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Extended Producer Responsibility for waste televisions and computers: A regulatory evaluation of the Australian experience

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ABSTRACT

High annual volumes of television and computer waste presents a challenge to Australian communities, resulting in the development of Extended Producer Responsibility (EPR) legislation. This study aims to establish, through the use of public interest theory, whether EPR legislation in Australia was in the public interest. Using a regulatory analysis, the results show that during the first 3 years of the scheme, over 130 liable parties joined co-regulatory arrangements each year to fund upstream recycling services for television and computer waste. In program terms, the scheme has been highly successful recycling over 130,000 tonnes of metals, leaded and non-leaded glass, plastics and other materials while limiting landfill transfers to approximately 6900 tonnes, all at a cost of A$50–60 million per annum to producers. The scheme has also seen a range of upstream recycling partnerships established between the co-regulated administrators and formal technical and social enterprise waste management organizations. However, while the upstream material recovery rate is steady at approximately 95%, the results suggests that exporting waste for downstream processing will continue in the future. Analysis also points to substantial funding for 'over target' collections, downstream recycling infrastructure and landfill diversion strategies as critical for averting severe environmental impacts from e-Waste dumping. The study concludes by suggesting that while the successes of EPR scheme are in the public interest, its potential deficiencies could limit such benefits and therefore need to be addressed. Notably, the scheme could be enhanced through the application of improved recycling target methodologies, including the estimation and forecasting of domestic Waste Electrical and Electronic Equipment (WEEE) stock levels.

1. Introduction

Critical research shows that the inability to manage Waste Electrical and Electronic Equipment (WEEE) has resulted in toxic metals landfill disposal, low recycling-recovery rates, and limited infrastructure investments (Lim and Schoenung, 2010a, 2010b). Globally, this is observed as a growing problem with up to 50 million metric tonnes of WEEE being generated annually (StEP Initiative, 2014). In this context, WEEE presents Australian communities with serious environmental and management challenges with steady population growth and gross levels of Information Technology (IT) consumerization driving the strong rise in WEEE. As a pointer to the future, contemporary data published by the United Nations shows that in 2014, Australia generated approximately 468,000 metric tonnes of WEEE (Baldé et al., 2015). In order to address this growing problem, the federal government enacted Extended Producer Responsibility (EPR) legislation to implement a co-regulatory regime to collect, recycle and materially recover a portion of discarded televisions and computer equipment. EPR is an approach aimed at enhancing management of environmental impacts and is in line with the premises of cleaner production.

The central research question of this study explores whether the EPR legislation, within the Australian context, was in the public interest (and if so, how it might be improved). Consequently, this research undertook a regulatory analysis of the EPR regulations that

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applies to a segment of WEEE in Australia (i.e. televisions and computers) (Manomaivibool, 2009; Queiruga et al., 2012). The Australian application of EPR under the National Television and Computer Recycling Scheme (NTCRS) has been confined to the recovery of waste televisions, computers, printers and computer products (Commonwealth of Australia, 2016a). Based on 2014 data, it is noted that the NTCRS is only recycling approximately 11% of all domestic WEEE (brown and white products) with state-territory and local governments responsible for the balance 89% WEEE. Hence, the four year analysis of the NTCRS from 2012 to 2015 is aimed at analysing those parameters embedded in the regulations and determining the relative points of success related to this specific program (Manomaivibool, 2009; Queiruga et al., 2012). Compared with other country based studies, this attempts to take a more dynamic and evolving view of EPR programs and provides a building block for future WEEE studies.

2. Theory

2.1. Prior studies

The examination of global WEEE has a longer history that dates back over 20 years. As an example, Welker and Geradin (1996) reviewed a range of producer responsibility initiatives in the European Community, identifying shortcomings and inconsistencies in WEEE management, scheme financing and strategic leadership. In particular, the lack of programmatic coordination and finance sourcing presented as clear inhibitors to scheme success. In the intervening period, key studies of WEEE management have sought to examine infrastructure and technology developments (Kang and Schoenung, 2005); mechanisms for waste reduction (reuse, repair, recondition, remanufacture and recycle) (King et al., 2006; Osibanjo and Nnorom, 2007); and eco-design and production of electrical and electronic equipment (Babu et al., 2007; Gottberg et al., 2006). These studies were primarily focused on the critical capacities of communities and producers to find alternative strategies to reduce end-of-life waste, better manage the tyranny of product obsolescence, and create sustainable production processes that reduced toxic materials discharge into the environment.

