

ECONOMIC STRATEGY FOR REDUCING COSTS WITH MATERIALS CAN ALSO BRING BENEFITS FOR ENVIRONMENT: PROPOSAL BASED ON THE STUDY IN A BRAZILIAN INDUSTRY

ESTRATÉGIA ECONÔMICA PARA REDUÇÃO DE CUSTOS COM MATERIAIS TAMBÉM PODE TRAZER BENEFÍCIOS PARA O MEIO AMBIENTE: PROPOSTA BASEADA NO ESTUDO EM UMA INDÚSTRIA BRASILEIRA

Recebimento: 11/3/2017- Aceite: 15/05/2017- Publicação: 30/06/2017
Processo de Avaliação: Double Blind Review

Laiane Aparecida Soares Sena Nery¹

Especialista em Logística

IFSP- Instituto Federal de Educação Ciência e Tecnologia de São Paulo - Suzano

laiane.sena1@gmail.com

Gabriel Nery Silva

Especialista em Logística

IFSP- Instituto Federal de Educação Ciência e Tecnologia de São Paulo - Suzano

nery.gal.nery@gmail.com

Luiz Teruo Kawamoto Jr

Doutor em Engenharia Biomédica

IFSP- Instituto Federal de Educação Ciência e Tecnologia de São Paulo - Suzano

luizteruo@hotmail.com

¹ Autor para correspondência: Av. Mogi da Cruzes, 1501 - Parque Suzano - CEP 08673-010 - Suzano – SP. Brasil.

Enio Fernandes Rodrigues

Doutor em Engenharia de Produção

IFSP- Instituto Federal de Educação Ciência e Tecnologia de São Paulo - Suzano

efr@uol.com.br

ABSTRACT

The aim of this work is to evidence the benefits for environment resulting from an economic strategy performed by a Brazilian industry. In order to reduce costs with purchasing of pallets, Chapatex and wooden frames, which are used to pack and transport its products, the studied industry elaborated a strategy in partnership with its customers that resulted in exploitation by devolution of the biggest part of those materials that went to customers but did not come back. The costs reduction with the acquisition of those materials was highly beneficial. However, even more important was the result from the environmental viewpoint, because the re-exploitation of those materials reduces in the environmental impact, as for not need to acquire new materials, that is, take them from nature, considering they are wood, as to avoid inappropriate disposal of materials stopped and no-using for customers. This study, therefore, proposes for the decision makers considers the environmental and sustainable vision even in areas of the organization where the focus on profits predominates.

Keywords: *Environment; Environment Impact; Reverse Logistics; Packing; Wood; Sustainability.*

RESUMO

O objetivo deste estudo é evidenciar os benefícios para o meio ambiente resultantes de uma estratégia econômica realizada por uma indústria brasileira. Visando reduzir custos com a compra de paletes, Chapatex e quadros de madeira, usados para embalar e transportar seus produtos, a indústria estudada elaborou uma estratégia em parceria com seus clientes que resultou no aproveitamento por devolução da maior parte desses materiais que iam até o cliente e não retornavam. A redução dos custos com a aquisição desses materiais foi altamente benéfica. Entretanto, mais importante ainda foi o resultado sob o ponto de vista ambiental, pois o reaproveitamento desses materiais reduz no impacto ambiental tanto por

não precisar adquirir novos, isto é, retirar da natureza, haja vista serem de madeira, como por evitar descartes inadequados de materiais parados e sem uso para os clientes. Este estudo, portanto, propõe para os responsáveis pelas tomadas de decisões, considerar a visão ambiental e sustentável, mesmo nas áreas da organização em que predomina o foco nos lucros.

Palavras-chave: Meio Ambiente; Impacto Ambiental; Logística Reversa; Embalagens; Madeira; Sustentabilidade.

INTRODUCTION

A recurring theme in practically any area of science is the resource limitations issue, be it biological sciences, applied sciences, economics sciences or social sciences. It is already known that the planet's natural resources are scarce and limited; in contrast, the needs for production and consumption from people are abundant and unlimited.

