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The benefits of implementing a reverse logistics project: The case of a metallurgy in cearance

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ABSTRACT
Logistics currently plays a fundamental role in the development of any company. The global environment is forcing companies, regardless of where they are located, to consider the entire global market in their strategic planning analysis.

Keywords: Logistics, Metalworking, Companies.

INTRODUCTION

Currently, logistics plays a fundamental role in the development of any company. The global environment is forcing companies, regardless of where they are located, to consider the entire global market in their strategic planning analysis.

Companies that wish to operate in the market competitively need to consider external factors such as: economy, politics, market trends, technological innovation of their competitors anywhere in the world. It is common today for a Japanese company to manufacture a product in India and be sold easily in Brazil. All of this is possible as long as the company has planning aligned with globalization.

Companies that manage to improve their logistics processes in an organized and planning-focused way end up generating satisfaction for their customers and profits for the company, thereby standing out from the competition.

With accelerated globalization, customers begin to have greater desires to meet their needs. Generally, customers value quality products and services that are affordable and available as quickly as possible.

With the help of logistics systems and tools, products are easily delivered to any customer, anywhere in the world, if the company has good logistics planning. In this situation, many companies failed in their objectives, because they did not plan their logistics processes (FLEURY, 2003).

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From the 90s onwards, an innovative concept known as Supply Chain Management (SCM) emerged, understood as a tool that uses information technology, and allows the company to manage the supply chain with greater efficiency and effectiveness (FLEURY, 2003).

In this context, this article aims to identify: what are the benefits of using reverse logistics in a metallurgical company?

Specifically, the study aims to: 1) identify the main reasons for merchandise returns in the company researched; 2) analyze return shipping costs by region; 3) show the cost reduction with the use of reverse logistics.

Regarding research methods and techniques, the study is classified as documentary and bibliographic with a case study. Its main aim was to show the benefits of using reverse logistics in a metallurgical company.

The choice of the metallurgical company from Ceará is justified as a unique case, as it is the only reseller of steel coils in the state of Ceará to customers from all over Brazil. The case study was carried out with the analysis of the information made available by the company, with a view to identifying how it uses the reverse logistics tool to support control and mitigate logistics costs with the return of containers to the production process.

GOAL

In this context, the research studies the following problem: what are the benefits of using reverse logistics in a metallurgical company? Therefore, the research has the general objective of identifying the benefits of reverse logistics for the logistics processes of this company. The method used to prepare this article was documentary and bibliographic, with a case study in a metallurgical factory in Ceará.

METHODOLOGY

The research that underpins this article is documentary and bibliographic with a single case study in a metallurgy company. As research sources, books, monographs, printed articles and internet research were used to prepare the article.

To prepare this research, the participation of some managers in the logistics area, such as logistics coordinator and manager, as well as information technology analysts, was essential. The field research involved collecting data from those involved, through interviews with direct questions from managers.

The company in question authorized the disclosure of its name in this study as long as all information was distorted by a margin of 10% plus (+) or minus (-).

The research carried out was bibliographic, which is carried out based on the available records, resulting from previous research, in printed documents, such as books, articles, publications, etc.

Gil (1999) defines that bibliographical research is developed based on material already prepared, mainly books and scientific articles.

Generally, the material consulted in bibliographic research covers all the references already made public in relation to the topic of study, from publications, bulletins, newspapers, magazines, books, research, monographs, dissertations, theses, among others. Through these publications, knowledge on the researched topic is gathered.

Although all other types of research require work of this nature, there is research exclusively developed through bibliographic sources. Gil (1999) adds that the case study is not a method, but the choice of an object to be studied. It can be single or multiple and the unit of analysis can be one or more individuals, groups, organizations, events, countries or regions. The case study allows for greater depth of the subject in relation to the theoretical part. It is especially suited to the study of processes and explores phenomena based on several variables.

To prepare this document, searches were made for models of complete articles. Then, some researchers debated creating a model. (Describe, objectively, how the work was carried out).

DEVELOPMENT

Great authors have addressed Logistics and Reverse Logistics in their work over the years based on studies and research, these being the topics covered in this section.

LOGISTICS

Logistics is a fascinating and still little explored field. Today it is considered a key element of competitive advantage for any organization in any segment (NOVAES, 2001).

> Logistics is the process of strategically managing the acquisition, movement and storage of materials, parts and finished products (and related information flows) across the organization and its marketing channels in order to maximize present and future profitability through customer service. of orders at low cost (CHRISTOFER, 1997, p 2).

The term “logistics” is related to good planning for the movement of raw materials, storage and inventories, distribution of finished products, providing cost reduction. According to Pozo (2007, p. 13), logistics:

> It deals with all movement and storage activities that facilitate the flow of products from the point of acquisition of raw materials to the point of final consumption, as well as information flows that put products in motion, with the purpose of providing levels of services to customers at a reasonable cost.

For Dornier et al. (2000, p. 29) logistics is the management of flows between marketing and production. Business logistics is a fascinating and rapidly expanding field, with the potential to achieve extraordinary results for the organization.

Pozo (2007) succinctly defines logistics as a company function that is concerned with managing the physical flow of the supply of raw materials, as well as the distribution of final products to customers.

According to Ballou (1993, p. 24):

> Business logistics deals with all movement and storage activities that facilitate the flow of products from the point of acquisition of raw materials to the point of final consumption, as well as the information flows that put products in motion, with the purpose of providing adequate service levels to customers at a variable cost.

Logistics is the process of efficiently planning, implementing and controlling the flow and storage of products, covering from the point of origin to the point of consumption, with the aim of meeting consumer needs (NOVAES, 2001, p.36).

The mission of logistics, according to Ballou (1993), “is to provide the right merchandise or service, in the right place, at the right time and under the desired conditions, while providing the greatest contribution to the company”.

