








Sustainability in fashion retail: literature review and bibliometric analysis

Sustentabilidade no varejo de moda: revisão de literatura e análise bibliométrica

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How to cite: Prado, N. M., Silva, M. H. P., Kaneko, C. S. K., Silva, D. V., Giusti, G., Saavedra, Y. M. B., & Silva, D. A. L. (2022). Sustainability in fashion retail: literature review and bibliometric analysis. *Gestão & Produção*, 29, e13322. <https://doi.org/10.1590/1806-9649-2022v29e13322>

Abstract: The main objective of this study was to explore and analyze the recent scientific production on sustainability in the fashion retail sector. The methodology was based on a literature review and bibliometric analysis of the last 12 years of peer-reviewed published papers on the topic. The results illustrated an increase in publications in 2017 and 2018, with large participation from countries such as the United States and China. The findings covered a broad diversity of topics related to fashion retail such as: slow fashion, fast fashion, sustainability in the supply chain, sustainable production and consumption of textile products, and the main barriers, benefits, and trends for this sector in a near future. Due to the increase of negative social and environmental impacts in the last decades more studies related to sustainability practices to be adopted by this sector are required to identify potential alternative solutions for the problem. We did a list with the 55 most important practices to promote sustainability in fashion retail.

Keywords: Sustainability; Fashion industry; Sustainable production; Consumption.

Resumo: O objetivo principal deste estudo foi explorar e analisar a produção científica recente sobre sustentabilidade no varejo de moda. A metodologia foi baseada em uma revisão da literatura e análise bibliométrica dos últimos 12 anos de artigos publicados revisados por pares sobre o tema. Os resultados ilustraram um aumento nas publicações em 2017 e 2018, com grande participação de países como Estados Unidos e China. Os resultados abrangeram uma ampla diversidade de temas relacionados ao varejo de moda, tais como: slow fashion, fast fashion, sustentabilidade na cadeia de suprimentos, produção e consumo sustentável de produtos têxteis e, as principais barreiras e tendências para o setor em um futuro próximo. Devido ao aumento dos impactos sociais e ambientais negativos nas últimas décadas, mais estudos relacionados às práticas de sustentabilidade a serem adotadas por esse setor são necessários para identificar potenciais alternativas de solução para o problema. Fizemos uma lista com as 55 práticas mais importantes para promover a sustentabilidade no varejo de moda.

Palavras-chave: Sustentabilidade; Indústria da moda; Produção sustentável; Consumo.

Received Aug. 11, 2022 - Accepted Sept. 19, 2022

Financial support: Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) under process code 88887.498791/2020-00 and Finance Code 001. Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP) under process code 2021/06685-1. Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) under CNPq 06/2019 - Research Productivity Scholarships. Process: 302722/2019-0.



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1 Introduction

According to the United Nations and Environment (2018), the social concern with the environment started from the transformations that took place in the world scenario after the end of the Second World War, which has spurred studies on the production chain management and the development of new production strategies. Due to these changes in society, there was a significant increase in productivity in the industrial environment, through the advancement of new technologies, standardization of products, greater efficiency of the processes involved, and reduction of costs and prices due to scale economies.

In this sense, the reflection of the change took the large-scale clothing productions whose denomination of the fast fashion concept according to Fletcher (2010) refers not only to speed but also to a set of practices applied in the fashion market that aims at continuous growth based on the power and prosperity that the brand represents. In 2017, the biggest fast fashion brand, H&M, reached 1.4% of the total market and in 2020 the global fashion industry (clothing) increased production by 6.2% (O'Connell, 2019). According to Zhang et al. (2021), the economic performance of the fast fashion business model is notable due to low prices and fast product rotations that encourage over-consumption, mainly in the youngest generation.

Thus, brands that previously developed a launch collection each semester, now start to develop multiple entries in the same period of time, in addition to increasing the number of items created per collection, resulting in an increase in the number of sales (markdown) (Carvalho, 2016).

Todeschini et al. (2020) report that global fashion offers high economic benefits but at the same time, there are many sustainability problems, some of which are related to the low reuse and recycling rates during their life cycle, especially in the post-use phase. According to the EMF (2017) the recycling rate in the fashion industry is around only 1% compared to the plastics sector which presents a recycling rate of 14%.

According to the UN Trade and Development reports (United Nations, 2019), this sector was considered the second most polluting industry in the world in 2019. Furthermore, it uses approximately 93 billion cubic meters of water per year, and 50 thousand tons of microfiber, and other raw materials (United Nations, 2019; Fung et al., 2021). In the case of the production of a single T-shirt, approximately 2,700 liters of water are required, not to mention what would be spent in the rest of the product life cycle. This sector is responsible for 10% of the total greenhouse gas emissions worldwide (Salcedo, 2014).

In the social sphere, Salcedo (2014) remarks on the unhealthy and unsafe working conditions offered by the global textile industry, which are installed for the most part in Third World countries such as India and China, where labor is cheaper and not necessarily more qualified. In addition, we highlight the exposure of children and adolescents to these often-unhealthy environments, the low remuneration offered to employees (about 1% to 2% of the sale price of a piece), and their exposure to various chemicals, insecticides, and other substances harmful to human health and ecosystems.

In this context, Shen et al. (2017) cited the importance to integrate changes in the whole textile supply chain. Vehmas et al. (2018) add that sustainable production and consumption are important to preserve natural resources and reduce the impact of the fashion industry on the environment. Todeschini et al. (2020) mention that, currently, the fashion sector is more open to incorporating sustainable innovation alternatives. Testa et al. (2021) add that in the fashion industry the brands with more sustainable

alternatives and social responsibility are more accepted by the consumers and encourage other brands to follow in the same direction.

