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Application of returnable boxes in logistics process of parts imported from Thailand to Brazil

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ABSTRACT: *During this project will be presented a qualitative project, made inside a company for automobiles, Motos da Amazonia, it is about evolutions, proposal and implementation ofimprovement for reverse logistics. Academics motivation will be presented for theme development, as will be the reason, the theory references of the reverse logistics study. This division has increased in Brazil, by the fact the it is a differential with competitors and due to laws for materials returns (raw and scrap) to its origin place. By applying a reverse logistics in the company, it is necessary to control all the information so packing can return to production cycle, also because a correct planning can save cost , be ecological , logistics profitable and others. This project proves a cost reduction by reusing plastics packing when transporting materials, by a comparative analysis for cost and packing durability so project can be applied successfully.*
KEYWORDS -*Reverse logistics; packing; cost; reuse; durability .*

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I. INTRODUCTION

With the industrial revolution, there was a significant growth in the production of goods and services and consequently the availability of products for the world population. In this context, modern society has become increasingly consumerist. The products purchased by the population are wrapped in plastic packaging, paper, glass and metals, which are identified as garbage after use, being discarded.

According to Guarnieri (2005), with the advent of globalization, and the consequent service to distant markets and high inventory turnover, warehouses discard huge amounts of materials at the end of the logistics process. These materials, besides representing considerable economic value, can cause damage to the environment if disposed of indiscriminately.

Even today when the term logistics is mentioned, in general, it refers to the management of material flow from its point of purchase to its point of consumption, which would be a reality for direct logistics. However, a new approach to logistics has begun to be studied and practiced more often. Logistics manages the reverse flow of materials from the point of consumption to the point of origin, disposal or recycling, and the management of this reverse flow. Which is called reverse logistics.

According to Guarnieri (2005), reverse logistics takes care of the flow of materials that start at the points of consumption of the products and end at the points of origin, in order to recapture value or final disposal. Logistics can therefore contribute to sustainable and economic development by planning, operating and controlling the flow and related logistics information from the return of after-sales and post-consumer goods to the business cycle or the production cycle, by means of reverse distribution channels, adding value to them of various natures: economic, ecological, legal, logistic, corporate image, among others.

Given these facts, then came the proposal of the work that is to present the application of reverse logistics of packaging, in view of improvements in the face of the need to improve logistics in the workplace, bringing cost savings and consequently contributing to the reduction of environmental problems. .

Understanding that in the global context, economic situations are evidenced that increase competition in both local and global markets. Companies resort to cost reduction techniques to strengthen their profit margin. In this way, organizations can look to inventory management for resources to gain competitive advantage by reducing storage costs. In order to combat pressures imposed by the global crisis, it is necessary to develop projects aimed at reducing costs.

The research on nature will be qualitative approach, where the process and its meanings are focus of the approach and the natural environment is the direct source for data collection. Regarding the objectives, the research is characterized as descriptive, detailing the steps and the reverse logistics process.

The general objective of this paper is to reduce costs in the reverse logistics process by reusing the packaging; and consequently reducing the environmental impact of the process.

The specific objectives are as follows:
• Conduct a survey of the current logistics cost;
• Analyze the packaging costs used;
• Propose reduction focusing on the use of more cost-effective packaging. (10)

II. THEORETICAL FOUNDATION

2.1. Logistics

According to the Aurélio Dictionary the word logistics is of French origin "logistique", has its meaning in the definition of military scope, "the part of the art of war that deals with planning and carrying out project development, procurement, storage, transportation. , distribution, repair, maintenance and evacuation of material for operational or "administrative" purposes. (FERREIRA, 1986).

However, this definition does not encompass all aspects of business logistics management. A more faithful representation is that of the Council of Logistic Management (CLM), which is called: Logistics is that part of the supply chain process that plans, implements and controls the efficient and effective flow and storage of products, services and related information from point of origin to point of consumption in order to meet customer needs (MOURA et al, 2004, p.8).

According to Moura (MOURA et al, 2004, p.8), logistic activities involve: transportation, storage, storage of consumables and maintenance, packaging, material handling, order fulfillment, inventory forecasting, production planning, supplies, customer service, location, product control. inventory / inventory, production, quality control, physical distribution and safety.

