



Revisiting the extended producer responsibility program for metal packaging in South Korea



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ABSTRACT

Recently, developed and emerging countries have increasingly adopted the principle of extended producer responsibility (EPR) to reduce waste. In 2003, South Korea replaced the waste deposit recycling (WDR) program with the EPR program. Previous comparative analyses between the WDR and EPR programs have been qualitative evaluations and have not yet quantitatively shown whether the change has increased benefits. The aim of this paper is to explore which program brings larger net benefits. Because of limited data availability, here we focus on metal packaging exclusively. We find that the recycling rate dropped from 59% in 2000 to 40% in 2011 and recycling volume dropped accordingly. Cost-benefit incidence analysis shows that net social benefits decreased by 2.8 billion won (2.5 million US dollars), while the net benefits to producers increased by 1.9 billion won (1.7 million US dollars) under the EPR program compared with the WDR program. The government of South Korea should set an ambitious recycling target and narrow the scope of the exemption from the mandatory recycling requirement.

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1. Introduction

Faced with increasing waste generation, most OECD countries now implement extended producer responsibility (EPR) policies in key sectors (OECD and Ministry of the Environment, Japan (MOEJ), 2014). The OECD defines EPR as an environmental policy approach in which a producer's responsibility for a product is extended to the post-consumer stage of a product's life cycle (OECD, 2001). The OECD (2007) introduced EPR as one of the tools for Environmentally Sound Management of Waste. Emerging economies in Asia, Africa and South America have also started to develop EPR programs in recent years (Manomaivibool and Hong, 2014).

The original concept of EPR places emphasis on environmentally compatible product design as a way to minimize wastes at the source (Lindhqvist, 2000; Walls, 2006). Recycling itself is not treated as an objective. In developing countries, however, EPR is

often viewed as a direct governmental intervention to promote recycling (Manomaivibool, 2011).

In 1991, South Korea implemented the waste deposit recycling (WDR) program as a system that imposed a charge for certain products. The WDR program was intended not only to finance waste management but also to divert certain materials from the mixed municipal waste stream. A shortage of landfill sites was the main driver of this initiative according to the South Korean Ministry of Environment (MOE, 1992). The WDR program imposed a charge on packaging materials and household appliances (air conditioner, refrigerator, television, and washing machine). Producers of regulated packaging and products paid the charge in accordance with the products they sold in the previous year. A portion of the charge was refunded to producers of regulated packaging and products in accordance with the amount of recycling.

However, the WDR program has caused political hardship when the rates were raised (Shin, 1995). Producers of regulated packaging and products claimed that the product charges had weakened their competitiveness (Kim et al., 2006) and that the government should be held accountable in its use of the revenues raised from product charges (Lee, 2010). The WDR program was evaluated as being effective in reducing waste from metal packaging and glass (Kim et al., 2006) but not home appliances (Manomaivibool and Hong, 2014). Opposition from industry and insufficient recycling performance for some products led the government to replace

Abbreviations: EPR, extended producer responsibility; KMCRA, Korea Metal Cans Resources Association; WDR, waste deposit recycling; CBA, cost-benefit analysis; MOE, Ministry of Environment, South Korea; MOEJ, Ministry of the Environment, Japan; KEI, Korea Environment Institute; KOSIS, Korean Statistical Information Service; KECO, Korea Environment Corporation.

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WDR program with the EPR program in 2003. The EPR program was backed by the OECD's Recommendation of the Council on the Environmentally Sound Management of Waste (OECD, 2007). To date EPR is the leading instrument for packaging waste management in Korea.

In Korea, the EPR program requires mandatory recycling with binding targets and fines for noncompliance. The program's objectives are waste reduction and cost minimization through recycling (Park, 2006).

In the years since the EPR program replaced the WDR program, a few comparative analyses between the programs have been conducted. However, these evaluations were qualitative and have not shown quantitatively whether the change has increased benefits.

Against this background, this paper aims to explore which program brings larger net benefits. A cost-benefit table is employed with landfill disposal taken as a baseline. Because of limited data availability, this paper focuses on metal packaging exclusively.

2. Previous research

Cost-benefit analysis (CBA) is a technique that compares the costs and benefits to society of providing a public good. Sturges (2003) advocated CBA as a tool for evaluating EPR programs. Smith (2005) constructed an analytical framework for the CBA of EPR programs.

There are two types of CBAs for waste management programs: financial and environmental assessment. Integrated financial and environmental assessments have been conducted by Bruvoll (1998), Eriksson et al. (2005), Hosoyamada et al. (2003), Ibenholt and Lindhjem (2003), Morris (2005), Nolan-ITU et al. (2001), RDC and Pira (2003), Reich (2005), and Vigsø (2004).