In this sense, it is important there be policies in the production that rethink the use of resources, both from the environmental and economic viewpoint, which is undoubtedly a major concern for today's large industries.

Logistics plays a key role in enabling companies assess the distribution and use of their resources. The concern with the environment is very recent, until recently the companies did not worry about the impacts generated by the production and the exploitation of the natural resources.

Within this context is Reverse Logistics, an area of logistics that works the reverse process of goods, that is, from the consumption point to origin point, be them products, carcasses, packaging, waste etc.

Basically there are two situations in what a product returns to its productive cycle, they are: post-consumer reverse logistics, which is characterized by the product that completes its life cycle and is returned, that is, it returns to the manufacturer for rework, recycling or disposal; or after-sales reverse logistics, which has as characteristics the return of a product with little or no use, which can be made by the final consumer or chain links.

Reverse logistics is undoubtedly a very important area for companies from the resource management viewpoint, since through it the company can carry out the reuse of materials,

contributing for the economy in the purchasing of new raw materials, as well as it can contribute for a lower environmental impact generated by the disposal of materials, in the case of this study, packaging.

Packaging has a key role in the production process today, because it is through it that the transportation and the quality of the products are possible.

According to *Associação Brasileira de Embalagem (ABRE)* (2015), packaging worldwide moves more than US\$ 500 billion, representing between 1% and 2.5% of GDP in each country, and in Brazil it currently moves R\$ 47 billion and generates more than 200,000 direct and formal jobs.

Among some types of packaging there is the "reusable packaging" that refers to, according to the definition given by ABRE, a packaging designed to be used more than one time in order to perform a minimum number of use within its life cycle. This concept includes, for example, the Brazilian Standard Pallet (PBR), the Chapatex and the wood frame, commonly used in the palletization of merchandise, with the purpose for guaranteeing more safety for the transportation and to facilitate the movement and storage of this material. These items are not designed to be used only once, thus the cost of acquisition becomes lower as they are reused.

According to *Ministério do Meio Ambiente* (2016), one third of the household waste is composed by packaging. Approximately 80% of the packaging is discarded after a single use.

We are accustomed to treat the packaging of the most diverse products as something inherent at the product; that is, it exists to only accompany the product, without any concern with the handling, with the disposal and with the impacts generated by it in the environment. Not infrequently in the media and in the means of communication are tidings that show tons of packaging that are discarded in nature, and how many years are needed for these materials to completely decompose in nature. A classic example is the plastic (composition of the most packaging), which takes, according to *Ministério do Meio Ambiente* (2016), about 400 years to decompose in nature. There is also wood, which is, in turn, the raw material of the pallet, Chapatex and wood frame; and it is example in this study.

The packaging used for transportation in the studied industry also cause concern, because, though, they are not disposable in the most of the time, sometimes they suffer it

because a lack of logistical control. The pallet is a good example, although it can be used more than once, hardly after it to be sent to the customer (to pack the goods) it comes back to the company, thus causing an inconvenience for the logistics area.

There are currently companies which provide a specific packaging management service, such as pallets. These companies are responsible for renting pallets and controlling them throughout the production chain, and then pallets that are sent to customers will surely return to the company. This type of service increases the logistical costs a lot, which makes it difficult for new customers to join this type of service.

The industry studied in this work carries out the transportation of its packaged and unitized products on pallets. In order to reduce costs, studies were carried out on it (SENA NERY et al., 2016; SENA NERY, APOCALYPSE e NERY DA SILVA, 2016). From these studies came the bias of this research. Therefore, the objective of this study is to point out that measures such as these also bring benefits for environment, besides the economic advantages resulting from studies with purely economic and financial bias.

1. LITERATURE REVIEW

1.1. The conscious use of resources and the impact of the packaging in environment

According to *Minsitério do Meio Ambiente* (2016), any impact could be reduced or eliminated, basically by reducing the unnecessary consumption and the correct separation and destination of the garbage: we buy only what is necessary, reuse what is possible and send to recycling the recyclable materials and for composting the organic wastes.

