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Empowering Waste Pickers in Brazil: A Case Study of Reverse Logistics

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Abstract

This case study explores the application of Reverse Logistics - RL in the waste pickers cooperatives in Brazil. This study also proposes a novel RL model to integrate society and recycling companies in the effort to clean up the environment and reuse the recycled products as a source of reduction in its production costs. If the government adopts changes to the relationship between the waste pickers cooperatives and manufacturing companies, that will allow municipalities to focus on issues pertinent to the local administration rather than being the "middle man" in the RL chain. With the revised model proposed in this study, waste pickers' cooperatives would negotiate contracts directly with the manufacturers, optimizing the RL chain.

Keywords: Waste Management, Reverse Logistics, Waste Pickers, Raw Materials, Recycling, Profession

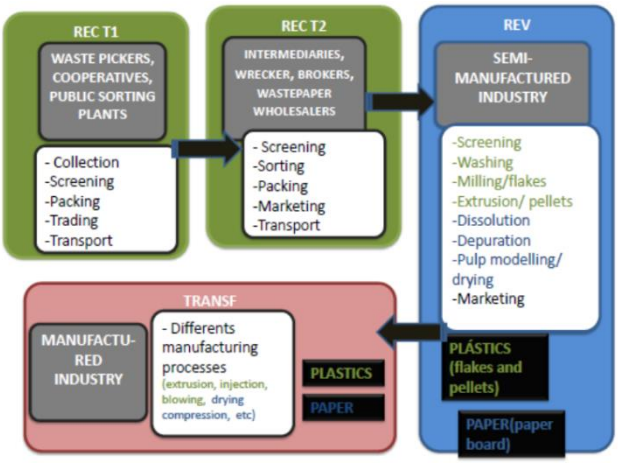
Introduction

Waste management is a concern worldwide as the population grows. According to the World Bank, cities around the globe produce annually 1.3 billion tons of solid waste, with the world seeing a per capita increase of 1.2 kilograms a day in solid waste (World Bank, 2020). By 2030, the World Bank estimates that solid waste production will reach 2.2 billion tons. In this context, the role of waste treatment and recycling is crucial for current and future generations.

In line with this concern, the topic for the present case study is Reverse Logistics (RL), broadly defined as the reverse flow of goods (Murphy and Poist 1989). I examine the relationship between suppliers of recycling materials (e.g., plastics, glass, aluminum) and manufacturers, focusing on waste pickers' cooperatives in Brazil. The following sections provide an overview of waste pickers' cooperatives in Brazil and their challenges and propose changes to their existing supply chain.

Reverse logistics and waste pickers' cooperatives in Brazil

Carter and Ellram (1999) and Rogers and Tibben-Lembke (2001) provide a comprehensive definition of reverse logistics as "the process of planning, implementing, and controlling the efficient, cost-effective flow of raw materials, in-process inventory, finished goods, and related information from the point of consumption to the point of origin to recapture value or proper disposal." In the US and other developed countries, waste haulers such as Waste Management Inc. are physically responsible for developing and supporting the development of systems to treat waste as an element that generates a new source of wealth for them (Waste Management Inc., 2021). However, in countries such as China, Thailand, and Brazil, a portion of the population survives under harsh conditions as they collect waste such as paper, aluminum, metals, plastics, and glass in public land fields as a source of income (Dias, 2016). They are



Adapted from RUTKOWSKI, VARELLA, CAMPOS (2014).

Figure 1 – Recyclable Materials RL Chain

known as "waste pickers."

Figure 1 shows the RL chain relationships and the descriptions of all activities involved in collecting and recycling recyclable material disposed of in land fields. It is noticeable that waste pickers are the starting point in the process and that there are two intermediaries (middlemen) between waste pickers and the manufactured industry. Indeed, research on the recycling production chain in Brazil shows an interdependent relationship between waste pickers and middlemen (Rutkowisk, Varella, & Campos, 2014).

The profession of the waste picker is recognized by Brazilian labor and employment law, and as of 2019, 281,025 people work in land fields collecting recyclable materials (Bouvier and Dias, 2021). Many of them work alone, selling their waste collection to the middlemen who often exploit them by paying a lower price or cheating on the weight they pay for the collected materials. Many NGOs have been working to improve the waste pickers' lives and help them work together in a *cooperative system*. This business model provides waste pickers with more bargaining power and dignity. However, only around 50,000 waste pickers are organized in cooperatives or associations.

