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Consumer perceptions and actions related to circular fashion items: Perspectives of young Brazilians on circular economy

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Abstract

The fashion industry is one of the most important industries for the world economy, but is also one of the most polluting. Some fashion companies have been adopting circular economy initiatives to combat this. Circular fashion (CF) results in cleaner production and reduces textile waste, but depends on consumer collaboration. Several studies analysing consumer CF issues worldwide have been recently published, but these studies are not common in emerging countries. This paper seeks to investigate the relationships between Brazilian consumers and CF. The methodology comprised a systematic literature review and survey. The main results show that, although young consumers are willing to change their clothing consumption habits and believe that fashion companies should be more sustainable, most of them never get involved in circular actions in the fashion chain. This paper seeks to fill a research gap on Brazilian CF, and contribute to both literature and the fashion industry in developing countries.

Keywords

Circular economy, fashion industry, circular fashion, sustainability, young consumers, developing countries

Received 24th January 2022, accepted 8th June 2022 by Associate Editor Andreas Bartl.

Introduction

The fashion industry is one of the most significant industries in the global economy, with worldwide annual sales totalling more than $450 billion (Resta et al., 2016; B. Wang et al., 2020). The fashion industry underwent significant changes in 2020 due to the coronavirus pandemic. Almost three-quarters of all listed fashion companies reported losses, which were some of the worst to date (Amed and Berg, 2020). Fashion companies need to reduce complexity and find ways of increasing full-priced sell-through to decrease inventory levels by taking a demand-focused approach to their assortment strategies (Amed and Berg, 2020).

In addition to problems associated with the Covid-19 pandemic, which increased waste generation and made waste management even more difficult (de Aguiar Hugo and da Silva Lima, 2021; Moraes et al., 2021), the fashion industry is also under pressure to become more sustainable, since it is one of the most polluting and socially challenged industries in the world, as many nonrecoverable materials and blends are used in clothing. The fashion industry also uses a lot of water and dangerous chemicals during manufacturing processes. Additionally, it has a poor human rights record (Provin et al., 2021). Although some fashion products can be recycled or donated to charity, industrialization and fast fashion trends make the clothing pollution problem much more severe, especially during the manufacturing, sales, distribution and use phases (Hu et al., 2014). Specific laws are

necessary for proper waste disposal (Paes et al., 2017), because waste also negatively impacts landfills in the form of methane emissions and groundwater pollution from toxic leachate (Han et al., 2017). These waste management techniques must be monitored for sustainability (Alves et al., 2021; Moraes et al., 2020).

The fashion industry needs to eliminate pollutants released into the environment to reduce environmental problems. Clothing should be designed to last longer, and the way fashion products are designed, sold and used needs to be reconsidered. Recycling systems need to be improved so the industry can recapture lost material value and eliminate negative impacts from disposing items. Resources should be more effectively used, and renewable inputs should always be the first choice (Atalay Onur, 2020; Ellen MacArthur Foundation, 2017). These changes would advance the fashion industry towards circular principles.

Circular economy (CE) was proposed as a sustainable alternative to current linear economic systems, extraction-manufacturing-disposal methods, and as a substitute for recirculating material

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resources for developing new products (Singh and Ordonez, 2016). CE also includes new business strategies, promoting new understandings of design principles and slowing the pace of consumption (Forman and Carvalho, 2018). Moreover, innovative industries might benefit from new circular value creation (Repp et al., 2021).

However, circular strategies also require consumer engagement. Communication strategies focusing on specific pro-environmental behaviour could be effective in persuading people to adopt more pro-environmental practices, resulting in positive spill overs (Ha and Kwon, 2016). Consumers need to be informed on sustainable fashion product solutions via labels or using information campaigns (Friedrich, 2021), since more consumer education and more consumer information on fashion sustainability will influence their behaviour and purchasing patterns more (Blazquez et al., 2020).

Understanding consumer evaluations on green products helps reduce the need for using raw materials in the future (Adıgüzel and Donato, 2021). Many studies conducted worldwide prove that consumers are in favour of these practices, as exemplified by Adıgüzel and Donato (2021), who found that consumers favour upcycled and recycled luxury products to unsustainable luxury products. Chaturvedi et al. (2020) also found that people proudly wear sustainable clothing, even though it is more expensive than normal clothing.

These studies are not common for developing countries like Brazil, where many fashion industries are still stuck in linear models. Developing countries are trying to find ways of migrating to circular models, but there are few studies in these countries. Kirchherr and van Santen (2019) analysed 160 EC papers and found that only 5% focused on emerging economies. Emerging economies are global centres of production, and Brazil is already a driver of consumption (Galatti and Baruque-Ramos, 2019). The Brazilian textile and apparel industry is a sector worth investigating, since Brazil ranks fifth amongst the largest textile producers in the world, and fourth amongst the largest clothing producers in the world (Abit, 2018).

This paper seeks to investigate the relationship between Brazilian consumers and circular fashion environmental issues, to determine what consumers think about new consumption ideas, and how willing they are to change towards sustainable fashion. The research method was a systematic literature review (SLR) and survey. The data were collected using SLR to conduct the survey to fill a research gap on Brazilian circular fashion and to contribute to literature and the fashion industry for developing countries.

This paper is divided into seven sections. The introduction is presented in section "Introduction." Section "Fashion circular economy initiatives" presents a brief background on CE initiatives in the fashion industry. Section "Methodology" presents the methodology and section "Results" presents the results. Section "Discussions" presents the discussions and section "Conclusions" presents the conclusions, followed by the limitations of this study and recommendations for future studies. This is followed by the acknowledgments, the references, and appendices.

Fashion CE initiatives

Several CE practices have already been adopted in fashion industry production systems to minimize the environmental problems generated by the sector. These practices fit well within three key CE principles, that is, reusing, recycling and extending product-lifespans (Colucci and Vecchi, 2021). Reduction practices and/or resource preservation practices could also be added to this list as sustainable strategies for reducing environmental impacts (Colucci and Vecchi, 2021).