In this sense, the main objective of this study was to explore and analyze the recent scientific production on sustainability in the fashion retail sector in the last years. The study tried to answer the following Research Questions (RQs):

RQ1: Which are the main trends in studies related to the topic in recent years?

RQ2: What are the main limitations and challenges to making the fashion retail sector more sustainable?

RQ3: What are the main sustainability practices (tools, concepts, guidelines, etc.) adopted by the mapped studies to analyze and suggest opportunities for improvement of fashion production and sector?

2 Research methodology

The methodology adopted in this study was a literature review divided in two steps: (1) a research data collection carried out in the Web of Science (WoS) database, and; (2) a bibliometric analysis using the software tool VOSviewer version 1.6.16.0 (Figure 1). This research can be characterized as exploratory where the objective is to familiarize itself with the studied content and to associate essential characteristics for the subsequent realization of inferences and interpretations of results.

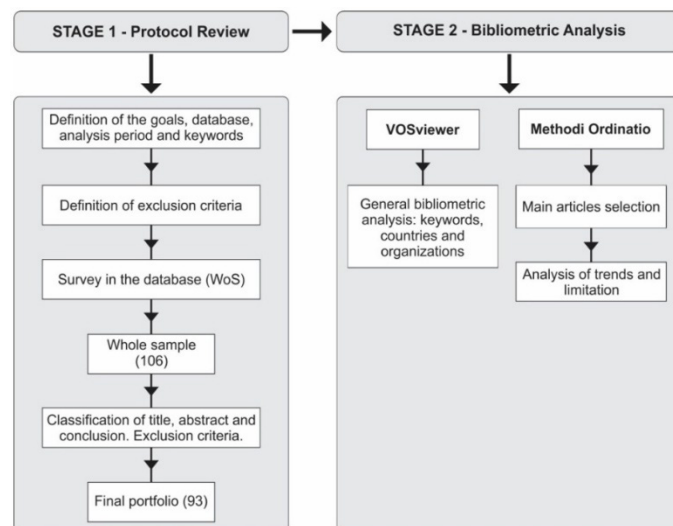


Figure 1. Methodological steps encompassed in the literature review.

During Stage 1, we defined the goals of the literature review, the search string, the database used (Web of Science), and the definition of exclusion criteria. Some initial parameters were taken into account in order to analyze the increase in the number of recent publications on the topic addressed limiting to the publications of the last 12 years (2009-2021). The language used in this research was limited to English due to its global character and influence in many of the countries investigated. Thus, the keywords used in the study for an initial filter were: “Sustainability” AND “Fast Fashion”

OR “Sustainability” AND “Slow Fashion”. The searches were finished in May 2021. This database search returned a total of 106 articles.

From this sample, we applied the exclusion criteria: duplicate articles or did not address Fast Fashion and Slow Fashion in the context of sustainability according to the titles, abstracts and conclusion of the articles. After these analyses, 13 articles were excluded and 93 final articles were selected as relevant for further analysis.

Stage 2 included the content analysis of the 93 articles selected in Stage 1 with the support of bibliometric software VOSviewer (authors, keywords - five or more occurrences - and countries) and the Methodi Ordinatio proposed by Pagani et al. (2015). The Methodi Ordinatio is an indicator that aims to rank the most relevant articles according to the Impact Factor (IF) of the journals, number of citations of the articles, and year of publication. The number of citations was extracted from the WoS database and the IF from the Journal Citation Reports. In order to maintain the scientific rigor and the robustness of the analysis of trends and limitations, only articles published in high-impact journals were considered. The year of publication was assigned a weighting factor of 10, which means that the authors gave more importance to recent articles. Articles with indicators greater than or equal to 100 were considered.

3 Results of literature review

3.1 Evolution of publications

Figure 2 shows the evolution in the number of published articles related to sustainability and fashion in the last twelve years. Initially, we observed the increase in the number of publications started in 2014, which may be the result of scandals such as the accident at the Rana Plaza building in Bangladesh in 2013, and other tragedies broadcasted by the international media about inhumane working conditions in this sector. According to Sinkovics et al. (2016), the consequences of the accident, the lack of regulation of the working conditions, and safety in the Bangladeshi industries led outside buyers and investors to pressure the local government. Consequently, Li et al. (2014) add that different companies are adopting more sustainable practices to redesign their supply chains in order to obtain a better balance between the social, economic, and environmental performance.

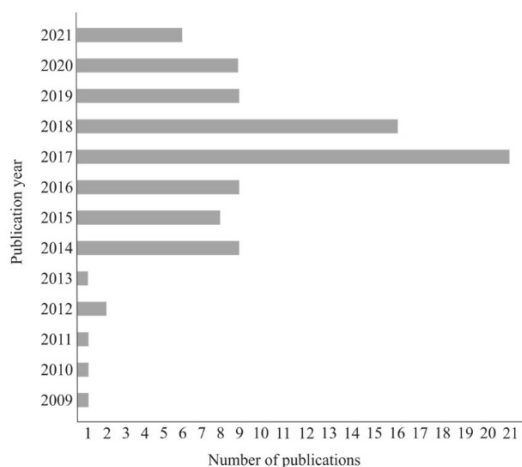


Figure 2. Number of articles published in the WoS database in the last 12 years.

Figure 2 shows that 39.8% of articles were published between 2017 and 2018. Furthermore, there was a growth of approximately 133% in the number of papers published in 2017 compared with 2016, which indicates the relevance of the issue in recent years.

3.2 Main countries of the sample

Table 1 presents the main countries with more publications in the WoS database and their total link strength. This latter parameter is a metric of the VOSviewer tool that helps to analyze the relevance of articles in other publications according to the chosen category, such as countries, authors, types of articles, and other information, besides the number of citations. Six countries (United States, China, England, Australia, South Korea and Sweden) present almost 80% of all articles about fashion and sustainability.

