# Packaging in General Reverse Logistic System: Social Impacts Arising From the Implementation of the Sector Agreement in Brazil

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**Abstract:** In this article a bibliographical survey was carried outaddressing packaging in general reverse logistic system, details of the sectoral agreement established and results of its operationalization, as well as providing a discussion about tthe social impacts resulting from the sectorial agreement, thus bringing an overview on the subject in Brazil. In the results obtained, it was possible to highlight the importance of this sectorial agreement, involving a large chain of employees, mainly the social impact generated by the increase in job creation, in the training of workers and in the increase of productive capacity of cooperatives. In this way, the content addressed in the article incorporates the relevance of the theme in the national scenario, contributing to the diffusion of knowledge about actions like this, truly conceived in the search for sustainability, combining the environmental, economic and social spheres.

**Key words:** reverse logistic; sectoral agreement; packaging in general; social impact

**JEL codes:** Q01, Q52, Q53

## 1. Introduction

According to the macroeconomic study of the Brazilian packaging industry, there was an increase in the gross value of packaging production, in 2015 the gross value was R $ 60.4 billion reais while in 2016 it reached R $ 64.3 billion reais, being thus an increase of approximately 6.6%. However, the study shows a 4.20% decrease in physical packaging production, due to the country's current economic performance (ABRE, 2017).

Presenting as the main user industries, the industries of non-durable consumer goods (such as food, beverages, tobacco, leather, footwear, among others), it is presumed that there will be a large disposal of these packages. According to the MMA, about a fifth of the waste generated in Brazil is composed only of packaging, most of which are used only once. The aggravating factor is that the number of packages accompanies

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consumption, and it tends to increase over the years (MMA, 2017).

This set of national environmental concerns culminated, on November 25, 2015, in the signing of the sectoral agreement that regulates the reverse logistics of Packaging in general (SINIR, 2017).

In addition to the great diversity of types of packaging waste and the significant amount they represent, the sectoral packaging agreement in general involves, as a striking differential, the social responsibility of the entire chain involved.

In view of this, this article aims to carry out a bibliographic survey on the topic, focusing on the social impacts generated from the implementation of the aforementioned sectoral agreement and to analyze the current panorama of reverse packaging logistics in Brazil.

## 2. Reverse Logistics

Reverse Logistics is an instrument for the application of the shared responsibility for the life cycle of products, provided for by the National Solid Waste Policy. Within Reverse Logistics, actions are added to carry it out, such as reuse, making collection feasible, returning solid waste to the production cycle, among others (MMA, 2017a).

Reverse Logistics can be understood as a logistics that plans and controls the flow corresponding to the return of after-sales and post-consumer goods to the production cycle, complementing with environmental responsibility and improving the corporate image, among other values (Leite, 2002).

However, Reverse Logistics is not only about returning solid waste to the production cycle, covering a larger scope, which includes the economic and social development of the chain that involves the waste in question.

## 3. General Packaging Sector Agreement

As soon as the National Solid Waste Policy (PNRS) came into force, the elaboration of sectoral agreements, proposed by manufacturers, importers and resellers together with the public authorities, began to be developed.

Sectoral Agreement can be defined as an "act of a contractual nature signed between the government and manufacturers, importers, distributors or traders, with a view to implementing shared responsibility for the products' life cycle" (SINIR, 2017a).

Considering this situation, on June 22, 2012 the Ministry of the Environment (MMA) published a call for bids for the elaboration of a sectoral agreement for the implementation of a reverse logistics system for packaging in general. On November 25, 2015, the sectoral agreement drawn up by the MMA and by companies that joined forces and formed a business coalition, representing industry and commerce (Cempre, 2017).

### 3.1 System Operations

The sectoral agreement deals with packaging that is contained in the dry fraction of solid urban waste or similar, and can be distinguished in: paper and cardboard, plastic, aluminum, steel, glass, long-life carton packaging, among others. This fraction does not include packaging that is considered dangerous by Brazilian law (SINIR, 2017b).

