

## Electronic Waste Status in Jharkhand Cities

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### ABSTRACT:

The use of Electrical Electronic Equipments (EEE) in day to day life is increasing and changing with rapid and frequent changes in technology. Like any product these EEE have also their life and at end of life when they lose their credibility and usability turn to waste and are popularly known as Electronic Waste (e waste). These e wastes contain many toxic and hazardous constituents in it which are dangerous and harmful to health and environment. The e wastes are day by day increasing and are posing threats to the mankind by increasing the pollution. India being developing country with extreme poverty and has vast unskilled manpower ready for doing any work without knowing the hazards is more liable to risks of the e wastes. In India also we notice the various states representing the various levels of economic strata and affordability. The developed states are moving towards managing e wastes through regulations but the less developed states lacks on this front also. The study of the Jharkhand developed cities and relatively less developed cities has been carried out. The study reveals that the maximum volumes and weights of the e wastes are from the larger and bigger EEE products i.e. AC, Refrigerator, Washing Machine etc. The major eight products present in everyone's life have been considered in this study. The reuse and recycle takes place in formal and informal sectors. 95 % of recycling is done in informal sector which is performed and actuated in most toxic and hazardous environment. The extended producers responsibility (ERP) which requires the producer or propagators to take back e wastes for recycling or disposal as buy back with fees or without financial initiatives is day to day becoming fact and figure for strict requirement for proper tackling of e wastes. The lack of knowledge of the user that wastes of EEE also have reusable components can entitle them good return often lead to ignorance of consumers to hand back to the manufacturer and lack of market of reusable components among the manufacturers also leads to e waste in bulk though meaningful components can be extracted and reduction of waste volumes can be noticed. The main concerns are the following of western thinking of "one size fit all", eco label initiative or oligopoly approach of Indian Government and pollution control boards. The large scale imports with inappropriate technology and imports of junks in name of up gradation from developed countries lead to increased e waste. The employment generation, lack of job potential and poverty compels the user and workforce to drive themselves into these. The status of Jharkhand is also same as there is no specific state government initiative for tackling the e wastes. The production of e waste is in line of any other state in India. The scenario of this state is in confirmation to the states of affairs in the developing states category, if India has developed, developing and underdeveloped states. The worst sufferers are the common man and the poor users who inherit the junk in name of technological upgradation and making the life easier by automating the lifestyle.

**KEYWORD:** EEE, e waste, Environment, Technology, End-of-life, Disposal, Household, Discard, Pollution.

## I. INTRODUCTION

The rapid growth & industrialization and desire of common man to lead a easy life leads to the boom in the rapidly growing electronics in particular and electrical and electronic equipments (EEE) and information technology industry is the fastest growing sector in particular. The information technology industry in India is equally prominent sector as witnessed in the global scenario. The influx of leading multinational brands and companies in the manufacturing sector of these EEE has reported as a result of changing policies and exchange of R&D facilities. The advancement in technology results in increase in updated EEE products and this leads to a situation of obsolesce of old products as they lose their usefulness and this leads to end of life rise and hence generation of Waste of Electrical & Electronic Equipments (WEEE) i.e. electronics waste (e waste).The popular EEE products include computers, laptops ,Printers, mobiles , electronic gadgets, televisions, VCRs, DVD, stereos, copiers, fax machines, lamps, audio equipment , electronic toys , electrical home appliances, electric equipments and batteries etc. The recent past has witnessed accelerated manifold growth of e waste. Various factors for rise of e waste includes the imports of used and obsolete EEE products in name of technology up gradation aimed to the third world countries who have vast potential of consumerisation or market from the developed countries. The e waste amounts to 2.7. to 3 % of the total waste whose handling itself is a complex phenomenon. The issue of e waste handling are concentrated at manufacturer, distributor or consumer levels. The initiative of the regulatory mechanism for such issues is being talked about and are at initial stage only. The consumer handling of e waste is itself a complex issue as the e wastes constitute hazardous elements also. The making use of products at various levels and through various techniques includes its recycling; reuse and sometimes mixing of components for making it usable are prevalent in India, though are rarely evident in the developed countries. The developed nations mostly follow use and throw policy. The dependence on the EEE is still a status symbol and its affordability is to the elite and economically affordable section of the society only. The economical betterment and affordability of citizens is creating larger markets for EEE. The gray market mostly for the computers where assembled computers market is evident, resale and reuse is prominently evident. The survey and research for estimation of e waste is only taken up by limited organizations and are in stray condition. This is the sole reason that we lack reliable data of e waste and e waste generation.

