



Reverse Logistics Credits

A social and environmental
innovation to address urban
waste and recycling

A case study of BVRio in Brazil







BVRio Institute (www.bvrrio.org) is a non-profit association created in 2011 with the objective to develop market mechanisms to facilitate compliance with Brazilian environmental laws. iBVRio is a Climate Action Leader of the R20 Regions for Climate Action initiative, and received the Katerva Awards 2013 for Economy. BVRio was created in partnership with the Secretariats of Environment and Finance of Rio de Janeiro's state and municipal government, and its governance structure includes representatives of the Brazilian Fund for Biodiversity (Funbio), the Brazilian chapter of the World Business Council for Sustainable Development (CEBDS), Brazilian Foundation for Sustainable Development (FBDS), Federal University of Rio de Janeiro (COPPE - UFRJ), E2 Socio Ambiental, the Instituto Pereira Passos of urban planning, and Pacto para o Rio.



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Introduction

Solid waste management is a serious global challenge, usually concentrated in urban centres. Today, world cities generate about 1.3 billion tonnes of solid waste per year, and this amount is expected to double over the next 20 years in lower income countries².

The consumer goods industry, which generates around US\$ 12 trillion in annual sales and spends approximately US\$ 3 trillion on raw materials, is responsible for the vast majority (75%) of municipal solid waste³. At the same time, recycling and reutilization of materials could result in savings exceeding US\$ 1 trillion⁴.

Globally, solid waste management costs more than US\$ 200 billion⁵, placing a financial burden on municipal governments that do not always have the resources to ensure the proper collection and destination of these residues.

While most types of solid waste can be collected and recycled, recycling rates in developing countries are still very low. The remaining waste is landfilled, incinerated or remains uncollected, contributing to public health impacts and flooding, as well as air, water and ocean pollution.

Failure to recycle waste also results in significant and unnecessary greenhouse gas (GHG) emissions. For many materials, the emissions generated by recycling are significantly lower than those from the production and use of virgin raw materials⁶.

Failure to recycle also squanders a financial opportunity worth more than US\$ 30 billion per year⁷. This is particularly unfortunate, given that waste separation and recycling in developing countries tend to involve and benefit low-income groups.

This paper describes a market mechanism to incentivize the collection, separation and recycling of solid waste, the results of an initial trial in Brazil, and proposals to scale up its use.

1 _ World Bank, 2012: What a waste. A Global Review of Solid Waste Management. Daniel Hoornweg and Perinaz Bhada-Tata. March 2012, No. 15 - http://siteresources.worldbank.org/inturbandevelopment/Resources/336387-1334852610766/What_a_Waste2012_Final.pdf

2 _ Ibid, and Abramovay, R., Speranza, J. and C. Petigand, 2013: Lixo zero: gestão de resíduos sólidos para uma sociedade mais próspera. Planeta Sustentável, Instituto Ethos, São Paulo 2013: www3.ethos.org.br/wp-content/uploads/2013/09/Residuos-Lixo-Zero.pdf

3 _ Ellen MacArthur Foundation, 2013: Towards the Circular Economy. Opportunities for the consumer goods sector. 2013. www.ellenmacarthurfoundation.org/business/reports/ce2013

4 _ International Solid Waste Association ISWA and UNEP, 2015: Global Waste Management Outlook 2015. United National Environment Programme - www.unep.org/ietc/Portals/136/Publications/Waste%20Management/GWMO%20report/GWMO%20full%20report.pdf

5 _ World Bank 2012 (ibid).

6 _ ISWA e UNEP 2015 (ibid).

7 _ UN-HABITAT, 2010: Solid Waste Management in the world's cities. Water&Sanitation in the world's cities 2010. Malta.



Márcia Foletto / Agência O Globo

1. Background

1.1 Waste management and the industrial sector in Brazil

Brazil produces about 67 million tonnes of solid waste per year⁸, and only about 1% is recycled⁹. It is estimated that the value of wasted recyclable materials in Brazil amounts to more than US\$ 3 billion a year¹⁰. Waste management is one of the most challenging tasks facing municipal governments¹¹. Less than 3% of all household waste in Brazil is segregated¹² and segregated collection of waste is only available in 14% of municipalities¹³.

The National Solid Waste Legislation (PNRS¹⁴), announced in 2010, aims to create solutions to the challenge of solid waste generation and disposal in Brazil. The law creates the concept of shared responsibilities for the collection and disposal of solid waste generated by a range of industrial and commercial sectors. These legal obligations apply to producers, importers, retailers and distributors from seven industrial sectors (tyres, lubricating oils, batteries, pesticides, fluorescent lamps, electric and electronic products) and packaging in general (which may involve different sectors and approaches).

Producers and importers of these products need to ensure that they are appropriately disposed of at the end of their lifetime. This requires the development of systems for the collection, recycling, re-use or environmentally appropriate disposal of such products (referred to as the 'reverse logistics' of the original supply chain associated with these products). These obligations are creating challenges among the sectors directly affected by the legislation, some of which are a great distance along the supply and consumption chain from the final waste generated from the products originally sold.

The consumer goods industry is pre-occupied with the difficulties and costs associated with developing and operating 'reverse logistics' systems to collect the residues derived from their products. Given the disaggregated nature of waste generation, the collection and recycling

8_ Abrelpe 2012: Panorama dos resíduos sólidos no Brasil. www.abrelpe.org.br/panorama_apresentacao.cfm

9_ Waste Atlas, <http://www.atlas.d-waste.com>

10_ IPEA (Instituto de Pesquisa Econômica e Aplicada), 2010: Pesquisa sobre pagamento por serviços ambientais urbanos para gestão de resíduos sólidos.

11_ Governo de São Paulo, ISWA e Abrelpe, 2013: Resíduos Sólidos: Manual de boas práticas no planejamento.

12_ IPEA, 2013: Situação Social das Catadoras e dos Catadores de Material Reciclável e Reutilizável.

13_ CEMPRE (Compromisso Empresarial para Reciclagem), 2015: Relatório CEMPRE 2015 (www.cempre.org.br).

14_ Política Nacional de Resíduos Sólidos, Lei 12.305 de 2 de Agosto de 2010.



Michael Gaida

of consumer goods packaging is particularly challenging (see Box 1). This report focuses on a system created for the packaging sector, but also describes a model developed for the automobile tyre sector (see Annex1).

Companies are working on alternative arrangements to meet their obligations. In most cases, this has been done through sector associations, such as CEMPRE¹⁵, Abividro¹⁶ and Reciclanip¹⁷. In other cases, it involves independent waste pickers (see next section).