Inventory control is of utmost importance as it is necessary to maintain the level of service, but in return generates large costs. To reduce these costs two actions can be triggered: the centralization of inventories that reduces the total stocked and the most accurate planning possible not generating unnecessary inventories.

Logistics is very important in organizations today, as it operates in relation to all other administrative areas and seeks to improve operational processes.

2.2. Reverse Logistics

Reverse logistics has become increasingly important in the competitive market, and because of this, new concepts emerge in order to define it. Therefore, some more relevant concepts found in the researched literature will be addressed.

For LACERDA, L. (2002) reverse logistics is the process of planning, implementation and control of flows of raw materials, in-process and finished products, and information from the end consumer to the supplier, with the objective of recover value or make appropriate environmental provision.

Stock (1998), with respect to LR, also encompasses aspects related to material reduction and reuse, claiming that it is the term commonly used to refer to the role of logistics in product return, source reduction, recycling, material substitution. , material reuse, waste disposal, refurbishment, repair and remanufacturing.

Reverse logistics can be defined as the part of logistics that aims to relate topics such as: reduction; source conservation; recycling; replacement; and discarding traditional logistic purchasing activities such as supplies, traffic, transportation, warehousing, storage and packaging (LAMBERT, 1998).

For Lacerda (2002), materials can be divided into two groups to apply reverse logistics: products and packaging. The first because they may need repair, recycling or be returned by customers, and the second because of reuse or legal restrictions.

Some factors, considered critical, must be carefully analyzed and studied for reverse logistics to be successful, according to the author, they are: good input controls, so that there is no confusion with the types of materials that will follow each flow:

(resale, recycling, reconditioning); process standardization and mapping to maintain service quality as they are often sporadic; reduced cycle time, time from need identification to actual processing, because the longer the time, the higher the costs; information system to help control all these other factors, making the process more efficient; and planned logistics network, since unplanned, can affect the quality of service.

According to Andrade, Ferreira and Santos (2009), reverse logistics systems are classified according to the final value recovered, reduction of possible environmental impacts and different levels of processes performed, having the Logistic Disposal System (SLD) as the first level. , in which the objective is to respect the laws and regulations in force, the Logistic Recycling System (SLR) as a second level, with the purpose of recovery and reuse of products, with its cost reduction, and finally the Logistic Recovery System (SLRec).), whose main objectives are revaluation of goods and reuse of products.

The main opportunities indicated for product value recovery by Andrade, Ferreira and Santos (2009) is the recovery of packaging and products, with direct or indirect gains by the company, building a positive image and developing a good relationship with the customer. . There are more internal barriers, such as business policies, than external barriers, such as unfavorable legislation to perform the value recovery of production products / waste.

2.3. Ecological Factor in Reverse Logistics

Considering the context of reverse logistics, one cannot but mention the concern with the environment, which is one of the main factors that motivate it. According to Lacerda (2002), the environmental issue has been gaining increasing importance since the 70's, when consumers started to demand from the consumer goods or services industries greater environmental awareness and only after the 90's did their influence show itself. more intense.

For Butter (2003), the relationship of reverse logistics with the environment is important because the constant movement of waste materials from manufacturing processes and product returns may cause environmental accidents in some way. Thus, an environmental management system, when implemented, provides tools and procedures that will facilitate the reverse logistics of solid waste.

2.4. Packing

Adlmaier and Sellitto (2007) point out that, with regard to environmental aspects, reverse logistics (LR) in Brazil starts, among other reasons, from a need to comply with the legislation for the transportation of products considered hazardous, and make it clear that the concept LR.Which is item value recovery, is different from environmental management, which is concerned with collecting and processing waste, scrap and waste at the end of its useful life.

However, they address the problem of packaging, which may be disposable, which loses much of its value during the consumption of the product and LR, in this case, has the purpose of collecting and disposing of the material, or may be returnable, whose value is maintains after product consumption, and LR aims to reposition the material in the cycle and extract this value.

Currently, according to Adlmaier and Sellitto (2007), returnable packaging is being used more because it reduces waste and environmental risks, and according to Leite (2003), protect more products, offer greater flexibility to the user, can return to the manufacturer. as a recyclable material if they are no longer applicable in the company, more reliable for Just-in-time production systems and environmentally friendly. In addition, returnable packaging is used to reduce waste generation and reduce packaging costs and their proper disposal.

