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Bridging the gap: Barriers and potential for scaling reuse practices in the Swedish ICT sector

Katherine A. Whalen*, Leonidas Milios, Julia Nussholz

The International Institute for Industrial Environmental Economics, Lund University, Tegnérsplatsen 4, 223 50 Lund, Sweden

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ABSTRACT

This paper presents two case studies of Swedish ICT 'gap exploiter' companies to provide a nuanced perspective in the investigation of ICT reuse business models and policies. Gap exploiters are third-party firms that create value through the re-utilization of existing products. While extending product life through the gap exploiter model is promising in the transition to a circular economy, business models and policies related to ICT reuse are under-researched in literature and existing studies are characterized by general approaches. While the generalizability of this study has limitations based on size and geographic location, this paper provides an in-depth look at how circular economy strategies can be embodied in the gap exploiter business model within the ICT sector. Main findings include barriers to business operations and opportunities to address them through business model innovation and policy intervention. The study furthers understanding of ICT reuse operations and their related business models. It also contributes to the upcoming policy debate on how to encourage and create a more resource efficient and circular economy.

1. Introduction

Technological advancement of electronics in the past thirty years has increased global demand for a number of elemental resources (Greenfield and Graedel, 2013). Moving towards a circular economy, where economic growth is decoupled from resource consumption (Ghisellini et al., 2015; Sauvé et al., 2016), is promising for addressing current and future resource concerns. Within a circular economy, extending ICT product life through waste prevention and reuse is emphasized prior to recycling as product complexity can make it difficult to recover valuable materials in ICT products (Dahmus and Gutowski, 2007; Olson and Riess, 2012). Although the meaning of 'reuse' is inconsistent within literature, in accordance with the European Commission's Waste Framework (Directive 2008/98/EC, 2008), reuse refers to any operation by which products or components that are not waste are used again for the same purpose for which they were conceived. Product repair, refurbishment, and remanufacturing are three reuse activities (Ijomah and Danis, 2012; Bakker et al., 2014b) thought to contribute to environmental impact savings by displacing new production (Geyer and Blass, 2010).

Yet, despite a potential for saving critical resources (André et al., 2016) and multiple examples of innovative business models in this area (Gelbmann and Hammerl, 2015), current understanding of how ICT reuse is undertaken in practice is limited. While research on ICT remanufacturing as a reuse option has grown in previous years (King et al., 2006b; Matsumoto et al., 2010; Matsumoto and Umeda, 2011; Prendeville and Bocken, 2017), recent investigations have identified a lack of existing research on repair and refurbishment business operations (Kissling et al., 2013; Sabbaghi et al., 2017). The value of further research into specific business models that could generate, deliver, and capture value from ICT reuse has also been noted (Kissling et al., 2012). And finally, although the revision of certain rules and legislation is expected to be promoted with the European Union's adoption of a circular economy action plan (European Commission, 2015), previous investigations have not specifically focused on how current and potential policy measures support or hinder ICT repair and refurbishment operations.

The term *circular business model* has emerged in recent years, viewed as an important enabler in creating a circular economy (Lieder and Rashid, 2016). Although the concept lacks a cohesive definition (Lewandowski, 2016), a circular business model can be understood as a business model that enables prolonged useful life of products and components and aims to close material flows. Many types of circular business models are emerging in practice, with Bakker et al. (2014a) distinguishing five types in their classification of circular business models. One such model is a specific life-extending business model

* Corresponding author.
E-mail addresses: katherine.whalen@iiiee.lu.se (K.A. Whalen), leonidas.milios@iiiee.lu.se (L. Milios), julia.nussholz@iiiee.lu.se (J. Nussholz).

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called the Gap Exploiter Model.

A 'gap exploiter' is a third-party firm, not OEM,[1] who 'exploits' the residual value of other companies' products by 'slowing down' the throughput of products in society (Bakker et al., 2014a; Bocken et al., 2016). For a business model to fall under the gap exploiter archetype, Den Hollander and Bakker (2016) argue the firm must: 1) identify commercial value in physical products which OEMs have not perceived to be of value and 2) base their value proposition around extending the life of such products. Gap exploiters center their activities on reuse operations, obtaining products that are obsolete,[2] but before they are waste. OEMs often choose not to perform these activities because of sales cannibalization risks (Geyer and Blass, 2010) and increased operational complexity related to establishing return product flows (Mont et al., 2006; Velte and Steinhilper, 2016). As OEMs show limited engagement in undertaking reuse of ICT (Ongondo and Williams, 2011), the gap exploiter model is a relevant business model for the ICT sector that can potentially contribute to the transition towards a circular economy by encouraging reuse.

To help enable broader use of the gap exploiter model and further research on business operations within the ICT reuse sector, we present two detailed case studies of Swedish gap exploiters focused on ICT repair and refurbishment. The companies were selected as they present a snapshot of gap exploiter diversity in terms of product life extension strategies, product types, and size. Godsinlösen (GIAB), a small organization of 30 employees, enables product life extension of many products, including a special focus on repair of mobile phones. Inrego, a slightly larger organization with 100 employees, specializes in refurbishment of multiple ICT types with a focus on computers.

