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“TEN YEARS WORKING TOGETHER FOR A SUSTAINABLE FUTURE”

The trash becomes profit for Brazilian Grocery Retail

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Abstract

The aim of this work was to analyze the reverse logistics implemented in 22 grocery retails located in São Paulo state (Brazil) and to quantify the profit obtained with this implementation. For this, during 24 months the quantities of cardboard and plastic discarded by these grocery retails were monitored. As a result, it was possible to observe that the supermarket corporation increased its net profit with the practice of reverse logistics in value proportional to the net profit generated by two supermarkets with revenue of 600 thousand dollars. It was concluded that the implementation of reverse logistics was satisfactory, as well as generating environmental benefits resulting from waste reduction, also contributed to the generation of direct and indirect jobs generated by business growth.

Keywords: Reverse Logistics; Grocery Retail; Supermarket; Sustainability; Waste Management

1. Introduction

Competitiveness in Brazilian retail has always been very strong. Data presented by the Paulista Supermarkets Association (PSA, 2016) reflect the low profitability of the sector, which is around 1.8%. For this reason, the search for alternatives that allow the retailer to create new sources of income to leverage net profit becomes relevant.

On the other hand, even with a low profit margin, the large representation of retail grocery in the Brazilian trade gives to this sector a series of responsibilities, in addition to its important role in the movement of sustainability, environmental education and awareness for a less exaggerated consumption. These responsibilities require constant innovation of their managers in the ways of acting and thinking the organization in environmental and social areas (Szczyzny, Lenk & Huang, 2008; Ceretta & Froemming, 2013; Winandy & Gallardo, 2014).

The adoption of reverse logistics practice recalls products such as cardboard and plastic in the production chain and has been proven to be a new source of financial revenue. In this way, some factors encourage the adoption of this practice in the retail sector, such as: reduced availability; the cost of cardboard and plastic used by other sectors of the economy; the concern of the population regarding the preservation of the environment and, the idea of reducing the waste of materials that can be reused in the production process (Dias & Braga Junior, 2015).

Considering that, reverse logistics appears as a profit opportunity for the sector. The reuse of materials that would be discarded by groceries will generate economic, environmental and social benefits. Thus,

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the retail sector gains new opportunities, for example, the commitment to reduce the generation of garbage and the recycling and reuse of materials that would be discarded. This makes the retail grocery an important intermediary in other chains that, until then, were not part of its scope of action and that comes to bring benefits to its image as an environmentally correct company (Braga Junior & Rizzo, 2010; Dias, Braga Junior & Martinez, 2016).

Knowing the environmental and social benefits when using reverse logistics, the economic aspect ends up being aggregated by not requiring significant investments for the retailer to carry out the process of separation, storage and sale of the cardboard and plastic that would be discarded. Therefore, the research problem that guides the present work is expressed by the following question: How does the implementation of reverse logistics can contribute to the increase in retail grocery's profit?

Guided by this question, the objective of the research was to analyze the financial result achieved with the practice of reverse logistics of cardboard and plastic. A case study was carried out in a grocery network in the State of São Paulo, Brazil, which consists of 22 stores. In this study we obtained the values invested for the implementation of the process, the costs and expenses of maintenance and, finally, the revenue achieved with the reverse logistics of cardboard and plastic.

As a result, it was possible to observe that the grocery corporation increased its net profit with the practice of reverse logistics in value proportional to the net profit generated by two groceries with revenue of 600 thousand dollars. It was concluded that the implementation of reverse logistics was satisfactory, as well as generating environmental benefits resulting from waste reduction, also contributed to the generation of direct and indirect jobs created by business growth.

2. Theoretical Discussion

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" (Parente, 2000, p. 22). Historically, retail 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 Levy and Weitz (2000), retail is divided into selling of general goods and selling of services, and the supermarkets are inserted in the food retailing category. Some authors such as Parente (2000), Saab and Gimenez (2000) and Levy and Weitz (2000) 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 m² and 5,000 m² (Braga Junior, Merlo, & Nagano, 2009). 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 (Saab & Gimenez, 2000).

Over time, the grocery retail has undergone several changes. According to Parente and Gelman (2009), 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 (Braga Junior & 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 (Parente & Gelman, 2009).