Slomski (2012) affirms that for the production of goods and services, companies should use resources and strategies that consider sustainability, treating effluents and waste, which need to be measured and controlled. There is an emerging need for companies look at the total life cycle of the product and see, in that context, where their industrial costs begin and finish, and what impacts they can generate for environment when the process is incomplete or does not receive the due attention.

1.2. Reverse Logistics

According to Leite (2009), Reverse Logistics can be understood as the area of Business Logistics that plans, operates and controls the flow of the return of after-sales and post-

consumer goods to the business cycle Or to the production cycle and the corresponding logistics information, through the reverse distribution channels, adding value to them in several natures: economical, ecological, legal, logistical, corporate image, among others.

According to Faria and Silva Pereira (2012), Reverse Logistics occupies currently an important space within the logistics operation of companies, whether for their economic potential or for their importance for the preservation of resources and the environment, aiming an ecologically correct institutional image.

Lied and Bianchi (2016) argue that reverse logistics is being considered important for companies because returned products provide chances for the recovery of their value. The economic objective is the most relevant in the implementation of reverse logistics, but the predominant factor is sustainability.

1.3. The use of returnable packaging

According to ABRE (2017), the packaging is classified into three levels, being: primary: is the one that is in direct contact with the product; the secondary packaging is designated to contain one or more primary packaging and may not be suitable for transport; finally, the tertiary packaging comprises several primary or secondary packages for transport, such as the corrugated carton. Moura (2000) goes further, and says that there are two further packaging levels: quaternary and fifth level.

According to Fontes (2014), to provide a longer period of life packaging or its by-products is a business strategy because it represents opportunities for gains from raw material savings and recycling as well as environmental responsibility. Thus, a win-win policy is established between the environment and companies.



Figure 1 - PBR pallet and its dimensions. Source: Citisystems, 2016. Available at <[https://www.citisystems.com.br/?s=palete&lang=en#iLightbox\[gallery\]/0](https://www.citisystems.com.br/?s=palete&lang=en#iLightbox[gallery]/0)>.

According to *Associação Brasileira dos Fabricantes de Paletes PBR* (ABRAPAL) (2017), the standardization of the pallet allows a mechanical handling system and the transfer of goods with interchangeable pallets. The measurement of the PBR pallet (Fig. 1) is 1.20m X 1.00m, and besides Brazil, it is also adopted in the USA and Europe; its capacity is 1200kg.



Figure 2 – Chapatex. Source: Soluções Industriais, 2016. Available at <http://www.solucoesindustriais.com.br/images/produts/imagens_144/p_chapatex-sb-pallet-7.jpg>.

Besides the PBR pallet, which is used in practically all production operations, the company also uses Chapatex (Fig. 2) and wooden frame (Fig. 3), which are wooden "accessories" used to provide greater lift and balance in the assembly of the pallet, in order to ensure the safety in the movement and greater quality in the products.

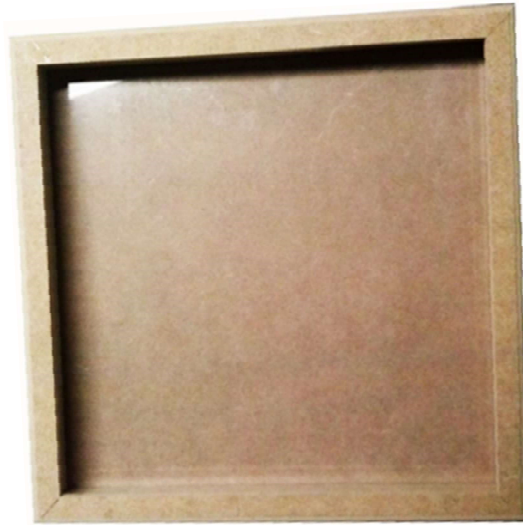


Figure 3 – Wooden frame. Source: Google images, 2016.

