INCLUSIVE PACKAGING RECYCLING SYSTEMS: IMPROVING SUSTAINABLE WASTE MANAGEMENT FOR A CIRCULAR ECONOMY

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ABSTRACT: Recycling can reduce the scarcity of natural resources and the negative environmental impacts of an increasing waste production, also contributing to the global effort to mitigate climate change. Innovative and low-cost methods of waste recycling have been developed by vulnerable and marginalized waste pickers who constitute the informal recycling sector (IRS), which is part of waste management systems in many developing countries. The IRS's working procedures differ from those implemented in EU recycling schemes, defining a “social” tech-nology (ST) that helps reduce overall recycling costs and amplifies amounts recovered as well as provides in-come to a poor and jobless population. This article presents a comparison of the Brazilian ST IRS with the EU recycling model, focusing on Packaging Recycling Systems. The goal is to analyze the differences and similari-ties of both models and discuss how they can learn from each other to improve the recycling rate in the world towards a Circular Economy

Keywords: Cirular Economy, waste management, waste pickers, inclusive recycling, sustainable cities, EPR for packaging

1. INTRODUCTION

It is widely recognized that waste recycling, which encompasses a part of Integrated Sustainable Waste Management (ISWM), can reduce both natural resource scarcity and negative environmental impacts of an increasing global trash production. Expanding the extent and depth of waste recycling is a key to construct a circular economy, contributing significantly to the global climate-change effort, at both local and national scales. Undertaking ISWM across the Globe, however, requires identifying affordable solutions, especially in low- and-medium-middle-income countries (LMMIC).

Some recycling initiatives from vulnerable and marginalized waste pickers (WP) in different LMMICs led to an informal waste recycling sector (IRS) (Ezeah, Fazakerley, Roberts 2013; Velis et al 2012; Medina 2000), which has developed innovative methods of waste recycling, defining a social technology (ST) which has the potential to be more widely implemented. This IRS ST is considered beneficial for the ISWM, as it reduces overall costs and amplifies the amounts recovered, as well as provides income to a poor and jobless population (Rutkowski, Rutkowski 2015). Many international agencies (OECD 2016; UN-Habitat 2010; World Bank 2008) have recommended drawing lessons from current IRS initiatives to guide policy development in this area. However, the IRS' working procedures differ from those implemented in the EU recycling schemes, which can be considered as a benchmarking case in the world. These raise questions about how these informal operators should be invited to work with, rather than against, the

ISWM systems.

Packaging is an important stream of urban waste. The recyclable materials - paper, plastics, glass and metals, that compound most packaging, represent in the LMMIC about 20 to 30% of the waste generated. In large cities in OECD countries, these represent almost half of the waste generated (OECD 2016). Reducing the amount of packaging waste ending up in a landfill it is a common target in many countries, usually achieved through the implementation of Packaging Extended Producer Responsibility (P-EPR) measures. Recently, those have been highlighted also as a way to increase the recovery of natural resources and save energy for a greater circularity in the industrial economy (Ellen MacAthur Foundation 2013).

The EU Directive on packaging (1994, updated in 2004) aims to limit the production of packaging waste and promote recycling, reuse and other forms of waste recovery. The first P-EPR schemes in the world were implemented in the 1980s in European and other rich northern countries. Nowadays, about 100 initiatives are in course in the world, most of them in these countries but also in LMMIC as Brazil, India and some African countries (IRR 2018). P-EPR practices encompass a number of different activities to engage and encourage the public to take responsible actions in relation to the products and packaging they consume, and to create recovery programs under the responsibility of companies, which need to support, at least financially, the collection and recycling of packaging waste, in addition to designing products for reuse or recycling (Tojo, Lindhqvist, Davis 2001).

In Brazil, the EPR Packaging Agreement among industry and Government, signed in 2015, sets recycling index based on the amount of recyclables collected and sorted by WP Cooperatives, and suggest increasing targets based on improving the productivity of WP work and facilities (CEMPRE, BRASIL 2015). This inclusive EPR approach constitutes an innovation to the P-EPR schemes. In developed countries, packaging recycling is totally deployed by the industry; economic and market concerns have been the main drivers of waste recycling rules (Rogoff, Ross 2016). However, this approach has not succeeded in achieving the EU CE targets (World Economic Forum, Ellen MacArthur Foundation and McKinsey &Company 2016).

