

Sustainable Textile and Circular Economy: Paradigm Changing

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ABSTRACT

To address sustainability is to talk about empathy and exhaustible natural resources, i.e., to adhere to attitudes in the present that can avoid future scarcity. The more we consume, the more we produce. The more it is produced, the greater the negative impact on nature and the frequency of disposal, promoting damage to the soil and, consequently, to ourselves, one of the fast fashion problems. The circular economy is based on a sustainable attitude and the concept of the five R's: rethink, refuse, reduce, reuse and recycle materials and energy. The objective of the circular economy is, therefore, to promote socio-environmental responsibility actions among people, whether individuals or legal entities, understanding that nothing has a definitive end. Among the various R's of the circular economy, this research project focuses on recycling, which means reusing a product so that another object can be manufactured from it, such as the textile product. In this sense, several sustainable actions involving the circular economy have been taken by the regulatory bodies of the textile industry and by the fabric manufacturers themselves. The idea is to collaborate with the conception, structuring and execution of projects that aim to carry out ecologically correct activities. With the worsening of the environmental crisis and the urgent need to implement Sustainable Development, companies have felt greater pressure to integrate sustainability into their business, namely companies in the Textile and Clothing Industry, whose environmental and social impact is notorious. Although the value attributed to sustainable practices depends on the business model and vision of the companies, the textile industry is an industry in which sustainability is of special importance. From material selection to product disposal, the value chain has a significant environmental and social impact, namely related to: the use of toxic chemicals in the dyeing process; the high energy consumption and working conditions in the confection; the high amounts of greenhouse gases emitted in transport; in addition to the disposal of clothing in landfills and incineration. The main objective of this ongoing research project is to understand and to underline the importance of sustainability and the circular economy in textile production, as perceived by young designers and fashion students, as well as by consumers of recycled textile products. For this, a mixed methodology composed of literature review and survey was used. This paper presents the results achieved so far, which show awareness on the part of the different groups that took part in the study, but also the difficulties and challenges faced by the implementation of sustainable measures in the practice of recycling textile products.

Keywords: Sustainable textile, Circular economy, Textile waste, Slow fashion

INTRODUCTION

To talk about sustainability is to talk of empathy and exhaustible natural resources, that is, it is to adhere to attitudes in the present that can avoid future scarcity. The more you consume, the more you produce. The more it is produced, the greater the negative impact on nature and the frequency of disposal, promoting damage to the soil and, consequently, to ourselves, one of the evils of fast fashion.

It is urgent to reflect and act on the part of the main stakeholders in the textile and clothing area, with regard to sustainability and circularity.

Thus, this paper is part of the dissemination of an ongoing research project, whose main objective is to understand the importance of sustainability and the circular economy in textile production, perceived by designers and fashion students, as well as by consumers of recycled textile products.

Fundamental concepts within the scope of the problem are addressed and results of part of the work are presented, in which a mixed methodology was used consisting of literature review and two types of survey, by interview and by inquiry.

The results achieved so far not only are accord to the reviewed State of the Art, but also show awareness on the part of designers working in companies in the sector, but also the difficulties and challenges they face in implementing sustainable measures in a practice recycling of textile products.

SUSTAINABLE TEXTILE AND TEXTILE WASTE

From material selection to product disposal, the value chain has a significant environmental and social impact, namely related to: the use of toxic chemicals in the dyeing process; the high energy consumption and working conditions in the confection; the high amounts of greenhouse gases emitted in transport; in addition to the disposal of clothing in landfills and incineration (Dias, 2020).

With the worsening of the environmental crisis and the urgent need to implement Sustainable Development, companies have felt greater pressure to integrate sustainability into their business, namely companies in the Textile and Clothing Industry (TCI), whose environmental and social impact is notorious.

Although the value attributed to sustainable practices depends on the business model and vision of the companies, the textile industry is an industry in which sustainability is of special importance.

