Role of Informal Sector in E-waste Recycling

― The Indian Scenario ―

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Waste Electrical and Electronic Equipment, which is generally termed as Electronic waste or simply “e-waste” is a growing national and international problem. The hazardous components found in e-waste make it much more difficult to recycle. Although, most developed countries have a proper recycling system, sophisticated equipments and sufficient financial resources to manage e-waste recycling, while in several developing countries e-waste is managed by the informal recycling sector. Many urban poor in the informal sector have developed a livelihood strategy by tackling this electronic waste. They are involved in various processes like collection, dismantling and metal recovery. Some aspects of their work pose severe occupational health risk for them. They internalize the cost of e-waste recycling by risking their health and environment. The lack of formal job opportunities and immediate monetary gain are the factors lying at the core of this widespread informal recycling network. The biggest challenge is to ensure safe and environmentally friendly recycling on one hand and protecting and upgrading the livelihood of several urban poor in the informal recycling sector on the other.

This research note emphasizes the role of the informal sector and suggests the present challenges and opportunities in this sector. An attempt has been made to find out the historic presence of informal sector and the current scenario of e-waste management in India. The informal sector is also acknowledged by the E-waste Management and Handling Rules 2011. The rules are directed towards development of formalized recycling units for the proper channelization of e-waste. Hence, they provide an opportunity for the informal sector to legally become part of e-waste management system. The legislative system with its potential outcomes and weaknesses is analyzed. Furthermore, the model for the integration and cooperation between Informal and formal sector is introduced as a key solution for the management of growing e-waste problem. The mutual relation between these two sectors at a broader level is indispensable for the success of e-waste management in India. Exploring the potential in informal recycling is important not only in India but in other developing economies distributed all over the world. Therefore, the failure and outcomes in the Indian context can be useful and the lessons learned can be applied worldwide. Analyzing critically the nature and scope of informal sector in e-waste management has received very little scholarly attention. This study contributes in filling this information

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deficiency by examining the crucial role played by informal sector in e-waste management in India.

**Informal Sector in E-waste Processing**

The advent of new technology, unrestrained resource consumption, and the obsolescence of electronic products have led to an alarming rate of waste generation. This problem is much more severe in developing countries like India, as it needs to tackle not only its own waste but also the imported one as well. The lack of proper infrastructure and financial resources has worsened the overall situation. A rough estimate by the Central Pollution Control Board (CPCB) suggested that the generation of e-waste has been 1,46,180 tonnes in 2005 and was expected to exceed 8,00,000 tonnes by 2012 (1). The economic liberation of 1990s, the competitive prices and services offered by foreign companies and increasing purchasing capacity of individuals especially the middle class of society, are among the factors which lead to the great boom in the Indian electronics industry. It is expected that the electronics industry will continue to grow exponentially with increasing consumerism. India and other emerging economies are predicted to be the best markets for consumer spending in 2010 and beyond. Such a prediction also indicates towards the large proportion of obsolete electronics added to the e-waste stream. It is evident that a significant amount of e-waste needs to be properly handled in order to avoid any irreversible damage on the environment and people's health.

