

# **Role of Informal Sector in E-waste Management in Pune Region**

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## **ABSTRACT**

Pune is one of the major hubs of E-waste generation in India. According to several studies Conducted in India, Pune is a major repository of WEEE. The Mumbai-Pune industrial belt is one of the electronic goods manufacturing hubs of the country. This study focuses on e-waste generated in Pune and Pimpri Chinchwad, understanding material flow and trade chain in the two cities, processes of recycling and disposal covering the informal sector, environmental impact of e-waste recycling and assesses the capacities of existing stakeholders.

This study tells the story of the journey of E-waste and its movement from the point of Generation through collection, trading, intermediate processing, forwarding and final disposal in the city of Pune. The study is exploratory rather than exhaustive in scope and was carried out over a brief period of two months. The findings are indicative rather than conclusive. The study draws upon secondary sources of information including research studies and reports as well as primary sources that were willing to volunteer information.

## **Keywords**

E-waste, recycling, informal sector, pune

## **1. INTRODUCTION**

The rapid growth of the electronic industry and the high rate of obsolescence of the electronic products, lead to the generation of huge quantities of electronic waste (e-waste), which is one of the fastest growing waste streams worldwide today. An assessment, carried out in India under an Asia Pro Eco Project in 2007, by the Manufacturers Association of Information Technology (MAIT) and German Technical Cooperation (GTZ), quantifies e-waste generation to approximately 330,000 MT, expected to touch 470,000 MT by 2011. The assessment also shows that, out of this potential waste, only about 19,000 MT are being recycled. This huge gap between generation and recycling needs to be bridged by improving the channelization of the ewaste for proper recycling and establishing a system of accountability in e-waste management.

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. This is because businesses sell their discarded IT and other equipment to informal recyclers for quick money without realizing the hazardous implications it causes to health and environment.” (MAIT - GTZ, 2008) The MAIT-GTZ study also observes that only 6 per cent of the E waste generated is recycled of which 95 per cent is recycled through the informal sector.

## **2. E-WASTE - CURRENT STATUS IN PUNE AND PIMPRI CHINCHWAD**

There are two aspects which have to be looked at when referring to E waste in the Pune region. The first is the extent of use of goods that would potentially generate E waste. The second is whether there is significant large scale E- waste recycling in Pune that creates a demand for imports of E waste from other towns and cities as well. In the first case, appropriate collection and dismantling and transport/forwarding is the critical factor, while in the second the environmental implications and consequences of the recycling processes within the city, also need to be addressed. The IT directory brought out by the Mahratta Chamber of Commerce Industry and Agriculture (MCCIA) lists 1000 IT and ITES companies and IT educational establishments in Pune alone. Contrary to the traditional image of Pune, the city now boasts of a number of famous educational institutes in India like the National Defence Academy, IUCAA, NCL, FTII, and is a host to leading software companies like Infosys, IBM, Wipro, Tata Technologies and Software Technology Park of India (STPI). Due to this, an increasing portion of Pune’s population consists of students, IT professionals and BPO workers. On the one hand, this contributes to creating a vibrant commercial and cultural environment in Pune. But it also means that usage of electrical and electronic goods is high in the city making it an important city in terms of e-waste generation in India. A 2007 report by Maharashtra Pollution Control Board on e-waste in Mumbai and Pune region states that along with Mumbai, Pune is among the top ten cities that generate the maximum e-waste in the country. As such it is difficult to get precise estimates of the amount of e-waste generated in Pune. This is because most of the waste generated does not enter the waste stream at all. Further, there are no studies yet to assess the rate of obsolescence of electrical and electronic goods which can be used along with data on the supply of such goods to estimate the quantity of e-waste generated in the city. However, a study done by the Maharashtra Pollution Control Board in 2007 did draw up an estimate according to which the Pune Municipal Corporation and Pimpri Chinchwad Municipal Corporation area together accounted for over 3616.58 tonnes of E-waste annually. However, the current study shall not attempt to work with figures of e-waste and the amounts going into different streams. Rather it shall try to understand the people and the processes which are involved in e-waste collection and handling, the strengths of the current system as well as its weaknesses. This would assist us in identifying areas in which interventions would help reduce the hazards posed by e-waste whilst increasing its contribution to society in terms of better livelihoods and lowering the demand for primary resources.

