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Informal Sector E-waste Recycling Practices in Bangladesh

Sarwar Uddin Ahmed, PhD

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About D.Net

D.Net (Development Research Network) is a not-for-profit research institution in Bangladesh, established in 2001. D.Net's vision is a society where information and knowledge facilitates all stakeholders' participation in generation of wealth and its equitable distribution for poverty alleviation. Its mission is to become a premier organisation in Bangladesh and beyond by undertaking research and various action programmes in the areas, where information and knowledge can contribute to poverty alleviation, economic growth and peace.

During initial years of activities, D.Net's main focus was research on Information and Communication Technology (ICT) for poverty alleviation. D.Net's in-depth research in the area of ICTs for poverty alleviation has drawn attention of stakeholders not only in Bangladesh, but also across the globe.

Under its Mission 2010, D.Net's five year strategic plan, D.Net conducts research and implements important action programmes primarily in six thematic areas:

- Access to Information and Knowledge
- Enhancing Business Competitiveness for Economic Growth
- Governance and Human Rights
- Human Resource Development
- Institutional Capacity Development
- Economic and Development Policy Research

D.Net also undertakes policy influencing activities, for bringing burning issues before the policy makers and stakeholders to create awareness and to take proper actions.

D.Net has started to play a visible role in the research arena within the national boundary and in South Asia through involvement with BRAC, SAPANA, CENTAD, Sarvodoya, APC, IDS and ICRIER. It has also gone beyond South Asia through telecentre.org, Canada; ICTSD, Switzerland; IKED, Sweden; ADB Institute, Japan; and ELDIS, UK. D.Net is a member of Global Knowledge Partnership (GKP), One World South Asia, and PANAsia Network of IDRC.

D.Net received the Gender & ICT Award at 2005 for its innovation to linking new ICT tools for improving access to livelihood information by the poor people, particularly women and the handicapped, through the introduction of the “mobile lady”. D.Net also received Manthan Award at 2008 and 2009 for its contribution on e-Content development and e-Education sector.

About the Toxics Link

Toxics Link is an environmental NGO, dedicated to bringing toxics related information into the public domain, both relating to struggles and problems at the grassroots as well as global information to the local levels. Toxics Link work with other groups around the country as well as internationally in an understanding that this will help bring the experience of the ground to the fore, and lead to a more meaningful articulation of issues. The areas of engagements include communities and urban waste, toxics free healthcare, hazardous wastes and pesticides. Working in networks, utilising community outreach and education, policy analysis, research, training and programme development. Toxics Link work at the state and central levels to help create solutions, which are driven by the needs of people. Toxics Link also involved in a wider range of environmental issues in Delhi and outside as part of a coalition of non-governmental organizations.

About the Series

The objective of the research paper series is to bring important issues to the readers on various topics of public domain, based on the findings, observations and insights revealed from D.Net's in house research activities and action programmes.

This study aimed at examining the current practice of recycling e-waste in the informal sectors of Bangladesh and identifying the problems towards development of a system of hazard-free e-waste recycling in the country. It was based on both primary and secondary data sources. Sample comprised of owners and workers of recycle shops located in different parts of Dhaka and Chittagong. Structured questionnaires were used for the recycle shop owners and workers to collect the information used in the study.

Findings of the study on the informal recycling sector revealed that, the main source of e-waste is personal computers in Dhaka and ship breakage electronic products in Chittagong. Salient features of these recycling markets include inefficient recycling process, low wages, ignorance regarding hazards of e-waste, higher profit extraction and no government control or monitoring. Recommendations such as, mass scale awareness program, development of legislation and infrastructure for hazard-free recycling, organising and extending producer responsibility, and providing incentives, were provided to develop the e-waste handling capacity of the country. Finally by recognizing the limitations of the study, a follow up study with large sample size was suggested.

D.Net believes that this publication will meet the demand of policy makers, researchers, academics and activists for analysis on the mentioned topic. Readers are most welcome to send their queries, comments, criticism and suggestions for further improvement of D.Net's publications.