One reduction practice implemented by the fashion industry is reducing raw material consumption, which optimizes material resources to use only what is necessary to reduce waste (Todeschini et al., 2017). Reducing raw materials implies using techniques for efficiently cutting fabric patterns, for example, patchwork to optimize available materials (Mishra et al., 2020). This can be done using material management practices to reduce environmental impacts (Talay et al., 2020).

Another reduction initiative fitting into resource preservation is reducing natural resources and chemicals. Fashion companies have adopted technologies that reduce natural resource consumption, like water, and that reduce chemicals used in productive processes (Claxton and Kent, 2020; Talay et al., 2020).

Slow fashion consumption reduction is another reduction initiative to extend garment lifespans. Companies that adopt slow fashion practices generally use more local infrastructures and reduce production to smaller batch sizes by using traditional craft techniques and locally produced materials (Blazquez et al., 2020). This practice is meant to extend clothing use, for example, clothing should be created to be used and valued for as long as possible, by using items that consumers already own, withholding from purchasing more clothing in quick succession (Freudenreich and Schaltegger, 2020), thereby reducing over consumption promoted by fast fashion.

Second-hand clothes and rented clothes are some examples of reuse. These practices extend product lifespans and reduce fashion production (Colucci and Vecchi, 2021; Durrani, 2018), since clothes are made to last and be valued for as long as possible (Freudenreich and Schaltegger, 2020). Reuse also includes resource preservation techniques that reuse natural resources by employing water recapture systems, heat recovery systems, or CO_2 recovery systems, or by reusing raw materials, for example, leather scraps, cotton waste, wool scraps or reused fabrics (Colucci and Vecchi, 2021).

Textile recyclers reuse or reprocess used clothing, fibrous material, and clothing waste recovered from manufacturing processes (Hu et al., 2014). New technologies are currently being developed to help recycling processes, for example, classification technologies that use sorting equipment to classify fabrics by fibre type (Sandvik and Stubbs, 2019). Another example is prototype chemical recycling to reprocess mixed fibres and cotton textiles waste back into fibres (Norris, 2019).

Furthermore, essential functions must be considered when using commercial textile-to-textile recycling technologies, for

example, traceability, transparency, standardization, automatization and connections with different stakeholders or processes (Sandvik and Stubbs, 2019). The first step for recycling, reusing or reprocessing used clothing is collecting textile waste. Some fashion companies, like H&M and Renner S.A., use reverse logistics for unwanted consumer clothing, setting up collection points in their stores (H&M, 2018; Renner, 2021).

Another sustainable practice that fashion industries are implementing is using natural fibres to make products 100% biodegradable (Brydges, 2021). Gucci introduced 100% biodegradable shoes made from APINAT, and Stella McCartney launched a shoe collection made from biodegradable bio-plastic (Moorhouse and Moorhouse, 2017). Also, there are vegan fashion products that use production approaches that deliberately refrain from using raw materials of animal origin (Todeschini et al., 2017).

Methodology

The selected research method was a SLR and survey. SLR helps identify relevant academic literature in a particular research area, and critically evaluates the selected topic (Siemieniako et al., 2021). A survey collects primary data from individuals, which is useful for collecting general information on people's experiences (Hair et al., 2003).The methodology was organized using the following three steps: data collection, data analysis and synthesis (Enomoto and Lima, 2007; Tranfield et al., 2003).

The databases chosen for the SLR searches were the ISI Web of Science (WoS) and Scopus, which are indexed databases that allow users to export necessary metadata to perform bibliometrics (Gonçalves et al., 2018). The search period for the two databases was from January to May 2021. The keywords used were: 'circular economy' and 'fashion industry' or 'fashion retail' or 'fashion supply chain' or 'fast fashion'. The search returned 729 publications in the WoS and 54 in the Scopus database, resulting in 783 articles listed in a number of publications per year.

From the 783 publications, we decided to apply exclusion criteria using some refinement filters such as document type (only articles), a language filter (only texts in English and Portuguese) and year of publication (only articles published between 2011 and 2021). After applying these filters, the result was 509 publications for both databases.

The titles and abstracts from the 509 articles were carefully read to identify relevant records for this review, and the first screening was based on analysing the titles and abstracts. Then, we excluded 426 papers that did not meet our inclusion criteria, which were to fit the research scope for CE in the fashion industry. Some articles were on circular economies but for different sectors, while the other seven were not available for full reading. When the authors could not reach a consensus, the full paper was analysed and discussed. Next, the snowball sampling technique was employed to identify the most relevant references that were not retrieved in the initial sample, considering the most cited studies that fit the research scope, using the same screening process. The result was a final sample of 66 articles (WoS Ω Scopus and WoS υ Scopus) resulting from this process.

The final phase of SLR consists of a detailed analysis of each preselected article from the previous stages. Sixty-six publications (Appendix 1) were read and analysed to collect information used for carrying out the survey and to compare the results in the discussion. This process is illustrated in Figure 1.

The survey was conducted using a structured questionnaire with 39 questions formulated using Google Forms (Appendix 2). The questionnaire was sent to undergraduate and graduate students from 22 Brazilian universities located in different states, via email and social networks, from May to August 2021. We obtained 102 valid responses for analysis. We believe that the low adherence level to the survey was due to the Covid-19 pandemic. Brazil was going through a very troubling period at the time this study was conducted, and many of these universities were closed, thereby hindering more student participation.

The student answers were collected using a Likert scale ranging from 1 to 5, with 1 being 'strongly disagree' and 5 being 'strongly agree'. There were also objective questions that offered alternative answers and questions to which the student could expound upon. These questions were aimed at getting to know the student's knowledge on issues related to post-consumption reverse logistics, CE, correct disposal for clothing at some stores, and fashion consumption behaviour (clothes, shoes, accessories, etc.).

Results

Metadata from the WoS and Scopus databases resulted in 66 articles in the final sample for number of publications per year. The number of publications has grown over time, as shown in Figure 2.

The graph also shows more publications that analysed consumer behaviour relative to circular initiatives adopted by the fashion industry. Consumer studies are becoming more important in light of the Covid-19 pandemic, which has slowed the fashion industry (McMaster et al., 2020). Of the 66 articles analysed, 22 addressed this issue, showing the importance of this type of research. These 22 papers are described in Table 1 along with the countries where the studies were published.