Table 1. Contribution of the top 10 countries with more publications in the WoS database.

Country	Quantity	Total link strength
<i>USA</i>	29	70
<i>China</i>	11	64
<i>England</i>	8	8
<i>Australia</i>	8	22
<i>South Korea</i>	7	18
<i>Sweden</i>	6	12
<i>Italy</i>	6	19
<i>Finland</i>	5	12
<i>Turkey</i>	5	23
<i>Canada</i>	3	33

China presented about 11 published articles, which have been cited 775 times in the literature. The relevance of this issue may be associated with the growth of fashion production in the country. Largely, there is a concentration of textile factories in Shanghai, which exports its products to different places worldwide (Shen, 2014).

In the reports showed by Common Objective (2018), it is cited the difference between quality and frequency of purchasing products. North American consumers tend to consume a moderately priced piece per week, while the British buy 20 pieces less per year but invest 70% more than North Americans. Likewise, Japanese consumers buy an average of half and invest 31% more per product than North Americans, and Chinese consumers buy 23 items less than Japanese and spend a quarter of the price compared to North Americans. China and the United States represent the countries with more amounts of products purchased, 40 billion and 17 billion, respectively (Common Objective, 2018). This data can be used to explain the scientific production focused on the contribution of the top 10 countries with more publications in the WoS database.

3.3 List of main keywords of the sample

Other results using the VOSviewer tool were the list of keywords, shown in Figure 3. It is possible to identify five clusters, red, green, yellow, blue, and purple colors which are related to each other according to the connection of the words found in the selected articles.

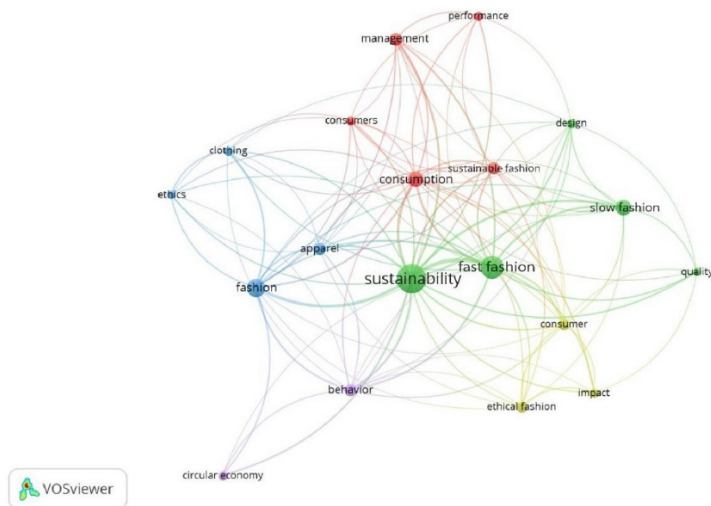


Figure 3. Connection network of keywords related to the theme of fashion and sustainability with five or more occurrences in publications found in the WoS database.

The distribution of these words reveals that sustainability is related to several other keywords from the other groups, presenting the highest number of scores in the survey. The red cluster is associated with the words performance, management, consumption, consumers, and sustainable fashion. According to Kim & Oh (2020), the analysis of information about consumers of sustainable fashion brands demonstrates that it can be used as a strategic direction for companies in order to improve brand performance and image.

The green cluster relates the words sustainability, fast fashion, slow fashion, design, and quality. Fast fashion retailers consider “strategic suppliers” those who have demonstrated good sustainability and quality indicators established and are therefore worthy of manufacturing large volumes of clothing and establishing long-term business relationships with them (Arrigo, 2020).

The blue cluster results from the connection between ethics, fashion, clothing, and apparel. Joy et al. (2012) remark that ethical fashion is related to a design with products and positive impacts, a consciousness of the consumer, and sustainable methods of production with benefits for workers, consumers, society, and the environment. Reimers et al. (2016) informed that ethical fashion perception is related to animal welfare, employee welfare, slow fashion, and environmental responsibility.

The yellow cluster presents the words ethical fashion, impact, and consumer. Fashion proposes as a development model the connection between local artisanal production and the international fashion market through a positive narrative of “ethical fashion” (Hammond, 2020). And, the purple cluster represents the word behavior and circular economy. The behavior of generations such as Millennials demonstrates a predominant trend based on sustainability and involvement in activities such as Corporate Social Responsibility, revealing how consumer demands and behavior can influence mainly luxury brands (Pencarelli et al., 2020).

3.4 Main journals of the sample

Table 2 shows the Journals that presented the highest number of publications on the topic of fashion and sustainability in the WoS database, indicating the ones with two or more publications on the sample.

Table 2. Journals found in the WoS database.

Journal	Number of papers
<i>Journal of Cleaner Production</i>	64
<i>Sustainability</i>	16
<i>Journal of global fashion marketing</i>	5
<i>Clothing cultures</i>	4
<i>Clothing and textiles research journal</i>	3
<i>International Journal of consumer studies</i>	3
<i>Journal of fashion marketing and management</i>	3
<i>European management journal</i>	2
<i>Fashion practice-the journal of design creative process & the fashion industry</i>	2

From the list in Table 2, it is clear that six journals (*Journal of global fashion marketing*, *Clothing cultures*, *Clothing and textiles research journal*, *Journal of fashion marketing and management*, and *Fashion practice-the journal of design creative process & the fashion industry*) have guidelines for the fashion. *European management Journal* focuses on the business area; two journals (*Sustainability* and *Journal of Cleaner Production*) focus more on sustainability, cleaner production, and product life cycle management that have the most articles published; and *International Journal of consumer studies* focuses on the study of the consumer profile.