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List of Abbreviations:

BDT	Bangladesh Taka
BEMMA	Bangladesh Electric Manufacturer and Merchandiser Association
CVM	Contingent Valuation Method
DCC	Dhaka City Corporation
E-waste	Electronic Waste
MA	Market Supply Method A
MB	Market Supply Method B
MoEF	Ministry of Environment and Forests
PC	Personal Computer
PPP	Public-private partnership
PRO	Producer Responsibility Organization
SVDR	Simplified Voice Data Recorder
WEEE	Waste from Electrical and Electronic Equipment
WTP	Willingness to pay

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Informal Sector E-waste Recycling Practices in Bangladesh

1. Introduction

In the current era of digital revolution we can see and feel the presence of electronics goods everywhere around us. The exponential growth in the field of telecommunication and information technology is leading towards the development of new electronic appliances. These new electronic gadgets include computers, cell phones, televisions, refrigerators, photocopiers, washing machines, air conditioners, DVD players and other consumer durables. With the development of new technology electronic products are becoming cheaper, fancier, faster, and easier to use. However, they also get obsolete very fast. Consumers in some cases find it comparatively cheaper and convenient to buy new devices than repairing the older ones. The wastes generated form these obsolete items are termed as electronic waste (E-waste) or WEEE (Waste from Electrical and Electronic Equipment) and contain more than 1,000 different toxic materials. For example, chemicals such as lead, mercury, copper found in computer screens and TVs and beryllium in motherboards are poisonous and can lead to fatal diseases like cancer, kidney failures, thyroid hormone disruption and damage the environment through soil and water pollution (Sinha et al. 2007).

Commensurate to the global trend, in Bangladesh also the market for electronic goods is having exponential growth due to the rising disposable income and increasing demand for the latest electronic gadgets. A large proportion of waste generation in our country comprises e-waste. In Bangladesh, generally e-waste includes PCs, televisions, telephones, cell phones, air conditioners, electronic toys, washing machines, etc. But in addition to this, junk electronic products such as auto pilot, navtex, printer, SVDR, lights, radio, horn, compass etc. generated from ship breakage industry also constitutes a significant quantity of e-waste in Bangladesh.

Fig 1. Location of Dhaka and Chittagong

According to BEMMA, Bangladesh consumes around 3.2 million tonnes of electronic products each year. Of this amount, only 20 to 30 per cent is recycled and the rest is released in to landfills, rivers, ponds, drains, lakes, channels and open spaces, which are very hazardous for the health and environment of the country. Presently, there is no specific law or ordinance for e-waste management and recycling in Bangladesh. Also there is no formal plant to recycle e-waste in a hazard-free manner. Most of these electronic products are recycled by the informal sector located mainly in Dhaka and Chittagong (see Fig. 1 for the location).

On this background, this study below aims at assessing the current practice of recycling e-waste in the informal sector in Bangladesh. The results of the study would provide us important insight into the growing concern of e-waste and would help us to gather input for designing policy measure to recycle e-wastes in a hazard-free manner.

1.1 Objective

The main objective of this project is to identify the current e-waste recycling process in Bangladesh. The more specific objectives of the study are

- To detect the sources of e-waste in Bangladesh
- To identify the e-waste hotspots in Dhaka and Chittagong
- To map the present e-waste recycling process in the informal sector
- To understand the awareness level regarding e-waste in the informal sector.
- To identify the problems and provide recommendations

1.2 Methodology

This study used both primary and secondary information sources. In order to have an idea about the current status of e-waste recycling in the informal sector, existing literature were reviewed. In addition to this a primary survey has been conducted in Dhaka and Chittagong with structured questionnaires to collect information from recycle shop owners and workers regarding the recycling process (see Appendix A for questionnaires). However the scope of the study was limited to Dhaka and Chittagong. The interviewers surveyed two shops at each spot and closely observed rest of the shops to infer on the entire spot.

1.3 Organization

This study is organized into five chapters. Chapter one presents the overall background of the study and includes introduction, objective, and methodology of the study. Current status of e-waste in Bangladesh is presented through the second chapter, which also includes the awareness level. Chapter three provides the informal sector e-waste recycling practice in Dhaka. Chapter four discusses the same for Chittagong. Finally, chapter five presents recommendation and limitations of the study. Some suggestions are also provided at the end of the report for conducting future studies.

