



Influence of the expansion of the selective collection in the sorting infrastructure of waste pickers' organizations: A case study of 16 Brazilian cities



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ARTICLE INFO

Article history:

Received 15 September 2017

Revised 3 May 2018

Accepted 5 May 2018

Keywords:

Recyclable market

Waste pickers' organizations

Solid waste

Economic analysis

Brazil

Selective waste collection

ABSTRACT

Although recycling is a viable alternative to minimizing the impacts of the Municipal Solid Waste (MSW), identification of the local recycling market is a requirement for its empowerment. This paper aims to assess the recyclable solid waste market in 16 cities of Brazil. Through the application of interviews, field research and secondary data collection this research observed that while relying on poor infrastructure and on Government subsidies, the 12 pickers organizations surveyed can deliver 18.53% of recyclable waste to recycling with an average sorting productivity of 109 kg/picker/day and average earnings of US\$ 293.40/picker/month. Based on the validated methods, 17% of these organizations were classified as having average efficiency, whereas 82% of them operated with very low efficiency. The investment required for the adequacy and expansion of the sorting capacity of waste pickers' organizations has been estimated at US\$ 2.5 M, which could be counterbalanced by the savings with the current US\$ 2 M/year spent with the disposal of recyclable waste into landfills. We also estimate new 189 job openings in the pickers' organizations to meet the requirements of the proposed scenario, contrasting with the current 93 cooperative members currently formalized. Regarding the consumer market, only few recycling companies were identified in the region, which may justify the low price paid for waste. The market for recyclables is mostly composed of micro and small companies that generally carry out the collection, transportation, sorting, and commercialization.

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1. Introduction

Following a lengthy bureaucratic process at the Brazilian National Congress, the Federal Law 12,305 was approved in 2010, enforcing the National Policy on Solid Waste (NPSW) and becoming a regulatory framework for solid waste management in Brazil. NPSW cover topics such as prioritization of solid waste management actions, promotion of social inclusion, intensification of environmental education actions, selective collection, reverse logistics and shared responsibility for the product life cycle, additionally to the economic management for its effectiveness.

Among other obligations, the NPSW determines that municipalities must eliminate dumps and install sanitary landfills, which will only receive tailings, in addition to preparing their Integrated Solid Waste Management Plans in order to continue having access to Federal Government resources (BRAZIL, 2010). These should count

on the implementation of selective collection with the participation of cooperatives or other kinds of pickers' association of reusable and recyclable materials formed by individuals with low-income (BRAZIL, 2010).

In 2012, a proposal for a National Waste Plan was published which provided the total elimination of the dumps until 2014, as well as the progressive reduction of recyclable waste disposed in sanitary landfills. However, due to some difficulties encountered by municipalities in meeting the proposed goals, the Federal Senate approved in 2017 an amendment that establishes deadlines varying between 2018 and 2021 according to the population size of the municipality.

The main difficulties are related to an inadequate solid waste management planning to meet the NPSW, which often leads to a higher cost associated to a correct waste disposal. According to Gunther and Grimberg (2006), a significant challenge for municipalities, being responsible for urban cleaning services and solid waste management, is the transition from the current waste management model, which is based on grounding, to a model aimed at selective collection, recycling, and social inclusion.

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Waste pickers' associations and cooperatives, although being central in integrated solid waste management, require information to maximize their profitability through the valuation of recyclable waste. The organizations are not homogeneous and there is no data available to clarify the heterogeneity among them. Brazil has more than 5000 cities with a strong diversity of socioeconomic levels, and reality is that several cities do not even have pickers' organizations while in some others these organizations could be considered as embryonic. It is clear that there is a lack of investment in municipal solid waste management and public policy systems focusing on waste recycling.

According to Spies and Scheinberg (2010), Wilson et al. (2009), and Asim et al. (2012), these organizations are driven by the market and are dependent on their sales and on the city subsidies. In agreement with previous observations (Cardenas and Casanova, 2010), the lack of market knowledge makes wastes pickers vulnerable to competition with intermediate business firms that profit from negotiating with the recycling industry.

In Brazil, most of the cities' waste management systems favor the segregation of recyclable residues (dry waste) from organic residues (wet waste). Regarding recyclable residues, Brazilian cities employ a combined collection system with door-to-door picking and volunteer delivery points. In both cases, the presence of formal and informal pickers is noticed (Tirado-Soto and Zamberlan, 2013). In Abidjan/Ivory Coast, the picking is exclusively made by individual pickers and associates (Andrianisa et al., 2016), and in Suzhou the informality of the recycling system has been prioritized while a formal system has just started to develop (Fei et al., 2016). Even in refugee camps, recycling is able to provide jobs, as demonstrated in a study on the composition of municipal solid waste generated at the Zaatari Syrian Refugee Camp (Saidan et al., 2017) – nevertheless it is still required a recycling project to organize the system. Typically, collected recyclable residues are directed to sorting sheds for segregation of the marketable fraction, then compressed and bundled. The rate of recycling of a given material depends on its yield, the existence of local markets, the demand for secondary raw materials, the level of governments financial and regulatory interventions, the value of primary raw materials, and the treaties related to commerce (Wilson et al., 2006). Within this economic structure, formal and informal pickers constitute the bottom of the economic pyramid, which grows in terms of earnings, but decreases in number of individuals (Tirado-Soto and Zamberlan, 2013; Wilson et al., 2006).