15 www.cempre.org.br

16 www.abividro.org.br

17 www.reciclanip.org.br



Box 1: Need for industry involvement

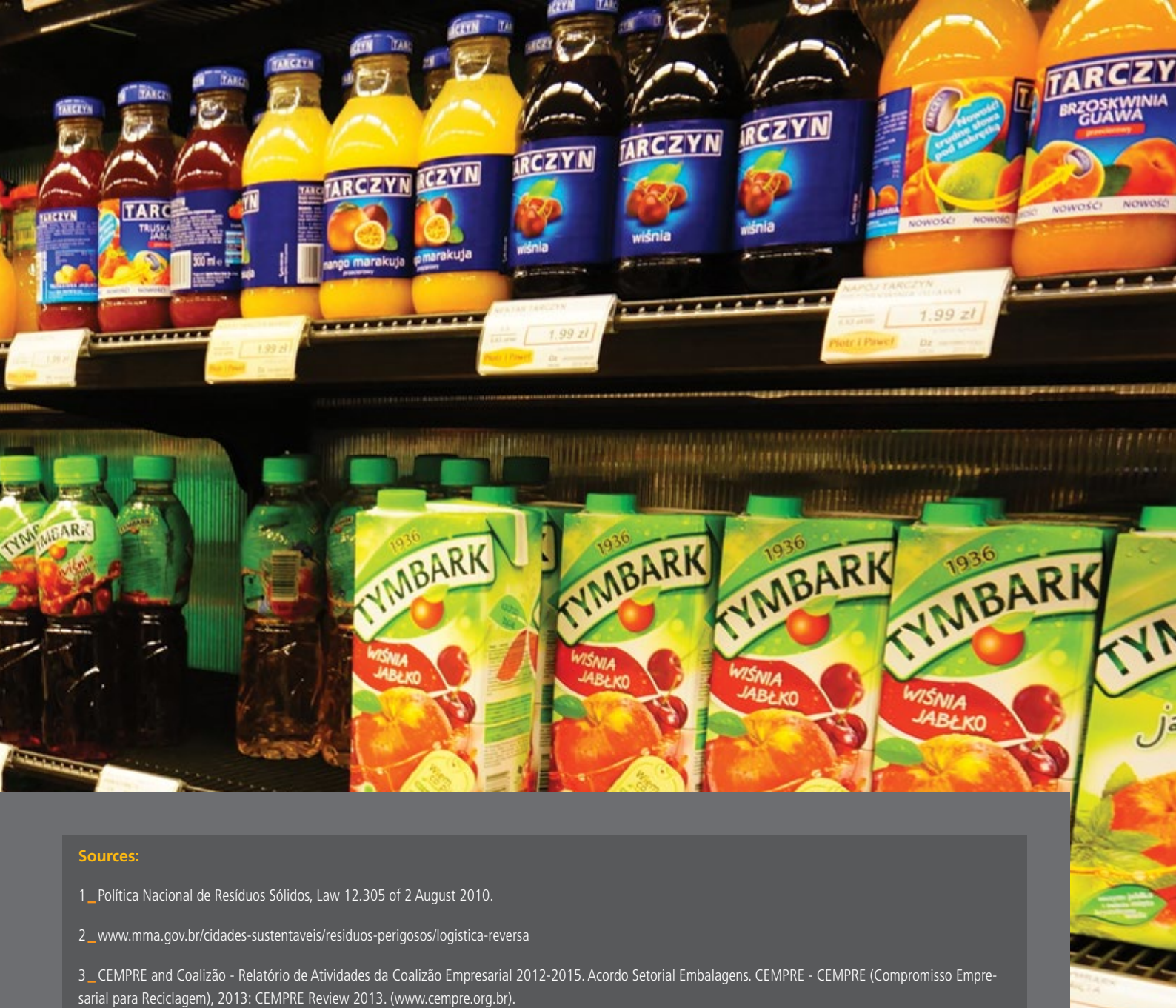
Following years of negotiation, in 2010 the Solid Waste Legislation (PNRS) was approved in the Brazilian Congress¹, but its associated regulations took another five years to be developed². In order to maintain the involvement of the industrial sector, the government devolved to the private sector the task of proposing a Sector Agreement describing how industry intended to comply with the obligations of the law.

In the case of the packaging sector, negotiation of the Sector Agreement was conducted through an industry association that includes, and is led by, most of the large, international household brands³. Despite the importance of their role in the reverse logistics cycle, waste pickers were not involved in the negotiations of the terms of this Agreement.

The unequal political bargaining power of the industry and the waste pickers – on the one hand, an association whose members combined turnover amounts to some US\$ 300 billion a year, and on the other, Catadores with an average income of US\$ 150 a month⁴ – created a dysfunctional process that resulted in a Sector Agreement devoid of positive social-environmental benefits⁵. Industry, led by large international companies, opposed the concept of directly remunerating the Catadores for the reverse logistics service they provide, and chose to continue to benefit for free from the environmental work done by some of the lowest income groups in Brazil⁶.

At the same time, some of the international companies involved in these negotiations have also made strong commitments in their home countries, assuming financial responsibility for the collection and adequate destination of the used packaging of their products⁷.

There is a need, consequently, to find ways to encourage these large brands to adopt similar responsibilities in Brazil. A positive approach to the implementation of the Brazilian Solid Waste Legislation has the potential to bring unprecedented social and environmental benefits. And this should not be compromised by the short-term objective of profit generation of large international brands.



Sources:

- 1_ Política Nacional de Resíduos Sólidos, Law 12.305 of 2 August 2010.
- 2_ www.mma.gov.br/cidades-sustentaveis/residuos-perigosos/logistica-reversa
- 3_ CEMPRE and Coalizão - Relatório de Atividades da Coalizão Empresarial 2012-2015. Acordo Setorial Embalagens. CEMPRE - CEMPRE (Compromisso Empresarial para Reciclagem), 2013: CEMPRE Review 2013. (www.cempre.org.br).
- 4_ IPEA, 2013: Situação Social das Catadoras e dos Catadores de Material Reciclável e Reutilizável.
- 5_ www.sinir.gov.br/web/guest/embalagens-em-geral
- 6_ A series of examples can be listed of companies that object to the direct remuneration of Catadores while, at the same time, benefiting from the services provided (including significant marketing benefits). See, for instance, Coca Cola, 2012: Relatório de Sustentabilidade 2010/2011. Sustentabilidade em cada gota.
- 7_ At its December 2014 meeting, the Board of the Consumer Goods Forum Board approved... the concept of a circular economy... to eliminate the concept of waste from their products and services,... Its members will... maximize the social and economic value of any waste still produced via materials and energy recovery and work with the informal waste sector and others to establish pilots to improve the effectiveness and efficiency of informal waste systems (www.theconsumer-goodsforum.com/sustainability-strategic-focus/waste).

1.2 The role of waste pickers (Catadores)

While companies and the public sector try to devise ways to meet the objectives of the PNRS, Brazil currently has more than 800,000 independent waste pickers known as Catadores, a low income group who make a living by collecting recyclable materials in the streets, rubbish dumps and landfills of Brazil. The Catadores are important actors in this waste management chain and should be a part of the solution¹⁸.

The needs of private companies, the public sector and independent Catadores can be met if implementation of the PNRS legislation involves both the producers of waste and those involved in its collection, disposal and recycling. This can be accomplished by allowing those obliged to pay for the reverse logistics of their products (i.e. the industrial and retailing sectors) to 'subcontract' certain activities to those currently involved in collection and disposal (i.e. the cooperatives of Catadores).

Recognizing this reality, the Solid Waste Legislation emphasizes the need for the involvement of Catadores in any policy to address the solid waste challenges posed to the various industrial sectors affected by the law. At the same time, the involvement of Catadores in this activity has potential to contribute to the social and economic inclusion of this large group in the production cycle¹⁹.

In order to contribute to their empowerment and improve their welfare, over the last 15 years the Brazilian government has promoted the organization of Catadores into cooperatives that support their economic development. A series of government-led programmes, such as Programa Pró-Catador²⁰ and Cataforte²¹, have promoted the organization of Catadores into cooperatives and networks. Today, there are more than 1100 waste pickers cooperatives throughout Brazil²².

Historically, waste collector cooperatives either operate independently or enter into contracts with municipal agencies or companies for waste

18 _ www.mnrc.org.br

19 _ Law 12.305. See also, IDB 2013: Preparing informal recycler inclusions plans – an operational guide. (www.iadb.org)

20 _ Programa Pró-Catador, Decree 7405, Dec 2010, from Ministry of Labour and Employment (Ministerio do Trabalho e Emprego), allocated R\$ 185 million to state and municipal governments, with a view to promoting the social and economic inclusion of Catadores

21 _ Project Cataforte (Fortalecimento do Associativismo e Cooperativismo dos Catadores de Materiais Recicláveis) is a partnership between Fundação Banco do Brasil and the Secretary of Inclusive Economy (Secretaria Nacional de Economia Solidária) of the Ministry of Labour (Ministério do Trabalho e Emprego) and involves capacity building of over 10,000 Catadores in 18 states of the country.

22 _ Sistema Nacional de Informação de Sanamento Básico (SNISE), 2014. Diagnostico de RSU SNISE 2014. Ministério das Cidades.

screening. The terms of these contracts are often established by the counterpart organizations and are not always advantageous to the cooperatives²³. This problem is exacerbated by cooperatives' lack of working capital. Most individual waste pickers need to be paid for the waste collected on a daily basis, and as a result cooperatives cannot accumulate enough recyclable materials to justify the freight costs to sell them to recycling facilities. Instead, they sell their materials to intermediaries, at a lower price, in order to generate cash flow.



