How E-waste is perceived in contemporary urban India: An in-depth analysis of publics' understandings and awareness

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What is Electronic Waste (E-waste)?

- Electronic waste (E-waste) or Waste Electrical and Electronic Equipment (WEEE) – Signifies discarded appliances that utilize electricity for their functioning.

- Growth rate of 3-13% per year: One of the fastest growing toxic waste streams in the world (Wibowo and Deng 2015).

- According to the United Nations University (UNU, 2017):
  - 44.7 million tonnes of E-waste generated in 2016.

  - It is “equal in weight to almost nine Great Pyramids of Giza, 4,500 Eiffel Towers, or is enough to form a line 28,160 km long, the distance from New York to Bangkok and back”.

Definitions: European Union and Indian

1. Large household appliances
2. Small household appliances
3. IT and telecommunications equipment
4. Consumer equipment

} **Indian Definition**

5. Lighting equipment
6. Electrical and electronic tools (with the exception of large-scale stationary industrial tools)
7. Toys, leisure and sports equipment
8. Medical devices (with the exception of all implanted and infected products)
9. Monitoring and control instruments
10. Automatic dispensers

E-waste in India: An Overview

- India: One of the largest generators.
- Domestically produces 2 million tonnes of E-waste annually (ASSOCHAM 2018).
- Another 50,000 tonnes imported every year (Agoramoorthy and Chakraborty 2012).

- A joint report by United Nations Environment Programme (UNEP) and United Nations University (UNU) predicts:

➢ By the year 2020, a growth of 500 % would be observed in India with respect to E-waste from old computers than its 2007's level.

➢ During the same time, an overwhelming 18 times increase in E-waste production would be observed from discarded mobile phones in India respectively (Lu, Zhang et al. 2015).

E-waste Generation in 2014

Continent	Country	Kg/Inhabitant	Kilo Tonnes
Asia	China	4.4.	6033
	Japan	17.3	2200
	Korea	15.9	804
	Taiwan	18.6	438
	Thailand	6.4	419
	Vietnam	1.3	116
	Philippines	1.3	127
	India	**1.3**	**1641**
Europe	**Switzerland**	**26.3**	**213**
	Spain	17.7	817
	Germany	21.6	1769
	The United Kingdom	23.5	1511
Africa	Nigeria	1.3	219
	Ghana	1.4	38
North America	The United States	22.1	7072
	Canada	20.4	725
South America	Brazil	7.0	1412
	Mexico	8.2	958
Australia	Australia	20	468

Source: Baldé, Wang et al. 2014

Researches on E-waste

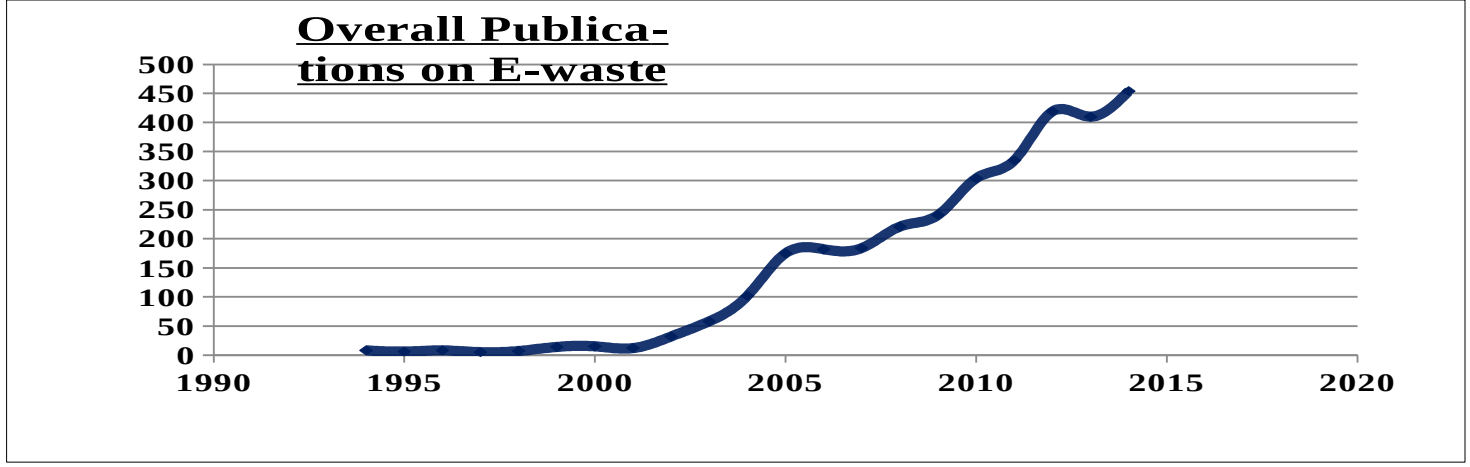
- During the last decade, researches on E-waste has experienced a considerable growth with the trend appears to continue in the near future.

