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Reverse Logistics Analysis and Results Applied to the Grocery Retail

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Abstract: The purpose of this research was to analyze the reverse logistics practices carried out by supermarkets in the western region of the state of Sao Paulo and quantify the volume of waste that are no longer discarded in the environment. To achieve the proposed objective was conducted a field survey in three supermarkets, with direct observation over a period of six months, where the reverse logistic practice was observed in each supermarket to quantify what was left to pollute through the proper disposal of materials (plastic and cardboard). To this, it was used for data analysis method developed by the Institute Wuppertal to quantify the data in accordance with the produced material (abiotic and biotic) and the amount of water and air are no longer polluted. As a result it was observed that the supermarkets surveyed in total, do not generate about 220 tons of abiotic and biotic materials during the observation period and a large amount of water and air is no longer polluted. Through the obtained results, we see the great importance of reverse logistics in the preservation of the environment.

Key words: Reverse logistics, retail supermarket, sustainability, recycling, solid waste

INTRODUCTION

Environmental preservation is a frequent theme in the current business scenario. Companies' awareness toward the conservation of natural resources involves more than the possibility of branding and customer loyalty. Environmental sensitivity is present in several countries and in Germany and the Netherlands, this perception on the part of agents (companies and individuals) is quite high. In other countries, such as the United States, the largest force linked to reverse logistics is associated with the potential value that can be recovered from the reuse of products, parts or recycled materials.

In this context, retailers have begun to take on new tasks, such as the commitment to reduce the waste they generate and to recycle and reuse what is generated with the purpose of increasing their responsibility to the final consumer (Junior and Rizzo, 2010).

One method is to adopt the practice of reverse logistics which is recognized as the area of business logistics that plans, operates and controls the flow of materials corresponding to the return of after-sales and post-consumer. The production cycle through reverse distribution channels, adds values of differents natures: economic, ecological, lawful, logistical and related to corporate image, among others.

This care for the environment is due to the fact that incorrect disposal of waste strongly affects the environment. Currently, supermarket retailers are paying more attention to the practice of reverse logistics because of great public concern for the environment as well as the influence of laws such as the Brazilian National Policy on Solid Waste (NPSW). The use of reverse logistics allows the recycling of packings used by retailers, ensuring the return of these materials to the production process and reducing their environmental impact.

Thus, the problem of research that guides the present study may be expressed by the following question: How do reverse logistics practices deployed by a grocery retail in the Alta Paulista region contribute to sustainability? In this sense, the objective of the research was to analyze the reverse logistics practices carried out by three supermarkets and quantify the volume of waste generated.

As a result of this study, it was observed that the supermarkets stopped generating 220 tons of biotic and abiotic materials per month (using the Wuppertal method) and these materials are influencers in on global warming and the depletion of the ozone layer.

Literature review

Grocery retail: Retail is a part of the distribution channel and the main intermediary between industry and the final consumer. Thus, it can be defined as "all activities which include the process of selling products and services a personal need of the final consumer". Historically, retail

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originated from informal sales taking place on city streets and evolved into stores and emporiums that sold durable and nondurable products. Since, the Industrial Revolution, with the growth of industry and the creation of standardized products, commercial establishments have grown, thus resulting in large self-service markets.

For Dias and Junior (2003), retail is divided into selling of general goods and selling of services and the supermarkets are inserted in the food retailing category. Some researchers such as Parente, Saab and Gimenez, Levy and Weitz classified grocery retails as self-service systems relying on a variety of between 4,000 and 14,000 products including food and nonfood items, with at least two checkouts and a sales floor area between 300 and 5,000 m^2 (Dias (2003; Junior *et al*., 2011). Supermarkets consist of sections such as grocery, butcher, cleaning products, etc. and provide carts and baskets to consumers, without requiring the presence of a seller. Another important feature of this sector is high turnover of products with low profit margins.