In the case of wood, an observation by Larrère C and Larrère R (1997), apud Cazals et al. (2013), is important. According to the authors, from the viewpoint of the classical economists, the forest resource is not considered only as a capital to increase. This reinforces the need for awareness that everyone must have it, not only about forest resources but also about all natural resources.

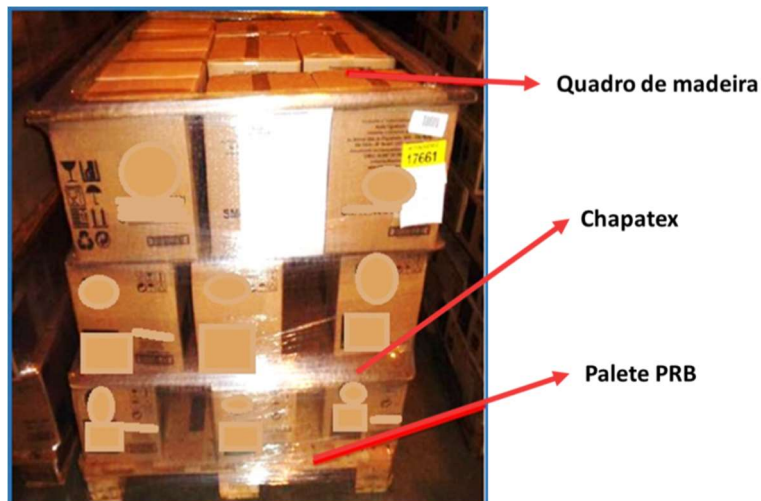


Figure 4 – Unitized packing ready for transportation. Source: the authors.

Saito (2007) argues that even with the low cost of the wood pallet compared with other types of materials (plastic, cardboard), it is poorly used, as only 10% of the pallets are reused generating costs for disposal. The environmental aspect is a relevant point in the use of the wood pallet, as it impacts directly in the deforestation, causing immediate need for reforestation.

According to Souza et al. (2016), wooden pallets are often the most indicated due to several factors, such as low cost, possibility of reuse, recycling and time of duration. These pallets are used in reverse logistics systems.

2. METHOD

This work is based on the descriptive method, which has, according to Gil (2010), the purpose to give greater familiarity with the problem, making it more explicit. On this way, a work already carried out that focused on cost reduction was used as basis, and a research bias focused on environmental benefits was applied.

Initially, research was carried out in periodicals and specific sites focusing on returnable packaging, reverse logistics and the importance of the conscious use of natural resources. At this stage, the main objective of the research was to seek evidences to show that changes in packaging management, besides economic benefits, can also bring environmental benefits. After the bibliographic review, the arguments proposed in this study were formulated.

At the end, it is suggested a topic for future research that may help to highlight the positive aspects for the environment resulting from financial and economic strategy attitudes.

3. SCENARIO STUDIED

This work was carried out in a large national glass industry that has products present all over Brazil and in 120 other countries.

In this company pallet, Chapatex and wood frame are used as unitized packaging for shipment of products to the most diverse customers, throughout Brazil (and other countries). The company estimates that the equivalent to R\$ 300,000.00 per month is spent on this type of packaging (Table 1).

The industry deals the sending these packages in two ways: the customer can choose to buy these packages, in this way an invoice for the sale of input is issued and sent together with the products and their respective invoice; *or* the customer can choose not to buy the packages, in this case, it must schedule with the company a date for the return of these packages.

Purchase of packaging	Unitary value	Monthly amount issued	Average monthly value spent
Pallet	\$ 16.90	6450	\$ 109,005.00
Chapatex	\$ 5.12	32250	\$ 165,800.00
Wood frame	\$ 4.00	6450	\$ 25,800.00
<i>Average monthly value spent with packaging</i>			<i>\$ 299,925.00</i>

Table 1 - Packing purchase. Source: the authors.

However, a large number of customers do not make the purchase, but also do not carry out the schedule for the return of the packaging, which generates a large balance of open packages in the system, thus forcing the company to make a new purchase of packaging monthly.

