stepping up life cycle greening by the manufacturers.

5. NEW INITIATIVES

It is desirable to maximize reuse of equipment and economic development while minimizing environmental burdens and economic costs. Multi-stakeholder aspects are also important; the issue is politically contentious, both within and between nations. It is argued that, to the extent possible, effective research requires collaboration between different regions and societal sectors, and debate on solutions should be rigorous and take place in a neutral arena. Households, companies, and governmental organizations can encourage electronics manufacturers to design greener electronics by purchasing computers and other electronic goods with environmentally preferable attributes and by requesting take back options at the time of purchase.

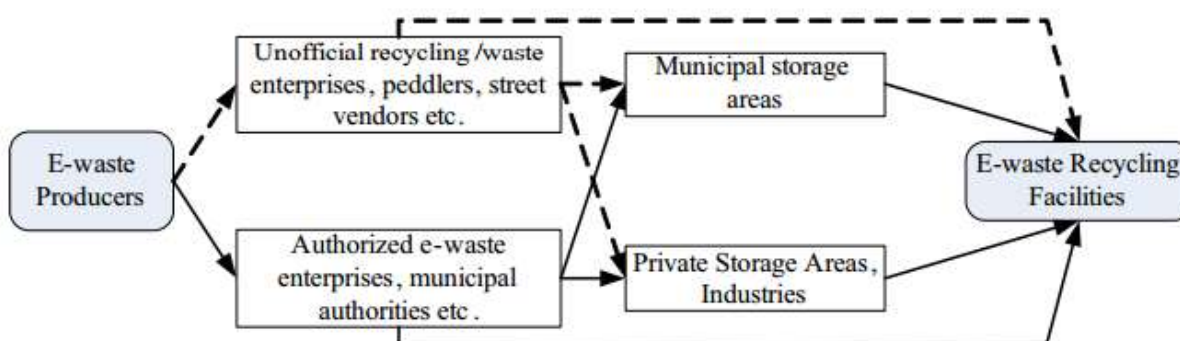


Fig 2: Proposed method for controlling E-waste

6. CONCLUSION

Most waste is inherently dangerous. It can degrade to produce leachate, which may contaminate ground water, and create landfill gas, which is explosive. In addition, because of the dangers associated with landfill sites, there are now very strict requirements on the construction, operation and aftercare of such sites. Most planning authorities want a worked out quarry to be used for landscaping rather than a landfill site which no one wants in their back yard". Product design must be employed to help to minimize not only the nature and amount of waste, but also to maximize end-of-life recycling. Manufacturers, retailers, users, and disposers should share responsibility for reducing the environmental impacts of products.

Minimization of environmental effects caused by the generated e-waste, many technological changes have been effectuated. The following are indicated:

- The replacement of CRT screens with LCD screens (Pb elimination but Hg introduction),

- The introduction of optical fibres (Cu elimination from the cablings, but F, Pb, Y and Zr introduction),
- The introduction of rechargeable batteries (Ni, Cd reduction, but Li increase), etc.

Non-governmental organizations and citizens movements press for the elimination of hazardous substances in electronic appliances, resulting to manufacturers competing for a more "green" profile.

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