This paper presents a comparative case study between the EU recycling model and the Brazilian IRS model. The Brazilian experience in P- EPR, which is being implemented in an inclusive manner, is investigated using the European experience of EPR Packaging, the first and most consolidated experience in the world, as a benchmark. Qualitative and quantitative methods were combined to analyze the models, highlighting similarities, strengths, and weaknesses of each one. The research also discusses how the two models can learn from each other to improve Circular Economy in the world and contribute decisively to solutions to recent concerns and international plastic waste prevention agreements.

2. MATERIAL AND METHODS

The comparative case study is focused is on extended producer responsibility for packaging (P- EPR) because packaging is responsible for 30 to 50% of municipal waste, and EPR has been a policy implemented in many countries to address this problem (Hwang 2007).Qualitative and quantitative research methods were combined to analyse the models.

Initially, a systematic literature review on the EU packaging recycling model was done to register the way that the P-EPR schemes have been organized in European countries as well as their main results. This review encompassed also grey literature because recent reports on the European P-EPR have been published on some professional and institutional websites in charge of the recent discussion of the new EU Circular Economy Directive that results on amendments on the EU Packaging Directive and others. Reports on several experiences implemented in Brazil to improve waste pickers' work conditions and to

contribute to their inclusion on waste management and P-EPR schemes are also analysed to complement primary data collected on different participatory activities that have been run by the researcher and her partners of ORIS- Observatory of Inclusive and Solidarity Recycling (Rutkowski et al 2017), since 2015.The abstracts of 106 entries were analysed resulting in 38 papers, reports and thesis fully read for complementing the information in both models.

Data was also collected from participant observation on some professional conferences, seminars and lectures organized to discuss how the new EU directives for Circular Economy, waste management and packaging are going to impact the EU P-EPR. Field observation through technical visits to EU recycling facilities and study tours in addition to some non-structured interviews with some key informants (Flick 2009) were done to a deeper understanding of the packaging recycling processes in Europe from a practical, operational and business' view. Interviews were done also for capturing the Brazilian waste pickers' assessment about the inclusive P-EPR model.

3. RESULTS AND DISCUSSION

EPR is environmental policy, based on "the polluter pays" principle. This aims to increase waste diversion and recycling of targeted materials - in this case, packaging. It should also lead companies to develop activities and innovation in Design for the Environment (DfE). EPR policy is implemented under different economic instruments and operating strategies around the world, but for packaging it can be summarised by producers being responsible for collecting or "tacking back" packaging from waste and treating it for recycling. To support these activities, each producer pays Advanced Disposal Fees for the amount of packaging they place on the market (OECD 2016; Gupt and Sahay 2015; Da Cruz, Simões, and Marques 2014).

In Europe, recyclable waste is collected by local authorities or by private companies hired by them. Recycling services - sorting, classifying, baling - are usually under the responsibility of different private companies. These organisations have the operational costs of these services financially supported, either fully or partially, by packaging producers (Da Cruz et al 2014; Tojo, Lindhqvist and Davis, 2001; Cahill, Grimes, and Wilson, 2011).

In Brazil, packaging producers have supported waste picker cooperatives (WPC) to improve their collection and sorting capacity (Fernandes 2016; Demajorovic et al 2014). Waste pickers are organized into cooperatives and collect household packaging, preparing the different recyclables in their cooperative's sheds for recycling, acting as the link between the waste management services chain and the recycling value chain (Rutkowski & Rutkowski 2017). In this model, they improve their working conditions and income; they do not need to work in unhealthy conditions, in dumps or on the streets as before, and can share activities and responsibilities with other waste pickers. Organized into cooperatives, they can market recyclables materials that they collect and process better than they could as individuals, reducing the transaction costs of their activities. They also feel empowered by being involved in both chains (Rutkowski & Rutkowski, 2015).

The inclusive EPR is running independently of the Local Authorities (LA) (Demajorovic & Massote 2017). In most developing countries there is a lack of responsibility of LA in implementing waste management (Silpa et al, 2018; UN-Habitat, 2010). Therefore, this scheme is providing simpler operation and an easier system for dissemination.

