



Global business and emerging economies: Towards a new perspective on the effects of e-waste



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ABSTRACT

Although there has been a growing body of research on the detrimental effects of electronic waste (e-waste) in emerging economies, this fails to capture a complete picture of the subject. The purpose of this paper is to address this deficit in our understanding by developing a unified perspective of the effects of e-waste. The paper advances three main perspectives (i.e. the positive, detrimental and the unified perspectives) of the effects of e-waste in emerging economies. These perspectives unify the existing scattered streams of research on the subject to offer more robust explanations of the effects of e-waste in developing countries. Through an illustrative case of an emerging economy, the paper demonstrates that contrary to the perceived view that e-waste from advanced economies to developing countries is detrimental; some sectors such as the second-hand market, aftermarket and repair industry have flourished. The paper outlines a range of strategies for countries that can be adopted to develop and enhance environmental sustainability.

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1. Introduction

Since the turn of the twenty-first century, waste electrical and electronic equipment (WEEE) or electronic waste (e-waste) has become a much more of pressing issue facing governments, technology companies and wider society (Baldé et al., 2015a, 2015b; Atasu and Van Wassenhove, 2012). The past three decades have also witnessed unprecedented growth of e-waste as more products are produced and consumed by the rising global population (United Nations Environment Programme (UNEP), 2011). The current growth rate of 8% annually is expected to increase and poses major challenges to such countries (The Economist, 2014). E-waste is one of the fastest-growing problems facing developing countries and the weight of e-waste worldwide is expected to increase (Chi et al., 2011).

In 2014, around 41.8 million metric tonnes (Mt) of e-waste was generated globally and is projected to surge to 50Mt by 2018 (Baldé et al., 2015b). In an increasingly changing global environment characterised by rapid technology innovation, electrical and electronic equipment such as laptops, mobile phones and computers are being superseded at a much faster pace and thereby rendering old versions obsolete (Baldé et al., 2015a, 2015b; Kiddee et al., 2013). As more consumers upgrade their products to the latest version, the old ones are rendered outmoded (Kiddee et al., 2013; Widmer et al., 2005). In the case of computers, the average lifespan has shrunk from 4.5 years in 1992 to around 2 years in 2005 (Widmer et al., 2005). The growth of e-waste has also

garnered a growing stream of research which has enhanced our understanding greatly (e.g. Orlins and Guan, 2015; Robinson, 2009).

Notwithstanding these past accomplishments by researchers, their analyses suffer from a number of deficiencies. First of all, much of the existing research on emerging economies has focused on mainly the negative effects stemming from developed nations (e.g. Asante et al., 2012; Kiddee et al., 2013; Perkins et al., 2014). In addition, much of the existing literature has developed in insolation. Given the one-sidedness of the existing streams of research, there is a need for a comprehensive overview of the literature to enrich our understanding of the effects of e-waste in emerging economies. Such analysis would also help to put the subject on a much stronger footing.

This paper represents an effort to address this gap in our understanding by reviewing the literature on the effects of e-waste in emerging economies. The paper then illustrates the theoretical analysis using insights from a developing economy. We focus on emerging economies, in general, and Ghana, in particular, to illustrate the effects. Our focus was driven by a number of factors. First, Ghana is one of the most stable democracies in Africa with thriving industries and technology development (Amankwah-Amoah and Debrah, 2010; Amoyaw-Osei et al., 2011). Second, the Agbogbloshie Market in the country has been dubbed “the world’s largest e-waste dump site” (The Guardian, 2011) and “Africa’s computer graveyard”, and takes around 192,000 t of e-waste a year (Asante et al., 2012; Vidal, 2014). Therefore, this setting provides a promising example to inform the analysis.

The paper makes two main contributions to information technology, strategy, operations management and waste management research. First, although some studies have examined the effects of e-waste (e.g. Xu et al., 2012), they have largely focused on the negative

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externalities of e-waste and thereby overlook any potential positive externalities. The paper develops and advances three main perspectives (i.e. positive, detrimental and the unified perspectives) on the effects of e-waste in emerging economies. These unify the existing theoretical explanations on the subject. Second, much of the existing analyses have focused on the impact of the wider economy and thereby ignoring the industry-specific implications. The study fills this void in our understanding by using insights from the second-hand market and electronic repair industry to demonstrate how e-waste has helped to foster innovation and industrial development.

The rest of the analysis unfolds as follows. First, we develop a working definition of the subject and provide an overview of the literature on e-waste. This is then followed by a review and development of the three main perspectives on the subjects. The unified model of explanations for the evolution of e-waste is presented. The penultimate section identifies examples from an emerging economy to demonstrate the key arguments. The final section sets out a range of promising implications for governments, policymakers and other stakeholders.

