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Proposed Solution of e-Waste Management and A New Environmental Challenge of E-Waste

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ABSTRACT

Focal issue of the present investigation is electronic-squander (e-squander) which is developing as another natural test for 21st century. The quick development of the electronic and IT industry, show purchaser culture, expanding rates of utilization of electronic items have prompted shocking ecological outcomes. E-squander, while reusing, might be perilous in light of poisonous quality of a portion of the substances it comprises of. A portion of the waste has been demonstrated to contain numerous growth causing operators. The results and lethality is because of release of lead, mercury, cadmium, beryllium and other dangerous substances. Created nations trade this loss as gift to creating nations. China and India, where ecological models are low, are the greatest beneficiaries of e-squander which, much of the time, is handled unlawfully. The ecological weight of e-squander is conceived by individuals who live in creating nations, particularly China and India, which forms the most extreme measure of e-squander. Regardless of different laws and orders in created nations, the e-squander engagement is uncontrolled. The present investigation centers around the impact of use, dumping and reusing of the electronic waste on the indigenous habitat.

I. INTRODUCTION

Globalization and information technology are being widely recognized as main drivers of the human civilization in the later part of twentieth century and the 21st century. The Information Technology (IT) has been the power house of the global economy particularly since early 1990s. Software and hardware part of IT has touched most of the parts of social, technical, economic and natural environment. Exponentially increasing production of computer hardware has posed major challenges of proper disposal of the waste (e-waste) produced by this industry. Current study focuses on the effect of usage, dumping and recycling of the electronic waste on the natural environment.

The paper has five sections. In the introduction section size of the global and Indian electronics market (particularly computers) has been presented. Next section is born out of hazardous impact of different chemicals disposed in environment in the process of computer usage, disposal and inefficient recycling. The third section

brings out the dynamics of international trade, environmental regulations and technology transfer issues for comprehensive understanding of e-waste issues mainly caused by computers. The fourth section describes the case of India in this regard which has been presented in the above mentioned broader context. The paper is concluded with discussion, conclusion and recommendations for better management of e-waste.

II. RECENT STUDIES

Level headed discussion proceeds over the refinement amongst "item" and "waste" gadgets definitions. A few exporters are blamed for intentionally leaving hard to-reuse, out of date, or non-repairable gear blended in heaps of working hardware. Protectionists may widen the meaning of "squander" gadgets with a specific end goal to shield residential markets from working auxiliary gear. The high estimation of the PC reusing subset of electronic waste can help pay the cost of transportation for a bigger number of useless pieces than can be accomplished with show gadgets, which have less piece esteem. In A 2011 report, "Ghana E-Waste Country Assessment", found that of 215,000 tons of gadgets imported to Ghana, 30% were spic and span and 70% were utilized. Of the utilized item, the investigation reasoned that 15% was not reused and was rejected or disposed of.

1) USA discards 30 million computers each year and 100 million phones are disposed of in Europe each year

2) The Environmental Protection Agency estimates that only 15-20% of e-waste is recycled, the rest of these electronics go directly into landfills and incinerators

3) An estimated 50 million tons of E-waste are produced each year.

4) The United States is the world leader in producing electronic waste, tossing away about 3 million tons each year

5) China already produces about 2.3 million tons (2010 estimate) domestically, second only to the United States

6) Legal framework, proper collection system missing.

7) Imports regularly coming to the recycling markets.

III. ELECTRONICS: THE GROWING INDUSTRY

Worldwide electronic gear generation has developed from $225 billion of every 1980 to nearly $1 trillion out of 2000, which likens to a compound normal yearly development of 7.7 percent in the course of recent years. In 1980, half of all gadgets frameworks were produced in North America, one quarter in Europe and the adjust split amongst Japan and whatever remains of Asia. The PC was simply developing and the change to computerized broadcast communications exchanging was going all out. An emotional move underway administration happened throughout the following ten years.