III. MATERIALS AND METHODS

3.1. Type of Research

The approach method used was qualitative research. According to Adlmaier and Sellitto (2007), qualitative research aims to understand a phenomenon in its most intense sense. Therefore, this type of research allows an in-depth study of interesting ideas to converge on the determining factors for the applicability of the theme.

3.2. Research Techniques

To analyze the cost of using returnable packaging, a quantitative study will be carried out, comprising the following steps:

Step 1: A survey was conducted to understand how per-piece packaging definitions are made in the company's current flow by researching specific departments and cardboard packaging suppliers. The entire process was monitored from supplier packaging, shipping, transit and unpacking of parts within Motos da Amazonia so that the entire flow could be used in production as described below.

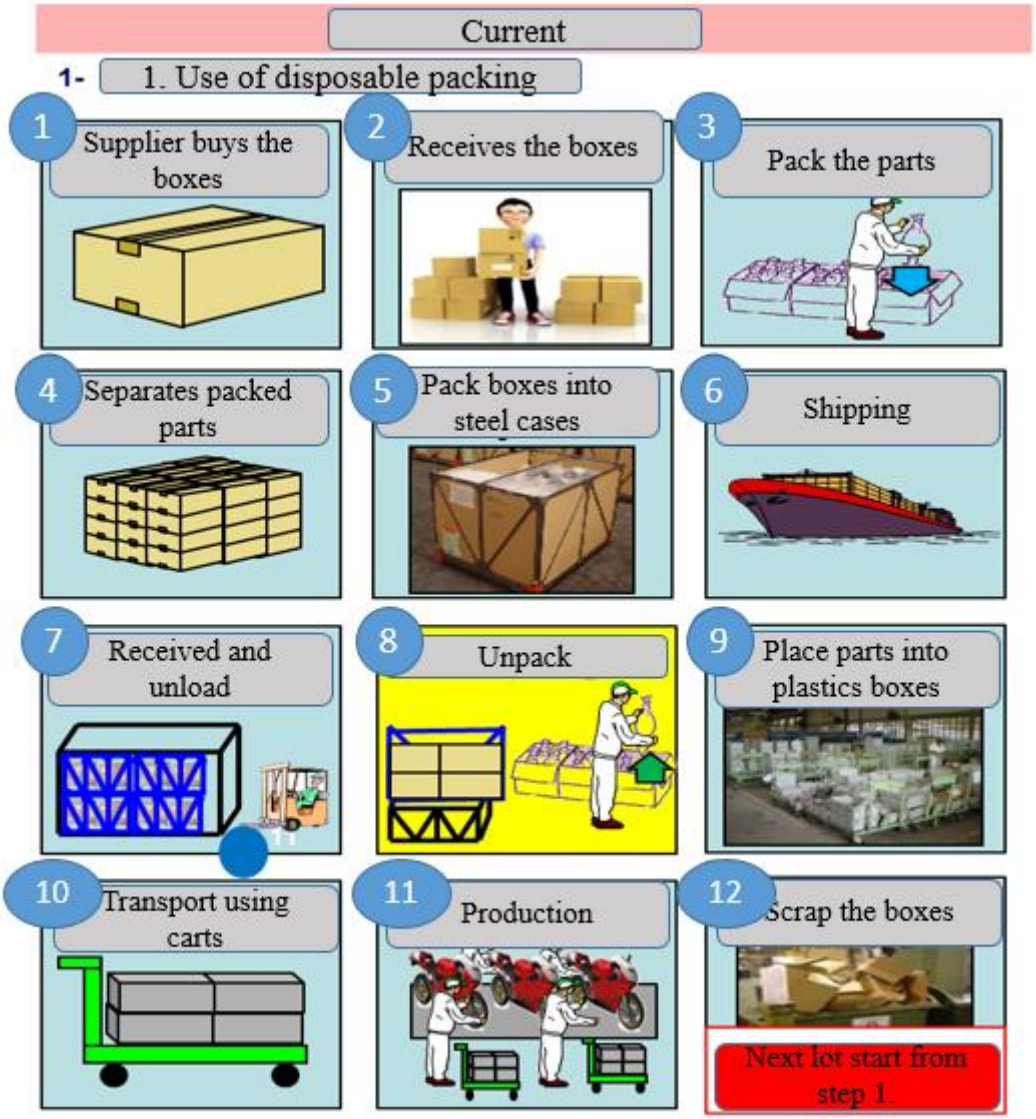

Figure 1– Flow of use of disposable packing.