For Ballou (1993), “one of the objectives of logistics is to improve the level of service offered to the customer, whether internal or external, where the level of logistics service is the quality of the flow of products and services and managed”.

According to Bowersox and Closs (2001), logistics is the entire flow management process from the acquisition of raw materials, receipt, storage, movement, distribution of products to customers, in an organized manner and at the lowest possible cost.

In view of the above, Ballou (1993) supports that logistics is all activities involving the movement of goods, from the starting point, which would be the receipt of the raw material, to the final point of delivery of the final product to the customer. With the same reasoning as Ballou, Novaes also adds that logistics' main objective is to meet consumer needs.

INTEGRATED LOGISTICS

Currently, due to the increasing degree of customer demand, products' life cycles are increasingly reduced and the market demands faster and more effective responses from all sectors of an organization and, mainly, logistics. From this requirement arises the concept of integrated logistics, which handles all product movement and storage activities from the acquisition of raw materials to the point of final consumption.

According to Fleury et. al. (2000, p.24) internal integration, that is, the integrated management of the various components of the logistics system, is a necessary condition for companies to achieve operational excellence at low cost.

The cargo transport sector in Brazil is basically characterized by the strong predominance of road transport, derived, according to Fleury (2002), from the low prices charged, a function of several distortions in the Brazilian transport system. Thus, the road sector has been responsible for more than half of all cargo movement in the country. According to data from the National Transport Confederation (CNT) in its 2016 Cargo Movement Statistical Bulletin, this mode moved 485,625 million RTK, as shown in Table 1, thus accounting for 61.10% of the total load moved by the system.

Table 1 – Loads transported by mode

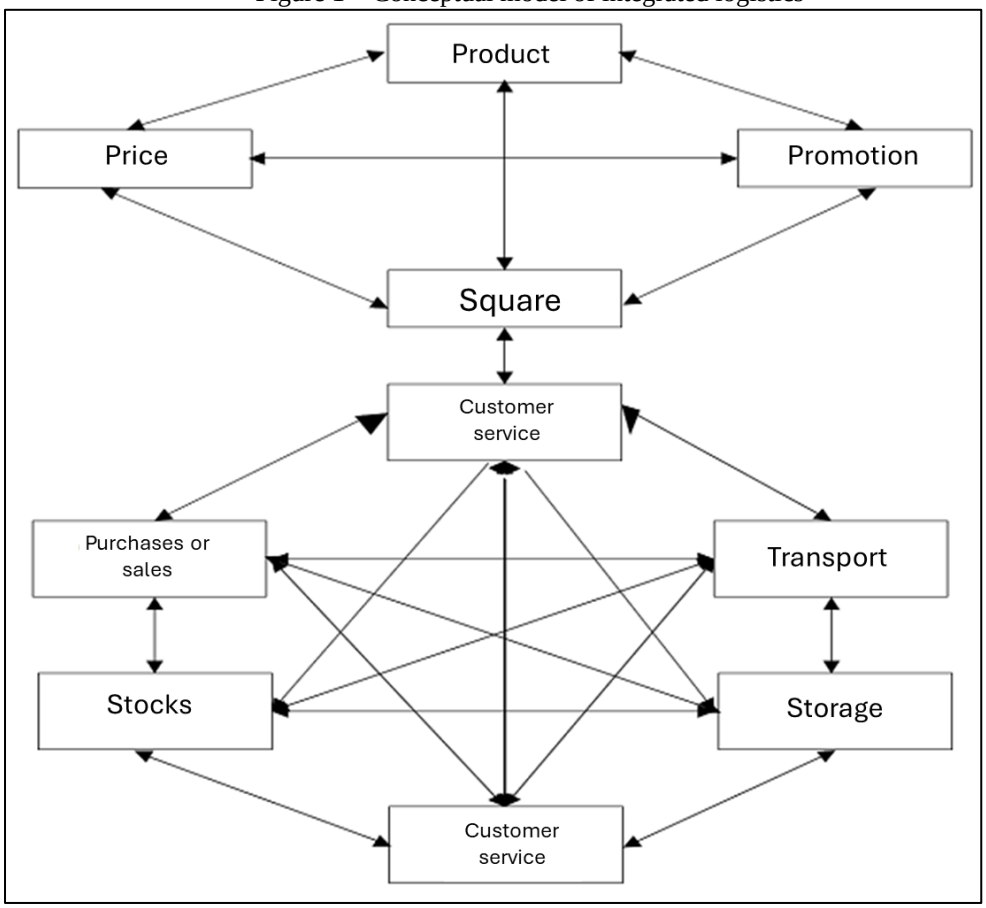
LOAD TRANSPORTATION MATRIX		
MODAL	MILLION (TKU)	PARTICIPATION (%)
Bus station	485,625	61.1
Railway	164,809	20.7
Waterway	108,000	13.6
Pipeline	33,300	4.2
Air	3,169	0.4
Total	794,903	100.0

Source: Statistical bulletin, movements (2016)

With the evolution of integrated logistics, the concept of Supply Chain Management (SCM) emerges. For Fleury et. al. (2000 p. 35) integrated logistics represents an internal integration of activities, while Supply Chain Management represents external integration, as it extends to the coordination of material and information flows to suppliers and the end customer.

For an organization to have excellence in its logistics process, management must consider logistics as a part of an integrated system, and not just as a department. Figure 1 shows the conceptual model of integrated logistics, where logistics is always linked to marketing and strategic planning.

Figure 1 – Conceptual model of integrated logistics



Source: Fleury (2000)

According to Fleury (2000), consumers are increasingly demanding in quality, speed and sensitive to prices, forcing companies to have efficient and effective purchasing management, production management, logistics management and commercial management. Integrated logistics deals with the integration and coordination of the sectors responsible for the performance of the supply chain, in order to unite everyone in pursuit of organizational objectives.