The system consists of technical support, investments, promotion of actions that enable the collection and recycling of this waste, supporting cooperatives, sorting centers or any other forms of selective collection (SINIR, 2017b).

For the operationalization of the system, its implementation was divided into two phases (Phase 1 and Phase 2). In Phase 1, it was envisaged that the coalition would adapt and expand the productive capacity of the cooperatives located in the host cities of the 2014 world cup, thus encompassing the following cities and their metropolitan regions: Belo Horizonte, Brasília, Cuiabá, Curitiba, Fortaleza, Manaus, Natal, Porto Alegre, Recife, Rio de Janeiro, Salvador and Sao Paulo (SINIR, 2017b).

In these regions, the sectoral agreement also provides for actions to purchase machinery and equipment for cooperatives, the installation and maintenance of Voluntary Delivery Points (ENP), investments in awareness campaigns on the correct separation and disposal of packaging, direct purchase or indirectly, at market price, of packaging sorted by the cooperative or sorting centers, training of waste pickers, among other objectives (SINIR, 2017b).

These actions have as a priority focus on cooperatives, sorting centers and any other form of selective collection, being able, for this, to have the support of CEMPRE (Business Commitment for Recycling), which coordinates the coalition and interfaces its communications with MMA (SINIR, 2017b).

Considering the results obtained in Phase 1, companies have the responsibility to create strategies to, in Phase 2, carry out the expansion of actions in other regions to be defined based on the criteria presented by the companies themselves. Ninety days after the end of Phase 1, the coalition must submit to MMA a plan for the implementation of Phase 2 (SINIR, 2017b).

## 4. Results (partial) Pertaining to Phase 1

On January 25, 2017, CEMPRE released the first performance report of the reverse packaging logistics system in general, referring to Phase 1, partially, as this phase will end only at the end of 2018 (CEMPRE, 2017).

As for the scope of the actions, since the signature of the sectoral agreement, there was an addition of 21 municipalities to the initial list, thus increasing the scope of the activities provided for in Phase 1, covering a total of 5,570 municipalities (CEMPRE, 2017).

In the released report, investments made by the industrial sector are classified into type, subtype and specifications. Among the types are Institutional training, which includes consultancy; qualification; technical diagnosis; processes and training, infrastructure and operational adequacy, which includes operations, equipment and logistics, and other types such as communication, environmental education and advisory for managing indicators, in addition to the types of actions carried out at Voluntary Delivery Points (ENP) that include installation, maintenance and operation (CEMPRE, 2017).

Since a large number of activities need to be carried out, which involve economic, environmental and social variables, and since Phase 1 is in progress, new data will still be presented at the end of the calculation of the current phase (CEMPRE, 2017).

The Report shows that from 2012 to 2016, 3,151 training, management, adaptation and structuring actions were carried out, of which 1,485 were in priority municipalities and 1,666 in other regions, with most actions being provided with infrastructure and operational adequacy. These actions were carried out in 702 supported cooperatives, the largest number of them in the state of Sao Paulo (CEMPRE, 2017).

In addition to the actions taken, a key point to achieve the goals proposed by the sectoral agreement is to triple the number or capacity of cooperatives and associations in the priority municipalities (until now, the business sector has met 71% of the goals). In 2010, there were 146 cooperatives in the priority regions and, in

2016, 310 cooperatives were reached - the forecast for 2018 is to reach the goal of 438 cooperatives (CEMPRE, 2017).

Another essential goal is the installation of ENP: between 2012 and 2016, 2,103 points were implemented and 7,861 actions were carried out in ENP. With regard to the goal of tripling the number of collection points in the priority regions, the business sector exceeded the proposed target - which was to reach 645 points — by 139% — the ENP reached a total of 1,540 points (CEMPRE, 2017).

Awareness and investment in environmental education are also goals in the system. Specific programs such as "Give your hand for the future" (initiative of the Brazilian Association of the Personal Hygiene, Perfumery and Cosmetics Industry — ABIHPEC) and the "Recycling Route" (initiative of the company Tetra Park), among others, are of paramount importance, representing initiatives of associations or companies that provide environmental content and facilitate the consumer's task within reverse logistics (ABRAS, 2017).