Pedro Guimle, Videovideo

The National Association of Collectors of Recyclable Waste (Movimento Nacional dos Catadores de Materiais Recicláveis)²⁴ was formed in 2001 in order to achieve stronger political bargaining power, to have the class recognized as a professional category, and to create a focal point for negotiations (see Box 2). The National Association is organized into chambers, which are located in each state of Brazil. Their presence all over the country facilitates the challenge of collecting and screening different types of waste materials prior to sending them for recycling or to appropriate final destinations.

23 — IPEA, 2013: Situação Social das Catadoras e dos Catadores de Material Reciclável e Reutilizável.

24 — www.mncr.org.br

Indeed, the 'Catadores' results are impressive. More than 95% of the



Luciana Freitas/ BVRio

Separation warehouse of Rede Recicla Rio Cooperative.

25 _ See statistics of Abралatas (Associação Brasileira Abралatas) – www.abралatas.com.br.

26 _ The price of aluminum can can reach up to R\$ 3000/ton (US\$ 850/t), www.cempre.org.br/servico/mercado.

27 _ Recycled glass costs around R\$70/ton (US\$ 20/t), www.cempre.org.br/servico/mercado.

28 _ Abividro, www.abividro.org.br.

29 _ Abiplast (2012), in Abrelpe 2014: Panorama de resíduos sólidos do Brasil – www.abrelpe.org.br.

aluminium cans produced are recycled²⁵. This is only made possible by the work of the Catadores, and because the raw material's high value creates a meaningful economic incentive for its collection²⁶. At the same time, raw materials with lower value face a more difficult challenge. Glass, for instance, is cheap²⁷ and is difficult to collect, as it is bulky, breaks and cuts. According to the Brazilian Association of Glass Producers (Abividro), less than 50% is recycled, despite unfilled demand from the industry²⁸. Plastic recycling is even lower at less than 21%²⁹.

As well as differences in price between materials, there are also seasonal variations. For example, following the festive season of carnival – and the associated increase in beer and softdrink consumption – the price of aluminium cans falls. This price differential between materials, combined with seasonal fluctuations results in a sub-optimal range of materials being recycled, with some materials neglected by waste pickers.

In general, the remuneration of Catadores is based only on the sale of the recyclable materials that they collect. There is no system to remunerate the cooperatives for the environmental aspect of their work (i.e. the collection and final destination of recyclable materials), which

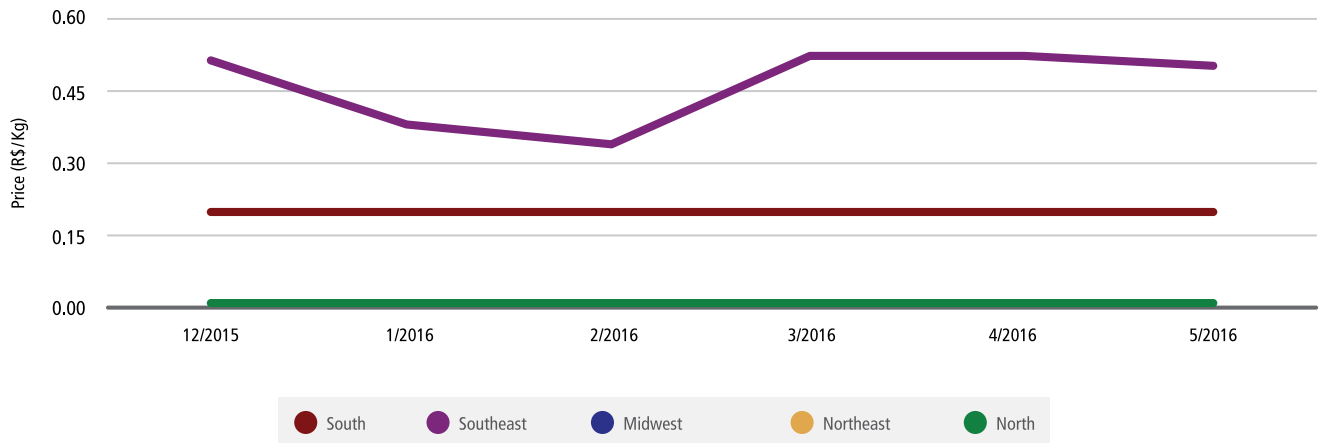


Figure 1: Price fluctuations of waste paper for recycling, in different regions of Brazil, along time.

should be paid by the companies that sold the products in the first place. One of the National Association of Catadores demands is to be paid for the environmental services (i.e. the reverse logistics) that they provide, in a fair and transparent way³⁰.

30 _ See www.mnrc.org.br.

Box 2: The National Association of Collectors of Recyclable Waste

The National Association of Collectors of Recyclable Waste (Movimento Nacional dos Catadores de Materiais Recicláveis, MNCR) is a social movement that assists waste pickers to organize themselves throughout the country. The Association was formed in 2001 with the objective of achieving professional recognition for the social and environmental value of waste picking, and to promote recognition of this occupation as a professional class.

The Association is divided into chambers, which are located in all states of Brazil. It adopts strict work ethics requirements from the affiliated cooperatives.

One of the MNCR's main demands is financial remuneration for the reverse logistics services that they provide to society as a whole.



Source: www.mnrc.org.br

1.3 Product distribution chain and its reverse logistics

The distribution of consumer goods in Brazil follows this simplified chain:

- Manufacturers and importers sell their products to distribution companies.
- Distributors supply the products to retailers.
- Retailers (e.g. supermarkets) sell their products directly to consumers.



A reverse logistics process integrated with the distribution chain would therefore happen in reverse:

- Consumers return their solid waste products to return points or through selective home collection;
- Retailers and distributors collect and return the post-consumption waste from goods they sold to their consumers;
- Producers and importers collect the solid waste products and dispose of them accordingly.

Introducing reverse logistics integrated chains, would therefore require investment in a range of activities:



Consumer awareness and information



Selective collection and disposal points



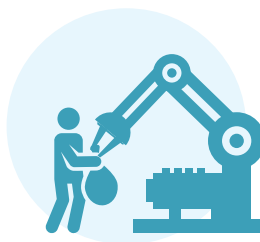
Waste transportation equipment



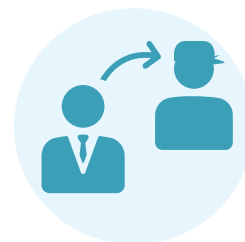
Storage and processing warehouses



Sorting and pre-treatment activities, including equipment and labour



Equipment for recycling or environmentally sound disposal



Coordination of these activities by each company's in-house team



Manus Khomkham



Eduardo Sengès / Comilurb



Room 76 Photography

From a financial perspective, this process could prove costly for companies. Furthermore, it would be incidental to the companies' main activities, and would divert human resources from core activities. As a result, reverse logistics integrated chains would have low efficiency and high costs.