Over time, the grocery retail has undergone several changes. According to Parente and Gelman, these changes have occurred mainly because of the influence of society, who are increasingly aware of the scarcity of natural resources. Thus, the protection of the environment shall be the object of attention in companies operating in retail from a socially responsible position. Retailers are now assuming a new role; committing to the reduction of waste generation, recycling and reuse and creating the effect of increasing their responsibility to the final consumer (Junior and Rizzo, 2010).

Among the environmentally correct actions, carried out by companies in the grocery retail segment are the use of recyclable packaging, encouragement of the practice of selective waste collection and prevention of wasting natural resources such as water and electricity.

In fact, grocery retails are increasing their accountability to the consumer's concern for the environment. Companies that adopt environmentally friendly practices are recognized by the consumer, thus creating a competitive advantage in the marketplace. Another result of these actions for retailers that operate in the supermarket area is increased business profitability which thus generates economic benefits.

Recycling and solid waste reuse: Since, the Industrial Revolution large-scale production has made the volume and diversity of waste generated in urban areas increase. Humans are experiencing the era of disposability (Fehr, 2014). Most products are used and then thrown away or incinerated, causing considerable damage to the environment. Currently, more stringent laws and growing consumer awareness are driving companies to think about their responsibility for their products after use (Veiga, 2013).

Parente and Gelman considered companies to be open systems that constantly interact with the environment where they are inserted and make terms of trade accordingly. Thus, the survival of enterprises is dependent on a healthy environment because when the medium comes into degradation, the system is compromised.

Recycling is defined as returning waste materials to the processing line in order to reduce process costs and open up new possibilities (Junior and Rizzo, 2010; Chaves *et al*., 2014; Veiga, 2013). According to Motta, the word recycling was introduced to the international vocabulary when it was found that the sources of oil and other nonrenewable raw materials were (and are) running out. To this researcher, recycling is a reverse channel revaluation where materials discarded from post-consumer products are extracted industrially, turned into secondary raw materials, not directly taken from nature or recycled and are then incorporated into the manufacture of new products. Recycling saves energy, saves natural resources and brings materials back to the productive cycle that were thrown out or discarded.

For Mano and coauthors (2005), the potential benefits of recycling include:"Reduction in the consumption of non-renewable natural resources, when replaced by recycled waste; Reduction of consumption of the virgin material for production process; Reduction of pollution" and "Reduction of areas required to landfill as waste is used again as consumer goods".

The recycling and reuse of materials that would be discarded and the remains that arise over the activities of the grocery retail create a reverse flow (Junior *et al*., 2011). The reverse flow of goods that were not consumed becomes an important tool for the sustainability of organizations (Junior and Rizzo, 2010).

Researchers such as Goncalves and Mano and coauthors explained that reducing the generation of waste and instead reusing and recycling these materials are parts of the clean production targets and cleaner production processes initially employed by the industry and today have been adopted by various business sectors.

To meet the demands imposed by the National Policy on Solid Waste-NPSW, Law No. 12,305/2010 increased investment in technology is needed in education and knowledge management. According to Nonaka and Takeuchi as cited in Marchi, it is of great importance to generate beliefs, commitments, situations and appropriate interactions so that information is converted into

knowledge and can enhance behaviors and attitudes. The NPSW sets standards requiring major market players to provide a suitable destination for solid waste that is generated in the manufacturing process and after consumption of various goods. Thus, one must have a means that enables the return of products and post-consumer packaging for the industry to adopt the processes and the most suitable procedures to recover waste components with the lowest environmental impact. In this sense, Dowlatshahi (2000) explained that reverse logistics can be a tool in waste management because it is a process in which the manufacturer receives the waste generated after the consumption of products and may thus recycle, remanufacture or dispose of.

Reverse logistics: Braga Junior e Santos analyzes reverse logistics in the supermarket sector and suggested it is made up of three main elements: industry, retail and the secondary market (represented by the recycling companies). These elements interact with each other, making transfer operations of materials who is returned for the supply chain through the secondary market who returns these materials, many times in the form of new packings ready to be used again by industry. So, the reverse flow originates from the retailer which transfer the packings to the secondary market, with in turn, sells the recycled material to industry, thus restarting the cycle. Over time, the reverse logistics concept has had some modifications. However, one of the main explanations is given by Rogers and Tibben-Lembke who posited that reverse logistics encompasses all of the logistical procedures of a company but in the opposite direction, belonging only to the two concepts of recycling and removal of waste and the administration of returns.