To face the challenges in waste management, the Brazilian government has passed the National Policy on Solid Waste Act (*Politica Nacional de Residuos Solidos* – PNRS, Law No. 12305/2010). The PNRS' main goal is to use reverse logistics to engage the private sector, cooperatives, and society in the recycling process of household waste (Brasil, 2010 a-b). The idea behind the PNRS Act is that each entity involved in the production chain – from the mineral extraction to the production of goods and services, sales, consumption, and refusal, has responsibility for what happens to the product after it has been discarded. The PNRS used the principles of reverse logistics and the idea of working with third-party logistics providers, or a logistic network, that ensures an efficient product-take-back activity (Efendigil et al., 2008).

Since the law has passed, many municipalities have implemented reverse logistics, involving the community and waste pickers cooperatives in the recycling process. The Inventario Estadual de Residuos Solidos Urbanos (CETESB, 2020) shows that one of the successful states in implementing this change is the State of Sao Paulo (Figure 2). There are 128 waste pickers cooperatives in the state alone, of which 78 are legally regulated and able to participate in the program. Goncalves (2013) describes the success of the program Bolsa Recycling (*Recycling Fund*) as "important to sustain the waste pickers organizations, since the State now recognizes the services provided by them, and pay them for it." Over one thousand pickers organized in 58 cooperatives received R$6 million (approximately $2.5 million) as encouragement and recognition for their work. During this period, the amount of recyclable materials (glass, plastic, paper, and metal) collected and processed by these workers totaled 14,500 tons, which handled $5.1 million to the state economy.

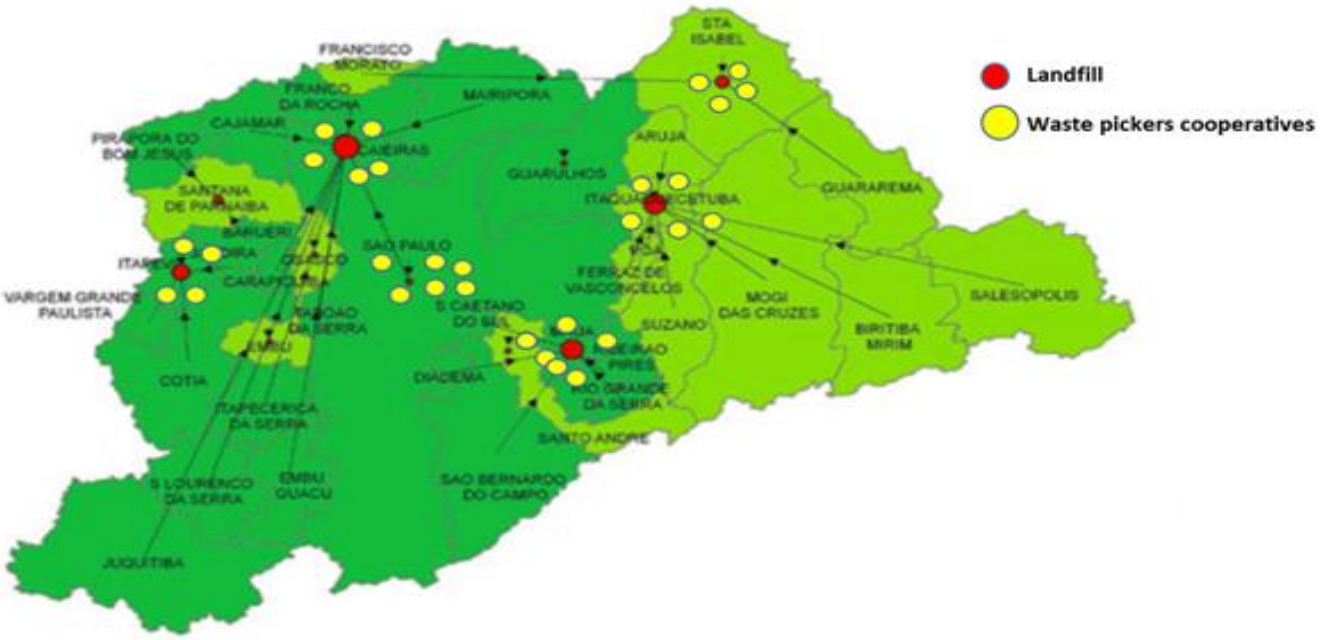


Figure 2 – Map of landfills and waste pickers' cooperatives' conglomerates in the State of Sao Paulo