If a few decades ago, textile companies adopted a reactive stance in combating the environmental crisis (Giovannoni & Fabietti, 2013), it is expected that their survival and success in the future will result from the adoption of sustainable practices, starting to be characterized by transparency, innovative business models, collaborative culture and focus on the long term, of a circular economy (Adams, 2015).

In order to obtain strategic and competitive advantages, and especially in the production process in the Textiles and Fashion area, SMEs must apply quality procedures and programs, inducing their managers to take on the best and most innovative business efficiency decisions. It is known that the

application of a strategic, operational and innovative business model can effectively contribute to the consolidation of a sustainable circular economy, using the flow of information, planning, control and rationalization of costs and resources, with a view to possible competitive advantages (Moreira da Silva, 2019).

According to Stubbs & Cocklin (2008), sustainable business model is a model in which the principles of sustainability are the driving force of the company and shape decision-making. It appears, therefore, that the traditional concept of business model has to be replaced by one that includes social and environmental priorities, making sustainability an integral part of the value proposition of companies (Geissdoerfer et al., 2018). There is an awareness on the part of society that increasingly seeks to select products from companies that have sustainability as one of the essential criteria at the time of production.

Companies have to adopt the practice of finding suppliers of sustainable fabrics, improving their image in the market and prioritizing environmental preservation.

CIRCULAR ECONOMY

The circular economy is based on slowing down production processes and constantly reusing materials.

The concept of “circular economy” replaces waste with reuse and aims to decouple economic growth from the use of virgin resources, being differentiated into: 1) biological cycles, in which non-toxic materials are “restored” in the biosphere while rebuilds natural capital after cascading reuse in different applications; and 2) technical cycles, in which products, components and materials are returned to the market with the best possible quality and for as long as possible, through repair and/or maintenance, reuse, refurbishment, remanufacturing and, ultimately, the recycling. The circular economy introduces to the market the possibility of reusing raw materials from discarded products, thus increasing the life cycle of materials (Marconi & Broega, 2021).

As mentioned by Sampaio et al. (2018), the life cycle of a product should be considered as the set of all the steps necessary for a product to fulfill its function in the productivity chain, from the extraction and processing of the raw material, to the final disposal. Thus, circular economy is a way of exploring new business, production and consumption models, implying social metamorphoses in habits and lifestyles.

The circular economy is based on the 5R's (rethink, refuse, reduce, reuse and recycle materials and energy). Among the various Rs of the circular economy, this research project focuses on recycling, which means reusing a product so that another object can be manufactured from it, such as the textile product.

However, as mentioned by Karell & Niinimäki (2020), the circular economy should start to adopt the 4M's (Making-off, Maker, Re-Make and Makeover). Making-off refers to the optimization of the manufacturing process; Maker to user involvement in both the manufacturing process and

reuse; the Re-Make to the second life cycle of the product; and Makeover to recycling.

The objective of the circular economy is, therefore, to promote socio-environmental responsibility actions among people, whether individuals or legal entities, understanding that nothing has a definitive end.

In this sense, several sustainable actions involving the circular economy have been taken by the regulatory bodies of the textile industry and by the fabric manufacturers themselves. The idea is to collaborate with the conception, structuring and execution of projects that aim to carry out ecologically correct activities.

While the fast fashion design called for the continuous change of standards, without great uniqueness of the products, it is expected that the design linked to the circular economy may promote slow, super slow and fast forward fashion with the promotion of consumption experiences that are more aware of the multiple implications of the enjoyment of clothes (Alves, 2022).

Based on a pedagogy intrinsic to design processes, namely the adoption of the 4M's, it could be possible to mobilize and raise awareness of circularity, for sharing new ideas and information with the consumer, making it a key element of codesign.

It was exactly with the purpose of realizing how the textile and clothing industry, from the designers point of view who work in companies of the sector, is aware of the practices, methodologies, processes that have to be implemented in order to achieve a sustainable textile and a circular economy, which gave rise to a research project using a mixed methodology consisting of a literature review and two survey moments: by interview and by inquiry.

