SOLID WASTE MANAGEMENT FROM CLOTHING INSTALLED AT MODA CENTER SANTA CRUZ

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ABSTRACT

Purpose: This research aimed to diagnose the solid waste management carried out in companies that operate at Moda Center Santa Cruz and the research question was: How does solid waste management from clothing installed at Moda Center Santa Cruz occurs?

Theoretical framework: Theoretical aspects related to clusters, externalities, waste management and public policies about solid waste management were considered.

Method/design/approach: This research is classified as qualitative, with an exploratory and descriptive objective. A questionnaire was used to collect information; 208 company managers contributed as respondents to this research.

Results and conclusion: Regarding solid waste management practices identified in the companies of the Moda Center Santa Cruz, the separation practices and destination of solid waste generated by clothing were verified. The solid waste found to a greater extent by clothing is knitted and fabric waste. The management of these materials occurs in a limited way, requiring expansion of activities related to waste management. In addition, companies have little knowledge about public solid waste management policies.

Research implications: Due to the application of this research having been carried out at the Moda Center Santa Cruz, its character as a contributor to the expansion of knowledge regarding the management of solid waste from clothing installed at Moda Center.

Originality/value: With this research, is possible to understand the need to expand the debate and articulation of knowledge, referring to the management of solid waste from clothing by companies that operate in the sector.

Keywords: Solid Waste Management, Clothing, Moda Center Santa Cruz, Clothing Solid Waste.

O GERENCIAMENTO DE RESÍDUOS SÓLIDOS DE CONFECÇÕES INSTALADAS NO MODA CENTER SANTA CRUZ

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RESUMO

Objetivo: O objetivo desta pesquisa foi diagnosticar o gerenciamento de resíduos sólidos realizado nas empresas que atuam no Moda Center Santa Cruz e a pergunta de pesquisa foi: Como ocorre o gerenciamento de resíduos sólidos de confecções instaladas nesse espaço econômico?

Referencial teórico: Foram considerados aspectos teóricos referentes à cluster, externalidades, gerenciamento de resíduos e políticas públicas sobre gestão de resíduos sólidos.

Método: Essa pesquisa classifica-se como qualitativa, com objetivo exploratório e descritivo. Foi utilizado um questionário para levantamento de informações, onde 208 gestores de empresas contribuíram enquanto respondentes desta pesquisa.

Resultados e conclusão: Sobre as práticas de gerenciamento de resíduos sólidos identificadas nas empresas de confecções, foram verificadas as práticas de separação e a destinação dos resíduos sólidos gerados. Os resíduos sólidos verificados em maior amplitude pelas confecções são os resíduos de malha e tecido. O gerenciamento desses materiais no local ocorre de maneira limitada, necessitando da ampliação de atividades referentes aos resíduos. Além disso, as empresas possuem pouco conhecimento sobre as políticas públicas de gestão de resíduos sólidos.

Implicações da pesquisa: Por essa pesquisa ter sido aplicada no Moda Center Santa Cruz, se destaca seu caráter contribuinte para a ampliação do conhecimento referente ao gerenciamento de resíduos sólidos das produções de confecções que funcionam no local.

Originalidade/valor: Com este trabalho compreende-se a necessidade de ampliação de debate e articulação de saberes, referentes ao gerenciamento de resíduos sólidos de confecções por empresas que atuam no Agreste de Pernambuco.

Palavras-chave: Gerenciamento de Resíduos Sólidos, Confecções, Moda Center Santa Cruz, Resíduos Sólidos de Confecções.

1 INTRODUCTION

Solid waste generation is an action related to the economic development of nations, because the more developed a country or a region, the more solid waste is generated (Kaza, Yao, Bhada-Tata & Van Woerden, 2018). This problem becomes more evident with the productive indices each time a country or city becomes more prosperous (Kaza et al., 2018).

In this context, waste management should occur as a response to the generation of these materials (Brazil, 2010), and brings together management activities such as collection, segregation, handling, storage, conditioning, transportation, minimization, reuse, treatment, recycling and final disposal (Philippi Jr., Romério & Bruna, 2004).

Among the types of solid waste, industrial waste can represent a volume 18 (eighteen) times greater than the municipal solid waste generated in the world (Kaza et al., 2018). Waste from the garment industry can degrade the natural environment in extreme ways when not properly treated. Therefore, it is worth highlighting that these materials need conscious handling (Pinheiro & De Francisco, 2016) and that involves aspects of social and environmental responsibility (Yacout & Hassouna, 2016).