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.

In order to achieve greater corporate profits and market share, in face of an extremely competitive environment, organizations seek to establish integration relationships with partners, suppliers and distributors to optimize their performance and gain competitive advantage. For Zailani, Shaharudin, Razmi & Iranmanesh (2015) the competitive level of an organization is closely related to its capacity for efficient interaction with the supply chain that it belongs to, since, as Ellram and Cooper (2014) argue, competitive advantage can be achieved through better use of internal and external resources and capabilities to meet the needs of consumers.

This integration, given by a supply chain, assists in the management of all activities involved in the production of consumer goods, such as the selection of raw materials, processing, and logistics activities, both integrated and reverse (Subramoniam, Huisinigh & Chinnam, 2009). Specifically, reverse logistics allows products and packaging to be reinserted in the production cycle (Silva et al, 2013; Dias, Braga Junior & Martinez, 2016). Marchesini and Alcântara (2016) show that the logistics activities developed in the returns management are: to develop a reverse logistics network; to identify logistics activities that can help avoid discards; to define logistics procedures to meet the return flow, including collection routes; to provide information on the costs of reverse logistics for the different disposal options (recycling, remanufacturing or use by secondary markets) and, to operate the return cycle (receiving the return request, selecting the disposal option, determining the route and receiving the returns).

Reverse logistics, as well as integrated business logistics, is part of the supply chain management. Integrated logistics is responsible for dealing with the direct distribution flows of produced goods (Gontijo, Dias & Werner, 2010; Agrawal, Singh & Murtaza, 2016), while reverse logistics (also known as green logistics) is the planning of reverse flow of products and packaging, starting from the consumption point to the origin point (Tibben-Lembke, 1998).

According to Leite (2002), reverse logistics covers the returns of post-sale and post-consumer products to the business cycle or to the production cycle, through the reverse distribution channel. In this sense, post-sales reverse logistics are related to products that, after being sold, return for some reason, such as shipping error, while post-consumption reverse logistics is related to products that have already been consumed, which can be designed to landfills or be recycled (Leite, 2002; Cruz, Santana & Sandes, 2013). It should be emphasized that both products and packaging can be destined for recycling processes or disposed of in landfills, or even discarded incorrectly in nature.

The efficiency and results of reverse logistics applications can be perceived by gains in advantages in the following areas: (i) Economic, due to the use of recycled raw material for the manufacture of new products, which generates reduction of costs in the processes, besides being a source of alternative income, obtained through the sale of the materials; (ii) Environmental, reducing the disposal of solid waste in the environment, mitigating environmental impacts; (iii) Social, with the generation of jobs (direct and indirect) and income, and by offering better living conditions to the population (Braga Junior, Merlo & Nagano, 2009; Hernández, Marins & Castro, 2012; Dias & Braga Junior, 2015); and (iv) Competitiveness, through the above factors (Tibben-Lembke, 1998).

The main factors that lead organizations to operate in reverse logistics are: 1) environmental legislation; 2) economic benefits obtained and; 3) the growing environmental awareness of consumers. Besides these, Rogers and Tibben-Lembke (1999) still point out other reasons, which are: 1) competitive reasons; 2) cleaning the distribution channel; 3) profit margin protection and; 4) recapture of value and recovery of assets.

According to Bernon, Rossi and Cullen (2011), reverse logistics can bring economic benefits because recycled products have a significantly lower value compared to the original item's cost. In this respect, some companies in Germany use the reverse logistics model to maximize their profits by selling recyclable materials, thus generating a financial return to the organization (Reyes & Meade, 2006).

Braga Junior, Merlo and Nagano (2009) analyze the reverse logistics in the grocery sector as consisting

of four main elements: industry, retail, final consumer and secondary market (represented by recycling companies). These elements interact with each other through buying and selling operations, where retailers buy ready-made products from the industry and resell them to the final consumer. The reverse flow is given from the consumer, who passes the packaging to the retailer that sells to the secondary market, which, in turn, sells the recycled material to the industry, thereby restarting the cycle (Jakhar, 2015).

In the case of this research, the final consumer is not inserted in the reverse flow, since this is done by groceries, where the first packaging is removed before the products are placed on the shelves for resale to the consumer.

