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Perspectives of environmental management in Brazilian fashion: a study of practices in the production of jeans

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SUMMARY
This study aims to diagnose environmental management practices adopted by industries in the jeans production chain and present new and sustainable solutions to reduce environmental damage throughout the production processes. Through bibliographic research, documentaries, and semi-structured interviews, it was possible to diagnose several actions proposed by the present company to reduce environmental damage and contribute to achieving social justice. Thus, the research is significant, as the textile sector has excellent potential for achieving the SDGs in Brazil, especially when considering the growth of the world market of jeans, tied to various environmental and social impacts throughout the production process. Initiatives taken by other companies in the sector were identified, indicating new possibilities that can be adapted to the reality of several organizations to use them as a reference in mitigating environmental impacts. Regarding the company analyzed, it was observed that there is a stance on pollution control, considering the various initiatives that seek to mitigate social and environmental issues. However, it is suggested that the company has many mechanisms and paths to evolve toward pollution prevention postures or even a strategic approach, which will ensure a better performance in the implementation of new sustainable practices.

KEYWORDS: Garment industry. Environmental impacts. Sustainable practices.

1 INTRODUCTION

In 2015, the publication of the 2030 Agenda, which presented the 17 Sustainable Development Goals (SDGs) and 169 goals, presented a transformative vision for society as a whole, showing that sustainability will be achieved when there is a focus on inequalities, poverty eradication, inclusive social promotion, environmental preservation and sustained economic development (UNITED NATIONS, 2015).

The new Agenda requires the effective participation of governments, organizations, companies, and civil society to accomplish the SDGs (CAI; CHOI, 2020). Among these groups, there is a great responsibility of companies in the face of environmental impacts, taking into account the excessive consumption of natural resources for the production of various articles, which can influence the exhaustion of ecosystems. Thus, it is essential to use practices that improve processes and products relating to environmental, social, and economic aspects (ALENCAR *et al*., 2015; ZHANG *et al*., 2019).

In this context, environmental management (EM) is emphasized, which aims to manage the production processes for the conservation of the environment and reduction of losses, in addition to regulating the behavior of companies and people, thus stimulating the award of environmental certifications (POL, 2003; SILVA; MARTINS, 2017). The introduction of environmental management in organizations directly influences companies to contribute solutions rather than remain part of environmental problems (ALENCAR *et al*., 2015).

Barbieri (2016) suggests a categorization of three different business environmental approaches. For the author, companies can act through pollution control, focusing on compliance with legislation, point solutions, and end-of-pipe control. With the increase in international pressure and environmental legislation, some companies have taken action for pollution prevention, which target the more efficient use of resources through corrective and preventive measures. Finally, the strategic approach stands out, in which organizations are concerned with a more competitive position in the market, anticipating problems and seeking medium and long-term opportunities.

With great relevance in the Brazilian scenario, the textile industry is one of the sectors that should be attentive to the implementation of environmental management to contribute significantly to achieving the SDGs. In other words, it is important for industries to promote and

foster the inclusion of environmentally friendly and cleaner technologies and processes (SDG 9), reducing environmental impacts through sustainable management and the efficient use of natural resources (SDG 12), preventing marine pollution (SDG 14), preserving terrestrial ecosystems (SDG 15), fostering partnerships between sectors, and ensuring economic advantages (SDG 17) (UNITED NATIONS, 2015; NETO *et al*., 2019).

In this sector, the production of jeans has, over time, become a popular item, serving all consumers and adapting to different lifestyles (ALMEIDA; EMÍDIO, 2012). For these reasons, global figures of the jeans market point to a constant expansion of the sector, with a projection of growth in production and consumption of 63% on average, until 2030. Thus, the jeanswear segment contributes significantly to income generation and employment (ANNAPOORANI, 2017; KOZLOWSKI *et al*., 2018; GRAND VIEW RESEARCH, 2019).

Despite presenting good financial results in the world market, the increase in the productivity of jeans also causes several environmental damages due to the number of natural resources used in production processes (ALENCAR *et al*., 2015). It also stands out as a dynamic of extreme competition in the global fashion industry, with ephemeral trends and extremely short product life cycles, which encourage the emergence of intense pressure for constant change in product lines. These demands, in turn, create a challenging context for implementing sustainable practices in the production chain (PAL; GANDER, 2018).