A few elements added to this quick move in worldwide electronic gear creation. Amid the 1980s, the Japanese economy was the envy of the world. Gross domestic product per capita had ascended from $5,000 in 1960 to $15,000 in 1980, and by 1990 had come to $22,000. Through the organizations like Sony, Panasonic and so on of Japan had turned into the reasonable pioneer in advancement of buyer electronic items and high volume modern electronic get together. The blend of developing indigenous request, worldwide shopper hardware item

administration, and numerous times of interest in assembling innovation and limit absolutely profited overall gadgets makers amid the 1980s.The last ten years have spawned enormous change in the global economy and in the electronics industry because of:

A. Democratization of Eastern Europe and the integration of the EU economies,

B. An increasingly pragmatic commercial orientation by China,

C. Rapidly increasing economic growth elsewhere in Asia,

D. The longest economic expansion in the USA,

E. Low cost production from Japan and

F. The bursting of the "bubble" economy

Asian generation has kept on flourishing, outperforming $200 billion out of 2000 and records for in excess of 20 percent of aggregate creation around the world. Asian generation of gadgets is to a huge degree trade driven. However, venture was engaged to serve the PC business, cell phone generation, and also satisfaction of quickly developing local interest for customer and modern hardware. This has supported the assembling base for proceeded with extension. China India, Brazil and other creating nations are assuming an expanding part in the IT showcase. IT related industry is required to grow 11% of every 2006. Over the most recent five years (1995-2000), the Indian IT industry has recorded a CAGR (Compounded Annual Growth Rate) of in excess of 42.4 for every penny, which is twofold the development rate of IT ventures in a considerable lot of the created nations. Throughout the decade the business has grown in excess of 150 noteworthy equipment players, upheld by more than 800 subordinate units and little time merchants occupied with sub congregations and hardware producing. This has expanded the introduced base to in excess of 5 million PCs and as on December 31, 2000, the entrance rate to in excess of 5 PCs for every 1,000 individuals.

IV. FORMS OF E-WASTE

Electronic Waste (e-squander) is the term used to depict old, end-of-life electronic machines, for example, PCs, PCs, TVs, DVD players, cell phones, mp3 players and so forth which have been discarded by their unique clients. In fact, electronic waste is just a subset of WEEE (Waste Electrical and Electronic Equipment). As per the OECD any machine utilizing an electric power supply that has achieved its end-o f-life would go under WEEE. Recognizing its advantages upheaval this segment presents darker reality of data innovation. Exceptionally speed of advancement that lies at the core of PC maker prompts the item out of date quality. The truth of PC life cycle uncovers a dangerous life cycle. The dull side of high mechanical improvement of electronic industry, particularly PC innovation, is uncovered as dirtied drinking water, squander releases that reason damage to angle, birth surrenders, high rate of premature delivery and growth among group laborers. Quick changes in PC innovation and the rise of new electronic merchandise, the developing reliance on data innovation, expanding rates of utilization of electronic items have prompted awful ecological results. This innovative advantages and blast in the market prompt broad utilization of electronic products, particularly PCs. This is turning the substance of the business and on the whole frame an issue of electronic waste the level of

waste that is innovation related is developing at a disturbing rate. In a current report scientists found that the volume of e-squander is expanding by 3 - 5% every year, which is just about three times quicker than the metropolitan waste stream is developing for the most part (2). The life expectancy of a PC has contracted from four or five years to around two years Electronics, the biggest and quickest developing assembling industry on the planet, forcefully advances a culture of quick oldness and expanded utilization. A lot of perilous chemicals are available in PC and other electronic products. The poisonous quality is because of lead, mercury, cadmium, hexavalent chromium (ChromiumVI), brominated fire retardants, plastic, PVC and so forth. A run of the mill PC screen may contain in excess of 6 percent lead by weight. As a rule, PC and electronic types of gear are entangled get together of in excess of 1000 materials, few of them are exceptionally lethal, for example, chlorinated and brominated substances, poisonous gases, photoactive and organic dynamic materials acids plastics and plastic added substances (Clean PC battle). Every PC show contains a normal of 4-8 pound of lead (MCC: 1996). Screen glass contains around 20 percent lead by weight. At the point when these segments are unlawfully arranged and pulverized in landfills, the lead is discharged into nature, representing a risky heritage for present and who and what is to come. Around 70 percent of the substantial metals including mercury and cadmium, found in landfills originate from electronic types of gear disposed of by the clients. These substantial metals and different perilous substances found in gadgets things, pollute ground water and posture ecological and general wellbeing dangers, (Poison PC and Toxic TV) A solitary segment of PC squander, Cathode Rays Tube (CRTs), has risen as the main edge of dangerous waste at the neighborhood, state, national and global level. CRTs are the glass Picture Tubes in PC screens and other video show gadgets that increase and concentrate high vitality electrons shaft to make the pictures, which we at last find in our screens. To shield shoppers from radiation harms, the glass in CRTs contain lead compasses which is roughly 20 percent of every CRT. Lead is a case of substantial metal, a metallic component that is in unadulterated shape overwhelming. Lead is to a great degree harmful, might be taken into the body, where they tend to join with and repress the working of specific compounds. A moment sum can have serious physiological or neurological impacts. (Lead in nature). Lead has a tendency to amass in nature and has high intense and constant consequences for plants, creatures and microorganisms. It makes harm the focal and fringe sensory system, blood framework, kidney and conceptive framework in human. It likewise influences endocrine framework and mental health among the kids. (E-squander India Report, 2004). Mercury utilized as a part of switches, circuit sheets and in level board shows is discharged into the earth when copied or refined into the earth. Thus Beryllium is utilized as a part of each electronic get together which is discharged into the earth through clean outflow, amid pounding, cutting and copying tasks. Circuit board and plastic packaging having brominated fire resistant are wellspring of dioxins and furans.