Integrated logistics, once implemented, requires greater automation of processes, so that it is truly efficient. Currently, logistics in Brazil has several bottlenecks that directly impact the final result, which is customer satisfaction. Fleury (2000) mentions that consumers are more voracious about quality, price and speed. Since we have few options for production flow, we directly affect the end customer, whether through delays in shipping their goods, more expensive shipping, etc.

REVERSE LOGISTICS

Currently, large companies are looking for different management models that solve their problems and that mainly generate value for their customers through their products and services, so that they can satisfy their needs (LACERDA, 2005).

The organizational processes related to reverse logistics are still evolving, as well as the use of these actions responds to the current socio-environmental responsibility requirements of companies. Due to the new possibilities for minimizing costs through reverse logistics activities, among the various concepts, Leite (2003) believes that Reverse Logistics' main objective is to guarantee the return of products in a systemic way, with quality, preserving the good condition of the product, generating value for the company and the customer.

For Dornier et al. (2000) reverse logistics in a broad sense is responsible for the function of product return, source reduction, recycling, replacement of materials, reuse of materials, waste disposal, renovation, repair and manufacturing.

According to the Council of Logistics Management (1993, apud Leite, 2003, p. 15), “reverse logistics is a broad term related to the skills and activities involved in managing the reduction, movement and disposal of product and packaging waste”.

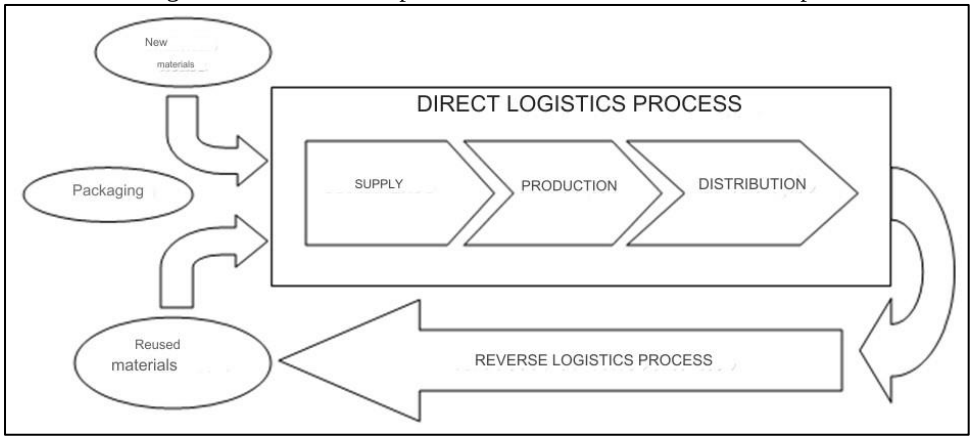
For Ballou (1993), the main activities of reverse logistics involve: inventory control, movement of materials and supplies, support of spare parts, order processing, packaging, reuse and removal of scrap and administration of returns.

For Lacerda (2005, p.11).

> Reverse logistics is the process of planning, implementing and controlling the flow of raw materials, in-process inventory and finished products (and their information flow) from the point of consumption to the point of origin, with the objective of recapturing value or realizing a proper disposal.

According to Rogers and Tibben-Lembke (1998), reverse logistics is a process of planning the logistical flows of raw materials, products in stock, and finished products from the point of consumption to the place of origin, with the purpose of recapturing value. Figure 2 shows the schematic representation of the direct and reverse logistics processes.

Figure 2 – Schematic representation of the direct and reverse processes



Source: Lacerda (2005)

Dornier et al. (2000, p. 39) state that the current definition of logistics should encompass all forms of movement of products and information. In this way, the area's scope of action is expanded, including not only direct flows traditionally considered, but also return flows of parts to be repaired, packaging and accessories, products sold and returned and used/consumed products from be recycled.

Dias (2005) states that reverse logistics seeks to find an efficient way of bringing the goods and materials that were sold from the point of consumption to the point of origin.

Reverse logistics, therefore, can be understood as the area of business logistics that aims to equate the benefits of returning goods to the production cycle, whether post-sales or post-consumption, so that they add economic, ecological, legal and location (LEITE, 2000).

Liva et al. (2003) classify reverse logistics into three types, namely: post-sales reverse logistics, post-consumer reverse logistics and reverse packaging logistics. Table 1 shows the details of each of these types of reverse logistics.

Table 1 - Types of reverse logistics.

After-sales Reverse Logistics
It deals with the logistical flow and the corresponding logistical information of after-sales goods, unused or with little use, that are returned. This category includes errors in order processing, warranty given by the manufacturer, defects or failures in the functioning of the product, damage during transportation, goods on consignment, sales station liquidation, stock ends, etc. These are products that can return to the business cycle, adding commercial value, be sent for recycling or to a final destination if reuse is impossible.
Post-consumption reverse logistics
It operationalizes the physical flow and corresponding information of consumer goods discarded by society, at the end of their useful life or used with the possibility of reuse, and industrial waste that returns to the business cycle or production cycle through specific reverse distribution channels. These post-consumer products may originate from durable or disposable goods that may suffer: 1 Reuse – normally in the second-hand market until it reaches the “end of useful life”; 2 Dismantling – after the product is dismantled, components can be used or remanufactured; 3 Recycling – where the constituent materials are reused and will become secondary raw materials returning to the production cycle. If there are none of these possibilities mentioned, the product must have a “final destination” in landfills, dumps or undergo incineration.
Reverse Packaging Logistics
Despite falling within post-sales or post-consumption reverse logistics, its importance means it is classified in a separate category. With distribution to increasingly distant markets, there is an increase in packaging costs, which impacts the final cost of the product – depending on the type of product and distribution, there is primary, secondary, tertiary, quaternary packaging, and the fifth level, which is the containerized unit or special packaging for long-distance shipping. There is a global tendency to use returnable, reusable or multi-trip packaging, considering that the total amount of waste increases every year, causing a negative impact on the environment.