Therefore, through the adoption of reverse logistics practices, the sector can obtain competitiveness and optimize its performance due to the great representativeness of the retail sector and its role of social, environmental and economic responsibility.

3. Methodology

This research aims to analyze the processes, data and financial results achieved through reverse logistics applied by a grocery network. Thus, in order to achieve the proposed objective, a research will be conducted characterized by a case study (Yin, 2015) of exploratory, descriptive and documentary characteristics. Such case study was conducted with 22 groceries belonging to a grocery network, whose stores are distributed in the State of São Paulo.

The exploratory research of qualitative nature was oriented to develop a theoretical basis through a bibliographical revision in relation to supply chain, reverse logistics and the retail grocery sector. In addition, a participant observation was made in the data collection process, seeking to identify the positive and negative aspects of the practice of reverse logistics (Aaker, Kumar & Day, 2004).

For the financial analysis data were collected on the investment made by the grocery network for the implementation of reverse logistics and the costs for the operation of the process through the sales reports of the cardboard and plastic.

The financial reports analyzed were:

- Management control of materials input;
- Management control of materials output;
- Invoice material output.

Regarding the analysis of the investment for the implementation of the process of press and storage of cardboard and plastic, data were raised from:

- Purchase of equipment for the processing of cardboard and plastic;
- Leasing space for cardboard and plastic processing.

For the maintenance of processing, the following costs were considered:

- Payment and expenses of employees assigned to the process;
- Costs related to processing (energy, water, etc.)

Based on these data and information, an IRR (Internal Rate of Return) and NPV (Net Present Value) analysis was also performed, as well as a result statement on the activities involving cardboard and plastic processing.

The data presented in the case analysis followed a proportionality of the actual data so as not to harm

the results presented in the work. This process was used to preserve the identity of the grocery network and the confidentiality of the information and data made available for the research.

4. Results

4.1 Company Characterization

According to Parente (2000), considering the number of check outs and the size of the sales area, the grocery network under study is formed by 22 stores classified as medium and large. These stores are located in 20 different cities in a radius of approximately 250km from its head store.

This geographic positioning contributed to the creation of a distribution center (DC) centralized in the city of the head store and strengthened the management model formatted by a distribution center that allows greater efficiency to the retailer, because it concentrates volume of purchase and reduces cost of processing and storage (Braga Junior et al, 2009).

This centralization system has been adopted since July 2014, both for distribution logistics and reverse flow, since in the distribution process, in 90% of the return trips, the trucks returned empty. With the processing of the cardboard and the plastic being carried out in the distribution center, the return trips to DC started to be better utilized, known as the return load. Prior to this centralization process, each grocery in the network made the final destination of these products in the way it believed to be the most appropriate.

Currently, all material generated by the 22 stores is transported to the distribution center through trucks that perform the internal logistics network, and thus are pressed and weighed. The bundle of pressed plastic weighs about 350kg, and the cardboard weighs approximately 250kg, depending on the percentage of moisture it has.

The cardboard is sold to the company SONOCO Inc., and plastic to the company that distributes materials of this type to the grocery store, in the form of garbage bags and bags. Because the large volume of cardboard, the buyer company withdraws the material once a week. However, the loads are shipped with less periodicity for plastics. Thus, these partner companies are responsible for giving the final destination of the collected materials.

The accomplishment of the input, storage and sale process of cardboard and plastic in the store is demonstrated by Figure 1.