GTZ-MAIT survey in 2007 estimated that the informal sector recycles 95 percent of e-waste generated in the country in urban slums (2). This sector is characterized by small-scale units which are labor-intensive, largely unregulated and unregistered. These units have low-technology manufacturing or provision of services. The informal sector entrepreneurs or enterprises do not pay taxes, have no trading license and are not included in social welfare or government insurance schemes. The informal recycling sector also refers to the e-waste recycling activities of scavengers and waste pickers. These terms are used to describe those involved in the extraction of recyclable and reusable materials from mixed waste. However their role is much more prevalent especially in the context of municipal solid waste management (MSWM). Some more complicated organizations, such as micro and small enterprises (MSEs) involving groups of up to 10 (micro), or 20 (small) people, operating with low capital investment are also part of this sector. According to Sumit Kumar of The Economic Times "A rough estimate keeps India’s e-waste industry in excess of a whopping Rs 8,000 crore (80 Billion), out of which large centres like Mayapuri, Seelampur in Delhi, Pune, Chennai, Moradabad and Bangalore only generate more than half of the total business" (3). The Seelampur market in East Delhi is also called the largest electronics dismantling market in the country, where over 50 percent of used computers end up for sale and recycling. WEEE Recycle estimates nearly 25,000 workers employed in the Delhi’s informal recycling sector alone handling 10,000-20,000 tonnes of e-waste annually (4). In 2004, Empa Pilot study in Delhi estimated that an e-waste recycler in India earns Rs 150/day approximately (5). The availability of a large number of skilled labor at low cost has given rise to the extensive and widespread informal sector in India.
The informal sector constitutes a group of waste collector, middleman, scrap dealers and recyclers in neighboring slum areas of Indian cities, specifically dealing with e-waste. The collectors who are at the lowest level of entry, specialize in collection of actual recyclable elements from the dump sites, houses and companies. They sell the collected recyclables to middleman before or after processing. The middlemen build bulk and sell it to the scrap dealers, who further sell it to Recyclers, second hand shops and other companies (Figure 1).

In most Indian cities there are strong metal and electronics scrap markets representing this widespread informal sector. The development of electronic-hubs (e-hubs) in these cities follows a particular yet similar trend. In case of Bangalore during the early 1980s with the influx of electronic devices, scrap dealers belonging to marginalized Muslim communities located in slum areas at the periphery of the city discovered a new kind of waste, namely e-waste in the-waste stream. A few of these focused their energy on developing techniques for exclusive collection, dismantling and processing of e-waste and become pioneers in lucrative e-waste recycling business. Most of them channelized their profit in capturing real estate. They made investments in buying small plots, whereas some made homes for their dwellings and others constructed rental units. The unemployed Muslim youth of neighborhood observed the rising fortune of e-waste recyclers and began to set up their own e-waste dismantling businesses. Thus the lure of quick profit making and leveraging that profit to speculate and capture real estate surplus was important pull factor for many unemployed Muslim youth to set up e-waste dismantling business. These initial efforts in e-waste recycling turned this neighborhood into a hub of e-waste recycling, which gradually become part of local as well as global e-waste flow.

The informal sector deploys “three methods for profit making: Collection of recyclable, manual dismantling and Metal Recovery”. The collection of recyclable is an important factor for making economic gains out of e-waste recycling business. In other words, it is the ability of informal sectors to territorialize e-waste flows, thereby ensuring constant collection. In order to access a substantial quantity of e-waste, informal
sector recyclers make direct contact and develop a personal relationship with facility managers of IT companies located in the city’s e-hubs. Such personal contacts and face to face negotiation with key personal help them in establishing their territories by procuring e-waste that get piled up in the firms and thereby warding off their competitors. The second method used by e-waste informal recyclers for profit making is to dismantle computer and other electronic waste items into its constituent parts. The segregated non functional computer parts such as plastic, glass and metal are sold to respective wholesalers of recycling materials. However, dismantlers sell the salvaged working parts of computers to vendors of assembled computers in the city market or computer repair shops. The repair shops use working parts salvaged by dismantlers to repair the broken computer etc. Most repair operations in these shops rely on skilled labor in order to transform waste electronics into working condition and thereby using them in different products. Though highly skilled, these labors often initially began their work as young boys working under technician in repair shops. They learn repair operations while working as shop boys employed to help manage routine office functions such as customer calls and orders or other tasks such as serving tea. Over several years, these shop boys learn their skills through apprentice-like arrangements with more experienced technicians in the shop. In many cases, these shop boys became technicians and later the proprietor of the operation by launching their own business. The third method applied by a small group of recyclers in the informal sector is to recover precious metals like copper, silver and gold by chemically processing certain parts such as printed circuit boards of computers. Their narrow scope of activity leads to emergence of precious metal recovery as a sub-niche within the Informal recycling sector. The workers of this sub niche have developed an in depth understanding of different chemical processes needed to extract the precious metal from the e-waste.