Source: Liva et al. (2003)

Reverse logistics is responsible for post-sale returns, but for this it is necessary that the reasons are classified, to facilitate the action plan.

> The classification of commercial returns involves reverse logistical movements of goods that were returned due to shipping errors, excess inventory in the distribution channel, on consignment, sales station liquidation, ends, among others, which will be returned to the business cycle through redistribution in other sales channels (ROCHA etb al., 2010, p. 3).

With regard to post-consumer materials, it is possible to find current information in a study carried out by the Associação Compromisso Empresarial para Reciclagem – Cempre, with overviews of recycling in Brazil, shown in table 2. It is observed that the reverse logistics of post-consumption -consumption is more widespread, mainly due to the direct and indirect employment opportunities it provides, with Brazil being one of the largest recyclers worldwide.

Table 2 - Types of reverse logistics.

Recycling paper, cardboard and long-life packaging in Brazil	A total of 3,017,400 tons of paper recovered (61.7% being corrugated cardboard boxes), 128 manufacturers, 28,347 direct jobs generated and revenue of R$ 3,269,038,000 (this is the result obtained in 2015, according to data from the Brazilian Pulp and Paper Association – Bracelpa).
Aluminum recycling in Brazil	A total of 121 thousand tons of aluminum cans recycled, 35 recyclers, 152 thousand direct and indirect jobs generated and revenue of R$850 million (this is the result obtained in 2015, according to data from the Brazilian Aluminum Association - Abal).
Steel recycling in Brazil	In 2015, five million tons of steel scrap were used in Brazil, of which 3.3 million tons were used to produce new steel. The manufacture of metal sheets for steel packaging consumed 1 million tons. Tinplate cans account for 21% of the national packaging market, 6% goes to cans for carbonated drinks and the rest is in the hands of steelworks that melt the scrap for new products or new steel sheets.
Plastic recycling in Brazil	For Abiquim, the potential of the plastic recycling market is great: the industry's installed capacity already reaches around 340 thousand tons/year and generates, in production value, more than R$200 million annually. In 2010, plastic production reached 3.7 million tons and, in 2015, it reached 3.9 million tons.
Glass recycling in Brazil	The latest survey by the Brazilian Technical Association of Automatic Glass Industries (Abividro) shows that investments in glass recycling were approximately R$700,000, yielded R$56 million and generated 1,200 direct jobs and more than 10,000 indirect jobs.
PVC recycling in Brazil	PVC has a recycling rate of around 10%, and its share in urban waste is less than 0.5%. It is a resin with a long life cycle – around 50 years – primarily applied (70% of production) in civil construction.
Tire recycling in Brazil	According to information from the National Tire Industry Association (Anip), only five rolling mills are registered with Ibama, but more than 20 work informally, recycling conventional tires that are transformed into products such as shoe soles and sofa straps, among others. According to Anip , around 70 thousand tons of tires were sent for recycling in 2015.
Recycling used lubricating oil	Data from Cempre's 2002 collection reveal that collection that year was 221.0 million liters, therefore, around 22.0%. The volume of used oil collected made it possible to manufacture 155 million liters of refined base oil in 2002.

Source: Adapted from Cempre (2015).

For Leite (2003), the increase in the speed of product disposal is increasingly due mainly to the increase in the disposability of products in general, in line with the lack of recycling channels. properly structured reverse distribution, causes an imbalance between the quantities discarded and those reused, thus generating an enormous growth in post-consumption.

The present study highlights the importance of using reverse logistics, as a satisfaction factor, with regard to meeting customer needs and reducing logistics costs with regard to the return of goods, originated through returns and mainly in the return of containers used to transport materials.

CASE STUDY

In this section, the case study referring to the company studied will be presented, showing the implementation of the reverse logistics project and the main reasons for returns, as well as the shipping costs for such an operation.

COMPANY IN THE METALLURGICAL SECTOR IN CEARÁ

In May 1995, a modern industrial unit was inaugurated for the production of steel tubes, profiles, plates, slitters and shaped flat steel in general. Today there are two manufacturing units, located in the municipality of Caucaia, metropolitan region of Fortaleza, capital of the state of Ceará, with a total built area of around 60,000 square meters. All distribution is carried out from this physical structure, which has national coverage, with an average release of 80 trucks/day, to serve a base of around 4,000 active customers/month.

Currently in 2018, the company has around 1800 permanent employees in industrial units located in Caucaia/Ceará. Its founding president is a Ceará native, born in the city of Marco. He began his career in the beverage trade in 1975. It was only in 1980 that he decided to leave the trade industry for good and began his journey in the steel market. In August 1981, he founded the first iron resale store, located at Rua Antonio Pompeu 1800, Fortaleza-Ceará, where the commercial unit is today structured.

The company's logistics area is quite vast, with operations in different sectors of the company. The movement of steel coils in the port of Pecém, located in São Gonçalo do Amarante (CE), stands out, making the company the largest cargo handling company in the port of Pecém for 3 consecutive years: 2012 to 2014. Also noteworthy in the logistics area is the company's own fleet of vehicles, which today has around 40 trucks, used daily to serve customers located in Fortaleza and the metropolitan region. Service to customers outside the state is carried out by outsourced trucks, with around 60 trucks being dispatched daily to all regions of the country.

The metallurgical company, with extensive experience in the Brazilian steel market, stands out for the expansion of its business and representation achieved in the steel market. Receiving the patent as the largest cargo handler in the Port of Pecém, located in the municipality of São Gonçalo do Amarante (CE), regional leader in the sector with a turnover of more than R$900 million in 2015, the company received, for the sixth consecutive year , the Taxpayers Award, in the category of collection of Tax on the

Circulation of Goods and Services (ICMS), granted annually by the Government of Ceará to the 50 largest taxpayers in the State.

