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The Residential Condominiums Management and the Sustainability

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1-**INTRODUCTION**

In Brazil, waste control has as main challenges, the treatment and destination of these wastes. Environmental pollution is one of the major problems currently caused, among other issues, due to the saturation of landfills due to the volume of waste that is dumped, where a significant percentage of this waste could be returned to production chains either for recycling or reuse through Reverse Logistics (RL).

There are countless efforts to return waste to the original production processes, motivated by the minimization of the elements discarded in nature and the moderation of the consumption of natural resources. The return of waste in production processes enables a more sustainable development, reducing the risk for future generations.

With the creation of the National Solid Waste Policy (PNRS) - Law No. 12,305, of August 2, 2010 - important concepts emerged, among them, the shared responsibility for the product life cycle and the concept of reverse logistic.

In article 3 of Law 12305/2010, the shared responsibility for the life cycle of products is defined as the set of individually assigned and chained activities of manufacturers, importers, distributors and traders, consumers and holders of public cleaning and handling services of solid waste, aiming to minimize the volume of these wastes and other wastes generated and thereby reduce the impacts on human health and environmental quality, resulting from the product life cycle.

Thus, it can be noted that Brazilian law makes the manufacturer or importer responsible for the destination of its products after delivery to its customers, and for the environmental impact promoted by the waste generated in the production process, as well as during its consumption. In this way, the National Solid Waste Policy (NSWP) presented as one of its instruments the RL.

Reverse logistic, through its set of actions and procedures, provides means to enable the collection and reintegration of solid waste into the business sector, such as the reuse objective or other environmentally appropriate final disposal.

Due to the importance of the topic, where reverse logistic has gained prominence in the operations of the companies due to recalls carried out by the company itself, the withdrawal of the purchase by the consumers, the expiration of the term of validity of products and the responsibility for the proper disposal of harmful products after its use, this study will address the obstacles to the adoption of reverse logistic by medium-sized companies in Brazil and will analyze the contributions of the efficient and effective adoption of RL. .

This study has as main theme the reverse logistic and tries to answer the following problem: what are the obstacles of the adoption of reverse logistic by Brazilian companies?

For the development of this study, the general objective was to analyze the obstacles to the adoption of reverse logistic by Brazilian companies.

However, in order to achieve this general objective, certain specific objectives have been established, namely:

- To study the existing collection and recycling processes in Brazil;
- Analyze how reverse logistic can be used to reduce environmental impacts;
- Identify the percentage of adoption of RL in medium and large Brazilian companies.

The study is justified by the importance that the theme of reverse logistic has today, where issues of environment preservation have gained prominence worldwide.

In this way, companies generally seek to mitigate the impacts generated by their products on the environment, also seeking to stand out in their markets through the generation of savings in productive processes.

The methods used in this study are exploratory research; descriptive with qualitative and quantitative approach, where a study will be analyzed with Brazilian companies in the medium and large food sector.

1. LITEATURE REVIEW

2.1 Reverse Logistics

Costa et al. (2011) state that logistics arises as one of the major challenges for Brazilian organizations, whether it concerns the place of installation of the company, the management of inventory, the entry of raw materials, or mainly the definition of better distribution channels for their products to customers. Ballou (2007) affirm that logistics in Brazil derives not only from the volume of resources handled or the growing responsibility and power of its executives, but derives from the clear perception in companies that logistics represents a strategic role, which can generate competitive advantage.

RL is associated with the return of aftermarket products for renovation, repair, remanufacturing, and replacement of materials; and post-consumption for reuse, recycling, energy recovery; and the final disposal of products at end of life (Aquino et al. 2018). The first studies on reverse logistic were evidenced in the 1970s and 1980s, where the logistics

process was applied in an inverse way to the traditional one, with the objective of satisfying the needs of collecting post-consumer and post-sale materials.

The speed with which a product is introduced to the market, the accelerated advancement of technology, the high competitiveness of organizations and the growth of environmental awareness regarding the consequences of products and their discards in the environment, are generating the adoption of new business behaviors and of society in general, thus pointing to a greater appreciation of the return processes of products and materials discarded in nature.