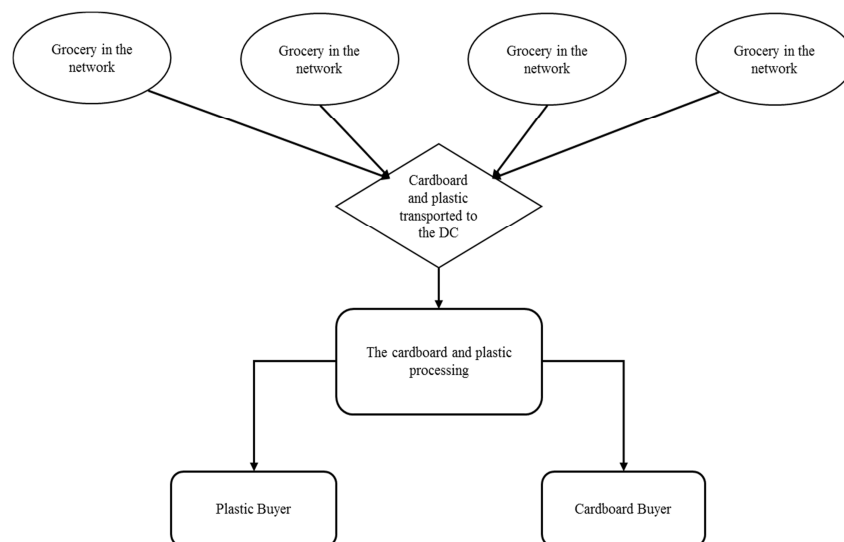


Fig. 1 - Process of reverse logistics of cardboard and plastic in the network

The network distribution center has 10,600m², being 5,800m² (54.7%) of covered area and 4,800m² (45.3%) of open area. This distribution is within the recommendations for the retail grocery sector proposed by Silva (2014). For the processing of cardboard and plastic, 60m² of covered area and 190m² of open area were separated, being, respectively, 1% of the covered area and 4% of the open area.

4.2 Financial Advantages

The calculation of the investment required for the centralization of the process was based on the cost of the m² of DC which is approximately US\$ 187.50 (Silva, 2014). In this way, the area that is reserved for processing has an approximate cost of US\$ 46,875.00 (US\$ 187.50 multiplied by 250m²) and its use must provide at least a return of US\$ 468.75 (1% of the nominal value of the leased property). In addition to the area required for processing, there was a need to invest in equipment and the total cost of investment is presented in table 1.

Description	Qty.	Value	Total
Area Rentals	1	\$ 468.75	\$ 468.75
12 Ton Baler Press	2	\$ 10,937.50	\$ 21,875.00
Hand pallet truck 2200kg	1	\$ 312.50	\$ 312.50
Space Suitability	1	\$ 468.75	\$ 468.75

Tab. 1 - Investment for Implementation of Reverse Logistics

Considering the investment values presented in Table 1, the NPV and IRR values were calculated to analyze the viability of centralization of the cardboard and plastic processing in the network distribution center considering the expected values of the cash flow that can be provided and which is presented in Table 2.

The estimated average revenue was based on the average volume of cardboard generated by the network (80,000kg) at the sale value of US\$ 0.13 and the plastic (5,000kg) at the value of US\$ 0.63. The cost is related to workforce, to the area rentals and to process maintenance.

	Period					
	P1	P2	P3	P4	P5	P6
Expected Average Revenue	\$13,125.00	\$13,125.00	\$13,125.00	\$13,125.00	\$13,125.00	\$13,125.00
Cost	- \$781.00	- \$781.00	- \$781.00	- \$781.00	- \$781.00	- \$781.00
Expense	- \$313.00	- \$313.00	- \$313.00	- \$313.00	- \$313.00	- \$313.00
Machines and Equipments.	- \$22,656.00	0	0	0	0	0
Result	- \$11,094.00	\$12,031.00	\$12,031.00	\$12,031.00	\$12,031.00	\$12,031.00

Tab. 2 - Expected cash flow

The calculations were based Hillier et al (2010) on the NPV formula (eq. 1) and, based on the estimated data, the results obtained were: IRR of 17.81% per month for the estimated period and NPV of US\$ 16,386.00 considering the expectation of 6 months for investment and an expected rate of return of 5% per month.

$$NPV = \sum \frac{PMT}{(1+i)^n} - I \quad (1)$$

Considering the feasibility of the investment, the cardboard and plastic processing was implemented in the network Distribution Center and the results from the period from July/14 to June/16 are presented in Table 3.