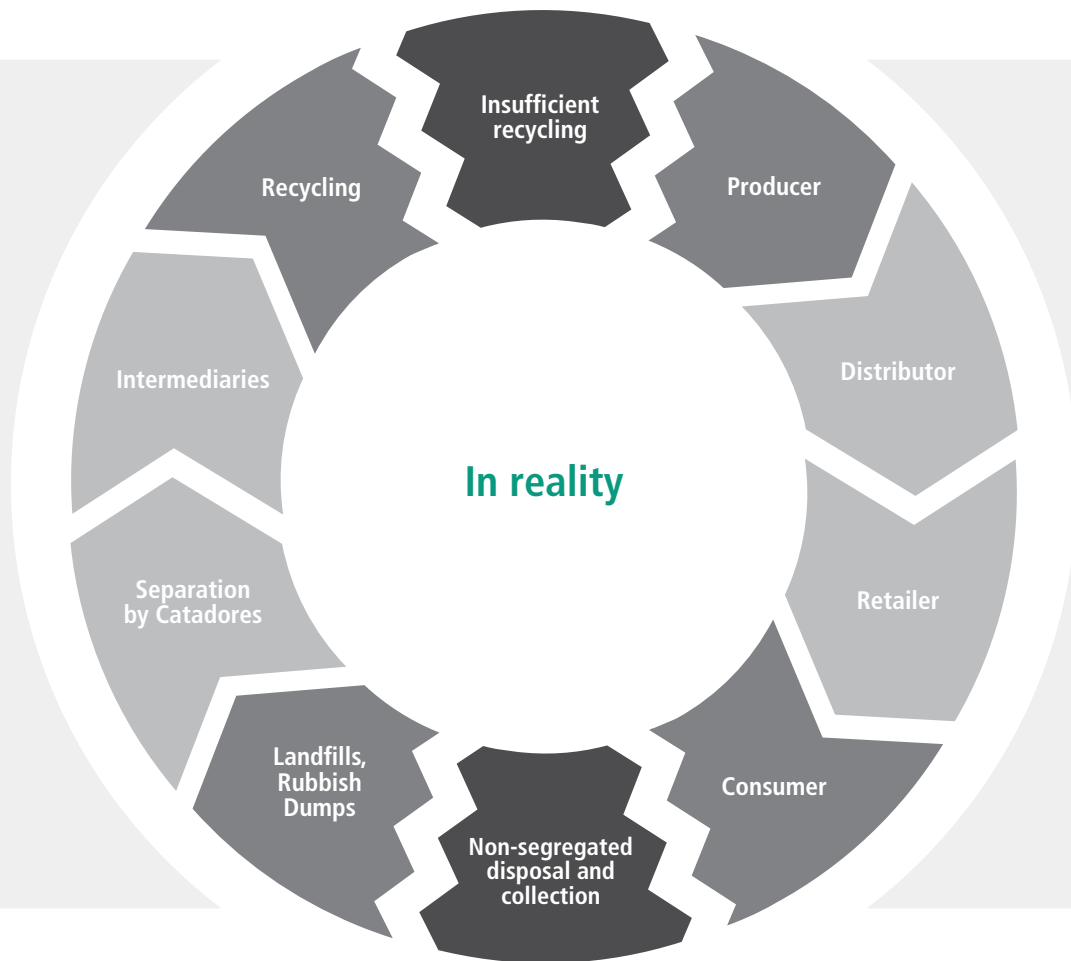
At the same time, if companies were to address these challenges with their in-house solutions, teams and equipment, there would be no social, economic or environmental benefits. Socially, the Catadores would not be involved, as they would only take part in the process in the event of a failure of the reverse logistics chain. Environmentally, waste sorting and household selective collection would remain restricted to the capacity and resources of the public sector – currently able to segregate less than 3% of the total waste generated in Brazil. And economically, it would bring no income redistribution or job creation to low-income groups, and yet would be more costly to the manufacturing sector.

Effectively, however, the waste collection and disposal process currently follows an alternative chain to that described above:

- Consumers dispose of their solid waste through household waste collection and urban disposal points, both predominantly unsegregated;
- Catadores sort the waste in landfill or sorting yards, or collect it directly from public areas;
- Middlemen buy the waste from the Catadores and aggregate volume before selling it to recycling companies;
- Recycling companies use the waste to produce recycled products, which are reintroduced to the production chain.

Depending on the value of the raw material, this chain can collect and recycle significant waste volumes, at low cost, mainly due to the work of the Catadores. But, as previously discussed, levels of recycling are affected by price variation between material types and seasonal fluctuations.

A more efficient and consistent alternative to the current system is therefore needed.



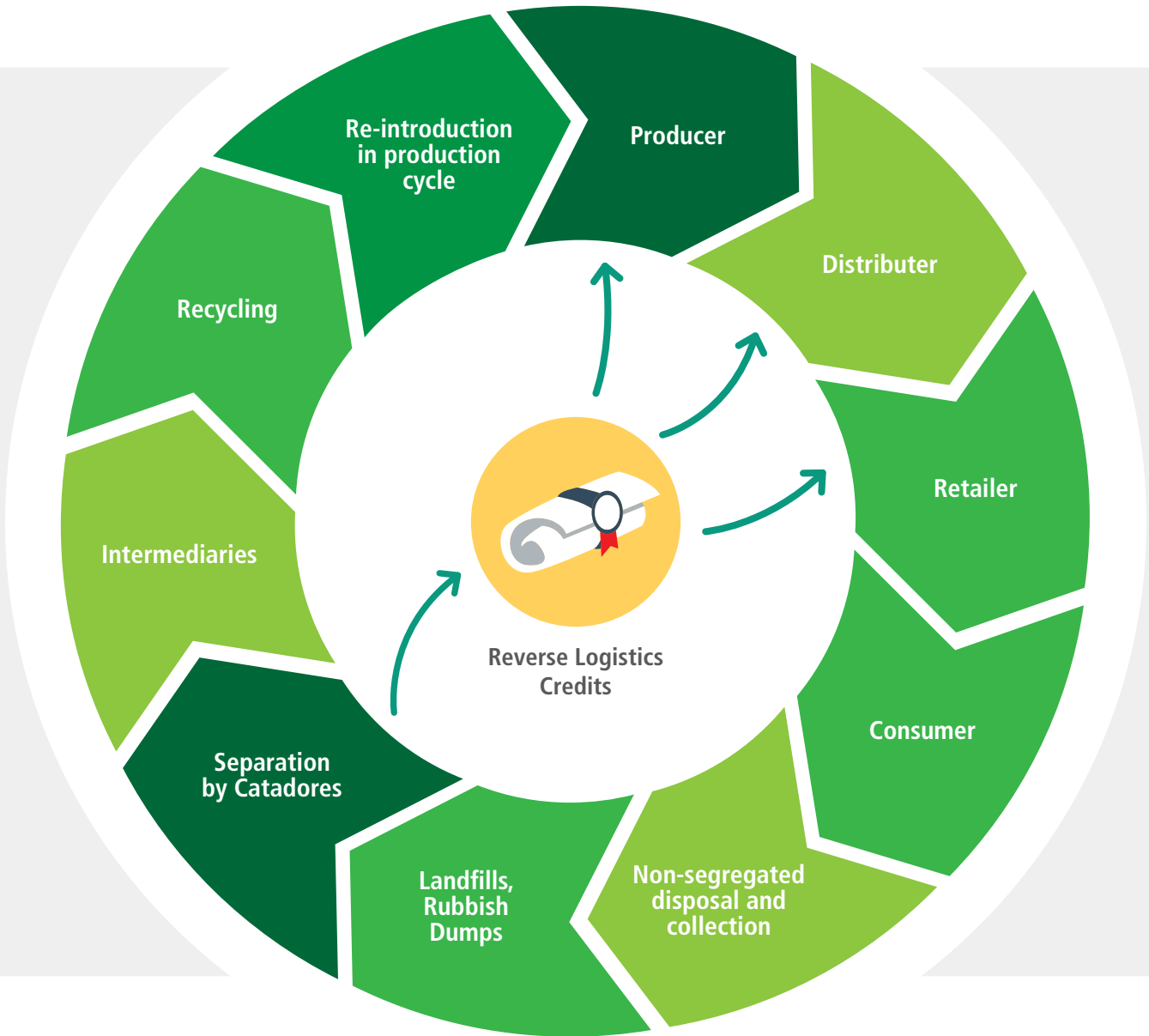
2. Reverse Logistics Credits: a market-based solution

Early in 2013, BVRio signed a collaboration agreement with the National Association of Catadores to develop a system to support the remuneration of Catadores for the environmental services derived from the reverse logistics and recycling that they provide to companies, the government and society as a whole.

Based on the factors and circumstances described in the previous sections, BVRio in collaboration with the National Association of Catadores, developed a system of Reverse Logistics Credits to assist companies to meet their obligations under the law while rewarding Catadores for their role.