Given this scenario, RL is highlighted by giving more attention to the recycling aspects and their advantages for the environment. Leite (2009, p.14) defines and highlights the added value that reverse logistics is the activity that plans, operates, and controls the flow, and corresponding logistics information, of the return of after-sales and post-consumer goods to the business cycle or production cycle through reverse distribution channels, aggregating the value of diverse natures: economic, ecological, legal, logistic, comparative image among others.

In this way, reverse logistic is defined as an instrument of economic and social development, characterized by a set of actions, procedures and means to enable the collection and restitution of solid waste to the business sector, for reuse, in its cycle or in other production cycles, or other environmentally appropriate final destination.

In this reverse logistic process, the concern for the return of after-sales and post-consumer waste, in a legal and environmentally correct manner, is one of the main objectives to be planned and structured.

After-sales logistics are concerned with planning the operation and control of the physical flow and logistic information with respect to after-sales goods that have not been used or rarely used and that for different reasons return the various connections in the supply chain. direct distribution.

As defined by Brandalise (2017: 124) aftermarket reverse logistic is the area of operation that deals with the operationalization of the physical flow of after-sales goods, without use or with little use, which return to the different links of the direct distribution chain, consisting of a part of the reverse channels through which these products flow.

To illustrate in a simple way, the following are examples of post-sale reverse logistics: return systems for beer glass hulls, plastic water bottles, butane gas cylinders, various equipment and materials for exchange, discards by any another reason, among other situations where the products were used or not.

The reverse logistic of post-consumption has the same concern of planning and control of the physical flow and logistic information, but in relation to the post-consumer goods. Continuing, Brandalise (2017, p.124) defines post-consumer reverse logistic and clarifies what post-consumer products are it is the area of reverse logistic that also operates physical flow and the corresponding information of discarded post-consumer goods that return to the business cycle or production cycle through specific reverse distribution channels. Post-consumer goods are end-of-life or used products with the possibility of re-use and industrial waste in general.

The most striking feature of post-consumer reverse logistic is recycling. This is because a large part of the products that are returned becomes the raw material for recycling. Examples are aluminum packaging that is collected and sold to companies that through processing can reuse them for the same purpose. In the same way, plastic, paper and cardboard can be processed for various applications.

About industrial post-consumer waste, there are more developed management regulations that provide for the control of pollution of the environment caused by industrial activities. In these cases, many of the residues have a destination, and the recycling process does not occur.

In Brazil reverse logistics is gaining momentum in the creation of Law No. 12,305, of August 2, 2010, which establishes the National Solid Waste Policy (NSWP). Law No. 12,305 / 2010, Article 33, provides that they are obliged to structure and implement reverse logistic systems, upon return of the products after the use by the consumer, independently of the public service of urban cleaning and solid waste management, manufacturers, importers, distributors and traders.

Reverse logistic is still an area of low priority in Brazilian companies. Many institutions see this logistic reverse process as a major problem since it represents costs that cause controls to seek further development.

Among the sectors concerned with reverse logistics in Brazil it is possible to highlight: Tyres (Lagarinhos & Tenório, 2013), vehicles batteries (Hojas Baenas, et al., 2011), packaging (Silva et al., 2013), and health, pharmaceutical and medicine (Pereira et al., 2017; Aquino et al., 2018; Dias et al., 2018).

2.2 The Brazilian Collection And Recycling Process

Mineral resources and renewable natural resources are at great risk because of society's modern lifestyle, which generate large volumes of waste and have low recycling rates, thus contributing to the loss of important and valuable natural resources.

Abrelpe - Brazilian Association of Public Cleaning and Special Waste Companies, in its annual study of the Solid Waste Survey in Brazil, pointed out that the generation of urban waste in Brazil in 2016 was 78.3 million tons, and that the destination of these residues showed a worsening, when compared to the previous year.

In the period from 2015 to 2016, there was an increase in dumps and a reduction in landfills, and 3,331 municipalities sent more than 29.7 million tons of urban solid waste, about 41.6% of what was collected in 2016, to dumps, or controlled landfills, which are known as not having a set of systems and measures necessary to protect the environment against damage and degradation.

Selective collection, according to the Abrelpe Panorama, is still not progressing and only 69.6% of the country's 5,570 cities have some initiative in this regard. "The direct consequence of this is the recycling rates that have been stagnant for some years, despite the great publicity that has been done in this respect, and the overload in the final destination systems," said Abrelpe director Carlos Silva Filho. (www.setor3.com.br and www.tratamentodeagua.com.br)

Besides the environmental impact, the deficiency of the Brazilian collection and recycling also involves the financial aspect of the country.