The company's mission is to operate in the steel market in a sustainable way with high performance processes and differentiated service, generating value for shareholders, employees, customers, suppliers and society. The vision is to be recognized as the best company in the production, commercialization and distribution of steel in Brazil. The values defined by the company: sustainable development; safety at work; Clients satisfaction; competitiveness and profitability; talented team; committed and accomplished; respect and transparency and especially Faith in God.

Regarding sustainability, it seeks development combined with environmental preservation. Its Environmental Policy is based on an Environmental Engineering Program (PEA) and monitored by an Environmental Control Program (PCA), which involves the entire production cycle, from receipt of raw materials to delivery of final products and disposal of products. As a social commitment, it has socially responsible management, which enhances and expands actions to combat poverty and marginalization. With social investments focused on culture, environment, health and education, the company seeks to contribute to the development of people, social inclusion, and improved quality of life through the actions carried out by its employees and its Institute.

COST REDUCTION WITH REVERSE LOGISTICS

All customers who purchase steel coils from the metallurgical company receive coil supports, better known as 'cradles', along with the merchandise. Coil supports are metal structures covered with rubber, manufactured for storing steel coils during transport. Initially, the company had no control over the number of cribs it shipped monthly and also what purpose this product received after the customer used the steel coil. The average cost of manufacturing this support was also not taken into account, which is around R$100.00 per piece.

Another important point were the complaints received from customers who said that the supports took up a lot of physical space in their stores, warehouses, industries, etc. And for customers, these objects were of no use. Thinking about resolving customer complaints and reducing costs with the manufacture of supports, reverse logistics control of coil supports was established from April 2015 onwards.

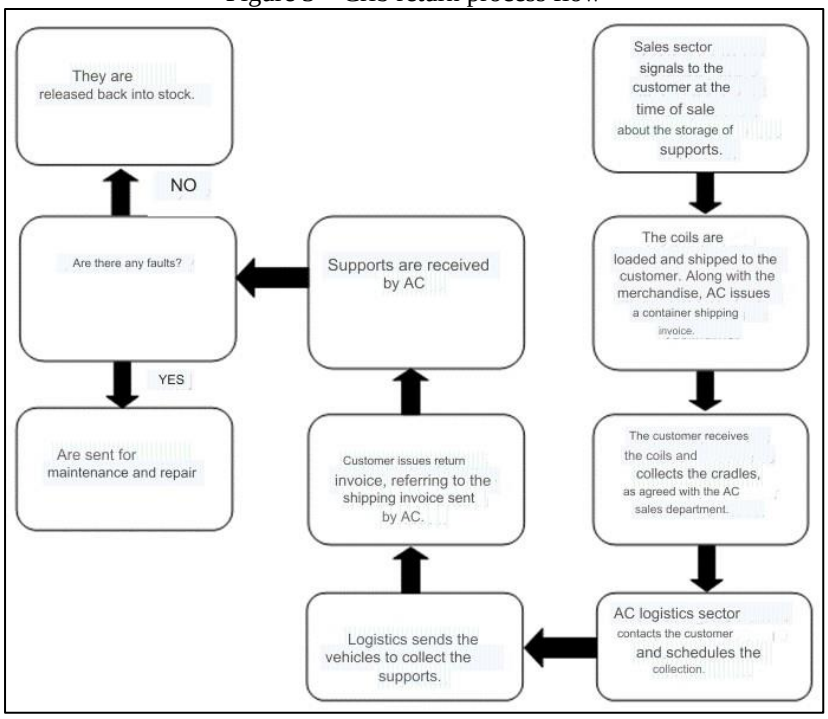
The main objective of the project was to identify the number of cribs in its own stock, which customers had unused cribs, to actually establish the reverse logistics of these containers and, finally, to create a rotating stock, which would meet the entire demand for shipping the logistics sector.

The project was created from a study group led by the company's logistics managers, which aimed to reduce logistical costs for shipping products. This project began in April 2015, in unit 2. The project was concentrated in this unit due to the fact that it was the only one to ship steel coils, with so-called

“cradles”. Those directly responsible for the project were the logistics supervisors of this unit, who together with the administrative shipping team, did all the shipping mapping of these supports to customers, since January 2015. The cost of the project was zero, since all the information necessary for execution, already existed in the company's system.

The sales sector was fundamental to the success of this project. Every time the commercial sector sold any coil, they in turn informed the customer that their coils would come with the supports and that these, upon receipt, could not be discarded, since the company itself would take care of the reverse logistics of this container must be carried out. Figure 3 represents the flow of the process for returning these cribs.