John Nyberg







Barak Broitman

Reverse Logistics Credits are certificates which confirm that reverse logistics services were provided to ensure that a certain amount of waste was responsibly disposed of. These credits are issued and sold by cooperatives of Catadores and purchased by producers and/or importers who need to comply with the solid waste legislation. Through the purchase of credits, companies effectively subcontract cooperatives of Catadores to provide reverse logistics services.

For the companies, the credits provide an efficient and cost effective solution to legal compliance. For the Catadores, the sale of credits provides an additional source of revenue, adding value to their activities and resulting in an important social impact.

Environmentally, the additional value generated by the sale of credits makes it worthwhile for Catadores to collect waste materials with lower raw material value, widening the range of products collected beyond the current high value products, such as aluminium cans.

The sale of Reverse Logistics Credits does not affect the ability of the Catadores to sell the physical material to be recycled. Reverse Logistics Credits only represent the environmental service provided by Catadores, i.e. the collection, screening, and direction of solid waste to recycling and re-utilization in the productive cycle – in other words, the service of reverse logistics. In this way, in addition to the revenue generated through the sale of recyclable materials, Catadores can also sell Reverse Logistics Credits to the companies that need this service to comply with the requirements of the National Solid Waste Legislation.

2.1 Creation and sale of Reverse Logistics Credits

The creation of Reverse Logistics Credits requires cooperatives of Catadores to demonstrate that they have conducted this environmental service effectively. Cooperatives need to submit to BVRio (through its trading platform) all documentation related to the waste collection, screening, weighing and sale of recyclable materials.

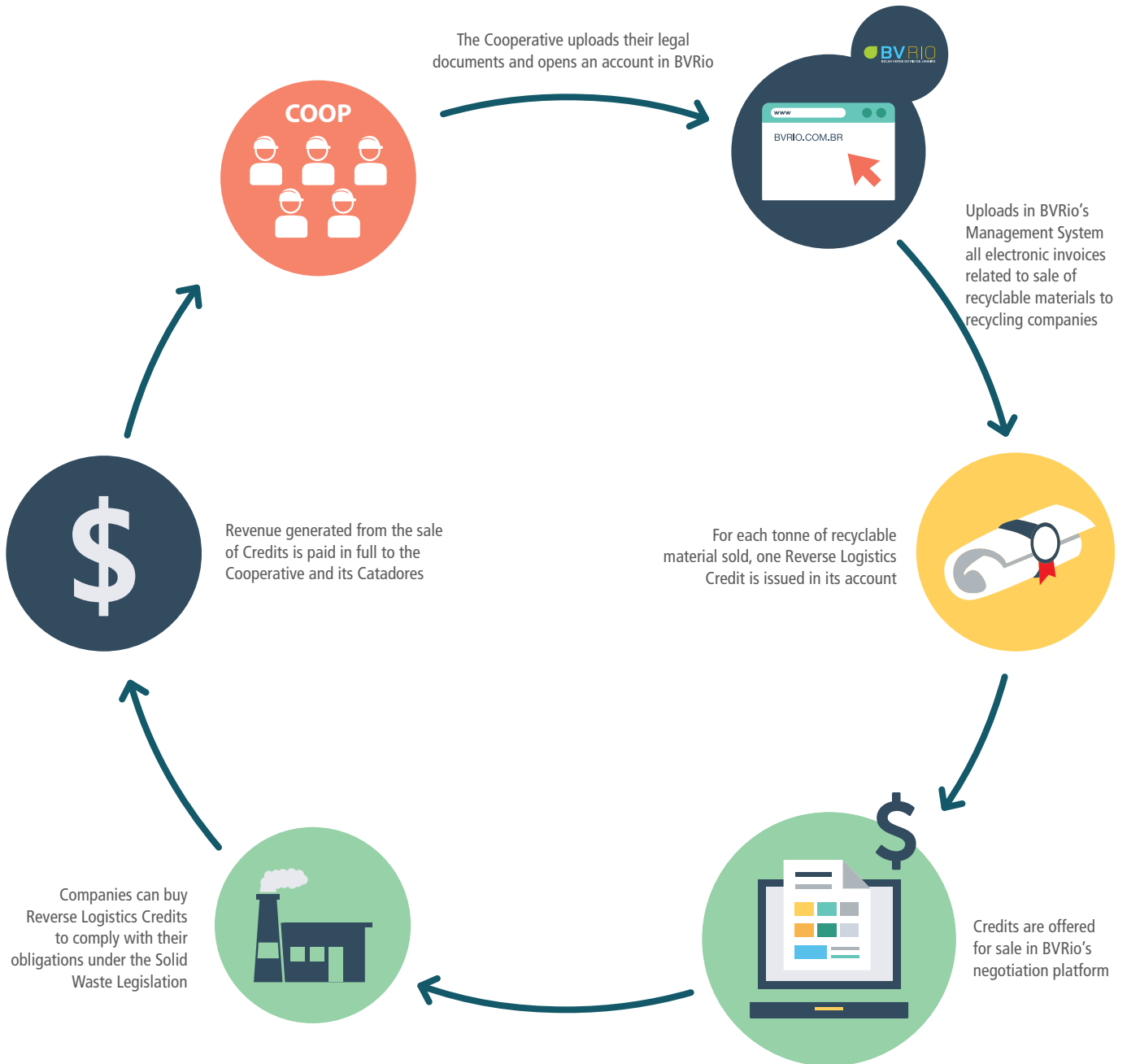
The electronic receipt for each sale of recyclable material is the main document to be uploaded, as this is an official document linked to the Brazilian Tax & Revenue system. For this reason, only official cooperatives, which have a Tax Registry Number (CNPJ), are allowed to participate in the system.

This documentation is gathered in a management system developed specifically for this purpose. The management system reconciles the flows of waste through the cooperative (inputs and sales) with the electronic receipts, and issues Reverse Logistics Credits for each tonne of material sent to recycling companies.

Once credits are issued, the terms of the transaction (price and quantity) are negotiated via an online trading platform created for this purpose. Each cooperative offers their credits for sale, at whatever price they choose. Companies registered on the platform can access these offers and make counteroffers until a settlement price is reached. Participants are anonymous on the platform to avoid direct negotiations between powerful companies and less powerful cooperatives.

BVRio conducts the clearing of these transactions – i.e. once transactions are concluded, it collects payment from companies and transfers funds to the cooperatives while simultaneously transferring the credits to the companies.

Figure 2: Process of creation and issuance of Reverse Logistics Credits



In order to increase the credibility of the system, the following activities are conducted:

- The issue of credits is restricted to the volume of recyclable materials sold with electronic invoices (Nota Fiscal Eletronica) issued by the cooperatives of Catadores. These electronic invoices are automatically linked to the internal revenue system and create a barrier to potential fraud;
- Electronic invoices are stored in BVRio's Trading Platform, providing a trail for auditing and verification;
- BVRio collects generic data about the cooperatives, including the number of Catadores, typical volumes processed, processing facilities and information on buyers of recycling materials. This enables BVRio to cross-check the information against the amount of credits actually issued and sold;
- BVRio's trading platform includes a management system to assist cooperatives to keep track of all waste flows, from initial receipts of mixed waste to final sales of screened recyclable materials.
- The system is subject to independent verification once a year. In addition, BVRio reserves the right to conduct spot audits and to verify operations where data discrepancies appear.



2.2. Supporting infrastructure

In order to control the process for creating credits, facilitate cooperatives' document management, and enable efficient negotiation, the following infrastructure was created:

- An online management system to help cooperatives track the volumes of waste received and recyclable materials sold. All information related to waste collection and separation, as well as to sales of recyclable materials and electronic invoices is collected. Based on these, the system calculates the results of the reverse logistics activities and issues credits corresponding to the amount of material recycled;
- An online trading platform³¹ to enable the negotiation of Reverse Logistics Credits;
- Standard contracts for buyers and sellers to transact credits. These contracts were developed in consultation with relevant stakeholders, including the National Association of Catadores, producers and recycling companies³²;
- Rule Books were developed with instructions for participants on different sides of the transactions (buyers and sellers) as well as instruction manuals, videos, etc³³;
- Criteria for participation in the market, to prevent 'free-riders' from opening accounts and selling credits through BVRio.