According to Barros Neto and Santos (2017: 269) Brazil currently loses R$ 8 billion per year by taking to dumps and landfills recyclable materials that could return to industrial production, according to the Institute of Applied Economic Research of Brail (IPEA).

2.3 The obstacles of adopting reverse logistic for Brazilian companies

The National Solid Waste Policy was a breakthrough in the history of basic sanitation in Brazil, since it can establish clearer and more targeted goals and objectives, with a focus on the country's environmental problems.

The exaggerated consumption of the Brazilian population creates a volume of urban waste that can be absorbed by the country and the environment, and so mountains of garbage are accumulated in inappropriate places, providing negative impacts to the environment, and wasting the opportunity for profit through reuse of materials.

According to Amaro and Verdum (2016, p.29) the great variety and quantity of products, thrown away in a consumer market such as ours, whose life cycles are becoming smaller, explicitly compromise the return of these products for reuse within the company's own productive process, its reuse / recyclability or environmentally sound disposal.

Reverse logistics requires companies to become aware of the destination of their waste as an intrinsic part of their value chain and consumers are also part of this cycle, with the active role in the separation of household waste that contributes to one of the central bases reuse and recycling.

Effecting the closure of this cycle in an organized and efficient way is an even greater challenge of reverse logistic. This is because unlike traditional logistics, where delivery products are concentrated in a distribution center, reverse logistic works with waste scattered throughout the country, making logistic transport more expensive.

There are other obstacles to the adoption of reverse logistic, namely:

- The time elapsed between the sale and the return of the product can be quite long;
- There is a conflict of responsibility in many cases, since the reverse logistic chain involves the consumer, the retailer and the distributors until they reach the manufacturer;
- Costs can be large, especially if there is a suitability of all parties;
- Return conditions: Is the product dangerous? What is the condition of the packaging? How to return liquid products?
- Is it possible to reuse the product or to include it in a reuse process? How will this be done? Is there a need for investments?

For some segments the obstacles to the adoption of reverse logistic are much stronger. The National Solid Waste Policy of 2010 sought to include requirements for some types of industrial segments, such as pesticides, batteries, tires, lubricating oils, among others. However, despite the time required to plan and adapt the structures by 2014, a part of these sectors still need sectoral agreements to carry out this type of practice, since several entities are involved in processes, such as consumers and retailers.

According to Amaro and Verdum (2016: 29) affirm that legislation leaves a gap, which results in our current situation. After more than four years, most industry agreements have not yet been signed by industry and government.

Even in the face of so many challenges, according to the 18th International Logistics Forum held in 2018 in Rio de Janeiro, about 40% of large companies develop programs related to the reverse logistic operation. (site www.noticias.terra.com.br)

Faced with this challenging scenario, companies that invest in technologies, infrastructures and transport modalities will be ahead of their competitors, being able to enjoy all the positive results that this reverse logistics process can offer.

2.4 The importance of reverse logistic for the environment

The improper management of waste generates numerous damages to the environment, and seriously impairs the quality of life of people, animals and the planet itself.

Therefore, reverse logistics is of great importance because it studies and manages how by-products of a production process will be discarded in the environment or reintegrated into the process.

The positive aspects of reverse logistics for the environment lie in the adoption of practices aimed at reducing the amount of waste disposed of, reducing energy and raw material consumption, reducing the generation of polluting agents, emphasizing the concepts of environmental responsibility, importance of recycling, among others.

According to Guarnieri (2011, page 134) reverse logistic aims to eliminate pollution and waste related to packaging materials, as well as to provide incentives for recycling and reuse of products and to replace polluting materials with the environment, thus contributing to the preservation of the environment.

When reverse logistics works to reuse solid waste, it reduces pollution of the environment, water, air and soil, thus prolonging the life of landfills, as it minimizes the amount of waste to be deposited.

Leite (2003) highlights the environmental benefits provided by reverse logistics, namely:

- Reduction of both safe and illegal disposal volumes;
- Energy saving in the manufacture of new products;
- Reduction of pollution by waste containment;
- Restriction of risks arising from landfills;
- Ecological awareness.

