

Solid Waste Textiles: Case Study of a Brazilian company

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Abstract

The textile chain involves a huge and varied network of raw material industry: fiber, passing by spinning processes, weaving, dyeing and manufacturing, producing highly diversified and differentiated products. As a result generating tons of solid waste throughout its production process. Reuse needs to be optimized.

Keywords: waste, textiles, fashion

Introduction

Studies on sustainability have been recurrent among the various discussions, both in terms of regulation by heads of state, or companies, organizations, educational institutions, consumers, etc., and within this perspective has, increased the importance relative solid waste.

The problems generated by solid waste is not only a function of his generation, but the correct study and understanding of the issues that guide. The impacts caused by incorrect

disposal of these, can pollute both the soil, contaminating the water and the air, triggering a series of harmful impacts on the pillars of sustainability: environmental, social and economic.

The rates of growth of the Brazilian economy increased greatly in recent years, accompanied by the promotion of social inclusion and increased consumption (IPEA, 2012). And after consumption or even during the production process there is the generation of solid waste and even in Brazil continues to be the deposition of industrial waste improperly and often without separation, thus making it extremely important studies on this topic in an interdisciplinary way, given the size and peculiarities, both to add in references as to bring light possible strategies and success stories that can be applied.

The textile and clothing sector is an important Brazilian economic development sector, according IEMI (2013), this sector accounts for 5% of GDP and 15% of the formally employed labor in the manufacturing industry, accounted more than 1.5 million people formally employed. Internationally is the fifth largest textile industry in the world and the fourth largest in clothing; the second largest denim producer and third in knitwear production.

This sector of the industry is considered big environmental pollution. Since getting the raw material, the fibers, through the spinning processes, weaving, dyeing, manufacturing and finishing, there is large consumption of work, natural, renewable and non-renewable resources, waste generation, harmful effects on human health which, according to Fletcher and Grose (2011), are also associated climate changes that are global and not local only impacts.

So this work is mainly focused look up, through a literature search, obtained through published material (Gil, 2002; Lakatos and Marconi, 2003), and try to measure the volume of textile waste generated by this sector and identify alternatives and practices that the textile industry is adopting through a case study, which, according to Yin (2001), allows a holistic research.

Literature review

Generation of Solid Waste Textiles in Brazil

The data on the generation and recycling of textile waste in Brazil are still scarce and difficult to measure. This problem is not specific in the textile sector, as shown in the Diagnosis of Industrial Solid Wastes, prepared by the IPEA in 2012. According to the report the data obtained from the survey did not allow a full diagnosis, because although some states have done the inventory and that did not have a pattern with different bases years and few companies scheduled.

According Zonatti (2013), the region of Bom Retiro and Brás in Sao Paulo, account for approximately 12 to 10 tonnes / day of textile waste respectively. Lopes (2013), in his studies of the solid residue in the clothing sector, asserts that the amount of textile waste generated in the Bom Retiro area, **"represents about 2% of the waste produced in Brazil, which is estimated in the order of 175,000 tons / year."**

Table 1 below shows the data of the states that have made the inventory and that appears measured textile waste:

Table 1 - distribution of the amount of textile waste inventoried

State	Year of the Inventory	Industrial Waste Quantity Textiles (ton.)
Pernambuco	2001	3.335,18
Rio Grande do Sul	2002	2.951,28
Amapá	2005-2007	2,79
Ceará	2001	8.017,03
Minas Gerais	2013	45.307,96
Paraná	2004-2009	72.125,23
Amazonas	2012	20,03

Source: Prepared by the authors through the IPEA data (2012) and the State of Amazonas (2012)

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Another peculiar problems of the sector, is in relation to the life cycle of fashion product. Berlin (2012), states that the product of "fashion" has come to be understood as something useful while "trendy", comprising: introduction, growth, development, maturity and decline, thus becoming shorter your cycle lifetime. In addition to the above classification, Kotler and Keller (2013) and Parente and Barki (2014) highlight three categories of product life cycle: style, fashion and fad, and that the fashion and fad cycle have a shorter life cycle and a lower degree of predictability.

In that sense, Fletcher & Grose (2012), draws attention to the interception reuse, recovery and recycling, in relation to textiles waste going to landfills, and how these methods to rethink the lead back to the production process as raw raw. Also points out the need to recast the design to collection and even business engineering strategies, always seeking to make better use of resources inherent to ask before designing them and discard them.

National Policy on Solid Waste (PNRS)

The generation of solid waste is a type of pollution with serious social and environmental consequences. According Abramovay (2009) is synonymous with process inefficiency and a form of economic waste, not the externality that arises from inevitably the production process. Porter and Linde (1995) assert that in recent years regulators and most advanced companies have adopted the concept of pollution prevention also called source reduction, limiting the pollution before the occurrence, increase competitiveness, generate less impact and have better features. And companies that are pioneering innovation longer enjoy such advantages.

