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Future Forecasting Pollutants in Cell Phone Waste

Research Article

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Abstract

The use of mobile phones has rapidly increased. The e-waste generated by obsoleted electrical and electronic equipment is growing fast. The recycling, reuse and refurbish is an efficient way to control e-waste. The survey tried to focus on two sets of stakeholders, end mobile users and mobile shopkeepers. An objective of the survey was to understand the action taken on old mobiles by end users and mobile shopkeepers. Based on the survey result, the total number of scrapped, refurbished and recycled mobiles was estimated. The study shows that action taken against exchange mobiles, against old mobiles and those mobiles which are not working. The finding of the survey shows that the old mobiles are discarded every after two years. Most of the discarded mobiles go through the recycling or refurbishing process. Few of those mobiles go as a scrap. Sales data of past 8 years was collected through secondary research to understand the probable e-waste generated by the mobiles This paper has estimated the total number of refurbished, recycled and scrap mobiles and pollution caused by these mobiles if not recycled properly till year the 2026.

Keywords: Mobile phones; Refurbished; Recycled; E-waste

Introduction

In the earlier days, the disposal of electronic devices are mainly due to damages, but in today technology boom, damages are no longer the only reason for disposing of electronic devices, where technical worn out, new product features, better aesthetics, and emotional value are having strong influences to the disposal of the devices. International Data Corporation (IDC) is the world's leading technology media, events and Research Company. According to IDC India is one of the fastest growing smartphone markets in the world. In terms of individual vendor positions, Samsung leads the smartphone market in India. IDC publishes quarterly mobile sales data and the vendors in India. This data was used as a secondary data source for the mobile sales data in India. "Healthy stuff's" organization publishes data on toxic elements present in electronic devices (Table 1). This data on iPhone and Samsung Galaxy S3 was obtained from this site. Due to their hazardous material content, mobile waste may

Table 1

Mobile phone	Chemicals	Parts Per million (ppm)
Button/screen	Bromine	2 ppm
	Lead	5 ppm
	Mercury	4 ppm
	Chlorine	1139 ppm
Circuit board	Bromine	605 ppm
	Chorine	6727 ppm
	Lead	Not Detected
	Mercury	44 ppm
Processor	Bromine	50 PPM
	Chorine	Not detected
	Lead	Not detected
	Mercury	198 ppm
Case	Bromine	6 ppm
	Chorine	4160 ppm
	Lead	63 ppm
	Mercury	141 ppm

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cause environmental and health problem. On another hand, if mobiles are recycled properly then it contains high-value materials such as gold, silver, copper, aluminium, and plastic. A preliminary survey was done through questionnaire both online and personal interview for mobile users as well as mobile shopkeepers respectively. The survey was done in the suburban area in Mumbai. Approximate 200 mobile shopkeepers and 300 mobile users participated in this preliminary survey. This paper predicts the number of mobiles which can be refurbished, recycled and scrap till 2018.

Methodology

major objective of this study is:-

To investigate old mobile recycling, scrap, and refurbishing percentage

1. To find total number of mobile sales per year over multiple years
2. To analyze the replacement rate of mobiles and action taken on old mobiles.

Data is collected from different sources:-

Mobile sales data in millions from the year 2008 to 2016 in India (Figure 1)

This study was conducted through a survey questionnaire among mobile users and shopkeepers. Battery recycling and primary survey from mobile users and mobile shopkeepers. The questionnaire has mobile manufacturer name, model number etc. questions and was sent as a Google form to all users. The survey is done in Santacruz, Vileparle and Andheri area. 313 users responded to the survey.

Results and Discussion

Analysis of mobile information

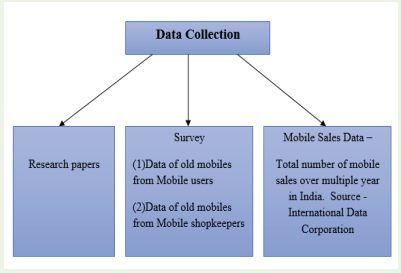
How often are mobiles change? (Figure 2)

Reasons for changing mobile (Figure 3)

Actions are taken on old mobiles by Mobile shops 64% shopkeepers send their mobiles for scrap, 26% refurbish and resale it, 10% of shopkeepers gives it to a recycling company (Figure 4).