According to the National Solid Waste Policy, integrated solid waste management is understood as the "set of actions aimed at finding solutions for solid waste, in order to consider
the political, economic, environmental, cultural and social dimensions, with social control and under the premise of sustainable development" (Brazil, 2010).

Thus, we realize that the National Policy on Solid Waste is a law that establishes the conditions for the management and management of solid waste in the Brazilian territory (Brazil, 2010). And among the various types of waste, those of confectionery are configured as materials of great complexity, due to their composition (Linke, 2017).

The confection cluster of the Northern Agreste of Pernambuco is an economic and territorial cluster of significant scope, reaching intense division of work and manufacturing production in the municipalities around Santa Cruz do Capibaribe and some cities of Paraiba, with influence even in Alagoas (Santos & Nascimento, 2017).

Accordingly, this work was developed as a proposal for expanding the conditions of knowledge and understanding, about how the management of solid waste of confections of the companies that work at the Moda Center Santa Cruz, due to the importance that the industrial activity of production of confections has for the city of Santa Cruz do Capibaribe, in Pernambuco.

In light of the above, the objective of this research was to diagnose the solid waste management in clothing companies operating in the Moda Center Santa Cruz and the research question was: How does the solid waste management of the confections installed in the Moda Center Santa Cruz?

Thus, this work is justified based on the scientific relevance that has emerged in the study of garment residues, due to the volume of production of these materials that does not receive adequate management.

This article is structured as follows: Section 1 presents the introduction of the article, Section 2 highlights the theoretical framework applied in the work, Section 3 has the methodology employed, Section 4 brings together the main results identified with the work and discussion and finally Section 5 presents the final considerations.

2 THEORETICAL FRAME

This work is grounded in the theoretical perspective of cluster, externalities, solid waste management and normative aspects about solid waste, which are integrated knowledge and necessary for the foundation and achievement of the objective of this work, that is, are important theoretical aspects for academic articulation regarding the diagnosis of solid waste management.

2.1 Cluster

Early ideas about industrial districts influenced the cluster perspectives. According to Alfred Marshall, industrial districts are characterized from the agglomeration of different industries in the same locality, in order to achieve their particular goals (Marshall, 1996).

Furthermore, the existence of clusters of companies in a given locality and which characterize the industrial district is based on two conditions: local supply and general demand conditions (Becattini, 2002).

From this, the cluster understandings that exist in the literature and are gathered in Table 1 below were idealized.

<table>
<thead>
<tr>
<th>Theorists</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marshall (1996)</td>
<td>Industrial districts are grounded in cooperation between companies, so that they can achieve their particular goals. That is why the concentration of</td>
</tr>
</tbody>
</table>
Knowledge, skills and know-how are outstanding features in an industrial district.

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Becattini (2002);</td>
<td>Industrial districts are territorial productive complexes that bring together economic, political and social actors.</td>
</tr>
<tr>
<td>Porter (1998)</td>
<td>Cluster is a concentration of companies and institutions in a given geographical space and competition presents itself as an outstanding feature among companies.</td>
</tr>
<tr>
<td>Britto &amp; Albuquerque (2001)</td>
<td>There are three groups of characterization of the clusters, considering the productive processes, which would be: technology companies; productive systems of machinery, automobiles and equipment; and traditional sectors.</td>
</tr>
<tr>
<td>Macedo, Martins, Rossoni &amp; Martins (2017)</td>
<td>Clusters are characterized by competitive and collaborative relationships between companies.</td>
</tr>
<tr>
<td>Oliveira &amp; Ramos (2018)</td>
<td>The clusters make it possible for companies to have access to several benefits, such as: the dissemination of new technologies, investments in training and in the improvement of the workforce, the sharing of infrastructure and of the logistics systems, and prospecting markets for the products.</td>
</tr>
<tr>
<td>Francisco, Pinto &amp; Botter (2021)</td>
<td>The clusters concentrate companies from the same sector, located in a close geographical area and with formal or informal relationships between them.</td>
</tr>
</tbody>
</table>

Source: Author (2022)

Considering these concepts, it is possible to understand that the ideas in relation to clustering have undergone transformations over the years, according to the conditions associated with industrial district and which served as a reference for the construction of a cluster. It was also started to observe the impacts that the conception of a cluster has in a locality, such as cooperation between companies, competition, technological development, improvement of commercial relations, among others.