Reverse logistic is based on the principle that product liability is the responsibility of the producer, that is the final destination of the products generated is the responsibility of the

manufacturer, including the duty to reduce the environmental impact that these products cause.

Reverse logistic also aims at environmental education, and it is through this education that the direction of the actions will be guaranteed and the efficient and effective maintenance of the reverse logistics in any place where it is applied. For this, it is necessary that this environmental education be well conducted and delivered so that the proposed objectives of reverse logistics are satisfactorily achieved

2.5 Reverse logistics in reducing environmental impacts

To reduce environmental impacts, reverse logistics is concerned with the efficient destination of waste, in order to avoid the deposition or contamination of the environment and its reintegration into the production cycle, through the process of reuse of solid waste.

For the use of these wastes, it is important to size the entire process, allocating the work in the collection, sorting and processing of the waste.

Collection is the first link in the process, followed by the logistics that lead to sorting, which in turn consists of waste separation, washing, pressing and storage.

The duly sorted waste follows several destinations and according to the economic feasibility they are sent for reuse or recycling. For this process is used the reverse logistics of distribution of selected waste.

Due to the growth in the generation of solid waste, the most appropriate solution in the destination of this waste is that in which the environment and the profit are combined in such a way that both the environmental directives and the financial result are satisfactory including the role of logistics reverse.

In these circumstances, it is evident that reverse logistic has consequences in the three dimensions of sustainability, namely:

- Economic;
- Social;
- Environmental.

The economic dimension refers to the financial gains obtained, from actions involving reverse logistics. For example, a company can reduce its costs by reusing materials that are discarded by its final customers, such as the return of aluminum cans of soft drinks, which after collection and sorting become the raw material for the manufacture of other cans or other for-profit purposes.

In the social sphere is the gain received by society, from activities involved in reverse logistics. With the recycling process job opportunities are generated, creating recycling cooperatives, collection centers and community mobilization projects.

Finally, the environmental aspect, which is related to the minimization of the problems caused to the environment, due to the incorrect disposition and use of solid waste generated by the population in general.

These three dimensions should be worked on in order to add value to the goal of successively reducing the environmental impacts of processing activities.

According to Dias (2011, p. 45) the most important approach in the three dimensions of corporate sustainability is the necessary and permanent dynamic balance that must be taken into account, and which must be taken into account by organizations that work in each of them: business (economic) organizations, , and environmental (environmental) entities. An agreement must be established between the organizations in such a way that none of them reaches the maximum degree of claims or the unacceptable minimum, which implies a permanent dialogue so that the three dimensions are considered in order to maintain the sustainability of the system.

One of the most striking features of reverse logistics is a way of reusing materials and respecting this singularity. Leite (2009) distinguishes three reverse subsystems: reuse, remanufacturing and recycling.

In the reuse, the waste does not receive any type of repair or increment and can be cleaned and left in conditions of reuse by the final consumer. In remanufacturing, waste can be reused in its essential parts, by replacing components that complement, reconstituting the product for the same purpose and original nature. Recycling is the reverse channel in which the product does not reserve its original functionality. Simplified recycling is the reuse of waste with raw material for the manufacture of a new product.

The initiatives to adopt reverse logistic have achieved considerable returns for companies and society, with the appropriate disposal of solid waste or its reuse, demonstrating the importance of the development and implementation of infrastructure that provides the operationalization of sustainable actions through a constant planning, cooperation between agents (suppliers, manufacturers, wholesalers, retailers and final consumers) and government support.

3. METHODOLOGY

For the accomplishment of this work, the exploratory and descriptive research with qualitative and quantitative approach through bibliographical revision and data and information obtained from sites surveyed in the world - wide network of computers was used.

To collect the data to be analyzed, an instrument was developed for this collection. It is a questionnaire containing ten objective questions that was sent electronically (e-mail) to each company that composed the research (A Appendix).

The sample was formed by 84 (eighty-four) Brazilian companies in the food business of medium and large size, and the collection period with submission of questionnaires between November 15th and 20th , 2018.

Emailing did not work as expected, since no company returned. A new e-mail was sent between November 23rd to 25th, 2018. Again, there was no return with the answers from the companies. From then on, it was decided by direct contact via telephone.