2. Current Status of E-waste

2.1 Quantity of e-waste

According to an estimate, more than 500 thousand computers were in use in 2004 and this number has been growing at 11.4 per cent annually (Hossain, 2004). Even if the figure of 500 thousand were taken as the baseline, that many PCs would contain approximately 15,323 tonnes of waste (@ 27.2 kg/PC for 5 year obsolescence) in 2010 containing deadly plastics, lead, mercury etc. The quantity of e-waste (PC and Cell phone) to be generated has been estimated by following two methods suggested in (Sinha et al. 2007). The first method, Market Supply Method A, (MA) assumes that the average lifetime of an electronic product is approximately five years and after that these are discarded and come to the waste stream. The second method, Market Supply Method B (MB) assumes that all the products are not disposed at the same time, rather they are disposed in varying quantities over successive years. Here weighted average method is used to show the product disposal trend. For PCs the growth rate is considered to be 11.4 per cent (Hossain, 2004) and for cell phones a 100% growth rate is considered annually (Pervez et al. 2007). The quantity of e-waste to be generated from these two types of electronic products is shown in Table 1 (see appendix A for details).

Table 1: Estimation of Pc and Cell Phone Waste in Dhaka

Year	Personal Computers Weight (in tons)			Cell Phone Weight (in tons)		
	M A	M B	Average	M A	M B	Average
2010	16,701	13,945	15,323	2,567	2,824	2,696
2011	18,251	16,701	17,476	5,135	5,135	5,135
2012	19,802	16,116	17,959	7,702	7,702	7,702

Note: 1. Weight of PCs is derived 27.2 kg/PC (Sinha et al. 2007).
2. Weight of cell phones derived 0.079kg/Cell phone (Pervez et al. 2007)

2.2 Public awareness

A public awareness survey was conducted by Ahmed (2010) to assess awareness level of the residents of Dhaka regarding e-waste. In this study contingent valuation method (CVM) was used to quantify the potential benefits to be generated from this system[1]. The survey covered 200 households randomly chosen from 90 wards of Dhaka city of which 185 questionnaire were found complete and useable for the purpose of the analysis. The findings of the survey were first of its kind and shed some light on the public awareness. Hence some excerpts of the findings of this study are presented below:

2.2.1 Knowledge and Attitude of the Respondents Regarding E-waste Management

Regarding the familiarity of the respondents about various toxic materials extracted during decomposition of e-waste, only 17%, 11%, 10%, 19% and 6% of the respondents reported that they know well about lead, mercury, copper, flame retardant plastic and cadmium, respectively (see Fig. 2). Hence it can be concluded that, knowledge level of the householders are not that much strong regarding these toxic materials.

When respondents were asked whether they support to have a hazard free e-waste management system for Dhaka city, approximately 98% of the respondents commented that they support it (see Fig. 3). Also 95 percent of the respondents commented that the e-waste disposal practice of Dhaka city was unsafe (see Fig. 4). It indicates that people are becoming aware of the perils of indiscriminate disposal of electronic goods.

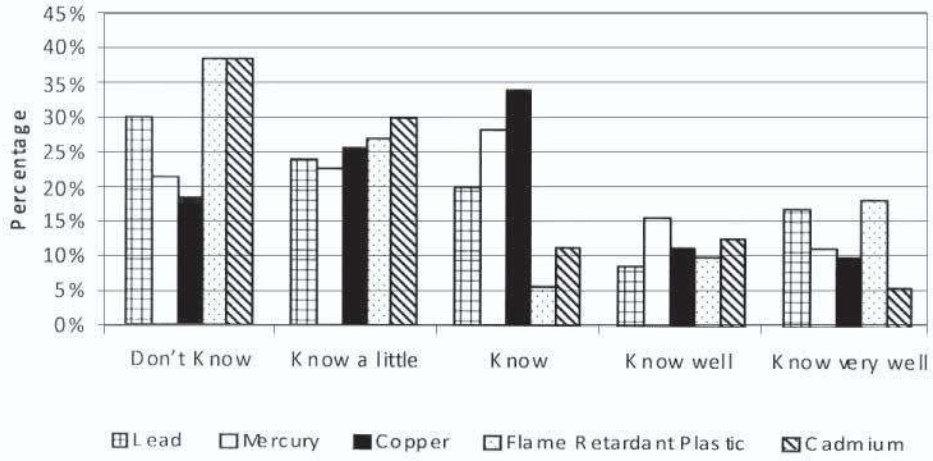

Fig. 2. Familiar ity with the hazardous items found on e-waste

Fig. 3 Support for e-waste management system

1. Widely known as contingent valuation, the technique uses economic theory and the methods of survey research to elicit directly from the consumers the values they place on public goods (Mitchell and Carson, 1989; Bateman and Willis, 1999)