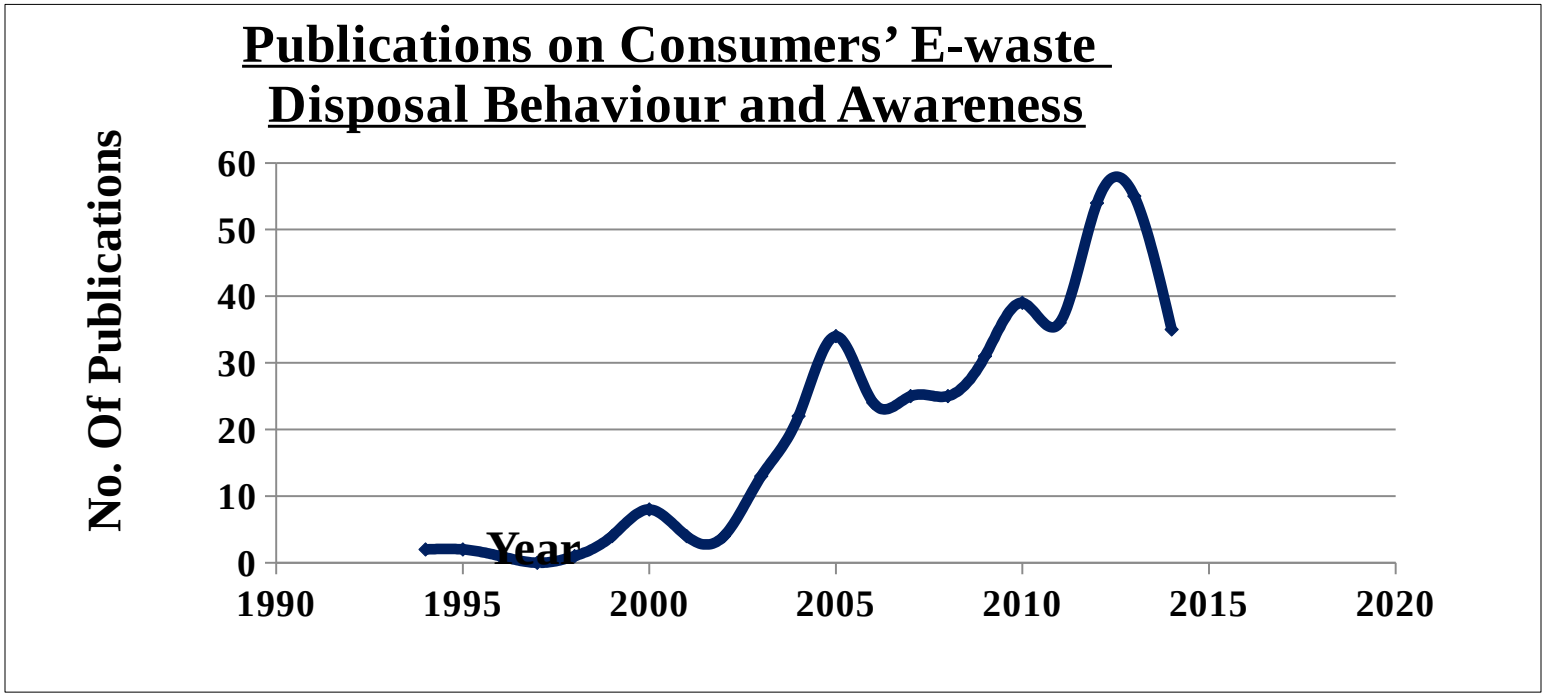
- Most of these studies focus on recycling of E-waste, chemical analysis and pollution studies, microbiological studies, lifecycle assessment, health impact studies of E-waste constituents and so on.