### 2.2 Externality

According to Mankiw (2014), the definition of externality is related to the negative and positive impacts resulting from transactions that may cause interference to the lives of other individuals who do not participate in the transactions.

Pigou (1920) presents some of the initial ideas on externalities, when he associates the liability for compensation that polluting companies need to possess in the face of the damage caused to third parties. The government's role in this situation would be of particular importance, since it could attribute to polluting institutions a tax that would correspond to the effect of the negative impacts of companies on society. However, in situations of positive externalities, according to Pigou (1920), the government could subsidize the companies involved to the same level of benefits generated.

Starting from a different approach, Coase (1960) stresses that externalities need to be considered by both the state and the companies involved in processes that generate externalities, based on negotiations between those involved.

According to Souza (2010), negative externalities can cause a series of environmental harm. Among the environmental impacts resulting from industrial production processes, the following stand out: solid waste, effluents, bad odor and noise (Souza, 2010). These impacts are described by Santos and Cardoso (2021), when they point to the relevance and need to achieve a reduction of negative externalities, due to the impacts they can cause to human life, the environment and the generation of solid waste.

In this scenario, the management of solid waste generated by society today is a necessary action (Mansano & Souza, 2010), due to the negative effects that externalities can cause, such as the accumulation and complexity of the solid waste generated. The accumulation of solid waste is associated with the generation and lack of management of these materials, while the
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complexity of the waste refers to the types of solid waste resulting from the production. Thus, the needs for correcting negative externalities are expressed, starting from the development of activities that can minimize the impacts of waste on society.

2.3 Solid Waste Management

Solid waste management is understood as the set of activities directed towards the solutions of the waste that is generated (Brazil, 2010). And so, it is understood that waste management needs to happen due to the generation of these materials coming from the activities carried out by human beings.

Solid waste management is also identified as the proposal and definition of a set of actions, be they regulatory, financial, operational and planning, that aim at solid waste management, and involve: collection, segregation, handling, storage, conditioning, transportation, minimization, reuse, treatment, recycling and final disposal of solid waste (Philippi Jr. et al., 2004).

As in other processing processes, the generation of solid waste is an activity that cannot be avoided in the production processes of apparel. When carried out, separation and proper disposal of solid waste can have positive impacts on environmental conditions. But beyond that, civil society is also benefited, due to the control of solid waste management. Under these conditions, the importance attributed to the separation and disposal stages of solid waste within waste management becomes evident (Machado & Henkes, 2016).

However, Silva and Oliveira (2018) express that there are a number of solid waste generated due to the activities of the clothing sector, in addition to tissue waste. In view of this, solid waste from confectionery requires the application of management processes, because of the impacts they may present (Berlin, 2014). This is related to the volume of waste generated by the clothing sector, which annually accumulates around 92 million tons (Niinimäki, Peters, Dahlbo, Perry, Rissanen, & Gwilt, 2020).

Corroborating this understanding, Linke (2017) reports that, in addition to the fabrics for making garments, the industry uses flyings made with different raw materials (metal, plastic) for application in the developed products. Thus, it can be seen that the productive activities of the clothing sector generate different solid waste, due to the productive stages that are adopted (Silva & Oliveira, 2018).

On garment waste, Berlin (2014) stresses that solid waste from this sector can find a market for reapplication, as it can be transformed into tow, pillow fillers, duvets, stuffed animals, among other products. These are practices related to the circular economy, based on the processes of reuse and recycling, which are considered as alternatives that can be incorporated into waste management by the National Policy on Solid Waste (Brazil, 2010), a law that presents the legal foundations of Brazil as to the waste produced nationally.

In the context of the application of these materials in processes related to the circular economy, many benefits can be achieved due to the optimized and conscious use of materials from this economic model, which aims at eliminating losses in production cycles (Kuzma & Sehnem, 2022).