Table 1 shows that the United States dominates research on consumer fashion. We can also observe that there is a lack of research for emerging countries. During the last three decades, countries like Brazil, Russia, India, China and South Africa have been undergoing fast urbanization, generating significant increases in waste (Gonçalves et al., 2018; Y. Wang et al., 2016).

Possibly, one reason why emerging countries are less studied is the lack of a sustainability transition. According to Geissdoerfer et al. (2017), CE is seen as a condition for sustainability, and as a beneficial relation. However, sustainability transitions involve far-reaching changes throughout different sectors: technological, material, organizational, institutional, political, economic and sociocultural (Markard et al., 2012) considering not only the usual economic factors but also the social and environmental in order to ensure the perpetuity of the enterprise (Nadae and de Carvalho, 2019).
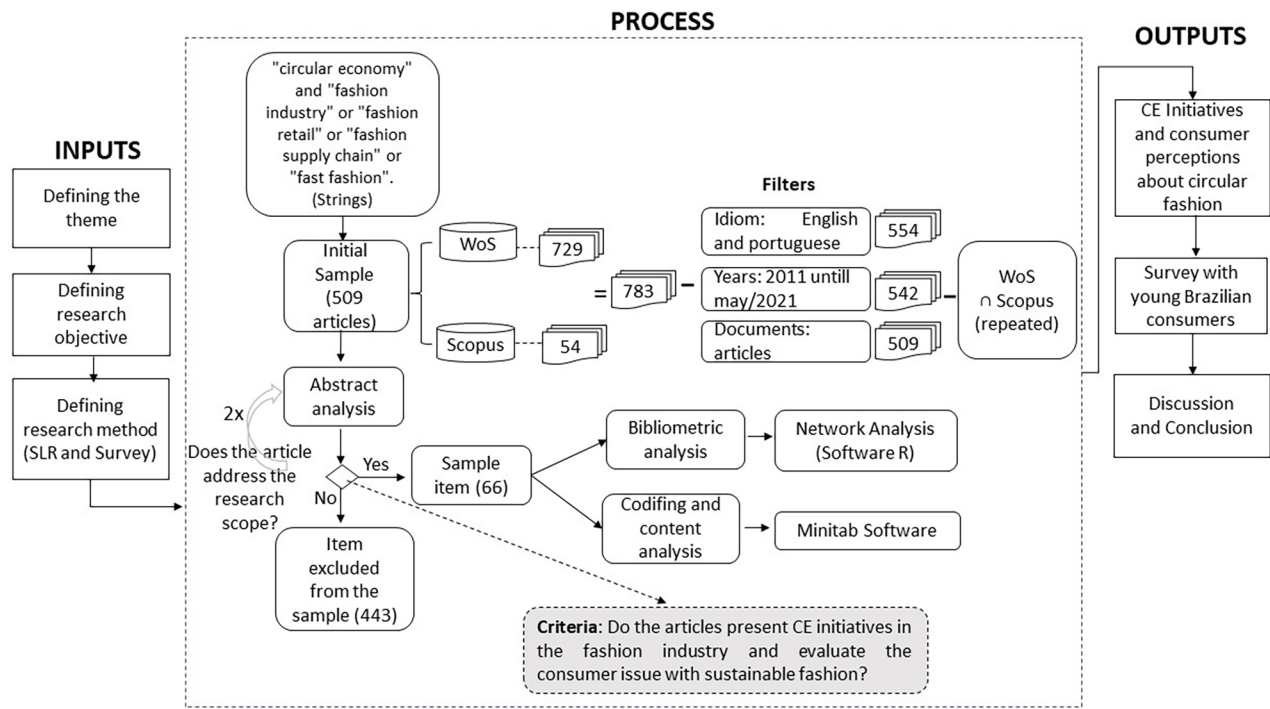
Figure 1. Flow diagram for the SLR.
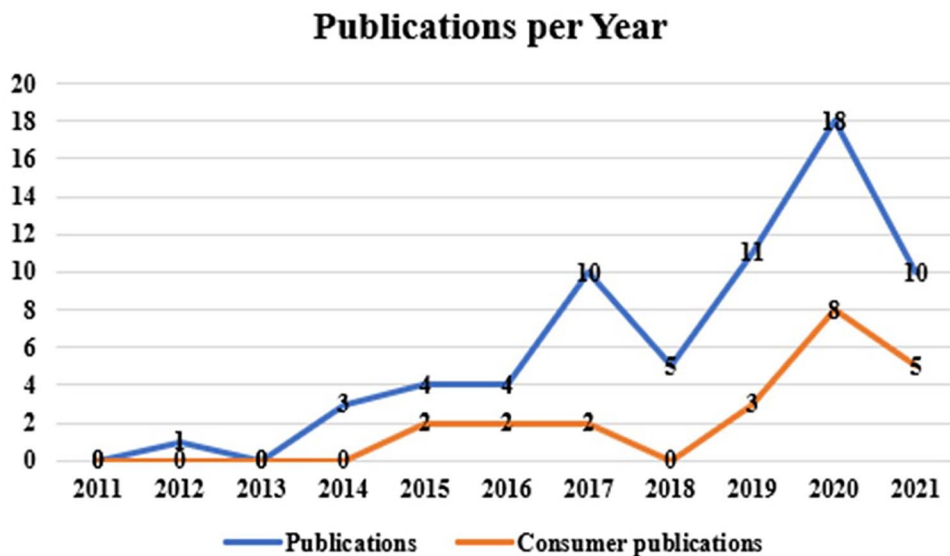Source: The authors of this study.

Figure 2. Publications per year up to May 2021.
Source: The authors of this study.

However, CE can lead to some adversities for emerging economies, since negative employment effects for countries involved in apparel production are higher, the more upstream the activities (Repp et al., 2021). Therefore, it is important that more research be carried out in these countries, to find a balance between social, environmental and economic factors, since they are major contributors to global pollution.