In answer to this problem with such proportion in 2010 was approved the Law 12.305 establishing the National Policy on Solid Waste, however, according Villac (2014), before approval had other standards that dealt with the subject in national, state and municipal. The PNRS, was processed in Congress for twenty-one years until his approval. To Villac (2014),

"the extended lapse, is indicative of the need for reflection [...] of inertia or conflicts that had to be overcome yet not necessarily reconciled".

For Torres and Borger (2014), Law 12.305 / 2010 - National Policy on Solid Waste addresses the principles, objectives, instruments and guidelines for the management of solid waste in general. And within its main objectives: reducing the amount of disposal in landfills; energy savings; preservation of natural resources; obtaining economic advantage through the valuation of waste; already on the priority perspective we have: not to generation; reduction; reuse; recycling; treatment of waste; final disposal environmentally sound (Silva, Leitão and Lemos, 2014).

Regarding the Brazilian textile industry, the Brazilian Association of Textile and Clothing Industry - ABIT, states that the strategic dimension that has permeated all analyzes of sustainable development always involves innovation and should emphasize differentiation strategies based on concepts of sustainability, and promotes the search for innovative knowledge into new fibers and new technologies, becoming as scarce assets in the near future, leading to lead those who dominate. Furthermore, the integration of consumer production system creates mutual understanding needs, based on shared attributes identification codes and environmental impacts arranged in products (CNI, 2012).

The improvements resulting from prevention at source and recycling occurs in a process and the products, we can mention: economies of materials; better use of by-products; Waste conversion value form; lower power consumption; reduction in the cost of products; reduction in packaging costs; more efficient use of resources; greater recovery of waste and reuse of colorífica energy; reduction in the generation of waste, and the company benefits from the financial advantages (Porter and Linde, 1995; Azzone and Noci, 1998; IPEA, 2012).

Reverse Logistics

Reverse logistics is a specialized field of handling and management of products and materials after sale and after consumption. In this sector is the reverse flow, ie the end of the string to the beginning, and this approach its key objective is to apply 4 "R" namely: reprocess, recondition, recycle and resell (Amato Neto, 2014).

For Torres and Borger (2014), the model gained success and space in a sustainable manner by the possibility of reintegrating post-consumer products in the supply chain. With that decreases environmental and social impacts, earning gains in image and competitiveness for the company.

The final disposition also becomes a very important factor to be noted, therefore there must be a mutual trust and still monitoring the company responsible for the final disposal and the success of reverse logistics depends largely on the final consumer.

Thus becomes of great importance to environmental education by companies and the consumer advice about collection points and procedure, after the product do its job, which is by means of labels, guidance in the purchase of manual education, etc.

Methodology

As a form to meet the objective of the study was conducted an exploratory, descriptive and a case study with a textile company, which has a solid waste management practices, as well as reuse of the same in its production process.

For the choice of the company, sought to analyze the companies that have a solid waste management system and also the reduction, recycling in its production process. For both rose through research on websites and in magazines in the textile industry companies that make a difference in the textile sector that is subject studied. The company studied beyond to make solid waste management internally, also has reverse logistics product discarded by the consumer, in compliance with the PNRS.

To prepare this paper, did a literature search, which as Lakatos and Marconi (2003), is a secondary source that covers the published literature and leaves the researcher in touch with what has already been studied. And through an interview with the management of sustainability of the company, together with data configured as the primary data source.

The research for better understanding of the subject were: textile waste; social, environmental and PNRS issues. The primary data were based on an interview with semi-structured questions, and secondary data were obtained in various ways, such as reports provided by the company, company websites, visit the shops, flyers, labels of parts and materials extracted from magazines.

The company

The Malwee Group is a textile industry, which started its activity in 1968, currently has about 12 thousand. His presence for socio-economic sector is of great importance, has more than 200 stores monomarcas, 40.000 multi-brand sales and a production of over 75 million pieces in year 10 plants.

The company has a strong presence in relation to solid waste. Own training, awareness and campaigns for both its employees, and for consumers. The company has internal collection points and make educational campaigns, Figure 2 is the disposal of solid waste company.