The activities found in the practice were described and approved in the company's service standard.

Step 2: Feasibility of changing cardboard packaging standards.

It was analyzed at other headquarters of the same company at a global level, which types of packaging are used for parts with the same characteristics, and which meet the need for transportation without compromising the quality of the packed material at the lowest cost. After the research was made contact with the department responsible for the approval of packaging change where it was found that if there is merit cost or efficiency in changing the current packaging becomes possible to make the modification.

Step 3: Feasibility analysis of returnable packaging deployment on parts imported from supplier in Thailand.

We contacted the supplier in Thailand to check if they had experience in returnable packaging for other customers, and whether there was legal or tax hindrance in the Bangkok free trade and industry area for this type of transaction. It was found that the supplier is already active in the methodology for other customers located in North America and Asia, and may expand its service to Brazil and that according to the import and export laws of Thailand this type of transaction is totally legal, confirmations that took us to another stage.

The proposed flow is shown in the figure below. Feasibility analysis of returnable packaging implementation in parts imported in supplier in Thailand.

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The proposed flow is shown in the figure below.

Figure 2 – Plastic packing flow.

Step 4: Analysis of the feasibility of deploying returnable packaging on parts imported to the Manaus Free Trade Zone.

We contacted the Motos da Amazônia legal department and the import and export advisory department that consulted with the authorities in the state and it was found that the transaction is legal and can be performed through the temporary import criteria making it possible to apply the project in legal terms.

Step 5: Comparative study of the cost of disposable vs. returnable packaging.

We conducted the survey of the necessary quantities of disposable boxes to meet the production of 1 day immediately thereafter for 180 days and 1 year according to the table below.

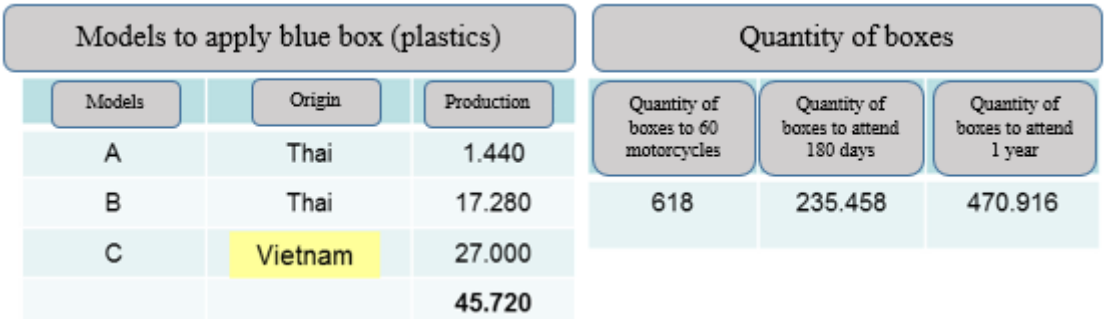

Figure 3–Comparative packing table.

Multiplying by unit price we arrive at the total spent in reais on disposable packaging for the period of 1 year and the forecast spending for 3 years also accounting for the labor cost to handle and dispose of packaging. The same procedure was performed for returnable packaging of plastic material and specification already approved and approved by other company headquarters abroad.
In the comparative matrix below it is possible to verify the analyzed costs.