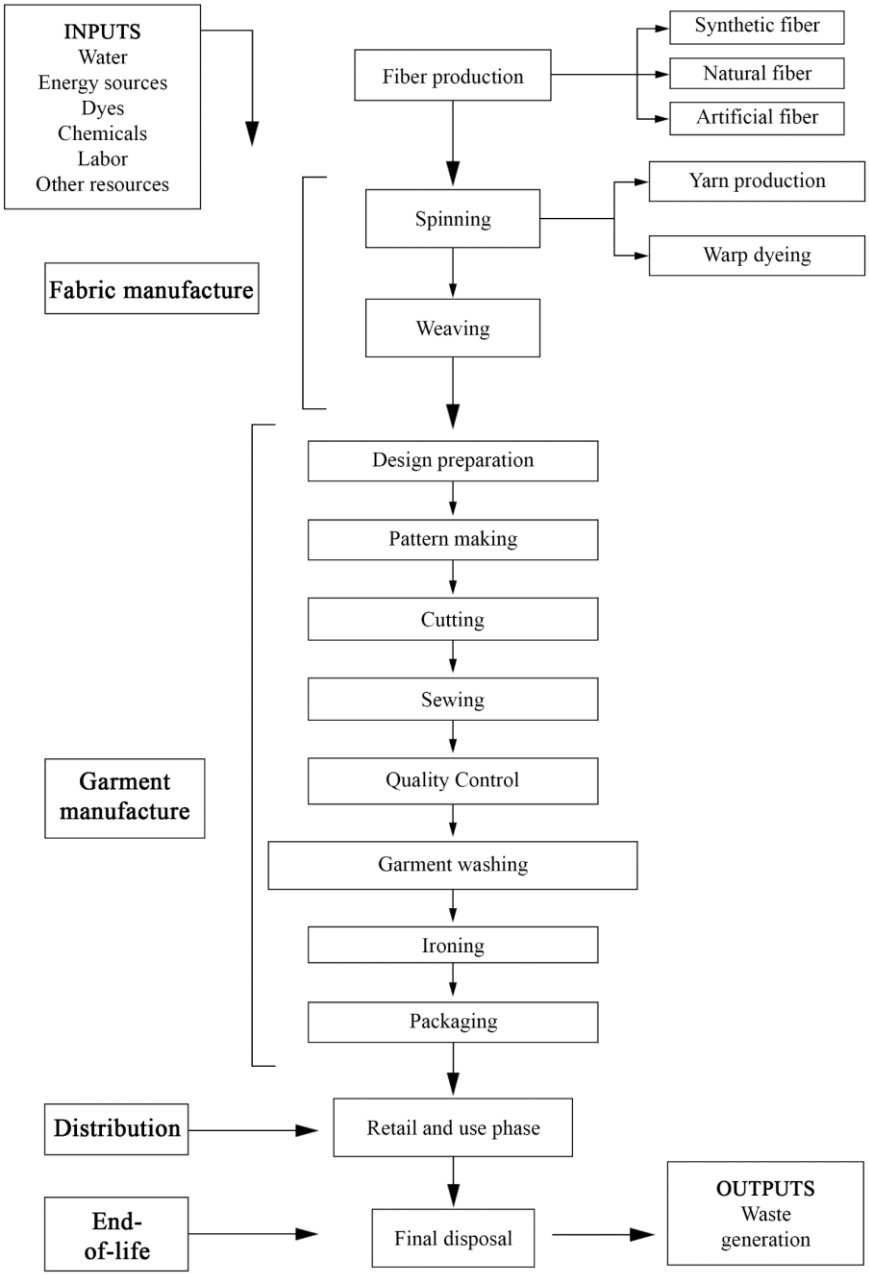
Given the possible damage the textile and clothing industries can cause to the environment, it is important to highlight new perspectives for environmental management within the sector. Therefore, the present study aims to diagnose environmental management practices adopted by the industry in the jeans production chain, as well as to present new and sustainable solutions aimed at reducing environmental damage in production processes.

1.1 Sustainability of the jeans production chain

The concept of sustainable fashion does not present a formal definition in scientific literature, rather, it is expressed in countless ways. Considering the objective of this study, we considered the sustainable fashion design presented by Kozlowski *et al*. (2018), which conceptualizes it as fashion developed with evaluation of clothing production stages and proposal of solutions to reduce the negative impacts of companies in communities, societies, people, and the natural environment.