### **3. MAJOR CONCERNS RELATED TO E-WASTE**

The villagers living around the Uruli landfill in Pune agitated for years, and even moved the Courts demanding that they did not want the stinking, rotting garbage of Pune to be dumped in their backyards. Their struggles have been covered extensively by the local press. E-waste on the other hand, neither rots nor stinks. Rather it comprises stately-looking products such as computers, refrigerators, mobile phones, televisions and other gadgets. They are costly, coveted items that apparently do not create as much nuisance as the fruit and vegetable markets with their odorous rotting wastes. The glitter gets considerably tarnished when these same symbols of technological progress become unusable relics and have to be taken apart into their constituent components in the scrap recovery markets. The processes of collecting and dismantling of items that can be classified as e waste, as also the extraction of trace metals and other materials, are primarily carried out in the informal sector. Poor regulation, low technology, manual processes, relatively less skilled labour, absence of safety measures for workers and low operating costs are some of the features of the informal waste recycling sector (Chikarmane et al. 2001). Hazardous elements in E-waste include lead, cadmium and mercury which are released during the process of dismantling. Further, the processes of recycling and extraction are often highly hazardous in nature. For instance, the extraction of gold from printed circuit boards is done by using mercury and acid baths. However, no precautions are taken for the safety of those engaged in giving the acid baths and they come into regular contact with cyanides, nitric acid fumes and mercury. Further, the highly toxic by-products of the processes (such as the left over acids and mercury) are released into our land and water bodies without any measures to safeguard against their harmful effect on the health of the environment.

Greenpeace International in its study of E waste recycling in Delhi, India and China found that “all stages in the processing of electrical and electronic wastes have the potential to release substantial quantities of toxic heavy metals and organic compounds to the workplace environment and, at least to the extent studied, also to surrounding soils and water courses. The processes listed were component separation and solder recovery; mechanical shredding; acid processing and leaching. Among the toxic heavy metals most commonly found in elevated levels in wastes from the industry, as well as in indoor dusts and river sediments, were those known to have extensive use in the electronics sector, i.e. lead, tin, copper, cadmium and antimony” (Brigden, 2005).

#### **3.1 Current recycling process in Pune and Pimpri Chinchwad**

The recycling sector is structured in the form of a pyramid, with the scrap collectors at the base and the reproducers perched at the apex. The activity levels of the pyramid differ in terms of the factors mediating entry, socio-economic backgrounds, work conditions, market environment and levels of income. At every stage, this work is usually carried out by informal Workers working either on their own or in informal enterprises.

At the bottom of the heap are the wastepickers who engage in the “free” collection of scrap from municipal garbage bins and dumps. Marginally above them are the itinerant buyers who Purchase small quantities of scrap from households. Between the scrap collectors and the Reprocessors are various levels of traders including retailers, stockists and wholesalers, most of

who are registered under the Shops and Establishments Act. Trade in scrap is relatively invisible, unrecognised and unregulated for the most part. There are no geographical areas designated as scrap markets. The traders are not part of associations like the Pune Merchants Chamber or the Maharashtra Chamber of Commerce, Industries and Agriculture. The scrap trade is generally believed to have a very low status within the hierarchy of commodity trading, regardless of the profit potential. It has no respectability. Registered Dealers are the *crème de la crème* among the traders. They are the gatekeepers to the transiting of waste as raw material into formal reprocessing enterprises. Reprocessors are in a class by themselves and are mostly factories and formal enterprises.