Countries in Asia and Europe have technologies embedded in the manufacturing processes of the clothing industries that make it possible to generate thermal energy from the waste generated by the companies themselves (Dissanayake et al., 2018; Nunes et al., 2018). As for the application of garment residues in innovation-related activities, it is noted that these materials have been incorporated into construction procedures, as well as leaching and dissolution processes (Echeverria, Handoko, Pahlevani, & Sahajwalla, 2019; Yousef, Tatariants, Tichonovas, Sarwar, Jonuākienė, & Kliuncininkas, 2019).

Thus, every application of solid waste management by clothing companies can result in industrial advantages, when considering the various activities that can direct towards the
application of the waste of clothing in processes that aim at competitive advantage and wide market performance.

2.4 Public Policies On Solid Waste

According to the National Policy of Solid Waste, it is understood as solid waste: materials, elements or artifacts that may be derived from activities carried out by individuals in society and that have impracticability of immediate disposal in the sewage network, because they present conditions of service in other productive processes and that need some technical or financial application for them to be allocated in new activities (Brazil, 2010).

More specifically, industrial solid waste is obtained from the production processes developed in industrial facilities (Brazil, 2010). In this context, solid waste from the clothing industries stands out due to the characteristics they may present, as they are obtained from activities characterized by their potentially polluting conditions (Brazil, 1981). And because of this, attention is paid to the processes for managing solid waste from garments.

Another prominent normative tool on solid waste is the National Solid Waste Plan (Brazil, 2022). This document, which was constructed in conjunction with the population and sectors that are experts in the debate on solid waste, highlights the associated circumstances for minimizing waste in the environment and the practices employed for managing these materials (Brazil, 2022).

In circumstances at the state level, the State Solid Waste Policy of Pernambuco characterizes solid waste as: "material, substance, object or well discarded resulting from human activities in society, to whose final destination it is obliged to proceed, in solid or semi-solid state, as well as gases contained in containers and liquids" (ALEPE, 2010).

Another normative instrument that exists in Pernambuco and that deals with solid waste is the State Solid Waste Plan of Pernambuco (SEMAS, 2012). This document contains all the "guidelines, strategies, targets, programs and projects, capable of subsidizing the management of solid waste in the state" of Pernambuco (SEMAS, 2012 p.09). And among the development regions, the North Agreste brings together 19 (nineteen) municipalities, including Santa Cruz do Capibaribe, a city that has a prominent in the commercialization of clothing artifacts and that has the Moda Center installed.

About this municipality, there is a solid waste plan that was built together with other cities located in the Agreste of Pernambuco and with those located on the border of Paraíba. The Intermunicipal Solid Waste Plan prepared by the Public Consortium of Agreste Pernambucano e Fronteiras (CONIAPE, 2016), deals with solid waste management in the municipalities of: Bom Jardim, Brejo da Madre de Deus, Casinhas, Frei Miguelinho, João Alfredo, Orobó, Riacho das Almas, Santa Cruz do Capibaribe, Santa Maria do Cambucá, São Caetano, Surubim, Taquaritinga do Norte, Toritama and Vertente do Lério.

By considering these national, state and local normative aspects on solid waste, it is possible to understand the importance of the management of these materials for society. And from this are evidenced the needs of waste management practices, to minimize the impacts arising from the poor application of these wastes by the garment companies.

3 METHOD

This study is characterized as applied research, with a qualitative approach. As for the objective, it is exploratory and descriptive research. It is exploratory because it deals with the management of garment waste in Pernambuco. It is descriptive because it describes the characteristics and phenomena of a population (Silva & Menezes, 2005; Creswell & Creswell, 2021; Richardson, 2012).
The clothing companies that act and manufacture parts in the clothing cluster of the state of Pernambuco carry out the commercial activities of clothing artifacts in the Moda Center Santa Cruz, which is a prominent shopping center installed in the city of Santa Cruz do Capibaribe, located in Agreste de Pernambuco, Brazil.

At the Moda Center Santa Cruz (Figure 1) are gathered around 9,624 boxes where 707 stores work, according to Santos and Nascimento (2017). At this location, the respondents of the questionnaire developed for this research were contacted, using an approach carried out on site with the support of the management of Moda Center Santa Cruz.

In this way, questionnaires were applied for data collection on weekends in the first half of November 2021. These days were chosen strategically, because the Moda Center's sales and trading activities take place with greater intensity on weekends. For this reason, a greater number of companies working in the Moda Center were reached on the days on which the research was applied.