In spite of their creativity and skills they usually suffers from severe occupational health problems like headache, dizziness, vomiting and diarrhea, chronic gastritis, duodenal ulcer and urinary stone. According to a study by Greenpeace there is a high degree of contamination of the workplaces and surrounding environments with hazardous chemicals from the wastes being processed in different regions of Guiyu, China and New Delhi, India. Most of operations related to e-waste are performed manually without personnel protection equipment. In the absence of adequate technologies and equipment, most of the techniques used for recycling or treatment of e-waste are very raw and dangerous. Dismantling and recycling operations involve open burning of plastic waste, exposure to toxic solders and dumping of acids. These processes are carried out in very congested places of the city and slums without any proper lightening and ventilation, exposing poor workers to environmental and occupational health risks. The growing e-waste industry is causing a serious threat to the environment, workers as well as the local community and if immediate action is not taken, the damage can increase many folds.

**Regulatory Framework for E-waste Management in India**

So far India’s e-waste problem was dealt with Hazardous Waste (Management & Handling)
Rules (HW (MHTM)), in lack of any other specific regulation targeting e-waste. The Government of India has promulgated these rules in 1989 through the Ministry of Environment and Forests (MOEF) under Environment Protection Act (EPA), 1986. However, recently the severity of problems associated with e-waste has been recognized and in a major step forward E-waste (Management and handling) Rules, 2011 came into force under the provisions of the EPA. These rules have been introduced with two salient features: Extended Producer Responsibility (EPR) and Reduction of Hazardous Substances. Under EPR the producer of electrical and electronic equipment has the responsibility of managing such equipment after its ‘end of life’. Producers need to set up collection centers or take back system in order to ensure proper recycling and disposal of their products. Bulk consumers such as enterprises and government are responsible for recycling the e-waste generated by them and need to channelize it to authorized collection center. These rules prohibit informal sector players to draw e-waste without authorization from CPCB or State Pollution Control Board (SPCB). However, implementing these rules is still a challenge in the presence of entrenched informal e-waste management sector competing with the formal recyclers. In many cases it's even difficult to locate producers as many micro and small enterprises are selling assembled products. The poor infrastructure for waste management, low public awareness and lack of international governance make it challenging to implement EPR in developing countries like India. There is a need to develop a policy where informal sector can play a complementary rather than a competitive role in waste recycling. CPCB has recognized the role of the informal sector and mentioned in its guidelines, “Producer may manage a system directly or with a help of any professional agency on his behalf for collection and channelization system of E-waste by involving relevant stakeholders such as consumer, bulk consumer, NGOs, informal sector, resident associations, retailers, dealers, etc.” (9).

**Formalization of Informal Sector**

As shown in Fig.1 the collectors and segregators form an integral part of informal e-waste chain as far as channelization and collection is concerned. This is largely due to the fact that the informal sector has a highly sophisticated collection network which, in addition to reaching bulk generators, can also collect from households through a door-to-door collection. Further, the design of electronic items keeps changing frequently; therefore the manual rather than mechanical dismantling proves to be quite efficient in overall collection and partial recovery of components. The informal sector workers possess necessary skills for sale purchase and to reuse the electronic parts, thereby extending the product’s lifecycle. This also prevents pollution by saving the amount of energy required to make new products, reduces carbon footprints and enhances the penetration of IT and consumer durables among the economically disadvantaged people. Despite of their important role, these poor rural immigrants working as labor in the e-waste industry are at a disadvantage in the face of competition with peers, lack of recognition by authorities, absence of minimum wage, and lack of access to social protection schemes, making them vulnerable.
The increasing quantity of e-waste generation and regulatory requirement encourages the entry of various formal recyclers for ensuring the safe recycling and disposal of the e-waste. At present there are 47 formal recycling units located in various parts of the country and are registered with CPCB or State pollution control board (SPCB). These formal recyclers are expected to use best available technology (BAT) for resource recovery and hence reducing the overall burden on the environment. However, the cost structure of the formal recycling units does not allow them to pay comparable prices for the collection of material from the bulk generators. Hence, more such units are unable to gain access to e-waste due to the competition from informal collectors, scrap dealers and recyclers.