In this model, different types of plastics, paper and metals, regardless of their market value, are being diverted for recycling in the inclusive scheme. In Europe, where the system is market-driven, only the most valuable plastics and papers are recycled due to screening costs and other technological constraints. Thus, in the inclusive model, a wider range of packaging is being effectively recycled due to waste pickers' modus operandi, which is not based just on the value and cost-effectiveness analysis that

organizes the selective collection and processing of recyclable materials in Europe. This is very important for the Circular Economy goals and for the recycling system, contributing to the improvement of the local recycling market.

The inclusive scheme has also provided mutual learning and support for both actors: producers can better understand the local recycling market because WP can clearly point out which recyclables cannot be recycled due to market restrictions. This information can help producers on improving their DfE actions. In the other hand, WP have learnt more about, and may be closer to, the recycling industry, avoiding intermediaries. Organised nationally in cooperatives and networks, Brazilian waste pickers are able to sell their labour-power in better conditions than those observed in other countries, transforming their position in the informal recycling sector. These is important to make their ventures and the whole system more sustainable.

Quantitative analysis in the database of WPC is being conducted, to further understand the results of the system, considering the economic, social and environmental aspects. In the next step, these results will also be compared with the results achieved by EU P-EPR.

4. CONCLUSIONS

The preliminary results of the research have shown some advantageous aspects on an inclusive packaging EPR scheme. It has been providing the recycling of different materials regardless of their market value in addition to improve livelihood of a vulnerable urban population. Also, a mutual learning and networking between different economic groups is other very interesting innovation in building new approaches to Circular and Green economies. This may be particularly important in view of the recent recognition of the IRS increase in EU countries whose recovery activities are being considered as “a significant resource for cities and regions to meet or exceed ambitious EU recovery and diversion targets” (Scheinberg et al 2016).

However, some challenges also need to be addressed by the inclusive system. In the long run, the system cannot continue to ignore LA, which is legally responsible for selective waste collection. They need to be included in the P-EPR scheme, but this must be done by ensuring that WP cooperatives are hired as municipal service providers for the selective collection and continue to be paid by producers for sorting services. As observed, they should be kept in the system for best results.

Finally, recycling targets do not imply real improvements to the overall waste management system. The inclusive system studied sins for poor governance. There is no effective control of packaging marketed by producers and no action for free-riders. But this is not a problem with the inclusive system itself but is related to the ability of governments to make companies agree to pay the real costs of recycling all packaging they marketed as well as reducing quantities marketed.

However, neither this nor all other aspects described seem to impede the transposition of the model to other countries where the presence of waste pickers is registered, despite the political and institutional issues that may arise.

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REFERENCES

CEMPRE; BRASIL. Acordo Setorial para Implantação do Sistema de Logística Reversa de Embalagens em geral (2015), available at http://www.sinir.gov.br/web/guest/embalagens-em-geral

Da Cruz, N. F.; Simões, P.; Marques, R. C.(2014) Costs and benefits of packaging waste recycling systems. Resources, Conservation & Recycling, April 2014, Vol.85, pp.1-4.2014.

Demajorovic, J.; Caires, E.F; Gonçalves, L.N.da S.; Silva, M.J. da C. (2014) Integrando empresas e cooperativas de catadores em fluxos reversos de resíduos sólidos pós-consumo: o caso Vira-Lata (Interconnecting companies and waste picker cooperatives in reverse flows of post-consumer solid waste: the "Vira-Lata" case). Cad. EBAPE.BR, v. 12, Edição Especial, artigo 7, Rio de Janeiro, Ago. 2014.2014.

Demajorovic,J. ; Massote, B.. Sectoral agreement on packaging: Assessment based on extended producer responsibility/ACORDO SETORIAL DE EMBALAGEM: AVALIACAO A LUZ DA RESPONSABILIDADE ESTENDIDA DO PRODUTOR/Acuerdo sectorial de envases: Evaluacion a la luz de la responsabilidad extendida del productor. (2017) RAE, 2017, Vol.57(5), p.470(13).2017.

Ellen MacArthur Foundation (2013), Towards the Circular Economy Opportunities for the consumer goods sector, https://www.ellenmacarthurfoundation.org/publications/towards-the-circular-economy-vol-2-opportunities-for-the-consumer-goods-sector

Ezeah, C. Fazakerley, J.A.; Roberts, C.L.(2013) 'Emerging trending in Informal Sector Recycling in developing and Transitions Countries'. Waste Management 33: 2509–2519.