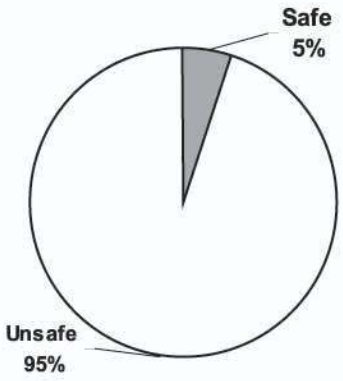

Fig. 4 Safety of current e-waste disposal system

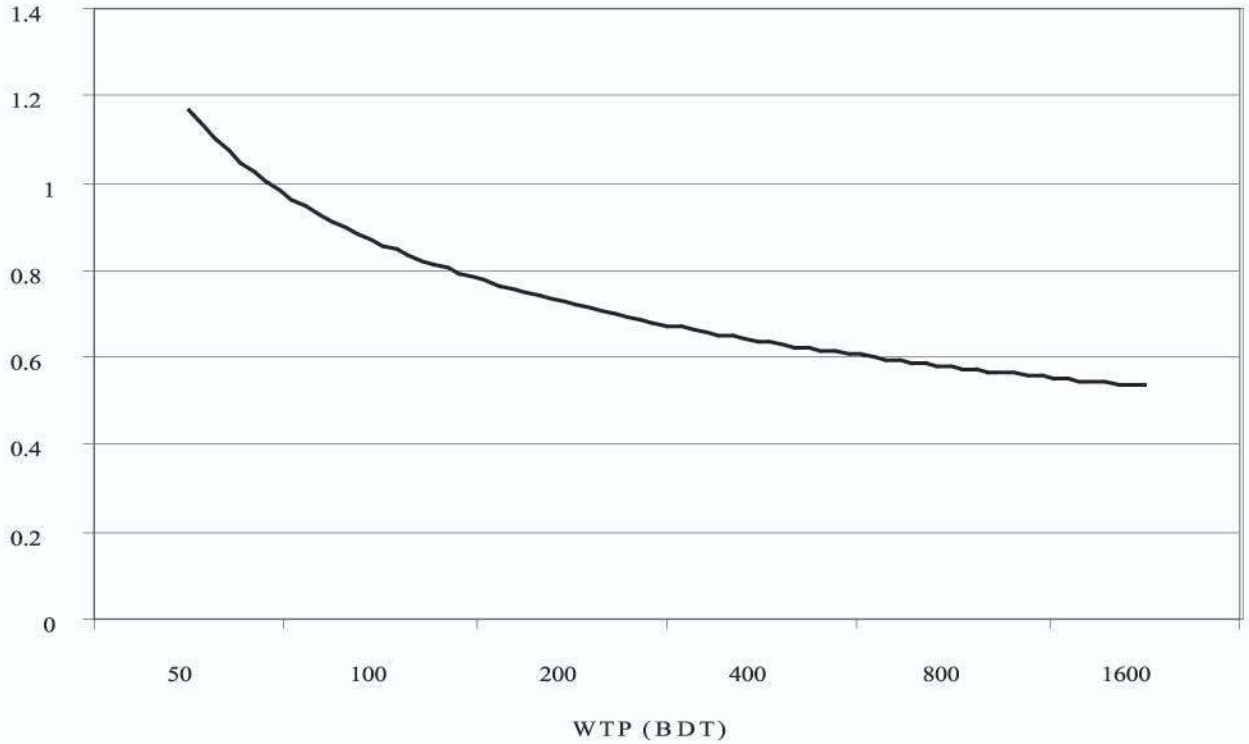

Fig. 5 Percentage of respondents WTP

2.2.2 Willingness to Pay (WTP)

In this study it was attempted to estimate the willingness to pay (WTP) for introducing hazard-free e-waste management system. Accordingly, the question asked to elicit the respondent's willingness to pay (WTP) was: Suppose we are going to create a fund named "Hazard-free E-waste Management Fund" to ensure safe management of e-waste in Dhaka city. Would you be willing to contribute BDT 100 (1USD is approximately 70 Bangladesh Taka) to this fund only once, to protect the environment? The amount of the first bid was assigned randomly ranging from BDT100 to BDT 800. This was followed by a follow-up question where the amount is increased (maximum BDT 1600) or decreased, depending on whether the respondent's initial answer was positive or negative, respectively. The questionnaires were divided into four versions or groups with different amounts of starting bid value under double-bounded dichotomous-choice elicitation method and were interviewed on January 2010.