With this new approach, it was only possible to contact 50 companies in the period from November 28th to 30th , 2018. In this last approach, 21 companies answered to the survey. The contact was made with representatives of the commercial area of the companies.

Based on the data collected from the questionnaire, data organization and analysis were carried out, aiming to identify the utilization behaviors and the barriers of the adoption of reverse logistics by Brazilian medium and large companies in the food sector .

4. ANALYSIS OF RESULTS

After telephone contact with twenty-one of the large and medium-sized companies in the food industry, the necessary data were obtained to compose the information relevant to the article under study. Table 1 shows the companies that participated in the survey.

The majority of participating companies are renowned and known by the Brazilian public and therefore it is expected that they will seek to preserve the environment and invest in social welfare, however, in the course of this analysis it is possible to notice that a good part of the companies is still very late in terms of social and environmental responsibility.

Table 1 – Participating Companies

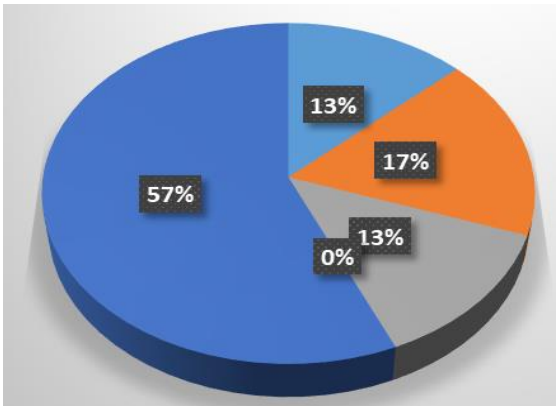
Companies participating in the survey		
AGUA DA VIDA	**COCAMAR**	**SORVETES COLEGIAL**
DOCES HELENA	**JBS**	**FRIMESA**
GOIAS VERDE	**GUARARIO**	**ITAIQUARA**
ITAMBE	**MASGOVI**	**MINALBA**
NESTLE	**OLE ALIMENTOS**	**PIF PAF**

PIRACANJUBA	**PREDILECTA**	**TREVO**
VIGOR	**BRF**	**RIO QUALITY**

Source: authors (2020)

In times of environmental disasters, global warming, air polluted by emission of polluting gases and soil contamination by incorrect disposal. As shown in Graph 1, 57% of the contacts still do not carry out any type of environmental impact study based on their activities and operations.

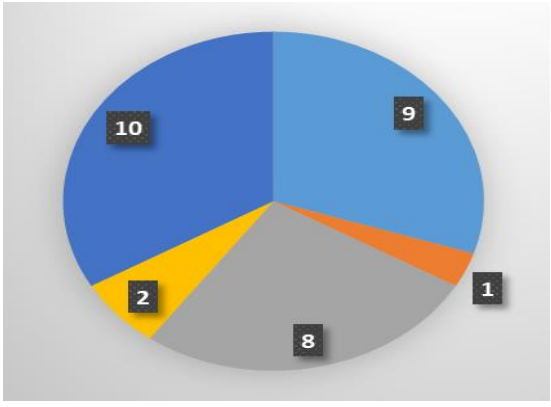
Graph 1 - Environmental Impact
Environmental impact study



13% - ground pollution 17% - water pollution 13% - air pollution 0% - noise pollution 57% - no study performed
Source: authors (2020)

Although the recycling service contributes to reducing the disposal of materials in the environment, generating revenues from recycled material sales, reducing costs and bringing a sustainable business image, ten of the twenty-one companies contacted do not carry out any type of recycling (Graph 2).