Regarding the number of packages collected, the estimated number of packages launched on the market provided by the coalition of signatory companies was 3,283 thousand tons/year. The goal of accounting for at least 50% of the collected volume of packaging persists until November 2018, therefore, in the released report the figures collected are not presented. However, the report contains the demonstration of the calculation, the recovery rate being the ratio between the volume of waste that is recycled and the volume of collected waste that can be recycled (CEMPRE, 2017).

## 5. Influencing Factors in the Operationalization of the System

Among the factors influencing the operationalization of the system, four showed special prominence, requiring greater attention due to the complexity and the number of variables involved (Mechanical separation, Selective collection, Increased waste generation, and Number of companies not signatory to the Sectorial Agreement), described below.

### A) Mechanical Separation

One of the challenges of packaging collection is consumer collaboration, since selective collection depends on the mechanical separation of waste that can be recycled from non-recyclable waste or organic waste (MMA, 2017b).

### B) Selective Collect

If not the main, perhaps the biggest problem with reverse packaging logistics in general, is the number of municipalities that do not yet have the selective collection service. According to Ciclosoft 2016 (biannual survey conducted by CEMPRE), only 18% of the municipalities operate with selective collection programs, 81% of which are located in the South and Southeast regions. It was found that only 15% of the Brazilian population has access to selective collection programs and that, in addition, among the municipalities that promote selective collection programs, only 44% support or maintain cooperatives as agents that execute selective collection (CEMPRE, 2017a).

### C) Increased Waste Generation

To carry out the operation of the reverse packaging logistics system, it is necessary to take into account some aspects, one of which is the generation of solid waste in the country. In the current context, according to the Panorama of Solid Waste in Brazil 2015, conducted by the Brazilian Association of Public Cleaning and Special

Waste Companies (ABRELPE), the Brazilian population showed a growth rate of 0.8% between 2014 and 2015 and the generation of solid urban waste (MSW) grew at the same rate, reaching the equivalent of 218,874 t / day of MSW generated in the country, an increase of 1.7% in relation to the previous year (ABRELPE, 2017).

### D) Number of Companies Not Signatory to the Sectorial Agreement

In November 2015, when the Sectorial Agreement was signed, 20 Brazilian associations were signatories, each representing their respective sphere of trade. However, this is only a fraction in relation to the number of manufacturers, importers and traders of packaging, thus having a small scope in the number of packages produced, and a commitment to financial sustainability in the adoption of actions to meet the goals (CEMPRE, 2017).

The collectors of recyclable materials have a fundamental role in the implementation of the sectoral agreement, as they participate in the selective collection, sorting, classification, processing and commercialization of waste. Many waste pickers work autonomously, in precarious working conditions, dispersed in dumps, others work collectively in associations or cooperatives (MMA, 2017c).

These workers are professionals recognized by the Ministry of Labor and Employment since 2002, and are of great influence in reducing the volume of waste that would be destined for landfills, as well as reducing the demand for natural resources (MMA, 2017c).

According to the eighth clause of the sectoral packaging agreement in general:

> Under the terms of article 40 of Decree no. 7,404/2010, the Reverse Logistics System defined in this Sectorial Agreement will prioritize the participation of Cooperatives or other forms of association of collectors of reusable and recyclable materials constituted by low-income individuals (SINIR, 2017b).

And to achieve this inclusion of collectors and cooperatives, manufacturers and importers of packaging or products that are marketed in packaging must make "investments with cooperatives as one of the forms of remuneration related to the quantity of packaging recovered and the labor offered by them. entities in order to achieve the established goals" (SINIR, 2017b).

The Sectorial Agreement aims to include collectors and cooperatives in the system, as its feasibility study shows that recycling may not only serve for the disposal of waste, but also as an agent of social and economic inclusion. The waste pickers work at the base of the recycling chair, most of them informally, so there is no concrete data on these activities, however, IPEA estimates that the number of waste pickers in Brazil is between 400 and 600 thousand and that around 10% are linked to cooperatives (SINIR, 2017c).