Figure 3 – Crib return process flow

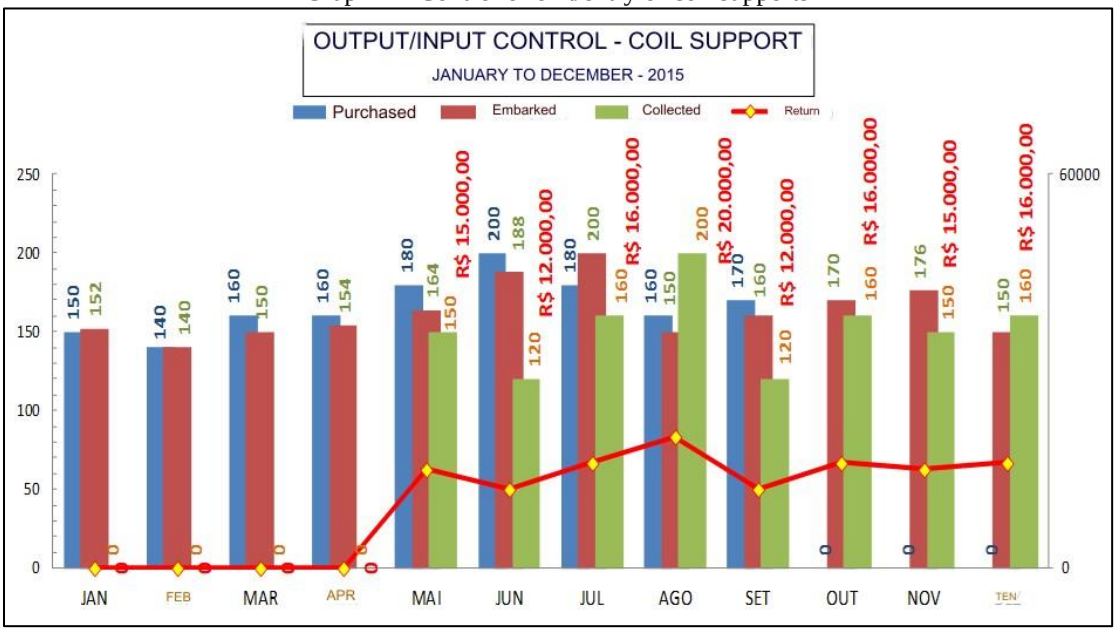


Source: Prepared by the author (2018)

With all the information necessary for management, it was up to logistics to carry out the most important step of the project, which would be scheduling and sending vehicles to collect the containers from customers. Every month, logistics had four vehicles available to travel through the North, South, Southeast and Center-West regions and collect these cribs from customers. Once collected, a return invoice for the containers was issued and they were returned to the company. Upon arrival, the quantity and quality of these berths was checked. They were later added to the other supports in stock. Cribs that had compromised quality were sent to the company's own maintenance department to receive the necessary repairs.

Graph 1 shows the number of supports that were purchased and shipped before and after the implementation of reverse logistics and the financial return that the company obtained with this initiative.

Graph 1 – Control of exit/entry of coil supports



Source: Prepared by the author (2018)

As can be seen, in the first months of 2015 the number of cribs that were purchased was strictly used to meet the demand for sales of coils that were shipped. The company was focused exclusively on purchasing coil holders to meet sales, but was not taking into account the return of these containers. In the first half of 2015 alone, the company shipped around 990 containers, with an average expenditure of R$100,000.00 reais when purchasing these containers. As reported, in April 2015 work began on identifying these existing containers and distributed among customers.

In May 2015, the first collection of containers was carried out at the company, according to data in graph 1. Around 150 units of containers were returned to the company, resulting in savings of R$ 15,000.00 for the company. In September of the same year, the purchase of these containers temporarily ended. The safety stock created through the return of these cradles allowed the company to maintain a rotating stock of these supports. It can also be observed that these returns continued throughout the rest of 2015, which resulted in savings of around R$ 122,000.00 at the end of 2015. The project became a practice adopted by the company, which has already It is part of the company's steel coil sales process.

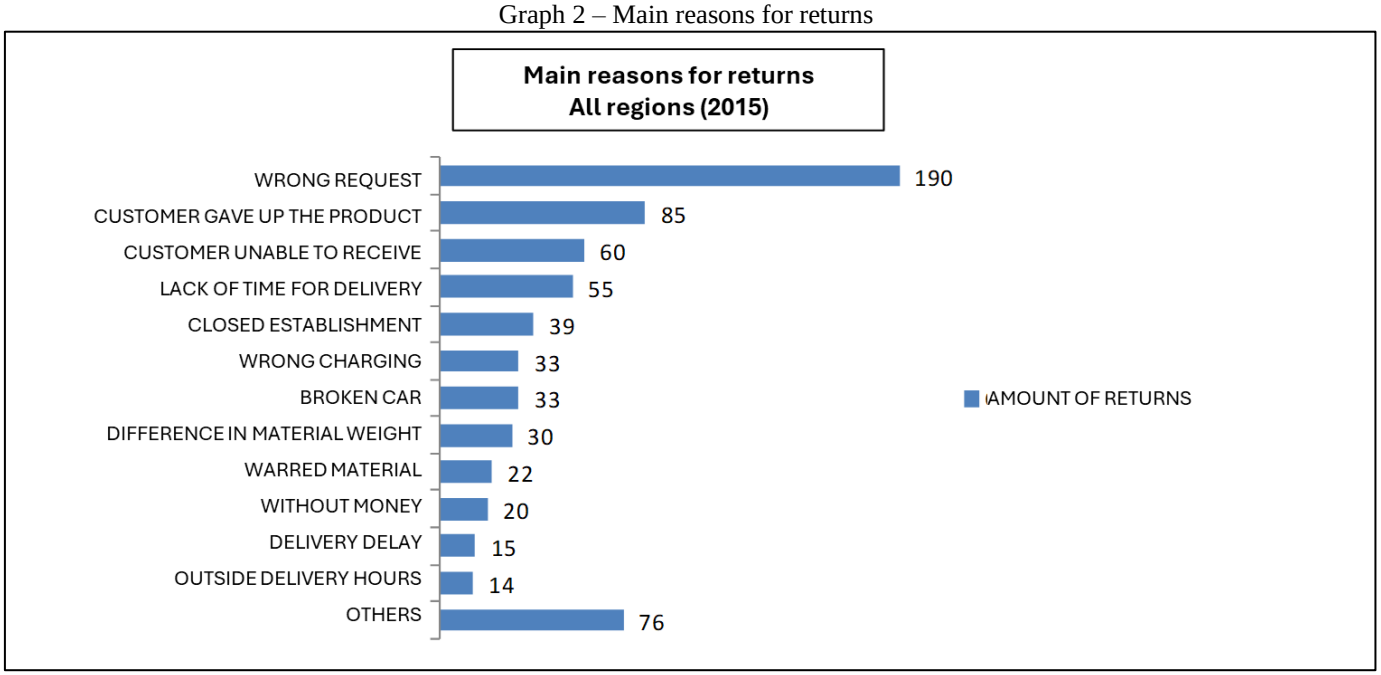
MAIN REASONS FOR RETURNS IN THE METALLURGICAL COMPANY

Good service to internal customers already provides a significant improvement in the level of returns for a company. If internal logistics serves its customers correctly, at the right time, with the correct

raw materials, this already significantly reduces possible returns that could exist on the part of the end customer. This requires good logistical planning on the part of managers.