Source: Adapted from CETESB (2020). Inventario Estadual de Residuos Solidos Urbanos. https://cetesb.sp.gov.br/residuossolidos/wp-content/uploads/sites/26/2021/07/Inventario-Estadual-de-Residuos-Solidos-Urbanos-2020.pdf

Nevertheless, the main issue for this program involves the political will. The Federal Government has requested municipalities to present their waste management plans, but only 60% of the municipalities have done so (Brasil, 2020). The issue relies on how cities currently manage the contracts and waste management infrastructure. Municipalities control all fees related to waste collection and are responsible for negotiating contracts with waste haulers. However, if they abide by the PNRS and engage in the consortium, they think they would lose control over the waste collection.

Examples of Reverse Logistics Initiatives

In Brazil, a network of waste pickers cooperatives has established the "National Movement of Recyclable Materials Waste Pickers" (MNCR in Portuguese). With the support from researchers from Fundação Getulio Vargas- FGV Rio de Janeiro, the Avina Foundation, and the Exchange Green Rio de Janeiro, MNCR has proposed reverse logistics credits (Fergutz, Dias, and Miltin, 2011). When placing a product on the market, companies issue a certificate by which they respond to the fate of their packaging (i.e., tire industry and battery manufacturers).

The follow-up and monitoring will vary according to the product and the region. It is crucial to consider the connection between the amount of wasted potential in the market and the allocation of the company's arrangement for recovery. After collecting, triaging, and sending materials to a recycling facility, waste pickers receive a certificate of credit issued by their cooperative. The company can purchase the certificate (i.e., aluminum recycling companies) to guarantee that their product had proper disposal.

A variation of the reverse logistics model credits is the Bolsa Recycling adopted by the state of Sao Paulo's government. Cooperatives and waste pickers associations receive government financial incentives based on the collected volume of material - paper, cardboard, plastics, metals, glass, and other post-consumer, as provided in the regulations (Law No. 19823/2011 Decree No. 45975/2012). The incentive is granted every quarter in the form of financial aid. Financial incentives are transferred to the cooperative or association, and at least 90% should be transferred to the waste pickers, the cooperative members, or associated collectors. The cooperative or association allocates the remaining 10% to cover administrative costs or management expenses, invest in infrastructure and equipment acquisition, and waste pickers training programs. The cooperatives and associations work alone with their waste pickers members since there are almost no incentives from the private sector to support the collection of recyclable materials (Abrelpe, 2020).

One exception is the Plastic Bag Recycling program. The program aims to encourage the reintroduction of recyclable materials in the production processes, reduce natural resources and energy use, and promote the social inclusion of waste pickers. It resembles the reverse logistics credit system because the amount transferred is proportional to the collected material. However, there is a limitation in the method in which the government is responsible for paying the cooperative, not the private sector (Abrelpe, 2020).

Recommendations: Changes to the cooperatives' relationships with government and private sector companies

As discussed in the previous sections, waste pickers provide an excellent service to society and are now getting organized in cooperatives to have more bargaining power with intermediaries. To bring more value to cooperatives, waste pickers should be placed in a more critical position in the RL Chain (Figure 3).