2. What is e-waste?

Scholars have broadly defined the term “e-waste” to include a range of electronic and electrical devices such as refrigerators, televisions, microwaves, washing machines, computers, copiers, stereos, VCRs and fax machines considered obsolete and/or discarded by the user (Puckett et al., 2002; Step Initiative, 2014). Such products have often reached the end of their lifecycle. However, their lifespan can be extended as second-hand goods by other users in the same or another country. Such products can be reused, refurbished, utilised in other products or recycled. Some of the primary causes of e-waste include technological obsolescence, changes in technology infrastructure, innovations and changes in government policy (Deubzer, 2012).

One of the main contributory factors is the ever-shortening lifespans of electrical and electronic equipment (EEE) (Baldé et al., 2015b). Many products are becoming obsolete at a much faster rate than ever before and thereby creating more e-waste. The preceding discussion outlined above have been summarised in Fig. 2. The figure demonstrates how a product that has reached a final stage in one geographical context/market can be redeployed for same or new uses in another market.

3. Electronic waste effects in emerging economies: towards a unified perspective

Three unique streams of research have evolved to inform and provide foundations for a better understanding of the effects of e-waste in emerging economies (see Fig. 1). The first stream, the detrimental perspective or adverse effect, argues that e-waste from developed to developing countries can only have deleterious effects on the local economy, industries and the health of workers. A growing stream of research has uncovered effects such as encouraging child labour, water contamination and air pollution as outcomes of e-waste (Asante et al., 2012; Baldé et al., 2015b). Electronic waste, entailing flame retardants, arsenic, cadmium and polyvinyl chloride, poses a threat to human life and individuals handling the waste (United Nations, 2014).

A recent study also uncovered that, electronic appliances can entail up to 60 different elements which are harmful if not treated properly (Orlins and Guan, 2015). These can contaminate of local rivers and soil, which then hampers agricultural activities in many developing countries (Asante et al., 2012; Orlins and Guan, 2015).

One interesting line of research has indicated that informal and formal workers are often exposed to toxic substances due to weak regulatory and legal systems in many developing countries (see UNEP, 2015; Perkins et al., 2014; Chi et al., 2011). One of the factors that has exacerbated the problems is that many of the workers in the developing world are often untrained in mitigating the harmful effects and are unprotected from them (Orlins and Guan, 2015). They also often do not possess the specialised and protected personal equipment required to recycle safely.

During the recycling, studies indicate that workers are often exposed to dioxins, brominated flame retardants and heavy metals which stay in the environment for a protracted period (Asante et al., 2012; Orlins and Guan, 2015). A study by Xu et al. (2012) uncovered that e-waste was linked to higher risk of stillbirth in a local area. Indeed, some scholars have gone as far as to suggest that “the transfer of used electronic devices to developing countries” should be forbidden (Kiddee et al., 2013, p. 1237). Although this particular narrative has garnered much theoretical and empirical support, it presents only a partial picture of the effects of e-waste. A recent study on Liberia by Strother et al. (2012) uncovered that the country lacks the necessary human capital and financial resources to develop and implement e-waste management programme

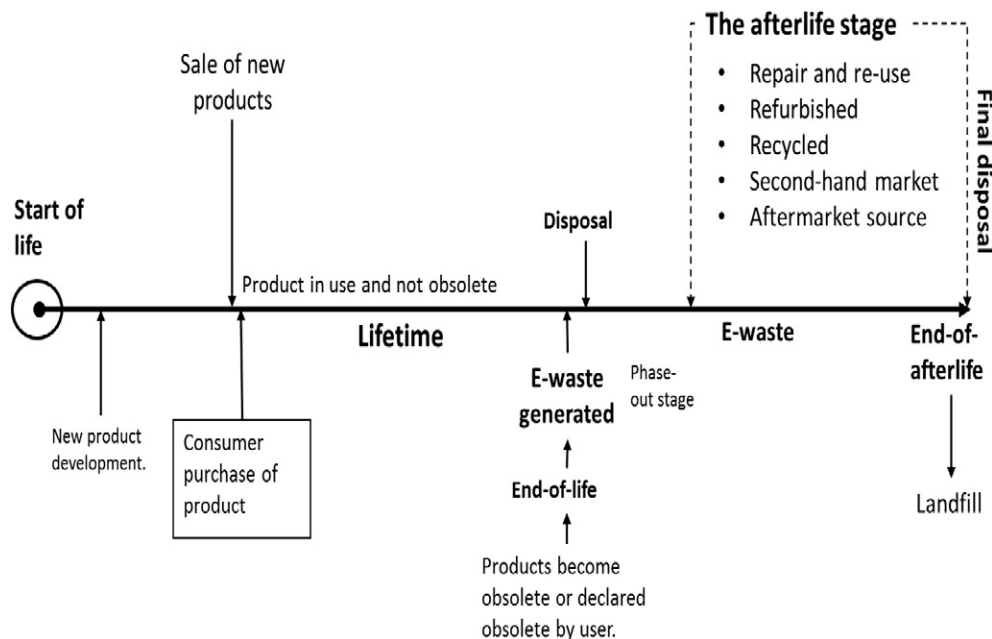


Fig. 1. A unified stage model of e-waste flows.

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