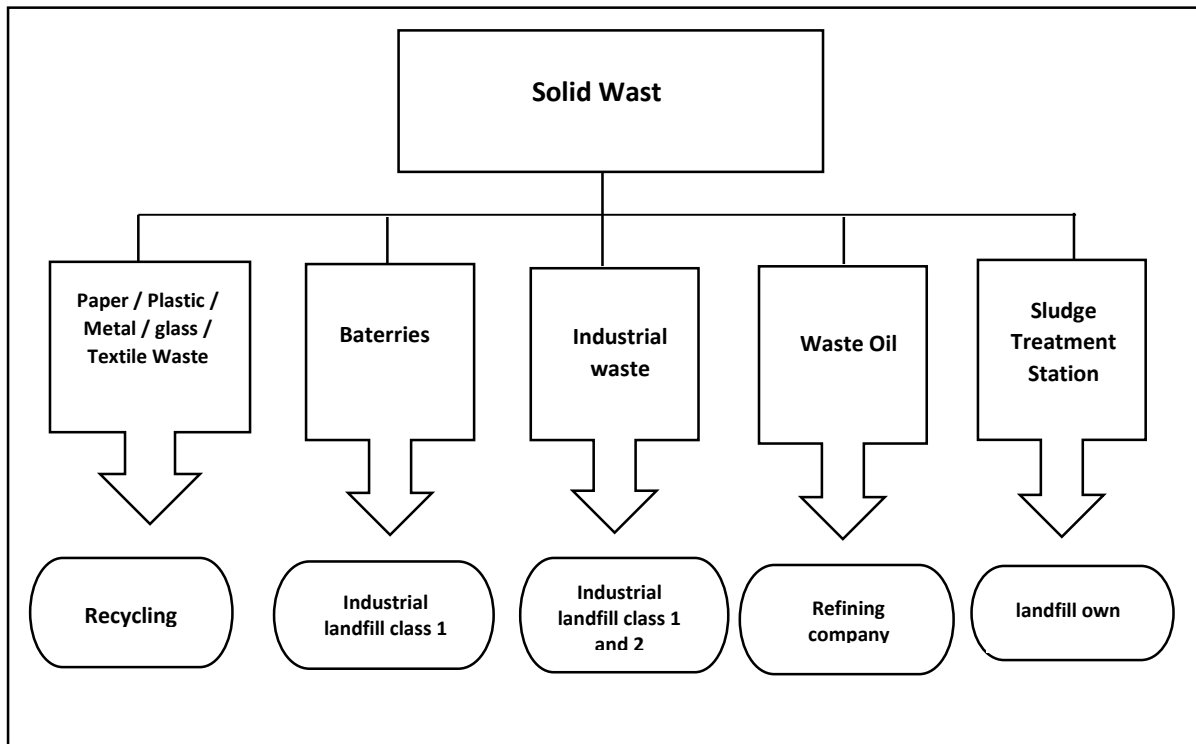


Figure 1 - Allocation of solid waste in Malwee company. Source: Minatti (2012).

The company has sustainability sector and internal committees responsible for goals and programs, and one of the departments, corresponds, after use, ie the company's commitment also involves the final phase of the product life cycle.

Recycling of textile waste and reverse logistics

In recent years, compared to advances in scientific research, the pressures and constant concern for solid waste and its environmental impacts, emerged in the textile sector concern about the tissue remains generated in the production process, turning the scraps into new parts and even even in new wires through recycling (Fletcher & Grose, 2011). But they emphasize that these ideas promise to slow down the volume of waste, however, assert that the emerging design there are techniques that allow to go further, in innovative ways of designing clothes.

The company front of concern for the generation of industrial solid waste, which according to the management of sustainability in the manufacturing process has two major generators of solid residues in the dyeing process with the production of textile sludge and cutting process product and the greater the variety of products is the largest percentage of scraps. Fabric scraps are sent to another company that defibering this material, turning it into new threads.

The company instituted internal recycling for sale to recyclers partners, thus generating shared value (Porter and Kramer, 2006). The textile sludge with a production of 5 tons / day, is the destination company's own landfill, and will be reduced with the implementation of the biomass boiler.

The reverse logistics system of the company, is the principle of shared responsibility along with environmental education present in PNRS, the company seeks to raise consumer awareness through marketing, as well as directing the consumer to bring the socks used to be donated and then reprocessed.

The social project of Puket, started in 2013, aims at making blankets from the reuse of textile waste (uncontaminated) the production process and by means of pairs of socks donated by customers at collection points in stores. Socks and waste are fragmented and felting process resulting in a blanket, and finalized as blankets. With this project Puket brand has benefited 11 institutions donating more than 2,200 blankets. The ratio for the manufacture of blankets is for every 40 pairs of socks donated 1 new blanket is made, and also donated.

For this program to continue is necessary for the consumer to continue doing its part, as this "change of behavior is an important factor in the prevention policies are successfully implemented" (Gonçalves Dias, 2009).