Period	Total of Plastic (kg)	Plastic Unit Price	Total of Cardboard (kg)	Cardboard Unit Price	Total revenue
Jul/14	0.0	\$ -	69,110.00	\$ 0.13	\$ 8,638.75
Aug/14	0.0	\$ -	25,860.00	\$ 0.11	\$ 2,828.44
Sep/14	0.0	\$ -	56,340.00	\$ 0.14	\$ 7,922.81
Oct/14	10,420.0	\$ 0.63	111,860.00	\$ 0.14	\$ 22,242.81
Nov/14	6,330.0	\$ 0.75	82,040.00	\$ 0.14	\$ 16,028.00
Dec/14	4,920.0	\$ 0.75	85,130.00	\$ 0.13	\$ 15,129.34
Jan/15	17,843.0	\$ 0.75	138,878.00	\$ 0.13	\$ 32,043.98
Feb/15	0.0	\$ -	74,580.00	\$ 0.13	\$ 9,322.50
Mar/15	20,940.0	\$ 0.75	130,304.00	\$ 0.13	\$ 31,993.00
Apr/15	0.0	\$ -	92,000.00	\$ 0.13	\$ 11,500.00
May/15	0.0	\$ -	88,200.00	\$ 0.13	\$ 11,025.00
Jun/15	0.0	\$ -	95,300.00	\$ 0.13	\$ 12,210.31
Jul/15	0.0	\$ -	72,220.00	\$ 0.13	\$ 9,253.19
Aug/15	0.0	\$ -	26,980.00	\$ 0.13	\$ 3,372.50
Sep/15	0.0	\$ -	58,530.00	\$ 0.13	\$ 7,316.25
Oct/15	0.0	\$ -	120,790.00	\$ 0.13	\$ 15,098.75
Nov/15	9,840.0	\$ 0.66	111,500.00	\$ 0.13	\$ 21,091.88
Dec/15	0.0	\$ -	134,700.00	\$ 0.13	\$ 17,679.38
Jan/16	12,578.0	\$ 0.66	98,380.00	\$ 0.13	\$ 21,166.69
Feb/16	9,650.0	\$ 0.70	102,000.00	\$ 0.13	\$ 20,172.66
Mar/16	10,609.0	\$ 0.66	99,460.00	\$ 0.14	\$ 20,948.72
Apr/16	9,509.0	\$ 0.69	99,220.00	\$ 0.14	\$ 20,490.25
May/16	0.0	\$ -	86,200.00	\$ 0.14	\$ 12,121.88
Jun/16	13,423.0	\$ 0.66	98,500.00	\$ 0.15	\$ 23,583.84
TOTAL	126,062.0		2,158,082.0		\$ 373,180.92

Tab. 3 - Results achieved

Regarding the values that actually occurred and discounting the costs and expenses to carry out the process, the average monthly result was approximately US\$ 14,000.00. This result represents the equivalent of the net profit of two groceries in the network with revenues of approximately US\$ 600,000.00.

5. Final considerations

By analyzing and comparing the results achieved by the grocery network, during the 24-month period, it was possible to identify the implementation effects of the collection and the processing of cardboard and plastic. One of the main effects observed was the new point of view that the group had on the environmental management in retail sector and the practices of reverse logistics process for these products. However, the main factor that encouraged the company to adopt the reverse logistics process of cardboard and plastic was the financial question, that is, the financial return that this activity could provide.

In this sense, the results obtained presented a good representation in relation to the net profit that the retail grocery can provide in Brazil. Another aspect that draws attention is that the management of the process for reverse logistics is structured independently of the management of the network stores. This may also be one of the factors that are providing the results presented in this research.

In addition, another point to be considered is the importance of environmental management through reverse logistics as a strategic retail tool. However, some aspects need to be considered so that environmental management through reverse logistics has this profile.

Firstly, the use of the reverse logistics potential is conditioned to the strategic decisions of the company. In this sense, management must take the initiative to exploit opportunities as a way of aggregating other results in the use of these resources.

Secondly, it is also necessary that the reverse logistics process be conducted in a way that ensures synergy of decisions, that is, the decisions taken in its scope must be in line with the company's business logistics decisions and other decisions in general.

Finally, one limitation of the present research is the fact that it was not possible to compare the results with the financial indicators of the network, and it is possible to only affirm that the financial result provided is equivalent to the financial result of two groceries stores with revenues of approximately US\$ 600.00.

As a suggestion, which is increasingly reinforced by the aspects observed and the implications for the company when it seeks sustainability, it is clear that the retailer's role in the retail reverse logistics chain should be viewed as an activity part of the company's business, as it can generate financial, social and environmental gains.

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