Other research has conducted either financial assessment (Begum et al., 2006; KECO, 2011; Leu and Li, 1998; Oh, 2003) or environmental assessment (Craighill and Powell, 1996).

The Korea Environment Corporation (KECO, 2011) conducted a financial assessment of Korea's EPR program in comparison with landfill disposal during 2003–2011. KECO found the total benefits of the EPR program have outweighed the total costs since 2003. However, this study underestimated the costs, as it did not include collection costs.

Oh (2003) conducted a financial assessment on the waste management of plastic packaging in Seoul, and compared two EPR policy alternatives against the WDR program: One where producers pay the costs for the collection, transport, and recycling of plastic packaging, and one where producers pay for only transport and recycling costs. Oh found that the net benefits of the WDR program are positive for only the first policy option. However, these two policy options are quite different from the current EPR policy, and thus, do not hold practical implications for the current EPR program.

Lavee (2010) and Hosoyamada et al. (2003) conducted environmental assessments, but focused on only electricity consumption and CO₂ emissions, respectively. Others researchers have covered wider social impacts in their environmental assessments: traffic accidents, congestion, and noise (Nolan-ITU et al., 2001); disamenity of landfills (RDC and Pira, 2003); and time value spent by households sorting garbage (Ibenholt and Lindhjem, 2003).

In Korea, there has been no CBA of the EPR program based on environmental assessments. One reason is insufficient data on environmental impacts and economic valuation. Data on environmental impacts from the collection and transport of households refuse and recyclable wastes by municipalities are available (Oh et al., 2008) but do not cover final disposal such as landfill and incineration. With respect to the recycling stage, Gwak et al. (1998) conducted the only research that employs life cycle

assessment of beverage cans throughout the whole lifecycle from manufacturing to recycling in comparison with landfill disposal. That study found climate change and ocean acidification to be the dominant environmental impacts. However, valuation of these environmental impacts is not available. Baek et al. (2011) evaluated the environmental impacts of the manufacturing stage of aluminum cans in which recovered material is used, but the recycling stage was not included.

Sturges (2003) has advocated CBA focused on environmental assessment. This is the only analytical framework that allows the optimal recycling level of a recycling program to be presented. However, this framework is difficult to apply in Korea because of the lack of data for defining the environmental impacts of the WDR and EPR programs in monetary terms. Meanwhile, Smith (2005) provided a framework for showing the performance of the EPR program against a counterfactual baseline. This is why the CBA framework of Smith (2005) is used in this paper, with a main focus on comparing financial assessments between the WDR and EPR programs, particularly the landfill savings targeted by these two policies.

3. Description of WDR and EPR programs

3.1. Theory

South Korea's WDR program for metal packaging differs from conventional deposit refund programs that place a surcharge on a product when purchased by consumers and issues a rebate when the packaging is returned. In South Korea, the government imposed a product charge on producers in proportion to their production output. The program had no mechanism to pass the refund from producers/retailers to consumers. Instead, producers received part of the total deposit from the government once discarded metal packaging was recycled.

In Fig. 1, if the deposit rate in the WDR program corresponds to line segment OT, producers should make a deposit to the government in advance; the deposit corresponds to the area enclosed by OTAB. When the deposit and refund rates correspond to line segment OT, producers recycle up to line segment BG, because BG is the recycling level where the cost incurred by producers becomes minimal. In this case, GFAB is returned to producers later. However, producers eventually bear the cost of OTFB, given by the

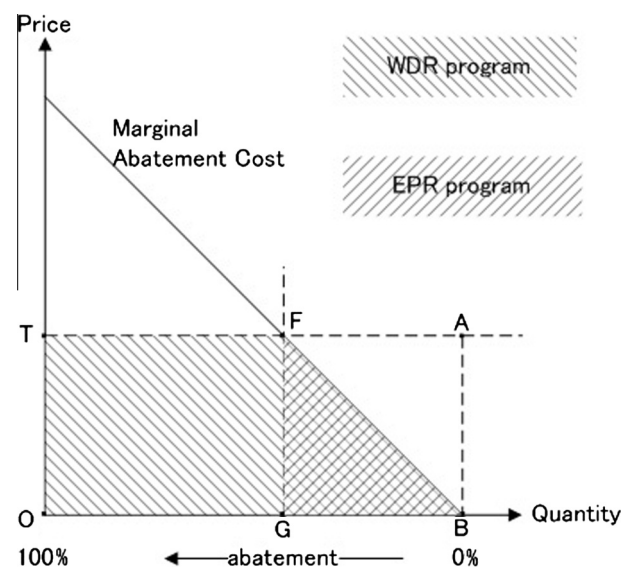


Fig. 1. Producers' recycling costs in the WDR and EPR programs.

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