The mean WTP found through this process was BDT 1,017 (USD 14.53) (see Fig.5). The amount found on this study is high compared to other studies (Afroz et al. 2009; Ahmed and Gotoh 2006). However, this implies the extent of importance of the hazard-free e-waste management system to the residents of Dhaka. From the economic point of view, it can be said that the utility function of the residents of the Dhaka would increase by this amount of total WTP, if hazard-free e-waste management system is implemented.

The total number of household in DCC (Dhaka City Corporation) was 1,112,000 (BSS, 2008). If we multiply the mean WTP by the number of households, the aggregate value of the WTP of the respondents in Dhaka would be (BDT1,017 X 1,112,000) BDT 1.13 billion (USD 16.16 million).

2.2.3 Summary

The results lead to the following observations and policy implications:

a. The respondents though reported low level of knowledge on hazardous items found in e-waste, they showed a very positive attitude towards (98 percent support) development of hazard free e-waste management system.

b. The aggregate value of the WTP of the respondents was BDT 1.13 billion (USD 16.16 million). This can be used as a benchmark to set environmental conservation tax and added with the price of the electronic goods.

c. A key policy implication drawn from the findings of the study is that the concerned authorities should seriously think about establishing hazard-free recycling and disposal centers for e-waste. Obviously the setting and running of such centers will involve cost. However, the extent of concern and willingness to pay shown by the respondents of the study indicate that they would even be willing to bear this cost in a reasonable structure.

2.3 Legislation

Bangladesh is a signatory to The Basel Convention on Trans-boundary Movements of Hazardous Waste. Currently there is no specific regulation dealing with e-waste management. However Ministry of Environment and Forests (Moef) is in the process of formulating the rules on handling of e-waste.

3. E-waste recycling in Dhaka

With the rapid update of technological product, large amount of electronic goods are becoming obsolete and are disposed of in a short period of time. The equipments that are disposed of by the various offices and personal users go to people involved in different tiers in recycling those things. In Dhaka very commonly it is known as the vangari shops which are involved in the business of these wastes.

3.1 E-waste hotspots

Nimtali, in chankhar pool, is the largest computer vangari spot in Dhaka. There are few Vangari spots in other places beside Nimtali of Dhaka these are Dolai Khal, Elephant road, Kazipara, Shewrapara, Mohammadpur, Mirpur, Gulshan 1, 2 but the number of shops there sticks to 2-4 (see Fig. 7 for the location). The main spots are:

- Nimtali
- Dolai Khal
- Elephant Road

3.2 Recycling flow

The recycling flow of the informal sector in Dhaka is shown by Fig. 6. Vangari shops buy pc parts from various organizations through auction. They also buy from hawkers, personal users, retail shops (old parts) and internal buying among the vangari shops. According to the shop owners there are 200-250 purchasing agents of these types of products who bring pc parts as wastage to them.

After purchasing a waste product they first run a check to see whether the product is functioning or not. If the product is functioning then they sell it to a purchaser who looks for second hand parts. Otherwise they break the product into pieces to separate iron, lead, copper, silver, plastic etc. and sell this to a purchaser of these things. They disassemble these products without any protection which can be injurious to their health and surrounding environment.