#### **3.2 Current scrap collection process**

Scrap collection is carried out by two categories of workers, waste pickers and the itinerant buyers. Waste pickers retrieve paper, plastic, metal and glass scrap from garbage bins or Receptacles that are provided by the municipalities for the disposal of garbage on the street, and from landfill sites where the collected garbage is transported and dumped. Itinerant waste buyers purchase small quantities of scrap from households, offices, shops and other small commercial establishments. All categories of scrap collectors rudimentarily sort and then sell the collected scrap commodities to retail scrap establishments on the basis of weight or unit. The factors that structure the scrap labour market are found to be age, gender, religion, ethnicity and 12 kinship (caste), geographical origin (migratory status), place of living (spatial distribution and locational specialisation) and education. Bhangar feriwallas in Pune-Pimpri-Chinchwad were more likely to be young men, who had entered the occupation as adolescents. Almost all belonged to the scheduled castes and their educational levels at the time were comparable to those of the average education of the scheduled caste population. Most bhangar feriwallas were literate. The incidence of poverty was the highest (37 percent) among male itinerant buyers because although they earned relatively better than waste pickers, the average household size and the dependency ratio among them was higher. Bhangar feriwallas and Cycle feriwallas are peripatetic. Cycle feriwallas move around by bicycle and collect mostly newspaper and plastic that is easy to transport by bicycle. Bhangar feriwallas move around on foot pushing their handcarts which they hire from their scrap trader for a nominal daily fee. Bhangar feriwallas collect all kinds of higher grade material such as LDPE, corrugated board, bottles, white paper, newspaper, ferrous metal and other items that do not work or need repairs. Some of them deal in generic items. Others specialised in certain items such as corrugated cartons, plastic and ferrous metals. Bhangar feriwallas had steady customers who periodically sold scrap to them, and fixed work beats along which they operated in mutual understanding with other feriwallas. Half the Bhangar feriwallas borrowed working capital and two thirds of those sourced it from retail scrap traders to whom they had to sell the scrap. No interest was paid on working capital. Most of them also rented the pushcart from the trader. The credit market was tied to the product market. Whether that had implications on their bargaining power was evident.

Scrap collectors in Pune and Pimpri Chinchwad have been organised into the Kagad Kach Patra Kashtakari Panchayat since 1993. The respective municipalities have endorsed the photoidentity cards of scrap collectors in recognition of their contribution to solid waste management and recycling. Both municipalities have institutionalised the integration of waste

pickers into door to door collection of waste through an arrangement with SWaCH (solid waste collection handling) Seva Sahakari Sanstha, a wholly owned cooperative of waste pickers and itinerant waste buyers.

### 3.3 Trading of scrap and related Market

The market comprises trade establishments performing varying levels of trading activities. The competitive relations among each class, homogenous in terms of activity level, determine market power. The ladder of level of trade activity where the class stands, determines the ability of the group to negotiate the terms of trade with higher and lower classes. There exists an element of non-price competition at all levels of trade like binding the sellers by way of giving advances. At the lowest end is the market of retail trade where retail trade establishments are the buyers and scrap collectors are the sellers. The buyers' side in this market segment consists of exclusive retail traders as well as retail traders combining retail trade with stocking and wholesale functions. The middle level market segment comprises retailers combining retail and higher level of trading activity as buyers, and the exclusive retail traders as sellers. However, the purchase- sale transactions are complex in this market segment. There exists a buyer seller relationship within the group of buyers. Hence, ideally this segment should further be divided 13 accordingly. At the top level buying selling classes are mixed and the clear distinction between buyers and sellers is difficult. All the segments in the scrap trade market are open segments. The traders in each segment also buy scrap from institutions in the formal sector.

## 4. METHODOLOGY

A multi-stakeholder consultation was organised during the course of the study in partnership With SWACH, that brought together representatives from the PMC and PCMC, the chambers of commerce and industry, NASSCOM, IT and ITES companies, scrap traders and bhangar feriwallas.

The sources of primary information for this E waste study include bhangar feriwallas, scrap traders, dismantlers and generators. There are no final stage recyclers within the informal Sector in Pune or Pimpri Chinchwad so they have not been included in this study.

The informal waste recycling sector, allows for open entry at the lower levels of the collection Segment that includes waste pickers and itinerant waste buyers. At the time that the study was carried out, a total of 7509 members were registered with the Kagad Kach Patra Kashtakari Panchayat (KKPKP).