Besides the financial loss, there is, too, the problem of the quantity of packaging that is acquired monthly, which causes impacts in two ways: generating unnecessary waste in the environment, since the packaging that should be reused by the company is accumulating at the customers; and also because the company makes unnecessary purchases, that is, more material (wood) is extracted from nature to supply the demand for pallets, Chapatex and wooden frames.

In this scenario the research problem emerged with economic focus, studied by Sena Nery et al. (2016) and Sena Nery, Apocalypse and Nery da Silva, 2016, which offered a strategy of partnership with customers to ensure the return of the packages at an acceptable cost, that is, the lowest possible cost.

From these studies came the bias of this research: in addition to the economic benefits that were reached through changes in packaging management, it is also possible to reach environmental benefits.

4. DISCUSSION

In the industry under study, packaging is fundamental for the transportation, safety and quality of products, since it is an industry that manufactures glass. The logistics area is responsible for packaging management (purchasing, distribution and reverse logistics), the process for using these inputs varies according to the product.

In the previous works carried out within the company, negotiations and changes in the management of the packaging gave significant cost reduction with the purchase of packaging, but besides the financial gain there was the environmental gain, since the packaging which was previously under the customers responsibility (which could discard them improperly), after the changes, were incorporated into the reverse cycle, that is, reused in new clients.

Besides the environmental gain conferred by the decrease in resources (packaging) discarded in the environment inadequately, there was another environmental gain, since, once the company was able to recover packaging and return it to its logistic cycle, there was a decrease in the number of packaging, thus contributing to a lower extraction of wood from nature.

Since the purpose of this study is to emphasize the sustainable viewpoint, as a complement of thought, it is considered appropriate to cite the study of Halverson (2016), since it analyzes the impacts of the production and use, among others, of wood, by life cycle approach, thereby reinforcing the need to be aware for the use of natural resources.

Based on purely financial studies, this study shows how possible and important is to be aware that natural resources are limited and must be used with full responsibility, and that financial strategies can also contribute to a more sustainable environment.

FINAL CONSIDERATIONS

It is needed for the studied industry in particular, as well as all other industries, companies and organizations, the conscious use of natural resources, which comes from sustainable thinking.

In the areas of management, costs, economics, finances, production controls and many others which are focused on companies, the predominance is the focus on money, that is, on profits, so the environmental factor is often forgotten, which is in charge of an only sector – the default responsible for the subject – as if the matter was exclusively interesting for that sector. This behavior is very normal, so in this work we try to draw the attention of the specialists of the above mentioned areas, always to remember the many biases and possible viewpoints in actions considered common. This attention also benefits the image of the company, which can use this vision to attract new customers, since currently the consumer is also interested in acquiring products and / or contracting services from organizations that truly care about the environment and reflect this in their actions.

Thus, it evidences here: may an attitude with lucrative intentions contribute to sustainability; may management, especially with respect to profit, broaden the vision, understand and see the sustainable side of actions and decisions; and may the opposite, that is, the attitude thinking about the environment result in direct profit for the organization, as well as other benefits, such as improving its image.

It suggests for future researches a quantitative description of the benefits in to reuse recyclable and reusable materials within the industry as well as not discard them, showing both sides numerically: forests which are no longer exploited and materials and / or packaging that, if discarded in nature, what impact(s) it will cause.

REFERENCES

ABRAPAL (Associação Brasileira de Fabricante de Paletes – PBR). **Histórico e criação do Paleta PBR**. Available at <<http://www.abrapal.org/pages/pbr.html>>. Accessed on 01/06/2017.

ABRE (Associação Brasileira de Embalagem). **Embalagem. O que é embalagem?** Available at <<http://www.abre.org.br/setor/apresentacao-do-setor/a-embalagem/>>. Accessed on 01/04/2017.

_____. **Tipos de Embalagens**. Available at <<http://www.abre.org.br/setor/apresentacao-do-setor/a-embalagem/tipos-de-embalagens/>>. Accessed on 01/06/2017.