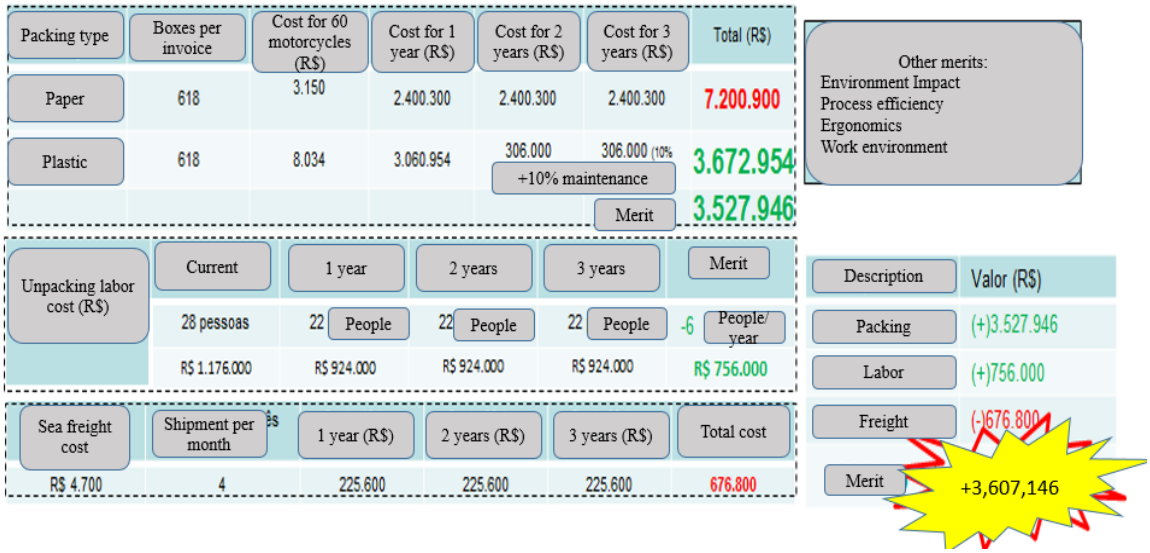

Figure 4– Table of costs analysis.

To meet the production of one year using disposable boxes is necessary to have $ 2,400,300 per year in packaging and to meet returnable packaging we need to have $ 3,060,954 in the first year, ie there is demerit of $ 660,654 in the first year but in the next 2 years, returnable packaging can be reused in the process without the need to purchase new, since disposable packaging needs replacement at the beginning of the cycle.

Considering a replacement margin of only 10% of returnable packaging due to misplacement, it is necessary to invest in the 2nd and 3rd years the amount of R $ 306,000 totaling the three year investment of R $ 3,672,954 in returnable packaging when disposable is required. invest R $ 7,200,900 totaling a merit of R $ 3,527,946 in three years.

Even with the increased efficiency of the unpacking process in Brazil, we can reduce the staff in the unpacking department from 28 to 22 employees with merit in 3 years of R $ 756,000.

Step 6: Return Flow Study in Reverse Packaging Logistics
We analyzed the time required to start using boxes at each stage of delivery and arrived at the results as shown in the table below.

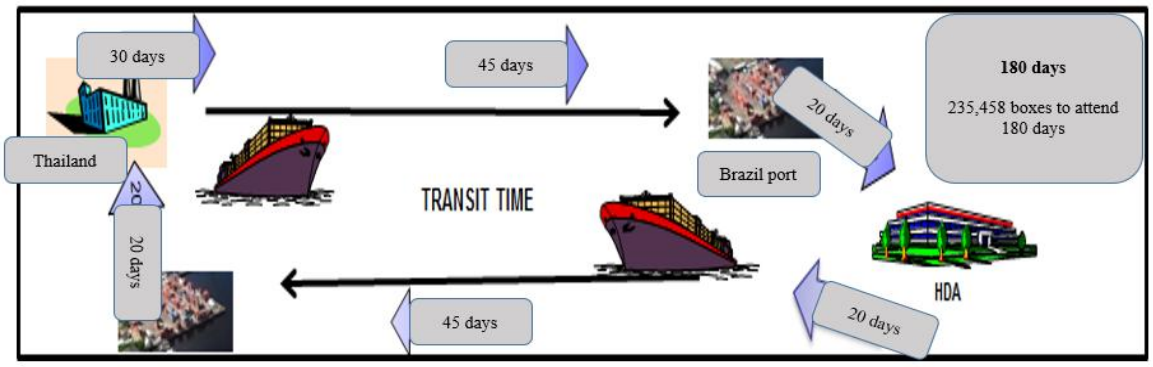

Figure 5 – Flow table.

In the flow from the beginning of the process to the return of packaging we need 235,458 boxes to meet the 180-day turnover.

It takes 30 days with the Thailand supplier for the parts to be packed and sorted as required, 45 days for transit to Brazil, 20 days for the cargo release process at the port of Manaus and transportation to the Motos da Amazônia factory, 20 days to use the empty packaging material in the container and export process, 45 days of transit from Brazil to Thailand and 20 days to release cargo at the port of Bangkok.