Reverse logistics has been recognized as the area of business logistics that is used to plan, operate and control the flow and logistic information corresponding to the return of after-sales and post-consumer goods to the production cycle through reverse distribution channels which adds value of various kinds, such as economic, ecological, legal aspects, logistic and related to corporate image, among others.

The concept also gets a new feature, the part of strategic planning that should be treated as an independent activity, turning the business's attention to management of individual logistics (Daher *et al*., 2006). Horvath *et al.* (2005) stated that reverse logistics is not optional but mandatory. Nevertheless, many companies still do not deploy such processes because of difficulties or even disinterest (Daher *et al*., 2006).

For the implementation of reverse logistics to be efficient and generate expected returns, Ahluwalia and Nema (2006) stated that a company must first develop strong reverse logistics strategies and then clearly outline the financial, corporate, marketing and other goals.

Daher *et al.* (2006) presented the main factors that lead organizations to engage in reverse logistics which are: environmental laws; economic benefits obtained and growing environmental awareness of consumers. In addition to these, Rogers and Tibben-Lembke also pointed to other reasons: competitive reasons, cleaning of the distribution channel, profit margin of protection and value and asset recovery.

Ahluwalia and Nema (2006) also described reverse logistics as other businesses with goals, objectives information tecnology resources individual and specific personnel and responsible for the execution and development of the business.

For researchers such as Hazen *et al.* (2014) and Rossi and Cullen, reverse logistics is also recognized as a key issue in the context of management of the supply chain, leading to gaining a competitive advantage in the marketplace. Internationally, Kokkinaki and coauthors described reverse logistics as a factor that has become popular over the years due to constantly growing environmental sensitivity and also to economic factors linked to it. These researcher also addressed legal issues related to strong reverse logistics, especially in some European countries such as Germany and the Netherlands. The laws present in these countries require manufacturers to develop a product reuse policy for the end of the product life cycle.

Companies are the main users of natural resources and also responsible for global economic development (Junior and Rizzo, 2010; Dowlatshahi, 2000). With the changes over time, especially since the Industrial Revolution, organizations began to produce consumer items on a large scale, greatly increasing the amount and diversity of waste generated in urban areas (Motta, 2011; Veiga, 2013). Thus, there was the need to create an alternative way to process such waste.

The scarcity of raw materials and increasing public awareness regarding the preservation of the environment, along with the idea of opposing waste, are some of the factors behind the development of reverse logistics (Fehr, 2014).

According to Junior *et al.* (2011) in the grocery retail, reverse logistics can emerge as a new possibility for profit and generate a great image for the company as it assumes the role of an environmentally friendly company. In addition, reverse logistics also assists in the performance of the organization, leading to recovery of materials that were generated and would be discarded as well as helping to reduce the environmental and social

impacts of waste generated by this sector and incorporating social and economic aspects (Chaves *et al*., 2014; Dias and Junior, 2015).

Junior and Rizzo (2010) also explained the importance of reverse logistics in the supermarket sector from the perspective of contributing to the reduction of social and environmental impacts, providing the opportunity to recycle paper, plastic, cardboard, pallets and other products coming from suppliers to supermarkets, allowing the emergence of a secondary market that generates direct and indirect jobs.

Dowlatshahi (2000) and Rossi and Cullen suggested that reverse logistics when applied can bring economic advantages because the products' original cost is offset by the value of the returned products and recycled products have a significantly lower value compared to the cost of the original item. In this respect, some German companies use a reverse logistics model to maximize their profits arising from the sale of materials that can be recycled, thus generating a financial return for the organization (Reyes and Meade, 2006).

In the United States, the greatest strength of reverse logistics is its link to economic issues. The potential value that can be recovered from the reuse and recycling of products is significant. Nationally and internationally, reverse logistics has been present for years in the concepts and business practices, updating itself as the conditions imposed by the macro and micro environments in which they operate.