Prior to the application of the questionnaires, all participants were directed to collaborate in this research, and were informed that the respondents or companies would not be identified, being protected the particular information of the companies or individuals who responded. Thus, 208 questionnaires were applied and used in this work.

Data analyzes were carried out from scientific studies and descriptive statistics. The analyzes conducted demonstrated aspects referring to the information collected with the field research. The aim was to highlight the ideas regarding the management practices adopted by the companies installed at the Moda Center Santa Cruz and information regarding the generation of the garment waste.

In this way, the activities carried out in relation to the solid waste generated by the confectionery, the destinations applied to the waste resulting from the confectionery activities,
the types of waste that are left over from the production of artifacts, and the knowledge regarding public policies by the confectionery companies operating at the study site were verified.

4 RESULTS AND DISCUSSIONS

Among the management practices described by the survey respondents, it was observed that separation and disposal are the steps understood as intrinsic to the production process, as they occur in the productive environment.

Separation of waste is an alternative put forward using different sites for each type of solid waste generated. And the non-separation of waste, is also an alternative raised by the respondents. Similarly, a number of participants chose not to answer that question, and mention was made of the failure to implement the activity of separation of solid waste from clothing. Table 1 provides this information.

<table>
<thead>
<tr>
<th>Activity carried out with solid waste</th>
<th>Number of undertaking carrying out activity</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gathers all waste in one place</td>
<td>109</td>
<td>52.4%</td>
</tr>
<tr>
<td>Uses different locations for each type of waste</td>
<td>84</td>
<td>40.3%</td>
</tr>
<tr>
<td>Does not apply any activity</td>
<td>14</td>
<td>6.7%</td>
</tr>
<tr>
<td>Prefer not to answer</td>
<td>1</td>
<td>0.48%</td>
</tr>
</tbody>
</table>

Source: Author (2022)

A total of 109 (one hundred and nine) respondents said that in their companies the procedure adopted corresponds to: bringing all the waste together in one container. Another 84 (eighty-four) replied that they use different types of waste in their local packaging and sorting companies.

On the other hand, 14 (fourteen) participants mentioned that the process of separation and packaging of waste is an activity that does not exist in their companies and only one participant preferred not to respond.

Thus, it was observed that many respondents stated that their companies do not carry out the separation of solid waste, representing a failure in the waste management process on the part of these companies.

Araújo (2005) recital Philippi Jr. et al. (2004), points out that among the activities that belong to waste management, separation is one of which is based on regulatory, financial, operational and planning aspects, on the part of industries.

Silva (2018) points out that the adoption of practices and tools that can reduce environmental impacts is a positive aspect for the market. Thus, it is understood that the separation activity can be favorable for circumstances of waste control and decrease of environmental impacts.

However, as can be seen, the reality of the garment companies that are part of the cluster shows precariousness in relation to the process of separation of solid waste, demonstrating a fault existing among many factories.

Another step of waste management verified was disposal. This is an important practice in materials management, as it directly interferes with the conditions of possible applications of waste in new production cycles or activities of economic significance for the clothing sector and the people who depend on this sector. For the disposal of a material can directly interfere with the cycle of use that this product can present, as well as with new activities that can be developed.
With the application of the questionnaire, 11 (eleven) different disposal possibilities were diagnosed, as shown in Table 2. Of this total, there are some related activities due to the mutual application of solid waste for various purposes.

**Table 2 - Destination of solid waste**

<table>
<thead>
<tr>
<th>Destination of solid waste</th>
<th>Number of undertaking carrying out activity</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trash truck</td>
<td>79</td>
<td>37.9%</td>
</tr>
<tr>
<td>Donate</td>
<td>51</td>
<td>24.5%</td>
</tr>
<tr>
<td>Sells</td>
<td>26</td>
<td>12.5%</td>
</tr>
<tr>
<td>Forwards to pickers</td>
<td>18</td>
<td>8.6%</td>
</tr>
<tr>
<td>Not applicable</td>
<td>9</td>
<td>4.3%</td>
</tr>
<tr>
<td>Trash truck + other activity</td>
<td>7</td>
<td>3.3%</td>
</tr>
<tr>
<td>Reuses</td>
<td>7</td>
<td>3.3%</td>
</tr>
<tr>
<td>Burns</td>
<td>3</td>
<td>1.4%</td>
</tr>
<tr>
<td>Forwards to pickers + other activity</td>
<td>2</td>
<td>0.96%</td>
</tr>
<tr>
<td>Make donation + other activity</td>
<td>2</td>
<td>0.96%</td>
</tr>
<tr>
<td>You don't know</td>
<td>2</td>
<td>0.96%</td>
</tr>
<tr>
<td>Burn + other activity</td>
<td>1</td>
<td>0.48%</td>
</tr>
<tr>
<td>Prefer not to answer</td>
<td>1</td>
<td>0.48%</td>
</tr>
</tbody>
</table>