Actions are taken on exchanged mobiles by mobile shops (Figure 5)

Actions are taken on not working mobiles by mobile shops (Figure 6).



Data:

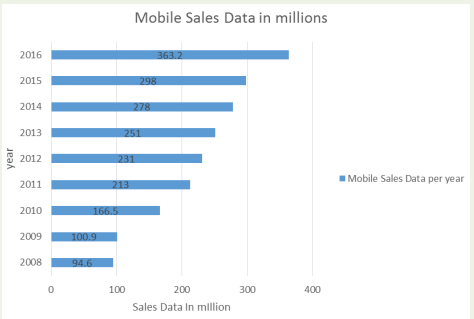


Figure 1:

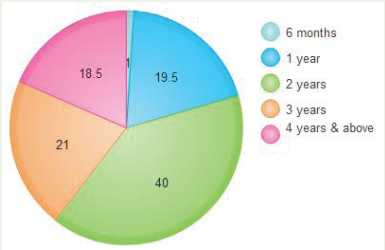


Figure 2: Pie chart showing how often mobile users change their mobiles.

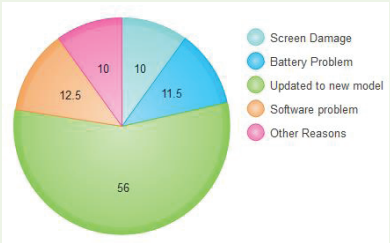


Figure 3: Pie Chart showing the reasons for changing the mobile.

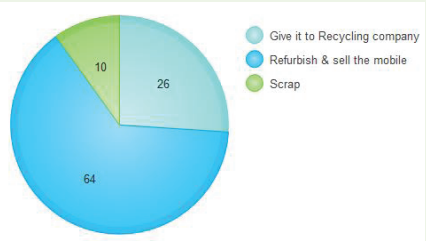


Figure 4: Pie Chart showing Actions taken by Mobile shops on old mobiles.

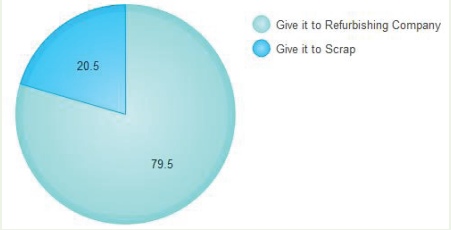


Figure 5: Pie Chart showing actions taken on exchanged mobiles by mobile shops.

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Analysis of old mobile data from mobile shop

The average was taken to find the percentage of recycling, refurbishing, and scrap. On an average the data of 16789 mobiles are

Collected from approximated 200 mobile shops in one month. The following is distribution for the refurbishing, recycling and scrapped mobiles.

It is inferred that the refurbishing, recycling, and scarp percentage is as follows (Table 2)

Prediction of pollutants based on the above data

After applying linear regression technique on scrapped data. The following is the total pollutant predicted till 2026 (Table 3).

Conclusion

Information shows that 40% of the users are changing their mobile every after two years. Moreover 56% of users which is more than the quarter wanted to change for upgrading new technology. 55 % of the mobiles are treated as scrap material. These results are discouraging. The 64% shopkeepers refurbish and sell the mobiles in the market. 53.5% mobiles will go for scrap. In India, the amount of mobile-waste generated is rising rapidly. With the increasing dependence on electronic and electrical equipment, the rise of E-waste generation is well expected in the country. However, the management of the same is a major challenged faced by the country. There is no large scale organized for the mobile waste recycling facility in India and the most of the recycling exists in the unorganized sector.