The feasibility study takes into account the last sense made in the country, in 2010, and shows that in Brazil there are approximately 223,537 people between recyclable material collectors and waste sorters, with São Paulo being the capital with the largest number of workers in this area (SINIR, 2017c).

Table 1 shows the profile of these workers, by income, hours worked and school level.

It is observed that the income of these workers is low, and the level of education also, through the questionnaire made by the common sense, it is not possible to distinguish scavengers who work on their own from scavengers associated with cooperatives, however it can be obtained that the workers in this area who have a formal contract they have one year more schooling and their salary is 60% higher (SINIR, 2017c).

Still according to the 2010 sense, it was observed that 5,800 waste pickers are under 16 years old, and that 10,300 are 65 years old or more (SINIR, 2017c).

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**Table 1   Profile of Workers**

| total pickers/classifiers | | age | income | | years of study | hours worked per week |
|---|---|---|---|---|---|---|
| Manaus | 1,180 | 38 | R$ | 821.00 | 6.4 | 40 |
| Fortaleza | 3,903 | 38 | R$ | 486.00 | 6 | 36 |
| Natal | 958 | 39 | R$ | 301.00 | 5.8 | 39 |
| Recife | 1,815 | 38 | R$ | 712.00 | 6.2 | 38 |
| Salvador | 3,252 | 39 | R$ | 369.00 | 6.3 | 39 |
| Belo Horizonte | 1,451 | 46 | R$ | 487.00 | 5.6 | 35 |
| Rio de Janeiro | 3,800 | 44 | R$ | 541.00 | 6.2 | 38 |
| São Paulo | 11,450 | 41 | R$ | 646.00 | 6.3 | 38 |
| Curitiba | 3,504 | 37 | R$ | 636.00 | 6 | 38 |
| Porto Alegre | 2,718 | 35 | R$ | 500.00 | 5.9 | 40 |
| Cuiabá | 416 | 42 | R$ | 833.00 | 5.5 | 33 |
| Brasília | 2,461 | 36 | R$ | 516.00 | 5,7 | 35 |
| Brazil | 223,537 | 40 | R$ | 503.00 | 6 | 38 |

*Source:* SINIR (2017c).

The pickers quantified by sense fit into the low-income population, and because they have a low level of education and age above the average of the labor market, a possible greater difficulty in obtaining opportunities with higher salaries is inferred, without an increase in their level of study.

To reestablish this situation, the agreement provides that managers of the urban cleaning service, in line with their goals of selective collection, recycling, among others, prioritize the hiring of cooperatives and other forms of association of waste pickers (SINIR, 2017c).

In addition, the investments made to improve training and triple the number of cooperatives are expected to increase by 14,700 employees in the supported cooperatives, also bringing an increase in income to these collectors, by increasing the productivity of the cooperatives (SINIR, 2017c).

According to the panorama made by ABRELPE, in 2015 the urban cleaning sector generated 149,985 direct jobs, with the southeast region being the largest generator, providing 71,091 direct jobs and generating R $ 27.517 billion in the same year (ABRELPE, 2017).

## 6. Final Considerations

In the present article, a bibliographic survey was carried out addressing the reverse packaging logistics system in general, details about the sectorial agreement established and the results of its operation, in addition to providing a discussion about the social impacts arising from that Sectorial Agreement, thus bringing an overview current on the topic in Brazil.

It is noteworthy that the agreement in question is not limited only to the reinsertion of waste into the production cycle, it covers the improvement of its entire chain, including the workers who form it. In the Sectorial packaging agreement in general, the collection of the material is mostly done "from door to door", which involves a class of low-income workers, who mostly exercise their function in terrible working conditions, for example. this, the social inclusion of this group of workers is of great prominence in relation to other sectoral agreements.