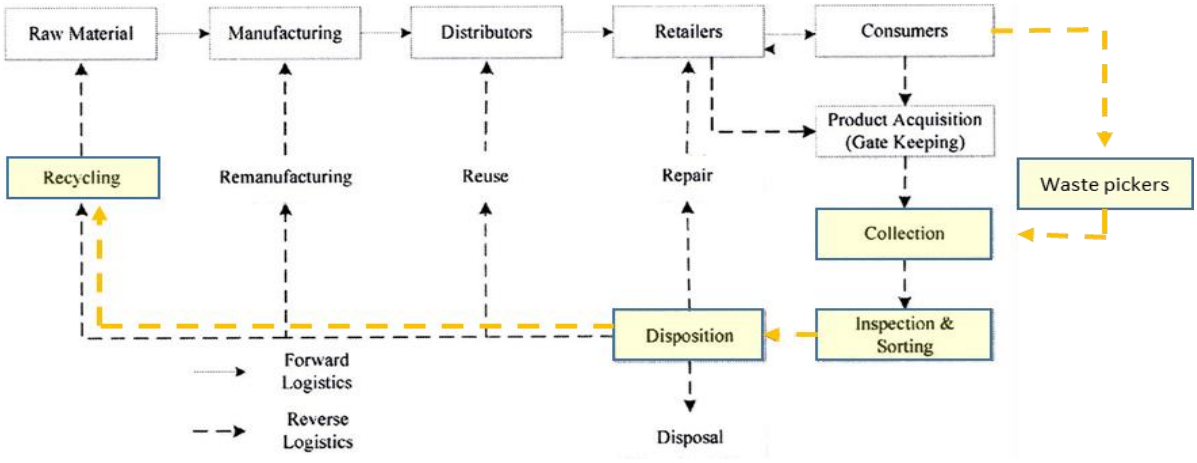


Figure 3 – Forward and Reverse Logistics processes and the waste pickers
Source: Adapted from Tibben-Lembke and Rogers (2002). I have added yellow arrows and waste pickers to the model.

To reposition the waste pikers in the RL chain, we recommend a direct relationship between the integrated waste pickers cooperatives (IWPC) and the manufacturing industry, thus eliminating the middlemen. The Reverse Logistics Model, shown in Figure 4, represents the cycle of goods from consumption to the recycling process and back to the market as new goods originated from recycling materials. The model also shows the role of the IWPC in the Reverse Logistics process. The IWPC's role is to collect all kinds of recycled materials such as glass, plastic, paper, cardboard, etc. In addition to the collection, the IWPC should also be involved in the pre-processed recycled materials, such as cleaning, sorting, packing, and delivering the recycling materials to the manufacturing companies.

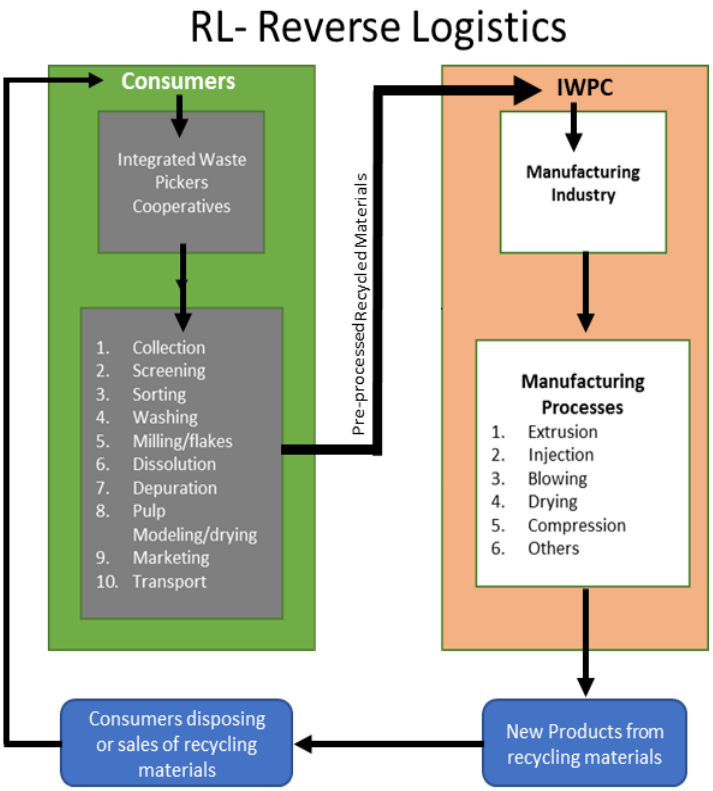


Figure 4 – Integrated Waste Pickers Cooperatives (IWPC) Recyclable Materials RL Chain

Establishing strategic alliances between the IWPCs and the manufacturing industry is crucial to implementing RL - reverse logistics. The recycling manufacturing companies would provide the means to develop the required infrastructure, technological resources, and skills.

A pertinent question is *How to encourage manufacturing companies that use recycled materials in Brazil to support RL initiatives?* The answer to the question of pressing the manufacturing companies to support RL and IWPC would be two prongs. First, the IWPC would increase the scale production of recyclable materials and reduce the costs of processing time and transferability (middle man). Second, from a manufacturing perspective, there would be a reduction in the costs of the raw materials and an optimization of the communication channel.

One of the limitations of integrating IWPC into a reverse logistics system is the cost of building and maintaining extensive recycling and processing facilities. We recommend the establishment of a *recycling network.* Blackburn, Guide, Souza, and Wassenhove (2004) demonstrate that investment costs are high because of the necessary investment in equipment and technology required for recycling. Thus, the supplier (waste pickers cooperatives) must have a high volume to make the investment economically viable, suggesting that WPC adopts a centralized and open-loop network structure with a small number of levels should be used.