**Table 1: Scrap collectors registered with KKPKP in 2013**

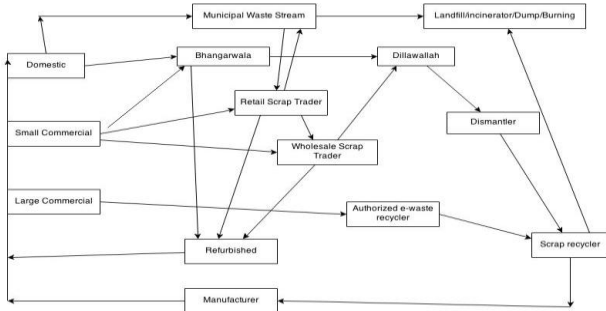
Type	Total	Percentage
Bhangar feriwallas (Itinerant wastebuyers: men)	1253	71
DabbaBatliwalis (Itinerant wastebuyers: women)	108	1
Wastepickers	4026	54

Door-to- Door waste collectors	2122	28
Grand Total	7509	100

Accessing Bhangar feriwallas (itinerant waste buyers) was relatively easy because they are embers of KKPKP and about 50 bhangar feriwallas shared their experiences and answered a questionnaire. However, not all of them answered all the questions. After a preliminary trial at using questionnaires, the thrust of data collection shifted to focussed group discussions and street corner meetings with Bhangar feriwallas. Only those living in Pune were contacted. Consultations with bhangar feriwallas were held at 10 locations and were attended by 194 Persons while consultations with waste pickers were held at 12 locations and attended by 200 bhangar feriwallas. Typically itinerant waste buyers and waste pickers congregate at particular spots referred to as their 'thiyas' where they rest and exchange notes after their collection rounds. The 'thiya' is a social space as much as it is a work space where rudimentary sorting of scrap for sale is carried out. The 'thiyas' became sites of informal information sharing. Meetings were also held with Bhangar feriwallas in the slum areas where they live. It is difficult to estimate the number of scrap traders in Pune and Pimpri Chinchwad. A decade ago, a study of the sector placed the number of scrap traders at between 350 and 500 across all classes of traders. The scrap trade and intermediate processing segments in particular are closely held, highly competitive and difficult to penetrate (Chikarmane et al 2001). The reluctance of scrap traders to divulge information and to permit the recording of information in response to a questionnaire was therefore anticipated. Given the long history of KKPKP and therefore relative familiarity with the traders, they were willing to engage informally. The researcher therefore, accompanied them and observed scrap traders who were willing to engage. Ten scrap traders from Pune and Pimpri Chinchwad were approached and six were closely covered. Some were selected because they were known to KKPKP, the rest were just approached at Chikhali and Handewadi. The field visits helped to identify the links in the E waste chain and its movement from the generators to the recyclers. No attempt was made to get an estimate of the number of scrap traders who dealt in E waste. E waste generators did not actually refuse to provide any information, none however filled in the questionnaires that they were given. They were not forthcoming with information either, when they were contacted. Janwani and the Pune Municipal Corporation issued letters requesting their cooperation in the study, but that did not seem to make any impression upon the generators of E waste. They refused to acknowledge that they generated any E waste at all. Some claimed to be storing it in their premises or in their offices. Three recycling firms in Maharashtra were granted approval for recycling E-waste by the Central Pollution Control Board (henceforth CPCB). They are Ecoreco Recycling Limited at Vasai with a capacity of 7190 metric tonnes per year, Earth Sense Recycling Limited at Bhiwandi with a capacity of 3000 metric tonnes per year and Hi Tech Recycling at Bhugaon with a capacity of 1000 metric tonnes per year. The operating licence of Ecoreco is valid till 2014 while that of the other two operators expired on 31/10/2010 and 31/5/2011 respectively. (MPCB website) iv. All the approved recyclers are located within 200 km of Pune. They were however not covered because they are formal factories. Ethical issues in research: Although none of the

participants were asked to sign any document, the researcher informed each of them about the reason and purpose of the study. If anybody specifically refused to participate in the study or requested that their names be kept confidential, their requests have been respected. In such instances, the information gathered has been shared but not the source