The journals related to the areas of fashion, design, and fabrics together presented 17 articles, resulting in an average of 2.83 articles per journal. *Sustainability journal* presented 16 articles related to sustainability fashion supply and closed loop supply chains. Three articles were found in the *Journal of Fashion Marketing and Management*, which has a long relationship with the topic of business management. Therefore, there is a great trend to study this topic in the areas of fashion, design creation, and wide study space for the areas of fashion production related to business strategies, the environment, management of the life cycle of the products, and supply chains.

3.5 Main researchers on the subject

Table 3. Main authors found in the WoS database regarding the topic of Fashion and Sustainability

Author	Country	Nº of publications
Jin, B.	USA	3
Jung, S.	Hong Kong	3
Chao, F.	Australia	2
Magnuson, B.	Australia	2
Reimers, V.	Australia	2
DeLong, M.	USA	2
Park, H.	USA	2

The results obtained about the United States were expected to stand out because the country is a modern fashion-producing center that is evidenced due to the number of academic publications. However, another country expected to be more academically involved in the subject was China, since the number of industries of the country in this sector has grown and has become a world reference in terms of the production of pieces for fashion retail. Finally, the low number of published papers per author in Table 3 means that we still have incoming authors on the topic and that this research area is not yet properly consolidated.

3.6 Main researches of the sample

The main researches of the sample were identified using the Ordination indicator. Figure 4 shows the 15 papers with Ordination indicator greater than 100.

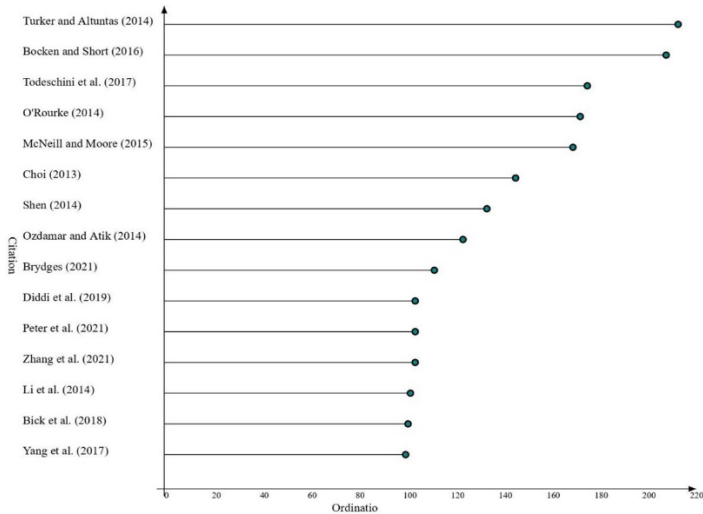


Figure 4. The main papers according to Ordination indicator.

It is noticeable that most of the selected articles directed their research to sustainability in supply chain management, highlighting the importance of Corporate Social Responsibility (CSR) - supplier networks - and society's conscious consumption.

In this context, Todeschini et al. (2017) identified CSR as a macro-trend to incorporate ethical attitudes and some alternatives for sustainable business models, such as: 1) Sweatshop Free: transparency about working conditions; 2) Fair Trade: employees' well-being in the work environment; and 3) Locally sourced: reduction of environmental impact with transportation, by promoting the manufacturing of products in the regions of interest of consumption.

In this regard, Turker & Altuntas (2014), claim that fashion retail companies are interested in applying sustainability to their companies; but at the same time is common these fashion companies to acquire materials with lower costs in developing countries and with serious environmental and social problems. Fast fashion companies need to move to sustainable supply chain management, looking for sustainable practices of external governance of their stakeholders. Thus, they assure good green marketing for their customers, without compromising the design of the pieces, as well as their quality and costs (Li et al., 2014).

Thus, in order to minimize such problems, initiatives such as transparency with consumers, improvements in labor standards, audits, and communication of companies' actions through sustainability reports have been highlighted as CSR measures (Todeschini et al., 2017). For example, Pelikánová et al. (2021), identified the rise in CSR statements provoked by the younger's group consciousness, mainly during the COVID-19 pandemic analyzing reports published by luxury brands.

In addition, Shen (2014) addresses the issue of fashion and applied sustainability in the supply chain management, presenting on the "Conscious Action" program of H&M. In this program, the company focused on creating greater opportunities and better working conditions for the developing countries, encouraged greater use of recyclable resources in its production, and the re-education of its customers according to sustainable topics.

Despite the difficulties of implementation and increase in general costs, the impact of this change was positive for its customers and competitors. Finally, the authors mention that the dynamics of the supply chain change from a company-to-company, and that is necessary more than one case study for mapping an entire sustainable fashion supply chain.

Li et al. (2014), which analyzed the fast fashion movement and the impact of CSR on sustainability performance and supply chain management at H&M, it had as its main results related to the commitment among all parties involved as suppliers with the use of organic cotton fibers; the reduction, reuse, and recycling of raw materials; and with the conscientious use of natural resources and promoting local projects with the community (Li et al., 2014).

According to Peters et al. (2021), the impacts of fast fashion have not grown as fast as the industry's output. However, environmental and social improvements can be achieved with energy improvements and by eliminating fast fashion as a business model. One of the challenges in reducing fast fashion consumption is to change consumer behavior.

Thus, Bocken & Short (2016) propose that business models based on sufficiency, i.e., consumer awareness and education for more conscious consumption, focused on meeting needs - and not stimulating desires - is an opportunity to reduce the use of resources and a driver for sustainability. The authors emphasize that even in approaches such as Circular Economy, resource consumption tends to increase if the final consumption of products is not mitigated, because, consumption management goes beyond indicators and assessment techniques and stops at behavioral measures stimulating a more conscious consumption of the population.