- Lack of studies on public perception, awareness and disposal behaviour of E-waste and how socio-cultural factors shape the consumption and disposal pattern of EEEs.

- Out of the total 3192 published papers on E-waste from 1994 to 2014, only 52 papers (i.e. a mere 1.6%) are found to have dealt with consumers' E-waste awareness/disposal behaviour in diverse countries.

A Bibliometric Analysis of E-waste Literature





Scopus 2015

Resources, Conservation and Recycling 117 (2017) 102–113

Contents lists available at ScienceDirect

Resources, Conservation and Recycling

journal homepage: www.elsevier.com/locate/resconrec

Review

Emerging trends in consumers' E-waste disposal behaviour and awareness: A worldwide overview with special focus on India

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ARTICLE INFO

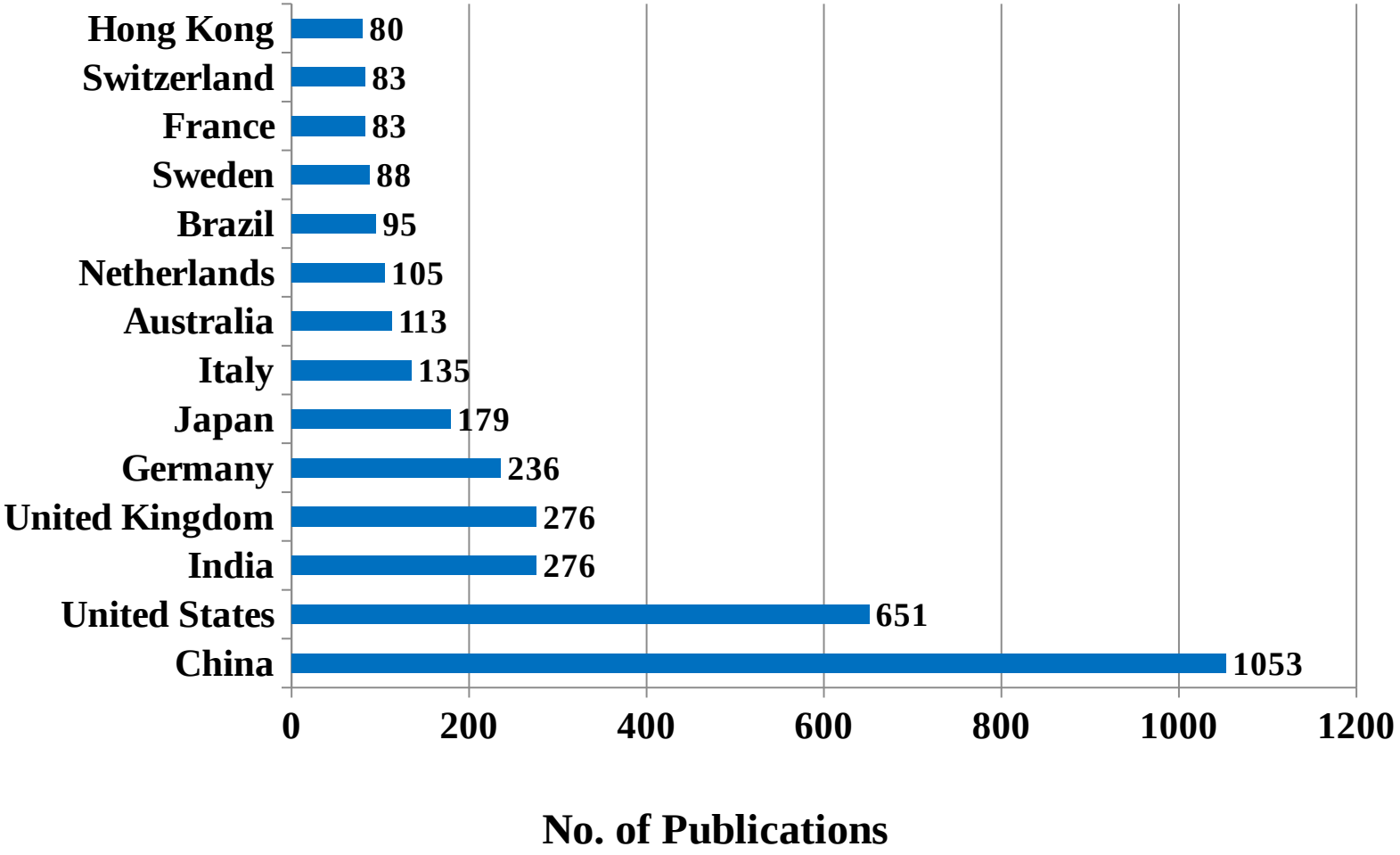
Article history:
Received 24 December 2015
Received in revised form 9 November 2016
Accepted 9 November 2016
Available online 19 November 2016