The table below analyzes the cost of resending the boxes to the source.

Freight cost	Shipment per month	1 Year cost (R$)	2 Years cost (R$)	3 Years cost (R$)	Total cost
R$ 4.700	4	225.600	225.600	225.600	676.800

Figure 6 –Ship back cost table for origin

Step 7: Packaging Reuse in the Production Process
Upon receipt of the returnable boxes at source, the supplier submits them to the sanitation, inspection and separation process so that they can return to the process and start a new parts packaging cycle.

Step 8: The final step is to purchase returnable packaging and apply to the supplier prior to shipping parts in Thailand to Brazil.
In this step we made the investment according to the table below.

Investment				
Packing type	Quantity of boxes	Safety (20%)	Unit Price (R$)	Total (R$)
Blue box	235.458	47.077	13,00	3.672.954
			Total Investment	3.672.954

Figure 7 – Investment table.

Initial investment of R $ 3,672,954 to acquire 282,535 returnable boxes, being 235,458 in the first year and 47,007 boxes in the second year and applied to the supplier's production line.
After completion the parts are packed in the packaging and sent to the Motos da Amazônia factory in Manaus as planned.
The merit in 3 years will be R $ 3,607,146 according to the table below.
Step 9: Data Analysis: In order to compare the cost a spreadsheet in Microsoft Excell® software will be developed with packaging cost data and its usage cycle.

3.3. Inclusion and Exclusion Criteria
Inclusion:
• Returnable packaging used at the plant of the Motos da Amazônia car plant in São Paulo.
Exclusion
• Packaging used at the motorcycle factory plant Motos da Amazônia in Manaus

3.4. Materials
To develop the project were used, Datashow, computer, plastic packaging, cardboard packaging, tape, protective gloves and pallets.

IV. RESULTS AND DISCUSSIONS

In this chapter we will present the results obtained after the project implementation in the logistic flow for models in mass production.

4.1. Cost Results
Three years after the beginning of the use of returnable packaging, we obtained the expected cost merit as shown below.

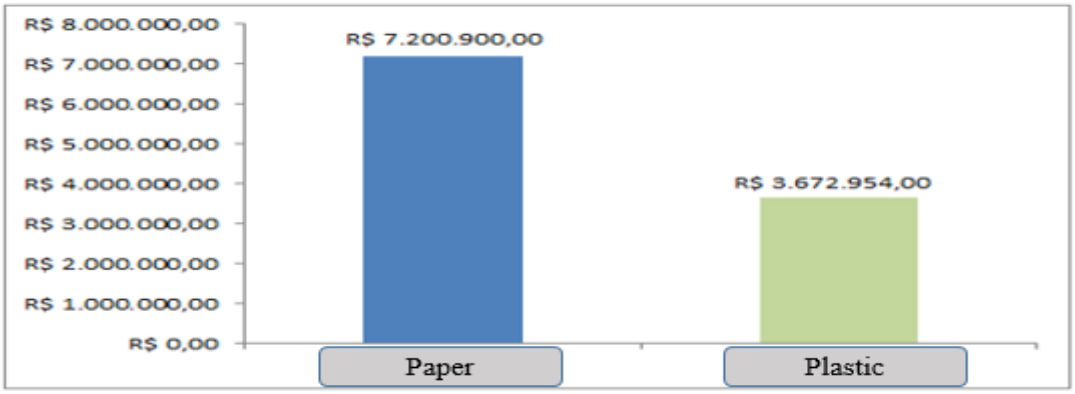

Figure 8: Cost Comparison Chart

If the project had not been implemented we would have spent R $ 7,200,900 on packaging alone, however the total spending on packaging was R $ 3,672,954.

4.2. Quantities of Package Used
Considering the same period of 3 years after the start of the project, the period being its matured and planned stage for the amortization of the investment, we can see the difference in cash consumption in the chart below.