To propose new sustainable initiatives in the jeans industry, it is essential to analyze the production cycle of the article to develop actions that reduce impacts in all production stages (Figure 1).

Figure 1 - Flowchart of the process of the jeans production chain



Source: Adapted from Costa and Rocha (2009) and Periysamy *et al*. (2017).

Thus, the production process of denim parts goes through several stages, which require large amounts of natural resources and generate numerous negative impacts on the environment from the beginning of the production chain (ITABORAHY; SILVA, 2006; DASGUPTA *et al*., 2015). The environmental damage caused by the jeans industry is observed throughout its life cycle, from fiber production to end-of-life.

A life cycle analysis study developed by jeans brand Levi's, for example, indicated that for the production of jeans, the company consumes about 3,781 liters of water, occupies 12 m² of land per year, generates a nitrogen and phosphorus deposit in the water of 48.9 g PO4-e and has a greenhouse gas release potential of 33.4 kg CO2-e, thus contributing to the depletion of natural resources, eutrophication of water bodies and increased climate change (LEVI STRAUSS, 2015).

Analyzing the production process of jeans as a whole makes it possible to identify early on some impacts in obtaining raw materials. In the production of the fibers most used in the manufacture of jeans, such as ordinary cotton and polyester, there is a significant impact on the environment, considering the high consumption of water (approximately 70% of total consumption in the process) and energy, as well as intensive use of agrochemicals and deforestation of large areas of land (AMUTHA, 2017; PERIYSAMY *et al*., 2017).

Then, in the manufacture of the yarn, there is high energy consumption by the machinery and the generation of dust and fiber residues that are highly toxic, contributing to air pollution and entailing risks to human health (PERIYSAMY *et al*., 2017). Subsequently, the yarn is dyed for the making of the denim fabric. At this stage, there is a generation of effluents with dyes and substances that pollute water and harm the entire aquatic ecosystem (AMUTHA, 2017).

In the manufacture of denim pieces, the generation of solid waste, such as textiles, papers, yarns, and trimmings, is evident. These form large volumes that contaminate the soil when discarded in landfills (ALENCAR *et al*., 2015; AMUTHA, 2017). Also, in the making, there is the stage of processing the jeans through the laundry processes, such as dyeing and softening, among others. At this stage of production, there is a significant consumption of water, placing the jeans in the first position on the scale of water use for textiles. In addition, industries are responsible for plastic pollution in the oceans and for the generation of liquid effluents containing dyes, dissolved solids, heavy metals, salts, chlorine, and other pollutants that increase water pollution and directly affect photosynthesis and water availability for human consumption (PRABHAVATHI *et al*., 2014; CHOUDHURY, 2017).

It is also essential to highlight the impacts caused by the generation of sludge in the treatment of liquid effluents, the contamination of the atmosphere by the burning of the boilers used for the operation of the laundries, and the ash residues generated by the equipment (ITABORAHY; SILVA, 2006).

These impacts are not limited to the production process and extend through the consumption and post-consumption phases. Excessive water use, for example, is also present in the maintenance of the piece by consumers, representing about 25% of the water consumption in the life cycle of jeans (LEVI STRAUSS, 2015). In addition, post-consumer waste is characterized by products discarded by consumers and non-saleable stocks, which are surpassed by the advent of new ephemeral trends (AMUTHA, 2017).

It is understood that the need to adopt measures facilitates the transition from fashion to a more sustainable system (KOZLOWSKI *et al*., 2018).

2 MATERIALS AND METHODS

The present study, with a qualitative approach, is characterized as exploratory since it seeks to address issues that have been little considered in the scenario of the clothing industries. For data collection, we opted for documentary research, followed by a semi-structured interview, which will be described below.

The research was submitted to the Research Ethics Committee of Unicesumar and registered in Plataforma Brasil.

2.1 Characterization of the study site

The place of study is a jeans-producing garment industry located in the municipality of Londrina; geographic coordinates are 23° 18' 36" S 51° 09' 46" W, (State of Paraná, southern Brazil) with approximately 575,377 inhabitants (INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA, 2020).