Barros et al. (1998) developed a model focusing on warehouse location, capacities, and optimal number in a case study about recycling sand refusal from construction sites. Their results show that location theory in waste and recycling management helps provide solutions and models for creating new complex networks. They found that the best way to deal with uncertainty related to processing plant location is to choose the site that allows the lowest logistics cost from the network availability. Indeed, recycling networks are not vulnerable to variability in supply volume and demand, requiring careful coordination between suppliers and buyers (Fleishmann et al., 2000). Hence, waste pickers' cooperatives can establish voluntary- rather than forced compliance agreements with manufacturers.

Conclusion

The improved RL process could be an alternative to waste pickers in developing countries and to society as a form to recycle its waste. Companies could take advantage of optimizing their production costs. There is still the issue of public awareness and education on environmental protection and the recycling processes, and most importantly, the political will in countries such as Brazil. However, if the government adopts changes to the relationship between IWPC and manufacturing companies, that would allow municipalities to focus on issues pertinent to the local administration rather than being the "middle man" in the RL chain. With the revised model proposed in this study, waste pickers' cooperatives would negotiate contracts directly with the manufacturers, optimizing the RL chain.

Works Cited

Abrelpe (2021). Panorama dos Resíduos Sólidos no Brasil. http://www.abrelpe.org.br/panorama.

Barros, A. I., Dekker, R., & Scholten, V. (1998). A two-level network for recycling sand: A case study. *European Journal of Operational Research*, 110(2), 199-214.

Blackburn, J. D., Guide Jr., V. R., Souza, G. C., & Van Wassenhove, L. N. (2004). Reverse Supply Chains for Commercial Returns. *California Management Review*, 46(2), 6-22.

Bouvier, M., Dias, S. (2021). Waste Pickers in Brazil: a Statistical Profile. Women in Informal Employment: Globalizing and Organizing, *Statistical Brief*, 29, 1-12.

Brazil (2010). Política Nacional de Resíduos Sólidos. http://www.planalto.gov.br/ccivil_03/_ato2007-2010/2010/lei/l12305.htm.

Brazil (2020). Plano National de Residuos Solidos. https://smastr16.blob.core.windows.net/conesan/sites/253/2020/11/pnrs_2020.pdf

Carter C. R., Ellram, L. M., (1998). Reverse Logistics: a review of the literature and framework for future investigation. *Journal of Business Logistics*, 19(1), 85-102.

Dias, S. M. (2016). Waste Pickers and Cities. *Environment and Urbanization*, 28(2), 375-390.

Efendigil, T., Onut, S., Kongar, E. (2008). A holistic approach for selecting a third-party reverse logistics provider in the presence of vagueness. *Computers & Industrial Engineering*, 54(2), 269-287.

Fergutz, O., Dias, S., Miltin, D. (2011). Developing Urban Waste Management in Brazil with Waste Picker Organizations. *Environment & Urbanization*, 23(2), 597-608.

Fleischmann, M., Krikke, H.R., Dekker, R., Flapper, SD (2000). A characterization of logistics networks for product recovery. *Omega*, 28(6), 653-666.

Goncalves, J. P. (2013). Programa de Gestao Integrada de Residuos Solidos Urbanos. Centro Mineiro de Referencia em Residuos. http://www.servas.org.br/projetos-e-programas/cmrr-2/.

Murphy P.R., Poist R. P. (1989). Managing of Logistics Retro movements: an empirical analysis of literature suggestions. *Journal of the Transportation Research Forum*, 29(1), 177-184.

Tibben-Lembke, R. S., Rogers, D. S. (2002). Differences between forward and reverse logistics in a retail environment. *Supply Chain Management*, 7(5), 271-282.

Rogers, D. S., & Tibben-Lembke, R. (2001). An examination of reverse logistics practices. *Journal of Business Logistics*, *22*(2), 129-148.

Rutkowisk, J., Varella, C., Campos, L. (2014). Recycling of Municipal Solid Waste in Brazil: Challenges and Opportunities for Expansion. *ISWA Solid Waste World Congress.*

Waste Management Inc. (2021). Company Deals and Alliances Profile. GlobalData, https://www.proquest.com/docview/2262605165.

World Bank (2020). "What a waste. A global review of solid waste management". https://datacatalog.worldbank.org/search/dataset/0039597.