Fernandes, A.G. (2016) Closing the Loop - The benefits of the circular economy for developing countries and emerging economies. EPEA Brasil, Tearfund and NuReS/UFSC. 2016

Flick,U. (2009) A Introduction to Qualitative Research. Fourth Edition. SAGE Publications LTD. London/UK.

Gupt, Y.; Sahay, S. (2015) Review of extended producer responsibility: A case study approach. Waste Management & Research, July 2015, Vol.33 (7), pp.595-611.

Hwang, B.B., (2007) Unpacking the Packaging Problem: An International Solution for the Environmental Impacts of Packaging Waste. University of Baltimore. June, 2007. https://works.bepress.com/billy_hwang/1/

IRR - Iniciativa Regional para el Reciclaje Inclusivo (2018), Estudio comparativo de legislación y políticas públicas de Responsabilidad Extendida del Productor – REP para empaques y envases, by Derek Stephenson and Isabelle Faucher, www.reciclajeinclusivo.org.

Medina, M. (2000). 'Scavenger Cooperatives in Asia and Latin America', Resources, Conservation and Recycling, 31(31), pp. 51–69.

OECD (2016), Extended Producer Responsibility: Updated Guidance for Efficient Waste Management, OECD Publishing, Paris, https://doi.org/10.1787/9789264256385-en

Rogoff, M.J.; Ross, D.E. (2016). The future of recycling in the United States. Waste Management & Research. Vol.34 (3). Pp.181-183. DOI 1177/07342422X16629599

Rutkowski, J.E and Rutkowski, E.W. (2017) Recycling in Brasil: Paper and Plastic Supply Chain. Resources 2017, 6, 43; doi:10.3390/resources6030043. 2017.

Rutkowski, E.W.; Rutkowski, J.E; Lima, F.P.A; Oliveira,F.G.; Silva, L.H.; Silva, L.M. (2017) Brazilian Ob-servatory for Inclusive and Solidary Recycling. ATHENS 2017 5th International Conference on Sustainable Solid Waste Management Athens, 21–24 June 2017

Rutkowski, JE & Rutkowski EW (2015) Expanding worldwide urban solid waste recycling: The Brazilian social technology in waste pickers inclusion. Waste Management & Research 33(12) DOI: 10.1177/0734242X15607424.

Silpa,K.; Yao,L.;Bhada-Tata,P. and Van Woerden, F. (2018) What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050. International Bank for Reconstruction and Development / The World Bank, Washington, 2018. https://openknowledge.worldbank.org/handle/10986/2174.

Scheinberg, A., Nesic, J., Savain, R., Luppi, P., Sinnott, P., Petean, F., Pop F.(2016)From collision to collaboration – Integrating informal recyclers and reuse operators in Europe: a review. Waste Management& Research 2016,

Vol.34(9)820-839.DOI:10.1177/0734242X16657608

Tojo, N;Lindhqvist, T.; Davis, G.A., OECD Seminar on Extended Producer Responsibility, EPR Programme Implementation: Institutional And Structural Factors, OECD, 2001.

UN-Habitat (2010) Solid Waste Management in the World's Cities - Water and Sanitation in the World's Cities, Earthscan Publications, London, http://www.waste.nl/sites/waste.nl/files/product/files/swm_in_world_cities_2010.pdf

Velis, C.A; Wilson,D.C; Rocca, O.; Smith, S.R.; Mavropoulos, A.& Cheeseman, C.R. (2012). 'An analytical framework and tool ('InteRa') for integrating the informal recycling sector in waste and resource management systems in developing countries'. Waste Management & Research 30(9) Supplement 43–66.

World Bank, NOTE NO. 44 (2008) by Martin Medina, The informal recycling sector in developing countries Organizing waste pickers to enhance their impact, Grid Lines Publishing, www.ppiaf.org/gridlines.

World Economic Forum, Ellen MacArthur Foundation and McKinsey &Company. (2016). The New plastics Economy – Rethinking the future of plastics. http://www.ellenmacarthurfoundation.org/publications