This clothing industry, the object of this study, was founded in 1999 on an 11,000 m² plot, of which 6,800 m² are developed. It operates in the production of pants and shorts of denim and twill fabrics for various audiences. Specialized in *Private Label*, currently has 108 active employees divided into product development, sales, modeling, cutting, quality control, and logistics. Other processes, such as sewing, embroidery, laundry, and finishing, are carried out by outsourced companies.

2.2 Documentary research

For the initial collection of data about the study site, documentary research was carried out through the collection of information in management reports, the 2020 sustainability report, the company's personal report that indicates the life cycle of sustainable jeans, booklets, and balance sheets made available by the company.

In addition, a query was made on the contents available on the studied organization's website (the veracity of the data presented online is the company's responsibility).

To identify the environmental management actions proposed by the organization, information related to pro-environmental and social responsibility activities was filtered.

2.3 Semi-structured interview

After the document analysis, we conducted a semi-structured interview with one of the company's managers, who holds the position of Administrative Operations Manager and oversees environmental management projects.

For the interview, an open question script was developed, in which the interviewee can respond freely without needing to standardize answers. In addition, the interview was complemented with random questions, which were elaborated on considering the circumstances of the answers presented.

The questions prepared by the authors sought to investigate the management's vision regarding the environmental responsibility of the garment industries, the attitude adopted by the company according to Barbieri concepts (2016), the involvement of employees in environmental management, the extension of these initiatives to the external community and the dissemination of actions to consumers and stakeholders.

The data obtained through documentary research and the interview were analyzed qualitatively and classified by the content of the information presented as follows: company facilities; solid waste management; environmental certifications and product life cycle; social projects; and internal training and dissemination of sustainable practices.

3 RESULTS AND DISCUSSION

3.1 Company facilities

Several policies were put in place by the company to increase the efficiency of the facilities and reduce environmental damage. The first initiative proposed by management was the capture of rainwater. A rainwater collection system was developed as the company needed to adapt to expand the facilities, under Law No. 11,552, of April 24, 2012, promulgated by the City Council of Londrina, which requires new buildings with consumption of more than 20 m^3 of water per day, to reuse water through recycling and use of alternative sources (LONDRINA, 2012).

The initiative proposed by the company was significant, considering that the simplest way to take advantage of rainwater is by capturing the water that falls from the roofs by gutters that lead to reservoirs. In addition to the low financial investment in this action, there is a decrease in the cost of water consumption and a contribution to the conservation of water resources (EL TUGOZ *et al*., 2017).

Another relevant aspect is that the roof of the entire construction of the company was made to enable the intelligent use of sunlight through transparent tiles with protection against UV rays, which help in the control of heat gains and losses. According to Al-Saggaf et al. (2020), using windows and roofs that allow the entry of natural light can reduce energy consumption.

Finally, the company has solar panels to generate photovoltaic energy, a low-impact environmental energy source. Currently, the company maintains 100% of the energy produced by solar panels, which led, according to the organization's data, to a reduction of about 30 metric tons of CO_2 emissions. In this sense, this is a contribution to the conservation of reservoir levels of hydroelectric plants, as well as to the economy of non-renewable resources.

Despite higher solar panel deployment costs, their installation has become increasingly feasible, and existing challenges are gradually overcome. Moreover, it is worth mentioning that the growing investment in photovoltaic energy by companies and households significantly influences the diversification of the Brazilian energy matrix (ROSA; GASPARIN, 2016; POMPEU, 2019).

To continue focusing on actions to manage the emission of greenhouse gases, the organization opted for using a GHG Protocol tool, which assists in quantifying emissions and promotes an agenda to combat climate change (FGVces, 2022). In this way, it becomes possible to develop solutions directed to the most critical life cycle stages: transportation, logistics, and distribution (76.7% of total emissions). From this emissions accounting, the company affirmed the commitment to neutralize carbon in the product cycle by acquiring carbon credits.

In recent years there has been a growing search for net-zero or "carbon neutrality”, which means that the organization emits no more carbon than it removes from the atmosphere. The big problem involved in this initiative is the concentration of companies to become carbon neutral without significant efforts to reduce emissions drastically. In other words, there is a focus on planting trees for carbon sequestration or capturing methane in landfills without significant changes in processes and products. At this point, compensation without reducing emissions can be risky since it does not guarantee substantial contributions to limit the increase in global warming (PONTECORVO, 2020).