The Information Technology (IT) sector is the most promising sector which is generating employment. The outsourcing of software development and solutions are day by day outreaching the far flung areas. The needs and changes are faster and this results in increased demand of optimized and recent hardware and software. Hence this sector is another area which is responsible for the e waste generation. The availability of finance and increase in affordability as the EEE prices are lowering down the tendency of procurement of new TV sets, mobiles, house hold appliances, electronic toys and other EEE are increasing many fold. With increase in consumption pattern e waste generation is also resulting. Jharkhand state has many cities like Jamshedpur, Ranchi, Bokaro, Dhanbad which are at high peaks of economic activity at one end and other cities like Dumka, Daltongang, Hazribagh, Ramghar are at lesser peaks. The cities in the vicinity of developed cities and well connected metros are developing as potential centres of software and hardware development in the IT sector and have traditional consumers of EEE. The industrial giants, hubs in the cities and rising network of BPO throughout state are creating high end society are also responsible for growth of EEE consumers and networks. As rough estimate the state has more than 800 numbers of software industries/ developers and numerous hardware industries/organisations established and several (BPO's) companies with more than fifty thousand employees. State cities like Jamshedpur, Ranchi, Dhanbad and Bokaro have emerged as important destination and or hub for reuse recycling of EEE and as a result e-waste generator. The reuse and recycling centers available in the areas are in informal and unorganized sectors only. Instances of shifting the ewastes to nearby metro are also in sight. The informal and unorganized sectors involvement in the recycling sector is leading to pollution and hazardous environment and is causing health concerns to the workers and persons involved in it. The higher consumption and disposal rates of the consumers are responsible for increased growth of e waste. Immediate concerns for the health and pollution and strict measures for the pollution control and proper recycling and reuse technology and training to personals is the emergent need of the day. The work being reported here is based on the exploratory sample estimation of e waste generation in the state.

## II. PRESENT E WASTE SCENARIO AND CONCERNS / TRENDS

As an estimate the e waste amount piled up in India is 800000 tones in India in 2012 as per Manufacturers Association of Information Technology Companies (MAIT) and GTZ study. The e-waste strategic Management Systems in the key developing and underdeveloped countries can be seen as a comparative way among sets of countries can be as depicted in the table 1. The table shows a comparative view of Prevailing overall Technology, E waste Management , Actors , Formal e waste collection, Disposal / dumping sites, techniques , uniqueness financial aspects and legal framework and its adherence in the India , China very fast developing country, south Africa example of third world nations and Switzerland sample of developed nation has been briefly outlined.

**Table 1 Approach Details of India, Developing country China, Third World Country S Africa Developed Country Switzerland**

<b>Important aspect</b>	<b>India</b>	<b>China</b>	<b>South Africa</b>	<b>Switzerland</b>
Technology	Mostly borrowed , few indigenous	Indigenous and borrowed	Borrowed	Developed , trans boarder migrated
Prevailing overall waste management system	Semi Organised in metropolitans but unorganized in other areas	Only organized in urban areas	Mostly unorganized	Organized , Swiss Association for the Information, Communication and Organizational Technologies (SWICO) system
E waste management	Partly specific through unorganized and informal	Non specific but Semi organized	Not specific	Not specific
Actors	Manufacturers, distributors, traders, importers, consumers, formal and informal recyclers and scrap dealers.	Manufacturers, distributors, traders, importers, consumers, recyclers, scrap dealers and disposers.	Distributors, traders, importers, consumers, recyclers, collectors, sorters and disposers.	Manufacturers, distributors, traders, importers, consumers, recyclers, licensed collectors and licensed dismelters and refiners.
Formal e waste collection centres	Mostly under Pollution control boards	EMPA, GTZ and EECZ	DESCO Electronic recyclers ND Universal recycling co.	SWICO and SENS (Swiss Foundation for Waste Management)
Disposal / dumping sites	Mostly in landfills	Municipal sites and mostly illegal sites	In Landfills	In Landfills
Disposal site technologies	No proper collection system	No legal methods	Permitted sites with technology	Systematic and meticulous process
Uniqueness	Reusable and secondary raw material segregation	Multiple conditioning and refining process	Unique processing and screening	Landfill capacity adherence
Financial Uniqueness	Lacking of defined system	Individuals are paid for the collected e waste	Payments are made by metal scrap dealers for the metals in the waste	Provision of Advanced Recycling Fees (ARF)
Legal framework and adherence alertness	100% prohibited in principle but no definite adherence	Legally imports prohibited	Stringent laws but loose in adherence	Strict tougher laws and adherence to norms

The e waste scenario as per various studies available till 2012 for all the states in India in terms of percentage of the total production of e waste (in India) can be viewed as mentioned in Table 2.