Keywords:
E-waste
Consumers' disposal behaviour
Awareness
India
Global E-waste

ABSTRACT

E-waste is a complex stream of toxic waste which requires specific handling considerations. Effective and responsible management of E-waste is a global concern today. Considering the depth of the E-waste problem, this paper is an attempt to review two key elements greatly accountable for influencing sustainable E-waste management initiatives: Consumers' E-waste 1) 'Disposal Behaviour' and 2) 'Awareness'. Taking into account the locale specific characteristics of consumers' E-waste disposal behaviour and awareness, we have attempted to perform an extensive review on the global context and identify the measures adopted by the consumers of different countries to dispose off their E-waste. We observe significant differences in consumers' E-waste disposal behaviour not only 'between' the developed and developing countries, but also 'within' these countries. The paper further especially explains the complexities in India's E-waste management system due to its multifaceted socio-economic, cultural and other associated connotations influencing consumers' disposal behaviour and awareness. We conclude that global experiences on consumers' E-waste disposal behaviour and awareness could be helpful for a particular country to devise inclusive E-waste management strategies to adequately address their current E-waste crisis.

Country-wise Distribution of E-waste Research from 1985 to 2016



Source: Scopus 2016

Methodology

- Both structured online questionnaire survey (using the online survey portal ‘Survey Monkey’) and semi-structured informal face-to-face interviews were carried out.
- The study was essentially qualitative.
- Obsolete mobile phones (especially smartphones) and computers were primarily considered as a representative of E-waste.
- First we identified the key informants and through them, we approached other consumers who participated in our study and provided relevant information. It was a kind of respondent-driven snowball sampling.

The questionnaire was structured into five main parts:

1. Ownership of EEEs;
2. Obsolescence rate of EEEs;
3. Disposal behaviour of E-waste;
4. Awareness on E-waste; and
5. Demographic information of the respondents.

Ownership of EEEs

- During1993 and 2000, India has observed a growth of 604% in the ownership of PC as compared to the world average of 181% (Sinha-Khetriwal, Kraeuchi et al. 2005).
- Mobile phones observed a similar growth with India being one of the largest market for smartphones today.

- *In-use* mobile phones=2, Computers=1
- *Out-of-use* mobile phone= 2 to 5, Computers=0 to 1.