3.2 Solid Waste Management

Regarding solid waste, the manager pointed out that it was necessary to develop new disposal strategies when the city of Londrina did not present sufficient collection capacity for the high volume of waste generated by the company. In 2009, the management of organic waste and waste of public and private responsibility (Solid Waste Management Plan - PGRS) was regulated for the municipality by Municipal Decree No. 769 of September 23, 2009 (LONDRINA, 2009).

The management of organic waste and waste of public and private responsibility aims to reduce, recycle or reuse the waste generated through planning, duties, and actions. It also shows that commercial or large waste generators must present a plan covering the characterization, separation, packaging, transportation, and disposal of solid waste. According to the decree, the main objective of the PGRS should be the non-generation of waste, and in the background, the reduction, recycling, composting, and proper final disposal (LONDRINA, 2009).

At the same time, in 2010, the National Solid Waste Policy (PNRS) was instituted, as provided for in Law No. 12,305 of August 2, 2010 (BRASIL, 2010). It is essential to highlight that the PNRS institution was a milestone for solid waste management in the national context. However, it can only be effective with the engagement of civil society, private organizations, and public authorities to significantly modify solid waste management practices (NETO; MOREIRA, 2010).

Given the obligation imposed by the legislation, the company had to review internal policies for solid waste disposal. To this end, in 2014, it developed a PGRS to manage the waste of tissues, paper, plastic, metals, glass, electronic waste, lamps, and organic matter.

Despite the initiative, the plan focused on analyzing the generation of these wastes to identify the possibilities of a discard that follows the legislation and has fewer impacts on the environment. That is, instead of seeking non-generation of waste, as is oriented in Municipal Decree No. 769 of 2009 and in the PNRS itself, the organization centralized its actions of the program in end-of-tube practices, which comprise methods of control/correction of pollution and not prevention (VARGAS *et al*., 2019).

This fact is made more evident in the Textile Waste Management Program and the Zero Textile Waste Program adopted by the company. The latter refers to the total reuse of production waste, preventing disposal in industrial landfills. Thus, the employees separated waste in the production process to send it to institutions such as asylums, schools, and small businesses. Data from the organization indicate that, in 2020, 80 tons of textile waste were sent for recycling, and 5 tons were given to social projects for income generation.

These pollution controls are important, considering that the reuse of textile waste can reduce soil contamination generated by large volumes of tissues (ALENCAR *et al*., 2015). However, the donation of textile waste is not fully efficient for the company. An attractive alternative would be the reuse of waste for the internal production of new articles rather than the donation of waste or the reuse of products discarded by consumers through reverse logistics (RL). In RL, products that return to the company undergo an analysis to verify the physical conditions of the piece to direct it to reuse or recycling, closing the product cycle (WACHHOLZ *et al*., 2020). In the case of the company analyzed, which works in the Private Label segment, it is verified that the reverse logistics strategy should be studied more carefully and considering the economic viability.

It is also worth mentioning at this point that preventive strategies are more efficient from an environmental and economic point of view when compared to corrective strategies

(BARBIERI, 2016; NETO *et al*., 2020) since by anticipating, the company can increase the life of products and reduce the consumption of natural and financial resources (PAL; GANDER, 2018; PISITSAK *et al*., 2018).

In this sense, it is evident the need to incorporate strategies that focus on the entire life cycle of the product and not only on production residues. Cleaner Production (CP) initiatives must replace end-of-pipe treatment technologies, which aim to prevent, reduce, or eliminate waste at the generating source through continuous improvements in processes, products, and services (LENZ; ACKER, 2009; PEREIRA; SANT'ANNA, 2012).

P+L involves a range of strategies aimed at less environmental impact by proposing the efficient management of resources, correct disposal and treatment of waste generated, the development of new technologies, and the organization of the supply chain and the company's sectors. It is noteworthy that CP is not limited to process management proposals; it also needs changes in product design and a difference in the company's philosophy and organizational culture, thus involving all employees (LENZ; ACKER, 2009; SOUSA; SILVA, 2018; GIANNETTI *et al*., 2020).