Graph 1 – Recycling services
Impacts of recycling services



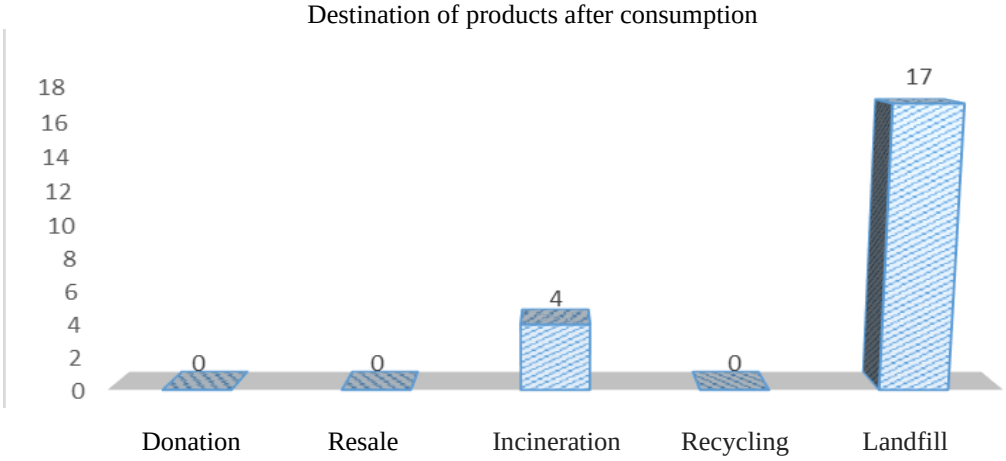
1- Reduction of costs 2-Revenue from sales of recycled products 8- Less polluted environment 9- Sustainable company image 10- Does not carry out recycling
Source: authors (2020)

None of the interviewing companies performs any kind of targeted work regarding the fate of their post-consumer generated waste. These wastes are only sent to landfills, as shown in Chart 3.

Four of them adopt the waste incineration process, although it is also harmful to the environment by releasing gases and toxic substances that can cause air pollution.

These companies implementing a recycling policy would significantly reduce the amount of waste sent to landfills, thus extending their useful life.

Graph 3 - Waste destination
Destination of products after consumption



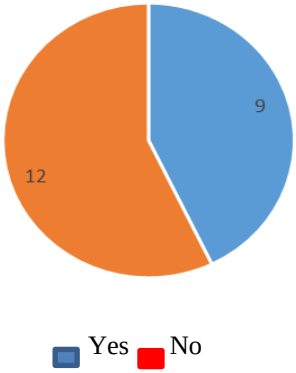
Source: authors (2020)

Only nine companies carry out a selective collection process and send the recyclable materials to the appropriate places. Ten companies do not have a selective collection process (Graph 4) although they recognize that this service exists externally in their region and two companies do not carry out any type of selective collection and claim not to have this service in their region, that is, in all 12 companies do not perform or participate in selective collection.

It is clear in the research that the selective collection process, which is so important for reducing the accumulation of solid waste dumped in dumps and landfills, is still something that is not found in most companies.

Graph 2 - Selective Collection

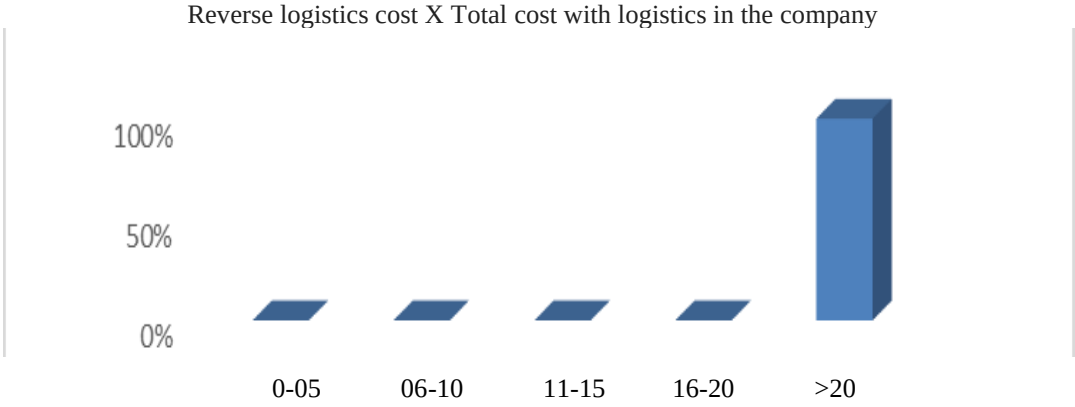
Do you participate in selective collection?



Source: authors (2020)

Companies believe that the costs of reverse logistics are high and may jeopardize the profit on billing, but they do not think they find match could profit and reduce costs using this tool (Graph 5).

Graph 5 - Reverse logistics: costs
Reverse logistics cost X Total cost with logistics in the company



Source: authors (2020)

Most companies think that it is important to implement reverse logistics to comply with legislation, however this process or better this tool is very important for the synchronization of an entire process, which may aid in organizational development, however, the vast majority think only of implemented to comply with the legislation

5. CONCLUSIONS

This study sought to identify the existing barriers to the adoption of reverse logistics by companies, as well as the collection and recycling processes in Brazil.