**Table 2 Showing Details of State wise E Waste Contribution in India**

<b>Sl</b>	<b>States</b>	<b>WEEE in % in India</b>	<b>Sl</b>	<b>States</b>	<b>WEEE in % in India</b>
1	Maharashtra	13.88121	19	Uttarakhand	1.123886
2	Tamil Nadu	9.235316	20	Himachal	1.092317
3	Andhra Pradesh	8.751912	21	Jammu & Kashmir	1.041916
4	Uttar Pradesh	7.108937	22	Goa	0.292682
5	West Bengal	6.888625	23	Tripura	0.259058
6	Delhi	6.662478	24	Chandigarh	0.246321
7	Karnataka	6.244472	25	Pondicherry	0.194619
8	Gujarat	6.159256	26	Meghalaya	0.144903
9	Madhya Pradesh	5.341829	27	Nagaland	0.099364
10	Punjab	4.765149	28	Arunachal Pradesh	0.090188
11	Rajasthan	4.332633	29	Andaman Nicobar	0.063138
12	Kerala	4.226421	30	Mizoram	0.054647
13	Haryana	3.086305	31	Manipur	0.05451
14	Bihar	2.092461	32	Sikkim	0.053483
15	Orissa	2.011792	33	Diu & Daman	0.02794
16	Assam	1.490594	34	Dadar & Nagar Haweli	0.019928
17	Chhattisgarh	1.472242	35	Lakshadweep	0.005067
18	Jharkhand	1.384383			

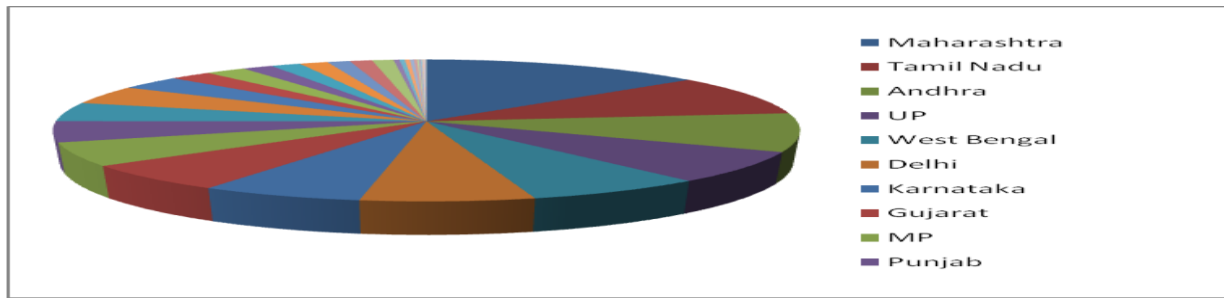


Figure Showing percentage representation of E waste generation in India state wise

### III. JHARKHAND STATE CITIES STUDIES AND DATA OUTLINES

The following strategies were employed for data collection and studies:-

1. Questioner were developed and data's based on the questioner were received basically from the diversified socio economic groups across the sections for proper ascertaining practical sample data of the state so far practicable particularly from the following groups
    - a) Households,
    - b) Business organizations & institutions including offices
    - c) Manufacturers, Importers / exporters, EEE collectors, EEE second-hand shops, EEE repair shops, Recyclers / dismantlers, Processors of recyclable materials, Re-users, R&D units and similar institutions.
  2. Selective interview with the selected group were conducted to ascertain the facts and figures and principle of thoughts
  3. The purchasing pattern, recycling, reuse and disposal practices were collected i.e. ascertained
- Broadly main seven types of consumer commodity of EEE were considered for determination of pattern of e waste disposal. The seven EEE are Computers inclusive of monitors (LCD / CRT both types),Laptops, Mobiles , Refrigerators , Air conditioners (AC) , Batteries including the mobile batteries.