The participation of technical researchers and the creation of interdisciplinary partnerships in the implementation of Cleaner Production contributes to achieving the SDGs. These initiatives can promote responsible production, consumption, and consequently, the conservation of terrestrial life, aquatic ecosystems, and climate change mitigation (GIANNETTI *et al*., 2020).

Considering the above, the company must seek new solutions for the design of products, aiming to improve efficiency and reduce the source of waste and pollution in all processes. In this sense, we highlight some proposals used in garment industries in the stage of product creation. Among them are modular clothes, which can be disassembled and restructured with other pieces. This allows the ability to create multiple possibilities with a single piece. The environmental value of modular design lies in maximizing the diversity of garments that can be made, in the high degree of flexibility and continuity of products, since it is possible to use a set of modules from an old collection in the development of new pieces (CHEN *et al*., 2018).

In addition, other industries focus on design for longevity, attributed to products designed for increased service life and easy repair. Similarly, the use of the *Open Design strategy* is relevant, which involves consumers in the creation of products, thus fostering a "self-reflection" about consumption habits and a change in the relationship between the individual and the object, considering that it can develop a more effective characteristic (HIRSCHER; FUAD-LUKE, 2013; PAL; GANDER, 2018).

Although several improvements can be implemented to contribute to achieving the SDGs, the company already planned actions of great relevance for the coming years. The manager indicated that the plan for 2021 is to win the Zero Waste Certification of the Zero Waste Brazil Institute (ILZB), still in the first semester (verbal information)[1]:

> Last year there zero textile waste; this year, the Zero Waste Brazil Institute will make the Zero Waste program to take care of paper, plastic, and all the company's waste.
> I requested to them that I wanted to extend this to the city of Londrina. I want a Zero Waste city. And they have no zero waste cities in Brazil, but in Italy this is very common ([1]Interview granted by R. L. Interview I. [Dec. 2020]. Maringá, 2020. File .mp3 (50 min. 13s.).

This Zero Waste Certification offered by ILZB is based on the orientation for changing lifestyles and practices to foster sustainable cycles, in which the materials that would be discarded can be turned into new raw materials. Thus, it seeks to promote the responsible production, reuse of resources, and recovery of materials and products, without burning or any environmental discharge (INSTITUTO LIXO ZERO BRASIL, 2020).

With the implementation of the Zero Waste Certification, the organization will be the first industry in the textile and clothing sector certified in the state of Paraná, which demonstrates a significant advance for the segment in the state and national scenario.

3.3 Environmental certifications and product life cycle

Continuing with the organization's certifications, those that demonstrate the company's concern about reducing environmental impacts and more sustainable production processes stand out.

The company and all its suppliers have the Brazilian Textile Retail Association (ABVTEX) seal, which refers to the incentive of best compliance practices throughout the production chain. In general, the ABVTEX Program aims to encourage decent work in all the production of textile and clothing items (ASSOCIAÇÃO BRASILEIRA DO VAREJO TÊXTIL, 2020).

In 2020, the organization also obtained the Chico Mendes Seal, valid for the year mentioned. This Green Seal, linked to the Certification Program for The Commitment to Social and Environmental Responsibility, is granted to companies that guarantee sustainability in all businesses, proving to its partners the pro-environmental actions, social justice, and economic viability (INSTITUTO CHICO MENDES, 2020).

In addition, the company values suppliers who are members of the Better Cotton Initiative (BCI) program, which aims to improve global standards of cotton production by producers for the environment and the future. BCI is a non-profit organization with the world's most extensive cotton sustainability program, ranging from building farms to clothing and textile brands, as well as civil society organizations (BETTER COTTON INITIATIVE, 2020).

However, it is essential to highlight that the cotton of the BCI initiative has no guarantees of being sustainable or even being the best option. An example of this is that although Brazil is the largest source of BCI, its national production of cotton requires the greatest application of agrochemicals per hectare in the world (KASSATLY, 2020), besides it being the fourth crop in the country that consumes these substances the most (BOMBARDI, 2017).

These chemicals used in cotton cultivation (from 7 to 10 different types) have several harmful effects on human health besides being environmentally persistent (PAUNONEN, 2019; TOOGE, 2019). And in the case of Brazil, the problem is even more severe considering that in the last four years, more than 1,500 new ingredients have been approved, many of them banned in Europe and the United States due to their toxicity (MODELLI; WELLE, 2022). In addition, the latter was marked by the movement for the approval of PL 6299/02, known as the Poison PL, which seeks to make the approval of new agrochemicals more flexible.