Conscious consumption was also identified by Todeschini et al. (2017), as macro-trends for the pursuit of sustainable business models: 1) Sharing economy and collaborative consumption: promotes a culture of exchanges and sharing of pieces, in addition to promoting a collaborative mentality throughout the value network with a focus on the so-called supporting ecosystem - sharing of knowledge among stakeholders, suppliers, and customers - and; 2) consumer awareness: which focuses on the practice of consumer behavior with ideas of minimalist awareness in the use and acquisition of clothing items and the slow fashion movement (opposite to fast fashion).

Regarding the articles applied to this theme of conscious consumption, McNeill & Moore (2015), approached fashion and sustainability from the point of view of different consumers (self, social, and sacrifice consumers) in New Zealand and concluded the importance of sustainable consumption practices (e.g., secondhand clothing, supporting ethical labor practices, etc.). Diddi et al. (2019) explored sustainable clothing consumption behaviors of young consumers and identify that buying higher quality clothing was one of the most sustainable behaviors that participants engaged in. However, the authors observed that participants who were aware of the negative impacts of fast fashion consumption did not express interest in stopping to buy it. The main reasons why participants did not engage in sustainable consumption practices were lack of variety style, budget constraints, skepticism, lack of skills for mending, emotions, and self-indulgent behavior (Diddi et al., 2019).

It is noted that the change in consumer behavior/consumption and the slow fashion movement are key points to help mitigate the impacts resulting from the rapid acquisition of fast fashion items. However, Ertekin & Atik (2015) argue that it is not clear if slow fashion can replace the fast fashion movement at all, and add the following trends for the near future: mobilizing barriers to act in favor of sustainable production systems; globalization of processes based on transparency; growing knowledge on the environmental impacts along the life cycle of fashion products, raising awareness among consumers about the consumption and their impacts; and obtaining government support for companies to align their production to the new parameters of sustainable production in the fashion retail.

In that context, Brydges (2021) argue that the brands are paying attention to resources due to the growing consumer demand for more sustainable products; however, less attention is paid to the whole life cycle of a product and to circular economy implementation. The authors also emphasized the need for more attention to social impacts in the fashion industry.

Given this lack of attention to environmental impacts over the entire product life cycle and the lack of incentive for the circular economy, O'Rourke (2014) stated that it is necessary to measure the sustainability of these companies, i.e., transform impact data into information to be included in decision-making strategies. The author highlights the importance of this measurement to convey information focused on the risks of the supply chain in the face of impacts that may harm not only a company but also the entire humanity, such as climate change and resource scarcity. The transparency of this information can be disclosed through reports that guarantee the consumer the power of choice.

Finally, among the sustainability tools for this purpose, O'Rourke (2014) highlights the Life Cycle Assessment (LCA), as being a methodology based on the quantification of potential environmental impacts. In addition, they proposed strategies for the use of this tool, the translation of environmental and social impacts into monetary terms with rating scales (profit and loss) for the public, and calculations that include the value of ecosystem services, i.e., the costs of ecosystem degradation in production processes.

In this context, Choi (2013) analyzed how carbon footprint taxation can be integrated into a QR system related to green operation management to improve environmental sustainability using local manufacturers rather than global manufacturers. The author states that the model currently practiced by most companies is to outsource their production to underdeveloped countries because their costs are lower compared to local suppliers, which makes up for the logistics costs. In addition, the results revealed that the correct carbon footprint taxation can attract the fashion retailer for the local manufacturers, reducing the level of risk and therefore allowing a more sustainable production for the textile companies. With this, it can be seen that technology and social responsibility act as key points for the choice of suppliers and contribute to the innovation of more efficient and sustainable production processes.

3.7 Main trends in recent years

From the article's analysis we observed the importance of some alternatives to the fast fashion movement. Developing a sustainable piece of clothing is more than using inputs whose sources are sustainable. If they are inserted in the same traditional production format of unrestrained consumption, the environmental and social impacts generated in the weaving, dyeing, and confectioning phases would be close to those of fast fashion.

As can be seen in Wakes et al. (2020), the practice of disposing of clothes is linked to the behavior of consumers. The authors observed that 50% of the interviewed consumers would discard a T-shirt after ten washes, as changes in color and modeling become noticeable. In this way, a conscious education focused on the concepts of slow fashion is considered important for a behavioral change of the consumers (Todeschini et al., 2017).

Herskind & Sidemann (2013) support the idea of ecodesign or Design for the Environment (DfE). This idea refers to a design approach to creating a product from the perspective of sustainability in which its focus is on the environmental and social impacts caused by a product throughout its life cycle.

Thus, McAloone & Bey (2009), presents some principles in ecodesign that can be followed to create a more sustainable product. These principles are expressed by reducing the amount of material and energy spent on its production or on the service offered; reducing dispersion and the use of harmful substances in the product; incorporating or replacing parts of the final

product with recyclable materials; and improving product durability. Therefore, to prevent the product from being constantly discarded it is necessary to increase the use of sustainable resources along the production chain, optimize the performance of the product or service with the purpose of minimizing losses, and is essential to think about the life cycle of the product to close the production loop, in a circular way.

According to Brydges (2021), it is essential to consider circular economy strategies at the stages of take (raw material supply) and make (production), in addition to waste (disposal). Thus, the LCA tool, mentioned by O'Rourke (2014), Johnson & Plepys (2021), and Peters et al. (2021), represent the most used method to analyze impactful phases of products and provide substantial results to professionals, students, and consumers to choose the option that makes the least impact. O'Rourke (2014) suggest investing in assessment tools that not only monitor/evaluate environmental impacts but also integrate aspects related to behavior change to predict unsustainable practices to assist in decision making.