In all 300 sets of questioners in equal numbers i.e. 100 each to the mentioned three groups were sent through email, post and distributed manually.

Responses from the three categories of target groups are as follows mentioned in the table

In household category for the eight cities total of 800 questionnaires supplied 734 were received back. The responses mentioned in table 4 are mainly the response that reflects the mood of the consumers on individual basis. Business organizations & institutions including offices: Out of total 800 targets the 600 receipts reveals the mood of the bulk user and policymakers. The details of responses are in table 5. The Manufacturers, Importers / exporters responses are in conformity of the e waste generation as it was most likely that the e waste would be nil only as the EEE products are not put to use themselves and are extended to others only for conversion to e waste after extensive use and handling, recycling and reuse. The details are in table 6.

Table 3 Showing the Responses in the three Segments Identified and Planned

Household			Business organizations & institutions including offices			Manufacturers, Importers/exporters etc.		
City	Questionnaire sent	Questionnaire received	City	Questionnaire sent	Questionnaire received	City	Questionnaire sent	Questionnaire received
Jamshedpur	100	95	Jamshedpur	100	90	Jamshedpur	100	89
Ranchi	100	99	Ranchi	100	87	Ranchi	100	92
Dhanbad	100	94	Dhanbad	100	88	Dhanbad	100	94
Bokaro	100	96	Bokaro	100	78	Bokaro	100	89
Hazaribagh	100	95	Hazaribagh	100	67	Hazaribagh	100	81
Ramghar	100	93	Ramghar	100	56	Ramghar	100	78
Daltonganj	100	94	Daltonganj	100	73	Daltonganj	100	74
Dumka	100	86	Dumka	100	61	Dumka	100	86

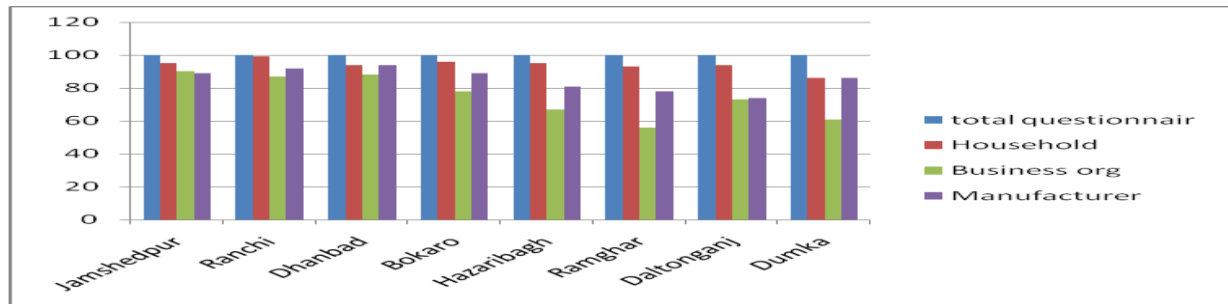


Figure depicting distributed and received questionnaire for individual three groups

#### IV. DETAILS OF SAMPLE SURVEYS

In Sample survey for household e wastes all together 800 questionnaires were sent and in all 752 were received i.e. 48 did not reply.

In case of business organizations and institutions the received number was 600 i.e. 200 chose not to reply.

In the manufacturers, importers / exporters etc category it was 683 indicates that 117 were non responsive.

Reusers / Recyclers/ Second hand market holders Questionnaires

In this category mainly four groups existed and they were

- Scrap metal collectors
- Second hand repair shops
- Formal pollution board listed/licensed vendors and
- Informal vendors active in this field.

Mostly the details were collected by the interview of such groups. The questionnaires were not responded and to collect data interview was only option left. The volumes and weight of the e wastes calculated in this study are as per the report of UNEP volume I published.

Details of collected data for the eight listed segments of the e waste are as mentioned in the tables listed here under.