### 5. THE JOURNEY OF E WASTE: GENERATION TO DISPOSAL



### 6. INTERMEDIATE PROCESSING OF E WASTE

Acres of barren hilly terrain are visible as we turn the corner to Handewadi located around two kilometres from the Uruli landfill. Miles away from civilisation are enormous concrete warehouses or godowns each of which can store up to 5 to 10 metric tonnes of E waste. Allusions of having paid bribes are made by the owner during our conversation. The owners are from the northern Indian states. It is not clear whether these are formally registered units and perhaps it's not a good idea to ask. We are there on sufferance and a misdirected syllable may give cause for terminating the visit. The huge spaces dwarf the industrious people at work inside them, sorting and breaking a truckload of computers that had emptied its contents, just as we reached. Many of the little hands belong to young children and others to young adults. At least 20 workers if not more, are present in each unit. Not a single girl or woman is in sight. It is evident that the workers are not locals. We hear that they have been brought all the way from Mehrauli, near Delhi and others from Etawah, Uttar Pradesh and other northern Indian states. Some sums of money were paid to their families when they were brought here. They are provided living quarters and food and are paid when they return to their respective villages. They have no foreknowledge of how much they will be paid or even what their accumulated earnings will be by the time they return home.

**Table 2 : Knowledge of Bhangar feriwallas about dismantling some electrical and electronic products**

Knowledge of Bhangarwalas		Everybody knows		
		Few knows		
Electrical / Electronic Appliance		Very Few Knows		
Computers	Full			
	CPU			
	Laptop			

Television	B & W			
	Coloured			
	Plasma or LCD			
Mobile Phone				
Microwave ovens				
Airconditioners				

We visited seven such units, two of which had a common owner. The units at Handewadi do not deal exclusively with E waste. Various types of plastic are the core commodity that they work with. The informers/owners ruefully tell us about the drying up of the plastic waste from the Uruli landfill after open dumping was stopped a year ago. Subsequently, the PMC started sending all municipal waste to the Refuse Derived Fuel (RDF) plant operated by Hanjer Biotech. At present the plants source plastic scrap from Juna Bazar to feed their machines. Dismantling, manual breaking, removal of the kits, segregation and mechanical shredding, washing, drying and packing of plastic are the operations carried out in these units.

### 7. SCRAP COLLECTION UNITS AROUND PUNE AND PIMPRI-CHINCHWAD

The scene is green and picturesque, with newly planted fields on either side of the road. There is a sudden break and we come upon Chikhali village. The village is crowded and congested and there are 8-10 units, much smaller than those at Handewadi that deal almost exclusively in E waste. The scale of business appeared to be small. The owners were around and were very communicative. Some of them had worked as dismantlers. They held out their hands to show the acid scars. We do not see any small children among the workers; the younger ones appear to be 16-17 years old. They did not live on site and did not seem to be 'bonded labor'. It seemed as though they were learning the trade as apprentices. Chikhali appeared to be a transit point with many dilliwallas storing their material in the godowns.



**Workers manually sorting E waste components Image 1**



**Manually washing E waste plastic Image 2**



**Shredding E waste plastic Image 3**

## **8. MAJOR FINDINGS, CONCLUSIONS AND RECOMMENDATIONS AND RECOMMENDATIONS**

The E waste market in Pune is not a separate market. It is a sub-market of the regular scrap Market. There is however some degree of specialization both in collection and trading where not all collectors and traders deal in E waste.