SURVEY BY INTERVIEW

The process began with the development of a set of semi-structured interviews with designers who work in textile or clothing companies [37]. They were carried out with the designers in person or using the Skype platform, trying not to exceed the maximum duration of 60 minutes each.

The interviews focused on the following aspects: basic information (about the participant and the company he works for); what is the role played by the designer and the responsibilities assigned to him; design product development process, its phases and work methodologies; try to understand what knowledge the designer had with regard to sustainability and whether or not this is met during the design process; in terms of sustainability, try to understand the needs and challenges of the designer.

During the interviews, designers were asked to exemplify some types of products, so that we could not only go deeper, but also better understand the perspective of each one of them on the concepts of sustainability and circularity of products. The interviews were recorded in audio or video, depending on whether they were face-to-face or via Zoom, and were subsequently transcribed. Then, the transcripts were analysed. As other researchers in the area have previously done (Karell & Niinimäki, 2019), according to the standards of current practices and the most critical issues, respondents were grouped by:

sustainable mindset; sustainable design practice; knowledge of sustainable design.

Results of Interviews With Designers

Regarding the sustainable mindset [24%], designers stated that the companies they were currently linked to, already have sustainability criteria both for the projects they develop and for the business operations, with a focus on the use of sustainable materials and processes, despite the difficulty in finding suitable materials for the products they develop and that best meet the company's criteria.

Around 18% of respondents said they still had little knowledge in terms of sustainable design and circularity. As for the practice of sustainable design [37%], a large majority of respondents fall into this category.

One of the curiosities in the responses obtained was that nowadays many of the respondents do not follow trends, betting on more lasting and timeless design proposals, as well as on product reuse, despite the companies where these designers work do not have a real knowledge of the cycle life of your products.

The circularity of the product and circular economy, or what are the current limitations of recycling depending on the materials used and the structure of the product itself, seem to be issues with a lack of information or aspects that are still very new for 68% of designers. It was found that 73% of respondents were not aware of the vast majority of existing sustainable design strategies or tools.

Of those interviewed, 17% are not aware of terminologies such as design for longevity or design for reuse, despite already resorting to and using sustainable design strategies.

SURVEY BY INQUIRY

Given the small sample of the interview phase, it was considered that it would be wise to cross these results with the implementation of an online questionnaire survey, in order to reach a larger group of designers.

As in the interview phase, the strategy used was to sample designers who worked in textiles or clothing, in a business environment, whose businesses were committed to sustainability. A survey was carried out of world companies that met the stated criteria, without company size being a criterion for the survey phase.

From the responses obtained, 51 companies were selected that matched the defined criteria, which were contacted by email. The companies distributed the questionnaires to their designers, and we were able to obtain a total of 156 validated responses.

Analysis of the Obtained Results

The survey by questionnaire was structured based on open and closed questions, following the thematic approach used in the interview phase, focusing on the daily work of designers with regard to sustainability and their knowledge of sustainable design strategies and tools.

In the analysis of the obtained results, an attempt was made to cross textual and numerical data. In terms of basic education, all survey respondents had technical or higher education in fashion/clothing design or textile design.

As main conclusions of the questionnaire survey phase, it was found that, in practice, companies, especially the larger ones, still find it difficult to adopt a sustainability policy and more ecologically aware behavior, which also directly affects the designers who work on them. In turn, designers need greater and constant updating of processes and tools that meet the principles of sustainability, allowing them to develop creative and innovative work that may be simultaneously sustainable and responsible, creating products that meet circularity.

CONCLUSION

The problem of sustainable textiles and the circular economy can only be solved with the awareness that there really is a paradigm shift, and as such a cultural change is necessary, in order to face the multiple challenges facing companies in the sector and designers, despite the many existing resistances. This process of change and incorporation of new sustainable models will certainly be easier at the level of SMEs, given that large companies, due to their size, become less flexible, making it easier to resort to partnerships and collaboration with companies of a smaller dimension, as a way of helping to implement the circularity of its products.