MATERIALS AND METHODS

Whereas the objective of the research was to demonstrate the environmental benefits and the importance of environmental education in the implementation of reverse logistics in the grocery retail. A study was conducted of a supermarket in Sao Paulo, Brazil to measure the volumes of waste (plastic and cardboard) collected by means of reverse logistics.

To achieve this purpose, the method developed by Ritthoff, Rohn and Liedtke Wuppertal Institute for analyzing environmental advantages was used. This method allows the assessment of environmental changes associated with the extraction of resources from their natural ecosystems. Thus, to supply materials to a system, a greater amount of materials must be previously processed into various environmental components which can be classified as abiotic, biotic, water and air.

The conversion of volumes was based on the study of Ritthoff, Rohn and Liedtke Wuppertal Institute. The table of conversion data is represented by Table 1 who highlights values for plastic and cardboard. To obtain the results, the monthly volume of solid waste, generated in kilograms was multiplied by the corresponding value in the Table 1 to get the total volume of materials that are no longer generated in the environment or who left to pollute.

Table 1: Conversion table (kg)

Variables	Abiotic material	Biotic material	Water	Air
Plastic	6.45		294.20	3.72
Cardboard	1.86	0.75	93.60	0.33

Adapted from "Calculating MIPS: Resource Productivity of Products and Services"

The values in the abiotic and biotic material columns indicate amounts generated in the environment, while the values in the water and air fields indicate the amount of pollution produced [or reduced] by the practice of reverse logistics. It is important to describe what is abiotic and biotic materials. Abiotic materials are not decomposed in the environment and biotic undergo decomposition process. Because this, just cardboard is considered at the biotic material compartment, as the plastic takes over 400 years to decompose in the environment.

It is important to note that studies of material intensity developed at the Ritthoff and coauthors Wuppertal Institute are based on energy mixes in Germany and elsewhere in Europe. However, this fact does not preclude the implementation of this methodological tool in Brazil, according to the institute, the quantitative data are very close.

Based on the research problem and the overall goal, a theoretical review of the issues covered in the survey was conducted. Field research was then done to learn about the processes implemented by the research supermarket; through weekly monitoring, data related to the reverse logistics process research were collected over a period of six months and recorded in a spreadsheet. The collected data were then analyzed qualitatively and quantitatively, to determine the environmental benefits generated by the process.

The quantitative analysis measured the environmental advantages of the implementation of reverse logistics in the supermarket, facilitating the development of the case study. Qualitative research, characterized as an attempt to produce detailed understanding of the meanings and situational characteristics presented by the interviewees and the cases analyzed, allowed in-depth observation of the deployment of reverse logistics processes and the environmental education process that was instituted for the supermarket's staff.

Table 2: Amount of plastic and cardboard generated by the supermarket by sector (kg)

	General Grocery		Cold Cuts		Butcher		Farmer's Market	
Variables	Plastic	Cardboard	Plastic	Cardboard	Plastic	Cardboard	Plastic	Cardboard
14, July	269.00	2,066.00	55.00	363.00	55.00	579.00	0.00	542.00
14, August	235.00	1,806.00	0.00	317.00	0.00	317.00	0.00	474.00
14, September	301.00	2,316.00	0.00	407.00	0.00	650.00	0.00	607.00
14, October	310.00	2,389.00	0.00	420.00	0.00	670.00	0.00	626.00
14, November	385.00	2,724.00	0.00	561.00	0.00	764.00	0.00	654.00
14, December	274.00	2,790.00	0.00	407.00	0.00	784.00	56.00	792.00
Total	1,774.00	14,091.00	55.00	2,475.00	55.00	3,764.00	56.00	3,695.00

RESULTS AND DISCUSSION

At the request of managers, the surveyed supermarkets will not be identified, here called as supermarket "A" of the city of Tupa/SP as supermarket "B" of the city of Assis/SP and supermarket "C" of the city of Ranchi/SP.