Our investigation is structured as follows: We first review findings and gaps in relevant ICT reuse literature, including previously identified business barriers, policy barriers, and policy opportunities for ICT reuse business operations. Next, the methodology and case study companies are presented in Section 3. Descriptions of the companies' business models, perceived operational barriers, and policy intervention preferences are presented in Section 4 before being analyzed further in Section 5. As we conclude with a reflection on the gap exploiter business model and how such models could be promoted within the ICT sector, our findings are potentially relevant to future research on reuse, business models, policy analysis, and circular economy implementation.

2. Literature review

While literature on gap exploiters and their business models is limited, Matsumoto (2009) conducted one of the first investigations, focusing on firms in Japan and four product areas: books, cars, autoparts, and liquid crystal (LC) panels.[3] For our investigation of gap exploiters in the ICT sector, existing literature on ICT reuse is relevant. In articles previously published in this journal, Sabbaghi et al. (2017) investigated ICT repair businesses in the United States and Kissling et al. (2013) identified barriers to business for a variety of reuse operating models. Similarly, Ongondo et al. (2013) investigated socio-economic enterprises (i.e. not-for-profits and charities) involved in ICT reuse within the United Kingdom.

2.1. Overview of ICT gap exploiter business model elements

A variety of business model elements, or building blocks, have been identified to help structure business models (Zott et al., 2011). Relevant to this study on ICT gap exploiters, Kissling et al. (2012) developed a business model framework for studying ICT reuse. Drawing on business model literature (i.e. Osterwalder et al., 2005), the framework consists of four elements: (1) *offer*, (2) *customers*, (3) *supply chain*, and (4) *finance*. Using previous literature on ICT reuse operations, the remainder of this section presents an overview of aspects related to these elements.

Gap exploiters may address *customers* in the private and public sectors as well as private individuals (Kissling et al., 2012; Ongondo et al., 2013). Customer acceptance of reuse (Kissling et al., 2013; Mashhadi et al., 2016), cost of the offer (van Weelden et al., 2016; Ylä-Mella et al., 2015), and time (of repair) (Cooper and Mayers, 2000; Gerner and Bryant, 1980; Sabbaghi et al., 2017) appear to be important factors in customers' willingness to seek out gap exploiters' *offers*. Compelling value propositions and incentives are needed not only to sell used products but also encourage the supply of used goods (Ylä-Mella et al., 2015).

Sufficient volume is a key success factor when looking at gap exploiters' *supply chains* (Matsumoto, 2009). To ensure sufficient supply, compelling promotional activities and advertising are needed (Ongondo and Williams, 2011). Access to spare parts, repair manuals, and tools is also required (Sabbaghi et al., 2017), although the original product design also influences what breaks, the spare parts required, and reuse potential (Mashhadi et al., 2016).

Finally, in terms of *finance*, gap exploiters may operate as for-profit and not-for-profit organizations. Most costs occur from procurement of ICT, logistics, operations, employee compensation, and marketing (Kissling et al., 2012). Labor comprises a significant cost (Geyer and Blass 2010; Mccollough, 2009) and, therefore, keeping labor costs low by acquiring good quality ICT or estimating repair time correctly appears important. The next section will build off these studies, reflecting on identified barriers for businesses faced by reuse organizations.

2.2. Business barriers for ICT gap exploiter business models

This section first presents barriers relevant for ICT gap exploiter business models identified in ICT reuse literature. Kissling et al. (2013) studied a variety of organizations undertaking reuse of ICT, ranking thirteen generic barriers and prioritizing four areas of future focus. From most to least important, the four areas were ensuring sufficient volumes of used ICT, addressing societal perception of used ICT (especially from informal and illegal reuse practices), removing legislative frameworks, standards, and design practices that hinder reuse, and addressing cost-related barriers. This section briefly reviews this prioritization list, integrating additional findings from recent studies. Legislative frameworks and policies are addressed in Section 2.3.

In addressing volumes of used ICT, take-back schemes alone do not ensure the return of products by consumers and incentives for recovery are often necessitated (Ylä-Mella et al., 2015). Monetary incentives appear to be the most effective in stimulating collection for reuse (Welfens et al., 2016). However, product quality is not guaranteed and many organizations face low quality products in return (Ongondo and Williams, 2011). Therefore, both lack of access to used products and poor quality of supply can contribute to a lack of sufficient volumes (Kissling et al., 2013; Ongondo et al., 2013). As Krystofik et al. (2015) point out, OEMs may also design products in such a way that makes it difficult to reuse products or leverage special intellectual property rights that hinder product reuse. Access to safety manuals and spare parts can also limit the amount of products that can successfully be repaired for reuse (Sabbaghi et al., 2017).

Bad re-use practices (such as illegal e-waste exportation) were ranked in Kissling et al. (2013)'s study as the leading cause of public hesitance towards reuse. However, recent literature on consumers' perceptions of refurbished mobile phones suggests other factors play a more important role. van Weelden et al. (2016), for example, identified four factors influencing consumer acceptance: lack of awareness (of refurbished options), lack of availability, lack of the 'newness' thrill,

[1] OEM – original equipment manufacturer.

[2] Products may be referred to as obsolete if they are a) no longer in working condition (i.e. fail physically) or b) still in working condition but no longer desired (King et al., 2006a).

[3] In this study, the term 'independent reuse business companies' is used instead of 'gap exploiter'.