The question that arises here is how this e-waste recycling industry can become environmentally, socially and economically feasible? Fair distribution of costs, protecting livelihoods, ensuring safe working conditions are among several factors which need to be concerned while targeting cleaner production and management of electronic waste products. The Government of India has emphasized the role of the informal sector in its policy statements. In accordance with the mandate of the National Environmental Policy (NEP) 2006, there is a need to identify the activities and contributions of the informal sector and provide them with a legal status. In e-waste processing, the roles and responsibilities of the informal and formal sector in the recycling chain should be well defined ensuring socially acceptable, economically feasible and environmentally responsible workable models. One such model is proposed by MAIT-GTZ for formalization of the informal sector (Figure 2).

At present all the stages including collection, segregation, dismantling and resource recovery is performed by both Informal and Formal sector. On one hand, the informal sector due to lack of capital and resource is unable to set up large recycling plants and hence end up performing rudimentary processes for extraction of precious metal, which cause not only environmental damage but also cause health damage. On the other hand due to the presence of this widespread network, there is hardly any collection by the formal sector. There are even cases of importing e-waste for running these formal recycling plants. Hence using the widespread

![Figure 2: Formalization of Informal sector](image-url)
network of informal sector for the collection, segregation and manual dismantling can help to bring about the optimization of resource flow for formal sector, whereas higher levels of processing by formal sector would be comparatively advantageous in overcoming the limitations of the informal sector. As per the model, the formal sector would invest in mechanized full scale recovery operations by sourcing material from the informal sector associations and acting as a buffer between the informal sector and large scale smelter or refinery.

The process of integrating the informal sector with the formal sector is challenging and requires a number of stages with different levels of involvement to integrate these informal stakeholders in the formal recycling scheme. First of all the formalization process involves identification of recycling clusters, followed by creation of groups of stakeholders within the cluster and to identify their core processes within these groups. Then the members of this group need to design an institutional and financial set-up that will allow it to function as one business entity in the future. An earlier attempt for formalization of informal sector in 2004, by the Swiss and German development agencies (SECO) and GTZ in a partnership with the state Pollution Control Board (PCBs) of Bangalore to streamline and modernize e-waste disposal practices, authorized informal sector recyclers by regulatory agencies to collect and process e-waste. The initiative led to the establishment of a private, large-scale formal recycling unit named E-Parisaraa. To further explore the feasibility of informal privatization, few groups of the informal sector workers has been registered as private limited companies in the Delhi region, namely E-waste HRA Pvt. Ltd. and Green E- Waste Recyclers Pvt. Ltd.

Conclusion

E-waste is a growing problem in developing countries like India. Inappropriate technologies are still being applied which not only causes loss of resources but severe environmental pollution. The regulatory framework has not been proven very successful in handling the situation. The informal sector players which play significant role in recycling e-wastes are in competition with formal recyclers and implementation of the rules is still a challenge. The key for converting e-waste problem into opportunity lies in managing and developing informal sector, not in eliminating them. A mutual support system that could integrate operations in the informal and formal recycling units is ideal for developing economies. Such integration process helps in the betterment of their livelihood and environmental protection as well. However, the informal sector has limited capital and resources and at present there are no economic incentives for the informal sector for complying with the environmental standards. The incentive system, Government aid, as well as support from formal recyclers and manufactures to informal sector recyclers can help in bridging the overall gap in formal and informal sector e-waste recycling.

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Notes

(1) Central Pollution Control Board, GUIDELINES FOR ENVIRONMENTAL SOUND MANAGEMENT OF E-WASTE, at 8 (March, 2008) (http://www.cpcb.nic.in/latest/27.06.08%20guidelines%20for%20E-Waste.pdf).


(4) WEEE Recycle: About WEEE Recycle, Goals and Objectives, Activities in Cities, Delhi, City Background on E-Waste (Last assessed on 10 October 2013) (http://www.weixinrecycle.in/city_background_e_waste_delhi.htm).


(13) Supra note 6, at 66 (The reforms made by Indo-German Swiss e-waste (IGS) are said to be uneven and biased with the corporate e-waste sector and the informal sector subject to punitive regulatory restrictions).