Source: Author (2022)

Of the 208 (two hundred and eight) respondents, forwarding to garbage trucks, selling, donating and forwarding these materials to solid waste picker organizations, it was found that these are the most outstanding options.

It was found that 79 (seventy-nine) sample representatives dispose in the garbage truck along with household waste. Fifty-one (51) other participants donate these materials to people from the civil society of Santa Cruz do Capibaribe, who can earn income from the use of these materials. Among the participants, 26 (twenty-six) respondents mentioned that they carry out the sale for bushing industries, and another 18 (eighteen) participants mentioned that they forward to waste pickers and identify this as an alternative disposal of these materials.

Today, it is already established that garment waste can be reused, and directed to the development of new products (Berlin, 2014), or even more complex forms of reuse, such as alternatives to power generation (Dissanayake, Weerasinghe & Wijesinghe, 2018; Nunes, Godina, Matias & Cataldo, 2018).

However, even with technological advances and innovations related to the disposal of waste clothing, the reality of the companies that were represented in the research shows that the processes of conscious disposal in the region of Santa Cruz do Capibaribe are not carried out or recognized by the factories.

As total waste disposal during production is unfeasible (Silva, Souza & Silva, 2018), the correct separation and disposal of solid waste must be carried out.

However, in the companies that operate in the Moda Center, the activities that are linked to disposal demonstrate the need for structuring the sector. In addition, there is a lack of coordination between activities that can better justify the disposal of waste. This fact can be contemplated in the statements of Correia, Forno, Marangoni and Valle (2018), when they point out that the activities of the management of waste of clothing can favor the development of new jobs.

This is a positive aspect, if carried out among the garment companies, because waste management activities can be stimulated that underpin the relations between the garments, exalting a common characteristic in the **productive clusters**, which is cooperation (Oliveira & Ramos, 2018). In addition, the association of companies of the same segment can generate...
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mutual benefits for all involved, since "the collective good of a society" can be reached (Liberato, 2016).

On the types of waste, it has been found that there is a diversity of materials that can be considered as solid waste from garments. However, starting from the consideration of the types of materials mentioned as waste by the respondents of the research, it was observed that, in the majority of cases, the materials that result from the applications in the production of artifacts for marketing are understood as waste from confections.

However, the activities of the garment sector begin with the planning of the parts that can be marketed in a given season. These practices involve the participation of different professionals and the demand for different raw materials.

Especially during the cutting and sewing stages, fabrics and knitwear, which are the most characteristic materials of a garment, are used more intensively. It is precisely at these stages that the pieces start to gain identity, by joining together the parts of the cut tissue. But the fact is that, besides the observation and consideration of important materials, it is up to the reflection on everything that is waste, but not always recognized as waste from confection.

Table 3 shows the types of solid residues observed by the participants in the study. Many respondents directed their responses to materials needed for direct production of the parts. However, there are various materials that may be the result of making, such as needle metal and parts of machines, leftover trim and even other important materials in production, such as papers.

Table 3 - Solid waste types

<table>
<thead>
<tr>
<th>Solid Waste</th>
<th>Identified frequency of residues</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mesh</td>
<td>59</td>
<td>28.3%</td>
</tr>
<tr>
<td>Fabric</td>
<td>59</td>
<td>28.3%</td>
</tr>
<tr>
<td>Line + other material</td>
<td>26</td>
<td>12.5%</td>
</tr>
<tr>
<td>Mesh + other material</td>
<td>21</td>
<td>10.04%</td>
</tr>
<tr>
<td>Fabric + other material</td>
<td>21</td>
<td>10.04%</td>
</tr>
<tr>
<td>Jeans</td>
<td>8</td>
<td>3.8%</td>
</tr>
<tr>
<td>Row</td>
<td>4</td>
<td>1.9%</td>
</tr>
<tr>
<td>You don't know</td>
<td>3</td>
<td>1.4%</td>
</tr>
<tr>
<td>Plastic</td>
<td>2</td>
<td>0.96%</td>
</tr>
<tr>
<td>Income</td>
<td>2</td>
<td>0.96%</td>
</tr>
<tr>
<td>Miscellaneous remaining</td>
<td>1</td>
<td>0.48%</td>
</tr>
<tr>
<td>Aviation</td>
<td>1</td>
<td>0.48%</td>
</tr>
<tr>
<td>Velvet couch</td>
<td>1</td>
<td>0.48%</td>
</tr>
</tbody>
</table>