Carbon dark in printers and toner is class 2b cancer-causing agent and beryllium, ordinarily utilized as a part of mother sheets and finger cuts, is a wellbeing danger. Beryllium has, as of late, beenclassified as a human cancer-causing agent as introduction to it causes lung growth. (Sending out Harm, 2002) BFRs are among a gathering of terrible performing artists particularly known as constant natural contaminations. Creature tests have

demonstrated that some of these chemicals influence thyroid capacity, have estrogenic impacts, and act through a similar receptor-interceded pathways as does dioxin, which is among the most intense creature cancer-causing agents known. Further, preservationists charge that hardware recyclers have not by any means deal with the unique ecological issues that they say are inborn in the productive utilization of BFRs in e-squander plastics. "There are by and by no investigations on a definitive destiny of BFRs when they are softened or consumed in reusing or cremation applications. A more intensive take a gander at some of electronic waste uncovers that normally utilized reusing practices can hurt the earth more than the waste itself. Examination led by a few spots found that the specialists frequently utilized corrosive shower and different metals, washing the deposit specifically in to adjacent waterways and other water bodies. Part that can't be reused are sent to landfills or consumed in the open, discharging extra poisons in the earth. Expansion of life expectancy is the key system in dealing with the extent of condition affect. Social and money related powers for PC squander administration requires proficient association amongst open and private segments and also arranged exercises between researchers, business people and approach creators around the globe. As per Xinhua News Agency, China has created about 1.1 million tons of ewaste every year since 2003, including 5 million TV sets, 4 million iceboxes, 5 million clothes washers, 5 million PCs, and a huge number of cell phones and it will keep on piling up. Greenpeace evaluates that by 2010, there will be 178 million new PC clients in China alone. The U.S. National Safety Council predicts that in that nation alone between 315 million and 680 million PCs will wind up out of date inside the following couple of years. The waste will contain in excess of 2 billion kg of plastic, 0.5 billion kg of lead, 1 million kg of cadmium, 0.5 million kg of chromium and about 200,000 kg of mercury. Tree huggers likewise stress that with the prominence of new fluid gem show innovation, an expanding number of old screens utilizing cathode beam tubes are winding up in the waste. The transfer issue with respect to the a huge number of original cell phones are today‟ s developing test. • Total evaluated e-squander produced from PC , TV, cooler and clothes washers is 1,46,180 tones and is relied upon to go up to around 1,600,000 by 2012.(CII,2006)