Analyzing the data presented by the survey carried out with the 21 medium and large companies, it is concluded that all companies, even though they are aware that the use of

reverse logistics can generate a sustainable company image, contribute to the reduction of solid waste dumping in the environment and valuing their brand do not invest in this process in a significant way because they consider their cost as being high compared to the total cost of their logistics, so the adoption of this process has a very low percentage of adhesion precisely because of the company's business posture.

The companies still do not understand that despite the costs, the adoption of reverse logistic with the implementation of collection and recycling policies by companies can rather present growth not only in image and billing but also positively boost the organization's performance.

The collection and recycling service in Brazil do not go to other developed countries. We continue to produce tons of solid waste that could be transformed into other products thus moving our economy, but are, however, dumped in several dumps, degrading the environment or landfills in a disorderly way.

This is a social issue, since it requires a participation of society as a whole; economic because what could be being recycled would generate revenue through a new product available in the market; and environmental because it destroys the environment by reducing the quality of life of an entire community.

Companies have responsibility for the residues of their products and must be responsible for the accomplishment of the logistics and / or final destination of their waste, but as analyzed in the survey, most do not collect and do not treat these residues that could be recycled. Most companies that perform some type of collection prefer to dispose of the waste in landfills, reducing its useful life, contributing to soil pollution, further degrading the environment.

The adoption of reverse logistic by companies can reduce operating costs and reduce the need for new raw materials generating financial benefits, can be a differential of customer loyalty, minimize the penalties of environmental laws and even make companies more competitive in the as waste returns to the production cycle, transforming the companies that make their use into environmentally responsible, bringing economic, social and environmental benefits.

This study is a starting point. It is advisable the expansion of the discussions with the development of new studies considering companies of other sectos for future studies.

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A Appendix - Research Questionnaire

1. Does the company conduct studies of possible environmental impacts?

- ☐ a) Soil pollution
- ☐ b) Water pollution
- ☐ c) Air pollution
- ☐ d) Sound pollution
- ☐ e) No study

2. Report the impact to the company from the recycling service [Possible to mark more than one item]:

- ☐ a) Sustainable image of the company
- ☐ b Reduction of costs with the solid waste disposal operation (reverse logistic)
- ☐ c) Collaboration with the reduction of the accumulation of solid waste deposited in nature
- ☐ d) Generation of revenue with blindfolded materials that can be recycled

3. What is the most frequent destination for the post-consumer products received by the company?

- ☐ a) Donation
- ☐ b) Resale
- ☐ c) Incineration
- ☐ d) Recycling
- ☐ e) Landfill

4. Does this company participate in selective collections?

- ☐ a) Yes, there is a process of selective collection, where recyclable materials are sent to the appropriate places.
- ☐ b) Yes, there is an informal separation of some recyclables, but there is no differentiated external collection for recyclable and non-recyclable materials.
- ☐ c) There is no selective collection process, although there are external selective collection services for recycling in the region.
- ☐ d) There is no selective collection process and no external selective collection service in the region of the company.

5. What is the volume in monthly percentage of collections of:

	No Collects	up 20%	up 40%	up 60%	up 80%	Column 6
Plastic						
Metal						
Paper						
Glass						

6. What is the percentage of the materials collected destined as waste, that is, those that should be discarded?

- a) 0 to 05
- b) 06 to 10
- c) 11 to 15
- d)16 to 20
- e) > 20

7. What percentage of collected materials goes to landfills?

- a) 0 to 05
- b) 06 to 10
- c) 11 to 15
- d)16 to 20
- e) > 20

8. What is the cost of reverse logistic in relation to the total costs of logistics in the company?

- a) 0 to 05
- b) 06 to 10
- c) 11 to 15
- d)16 to 20
- e) > 20

9. Why is it interesting for the company to implement reverse logistics?

- a) In order to comply with
- b) To qualify the logistics process
- c) To reduce costs
- d) To be recognized as a sustainable company
- e) To value the brand

10. Does the company have a technical certificate issued by IBAMA?

- ☐ a) Yes
- ☐ b) No