It is necessary to change the productive system in a linear “cradle-to-grave” mode of the textile and clothing industry: extract, manufacture, discard.

It also involves using more sustainable dyes, technologies and dyeing processes, identifying more ecofriendly textile coating products, including the incorporation of waste from different industries. It is urgent to create criteria for the selection of chemical products that meet the certification of sustainable products.

In order to safeguard the textile sustainability and implement the concept of circular economy in the fashion industry, designers and companies must define strategies to interrupt the current linear flow of the industry, through the development of proposals based on a logic of slow fashion, taking into account ethical, technological and design dimensions, which can lead to the implementation of business models based on the principles of a circular economy.

To this end, and based on the study carried out, we believe that a closer collaboration between academic researchers, designers, industry, policy makers and consumers can contribute to accelerate the paradigm shift and much more rapidly transform the fashion industry.

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REFERENCES

- Adams, W. C. (2015). "Conducting Semi-Structured Interviews", in: Wholey, J. S., Harty, H. P. and Newcomer, K. E., Eds., *Handbook of Practical Program Evaluation*, Jossey-Bass, San Francisco, pp. 492–505.
- Alves, M. (2022). *Design e Comunicação Sustentáveis na Indústria Têxtil – Estudo de caso Tetribérica*, Master Dissertation, Mestrado em Marketing e Comunicação, ESE e ESTG do Polytechnic Institute of Coimbra.
- Dias, M. S., (2020). *A relevância da Sustentabilidade na Indústria do Vestuário - O caso das PME portuguesas com presença no Reino Unido*, Master dissertation presented at Universidade Católica Portuguesa.
- Geissdoerfer, M., Vladimirova, D. & Evans, S. (2018). "Sustainable business model innovation: A review", in: *Journal of Cleaner Production*, Vol. 198, 10 October 2018, pp. 401–416.
- Giovannoni, E., Fabietti, G. (2013). "What Is Sustainability? A Review of the Concept and Its Applications", in: Busco, C., Frigo, M., Riccaboni, A., Quattrone, P. (eds) *Integrated Reporting*. Springer, Cham.
- Karell, E., & Niinimäki, K. (2020). A Mixed-Method Study of Design Practices and Designers' Roles in Sustainable-Minded Clothing Companies. *Sustainability*, 12(11), [4680].
- Karell, E., Niinimäki, K. (2019). "Deconstructing the clothing design process for a circular economy", in: *PLATE Product Lifetimes And The Environment 2019 – Conference Proceedings*, Berlin, Germany, 18–20 September 2019; Nissen, N., Jaeger-Erben, M., Eds.; TU Berlin University Press: Berlin, Germany.
- Marconi, B., Broega, A. C. (2021). *Sustainable Alternatives Study for the Portuguese Textile Sector*, 8th Sustainable Design Symposium, 1–3 December 2021, UFPR, Curitiba, Brazil.
- Moreira da Silva, F. (2020). "Textile and fashion SMEs: The adoption of sustainable strategic models", in: *Textiles, Identity and Innovation: In Touch*, Gianni Montagna & Manuela Cristina P. C. Figueiredo (eds.), CRC Press.
- Sampaio, C. P., Trein, F. A., Santos, A., Lopes, C. S. D., Chaves, L. I., Librelotto, L. I., Ferroli, P. C. M., Lepre, P. R., Engler, R. C., Martins, S. B., & Nunes, V. G. A., (2018). *Design para a Sustentabilidade - Dimensão Ambiental*. E. Insight, Ed.; Primeira edição. Lens Brazil.
- Stubbs, W., & Cocklin, C. (2008). Conceptualizing a "Sustainability Business Model." *Organization & Environment*, 21(2), pp. 103–127.