Table4 Showing E waste generation from household

Components	Household sector e waste survey ( Total received records 752 from all the 8 districts)								
	Large scale			Medium scale			Small scale		
	Used	Repaired/discarded	E waste	Used	Repaired/discarded	E waste	Used	Repaired / discarded	E waste
Computers with monitors	409	121	3533.2	131	26	75.92	12	3	8.72
Laptops	242	67	234.5	98	23	80.5	32	4	14
Printers	54	11	55	23	12	60	9	2	10
Mobile phones	1052	246	922.17	678	154	12.63	890	341	27.96
TV	1436	203	4060	1231	401	802.0	776	456	91.2
Refrigerator	259	37	1110	328	41	123	35	6	18
AC	498	53	1065	541	48	94.6	4	2	1.2
Washing machines	256	23	460	349	71	92	80	36	6.4
Total e waste	11439.87 kg/yr			1340.67 kg/yr			177.48 kg/yr		

The major e waste generated in this segment is in the TV field followed by computers although the mobile users was the second largest i.e. after TV. The e wastes figures from the Jamshedpur and Ranchi cities were largest compared to the cities of Ramghar showing the least one. His understandably so as the availability of the products and paying capacity of the members in the cities of Jamshedpur and Ranchi are higher compared to the other cities.

Table 5 showing E waste generation from Business organizations &amp; institutions including offices

Components	Software sector e waste survey ( Total received records 75 from all the 8 districts)								
	Large scale			Medium scale			Small scale		
	Used	Repaired / discarded	E waste	Used	Repaired / discarded	E waste	Used	Repaired / discarded	E waste
Computers with monitors	21265	2098	61802	987	112	3360	298	46	1343
Laptops	9826	965	3377.5	421	46	161	68	23	80.5
Printers	872	176	880	321	38	190	121	28	140
Mobile phones	748	89	7.3	173	56	4.59	114	41	3.36
TV	357	91	3276	162	16	756	75	4	144
Refrigerator	67	23	1108	46	18	540	41	23	690
AC	189	41	1640	56	32	1280	12	4	160
Washing machines	23	9	180	11	2	40	3	1	20
Total e waste	72271.8 kg/yr			6151.59 kg/yr			2580.86 kg/yr		

As the major business, official and educational organizations are situated in the Jamshedpur, Ranchi and Dhanbad cities the bulk users are in the computer and laptop segments. These sections show the major e waste generations also. The small cities like Ramghar and Dumka generated lower e waste in this segment.

Table 6 Showing E waste generation from Manufacturers, Importers/exporters etc.

Components	Software sector e waste survey ( Total received records 75 from all the 8 districts)								
	Large scale			Medium scale			Small scale		
	Used	Repaired / discarded	E waste	Used	Repaired / discarded	E waste	Used	Repaired / discarded	E waste
Computers with monitors	8046	03	Returned	1208	6	Returned	1561	4	0
Laptops	3471	2	Returned	189	0	0	0	0	0
Printers	4847	7	Returned	231	0	0	0	0	0
Mobile phones	16123	8	Returned	431	2	Returned	0	0	0
TV	11347	7	Returned	2028	39	Returned	1091	81	0
Refrigerator	6711	4	Returned	0	0	0	0	0	0
AC	958	2	Returned	871	9	Returned	0	0	0
Washing machines	3218	3	Returned	592	7	Returned	682	43	0

The major manufacturer/importer/exporter units are located in Jamshedpur followed by Ranchi and Dhanbad. The connectivity of Jamshedpur and Dhanbad to Kolkata is easier and hence these cities were better having facilities of returning the damaged products. The company owned maintenance and service centres are mostly in Ranchi followed in Jamshedpur. The Dhanbad is well connected to Kolkata so the service providers are mostly attending from there only.

## V. SEGMENT WISE RESULTS AND DISCUSSIONS

**Household:** Survey of total of 752 out of 800 houses to get a trend of generation of e waste was done. Here the number of family members count divided the large, medium and small section. The overall trend for these shows that the EEE are in properly maintained conditions. They often get repaired when they get defects. The authorized centres personals come for the repairing. The care and frequency are the sole causes of low generation of e waste. The outdated Computers , Laptops Printers , TV AC etc get exchanged in the market and often get their reflection as e waste in the next group where we dealt with the reusers and recyclers etc. The table shows the details of use and e waste generation. The e waste generation is from the products which came from the gray market. The items and products of the standard companies did not contribute much to the e waste. The Maximum of e waste generated in computer is because of the low life span and fast technology upgradation and tendency that the latest version of software are not supported by the



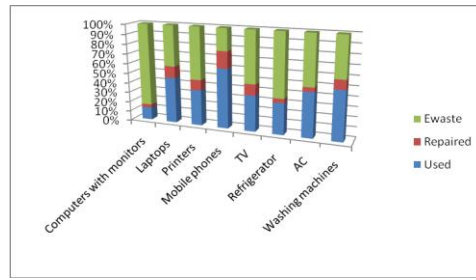


Figure showing Household E waste details

Old computers which offer low generation and lesser speed peripherals. The choice of lesser repairs is also reason for e-waste generation. In case of TV the changing pattern of consumers for changing technology is the basic cause of shifting of product to lower groups and ultimately resulting in the obsolescence i.e. e waste. The refrigerator is the other EEE product which often gets converted to e waste as the repairing cost is high and recovery of the items is easy and volumes of metallic part results in the major e waste by weight and volume. The second hand market is not that high.