E waste is among the scrap commodities collected by Bhangar feriwallas and traded by retail scrap traders to whom they sell the items. Both expressed their hesitation in collecting and storing e-waste because of the risk of being harassed by the police on account of the absence of proof and records of transactions from domestic and small generators. The bhangar feriwallas are hardly in a position to produce such receipts from the generator. Bhangar feriwallas, dabbatliwalis and waste pickers have unmatched reach to every household and enterprise in the city. The costs of collection are usually the highest in any recycling activity and therefore a key determinant in the financial viability of recycling. Bhangar feriwallas are self employed and earn their livelihoods from collection, thereby subsidizing collection costs through their labour. They are street entrepreneurs. They ensure that any electrical or electronic item or even its part which can be repaired and reused will indeed be repaired and reused. They work with the bare minimum requirement of fossil fuels, electricity and motorization and work depends largely on their

physical and intellectual endowment. Any future strategy for environmentally sound e-waste management needs to take into account their tremendous contribution and incorporate them in the changing scenario. E waste in Pune is collected, segregated, dismantled and shipped to Delhi, Mumbai and Bangalore for further processing. The processes that are carried out in Pune include collection, trading, breaking, removing, recovering, sorting, segregation, shredding, washing, packing, transporting. Actual extraction and recycling are not carried out in Pune. Metals do get recycled in foundries around Pune. All the processes are carried out in the informal economy of trading where interpersonal relationships and oral informal arrangements are the modes of transaction. Formal documentation of E waste deals does not exist and cash trading is the prevalent practice. The exceptions may be those registered dealers who are in the on line and off line tendering processes. The trading enterprises may have some kind of registration under the Shops and Establishments Act, which is quite poorly enforced. Many of the enterprises that deal with collection and dismantling of E-waste would be classified in the micro and small category and would therefore be excluded from the EWMHR. The regulatory framework for E waste appears to be premised upon the belief that environmental compliance will improve if formal enterprises undertake the management of E waste. It is assumed that they will use technologies that are state of the art and environmentally more acceptable and those that will enhance resource recovery as well. The E waste management and handling rules favor big business interests and have led to the spawning of Ewaste management companies. The fuzzy part in this schema is the relationship between the informal and the formal and the terms on which they would relate. More specifically, it is not clear if the formal would supplant or complement what the informal is doing today. The informal sector currently recycles 95 percent of E waste. It is done entrepreneurially and profitably without any government intervention. Informal enterprises have a competitive edge because of their ability to work with low establishment, infrastructure and labor costs. The 33 downside is that environmental norms and conditions of work and occupational health and safety issues of labour are compromised. The solution is therefore not to replace the informal with the formal but to enable the informal to progressively improve and meet the requirements.

Thousands of urban poor work in this sector, in collection as well as in the scrap establishments and intermediate processing. Future work on e-waste must attempt to include the tremendous strengths of the informal sector in terms of extensive outreach, low costs and low carbon footprint along with the strengths of the formal sector in terms of technological knowledge, legality and brand image and ability to invest in research and capacity building.

The responsibility of Manufacturers of products that generate E waste, to substitute non recyclable material; ensure safe collection, reprocessing and disposal must be legally mandatory. Take back programmers in India are hopelessly inadequate. Manufacturers are raking in profits while workers and entrepreneurs in the informal economy, subsidise the cleaning of the mess that their products have created. Making stringent rules for recycling enterprises while leaving manufacturers free of any responsibility is like locking the stable after the horse have bolted. Products that end up in the E waste stream are manufactured for the most part in the formal sector which is relatively easier to police and enforce good practices. The entry of Dilliwallas over the past four years has had a favorable impact on the price of Ewaste in the

recycling market. There are an estimated 100 such agents working in Pune and are extremely difficult to trace because of their highly mobile working style and because they are commission agents who work without any overheads and without owning any space.

### **8.1 Recommendations**

1. Registration of all categories of waste collectors and provision of photo-identification. The registration could be renewable every ten years.
2. E waste trading, dismantling and recycling requires space. Reservation of amenity Spaces for waste (including E waste)
3. Collection and recycling centers in the development plans. Reserving space for scrap markets in the development plans. Other markets such as vegetables, fruits, iron and steel, timber have designated space in the city while scrap markets do not.
4. Taxing E waste manufacturers with an obsolescence tax that would be levied on all products that would enter the E waste stream. The tax collection could be diverted to create the institutional mechanisms/frameworks to support informal waste collectors and micro enterprises.

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