Time for replacement of EEEs

Years	Mobile Phones (%)	Computers (%)
1-2	20.3	0
2-3	46.4	11.2
3-4	33.3	88.8
Above 4	0	0
Total	100	100

Major reasons for replacement of EEEs

	Reasons	Responses (%)*
1.	The old one has become non functional	48.3
2.	The old one cannot be repaired	34
3.	Considering the cost of repair, it is wiser to buy a new one than repairing the old one	68.1
4.	The latest models have attractive novel features	53.8
5.	Carrying the latest model will increase my status in the society	2.2
6.	All my colleagues/friends are buying the latest models, so do I	1.1

Methods of disposal

E-waste Disposal Behaviours

	Disposal Behaviour	Response Rate (%)*
1.	I keep them stored at home	59.3
2.	I give them e.g. to my children/relatives	32.6
3.	I sell them to the scrap dealers or 'kawariwalas' at certain price	19.8
4.	I leave them at the store when buying a new one	22.1
5.	I take them to the recycling centre	9.3
6.	I dispose them with mixed waste	2.3

- A maximum of 59.3% respondents mentioned that they keep their obsolete EEEs at home : Compliments the study by Ramachandra and Varghese (2004) in Bangalore.

- 32.6% respondents give their obsolete EEEs to others for subsequent use: Corresponds to a major Indian socio-cultural characteristic.

–“ I had a Nikon Camera. After 2 years of use, it developed a crack at the place which holds the batteries. The crack is very very tiny. But due to this minute crack, the camera could no longer hold the batteries. I went to an authorized repairing shop by Nikon. The shop said that they would charge me INR 2600 for the repair. During the same time, some offers on electronics were going on in Amazon (the online shopping site). I checked for a camera in their site and purchased a camera for INR 3000. By spending INR 400 more, I got a new camera with a higher resolution than the previous one”.

–“I do not want to discard my laptop or desktop after using them only for a few years. However, new and modified versions of some softwares that I regularly use are launched every few months. […] Many a times, the older hardwares are not compatible with the new softwares. Therefore, in order to maintain uninterrupted services, my company and I have to discard our older electronics and buy new ones. […] We work in groups where we need to interact with our team members and clients who are based in different parts of the world. […] Therefore, it is always better to purchase a new computer altogether which guarantees at least a few years of uninterrupted services. Most of the time, it is also financially gainful”.

– “I know that this phone stopped working properly and I recently have purchased a new one. I also know that my older phone is a kind of ‘waste’ now. But I was gifted that phone by my mother who is no more with us. I remember the occasion when she gifted me this phone. It was my 21st birthday and I had just graduated with good marks from my college. Even if I don’t use the phone now, it is and will remain precious to me”.

– “Currently I have a HTC mobile phone. My son insisted me to purchase it a few months back. Previously I used a Google Nexus which I purchased for INR 28000. Now although I don’t use that anymore, I don’t feel like discarding it off. I inquired about its price in a secondhand market through my driver. The shopkeepers told that I shall get a maximum of INR 3000 for the mobile. The mobile is only three years old and working almost perfect. Moreover, how can you sell a phone so cheap when you originally purchased it so expensive? I don’t mind laying it unused in my house. But I am not going to sell it so cheap or donating such a costly phone to someone for use”.

Conclusions

- The demand for electrical and electronic equipments in India is increasing: Generation of E-waste in India is rising rapidly.
- Per capita generation is low, but absolute volume is high.
- E-waste management system in India is dominated by the informal sector : Integration of the informal sector with the formal sector could be a viable management option.
- Obsolete EEEs are considered valuables with some intrinsic values : Causes reluctance to dispose it off immediately.
- Local Specific Management Strategy.