Methods of disposal of EEE in the sample survey of 752 studies noticed is as mentioned herein :

Activity	Frequency	Percentage
Disposable EEE keep in house	111	14.76
Send to manufacturer	36	4.79
To Repair/ Recycle centre	99	13.16
Transfer to relative	54	7.18
Charity transfer	72	9.57
Waste bins	293	38.96
Others	87	11.57

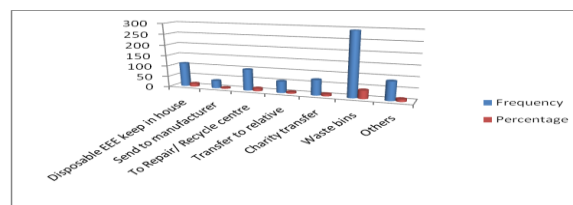


Figure showing Disposal Activity Freq. & Percentage

**Business organizations & institutions including offices:** The survey for the 800 sent information questionnaire out of which 600 were received details / information were gathered. The trends of e waste generation percentage and volume can be explained in different ways. The volume wise e waste generation is maximum in computers and printers followed by TV, AC, fridge, printer, washing machine and mobile. The e waste generation percentage wise is maximum in Refrigerator section followed by AC, TV, Washing machine, Computers, Printers, laptops and Mobile. The amount of e waste generated is understandably largest in the large scale sector and minimum in small sector.

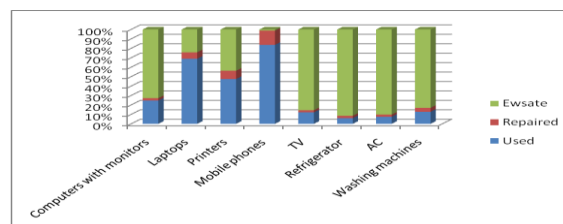


Figure showing e waste in Business etc organisations

**E waste generation from Manufacturers, Importers/exporters etc:** In this category we observe that since the products are not in use and only few in transportation get damaged and hence require repairs. The e waste produced is nonexistent in this case. The damaged items are returned back to the importers / exporters / manufacturers or assemblers. These parties make use of the new parts to other unit and hence the e waste is negligible. The branded parties and reputed assemblers of the area and region were only contacted hence the real story of the very small or cottage type industries scenario could not be studied.

## **VI. CHALLENGES, CONCERNS AND ECONOMICS OF E WASTES**

The mammoth growth and arising concerns for the Electronics Waste in a sustainable and sound environmental technological development with updating processing advancements and growth of use and throw mindset is increasingly making e waste management task bit challenging one. The outburst of hazardous toxic constituents of the e wastes in the environment has proved that we have failed to strike balance between safety, cost and advancement of technology with proper environment protection for green world. We need to address the facts of reduction of e waste through recovery, reuse and recycle to minimize toxic substances in order to arrive at technology for such labour intensive and safe product development with enhanced participation of stakeholders in fixing responsibility of managing e waste in more sensible manner. The e waste gets recycled in formal and informal sectors. As per initial estimate 90-95 % of e-waste gets recycled in India in the informal sector which is performed and actuated in highly hazardous conditions. The e waste is one which simultaneously poses threat and opportunity at same time. It contains different hazardous and toxic elements responsible for even health problem, if not properly treated and managed. The positive aspect of e waste is that E-waste also offers employment and handsome returns and offers great opportunity to small manufacturers in formal and informal sectors by providing means of supply of many inputs, recovered through recycling and dismantling process, at a vary cheaper rates.