Economists and econometric scientists also delivered a series of studies in WEEE access and logistics (Walther et al., 2008); establishing competitive markets for WEEE reuse and recycling (Kahhat et al., 2008; Widmer et al., 2005); and consumer behaviours associated with WEEE management (Wang et al., 2011). Critically, these investigations looked to determine how industrial facilities and competitive markets, shaped by social behaviours and economic imperatives, might be engineered and established to support WEEE recycling. Important for the focus of this study, these forerunning investigations set up a strong and growing cumulative tradition in EPR policy research (Jang, 2010; Khetriwal et al., 2009; Queiruga et al., 2012) where 'the producer's responsibility for a product is extended to the postconsumer stage of a product's life cycle' (Manomaivibool, 2009).

From a scientific perspective, a further block of studies has highlighted extreme dangers associated with toxic metals (arsenic, lead, selenium, cadmium, copper) and dangerous chemical compound releases from improperly managed WEEE (e.g. toxic environments in and around Guiyu, China showing elevated levels of cadmium +0.5 μg/L and copper +84 μg/L) (Wong et al., 2007; Robinson, 2009). The negative ecological and biodiversity impacts of WEEE mismanagement (Wong et al., 2007; Wager et al., 2011) underscore the critical importance of this issue, with illegal mishandling and primitive recycling of WEEE in some developing countries presenting as threatening public bio-hazard risks in local communities. Further research has highlighted this as a serious global problem with the largely negative health and human impacts that accompany informal and typically unsafe WEEE management schemes (e.g. e-waste workers and residents in Guiyu, China had high blood serum Poly-brominated diphenyl ether concentrations ranging between 35 and 126 ng/L) (Robinson, 2009; Sthiannopkao and Wong, 2013). Also, it is not uncommon for these problems to be enabled and further exacerbated by large-scale exportation of WEEE to poor and developing countries (in contravention of the Basel Convention) that are ill-equipped to deal with waste recycling and recovery (Nnorom and Osibanjo, 2008; Osibanjo and Nnorom, 2007; Robinson, 2009; Sthiannopkao and Wong, 2013).

From the sustainability viewpoint (King et al., 2006; Zhang et al., 2012), these impacts suggest that strict legislative controls (Zeng et al., 2013) are needed to protect the unskilled and underprivileged labour in developing countries, while also removing primitive and illegal recycling practices by unauthorised small (low cost) businesses (Zhang et al., 2012). However, investigative studies in developing countries where the dumping of WEEE is observed as a common and uncontrolled practice assert that sufficient governmental resources are often unavailable for successful regulatory enforcement and ongoing compliance audits and activities (Chung and Zhang, 2011; Nnorom and Osibanjo, 2008; Sthiannopkao and Wong, 2013). Hence, an interventionist government policy (such as EPR) and an associated program may be required to deliver satisfactory WEEE management outcomes.

The literature also enfolds country and global level studies that highlighted a vast range of relevant factors and issues related to WEEE management. Some factors emanate directly from technology and technical perspectives of WEEE management. Studies show a growth in technical requirements for improved plastics and metals recovery and recycling using mechanical, chemical, and pyro and hydro-metallurgical technologies (Mundada et al., 2004; Kang and Schoenung, 2005), prohibition of high temperature incineration and waterborne dumping of non-benign WEEE (Nnorom and Osibanjo, 2008); and ecological and biologically sustainable materials selection, systems manufacturing and product production (Babu et al., 2007; Gottberg et al., 2006; Kiddee et al., 2013; Zeng et al., 2013). These requirements demonstrated the ongoing importance of technology factors and forces in WEEE management, including the outturn circulation of recovered materials for cleaner manufacture and production (Manomaivibool and Hong, 2014).

Institutional viewpoints also feature strongly in the WEEE and EPR literature. Critically, studies highlighted important roles for government and public agencies including establishing robust supporting institutional, legislative and multi-tier governmental arrangements (Davis and Herat, 2008; Kahhat et al., 2008; Khetriwal et al., 2009; Mundada et al., 2004; Wagner, 2009; Widmer et al., 2005). This included using national WEEE stocks statistics collections and forecasting to guide policies (Peralta and Fontanos, 2006) and support rigorous evidence based development of national WEEE management systems (e.g. Brazil, Spain) (de Oliveira et al., 2012; Queiruga et al., 2012). Also, as part of countries' international obligations, researchers implored governments to implement and enforce WEEE import and export controls (Mallawarachchi and Karunasena, 2012) and deliver education and communications programs that promote positive WEEE management values and behaviours (de Oliveira et al., 2012; Wang et al., 2011). These types of institutional actions were seen as critical for improved WEEE handling and management.

In specific EPR context, countries and trading blocks (e.g. EU WEEE Directive) were observed to place regulatory obligations on producers, importers and retailers to cover whole of life WEEE costs