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Efficiency of packaging waste management in a European Union candidate country

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ABSTRACT

This paper provides a quantitative and qualitative evaluation of Serbia's packaging waste management system, which is based on the Extended Producer Responsibility scheme (EPR). Additionally, it identifies and discusses the major challenges faced by the system. This paper strives to shed some light on the challenges posed by the implementation of an advanced and highly institutionalized approach to packaging waste management in the context of a European Union candidate country. The analysis indicates that Serbia is a country with an evolving administrative and institutional approach to packaging waste management, which can reach national recovery targets through its EPR system. The main challenges that must be addressed for the system to continue progressing in order to meet European Union's recovery targets are: (i) increase the low supply of recovered recyclables from the municipal solid waste stream, (ii) close loopholes affecting recycling industry and work of National Recovery Organisations, and (iii) formalization of informal recycling sector's role within the formal packaging recovery framework.

1. Introduction

The management of packaging waste has been an integral part of European waste policies since the 1990s. The environmental impacts of non-degradable but recyclable waste as well as the strong orientation of the European Union (EU) towards diverting waste from landfills have been among the main drivers of these policies. The Directive on Packaging and Packaging Waste (94/62/EC) has triggered a process of rapid implementation of national-level policies that aimed to reduce impacts of packaging waste on the environment as well as to boost the market for both packaging products and waste. Besides the requirement for each member state to develop its own packaging waste management policies by 1996, the directive and its updates imposed the obligatory recovery and recycling rates to be met as well (EUROPEN, 2014). Since then, all the EU states developed recycling systems, usually by adoption of the Extended Producer Responsibility (EPR) scheme – a 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). In general, the EPR mechanism has been regarded as a successful policy in achieving the quantitative targets imposed by the EU legislation (Cahill et al., 2011; da Cruz et al., 2014). However, as noted by da Cruz et al. (2012), there are many issues that differentiate the countries in relation to recycling in general and the EPR system in particular, such as: level of generated additional financial cost for both public and private stakeholders, (Massarutto et al. 2011); an extent of the "free riding" problem – an issue related to situation where producers do not pay the fees for management of packaging waste – even though they are obligated by a law (Yau, 2010); extent of environmental impact in relation to setting up of an entire logistical chain for recycling of packaging waste (Ettehadieh, 2011); success in the optimization of the recycling rate for each type of material (Highfill and McAsey, 2001), etc.

In addition, a significant variability in recycling performance exists among EU countries, especially when comparing two groups of EU member states – the older (EU-15) and the newer (EU-13) member states (EUROPEN, 2014). Moreover, a much greater disparity exists between these two groups and European candidate countries, i.e. the non-member states that strive to join the European Union (Stanisavljevic et al., 2017; Vujić et al., 2011; 2015), which still have a long way ahead to achieve the EU recovery and recycling levels. Hence, one of the main challenges of European packaging policies in a short to

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medium term is to bridge the gap between the two groups of EU member states in relation to waste management performance, but also, considering a long-term perspective, to spur a rise in recovery and recycling levels among the EU candidate countries. In order to address the latter problem, one of the initial steps is to understand the specific local context of the European candidate countries and the challenges for implementation of the European Union packaging waste standards in general, and the EPR mechanism in particular. So far, in contrast to the EU member states, where a significant amount of research and policy attention has been directed towards the topics of packaging waste management and the EPR mechanism, to date there has been comparatively little attention focused on the same topics in the context of European candidate countries. In order to address this gap, by using Serbia as a case study country, this paper examined the evaluation and performance of a packaging waste management system based on the EPR mechanism in the context of an EU candidate country.

2. Theoretical framework: extended producer responsibility (EPR) system

2.1. What is it and how does the EPR system work?

The EPR framework is a national level and market oriented policy (OECD, 2001). It represents an environmental policy that encompasses the "polluter pays" principle where the producer bears the financial responsibility of (packaging) waste management. The EPR aims to internalize the cost of environmental burdens related to the product's whole life-cycle by assigning responsibilities to producers who are obligated to take care of their products after consumers' use (Lifset et al., 2013; Sachs, 2006). It is enforced for different types of materials – packaging waste, electronic waste, waste tyres, waste batteries, etc. – and is adopted worldwide, but gained the most prominence in the EU countries (e.g. Aarnio and Hämäläinen, 2008; Mayers, 2007; Nnorom and Osibanjo, 2008). Today, there are about 400 EPR systems implemented worldwide, generating significant resources from producers by contributing to a global market worth about € 300 billion (OECD, 2016).