It is worth stressing that, when it comes to recyclable solid waste from selective collection, the market is often non-regulated. Thus, in the negotiation process, aspects such as legal regulation, competition and production costs are not considered, leaving the final product price to be defined solely based on the stakeholders' agreement.

A recent study conducted by Lima and Mancini (2017) in Sorocaba City, Brazil, concludes its findings in light of the importance of waste pickers' inclusion in the formal labor system as well as the integration of the informal recycling sector with public participation. Similarly, Aparcana (2017) reports that in low- and middle-income countries legal policies and changes are fundamental for the formalization of waste pickers' organizations in the recycling market. In addition, Ghisolfi et al. (2017) measured the impact of such legal incentives and bargaining power obtained by the volume of collected waste on the efficacy of waste pickers' formalization. The authors identified that the result of the implementation of a waste policy at any level (federal, state or municipal) in addition to the increase of selective collection coverage will inevitably require an expansion of physical infrastructure and workers qualification, as the present article aims to measure. Similarly, for electrical and electronic waste management, the absence of an appropriate physical structure for the accumulation of the sorted

solid waste – which would allow greater bargaining power – is a critical factor to ensure the effective inclusion of waste pickers in formal management. Once the initial demand for secondary raw material is given by typical recycling industries, the description of this local market is of paramount importance for the determination of the expansion capability of the market. Figueiredo (2012) describes recycling as a profitable activity and highlights that Brazilian recycling industry is in development since 1990s with high recycling rates for some materials such as aluminum and cardboard. It has to be emphasized that industries which incorporate recyclable waste into their production chain, despite having the potential to become one of the most important sectors of the Brazilian economy, are mostly doing so exclusively to satisfy economic demands, leaving the environmental contribution in the background (Lino et al., 2010; Figueiredo, 2012).

Aspects such as value added to solid waste, increase in number of informal pickers, scrap dealers, recycling companies and other private enterprises interested in collecting and trading recyclable residues, as well as the rise of unemployment starting in the 1990s and the implementation of Brazilian public policies were essential for the expansion of the recycling rate and of the number of pickers organizations in Brazil (Demajorovic et al., 2004). According to some data from the Global Alliance of Waste Pickers (GAWP), these organizations are also present in about 30 countries worldwide, covering mainly Latin America, Asia and Africa (Fernández et al., 2014).

Formalization of individual pickers into organizations such as cooperatives or associations tends to reduce the social vulnerability of pickers, providing them with social and economic support, while pickers working individually face a limited capacity of waste processing and storage, and can also be easily exploited (Wilson et al., 2006). For Gutberlet et al. (2013), the formalization process is also a transforming factor of human dignity, bringing social equity for those formerly living from waste picking in landfills and on the streets. Also, the less organized the entity, the smaller its capacity of adding value to recyclable waste, thus, leaving them more vulnerable to middlemen exploitation (Wilson et al., 2006).

Several studies conducted in Brazil (Ghisolfi et al., 2017; Lima and Mancini, 2017; Campos, 2014; Castilhos Júnior et al., 2013; Tirado-Soto and Zamberlan, 2013) have advanced the knowledge that the participation of the pickers within the recycling chain can represent savings of resources to the Municipal Solid Waste System (MSWS). According to these authors, the pickers act on the reintegration of residues which would have been disposed otherwise in addition to promoting environmental gains and minimization of grounding costs. The authors also point out that the waste pickers' organizations lack incentives to promote the pickers' organization and insertion into the formal recycling market.

International research (Hartmann, 2018; Aparcana, 2017; Saidan et al., 2017; Andrianisa et al., 2016; Fei et al., 2016; Suthar et al., 2016; Dos Muchangos et al., 2015; Matter et al., 2015; Gutberlet, 2013; Asim et al., 2012; Atienza, 2010; Cardenas and Casanova, 2010; Chen et al., 2010; Zhang et al., 2010; Gunther and Grimberg, 2006; Wilson et al., 2006; Haan et al., 1998) show that the investigation concerning the issue of waste pickers is recent (about ten years) and that its existence is directly related to developing countries as, for instance, Bangladesh, Bulgaria, China, Côte d'Ivoire, India, Jordan, Mozambique, Nicaragua, Pakistan, Philippines, and Singapore, in which the pickers are sometimes the only option in the diversion of municipal solid waste to recycling.

Based on the research carried out for the preparation of the study, it is verified that a lack of database about selective collection and the picker's organizations is also seen in other regions of Brazil, which makes difficult an implementation of a strategic planning of the national recycling market. For Gunther and Grimberg (2006),

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