



Definition of generic re-use operating models for electrical and electronic equipment

Ramon Kissling^a, Colin Fitzpatrick^{b,*}, Heinz Boeni^a, Claudia Luepschen^c, Stefan Andrew^d, John Dickenson^e

^a Empa, Swiss Federal Laboratories for Material Testing and Research, Lerchenfeldstr. 5, CH-9014 St. Gallen, Switzerland

^b Department of Electronic & Computer Engineering, University of Limerick, Limerick, Ireland

^c Institute for Sustainability and Peace (UNU-ISP) SCYCLE, United Nations University, Hermann-Ehlers-Str. 10, 53113 Bonn, Germany

^d Institute of Machine Tools and Production Technology (IWF), Technical University Braunschweig, Braunschweig, Germany

^e AERCCR, Inc., Americas Take-Back and Compliance Systems, 42840 Christy Street, Suite 205, Fremont, CA 94538, United States

ARTICLE INFO

Article history:

Received 18 November 2011

Received in revised form 11 April 2012

Accepted 18 April 2012

Keywords:

Re-use of electrical and electronic equipment
Re-use operating models
Re-use typology
Re-use

ABSTRACT

This paper aims to define a typology for the most common re-use operating models for electrical and electronic equipment (EEE). The scope of the study is Information and Communication Technologies (ICT) and Large Household Appliances (LHA). To describe and categorize re-use operating models, an analytical framework was defined, which consists of the four dimensions supply chain, offer, customers and financial structure. Based on this framework, standardized telephonic and personal interviews were conducted with 28 case study partners.

Four re-use operating models for ICT and LHA were identified:

- The Networking Equipment Recovery Model
- The IT Asset Management Model
- The Close the Digital Divide Model
- The Social Enterprise Model

The first two models are for-profit, whereas the last two are not-for-profit. Moreover, models differ in terms of customer segments and products and services offered to these customers. The Networking Equipment Model processes Information Technology Networking Equipment for original equipment manufacturers (OEMs) as main customers. IT Asset Management organizations specialize in refurbishment of desktop and notebook computers for resale to distributors and retailers. The Close the Digital Divide Model provides used computers to eligible recipients in developing countries. Social Enterprises prepare computers and peripherals or large household appliances for re-use and sell them through retail shops to individual users.

The identified models constitute generic ways to structure re-use operations along the four dimensions of the analytical framework (“supply chain”, “offer”, “customers”, “finance”). Different entities can utilize one or multiple combinations of these models.

© 2012 Elsevier B.V. All rights reserved.

1. Introduction

1.1. Background

Re-use is regularly discussed as a means of moderating the environmental impacts of electrical and electronic equipment (EEE) (Williams et al., 2008; Devoldere et al., 2009; Truttmann and

Rechberger, 2006). It is seen as a progressive response to the shortening of product life times which is leading to greater pressure on resources and other manufacturing burdens in addition to the burgeoning quantities of e-waste which must be dealt with. Re-use, essentially, attempts to optimize the use phase of a product in order to achieve greater resource efficiency.

Over the last decades, the re-use sector for (EEE) has been growing steadily. Despite facing different challenges, many organizations have established successful operating models for the collection, preparation for re-use and redistribution of used EEE both in the profit and in the non-profit sector. Nonetheless, the

* Corresponding author. Tel.: +353 61213561; fax: +353 61202572.

E-mail address: Colin.Fitzpatrick@ul.ie (C. Fitzpatrick).

re-use sector is considered to have a lot of latent potential. For example, with the increasing prevalence of lease-based models where product life spans are shortened the case for increasing the amounts of re-use, particularly for computing equipment, are compelling (Intlekofer et al., 2010). Likewise, as large institutional users are increasingly giving environmental considerations greater emphasis in the process of disposition of EEE, it presents an opportunity to promote better outcomes through re-use (Babbitt et al., 2011), particularly as the life-spans are decreasing (Babbitt et al., 2009).

The practice of re-use also manages to generate another wide range of ancillary social and economic benefits. These range from providing employment and training opportunities for people with disabilities or the long-term unemployed to providing access to good equipment for people on low incomes in both the developed and the developing world thus helping to bridge the digital divide (O'Connell et al., 2010; Anon., 2012a, 2012b). It is also a major source of IT equipment for businesses and educational establishments in the developing world helping to promote vitally needed economic development (Streicher-Porte et al., 2009; Kahhat and Williams, 2009).