Furthermore, academic research on CE has just begun to emerge, and this is why it is still fragmented, mainly at the applied level (Korhonen et al., 2018). Kirchherr et al. (2017)

carried out a study of 114 definitions for the CE, and found that some authors possess wrong knowledge surrounding this concept, as they entirely equate CE with recycling, for example. Therefore, studies that consult the general public at large are very significant, since even scholars in the area are sometimes mistaken with respect to CE concepts.

The 22 publications described in Table 1 took different approaches and analysed consumer relationships with renting or purchasing second-hand, recycled, repaired clothing, or clothing made from natural materials. Other studies have surveyed

Table 1. Consumer studies and respective countries.

Identification number	Paper	Country of study	Authors
1	Consumers' value and risk perceptions of circular fashion: Comparison between second-hand, upcycled, and recycled clothing	South Korea	Kim et al. (2021)
2	Consumer perceptions related to clothing repair and community mending events: A circular economy perspective	USA	Diddi and Yan (2019)
3	Toward a circular economy: Understanding consumers' moral stance on corporations' and individuals' responsibilities in creating a circular fashion economy	USA	Ki et al. (2021)
4	Fast fashion avoidance beliefs and anti-consumption behaviours: The cases of Korea and Spain	South Korea and Spain	Yoon et al. (2020)
5	Fashionable detachments: Wardrobes, bodies and the desire to let go	Uninformed	Mellander and Petersson McIntyre (2020)
6	The impact of fast fashion retailers' sustainable collections on corporate legitimacy: Examining the mediating role of altruistic attributions	USA	Miotto and Youn (2020)
7	Sustainability efforts in the fast fashion industry: Consumer perception, trust and purchase intention	Sample from different countries	Neumann et al. (2020)
8	Eco-fashion adoption in the UAE: Understanding consumer barriers and motivational factors	United Arab Emirates	Munir (2020)
9	Trends in the fashion industry. The perception of sustainability and circular economy: A gender/generation quantitative approach	Italy	Gazzola et al. (2020)
10	Consumers' knowledge and intentions towards sustainability: A Spanish fashion perspective	Spain	Blazquez et al. (2020)
11	Exploring young adult consumers' sustainable clothing consumption intention-behaviour gap: A Behavioural Reasoning Theory perspective	USA	Diddi et al. (2019)
12	Second-hand clothing consumption: A generational cohort analysis of the Chinese market	China	Liang and Xu (2018)
13	The four faces of apparel consumers: Identifying sustainable consumers for apparel	USA	Park et al. (2017)
14	Spill over from past recycling to green apparel shopping behaviour: The role of environmental concern and anticipated guilt	USA	Ha and Kwon (2016)
15	Sustainable development of slow fashion businesses: Customer value approach	USA	Jung and Jin (2016)
16	Sustainable fashion consumption and the fast fashion conundrum: Fashionable consumers and attitudes to sustainability in clothing choice	New Zealand	Mcneill and Moore (2015)
17	Sustainable brand extensions of fast fashion retailers	USA	Hill and Lee (2015)
18	Comparative analysis of sustainability measures in the apparel industry: An empirical consumer and market study in Germany	Germany	Friedrich (2021)
19	Consumer attitude towards sustainability of fast fashion products in the UK	United Kingdom	Zhang et al. (2021)
20	Product-service systems and sustainability: Analysing the environmental impacts of rental clothing	Sweden	Johnson and Plepys (2021)
21	Proud to be sustainable: Upcycled versus recycled luxury products	USA	Adıgüzel and Donato (2021)
22	Investigating the determinants of behavioural intentions of generation Z for recycled clothing: An evidence from a developing economy	India	Chaturvedi et al. (2020)

Source: The authors of this study.

consumer perceptions of sustainable fashion companies and slow fashion. Some papers analysed consumer awareness and their pro-environmental behaviour in relation to fashion.

Figure 3 gives a summary of the objectives of this study according to the numbering proposed in Table 1, which identified each author and article name. This figure also includes a
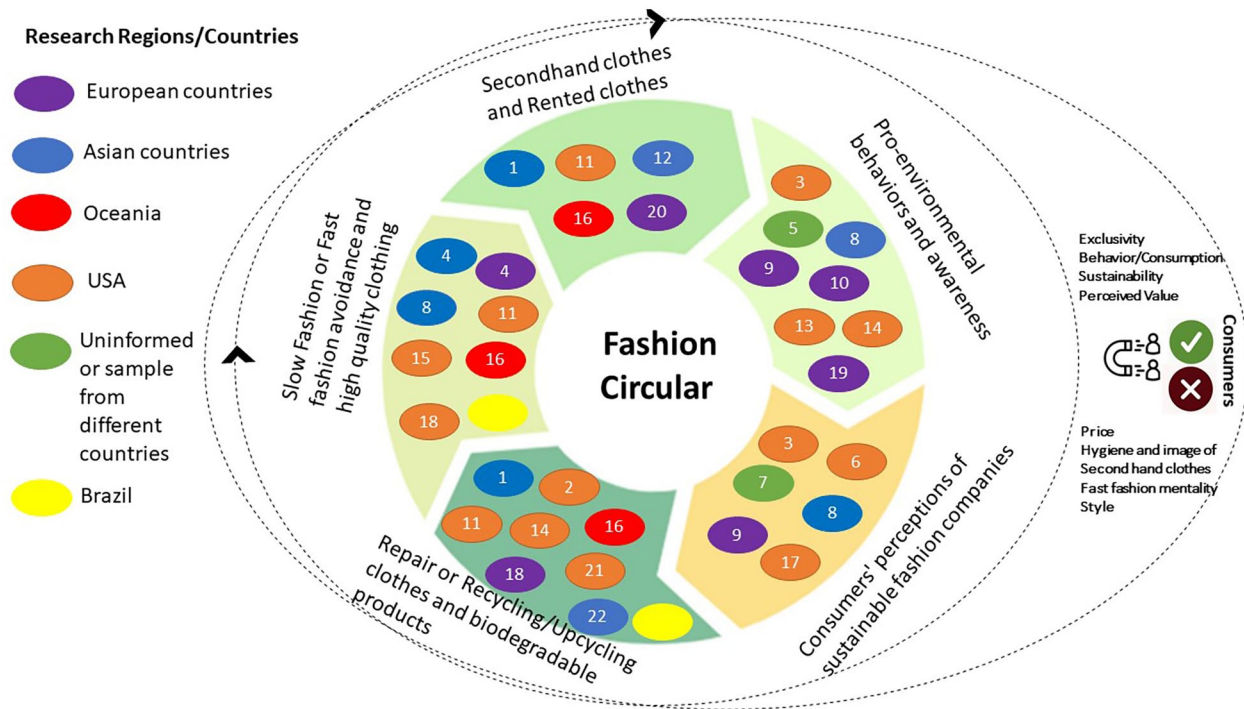
Figure 3. Article proposals.
Source: The authors of this study.

paper that carried out a case study at a Brazilian fashion company, which is the only company in Brazil that is a signatory to the 2020 Circular Fashion System Commitment (Ostermann et al., 2021).