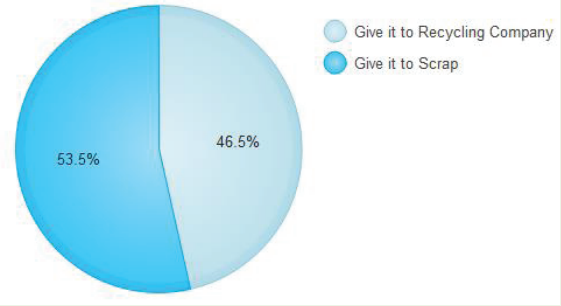

Figure 6: Pie Chart showing actions taken on not working mobiles by mobile shops.

Table 2: The refurbishing, recycling & scrap percentage.

Refurbishing percentage	Recycling percentage	Scrap percentage
Total no. of mobiles per month=5527	Total no. of mobiles per month=4968	Total no. of mobiles per month=6294
32.92%	29.59%	37.48%

Table 3: Prediction of refurbishing, recycling & scrapped percentage after applying regression analysis.

Year	Total Number of Scrapped Mobiles in Millions	Total Bromine PPM	Total Lead PPM	Total Mercury PPM	Total Chlorine PPM
2008	0	0	0	0	0
2009	0	0	0	0	0
2010	35.45608	23507.38104	2411.01344	13721.50296	426394.8181
2011	37.81732	25072.88316	2571.57776	14635.30284	454791.0903
2012	74.07634	49112.61444	5037.191224	28667.54417	890842.0833
2013	92.28186	61182.87434	6275.166599	35713.08049	1109781.669
2014	110.9647	73569.61707	7545.601751	42943.35114	1334461.863
2015	124.454	82512.99463	8462.871244	48163.6937	1496683.67
2016	140.724	93300.00514	9569.231296	54460.184	1692346.7
2017	152.6607	101214.013	10380.92441	58504.48623	1835897.015
2018	182.4537	120966.8014	12406.85142	69917.58342	2194188.165
2019	193.5607	128330.7222	13162.12536	74207.81181	2327760.582
2020	215.4034	142812.4311	14647.42883	82591.77073	2590440.87
2021	231.0984	153218.2098	15714.68818	88621.63492	2779188.824
2022	250.3238	165964.6793	17022.01839	95998.46932	3010394.017
2023	267.5254	177369.3526	18191.72847	102602.9593	3217260.685
2024	285.8893	189544.5813	19440.46988	109648.2483	3438104.276
2025	303.5869	201278.0907	20643.90674	116456.2225	3650935.624
2026	321.6671	213265.267	21873.36072	123392.0482	3868368.176

References

1. Ansari NL, Ashraf MM, Malik BT, Grunfeld H (2010) Green IT awareness and practices: results from a field study on mobile phone related e-waste in Bangladesh. IEEE Int Symp Technol Society, pp. 375-383.
2. Lee S (2012) Database management system as a cloud service. Database 5, no. 2.
3. Nagurney A, Toyasaki F (2005) Reverse supply chain management and electronic waste recycling: a multitiered network equilibrium framework for e-cycling. Transp Res Part E Logist Transp Rev 41: 1-28.
4. Terazono A, Murakami S, Abe N, Inanc B, Moriguchi Y, et al. (2006) Current status and research on e-waste issues in Asia. J Mater Cycles Waste Manag 8: 1-12.
5. Xu Z, Xue X (2008) Three-tiered e-waste recycling supply chains based on revenue sharing. Adv Manag Inf Globalized Enterprises.
6. Yuksel H (2009) An analytical hierarchy process decision model for e-waste collection center location selection. Comput Ind Eng, pp. 1684-1689.
7. Ari V (2016) A review of technology of metal recovery from electronic waste. In: Mihai F (Ed.), E-waste in transition - from pollution to resource. CBS Publishers & Distributors Pvt. Ltd, New Delhi, India. pp. 188.
8. (2000) Hazardous substance fact sheet. 01-06.
9. Chemical properties of copper-Health effects of copper-Environmental effects of copper. Lenntech.
10. Dvorsky G (2013) How to recognize the plastics that are hazardous to your health.
11. Gayle D (2012) Chemical breakdown: the toxic substances inside your mobile phone.

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