Thereby, the production of textile and apparel industries needs to change the way the products are commercialized, mainly in developing economies because of the impact on people's life related to environmental justice, occupational burdens, textile waste, and hazardous during the production and post-production (Bick et al., 2018). As well as the different perceptions and evaluation approaches to sustainable fashion between countries developed and countries in development (Yang et al., 2017).

Based on the design structure focused on sustainability, in fashion design, there are some different types of movements that seek to minimize the impacts caused by their production, consumption, and disposal steps. For Salcedo (2014) there are four sustainable movements: ecofashion, ethical fashion, slow fashion, and more sustainable fashion, the latter being a branch of the first. Among these movements, slow fashion stands out, as discussed in this section. Ecofashion has the principle of a fashion produced from methods that are less aggressive to the environment and more natural. Ethical fashion, on the other hand, is ecofashion together with a concern for the health of the consumer and the conditions to which workers are exposed along the product life cycle. Despite its noble goals regarding sustainability, it is difficult to maintain the competitiveness of ecofashion and ethical fashion products due to the low prices offered by fast fashion products (Pookulangara & Shephard, 2013).

Slow fashion emerged as an alternative to fast fashion. However, it is more than an opposing movement or just a slowdown in mass production, since it carries in its essence the importance of the quality and durability of products, together with a new point of view about consuming fashion. Another trend in slow fashion is related to the consumers since they start looking for pieces that translate their values, beliefs, and momentary feelings. According to Pereira & Nogueira (2013), in a slow fashion, the production takes place in a less intense way and with a smaller number of products available, offered in more spaced collection launches because their pieces have greater durability. Therefore, the product design in slow fashion is defined as timeless, that is, it can be used during several seasons without losing the essence for which the piece was created. In addition, this movement is also concerned with using potential sites to boost its creations, such as hiring local labor to add social value to the local community and incorporate local cultural aspects in the design thinking and, in the materials used to make the pieces.

Morais et al. (2011) also state that since slow fashion has a timeless design, higher quality in the chosen fabrics, and a higher cost over the pieces, this results in a feeling of exclusiveness by the customers, which had been lost with the fast fashion movement.

According to Zhang et al. (2021) sustainability contributes to subjective choices as much as objective prices, since the awareness of environmental impacts, consumers

of the millennial generation tend to choose products with natural and durable materials (sustainable fashion) instead of artificial and non-biodegradable materials (fast fashion) in clothes. This statement agrees with Diddi et al. (2019), which observed that buying higher quality clothing was the most likely behavior of young American consumers.

3.8 Main limitations and challenges in the sector

Regarding the limitations, we observed a difficulty inherent to the issue of slow fashion involving the lack of a clear definition of this term, its main characteristics, and where to find more information (case studies, business cases, etc.) about it. This makes it difficult to identify who takes part in this movement. In addition, we perceive that the issue of sustainability in fashion is something very subjective, being prone to different perceptions depending on the person, characteristic group, or even affection for the brand. For Brydges (2021) less is known when some brand or business is adopting a circular instead of linear economy. Therefore, the analysis of the brand value by the consumers and the formation of brand loyalty can reflect the global opinion about this issue in different ways.

It is noteworthy that one of the current great challenges on this topic is the formalization of the movement before the academy, allowing the setup of formal sustainability indicators in fashion retail so that the companies would be able to evaluate themselves. O'Rourke (2014) argued that the most used indicators are eco-efficiency and risk analysis and highlight the importance of an analysis considering the life cycle, such as LCA. However, to consider such an analysis, many companies complain of the high cost and time to perform the LCA, besides reporting that it is not feasible to apply it in a company and/or retail that has an extensive portfolio.

Liu et al. (2020) addressed the challenges of a partnership between multinationals (EMNs) and non-governmental organizations (NGOs) through loose coupling in the context of the fast fashion business. Since the EMNs business model violates social and sustainable responsibility (SSR) in order to expand profits, manage inter-organizational dissonance, possible power imbalance, and opportunism.

Furthermore, the challenges in each stage of the global supply chain are related to the innovation's development in textiles and garments, corporate sustainability, trade policy, and ethical consumption by consumer behavior (Bick et al., 2018). Beyond that, the communication and connection between ethical fashion practices and the benefits of secondhand products in developing countries is still an obstacle to building a bridge of knowledge for the consumers to engage with brands and organizations (Yang et al., 2017).

Another relevant challenge to achieving sustainability in the fashion sector is to change the consumers' behavior. For example, Diddi et al. (2019) observed that the interviewed young consumers did not relate reducing their consumption of clothing as a sustainable choice, and most part of them stated to buy clothes every month, mostly from fast fashion brands.

In order to overcome such challenges, we have identified some sustainability practices that could help on this journey to move forward toward a more sustainable fashion industry.

3.9 Sustainability practices (tools, programs, guidelines, concepts, etc.)

In this section we are presenting the main sustainability practices (Table 4) identified in the main articles according to Ordinato indicator.

Table 4. Proposed list of sustainable practices in fashion retail.