Figure 3 shows that articles address more than one objective, for example, paper 8 by Munir (2020), which analysed consumer perceptions on slow fashion and sustainable companies, and their environmental behaviour. Figure 3 also lists the main analysed SLR characteristics that attract and/or distance consumers from circular fashion.

According to the studies, the main criteria that bring consumers closer to sustainable fashion can be summarized by three factors, which are associations with sustainable causes, exclusivity and perceived product value. Clothing style, high prices, hygiene concerns for second-hand clothes and fast fashion mentalities were obstacles that keep consumers away from sustainable fashion.

Since 2019, many fast fashion companies have been on the decline, and this could indicate that consumer fast fashion mentalities are also on the decline. Simultaneously, however, Shein has slowly become the biggest online retailer, and one of the biggest fast-fashion brands in the world. From 2018 to 2021, the brand exponentially grew its revenue by 700%, from $2 to $15.7 billion, compared to $21.5 and $21.2 billion for Zara and H&M, respectively (UOL, 2022).

By contrast, we currently also see several emerging fashion companies that are seeking to be more sustainable, for example, Revoada and Ecoalf. Revoada is a Brazilian sustainable fashion company that uses discarded tire tubes and umbrella fabric as source raw material (Revoada, 2022), but the company it still

relatively little known among the general populous. The survey results are presented below to better understand young Brazilian consumers relative to circular fashion.

The survey was applied to undergraduate and graduate students from 22 Brazilian universities (12 public universities and 10 private universities). One hundred two responses were obtained from 39 graduate students and 63 undergraduate students. Most of them came from engineering courses (56%), but there were also students who were studying law, administration, accounting sciences, etc. With respect to gender, the responses were balanced, since we obtained 52 male, and 50 female responses. We also registered the age of the students and the state where the university was located. Figure 4 shows a graph for responses on level of education and generation, and Figure 5 shows a graph of responses from different regions in Brazil.

Figure 4 shows that there were respondents from generation X (not the focus of this study). Despite the low level of Gen-X participation in the survey, we decided to keep them in the sample, since their age group (generation) is relatively similar to respondents from generation Y.

The first group of questions analysed if participants think fashion companies should offer items produced with nontoxic and biodegradable materials made using cleaner production processes. Table 2 shows the results of these questions.

The results show that consumers are aware of the importance of offering fashion items produced more sustainably, since most participants chose alternatives 4 and 5 (should provide).

According to this study, fashion companies should provide items produced to minimize waste, since 97% (sum of the percentages for alternatives 4 and 5) of all students think this is very
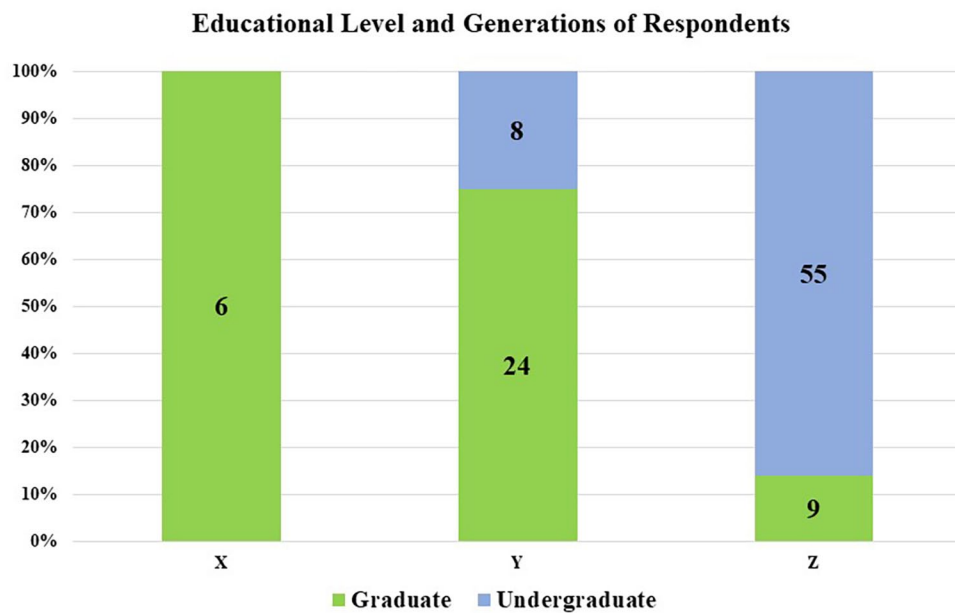
Educational Level and Generations of Respondents

Figure 4. Level of education and generation of respondents.
Source: The authors of this study.

important, while the remainder were neutral. This is a significant result.

Participants were also concerned with the materials used to produce fashion items. Around 63 and 62% of respondents thought that fashion companies should provide products made using nontoxic and compostable materials, and which are produced to minimize waste (respectively).

The second research group looked at how consumers think shopping for fashion items should be. The results are shown in Table 3.

Table 3 also shows that consumers are worried about sustainability in fashion shopping since the answers are more concentrated around 4 and 5 (agree and strongly agree).

We should note that most people seek to donate clothes they no longer use, or to recycle unusable products. Furthermore, most consumers are willing to buy fashion items that extend product lifespans with fabrics made from more sustainable materials.