Besides promoting the reverse logistics of their products, which meets the Law 12.305 / 2010 National Policy of Solid Waste, is a sustainable and socially responsible action of the company with philanthropic and strategic purposes. In doing so, the company is increasingly consolidating its brand in the market, still leading sustainable patterns as the basis for achieving sustainable value.

Figure 3 below represents the logistic flow of Malwee value chain. As can be noted for the occurrence of system sustainability, there must be harmony and commitment to the issues addressed by the company.

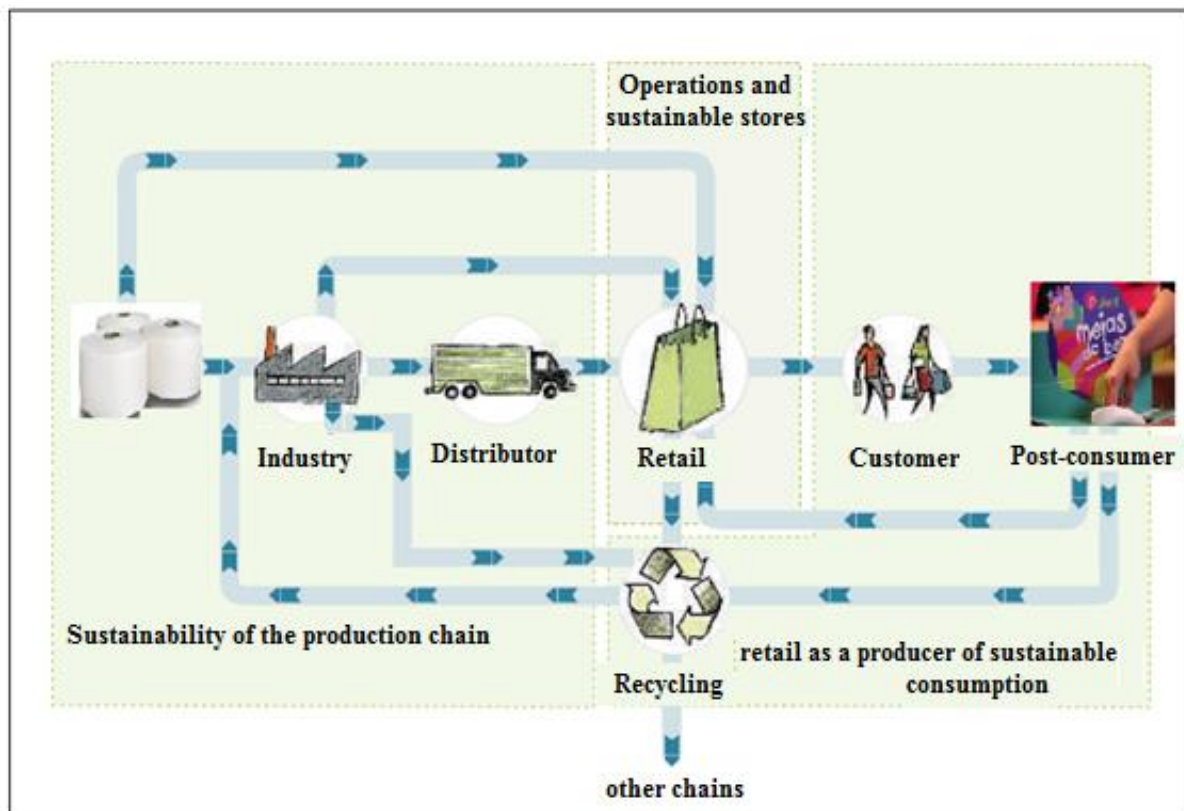


Figure 3: Connections of Malwee value chain. Source: Adapted by authors de Parente; Gelman. Fórum de Varejo e Consumo Sustentável: experiências, debates e desafios. São Paulo: FGV, 2009.

Final Considerations

The issue of solid waste constitutes a problem that is getting attention in a national context recently. Through this work it was possible to find data on the generation of textile waste in Brazil, but the data are still fragmented and without precision, not only to be a problem in this sector, but of solid waste in general (IPEA, 2012).

It was possible to identify the most common destination which companies adopt, with recycling and landfills, and this product after being processed into flakes can be processed into yarn or fabric flakes having various purposes.

The company in question uses both reducing harmful products to the environment, as well as fiber yarns from recycled PET bottles, and yet the reverse logistics system for a line of products that the company sells. Promotes awareness, both at the organizational level as for consumers. One of the barriers faced by the company and is in search through design and product development, is consumer resistance against innovations, such as recycled yarn.

The limiting factor is the research highlights the fact that obtaining the primary data have been obtained only with a company representative, delimiting in a one-sided view. Getting as suggestions for future research to obtain data more companies and the interview with more employees and from various sectors in order to get the multilateral vision.

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