#	Dimension	Description	C	P	G	T	Mov	9Rs	References
1	Environmental	Recycling products and materials						x	Joy et al. (2012); Jung & Jin (2014); Shen (2014); Li et al. (2014); McNeill & Moore (2015); Brydges (2021); Todeschini et al. (2017)
2	Environmental	Reuse materials (second-hand)						x	Joy et al. (2012); Shen (2014); Li et al. (2014); Ertekin & Atik (2015); Yang et al. (2017); Todeschini et al. (2017); Bocken & Short (2016)
3	Environmental	Minimize the environmental footprint (e.g., distribution phase)					x		Joy et al. (2012); Shen (2014); Peters et al. (2021); O'Rourke (2014)
4	Environmental	To use organic material (e.g. organic cotton)					x		Joy et al. (2012)
5	Environmental	Repair clothing to along lifespan						x	Joy et al. (2012); Brydges (2021); Diddi et al. (2019); Todeschini et al. (2017); Bocken & Short (2016)
6	Environmental	Replacing harmful chemicals with environmentally friendly ones						x	Jung & Jin (2014)
7	Environmental	To use longer product lifespan (e.g., maximize the utility in the products)					x		Jung & Jin (2014); Brydges (2021); Diddi et al. (2019); Todeschini et al. (2017)
8	Environmental	Controlling waste emission in the fashion industry and use phase of fashion products by consumers					x		Joy et al. (2012); Li et al. (2014); Shen (2014); Jung & Jin (2014)
9	Environmental	Maintaining the rate of extraction of renewable resources (i.e. harvest) within the regeneration rate.					x		Jung & Jin (2014)
10	Environmental	Minimizing the extraction of non-renewable resources					x		Jung & Jin (2014); Bocken & Short (2016)
11	Environmental	Maintaining depletion rates of non-renewable resources not to exceed the rate of creating renewable substitutes					x		Jung & Jin (2014)
12	Environmental	Life cycle assessment (LCA) of fashion products and materials					x		Turker & Altuntas (2014); O'Rourke (2014)
13	Environmental	Ecodesign (eco-labelled materials, eco-material preparation and developing clothes)					x		Shen (2014); Ertekin & Atik (2015); Joy et al. (2012); Yang et al. (2017); Todeschini et al. (2017)
14	Environmental	Adopting environmental pollution-abatement technologies in distribution					x		Shen (2014)
15	Environmental	Green marketing strategies					x		Jung & Jin (2014); Diddi et al. (2019)
16	Economic	Purchasing sustainable fashion products					x		Shen (2014)
17	Social	To incentive people to use recycled clothing						x	Joy et al. (2012); Li et al. (2014); Brydges (2021); Diddi et al. (2019)
18	Social	Corporate social responsibility					x		Joy et al. (2012); Li et al. (2014); Shen (2014); O'Rourke (2014); Todeschini et al. (2017); Bocken & Short (2016)
19	Social	Valuation of local materials (localism)					x		Jung & Jin (2014); Ertekin & Atik (2015); Todeschini et al. (2017)
20	Social	Functionality (e.g., versatility)					x		Jung & Jin (2014); Todeschini et al. (2017)
21	Social	Supply Chain democracy						x	Joy et al. (2012)
22	Social	Equity (better working conditions, careful with producers and local communities)					x		Joy et al. (2012); Bick et al. (2018); Todeschini et al. (2017)
23	Social	Consumer knowledge of the environmental impacts of clothing					x		Jung & Jin (2014); Diddi et al. (2019); Zhang et al. (2021); O'Rourke (2014); Todeschini et al. (2017)
24	Social	Authenticity of pieces					x		Jung & Jin (2014)
25	Social	Exclusivity of pieces					x		Jung & Jin (2014); Diddi et al. (2019)
26	Social	Sustainability governance framework					x		Li et al. (2014)
27	Social	Corporate sustainability in the supply chain management					x		Turker & Altuntas (2014); O'Rourke (2014); Todeschini et al. (2017)
28	Social	Slow fashion					x	x	Jung & Jin (2014); Jung & Jin (2016); Todeschini et al. (2017)
29	Social	Ethical Trading Initiative (ETI)					x		Turker & Altuntas (2014); Shen (2014)
30	Social	Brands Ethical Working Group					x		Turker & Altuntas (2014); Shen (2014)
31	Social	'Terre des homes'					x		Turker & Altuntas (2014)
32	Social	Ethical consumers					x		Shen (2014)
33	Social	Sustainable Society Index (SSI)					x		Shen (2014)
34	Social	Sustainable program for fashion industry development					x		Shen (2014)
35	Social	Avoid the Fast Fashion movement						x	Li et al. (2014); McNeill & Moore (2015); Jung & Jin (2016); Diddi et al. (2019); Peters et al. (2021); Todeschini et al. (2017); Bocken & Short (2016)
36	Social	Transparent production systems with less intermediation between producers and consumers					x		Ertekin & Atik (2015); Todeschini et al. (2017)

Table 4. Continued...

#	Dimension	Description	C	P	G	T	Mov	9Rs	References
37	Social	Production sensorial products	x						Ertekin & Atik (2015)
38	Environmental and economic	Carbon Footprint taxation					x		Choi (2013); O'Rourke (2014)
39	Environmental and economic	Upgrade services to aggregate more value	x						Joy et al. (2012); Shen (2014); Todeschini et al. (2017)
40	Economic and social	Sustainability performance of focal companies	x						Li et al. (2014); Todeschini et al. (2017)
41	Economic and social	Fashion leasing (Recycling)					x		Ertekin & Atik (2015)
42	Environmental and social	Ant consumerism movement					x		Joy et al. (2012); McNeill & Moore (2015)
43	Environmental and social	Eco-dress (hippie movement)					x		Joy et al. (2012)
44	Environmental and social	Adopt the slow fashion movement					x		Jung & Jin (2014); Jung & Jin (2016); Todeschini et al. (2017)
45	Environmental and social	Sustainability and consumer education	x						Jung & Jin (2016); Diddi et al. (2019); Todeschini et al. (2017); Bocken & Short (2016)
46	Environmental and social	Green distribution					x		Shen (2014)
47	Economic and social	Choose and reward responsible partners	x						Li et al. (2014); Todeschini et al. (2017)
48	Economic and social	TRAID (Textile Recycling for Aid and International Development)	x						Ertekin & Atik (2015)
49	Economic and social	WRAP (Waste & Resources Action Programme)	x						Ertekin & Atik (2015)
50	Environmental, economic and social	Sustainable fashion supply chain management principles	x						Turker & Altuntas (2014); Shen (2014); Li et al. (2014)
51	Environmental, economic and social	Intense communication with suppliers to produce sustainable products					x		Turker & Altuntas (2014)
52	Technical	Monitoring and auditing the processes in their supply chain					x		Turker & Altuntas (2014); O'Rourke (2014); Todeschini et al. (2017)
53	Technical	Just-in-time strategies					x		Turker & Altuntas (2014)
54	Technical	Agile supply chain structures					x		Turker & Altuntas (2014)
55	Technical	Qualitative and quantitative sustainability indicators					x		Turker & Altuntas (2014); O'Rourke (2014)