The most heterogeneous question, in terms of responses, was related to second-hand purchases. Consumers are still not completely comfortable with this style of shopping.

Table 4 evaluate consumer willingness to change fashion consumption habits, and the probability of engaging in correct disposal programs for apparel items.

Table 4 shows that, although answers were still concentrated towards 4 and 5, there was a greater distribution of answers among the options provided. The worst results were related to issues dealing with purchasing second-hand clothes, given fewer answers towards 4 and 5, and a more divergent response field.

The participants favoured the last three questions most, that is, buying 'clothes with ecofriendly fabrics' (71.3%); 'buying more sustainable denim clothes' (73.5%); 'buying different products made from recycled material' (72.5%). This last question showed
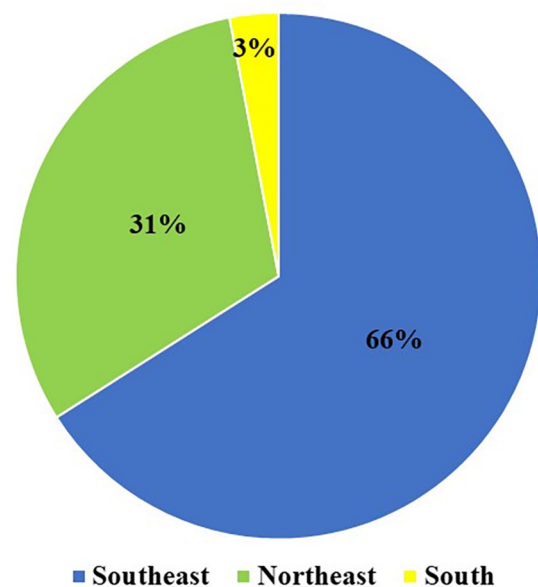
Figure 5. Regions of Brazilian respondents.
Source: The authors of this study.

interesting results because the question 'I like the idea of buying clothes made from recycled fibre' received the worse result (53.9%) compared to alternative 5 (strongly agree). This shows that people do not perceive recycled clothing as being the same as other recycled products.

Another issue showing good results was 'I like the idea of fashion companies accepting returned fashion items that customers no longer use' (71.6%). However, only 46.1% strongly favoured returning their old, used, or unwanted fashion items to fashion stores/companies for recycling, as per the first question. This can be problematic, since participants want companies to be more sustainable, but consumers are not willing to collaborate

Table 2. Should companies offer nontoxic items with compostable materials?

	Shouldn't provide → Should provide					Median	Mode
	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)		
Provide fashion items made using nontoxic and compostable materials.	3.9	1	6.9	25.5	62.7	5	5
Provide fashion items made with biodegradable materials.	0	1	10.8	28.4	59.8	5	5
Provide fashion items produced to minimize waste.	0	0	2.9	13.7	83.3	5	5
Provide fashion items produced to minimized raw material use.	2	4.9	11.8	19.6	61.8	5	5
Provide fashion items produced using recovery and reuse processes for industrial waste generated during manufacturing.	1	2	8.8	32.4	55.9	5	5
Provide fashion items produced from renewable energy (e.g. wind or solar energy).	0	1	6.9	23.5	58.6	5	5

Source: The authors of this study.

Table 3. How consumers think fashion shopping should be.

	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Median	Mode
	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)		
Purchase fashion items made from recycled materials instead of new products from raw materials.	0	1	13.7	34.3	51	5	5
Purchase fashion items that can be easily repaired to maximize product lifespan.	0	0	5.9	21.6	72.5	5	5
Purchase fashion items that can be easily redesigned (personalized) to maximize material use.	0	8.8	17.6	27.5	46.1	4	5
Purchase fashion items that can be easily dismantled to facilitate effective reuse or material recycling.	0	3.9	17.6	23.5	54.9	5	5
Purchase used fashion items instead of new items.	2.9	18.6	23.5	30.4	24.5	4	4
Give away unused fashion items to friends or relatives who might wear them.	0	2	2.9	10.8	84.3	5	5
Donate worn or irreparable fashion items to a recycling station for use as raw material (or components) as inputs to produce new fashion items.	0	1	2.9	14.7	81.4	5	5

Source: The authors of this study.

and engage with sustainable practices, thereby discouraging green actions at fashion companies.

Table 5 asks what participants do with their purchased fashion items and how they discard items they no longer use.

Different from the previous tables, most answers were not situated towards options 4 and 5 in Table 5. Most students (79.4%) have never returned clothes they no longer wear to stores that collect this type of waste, as per the first question. This significant result may be because many people are not aware of these initiatives promoted by some fashion companies, or because they live in cities where stores do not offer this service, since larger fashion store chains are normally located in big cities.

Another expressive result deals with online shopping for second-hand clothing, since almost 64% of all participants never purchased online second-hand clothing. Once again, we see that people are still very reluctant to wear clothes that once belonged to someone else.

The circular initiative that respondents practiced most was 'Shopping for clothes with dual functionalities', at 31.4% (sum of the percentages for alternatives 4 and 5). However, this result

is far below desirable levels for building efficient circular fashion economies and does not guarantee that people will buy this type of clothing to be more sustainable, since it may simply be a matter of financial savings.

Questions dealing with sustainable jeans, or recycled, biodegradable and ecofriendly materials showed similar results, at around 44% for alternative 1 (I never did this). We believe that this is due to the lack of supply for these types of products at Brazilian fashion stores, or little promotion of sustainable fashion items and consequently, consumers are unaware of the existence of green fashion items. Therefore, it is very important for the organization to share information and knowledge both internally and externally (Nadae et al., 2015).

Discussions

A SLR and survey were carried out and the main results from the survey were compared with results from publications analysed in the SLR. The results of this study were similar to results found in literature, as shown in Figure 6.

Table 4. Consumer preferences on purchases and disposing of fashion items.