The EPR system allows the producers to exercise their responsibility either individually or collectively, i.e. through individual or collective compliance schemes. In individual compliance schemes, a producer is responsible for organizing its own system for taking back used products – which is usually the case when a producer sells its product(s) to a limited number of users. On the other hand, when producers sell their products to a vast number of users, collective compliance schemes are much more common. Here, the producers transfer their responsibility for management of packaging waste onto a specific so-called *Producer Responsibility Organization* (PRO), which is set up to apply the EPR mechanism on behalf of all adhering producers. There could be a *centralized* or *competing* PRO system within a country, i.e. with one dominant PRO organization that covers the majority of materials placed on the market, or several competing PROs, respectively. In return for its service, a PRO receives financial contributions from producers, the level of which usually depends on the quantity of packaging products placed on the market. These contributions are used for investment in the development of the infrastructure for source separation and collection of recyclables, management of corresponding data, supervision of previously mentioned activities as well as to cover the operational costs of a PRO. Investments in source separation and collection of recyclables are usually made through contracts between PROs and local authorities and/or private waste management operators (collectors). The level of financial support that local authorities and/or private operators receive differs across the countries and depends on who owns and sells the collected recyclables.

The overall success of an EPR scheme is strongly related to its links to a range of other supplementary policies (e.g. waste taxes, subsidies – see also Alwaeli, 2010; Calcott and Walls, 2005) and regulations that complement recycling initiatives by closing various loopholes (e.g. landfill bans) (Loughlin and Barlaz, 2006; Tchobanoglous and Kreith, 2002). Finally, the EPR related activities require an adequate monitoring and reporting system on the quantities of collected and recycled packaging waste – which is usually done by a state authority.

2.2. Recent literature on EPR within the European context

The recent scientific literature shows different perspectives on European EPR schemes according to the topics covered. First, a group of contributions have analysed, evaluated and/or compared national EPR schemes by focusing particularly on drivers and market conditions that influenced the development of EPR schemes and their effectiveness, the role of local authorities within EPR schemes, etc. (Cahill et al., 2011; Hage, 2007; Loughlin and Barlaz, 2006; Niza et al., 2014). The second stream of literature includes articles that investigated different aspects of economic issues related to the functioning of EPR schemes, such as who is bearing the net financial cost of packaging waste management – industry or local government (da Cruz et al., 2012; 2014), cost and benefits of waste management operators within different EPR systems (Marques et al., 2014), appropriate producer fee models (Pires et al., 2015), etc. The third stream of literature addresses the issues related to the role and potential of EPR schemes in the prevention of packaging waste generation (e.g. Tencati et al., 2016; Walls 2006). Finally, the last group represents effort focused on examining various theoretical perspectives related to EPR schemes. For example, Massarutto (2014) and Fleckinger and Glachant (2010) studied alternative models of the EPR programme, Simões and Marques (2012) overviewed the use of different methods for assessing waste cost and (in)efficiency in the overall waste sector, Baum and Schuch (2017) analysed the necessity of adjustment for distorting factors in benchmarking analysis related to cost comparison of the different forms of the EPR implementation, while Dubois (2012) highlighted a specific gap that might be created between economic theory and implementation after introduction of specific measures. In addition to these streams of scientific literature, there are several recent and significant international organization reports. For example, a recent report of the European Commission (European Commission, 2014) aimed to identify guiding principles for the functioning of European EPR systems by analysing and comparing different types of EPR presented in European member countries. An OECD[1] (2016) report provided a broad overview of key issues as well as general considerations related to the EPR mechanism (e.g. potential benefits and cost associated with EPR, the inclusivity of the EPR system in regard to the informal recycling sector, etc.).

Our review reveals that the majority of the recent literature and reports covers predominantly the context of European member countries. So far, little is known of EPR schemes' performance and challenges in the context of European non-member countries. Furthermore, only a few scientific studies provide in-depth quantitative and qualitative evaluation of the overall national EPR system related to packaging waste (including all material specific recyclables: glass, plastic, metal, paper/cardboard and wood). In order to address these gaps, by examining the Serbian packaging waste management system, we wanted to address questions such as (a) how the EPR mechanism performs in the context of an EU candidate country and (b) what are the main challenges in achieving EU recovery and recycling rates.

3. Materials and methods

3.1. Description of Serbian packaging waste management system (SPWMS)

3.1.1. Institutional framework

Serbia has a relatively young packaging waste management system

[1] The Organization for Economic Co-operation and Development.