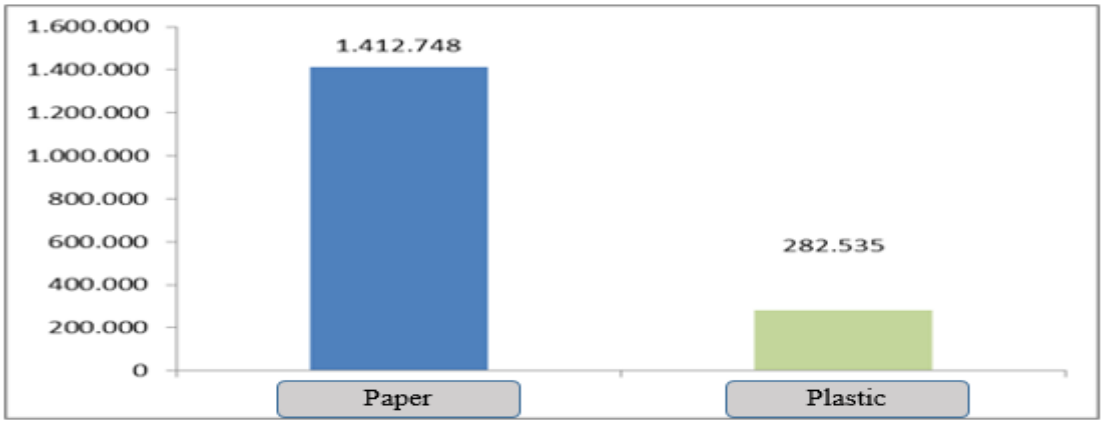

Figure 9 Comparative use chart

1,412,748 cardboard boxes would have been used when the actual used in plastic boxes is 282,535, a difference of approximately 80%.

4.3. Wates disposals
Great results were obtained for disposal positively affecting the environment, see the statement in the chart below.

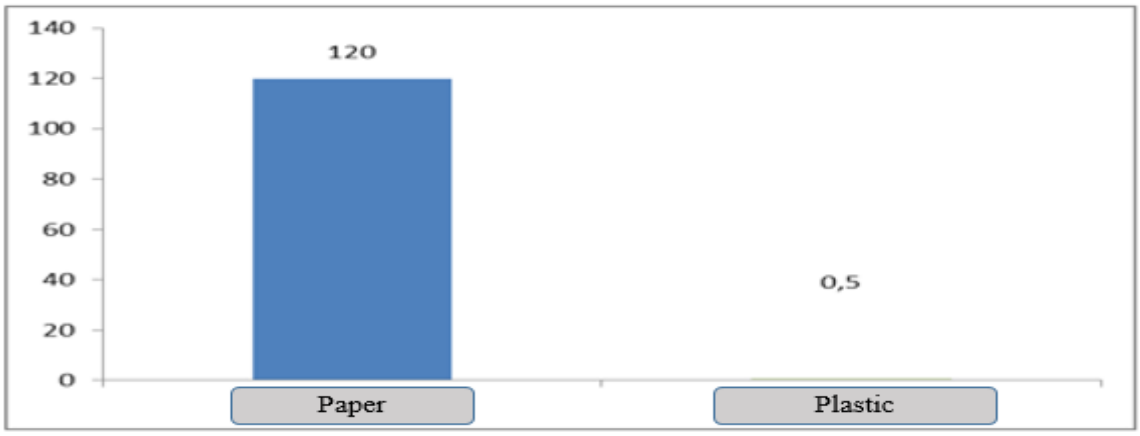

Figure 10 Comparative waste disposal chart

Only 0.5 tons of packaging waste was disposed of using returnable material. If the same volume had been met with cardboard boxes this number would rise to 120 tons.

V. CONCLUSION

With this research we can conclude that the use of returnable packaging within the import logistics flow is feasible and promotes better results considering the cost benefit, efficiency of the unpacking packaging process and considerably reduces the amount of solid waste discarded to the container. environment. Even if a relatively high investment is required at the start of the project in just three years, it will be possible to recoup the investment and still earn merit.

In addition, a more harmonious process has been set up within the logistics chain, avoiding waste and rework.

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A cycle is over, after much emotional and hard work done. Therefore, we dedicate this work to all who were part of this stage, especially to our families who endure with us, given support for long hours researching, writing and defending. Our colleagues that with patience, were able to open our minds and show us value of discussing to bring new ideas.

A special thanks to my lovely daughter **Julia Pastor Cardoso** who is the main reason that keeps me moving forward to become a better person every day.

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