Graph 2 shows the main reasons for merchandise returns at the company in 2015.

Graph 2 – Main reasons for returns



Source: Prepared by the author (2018)

According to graph 2, 665 returns were recorded in the company, counted from all regions of the country, with the main reason for returns in this company being wrong orders. Wrong orders are characterized when the customer refuses to receive a product claiming that the merchandise they are receiving does not comply with the request made to the seller, such as: wrong payment deadline, wrong unit value, wrong address, etc. When the order is correct according to the customer's request, but the product they are receiving is different from the one requested, this constitutes a loading error. Other reasons complemented the excessively high number of product returns in this company, such as: customer withdrawal of the product, customer unable to receive the product, customer without money to pay in cash, establishment closed.

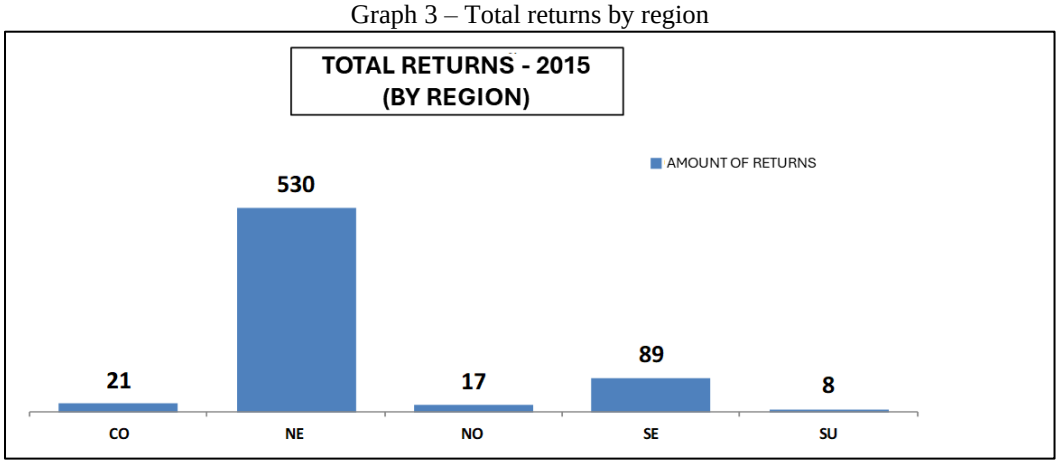
Logistics/shipping itself is responsible for the large number of returns that the company received in 2015, among which the following reasons stand out: discrepancy in the weight of material, sending material different from what was ordered, delays in deliveries, broken cars, among others.

The fact is that the company suffers from a large number of returns, for all reasons. This leads to high shipping costs and customer dissatisfaction due to not meeting their expectations.

TOTAL RETURNS BY REGION

Graph 3 shows the amount of returns by region in the company. The largest quantities of returns occur from customers in the northeast region, mostly the city of Fortaleza in Ceará.

Graph 3 – Total returns by region



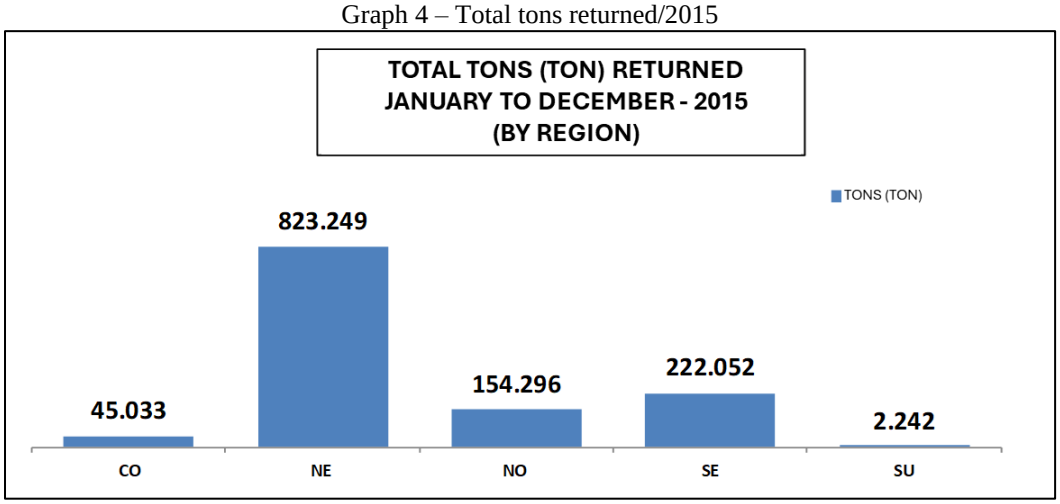
Source: Prepared by the author (2018)

Due to the fact that the company is located in Fortaleza, it has a large portfolio of clients in Ceará. In current records, the company has around 10,000 active customers in the state of Ceará alone, including individual and legal entities. These active customers are located in all regions of Ceará.

Still in the Northeast region, the main reasons for returns are due to incorrect orders from sellers, followed by customer withdrawal, customers unable to receive the material (Physical Space), delay in delivery, closed establishments, customers without money, etc.

Graph 4 shows the weight in tons of materials returned throughout 2015 at the company.

Graph 4 – Total tons returned/2015



Source: Prepared by the author (2018)

As can be seen, the largest number of tons of returned goods was also from the Northeast region, followed by the Southeast region and the North region.