C= Concept; P= Program; G= Guidelines; T=Tool; Mov=Movement; 9Rs = redesign, recover, repair, remanufacturer, reuse, recycle, redirect, recuse, rethink.

We assign the practices in Table 4 to the four common dimensions (environmental, economic, social, and technical) based on the surveyed papers. All the practices were classified in terms of concepts (technical definitions), programs (regular initiatives), guidelines (set of procedures or methodologies), tools, movements, and the 9Rs to promote the Circular Economy (redesign, recover, repair, remanufacture, reuse, recycle, redirect, recuse, rethink). In total, there were 55 practices organized in 12 concepts, 7 programs, 17 guidelines, 9 tools, 6 movements, and 5 9Rs, organized among the combined dimensions: 15 environmental, 2 environmental and economic, 2 economic and social, 5 environmental and social, 1 economic, 3 economic and social, 21 social, 2 environmental, economic and social, and 4 technical dimensions to promote sustainability in the fashion retail. Our selection of sustainable practices is based on an examination of the current literature.

The major change needed in the fashion retail companies identified in this study should give focus on promoting sustainability in the supply chain. In Table 4, it is possible to note that most of the initiatives have a clear effect on supply chain management. The main practices mentioned in the social and environmental perspectives are related to the use of ecodesign for the development of more sustainable products, exchange of conventional raw materials for organic or recyclable materials, and extending the life cycle of products, for example. It also involves the use of natural resources along the production chain, constantly monitoring the production stages and their workspaces, training, and guidance of employees on this subject.

In addition, the use of efficient marketing to encourage customers to get involved with the slow fashion movement was also taken into account. This was found in studies

on brand loyalty, public knowledge about sustainability, and their interest in changing their purchase behavior. Kim & Oh (2020); Parres Serrano et al. (2020); Parguel et al. (2020); Pencarelli et al. (2020), demonstrated the use of green marketing strategies through word association to communicate and promote the sensibilization in consumers about sustainable products. According to Arrigo (2020), the adoption of sustainable best practices in sourcing locations can contribute to building a reputation for strategic sourcing for fast fashion retailers, shifting from traditional offshoring to a new "Right-Shoring".

As well as, Marques et al. (2020) highlight the future implications considering the increase in fiber production, demand for water and energy, changes in paradigms in the sustainable design process, materials with advanced and recyclable fibers, and new technologies that will lead to the structure of Industry 4.0.

4 Conclusion

The definition of the concept of sustainability is perceived in different ways by producers, fashion brands, consumers and academia, which makes it difficult to parameterize how sustainable the modes of production can be or what level to reach. The main implications regarding the balance point to meet customer demands, social and environmental issues converge to the construction of a new supply chain model that has now become globalized. Thus, the strategies converge to a closed circuit whose materials and products can be reused within the production stages that are related to the management of the product's life cycle.

In this way, the proposition of new circular business models that adopt sustainable practices is meant to maintain the value of the product within the economy. In addition, consumer behavior has a considerable weight in relation to purchasing power, which is directly related to the ethical and social responsibility positioning attributed to companies and consumers. In this sense, we understand that only the use of ecological and recyclable materials are basic principles that must be at the heart of the production system along with the slow fashion movement that aims to slow down consumption, increase awareness of the systemic impacts of the chain and the post-use of products, as well as opting for quality and sustainable practices.

Thus, further studies on the sustainability of supply chain management and on how to motivate consumers to understand the consequences of fast fashion model causes on the environment society will be necessary to generate a change in consumer purchasing patterns. Therefore, the 55 practices identified can serve as a basis for the development of new alternatives in future research.

Acknowledgements

This work was supported to Daiane Vitória da Silva by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) under process code 88887.498791/2020-00 and Finance Code 001. This work was supported to Gabriela Giusti by Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP) under process code 2021/06685-1. This work was supported to Diogo Aparecido Lopes Silva by Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) under CNPq 06/2019 - Research Productivity Scholarships. Process: 302722/2019-0.

Statement on Data Availability

The data can be accessed in the Mendeley Repository at the available link:
<https://data.mendeley.com/drafts/x5jrx4smdz>

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Nátalie Martins Prado, assisted in literature revision, data analysis and writing the manuscript. Marina Hernandez de Paula e Silva, assisted in the literature revision, data analysis and writing the manuscript. Camila Sayuri Kikuti Kaneko, assisted in data collection, data analysis, and writing the manuscript. Daiane Vitória da Silva, assisted in the literature revision, data analysis and writing the manuscript. Gabriela Giusti, assisted in the literature revision, data analysis and writing the manuscript. Yovana Maria Barrera Saavedra, assisted in the theory-methodological approach definition, data analysis, writing and final revision of the manuscript. Diogo Aparecido Lopes Silva, assisted in the paper conceptualization, theory-methodological approach definition and carried out the final revision of manuscript.