Source: Author (2022)

In addition to the residues of materials needed directly for production, it is noted that these materials are associated with other materials. As for example, 59 (fifty-nine) respondents reported identifying the solid mesh residue, another 59 (fifty-nine) mentioned the tissue as the main waste generated. In addition, 26 (twenty-six) respondents cited the association of the line with other materials, 21 (twenty-one) participants also noted emphasis on the association of mesh with other inputs, and another 21 (twenty-one) respondents mentioned the relationship of tissue with other materials. Conversely, materials such as plastic (2), lace (2), flats (1) and jeans (8) were recorded with lower numbers.

Thus, it has been established that the type of solid waste generated by the production of garments requires the use of a variety of materials in view of the different stages that are part of the production process. It is precisely this fact that raises controversy about the understanding of solid waste from clothing industries working on the development of clothing artifacts.
Among the types of solid waste identified by Silva and Oliveira (2018) during the activities of confectionery, are highlighted: flaps, thread, plastic, paper and metals. Already Silva, Souza e Silva (2018) describe that the waste produced in clothing apparel are:

‘paper, plastic, leftovers, pots, fabric scraps, fabric scraps, trim packaging, overflowing burrs, line leftovers, yarn, tow and oil, cardboard reels, A4 paper, modeling papers, cutting papers, plastic reels of thread and yarn, broken machine needles, cardboard boxes and defective parts that cannot be marketed’.

Due to this diversity, the need for management of these materials is once again addressed, as described by Berlin (2014). When unmanaged, waste can have an impact on the environment of the region and on people living there, highlighting the negative externalities associated with the waste generated and the lack of conscious management practices, as mentioned by Souza (2010) and Santos and Cardoso (2021). Despite this, it was noted that materials such as paper and plastics are not considered as waste from clothing. This fact demonstrates a contradiction between the perception of the respondents of the survey, with other realities identified in the literature, as demonstrated by Linke (2017), Silva e Oliveira (2018) and Souza e Silva (2018).

About the companies that work in Moda Center, the site presents not so efficient management practices, because what is observed is the elimination or non-existence of some processes (Melo & Menezes, 2019). Information collected with field research has shown that management steps do not always occur on-site. At times, the waste from the confections does not go through separation according to the type of the residue, or directing them towards processes of reuse and reuse. However, at other times, indirectly, these materials are collected by the pickers of recyclable products, who direct the waste to the bushing factories, where they sell the flaps. These facts also make evident negative and positive externalities observed with practices related to waste management.

Another point identified is the provision of solid waste donations to people without income. For this way, families can sell this material or develop other products, which start to be marketed. Thus making it possible for families to access income.

It was also noticed that, in contrast, attention is paid to the environmental and waste management conditions on the part of entrepreneurs who are beginning to identify a niche market, directed towards the sale of materials that were previously regarded as common garbage.

As for the knowledge concerning public policies that deal with solid waste, it was verified that a good part of the participants do not have knowledge about the existence of laws and normative instruments on waste management. With Table 4, the answers obtained when asked to the participants in the survey about public policies that discuss solid residues can be verified.