Supermarket "A": The researched supermarket has a sales area of 1,300 m^2 with 12 checkout lines and records an average monthly flow 45,000-47,000 people. The consumer base includes mainly high income consumers. However, it also meets the needs low income consumers, reaching with the sales of the supermarket an average value of US$ 27.00 per cosumer.

Having a favorable layout for purchasing decisions, it is the only supermarket in the city that offers particular services and differentiated products such as telephone shopping and a wide range of imported products. Through environmental education processes and waste separation, reverse logistics was established less than a year ago and became part of the local management strategy. The study began at the same time that the management of reverse logistics practice applied in the company was changed, with more efficient manner where the solid waste materials such as plastic and cardboard began to be separated into bags and by sector (general grocery; cold cuts; butcher and vegetable garden and fruit).

Before that management be implemented, the materials were placed at warehouse of the supermarket where there were no organization or involvement of all employees. Also, the material was collected by collectors in exchange for letting the area clean, this way they were not taking all the advantages generated by the reverse logistics practices.

The supermarket is divided into four major sectors and all store waste are targeted as the source sector. The total of cardboard and plastic generated, separated and used to measure the volume of biotic material, abiotic, water and air which are no longer polluted by each sector is shown in Table 2.

The bags are placed in front of each sector where the workers put the materials on site to reach optimum capacity. They are then sent to the warehouse from the supermarket where these bags are sent to the matrix of the supermarket chain by the same truck that makes the distribution of products for sale and there are pressed and heavy to be sold. This type of process can allow greater efficiency to the retailer by focusing on volume and processing costs (Junior *et al*., 2011).

Table 3: Environmental advantages obtained in total by retailer through the reverse logistics (kg)

Variables	Abiotic material	Biotic material	Water	Air
Plastic	11,789.00	-	537,740.50	6,804.00
Cardboard	45,039.00	18,161.00	2,266,524.00	7,869.00
Total	56,828.00	18,161.00	2,804,264.50	14,673.00

Within six months of the implementation of reverse logistics, it was noted that the supermarket eliminated the production of 56,828.00 kg of abiotic material which cannot be transformed in the environment over time and 18,161.00 kg of biotic materials which can be transformed into the environment, as shown in Table 3.

Table 3 also shows that the company eliminated the pollution of 2,788,434.00 L of water and 14,474.00 kg of air due to the practice of reverse logistics, considering the water and air affected by the process of manufacturing of the plastic and cardboard materials.

The relationship of plastic and cardboard with these data is given by the incorrect disposal of these materials on environment, causing several impacts. The cardboard is composed by many substances, who includes abiotic and biotic materials. Plastic is also composed by many substances but don't presents composition by biotic materials, being composed just for abiotic materials, thereby does not decomposes in the environment.

The production of any material generates pollution. Thus, the water and air fields represent how much was left to pollute the water and air in the manufacturing process of plastic and cardboard. So, this data represent what is recovered, leaving to pollute the environment with the adoption of reverse logistics practices.

All refrigerated products like yoghurt and sausages, are supplied in cardboard and plastic-coated packaging. The type of material is stronger due to the characteristic of the product and often, the provider itself takes the

package to be reused. This does not happen when the packaging is damaged and ends up in the retailer to be discarded.

The butcher ranks second on the question of quantity of waste generated but an important factor to consider is the packaging of products which are packaged in thicker cardboard boxes coated plastic in addition to the retained moisture, especially in the cardboard due when in cold storage, causing the weight of the bags become higher when compared to other sectors which are thinner and no humidity packaging.

Finally, the farmer's sector is a sector that deals with grocery products in general. A relevant factor to be clarified is that the packaging of fruit and vegetables are being gradually replaced. What was delivered in wooden boxes, now come in plastic boxes and return to the suppliers to be reused. However, this form of distribution may not be applied to all products, occurring only with more resistant products such as carrots, oranges, lettuce, cabbage, potatoes, bananas, onions and that can be loaded in large quantities. The average weight per box is 25 kg. Most sensitive products such as apple, pear and grape, are provided in smaller cartons in small amounts, coated plastic.