Almost all recycling and/or separation of packaging is done by cooperatives and associations of waste pickers, who receive a low remuneration for their work, and have no structure or even training to meet the

quantity of tons of packaging produced, thus the investments made by the packaging coalition aim to improve the performance of these cooperatives and associations so that they are able to receive all discarded packaging.

The sectoral agreement goes beyond social inclusion, as it enables the economic emancipation of this class of workers, since the increase in productivity and direct sales of material from cooperatives and associations to recyclers can lead to an increase in the income of waste pickers and associates.

Thus, the content addressed in the article substantiates the relevance of the theme in the national scenario, contributing to the dissemination of knowledge about actions like this, truly conceived in the sense of seeking sustainability, combining the environmental, economic and social spheres.

## References

ABRAS (Brazilian Supermarket Association) (2017). "Solid waste reverse logistics", accessed on 23 May, available online at: http://www.abrasnet.com.br/pdf/cartilhalogisticareversa.pdf.

ABRE (Brazilian Packaging Association) (2017). "Macroeconomic study of packaging ABRE/FGV", accessed on 25 May, available online at: http://www.abre.org.br/setor/dados-de-mercado/dados-de-mercado-2016.

ABRELPE (Brazilian Association of Public Cleaning and Special Waste Companies) (2017). "Panorama of solid waste in Brazil 2015", accessed on 17 May, available online at: http://www.abrelpe.org.br/Panorama/panorama2015.pdf .

CEMPRE (Business Commitment to Recycling) (2017a). "Ciclosoft", accessed on 17 May, available online at: http://cempre.org.br/ciclosoft/id/8.

CEMPRE (Business Commitment to Recycling) (2017). "Technical report on packaging sector agreement", Sao Paulo, accessed on 27 May, available online at: http://abir.org.br/download/1o-relatorio-de-desempenho-do-sistema-de-logistica-reversa-de-embalagens-em-geral.

Leite P. (2002). "Reverse Logistics: new area of business logistics", *Technological Journal.* Sao Paulo, Publicare, Vol. VIII, No. 78.

MMA (Ministry of the Environment) (2017c). "Recyclable material pickers", accessed on 18 May, available online at: http://www.mma.gov.br/cidades-sustentaveis/residuos-solidos/catadores-de-materiais-reciclaveis.

MMA (Ministry of the Environment) (2017b). "How and why separate the trash?", accessed on 22 May, available online at: http://www.mma.gov.br/informma/item/8521-como-e-porqu%C3%AA-separar-o-lixo.

MMA (Ministry of the Environment) (2017). "Impact of packaging on the environment", accessed on 24 May, available online at: http://www.mma.gov.br/responsabilidade-socioambiental/producao-e-consumo-sustentavel/consumo-consciente-de-embalagem/impacto-das-embalagens-no-meio-ambiente.

MMA (Ministry of the Environment) (2017a). "Reverse logistic", accessed on 23 May, available online at: http://www.mma.gov.br/cidades- sustentaveis/residuos-perigosos/logistica-reversa.

SINIR (National Solid Waste Management Information System) (2017). "General packaging sector agreement", accessed on 24 May, available online at: http://www.sinir.gov.br/web/guest/embalagens-em-geral.

SINIR (National Solid Waste Management Information System) (2017a). "Reverse logistic", accessed on 23 May, available online at: http://sinir.gov.br/web/guest/logistica-reversa.

SINIR (National Solid Waste Management Information System) (2017b). "Sectoral agreement to implement the reverse packaging logistics system in general", accessed on 24 May, available online at: http://www.sinir.gov.br/documents/10180/93155/Acordo_embalagens.pdf/58e2cc53-3e38-420a-97fd-dba2ccae4cd3.

SINIR (National Solid Waste Management Information System) (2017c). "Economic feasibility study and socio-environmental impacts — Evaluation of social and economic impacts", accessed on 20 May, available online at: http://www.sinir.gov.br/documents/10180/93155/Anexo_VI.PDF/94ff49e2-7aa7-4620-8ad9-b263a4ffadd7.