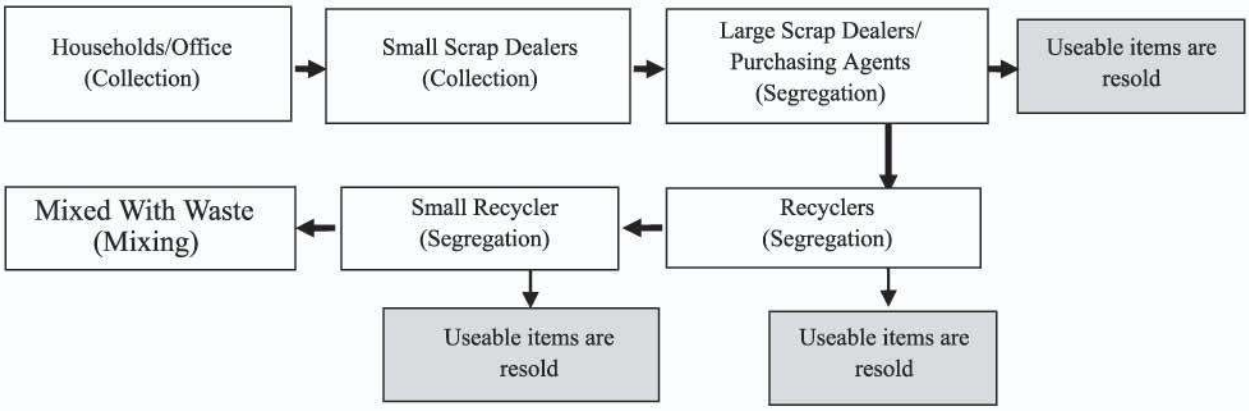

Fig 6. Informal Sector Recycling Process in Dhaka

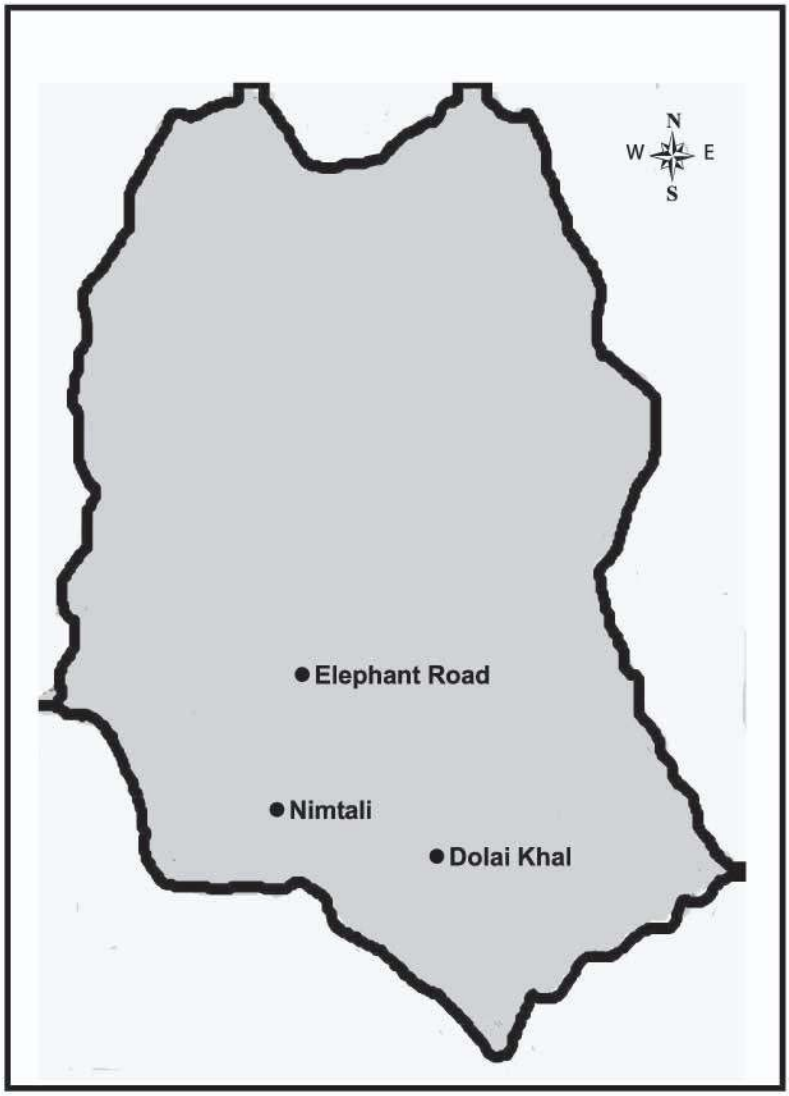

Fig 7 Major e-waste hotspots in Dhaka