SHIPPING COST WITH RETURNS

Table 2 shows the composition of the shipping cost that the company pays with returns to some cities in Brazil. The company pays the same shipping cost for both departures and returns of goods.

Table 2 – Coil support exit/entry control

COMPOSITION OF SHIPPING VALUE / DEPARTURES AND RETURNS												
			Composition of Gross Freight Vl						Parameters			
State	Vl Goods	Gross weight (ton)	Vl Liq Shipping	INSS Mot	SEST/SENAT	GO	Vl Gross Shipping	Total Cost/Ton	Vl Min	Average	Third Quartile	Vl Max
AL	150,620.34	49.3370	5,721.74	129.37	29.40	0.00	5,880.52	119.19	86.00	103.00	111.50	120.00
BA	229,589.58	67.5011	9,895.95	223.75	50.85	0.00	10,170.55	150.67	86.00	118.00	134.00	150.00
CE	267,849.65	78.8240	6,489.36	146.73	33.35	0.00	6,669.43	84.61	50.00	65.00	72.50	80.00
GO	151,368.84	57.0631	9,716.99	219.71	49.93	0.00	9,986.63	175.01	125.00	152.50	166.25	180.00
BAD	44,450.52	15.4347	2,417.28	54.66	12.42	0.00	2,484.36	160.96	95.00	117.50	128.75	140.00
MG	189,394.67	60.8423	4,656.24	105.28	23.93	0.00	4,785.45	78.65	115.00	147.50	163.75	180.00
SHOVEL	140,468.00	30.2110	4,445.23	100.51	22.84	0.00	4,568.58	151.22	120.00	140.00	150.00	160.00
PB	117,733.15	36.0956	3,273.73	74.02	16.82	0.00	3,364.57	93.21	60.00	80.00	90.00	100.00
FOOT	69,039.72	19.6419	3,096.42	70.01	15.91	0.00	3,182.35	162.02	65.00	93.00	107.00	121.00
PI	90,630.04	33.6253	4,139.77	93.60	21.27	0.00	4,254.64	126.53	65.00	102.50	121.25	140.00
PR	206,410.77	71.7403	15,904.05	359.60	81.73	0.00	16,345.38	227.84	179.00	199.50	209.75	220.00
RJ	81,286.79	29.0589	5,963.95	134.85	30.65	0.00	6,129.44	210.93	167.00	188.50	199.25	210.00
RN	242,697.85	88.4225	6,500.86	146.99	33.41	0.00	6,681.26	75.56	50.00	75.00	87.50	100.00
SC	16,638.99	6.7996	1,628.43	36.82	8.37	0.00	1,673.62	246.14	190.00	220.00	235.00	250.00
IF	53,743.00	22.4000	2,476.29	55.99	12.73	0.00	2,545.00	113.62	86.00	103.00	111.50	120.00
SP	111,061.05	38.8000	8,551.70	193.36	43.95	0.00	8,789.00	226.52	159.00	184.50	197.25	210.00
TO	36,671.22	14.5568	2,832.76	64.05	14.56	0.00	2,911.37	200.00	125.00	142.50	151.25	160.00

Source: Prepared by the author (2018)

In relation to the states that make up the northeast region, the company pays an average of R$126.14/ ton per ton loaded and/or returned. Taking into account that in 2015 there were 530 returns in the northeast region, totaling approximately 824 tons of returned material, the company had a cost of approximately R$104,000.00 this year. In the southeast region, 222 tons of material were returned with an average value of R$ 173.00/ ton , totaling a cost of R$ 38,200.00.

The average value paid for the states that make up the northern region is equivalent to R$152/ton. In 2015, around 154 tons were returned, accounting for an approximate cost of R$ 23,500.00.

If the number of tons returned from all regions is considered with their respective average values, the company in 2015 spent around R$200,000.00 on merchandise returns alone. All returns have shipping costs doubled, as there is the outbound shipping cost that is paid at the time of dispatch to the customer and also the return shipping cost. Another important point that must be taken into consideration is customer satisfaction, which is not met when, for some reason, the company does not meet customer expectations.

FINAL CONSIDERATIONS

The study highlights the importance of the reverse logistics tool in organizations. When implemented and well managed, reverse logistics provides profits for business owners, customer satisfaction, social and environmental responsibility. In the current situation, companies need to worry not only about the production and dispatch of goods to customers, but mainly about the correct return and disposal of these products. Thus, reverse logistics starts to play an important role in the business environment, because through this participation it will be possible to reduce costs and build an environmentally responsible corporate image.

The first specific objective of this work was to identify the main reasons for merchandise returns in the company, which was well evidenced in the data analysis. The majority of returns were caused by operational errors by sales teams and market situations. Training and qualifications are always good options for actions to avoid operational errors, as well as better monitoring by sales coordination. Market situations are unpredictable, but in some cases they can be avoided, such as: advance notice of deliveries, telemarketing etc.

The second objective was to expose shipping costs for returns by region, which was also evident in the analysis of the results, where the composition of the shipping value for departure and return in some states of the country was highlighted. The study showed the total expense the company had on freight for all regions of the country.

The third and final specific objective of this work was to show the profit that the company obtained after implementing the reverse logistics tool, which was evidenced by analyzing the results where it was shown that after three months of implementation, reverse logistics began to generate the first profits.

The truth is that reverse logistics in general is still a low priority area for companies. And this is a reflection of the small number of companies that adopt this tool. It is also true that this reality is changing, due to strong external pressures, companies gradually tend to adopt correct environmental policies that do not go against environmental legislation.

The development of this work was extremely important to show the importance of reverse logistics for organizations. Although this practice is little known and little applied, the tendency is that in a short

space of time many organizations will have to worry not only about product output, but mainly about the correct return of their products back to the production cycle.

Highlight the opinion and understanding of the authors in relation to the research results with the determined objective.

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