As discussed, it can be said that the reverse logistics practice contributes to environmental conservation, failing to emit pollutants and still contributing to the cleaning company and the city.

Supermarket "B": The supermarket "B" has a total area of 6,000 m^2, with 3,000 m^2 of sales area and 3,000m^2 distribution center. In all, they have 356 workers, divided into 130 at the distribution center and 226 in the sales area. It has 18 check-outs, average monthly flow of 100,000 people and average monthly ticket of US$ 23.00. The collection of plastic and cardboard at the supermarket "B" is made similarly to the supermarket "A" but it is not separated by sector, due to the physical structure of the building where it is located. Thus, the bags are placed in brackets in the tank and workers are responsible for putting the materials in their bags according to their classification which is given as: cardboard, plastic crystal and colored plastic.

In the supermarket, the transparent plastic known as crystal, is separated from the colored only to be compressed in accordance with the rating required by the buying company. The person responsible for part of reverse logistics company's services general manager, who developed this practice along with another worker. In addition to the reverse logistics practice the company has other environmental practices with a separation of water and oil system, energy conscious consumption, where from 18h is used only by generators and sporadically makes dirty oil per capita of population. With organic waste, the supermarket has a partnership with the Protective Association of Wild Animals of Assisi (APASS) and this is the collection of organic waste that can still be exploited to feed the animals.

Table 4: Environmental advantages gained by the supermarket "B" with the implementation of reverse logistics

Variables	Material abiotic	Material biotic	Water	Air
Plastic	17.692,23	-	806.985,280,00	10.212,12
Cardboard	67.510,18	27.221,85	3.397.286,52	11.796,13
Total	85.202,41	27.221,85	4.204.271,80	22.008,26

Through these practices is possible to obtain several advantages which can be classified into environmental, economic and social advantages. As environmental benefit has been the reduction of pollution and the appropriate disposal of waste by recycling, as social advantages to generate direct and indirect jobs may be cited, since this practice was necessary to hire five new direct workers and do new partnerships with companies that help the allocation of these materials which can be considered as indirect jobs. The economic advantages we can mention the reduction of energy costs and the return generated by sales of materials.

Thus in Table 4 data represent the environmental benefits obtained by the supermarket "B" through the practice of reverse logistics which shows that the retailer failed to generate 85,202.41 kg of abiotic materials and 27,221.85 kg of biotic material and allowed to pollute 4204271.80 kg of water and 22,008.26 kg of air.

During the research and the data collected it was revealed that the volume of cardboard generated by the retailer is significantly higher and you can realize this claim even by how much the buyers of these materials make the payment thereof in the company, with approximately one once per week and plastic, only once a month.

It can be seen that this supermarket is higher compared to the supermarket "A" and for this reason generates more waste and it is therefore most representative in the generation of environmental advantages.

Supermarket "C": The supermarket "C" has a 1.600 m^2 of sales area has 13 check-outs and registering a monthly average flow 50-53 thousand people. The increased flow of people is registered earlier this month which are held most large purchases. This is the main and most supermarket location, thus most of the local population ends attending the site, thus retaining large proportion of consumers. The consumer target audience encompasses all walks of life, due to the great diversification of

Table 5: Environmental advantages gained by the supermarket "C" with the implementation of reverse logistics

Variables	Material abiotic	Material biotic	Water	Air
Plastic	5.356,17	-	244.307,620,00	3.091,63
Cardboard	20.438,11	8.241,17	1.028.498,29	3.571,17
Total	25.794,27	8.241,17	1.272.805,91	6.662,80

products, schedule and prices. Thus, the retailer generates an average monthly ticket of approximately US$ 31.00.

Similarly to the supermarket "A", those bags with separate matrix materials are sent to the network where it is liable to give the target due to the collected waste. The person responsible for taking care of the business environment and reverse logistics practices is the manager. This accompanies daily as the work is being developed and directs the workers at the time of collecting the materials which are cardboard and plastic.