Thus, the importance of BCI is understood, but the initiative is not the best solution, or even a sustainable solution to mitigate the impacts generated on clothing production.

Despite this problem related to the intensive use of agrochemicals, the company is concerned with the materials used in the jeans production process, such as in the laundry stage.

In this sense, they choose to have as suppliers companies with ZDHC (Zero Discharge of Harzardous Chemicals*) certification*, which aims to use materials not harmful to human health and the environment, through a list of prohibited substances, such as heavy metals, phthalates, and nonylphenols.

It is also evident that it is possible to implement more sustainable practices in the dyeing process by using natural dyes, free of chemicals, which require less water and energy and reduce risks to human health and the environment. In addition to the environmental viability due to the reduction of chemical products, natural dyes can produce several colors with a single raw material, reducing the cost of materials and also ensuring greater ease in the execution of processes (PAUL, 2015; PISITAK *et al*., 2018; NARIMATSU *et al*., 2020). One innovation in the *market is Advanced Denim*, which dyes the jeans completely without the use of indigo dye, consuming less water without the generation of effluents (PAL *et al*., 2017).

The company also values monitoring the entire life cycle of suppliers and partners to prioritize raw materials with better efficiency. Thus, it is increasingly looking for organizations with smaller water footprints, better energy efficiencies, and minimum use of chemicals in production. This initiative is significant, considering the high polluting potential of jeans production (AMUTHA, 2017).

3.4 Social projects

Although pro-environmental initiatives have emerged, primarily due to the laws and norms imposed on the company, from the beginning, several social projects were developed and supported to generate income for the community in socioeconomic vulnerability.

Among the various initiatives is the Recicla Jeans Project, which aims to support social projects and companies that use textile waste as raw material for developing products through upcycling, recycling, and handicrafts. In this project, several institutions that receive textile waste, lines, and products that do not pass through the company's quality control are registered.

Another relevant point is the conduct of training the external community in the creation of new products with added value from industrial waste. Thus, the company has as an alternative action to the disposal of waste in industrial landfill, the donation for the development of new products and income generation.

Thus, the commitment made by the company voluntarily to the community is characterized as a practice of environmental and social responsibility (ESR). For projects to be identified as ESR initiatives, they must be executed with the company's activities spontaneously, that is, without legal obligation, and with the goal to preserve the environment and surrounding communities, ensuring the well-being of the whole society (GURGEL; ALMEIDA, 2018).

Considering the scenario of the informality of work in the textile and clothing industries, combined with poor working and living conditions, the importance of this project is observed in promoting income generation for the external community, thus addressing the social aspect of the triad of sustainable development (BRAGA; ABREU, 2017).

However, as much as it is a well-structured and consolidated project within the company, management, sewists, and stylists participate effectively. Thus, it is not tied to organizational culture, considering it does not yet extend to other sectors. According to Gurgel and Almeida (2018), ESR should not be the initiative of a few individuals, even if it is directed by

the owner of the company themself, as is the case. Thus, it is suggested that ESR be part of the organizational policy, involving all employees and not just part of them.

3.5 Internal training and dissemination of sustainable practices

As mentioned, participation in the organization's social and environmental projects, such as Recicla Jeans, is still limited to a few employees. In this situation, the company seeks to update in the coming years to involve more sectors and employees in existing projects and develop new activities. After almost 20 years of the company's operation, two years ago, it began the process of documenting the consolidated programs internally, as well as the dissemination through the official website of the organization.

The dissemination of project information online has become more appropriate as customers (magazines and retailers) have shown interest in selling more sustainable apparel products. Thus, with transparency in disclosure, in addition to winning customers concerned with environmental issues, the company offers possibilities for a clothing production sector that seeks to mitigate ecological damage (NIINIMÄKI, 2013).

Moreover, it becomes an instrument of environmental education, considering that it can make industries aware of the possible impacts generated on the environment, besides assisting other companies in developing environmentally friendly practices. In this sense, the information disclosed should be relevant and honest, enabling a dialogue between suppliers and customers and forming partnerships to propose new solutions focused on sustainability in the sector (PADILHA *et al*., 2009).