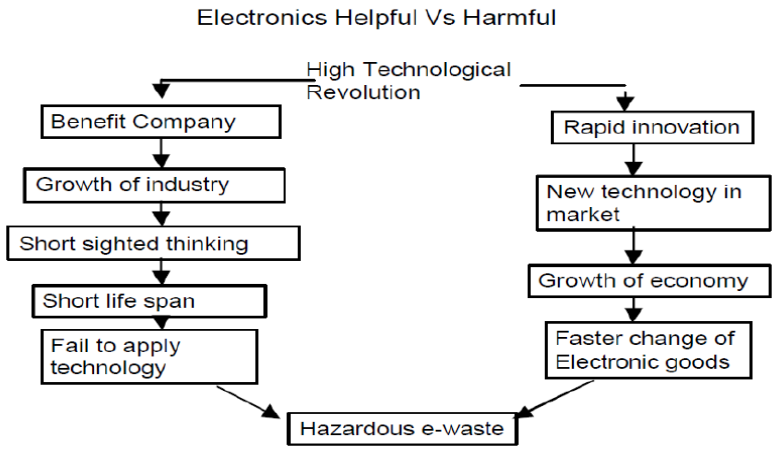


Fig 1 Electronics Helpful v/s Harmful

V. REASONS OF THE FLOW OF E-WASTE TO DEVELOPING COUNTRIES

Due to lower environmental standards and working conditions in China and India, ewaste is being sent to these countries for processing – in most cases illegally. Uncontrolled burning and disposal are causing environmental problems due to the methods of processing the waste. The labor-intensive nature of electronic waste recycling, abundant, cheap and skilled labor force and generation of huge profits for local governments causes the authorities to turn a blind eye to this practice. Thus, they serve as passive encouragement to its spread. It is more convenient and also economical to export e-waste to the third world countries like India, rather than managing and incurring high environmental and economic cost.

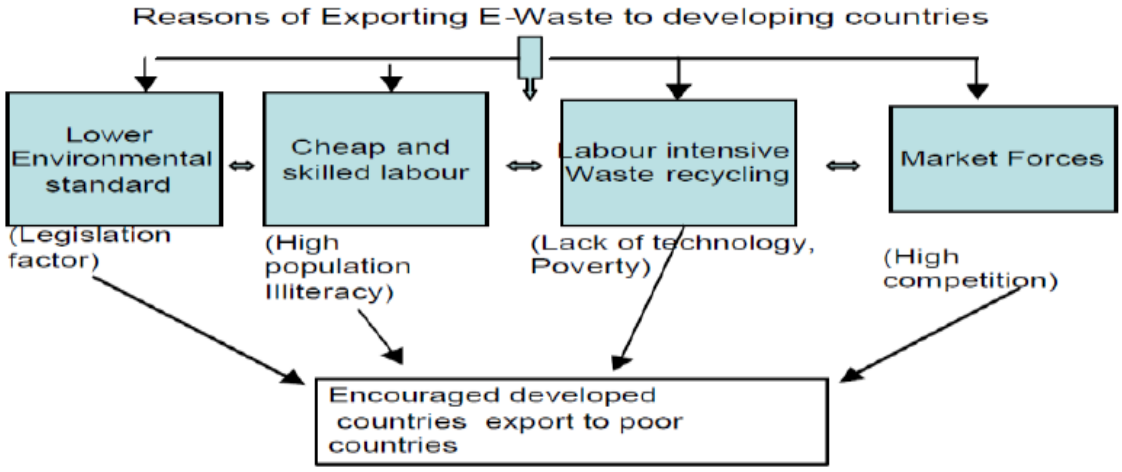


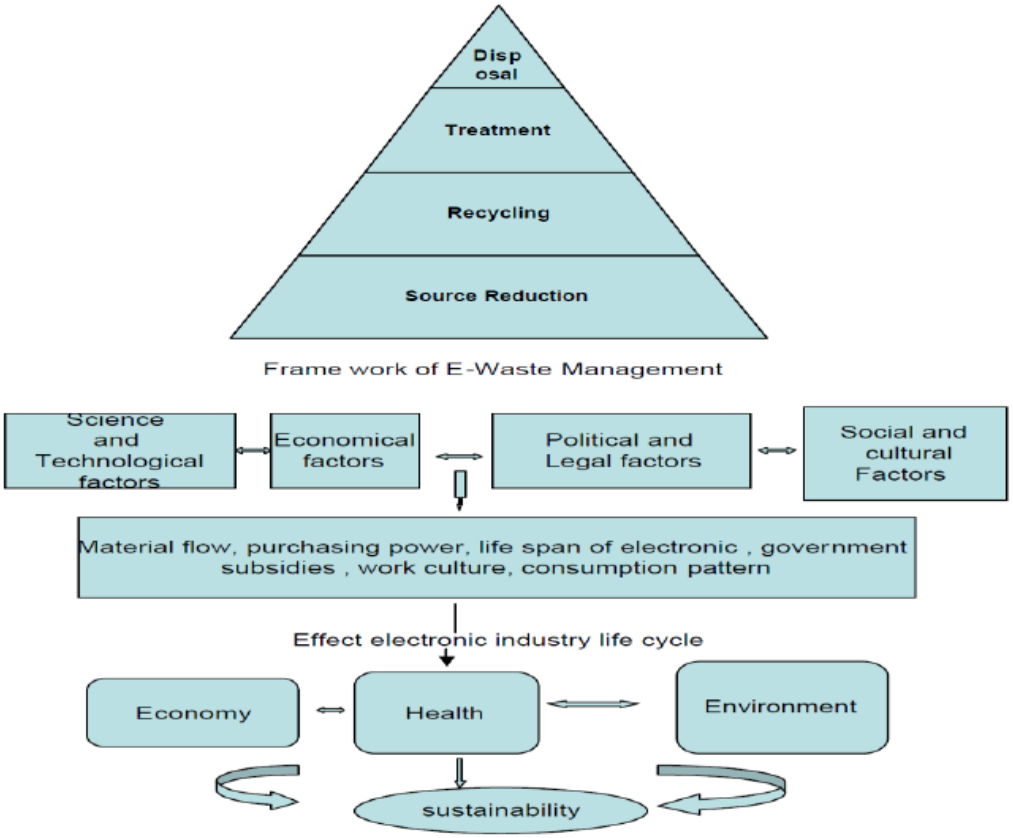
Fig. 2 Reasons of Exporting E-Waste to developing countries