In place, reverse logistics has always been present. The practice is performed basically like the other two supermarkets studied where the materials are in separate bags, one for cardboard and one for plastic and resold. The bags are located in the warehouse of the company, where each product replacement packages are removed and separated to be sold and recycled.

Precisely because it is the biggest supermarket in town, the retailer collects a lot of materials. Thus, Table 5 shows the environmental advantages obtained with the use of reverse logistics in place, obtained by the method Wuppertal.

Table 5 shows that through the reverse logistics retailer failed to generate the environment 25,796.27 kg of abiotic materials and 8241.17 kg of biotic material. The table also shows us that were left to pollute 1,272,805.91 kg of water and 6662.80 kg of air.

The results are significant, but it is noticeable that this supermarket is what got less environmental advantage in every aspect compared to the others. The reason for this difference is given by the amount of waste that is generated which is lower because despite being the biggest supermarket in the city and cover a large flow of consumers the population of this city is only 28,804 in habitants.

From the results you can see that reverse logistics it is also used in small locations, with lower volumes of waste, achieving satisfactory results in the issue of environmental preservation.

CONCLUSION

Since natural resources are not eternal, the retail supermarket is one of the sectors that generate more solid waste and that can make a significant contribution to the process of re-use. With a vision of environmental preservation, society increasingly been pushing for regulations that favor the implementation of an effective environmental practice to strengthen the industry to reduce the environmental impacts of this waste.

Thus, reverse logistics has been used in supermarket retail as an environmental management tool that brings environmental, social and economic benefits as was demonstrated in this study. Another aspect observed in the research is that the implementation of an environmental practice, it is necessary that this be accompanied by educational awareness activities in order to change concepts, habits and values so that there is efficiency and generate results even outside the workplace. The supermarkets surveyed, it was found that there is, even if informally, the presence of educational activities, but this is still timely and are not effectively consolidated on both retailers.

Even with little implementation time because the surveyed supermarkets only implemented the reverse logistics after the research proposal has been submitted, reverse logistics management in fact, is a strong ally in the preservation of the environment, however, that this is increasingly valued and have your optimized process, there must be disclosure of the results to stakeholders, generating motivation in performing the work and customers, so that it is reflected in the image of the stores, assigning environmentally friendly company image.

During the period analyzed the supermarkets surveyed do not generate a significant amount of waste on the environment. For each kg of recycled plastic and cardboard, it was able to avoid generating 2.18 kg of abiotic materials and 0.75 kg of biotic material in the environment. Likewise, it was possible to stop contaminating 107.68 kg of water and 0.56 kg air.

Management by sector, applied by the supermarket "A", from the city of Tupa/SP, helps everyone to be directly involved in the separation process because there is no dedicated staff to handle the materials. Thus, all have a greater process insight and become more aware of the importance of this practice and its impact on the environment which may result in the adoption of new environmental conduct day-to-day which is one of the environmental education goals transform the conduct of the individual, so that it can perform actions on behalf of the environment.

Supermarkets "B" and "C", the cities of Assis/SP and Rancharia/SP, respectively, also have a good management of reverse logistics practice, generating good results over the analysis period, however there is the involvement of all workers, many not being aware of what happens after the separation of materials.

The reverse logistics practice has full relationship with the size of supermarket and the flow of people that attends each month. You can see that in the supermarket "B" reverse logistics has greater influence, considering that this is the biggest supermarket compared to the three who were surveyed. This also has greater flow of people requiring replacement products faster and therefore more waste discarding.

Regarding the economic advantages, it is clear that reverse logistics is a great option to increase the company's cash, because through the sales material you can get significant amounts, that may assist the retailer in various activities, either to improve the structure of location, or even financially assist their workers with loans and advances.

As noted in the supermarket "B" reverse logistics practice is still a source of direct and indirect jobs, it is important for economic and social development of the region where it is applied.

Through the above, it can be considered that reverse logistics is a strong ally for environmental preservation in general, regardless of where it is applied, either a large or small establishment. Therefore it is essential to have a planning and monitoring of these processes so that results are achieved and reach the entire community in the form of example to be followed, assisting in the preservation and conservation of natural resources.

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