However, while many diverse stakeholders are supportive of greater levels of re-use it is difficult to identify policy instruments that can be used to do so without the risk of creating expensive systems with the potential for inefficient outcomes. This was particularly apparent in the process of recasting the WEEE Directive when the European Parliament had ambitions to promote re-use through the inclusion of a separate 5% re-use target which was resisted by the European Council of Ministers whose national governments would be responsible for delivering on these targets. This impasse is evident in the general lack of specific supporting measures (with a few notable exceptions) for re-use globally.

One of the contributing factors to this roadblock is that the re-use sector globally has come to be discussed as a single entity when it is in fact a very diverse industry with a complex structure and differing requirements. Likewise, the different operating models which have emerged have done so for differing reasons; some out of plain economic opportunity, others as a means of achieving domestic social goals and others for the purpose of overseas developmental assistance. Any attempts to stimulate or mandate these diverse activities will require very different types of instruments to overcome the specific barriers that they face.

This work aims to make a contribution by creating a better understanding of the complex structure and dynamics of the re-use sector by offering a typology that can help to provide a more concise description of different re-use activities. In doing so it hopes to help create an image of the EEE re-use sector that is not homogeneous and should not look for "one size fits all" approaches when aiming to promote re-use.

1.2. Scope

The study investigates both not-for-profit and for-profit operating models. Despite the differences in the financing, many good practice showcases of re-use operations exist for both sectors. However, the informal sector has not been included in the scope of this study, which investigates legal entities preparing EEE for re-use in a comprehensible and transparent way.

Table 1 summarizes the scope of the study.

Several electrical and electronic product types are suited for re-use (e.g. medical equipment, large photocopiers). However, the study focuses on ICT products (excluding large photocopiers) and on large household appliances. For these two product categories, large and steadily growing commercial and non-commercial markets have developed in the past decade. This situation offers an excellent opportunity to investigate different operating models

Table 1
Scope of study.

Dimension	In scope	Out of scope
Operating model	– For-profit and not-for-profit legal entities organizing an operating model	– Informal sector for re-use of EEE – Sheer trader, private seller
Product category	– Information and Communication Technologies (ICT) – Large Household Appliances (LHA)	– Small household appliances – Consumer equipment – Lighting equipment, (including electric light bulbs and household luminaries) – Electrical and electronic tools – Toys, leisure and sports equipment – Automatic dispensers – Medical equipment
Geography	– Operating models from Africa, South America, North America, Europe	– Operating models from Asia and Australia

that dominate these sectors. Moreover, an analysis of the technical, social, economic, environmental and legal re-use potential of the different EEE-categories supports a clear fitness for re-use for ICT and large household appliances (O'Connell et al., 2010).

As organizations engaging in re-use operations face different challenges in industrialized and in developing countries, the analysis included operating models from both contexts. The case study set was compiled through members of the Solving the E-Waste Problem (StEP) Initiative and their contacts. The StEP Initiative is an initiative of various UN organizations together with prominent members from industry, governments, international organizations, NGOs and academia with the overall aim to solve the e-waste problem (Anon., 2012c).

It represents operating models from Latin America, Africa, North America and Europe. Whereas the StEP community has well established relations to the re-use sector in the above mentioned regions, so far, little contacts have developed to Asian re-use organizations. Due to this hindered access to concrete data no Asian case study was included in this analysis. However, this does not imply that no re-use operating models and no good re-use practices may exist in Asia.

2. Method

2.1. Inductive research based on case study analysis

As this study pursues an exploratory purpose an inductive design is applied; the aim is to derive generic operating models by analysing specific successful re-use cases. The results are based on 28 case studies, listed in Table 2. A separate study of the respective barriers and success factors identified by these case studies is also being undertaken.

60% of the case studies are non-profit, the rest for-profit organizations. As for geographic distribution, 20% of the case study partners are headquartered in developing countries. Six of the non-profit organizations located in industrialized countries engage in the export of ICT equipment to developing countries. Whereas four organizations process LHA, the great majority of the case study partners focuses on preparing and redistributing ICT equipment for re-use.

This great variety in the case study set poses limitations to the generalizability of the results. However, the analysis enables the identification of typical patterns by investigating specific good practice case studies.

Download English Version:

<https://daneshyari.com/en/article/1063284>

Download Persian Version:

<https://daneshyari.com/article/1063284>

[Daneshyari.com](https://daneshyari.com)