Remains and scraps of the end of life products are the main source of e waste, in other words one can say that products which suffers from the technological obsolescence and permanent damage conditions results in e waste. Separate designated location for storage of e waste becomes inevitable. The extended producers responsibility which entitles the manufacturers or its importers / agents to take back e wastes for disposal as buy back or otherwise arrangement is day by day becoming fact and figure for strict requirement. The lack of awareness of the contents and toxicity and hazardousness among the users sometimes becomes consumer's ignorance for the handing over of the product even in case of buy back offers. The lack of knowledge of the user that wastes of EEE also have reusable components can feed them good return often lead to ignorance of consumers to hand back to the manufacturer and lack of market of reusable components among the manufacturers also leads to e waste in bulk though meaningful components can be extracted and reduction of waste volumes can be noticed. The response of the lack of awareness among the users and manufactures were noticed in the responses received. The proper awareness about belongingness of e wastes among the handler group was divided i.e. they are not fully aware that to whom this belongs and so was the case among the consumers / user. The situation of regulations and strictness of adherence was also divided lot. The overall reaction is that the "it carries" is the situation among the different groups. The Indian business leaders are reluctant towards e waste handling and its proper management. The duty of user is to handle the e waste is feeling in majority of the business leaders. The main concerns are the following of western thinking of "one size fit all", eco label initiative or oligopoly approach of Indian Govt. and pollution control boards. The large scale imports with inappropriate technology and imports of junks in name of upgradation from developed countries lead to increased e waste. The monopoly and oligopoly lukewarm approach of dominant players in cases environmental regulations and weak loopholes in the regulatory mechanism and governmental initiative for creating proper awareness among users are the main concerns.

The employment generation, lack of job potential and poverty compels the user and workforce to drive themselves into these. The underdeveloped or least developed countries are since not having more sophisticated gadgets and EEE so the level of pollution is low and can afford cuts in the pollution levels for the developed nations. The environmental protection from pollution among the developed and under developed nation has given rise to economics in needed items and trade. The health and aesthetic reasons for environmental protection has become luxury of the developed nations. The reduction of pollution is increasingly becoming need of these nations as they are becoming experimental grounds of the developed nations.



## VII. CONCLUSIONS

In the study regarding the e waste in the Jharkhand it came out that the situation is no different from the other states in India. There is lack of proper awareness among the users about the hazardousness and toxicity of the EEE products resulting in e wastes. There is lack of proper regulatory and awareness (propaganda) mechanism in the areas and requires that the manufacturers / agencies the governmental agencies who owe the responsibility to protect the consumers / users setup cells throughout in general and in each district in particular. The principle of polluter's pays and extended producer responsibility should be strictly implemented. The green technology and appropriate technology for information technology industries and similar organizations be implemented so that minimum e waste is generated. The reuse and recycle capacity and tendency must be applauded and increasingly adopted. The educational establishments, hospitals government establishments and common users must be encouraged to store and collect the e wastes separately and safely handled. The extended producer responsibility, take back or exchange or buy back initiatives must be encouraged in order to hand over the nearing end of life product to safe hand for proper e waste handling. The bulky items are more responsible for volume and weight wise e waste generation. The mobiles and small EEE products are more in numbers but volume-wise and weight-wise e waste produce are less. The bulkier AC, Washing Machines, Computers etc contribute volume-wise and weight-wise more in the e waste generation. The common man / consumer / user houses the e waste due to lack of awareness in their possession. Lack of awareness of toxicity and hazardousness of the constitutes of the e wastes puts the user in vernable condition and they suffer most. The awareness, binding regulations and strict confirmation to them by the three potential groups i.e. Household users, Business organizations and entities and the Manufacturers / importers / exporters / agencies responsible for EEE production / distribution and buy back and liable for extended producer responsibility is must for dealing the e wastes in effective manner. The adherence to regulations laws and awareness in handling e wastes will relive from further getting environment deterioration.

The study of the present case summarily reveals that following:-  
Household e waste generation due to large scale is 11439.87 kg/year, for medium scale it is 1340.67 kg/year and for small scale it is 177.48 kg / year. Business organizations including offices generate e waste to the tune of 72271.8 kg/year, 6151.59 kg/year and 2580.86 kg/year for large scale, medium scale and small scale respectively. In case of Manufacturers , Importers / Exporters etc the e waste understandably is minimal i.e. almost non existable as the e waste chances are due to breakage during transportation etc only and there also chances of maximum utilization of components and constituents reuse is maximum.

The assemblers of the computers don't produce e wastes. They are mostly associated as dealer of the reputed companies for computers, laptops and printers.

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