	Strongly disagree 1 (%)	Disagree 2 (%)	Neither agree nor disagree 3 (%)	Agree 4 (%)	Strongly agree 5 (%)	Median	Mode
I like the idea of returning my old, used, or unwanted fashion items to fashion stores/companies for recycling.	1	2	12.7	38.2	46.1	4	5
I like the idea of fashion companies accepting returned fashion items that customers no longer use.	0	1	5.9	21.6	71.6	5	5
I like the idea of buying clothes at second-hand stores.	4.9	11.8	22.5	29.4	31.4	4	5
I like the idea of buying second-hand clothes on the internet.	8.8	15.7	27.5	19.6	28.4	3	5
I like the idea of buying clothes with dual functionality, for example, a dress that can be used as a skirt.	2	2.9	14.7	25.5	54.9	5	5
I like the idea of buying clothes made from recycled fibres.	0	1	13.7	31.4	53.9	5	5
I like the idea of buying clothes made from biodegradable fabrics.	0	2	11.8	24.5	61.8	5	5
I like the idea of buying clothes with ecofriendly fabrics (made from materials like organic cotton, hemp, linen, soy silk or orange silk).	0	1	7.8	19.6	71.3	5	5
I like the idea of buying more sustainable denim clothes.	0	0	4.9	21.6	73.5	5	5
I like the idea of buying different products made from recycled materials, like sunglasses made from recycled acetate material (reused waste produced during conventional glasses production).	1	0	10.8	15.7	72.5	5	5

Source: The authors of this study.

The first result of this study is that survey participants would like fashion companies to be more sustainable, because most believe that they should provide cleaner products made using environmentally responsible materials. This corroborates a study by Vahdati et al. (2015), who showed that the more consumers perceive that companies are taking responsibility for sustainability, the greater the consumer propensity for adding value to these companies and their sustainable products. Furthermore, when a brand opts to be more sustainable, people tend to view it in a better light (Hill and Lee, 2015).

This study also showed that young (generations Z and Y/millennials) consumers are more concerned about the sustainability of their fashion purchases, since most agree that they would like to buy fashion items made from green and/or recycled materials made sustainably. This result corroborates studies by Kim et al. (2021), Yoon et al. (2020), Chaturvedi et al. (2020), and Gazzola et al. (2020). According to these studies, younger generations are more interested in sustainability fashion issues, prefer buying sustainable brands, and are willing to spend more for green products.

Moreover, we can infer that people do not view recycled clothing the same as other recycled products. Participants in a study by Diddi et al. (2019), identified as being engaged in sustainable activities, like recycling. However, these orientations did not transfer to clothing consumption. This may be because consumers believe that circular fashion may be less durable or of poorer quality, less valuable, or present sanitary risks, since the products are made from discarded materials (Kim et al., 2021; Munir, 2020; Sheth et al., 1991).

Sanitary risks may also be responsible for participant distaste towards purchasing second-hand fashion items. Some papers verified that participants were worried about hygiene and contamination risks from previous owners of second-hand clothes (Diddi et al., 2019; Munir, 2020). Furthermore, clothing is still very much related to social status or image. For many consumers, choosing these types of clothes is antithetical to their aspirations of being seen with higher social status (Gazzola et al., 2020; Liang and Xu, 2018; Munir, 2020). However, participants in this study were more willing to buy second-hand clothes compared to Chinese, since 10% reported being willing to entertain this idea (Liang and Xu, 2018).

Therefore, we can infer those second-hand and recycled clothes are not priority purchases for the participants in this study, since the results showed lower adherence to level 5 responses (strongly agree) regarding purchase intentions. With respect to recycled clothing, this result was slightly different from results found in Kim et al. (2021), since 78.4% of surveyed South Koreans were willing to buy recycled clothes, contrasted with 53.9% of the Brazilians who participated in this study. Similarly, Friedrich (2021) asked German consumers about their willingness-to-pay levels and their slow consumption, recycling, petrochemical clothing, and bioplastic clothing preferences. They found that most respondents preferred recycled clothing.

Table 5. Current consumer fashion habits.

|	I never did this → I always do this					Median	Mode
	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)		
Return fashion items I no longer use to stores that use these items.	79.4	7.8	4.9	2.9	4.9	1	1
Make purchases from second-hand stores.	24.5	21.6	32.4	12.7	8.8	3	3
Conduct online shopping for second-hand clothes.	63.7	7.8	13.7	8.8	5.9	1	1
Shop for clothes with dual functionality, for example, dresses that can be used as skirts, double-sided t-shirts, etc.	27.5	20.6	20.6	19.6	11.8	3	1
Purchase clothes made from recycled fibres.	44.1	20.6	22.5	8.8	3.9	2	1
Purchase clothes made from biodegradable fabrics.	48	19.6	20.6	6.9	4.9	2	1
Shop for clothes made with ecofriendly fabrics.	44.1	24.5	14.7	12.7	3.9	2	1
Shop for more sustainable jeans.	44.1	17.6	21.6	12.7	3.9	2	1
Purchase various products made with recycled material, like sunglasses made from recycled acetate material (reused waste produced during conventional glasses production).	42.2	13.7	30.4	8.8	4.9	2	1