31 _ www.bvrio.com/embalagem/plataforma/prepara.do

32 _ All of these contracts are available online at BVRio's trading platform (www.bvrio.com, menu Documents).

33 _ See video at https://www.youtube.com/watch?v=_8X5wE0DZq0



3. Pilot and proof of concept

At the end of 2013, more than 100 cooperatives in 21 states were registered on the system, representing more than 3000 Catadores and offering Reverse Logistics Credits derived from the recycling of over 145,000 tonnes of solid waste per year. At that point in time, most companies were still delaying any decision related to their strategies for the reverse logistics of solid waste, waiting for the Solid Waste Legislation to be regulated.

In order to test the system and demonstrate a proof of concept, BVRio identified industry champions that agreed to pioneer its use, and provide leadership in their respective sectors.

A pilot project (April 2014 – March 2015) was conducted with two leading consumer goods companies in Brazil: O Boticario³⁴ in the cosmetics industry and biscuit manufacturer Biscoitos Piraquê³⁵. The companies bought Reverse Logistics Credits through the platform over the period of one year, to 'neutralize' the solid waste generated by their products, predominantly different types of plastics and glass.



BVRio

34_ Grupo Boticário:
www.grupoboticario.com.br

35_ Biscoitos Piraquê
www.piraque.com.br

Photo: Severino Silva, from the National Association of Catadores, speaking at the launch of BVRio's Reverse Logistics Credit System. Present at the launch the CEO of Grupo Boticário, Artur Grynbaum, Environment Minister Izabella Teixeira, and BVRio's Directors Mauricio Moura Costa and Pedro Moura Costa.

Once a demand signal appeared on the platform, cooperatives from all over the country started posting sell offers for the credits that they generate. While initially there was a large discrepancy in terms of pricing for the different types of credits (i.e. related to paper, plastics, glass, etc.), in a short period of time clearer market prices appeared for the credits with fluctuations based on supply availability and competition. Very quickly, groups that typically are not accustomed to online trading became versed, wise and effective in their negotiating strategies with corporate counterparts.

Social, economic and environmental impacts

This initial trial involved more than 1000 Catadores from 30 cooperatives in 7 Brazilian states that, voluntarily, responded to this demand for credits. Reverse Logistics Credits related to more than 1600 tonnes of solid waste were transacted during the course of a year, generating over US\$ 100,000 of revenue for these cooperatives. The average price of the credits was US\$ 45.00 per credit.

Given that the demand was restricted to the needs of two companies, participating cooperatives only sold credits for about 4% of the total waste generated. If there was higher demand (with increased sales and possibly higher prices), the sale of credits could increase the income of individual Catadores by up to 50%. Note that the revenue generated by the sale of credits is additional to the value of sales of recyclable materials.

The costs of reverse logistics using the credits system ranged from US\$ 0.00013 to US\$ 0.011/ per unit of packaging (see Table 1). These costs are very competitive compared to the costs of companies conducting reverse logistics in-house. Given their low cost base and distributed presence, waste collector cooperatives can provide reverse logistics services at very competitive costs.

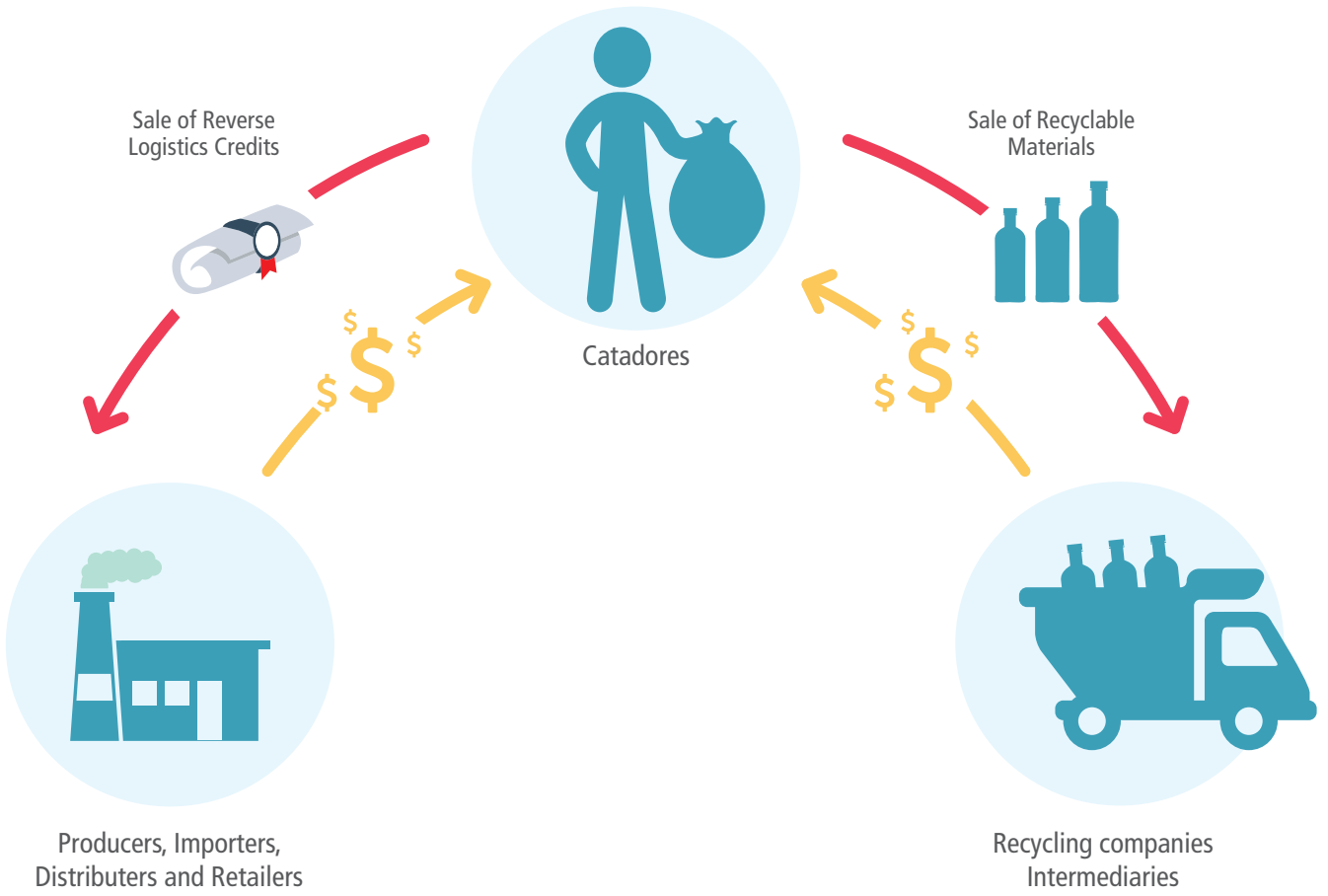












Table 1: Average cost of reverse logistics per individual packaging unit of different products.

PACKAGING	Units per tonne	R\$ 102,20
Cans	75.000	R\$ 0,0014
Plastic bags	332.000	R\$ 0,0003
BOPP	100.000	R\$ 0,0010
PET 2L	20.000	R\$ 0,0051
Glass	4.167	R\$ 0,0245
Cardboard	7.299	R\$ 0,0140

In terms of environmental impacts, this trial resulted in approximately the reduction in the emissions of ca. 2,000 tCO₂e and over 3 million litres of water were saved through the recycling of these materials.

Figure 3: Environmental impacts of waste recycling per ton of recyclable material

	Water	CO ₂ Emissions
Glass	 1 m ³	 0,25 ton
Steel	 13,4 m ³	 1,44 ton
Plastic	 2 m ³	 1,53 ton
Cellulose (Paper)	 40,5 m ³	 0,27 ton
Aluminum	 31,2 m ³	 5,08 ton

Source: IPEA (Relatório sobre pagamento por Serviços Ambientais urbanos, PSAU, 2010).

