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e-WASTE GENERATION AND MANAGEMENT IN UGANDA

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ABSTRACT

Difficulty of access to hardware and software to leverage the benefits of ICT is particularly acute for small and medium enterprises (SMEs) in less developed countries. Within the framework of the partnership agreement that was signed in July 2006, UNIDO and Microsoft plan to make secondary PCs available to SMEs in developing economies in a safe and sustainable way. As part of this initiative it is intended to support the establishment of local sustainable e-waste material recovery facilities (MRF). Hence with support of the Swiss Institute of Materials Science and Technology (Empa) and the Uganda Cleaner Production Centre an e-waste assessment study with emphasis on personal computers was carried out in Uganda. The study aims to provide the necessary data to define a solution for handling e-waste associated with the UNIDO/Microsoft refurbishment project in Kampala and to provide general data about the e-waste situation in Uganda. There are no specific mechanisms in place to deal effectively with e-waste, although some recent development in Ugandan legislation can be read as having a bearing on e-waste. The assessment indicates that in 2007 around 300,000 PCs were installed in Uganda, of which 75% in governmental, educational and non-governmental organizations. It was estimated that around 15% of imports enter the country as second-hand computers. In 2007 up to 50,000 PC units might have reached their end-of-life. However, only a small portion seems to appear in the waste stream. A few tons of computer waste could be tracked back to informal waste pickers from landfill sites and formal and informal refurbishment businesses in Kampala. This finding suggests that most of the e-waste in Uganda is still in storage, yet this situation could change soon. Although unproblematic fractions from computer waste, such as plastic and metal could be recovered in existing recycling facilities in Uganda, especially hazardous fractions, such as leaded CRT glass and PCB containing capacitors need new solutions. Therefore infrastructure and mechanisms to handle this waste stream should be in
place soon. An MRF as intended by the UNIDO / Microsoft initiative could be part of this solution and serve as a model for other refurbishment centres.

KEYWORDS

Personal Computers, Refurbishment, e-Waste, Massflows, Recycling, Uganda

INTRODUCTION

Within the framework of the partnership agreement that was signed in July 2006, UNIDO and Microsoft plan to make secondary PCs available to small and medium sized enterprises (SMEs) in developing economies in a safe and sustainable way. As part of this initiative it is intended to support the establishment of local sustainable e-waste recycling facilities.

Hence with support of the Swiss Institute of Materials Science and Technology (Empa) and the Uganda Cleaner Production Centre an e-waste assessment study with emphasis on personal computers was carried out in Uganda. The study’s objectives are to provide a situational analysis with respect to the generation and management of electronic waste in Uganda. It aims:

- to provide the necessary data to define a solution for handling the e-waste associated with the UNIDO/Microsoft refurbishment project.
- to provide general data about the e-waste situation in Uganda and thus the study should also serve for further initiatives by other stakeholders, e.g. for the developing a policy framework.

The study has been performed using Empa’s “e-Waste Assessment Methodology” (Schluep et al 2008), which is based on experiences gained from various countries as part of the “Swiss Global e-Waste Programme” (Widmer et al 2005, Widmer et al 2008). The methodology was standardized for the HP-DSF-Empa project “e-Waste Management in Africa” (DSF 2007) and has been applied in various other African countries (Laissaoui et al 2008, Muriuki et al 2008, Wone et al 2008).

CURRENT SITUATION

e-Waste related legislation

There is currently no e-waste specific policy or legislation in Uganda. However, approx. 9 national (environmental) laws and approx. 9 signed international conventions have a bearing on e-waste.

The environmental laws related to e-waste management are:

National Environment Act 4/1995

- The Environmental Impact Assessment Regulations S.1 No 13/1998
- The National Environment (Delegation of Waste Discharge Functions) Regulations S.I. No. 56/1999
- The National Environment (Standards for Discharge of Effluent into Water or on Land) Regulations S.I. No. 5/1999
- The National Environment (Solid Waste Management) Regulations S.I. No. 52/1999
This findings are in line with studies in other countries which reveal that although developing countries often don’t have specific e-waste legislations answers are certainly found in laws governing topics like the environment, water, air, waste, hazardous substances as well as health and safety (Dittke 2007, Schluep et al. 2008).

**Massflows**

Currently around 10 computers per 1,000 inhabitants are installed in Uganda. This amounts to about 300,000 installed computers in 2007 (Figure 1). The installed computers are mainly owned by governmental & educational Institution and NGOs (~75 %), followed by large enterprises (~20 %) and private households, SMEs and others (~5%). According to Customs records 25,000 new computers and 4,000 second-hand computers were imported in 2007. There is evidence that due to the newly introduced “zero tax policy on importation of computers” a large portion of imported second-hand computers is not registered through customs and thus this number easily could double.