Various departments of the government, public as well as private sectors are responsible for fast feeding of old electronic appliances such as computers, telephones, mobile phone, etc, into the waste stream. Other sources of e-waste are retailers, individual households, foreign embassies, PC manufacturing units, players of the secondary market, and imported electronic scraps from other countries. Individual households have the least contribution in generating of IT product obsolescence. Most Indian households prefer to pass their obsolete technology to near and dear ones or exchange it from the retailer. It is the illegal dumping of junked computers from other parts of the world that generates the biggest part of the e-waste In India; the mountains of e-waste have not yet manifested themselves. This is because of the propensity not to throw away equipment, even if it is obsolete, till it becomes totally unserviceable. But, in the younger generation, this attitude is changing and the throwaway culture of the west is slowly permeating into the country. Another factor limiting generation of e-waste in India is that we do not have a sizeable IT hardware manufacturing infrastructure as yet. We also commenced large scale computerization a bit late in this country, compared to the developed countries.

VI. TOTAL AMOUNT OF E-WASTE IN INDIA

- Around 1,050 tonnes of electronic scrap is being produced by manufacturers and assemblers in a single calendar year.
- In a single month, there is a reported case of import of 30 metric tonnes (MT) of e- waste at Ahmedabad port.
- The minimum number of computers procured by an average scale scrap dealer is 20-25 per month.
- The approximate number of scrap dealers specializing in electronics, in and around Delhi, is more than 40. This figure also includes large scale dealers who handle thousands of PCs per month.
- Approximately 1.38 million personal computers become obsolete every year.
- The IT and IT enable services are expanding at a faster rate in and around the national capital region like: Delhi, Gurgoan and Noida. Over the last five years, the Indian IT industry has recovered a compound annual growth rate of more than 42.4 %, which is almost double the growth rate of IT industry in many of the developing countries. Indian configuration of PC per 500 people is going to change to 1 for 50 by 2008.
- The total WEEE generation in India has been estimated to be 1, 46,180 tonnes per year based on selected EEE tracer items. Almost 50% of the PCs sold in India are products from the secondary market and are re-assembled on old components. The remaining market share is covered by multinational manufacturers (30%) and Indian (22%) brands.
- Mumbai currently tops the list of major cities with e-waste.
- Foreign companies helping Indian importers bypass government regulations to bring in the goods for recycling.
- Bangalore may be generating 10,000 to 15,000 tonnes of e-waste every month, according to industry sources. The Karnataka State Pollution Control Board has put it at 10,000 tonnes a month. Along with discarded obsolete hardware, many western countries are selling off their e-waste as scrap and some of this reach scraps dealers in this city. Metal components and some of the outer casings are resold, while the rest of the computers are dumped haphazardly.

VII .POLLUTION PREVENTION HIERARCHY



VIII. 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. Adopt product stewardship approach i.e. a product-centered approach should be adopted to preserve and protect environment.

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