Energ. Ecol. Environ. (2017) 2(4):225–235
DOI 10.1007/s40974-017-0060-0

VIEW POINT

How well are we managing E-waste in India: evidences from the city of Bangalore

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Received: 15 January 2017 / Revised: 17 May 2017 / Accepted: 26 May 2017 / Published online: 28 June 2017

Abstract As a toxic waste stream, E-waste poses serious challenges to the waste management initiatives in India. While the hazardous components of E-waste call for environment-friendly disposal mechanisms, the valuable and precious metal constituents necessitate adequate infrastructural provisions and responsible management programmes to avoid the loss of economically vital materials. Considering this duality, this paper is an attempt to evaluate the current E-waste disposal practices in India, particularly emphasizing on the city of Bangalore. Three argue that ensuring responsible disposal behaviour is central in any successful E-waste management initiative. Further, we emphasize on the relative disinterestedness of the research community in addressing the issues concerning E-waste in India by carrying out a detailed bibliometric analysis on the topic. We conclude that a transparent system across these diverse sectors with adequate infrastructural provisions and administrative controls is the key to address India's E-waste apprehensions.

Generation and Management of Electronic Waste in the City of Pune, India

Bulletin of Science, Technology & Society
2014, Vol. 34(1-2) 43–52

DOI: 10.1177/0270467614541242
bst.sagepub.com
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Abstract

Electronic waste (E-waste) illustrates discarded appliances that utilize electricity for their functioning. It is one of the fastest growing waste streams across the globe. A study on the generation and management of E-waste was conducted in the city of Pune, India, involving four different stakeholders, namely, the information technology (IT) sector, banking sector, educational institutes, and households. All these stakeholders are listed by the Indian Ministry of Environment and Forest as major contributors to the problem of E-waste in the country. Semistructured interviews were carried out at 4 IT companies, 10 banks, 16 educational institutes, and 50 households. Results show that the generation of E-waste with respect to computer waste is highest at the IT sector, followed by the banking sector. Apart from a few exceptions, rudimentary management practices were prevalent among the stakeholders. There is a lack of awareness on concerns related to E-waste. Establishing sustainable E-waste management practices, formulation and implementation of appropriate policy initiatives, transparency in the system, and educating people on their responsibility toward global E-waste problem are essential in order to address the emerging concern of E-waste in India.

Keywords

e-waste, stakeholders, generation, management, IT sector, banking sector, educational institutes, households

Journal of Cleaner Production 172 (2018) 1053–1066

Contents lists available at ScienceDirect

Journal of Cleaner Production

journal homepage: www.elsevier.com/locate/jclepro

Review

Public understandings of E-waste and its disposal in urban India: From a review towards a conceptual framework

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ARTICLE INFO

Article history:
Received 1 April 2017
Received in revised form
15 September 2017
Accepted 19 October 2017
Available online 25 October 2017

Keywords:
E-Waste
Theory of planned behaviour
Conspicuous consumption
Public understandings of E-waste
Urban India

ABSTRACT

Responsible management of electronic waste (E-waste) is a major apprehension in contemporary urban India. As a toxic waste stream, E-waste calls for conscientious management practices in order to avoid possible human health and environmental consequences. Publics' consumption, disposal behaviour and awareness/perception are central to any successful E-waste management initiative. This paper is a journey from a review of existing literature on some significant aspects of E-waste (including some widely used conceptual frameworks for waste management studies) towards a new conceptual framework of 'public understandings of E-waste and its disposal' in urban India. Accordingly, the paper is divided into two parts: 1) In-depth literature review on a few important aspects of E-waste and 2) Review of publics' perceptions of E-waste and the determinants of their consumption and disposal intention with the help of specific theoretical underpinnings. The concluding conceptual framework underlying our work uses elements that stem from the ideas of the theory of planned behaviour (TPB) and conspicuous consumption. Further, a case study carried out in the city of Bangalore is considered to validate the relevance of the new conceptual framework. Thus, the paper is an attempt not to restrict ourselves to the review of the existing literature alone, but also to test the new conceptual framework formulated through the literature review against a primary field study.

Thank You...