Government and large enterprises replace computers after 3-5 years and often auction them for second-hand use, where the computer is used for another 5-8 years. Imported second-hand computers through professional refurbishment centres have a life span of approx. 5 years. Figure 2 shows the development of generated end-of-life (EOL) appliances from 1995 – 2007. It can be seen that a total of 53,000 computers should have reached their EOL in 2007.

It is expected that only around 10% of those computers reach the waste stream, whereas the rest is kept in storage without being used. The 10% in the waste stream get collected by individuals, whereas material and parts are sold informally and the rest gets dumped informally. This suggests that Uganda has built up a computer waste stock of approx. 80,000 pieces. This equals to about 2,000 tons of computer waste (desktop unit and CRT screen) in total, which contains e.g. 80 tons of printed circuit boards and 400 tons of plastic. This numbers are hypothetical but represent a realistic order of magnitude.
Figure 1: Massflow diagram showing estimated computer units in Uganda for 2007 (in amount of computer units)

Figure 2: Analysis of generated end-of-life computers based on a life-span of second-hand computers of 5 years and new computers of 9 years.
Recycling infrastructure

Formal e-waste recyclers do not exist in Uganda. However there are recycling options for different waste streams generated by a personal computer, which includes the plastic (needs investments to include plastic from e-waste), ferrous metals, aluminium and copper. There are no recycling options for printed wiring boards, cathode ray tubes and hazardous fractions, such as batteries. No signs were found for the existence of any informal leaching activities to extract precious metals from e-waste (e.g. gold recovery). It has to be expected that cables and probably other parts from electrical and electronic equipment are burned in open fires in order to recover copper.

Table 2: Recycling options in Uganda for different waste streams generated by a personal computer

<table>
<thead>
<tr>
<th>Material fraction</th>
<th>Recycling in Uganda</th>
<th>Possible downstream partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastic</td>
<td>partially</td>
<td>Plastic Recycling Industries (U) Ltd (capable to recycle e-waste plastic only with investments)</td>
</tr>
<tr>
<td>Ferrous metals</td>
<td>yes</td>
<td>Steel rolling mills Ltd</td>
</tr>
<tr>
<td>Aluminium</td>
<td>yes</td>
<td>Shumuk Aluminium Industries (U) Ltd</td>
</tr>
<tr>
<td>Copper</td>
<td>partially</td>
<td>H&amp;H Ltd. (dismantling practice for cables unclear)</td>
</tr>
<tr>
<td>Printed wiring boards (precious metals)</td>
<td>no</td>
<td>Not available in Uganda, export to Europe or Asia.</td>
</tr>
<tr>
<td>CRT tubes (containing lead, beryllium, phosphor, etc.)</td>
<td>no</td>
<td>Needs a hazardous waste treatment facility (special incineration or controlled landfill) which is not available in Uganda. Export to Europe</td>
</tr>
<tr>
<td>Hazardous fraction (PCB in capacitors, mercury in backlights, batteries)</td>
<td>no</td>
<td>Needs a hazardous waste treatment facility (special incineration or controlled landfill) which is not available in Uganda, Smaller capacitors and batteries can be left on the PWB when sold to international smelters. Export to Europe</td>
</tr>
</tbody>
</table>

CONCLUSION

Considering the recent development in ICT imports of new and second-hand equipment and the already existing stock of computer waste it is expected that considerably more e-waste will show up on the street in short time. Hence it is the right time for Uganda to engage in addressing the problem of increasing e-waste volumes. Waiting too long with actions bears the risk of a developing informal sector and more informal dumping, with all its social and environmental drawbacks.

Results of this study underline that the idea to address the e-waste problem within the UNIDO/Microsoft refurbishment initiative was well anticipated. The initiative could play a pioneer role in Uganda in the responsible treatment of end-of-life computers. The manual disassembly of computer waste and further sales of the resulting material fractions can generate income for some of the fractions. However the correct disposal of the problematic fractions (especially CRT screens and batteries) will cost money. Thus it is expected that the sustainable recycling of computer waste in Uganda cannot be paid by the intrinsic value of the computer unit’s material
content. The UNIDO/Microsoft refurbishment initiative will need to have a strategy to cover recycling and disposal costs.

REFERENCES