4. Conclusions and next steps

Reverse Logistics Credits have the potential to become an important tool for meeting the challenges of solid waste collection, screening and recycling. These credits can be issued and sold by the parties involved in waste collection, separation and recycling, and purchased by companies (i.e. producers and/or importers of consumer goods products) that need to conduct the reverse logistics of their products.

Given that in the developing world these waste management activities are often performed by low income, informal waste pickers³⁶, this system has the potential to create positive social, economic and environmental impacts in many developing countries.

For companies, the use of credits provides an efficient and cost effective solution for their reverse logistics. For the waste pickers, the sale of credits provides an additional source of revenue, adds value to their activities and creates an important social impact. Environmentally, the additional value generated by the sale of credits makes it worthwhile to collect waste materials with lower intrinsic value, widening the range of products collected.



Gabe9000c

³⁶ IDB 2013: Preparing informal recycler inclusions plans – an operational guide, www.iadb.org

In the case of Brazil, the use of Reverse Logistics Credits could bring a series of benefits, including:

- Ease of compliance with the National Solid Waste Legislation, given that it is simpler and more cost effective for companies to contribute to the reverse logistics of their products through the use of credits than to create internal departments to deal with the new activity. It is expected that the benefits of specialization, comparative advantage, economies of scale, and trading will reduce the aggregate cost of compliance with the legislation for all parties;
- Increased transparency and credibility of solid waste management, providing an important source of information to support the compilation of solid waste and recycling inventories and the development and implementation of public policies;
- Creation of opportunities for social entrepreneurship and investment in a new economic activity related to the reverse logistics service industry. This would create jobs and support waste picker cooperatives, adding value and increasing income levels for more than 800,000 low-income people;
- Additional value creation for waste materials, increasing the range of waste types collected and recycled in a socially and environmentally beneficial manner;
- Potential to reduce greenhouse gas emissions estimated at about 20 Mt CO₂e per year³⁷.

37 _ Calculation based on waste volumes and GHG savings stated in IPEA (2010) Pesquisa sobre pagamento por serviços ambientais urbanos para gestão de resíduos sólidos..

Some improvements are planned to enhance the impact of the system. First, BVRio plans to create a working capital line of credit to the waste picker cooperatives. Currently, most cooperatives have to sell their recyclable materials to intermediaries in order to generate cashflow to

pay their waste pickers on a daily basis. Working capital would enable them to accumulate volumes and transport these materials to be sold directly to recycling stations, at a higher price.

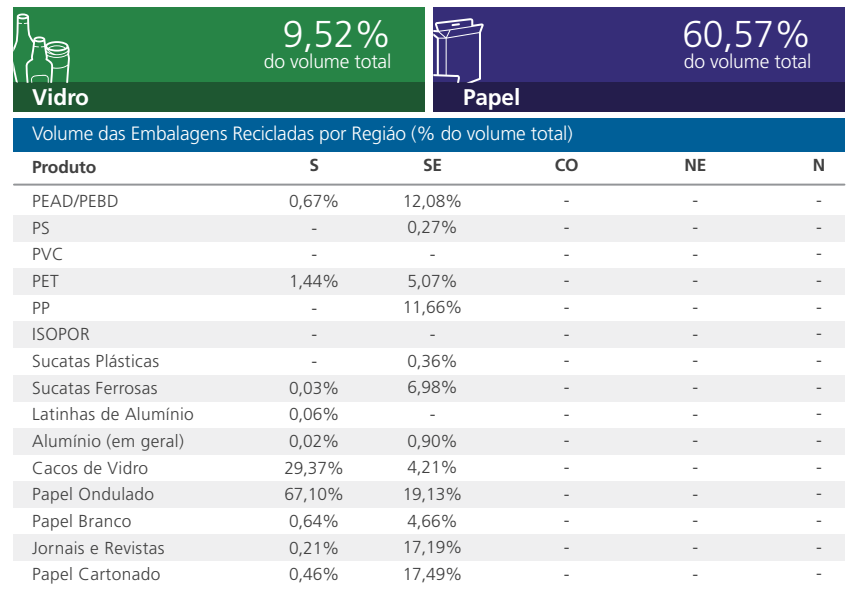
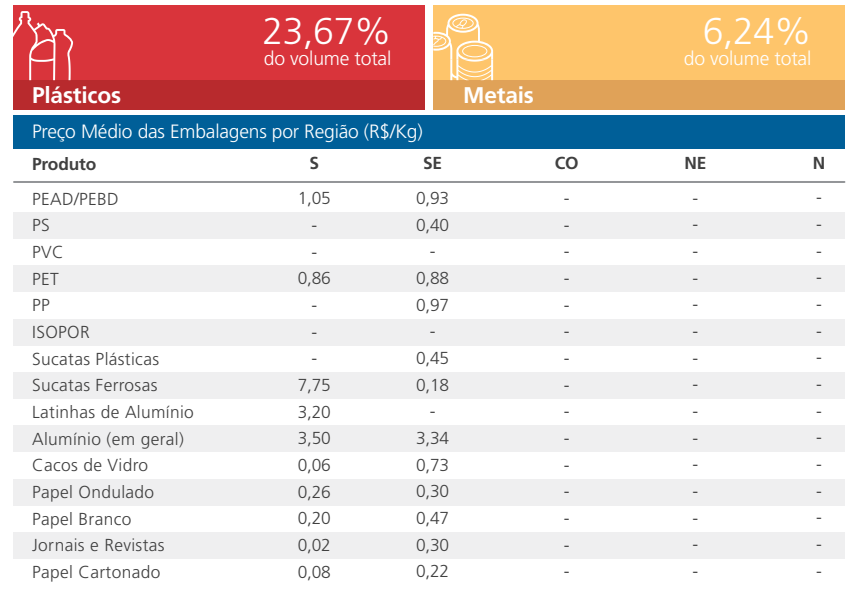


Figure 4: BVRio price index for physical waste recyclable materials.

A second improvement aims to improve the ability of cooperatives to sell the physical recyclable materials. BVRio plans to create a trading platform to negotiate sales of the materials, together with a system to facilitate freight contracts for the transportation of waste. As a first step, a price index was created, displaying the price of different recyclable materials in different regions of Brazil³⁸.

Ultimately, for this system to work, it is important that the law is enforced by the public sector, and that companies comply with their obligations. In order to contribute to the implementation of the law, BVRio and other civil society organizations in Brazil created the Observatory of the Solid Waste Legislation³⁹, a watchdog with the objective of improving implementation of reverse logistic strategies, solid waste management, and the social inclusion of waste pickers (see Annex 2).

At the same time, it is also essential that the large consumer goods companies operating in Brazil adopt Reverse Logistics Credits as a means of compliance with the Solid Waste Legislation. Given that historically, companies did not need to contribute to the reverse logistics of their products, the initial reaction of these companies was to reject any payment for these services (see 1, in Section 1 above). The main objection is related to costs, with the concern that credits would increase the price of their products, and the cost would ultimately be transferred to consumers. The initial results from the trial, however, demonstrate that the cost per unit of packaging is only a fraction of a cent (see Table 1).

While the direct remuneration of Catadores for the services they provide is not requested by the Brazilian government, the use of Reverse Logistics Credits is recognized as a means of compliance with the law. BVRio is now promoting this system among companies that are willing to adopt an innovative and cost-effective social and environmental solution in order to comply with their legal obligations.

38 <http://www.bvrrio.com/embalagem/venda/relatorioFisico.do>

39 <https://observatoriopnrs.org>

As of July 2016, more than 160 cooperatives in 24 states were registered with BVRio's system. These represent more than 8000 Catadores

in Brazil with the potential to offer Reverse Logistics Credits derived from the recycling of nearly 200,000 tonnes of solid waste per year. Furthermore, the system could be adapted for use in other developing countries, where these activities are also performed by low income, informal waste pickers.

The Reverse Logistics Credit system is ready to be used, and has the potential to provide a socially, economically and environmentally positive approach to waste collection and recycling in the developing world.