Another significant aspect is that disseminating the company's sustainable practices can contribute to developing an awareness of environmental conservation in consumers and promoting new consumption habits, moving in the opposite direction of mass communication that promotes unsustainable lifestyles (SEQUINEL; CARON, 2010).

According to the manager, this initiative is highly appropriate since many customers still opt for items produced in standard processes and are not sustainable[2]:

> So, even though I have the option of making sustainable pants, I will also have one that has the chemical. And I'm going to have these two options because the company's not going to be green. I will have sustainable production and a sustainable product. If you want to make pants that use different chemicals, which will make a plastic paint or a wash with permanganate or chlorine, I also have this option to sell, and today this is what sells. So I still can't turn the company into an ideal company ([2]Interview granted by R. L. Interview I. [Dec. 2020]. Maringá, 2020. File .mp3 (50 min. 13s.).

Regarding internal awareness, there is the development of projects for training employees in 2021, aimed at the exposition of information about the importance of separating solid waste for conservation of the environment. Notably, this action is fundamental, considering that companies' difficulties in mitigating impacts on nature lie in the lack of an environmental management system that includes permanent employee training (PADILHA *et al*., 2009). Developing an ecological plan is insufficient to achieve sustainable goals if the organization is not fully involved (SCHENINI, 2000).

In addition to pro-environmental initiatives, the company needs to focus on managing employees' ecological behaviors so that all sectors understand environmental management

processes and have a sense of responsibility and belonging (BOLZAN DE CAMPOS; GURGEL, 2012; SILVA; MARTINS, 2017).

Silva and Martins (2017) stated that without everyone's commitment, the company focuses only on solving the problem at the end of the process, performing the segregation and disposal of waste, without improving the efficiency and effectiveness from the beginning in the design of products.

Thus, the importance of an environmental education program (EE) within organizations is emphasized so that all employees are trained and develop awareness about the need for ecological conservation, which directly influences the individual engagement and performance of the company. Thus, the authors highlighted some requirements that should be addressed in an EE program based on the NBR ISO 14001/2004 standard, which presents the specifications and guidelines for implementing Environmental Management Systems. Among the requirements are environmental policy; environmental aspects; legal and other conditions; objectives, goals, and programs; competence, training, and awareness; communication; operational control; preparation for the emergency response; monitoring and measurement; and non-compliance, corrective, and preventive action (SILVA; MARTINS, 2017).

Given the above, it is understood that although the company fosters several initiatives towards sustainability, it remains with an approach of pollution control, according to Barbieri (2016), taking into account that it maintains a focus on specific solutions, compliance with the law and management at the end of the process, instead of seeking a reduction of impacts at the source.

CONCLUSION

Considering the current scenario of the jeans market, which is constantly growing, it is inferred that industries restructure processes throughout the production chain, reevaluate raw materials and propose new measures to mitigate the environmental and social damage caused by the production of clothing items.

Through research in the literature, documentary analysis, and semi-structured interviews, the objective of this study was achieved, considering the possibilities presented to be implemented in industries of the jeans production chain to reduce environmental damage. The initiatives evidenced can adapt to the reality of several organizations in this segment to become a reference in ecological damage mitigation solutions.

Based on the company analysis, it is verified that despite the focus on pollution control, many positive initiatives stand out, which in some way mitigate the environmental impacts generated by the production of jeans. However, it is essential to show that the organization has many mechanisms and paths to evolve towards policies of pollution prevention, or even a strategic approach. For this, it is suggested that the company evaluate more critically the actions such as carbon neutrality and BCI cotton, which may seem like great solutions if observed superficially, but which may present themselves as greenwashing practices. In addition, it is advisable to implement a certified environmental management system, which will ensure better results in the management of processes for the implementation of more sustainable practices.

Examining the results, information is evidenced, which, to a lesser or greater degree, can help garment industry professionals make strategic decisions to make organizations more

sustainable. Moreover, it is considered that the findings can contribute to achieving the Sustainable Development Goals, such as SDGs 9, 12, 13, 14, 15, and 17.

For future studies, it is suggested that the environmental management strategies of other industries in the jeans production chain that perform different functions of the analyzed company, such as laundries, be evaluated to obtain an overview of the sustainable practices effectively employed in each sector.

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