BRASIL. **Ministérios do Meio Ambiente**. Impacto das embalagens no meio ambiente. Available at <<http://www.mma.gov.br/responsabilidade-ocioambiental/producao-e-onsumosu>>

stentavel/consumo-consciente-de-embalagem/impacto-das-embalagens-no-meio-ambiente.>. Accessed on 01/06/2017.

CAZALS, C., DEUFFIC, P., SERGENT, A., & GINELLI, L. (2013). La forêt, un patrimoine au prisme de l'écologisation : le cas des Landes de Gascogne. **VertigO-la revue électronique en sciences de l'environnement**, (Hors-série 16).

DE FARIA, Ana Cristina; DA SILVA PEREIRA, Raquel. (2012). O Processo de Logística Reversa de Embalagens de Agrotóxicos: um estudo de caso sobre o INPEV. **Organizações Rurais & Agroindustriais**, v. 14, n. 1.

DE SOUZA, José; HADLICH, Débora P. Fischer; MAAHS, Thales Rômulo. (2016). Análise da substituição de paletes convencionais de madeira por paletes de papelão. **Revista Liberato**, v. 17, n. 28.

FONTES, Ana Taís Muniz. (2014). **Desvendando a logística reversa no Brasil: uma análise da legislação e da percepção de especialista**. 2014. Dissertação (Mestrado em meio ambiente, águas e saneamento) Universidade Federal da Bahia, Salvador.

GIL, Antônio Carlos. (2010). **Como elaborar projetos de Pesquisa**. 5ª ed. São Paulo: Atlas, 200p.

HALVERSON, L. (2016). **Comparison of environmental impacts from production of wood, concrete, and steel construction materials using a life cycle analysis approach**. Available at <http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=1050&context=honors_posters>. Accessed on 01/08/2017.

LARRERE, C.; LARRERE, R. (1997). **Du bon usage de la Nature : pour une philosophie de l'environnement**. Aubier : Paris, 355 p. *apud* CAZALS et al., 2013.

LEITE, Paulo Roberto. (2003). **Logística reversa**. Pearson, São Paulo.

LIED, Luciane Kemmerich; BIANCHI, Renata Coradini. (2016). A contribuição da logística reversa para a sustentabilidade em uma empresa do ramo industrial. **5º FÓRUM INTERNACIONAL ECOINOVAR 1ª CONFERÊNCIA INTERNACIONAL DE SUSTENTABILIDADE E INOVAÇÃO, 2016** – Santa Maria, RS.

MOURA, R. A. (2000). **Embalagem, unitização e containerização**. 3 ed. IMAM, São Paulo.

SAITO, Elizabeth Kioko. (2007). Estudo sobre a logística ideal para utilização de paletes de plástico. XXVII ENCONTRO NACIONAL DA ENGENHARIA DE PRODUÇÃO-ENEGE. **Anais**, Foz do Iguaçu, (PR), v. 9.

SENA NERY, L. A. S.; APOCALYPSE, B. S.; FORMIGONI, A.; RODRIGUES, E. F.; FREITAS, R. S. (2016). Análise dos efeitos da logística reversa de embalagens reutilizáveis - estudo de caso em uma empresa produtora de vidro. In: XI WORKSHOP de Pós-Graduação e Pesquisa do Centro Paula Souza, 2016, São Paulo. **Anais...**

SENA NERY, L. A. S.; APOCALYPSE, B. S.; NERY DA SILVA, G. (2016). Análise dos custos de frete na logística reversa em uma empresa produtora de vidro - estudo de caso. In: II Congresso de Logística e Operações do IFSP, 2016, Suzano. **Anais...**

SLOMSKI, Valmor et al. (2012). Sustentabilidade nas organizações: a internalização dos gastos com o descarte do produto e/ou embalagem aos custos de produção. **Revista de Administração (São Paulo)**, v. 47, n. 2, p. 275-289.