Ismael Franco



Fabio Bossa





Annexes

Annex 1: Tyre Disposal Credits

Producers and importers of tyres operating in Brazil must ensure that all tyres sold in the country are disposed of in an environmentally appropriate way at the end of their lifetime⁴⁰. Additionally, retailers are obliged to receive and temporarily store used tyres, and adopt procedures to track and record their final destination. The legislation establishes that, of the 800,000 tonnes of tyres introduced into the Brazilian market every year, producers and importers have the obligation to remove around 500,000 tonnes.

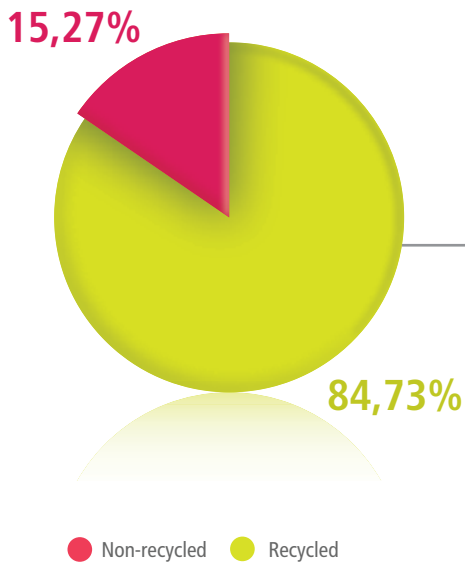
Currently, some 65% of this volume is successfully removed and used for fuel replacement in the cement industry. The challenges related to logistics and costs of this activity have prevented a higher rate of success. At the same time, the government systems used for the control of this activity are based on self-declaratory reports and no systematic verification occurs. This has led to a series of frauds that are beginning to affect the more serious players in industry, which are looking for alternative approaches to compliance.

⁴⁰ See CONAMA Resolution 416 of 30th September 2009, complemented by IBAMA's Normative Instruction N° 1, of 18th March 2010.





Currently, to comply with this legislation, producers and importers of tyres need to arrange for the collection of used tyres and engage companies that can give them an environmentally sound destination (e.g. recycling, production of rubberized tarmac and burning for fossil fuel substitution). The most common disposal method for used tyres is to shred them and send them to the cement industry for co-firing, replacing fossil fuels.



Producers and importers, however, have to organize themselves to contract these activities and monitor the subcontractors. The financial resources and management time required in this model can be onerous for some companies. As a result, a significant proportion of companies do not meet their recycling obligations. According to the federal environmental agency IBAMA, more than 15% of companies did not meet their targets in 2011.

As a means of facilitating compliance with the law, BVRio developed a system of tradable credits based on the provision of services related to the environmentally acceptable disposal of tyres ('Tyre Disposal Credits') which can be purchased by companies to comply with the law.

BVRio's Tyre Disposal Credits system includes four components:

- a Production Cycle Management System (the 'Management System') for the companies involved in tyre disposal (the 'Recycling Companies');
- a Registry of Tyre Collection Points;
- a Trading Platform;
- Integrated Tyre Collection and Management System .

The Management System is a tool to assist Recycling Companies with their operations. All data entered into the system is confidential but BVRio periodically conducts random audits of the system. Based on this data, the Management System issues Tyre Disposal Credits to Recycling Companies. The latter can sell these credits to tyre producers or importers, through an electronic trading platform operated by BVRio⁴¹.

In addition to serving as an efficient management tool for Recycling

41 www.bvrrio.com.



BVRio

Companies, the Management System adds credibility and integrity to the market, ensuring that only companies that maintain proper and auditable controls are allowed to negotiate credits in the platform.

All data entered in the Management System is consolidated with the Integrated Management System. This Integrated System allows the tracking of tyres from the Collection Points to their final destination, adding credibility to the credits negotiated.

Together, these tools assist tyre producers and importers to meet their legal obligations, and support government authorities in the surveillance and enforcement of the law.

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Home » Gestão de Pneus

Mercado de Créditos de Destinação Adequada de Pneus (CDA-PN)

Sistema de gestão de pneus (Robson de Almeida Duque - Laminação de Pneus Duque Ltda)

Quilos Toneladas

2013	Janeiro	Fevereiro	Março	Abril	Maio	Junho	Julho	Agosto	Setembro	Outubro	Novembro	Dezembro
Estoque de pneus inteiros												
Estoque anterior	-	59.780	43.079	103.732	224.156	292.288	261.068	326.400	527.216	527.216	527.216	527.216
+ Pneus recebidos	60.780	30.480	124.850	134.280	129.480	35.480	92.410	242.940	-	-	-	-
- Pneus processados	1.000	47.181	64.197	13.836	61.328	66.702	27.076	42.124	-	-	-	-
= Estoque final	59.780	43.079	103.732	224.156	292.288	261.068	326.400	527.216	527.216	527.216	527.216	527.216
Laminação												
Pneus processados	1.000	47.181	64.197	13.836	61.328	66.702	27.076	42.124	-	-	-	-
- Perda no processamento	564	1.500	5.000	11.100	12.200	14.200	4.500	13.850	-	-	-	-
= Produto laminado gerado	436	45.681	59.197	2.736	49.128	52.502	22.576	28.274	-	-	-	-
+ Estoque anterior (laminado)	-	176	454	454	918	1.166	1.910	2.710	2.710	2.710	2.710	2.710
= Disponível para venda	436	45.857	59.651	3.190	50.046	53.668	24.486	30.984	2.710	2.710	2.710	2.710
- Vendas realizadas	260	45.403	59.197	2.272	48.880	51.758	21.776	28.274	-	-	-	-
= Estoque final (laminado)	176	454	454	918	1.166	1.910	2.710	2.710	2.710	2.710	2.710	2.710
CDAs Potenciais criados	260	45.403	59.197	2.272	48.880	51.758	21.776	28.274	-	-	-	-
CDAs Potenciais												
+ Criados	260	45.403	59.197	2.272	48.880	51.758	21.776	28.274	-	-	-	-
- Deduções	-	-	-	-	-	-	-	-	-	-	-	-
- Transferências	-	-	-	-	-	-	-	-	-	-	-	-
= Acumulados	260	45.683	104.860	107.132	156.012	207.770	229.546	257.820	257.820	257.820	257.820	257.820
CDA-PN Negociáveis												
+ Criados (Ton)	-	-	-	-	-	-	-	-	-	-	-	-
- Vendas (Ton)	-	-	-	-	-	-	-	-	-	-	-	-
- Reconciliações (Ton)	-	-	-	-	-	-	-	-	-	-	-	-
= Acumulados (Ton)	-	-	-	-	-	-	-	-	-	-	-	-

Figure 5: Screen shot of the Management System for the Tyre Recycling Credits system.

Annex 2: Observatory of the Solid Waste Legislation



The Observatory of the Solid Waste Legislation⁴² is a coalition of more than 25 prestigious organizations from civil society and academia, convened by BVRio Institute and ABRAMPA (the National Association of Environmental Public Prosecutors⁴³), with the common goal of enhancing knowledge-sharing, transparency and engagement in the implementation of the PNRS. It serves as a watchdog for Brazilian solid waste policies. In addition, the observatory will contribute to the development of reverse logistic strategies on a national level by conducting and publishing comparative studies on the subject, as well as enhancing the social inclusion of waste pickers. The Observatory is presided by a representative from ABRAMPA, supported by BVRio Institute.

The Observatory's activities include monitoring of legal actions related to PNRS, institutional relations and engagement of stakeholders, awareness raising, research, and maintenance of an online information platform (populated with recent publications, articles and news items and able to respond to online queries).



42_ <https://observatoriopnrs.org>

43_ <http://www.abrampa.org.br>

The Observatory's objective is to improve implementation of reverse logistic strategies, solid waste management, and the social inclusion of waste pickers. It also aims to improve the transparency of government efforts to implement the National Solid Waste Policy.

The main beneficiaries of the PNRS Observatory are the Brazilian people in general, and the lowest income groups in particular, who suffer most from inadequate waste collection and proximity to rubbish dumps. Indirectly, the Observatory can also support federal, state and municipal government agencies by enhancing their ability to monitor the implementation of the PNRS.

John Nyberg



Members of the Observatory







Compo





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