<table>
<thead>
<tr>
<th>Regulatory Aspects Relating to Solid Waste</th>
<th>Quantity of Replies Received</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the company follow any laws or norms?</td>
<td>197 (No) 7 (Yes) 4 (Prefer not to respond)</td>
</tr>
<tr>
<td>Does the company know about the National Policy on Solid Waste?</td>
<td>181 (No) 27 (Yes) 0 (Prefer not to respond)</td>
</tr>
</tbody>
</table>
Does the company know about the National Solid Waste Plan?  
195 (No)  
13 (Yes)  
0 (Prefer not to respond)

Does the company know about the State Solid Waste Plan?  
201 (No)  
7 (Yes)  
0 (Prefer not to respond)

Is the company aware of the Intermunicipal Solid Waste Plan of the municipalities located on the border of Paraíba and Agreste of Pernambuco?  
202 (No)  
6 (Yes)  
0 (Prefer not to respond)

Source: Author (2022)

About the general political conditions of the clothing companies, about 197 (one hundred and ninety-seven) respondents stated that their companies do not follow rules and laws, demonstrating that out of the total of 208 (two hundred and eight), 94.7% of the clothing representatives stated that their companies do not follow any legal normative instrument.

As for the National Policy on Solid Waste (BRAZIL, 2010), 181 (one hundred and eighty-one) respondents said that their companies do not have knowledge about this policy instrument. Thus, of the total of 208 (two hundred and eight) confections questioned, 87% do not have notions about this law.

Correa, Sguarezi and Melo (2022) reiterate that actions for the consolidation of the National Policy on Solid Waste are essential, in the eyes of the public that can benefit from this public policy. Thus, the authors point to the relevance of the participation of the Public Prosecutor's Office in the activities related to this law, such as its dissemination.

On the other hand, about the National Solid Waste Plan (BRAZIL, 2022), 195 (one hundred and ninety-five - 93.8% of the total) replied that their companies do not present knowledge about this instrument.

About the State Solid Waste Plan of Pernambuco (SEMAS, 2012), 96.6% (201 - two hundred and one) stated that they do not have knowledge about the State Solid Waste Plan.

Dealing with the institutional reality of the Agreste of Pernambuco, about the Intermunicipal Plan of Solid Residues of the municipalities located on the border of Paraíba and Agreste of Pernambuco (CONIAPE, 2016), 97.1% pointed out ignorance about this document, characterizing a total of 202 (two hundred and two) confections represented.

Regarding the aspects that may interfere with the conditions established in the companies of a cluster, Prates, Magalhães, Prates and Avelino (2022) indicate that small companies suffer greater impact from regulatory and law aspects, as regards the implementation of environmental management systems, while large companies already have environmental initiatives instituted, due to competition interests. However, even with the existence of laws that deal with this subject, little knowledge was noted on the part of the clothing companies that act in the cluster of the Agreste of Pernambuco.

With this information, one can see that the clothing companies that took part in the research do not have structured knowledge referring to the public policies that deal with solid waste. This can be associated with the low identification of the types of waste that were mentioned by the research, as well as the waste management steps that are not followed. For these activities are articulated and justified from public policies that work waste in society and industry.

5 CONCLUSION

From this study, it is concluded that the separation and disposal of solid waste are stages of waste management that occur between the confections installed in the Moda Center Santa Cruz.
Cruz in a limited way and do not have scope coverage related to processes of solid waste management. If intensified, management practices may favor cooperation between clothing companies.

As for waste disposal, a considerable part of the waste produced by the garment industries is destined for landfills as household waste and is not disposed of as industrial waste, which can have environmental, economic and social impacts. Highlighting a negative externality observed due to the activities that are carried out today in the region.

Among the most commonly identified types of solid waste, knitted and woven waste are those highlighted by respondents in terms of volumes produced. However, materials such as plastic and paper are not considered in large proportion by the clothing companies as solid waste, demonstrating fragility in the design of these materials by the clothing companies of the confection cluster of Agreste de Pernambuco.

Thus, it was found that the research question assigned to the performance of this work was answered. However, the findings demonstrated that the management practices that take place are not favorable to the environmental and social conditions of the region, highlighting the weaknesses related to the activities employed by the companies of the sector in question.

Conducting research during months of COVID-19 pandemic occurrence has been a limitation faced, particularly with the application of questionnaires. As the clothing companies showed limited availability of activities, as well as the schedules for face-to-face visits during productive activities.

For future initiatives and research, the most in-depth quantification of the volume of solid waste generated by the clothing companies of the Agreste de Pernambuco, to verify the quantity of solid waste of confections generated, in a broader manner, is highlighted. As well as carrying out a mapping of the profile of the businessmen of the region, to identify the relationships that may exist between the experiences of these individuals and the applications directed towards the management of solid waste from apparel.

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Solid waste management from clothing installed at Moda Center Santa Cruz


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