Source: The authors of this study.
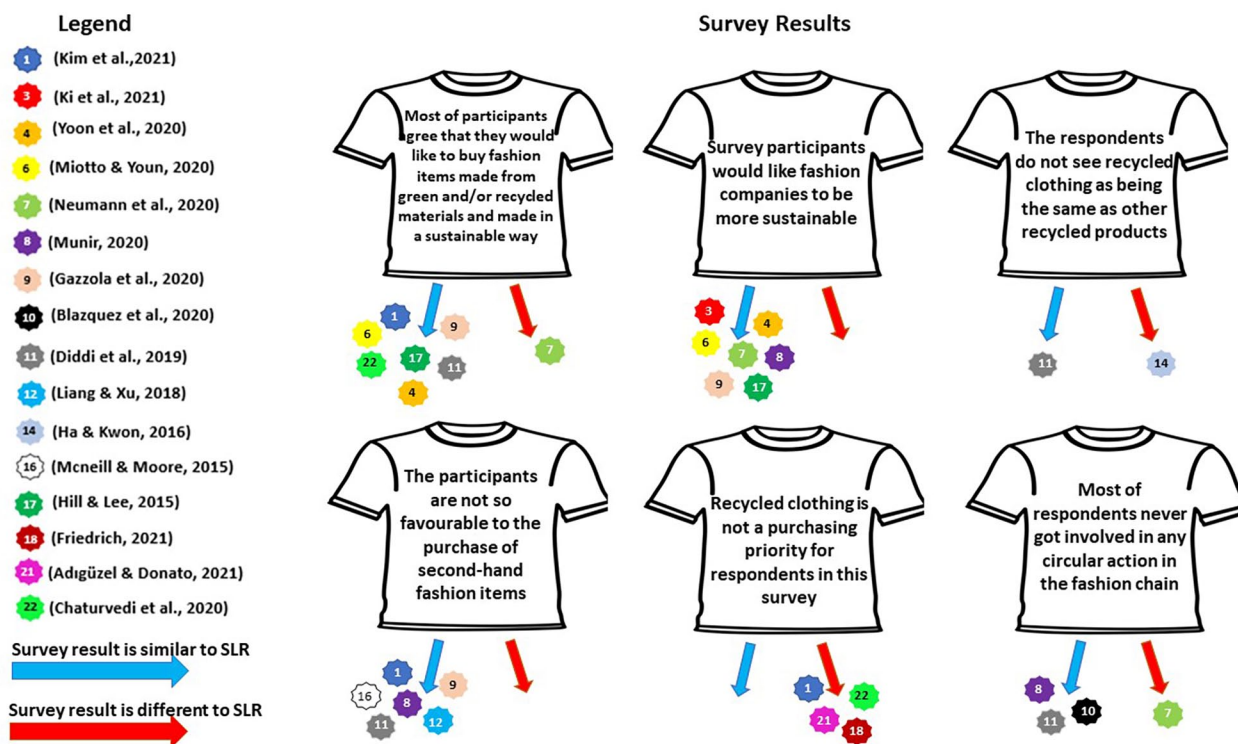
Figure 6. Are the survey results similar to the SLR results?
Source: The authors of this study.

While students like the idea of fashion companies accepting returned fashion items that customers no longer use, they are not willing to return their items to fashion stores for recycling to the same degree. This may be because discarding these items may in some way be related to letting go of their dreams and aspirations for the future (Mellander and Petersson McIntyre, 2020). Companies cannot make their supply chains truly sustainable unless consumers accept responsibility for returning their unwanted clothing (Ki et al., 2021). Therefore, it is important to encourage this initiative to increase adherence to circular causes.

The last finding of this study is that, although consumers are willing to change their clothing consumption habits and believe that fashion companies should be more sustainable, most never get involved in circular actions in the fashion chain. This contradiction was highlighted by other studies as well, that found that many participants are aware of sustainable fashion, yet these factors do not seem to play a key role in their final decision-making processes (Blazquez et al., 2020; Henninger, 2015). Moreover, lack of incentives for purchasing eco-fashion, the limited availability of sustainable fashion items, and unfamiliarity with sustainable clothing lines (Blazquez et al., 2020; Munir, 2020; Neumann et al., 2020) aggravate these issues.

This study contributed to literature on CE principles for the fashion sector, and to fashion companies that need consumer

feedback to promote more sustainability. This paper fills a gap on Brazilian circular fashion and contributes to literature on developing countries.

Conclusions

The fashion industry, for the most part, still operates using a linear model mainly driven by fast fashion (de Aguiar Hugo et al., 2021). However, some circular initiatives are slowly being implemented in this industry. So, this study sought to analyse the behaviour and opinions of Brazilian consumers relative to circular fashion environmental principles, since Brazil has been little studied in this area.

In general, the survey results corroborate most of the results from previous studies. However, Brazilian respondents do not consider recycled clothing to be a shopping priority. This result shows the need for more awareness and environmental education campaigns for the Brazilian public. Extra marketing efforts and raising awareness could be the main strategies for overcoming CE barriers (Hartley et al., 2022).

In Brazil, waste separation and recycling policies are still very little used among the general population. In most Brazilian homes, waste is mixed and discarded together. So, if there is no drastic change by local governments to encourage selective collection, Brazilians will likely remain unaware of more sustainable consumption alternatives.

This paper fills a research gap on Brazilian circular fashion, and contributes to literature and the fashion industry for developing countries. We hope that this study can positively influence both consumers and fashion companies in adopting new circular ideas to mitigate environmental impacts caused by current production chains.

Limitations and future studies

The study was conducted for undergraduate and graduate students at different Brazilian universities and is limited in that it does not account for a wide range of generations, since it is known that young people are more likely to adhere to sustainable causes.

Thus, different generations and different social classes could be studied, since little research on circular fashion of this nature has been carried out in Brazil. We also suggest that questions on monthly income and spending levels for fashion items be added to the surveys to verify how relevant fashion is for Brazilian consumers.

Moreover, the survey focused on CE environmental principles. This is also a limitation of the study, since CE social issues are a topic that should be studied more in emerging economies, given contradictions regarding job creation, as per (Kirchherr, 2021). So, future research should also investigate this topic.

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Appendix

Appendix 1. Publications analysed in the systematic literature review.

Title	Authors
Closing the loop on take, make, waste: Investigating circular economy practices in the Swedish fashion industry	Brydges (2021)
Consumers' value and risk perceptions of circular fashion: Comparison between secondhand, upcycled, and recycled clothing	Kim et al. (2021)
Homo sustentabilis: Circular economy and new business models in fashion industry	Marques et al. (2020)
Consumer perceptions related to clothing repair and community mending events: A circular economy perspective	Diddi and Yan (2019)
Innovative and sustainable business models in the fashion industry: Entrepreneurial drivers, opportunities, and challenges	Todeschini et al. (2017)
Sustainable design: Circular economy in fashion and textiles	Moorhouse and Moorhouse (2017)
Standard vs. upcycled fashion design and production	Han et al. (2017)
Sustainable product development processes in fashion: Supply chains structures and classifications	Y. Fung et al. (2021)
Sustainability prerequisites and practices in textile and apparel supply chains	Warasthe et al. (2020)
Toward a circular economy: Understanding consumers' moral stance on corporations' and individuals' responsibilities in creating a circular fashion economy	Ki et al. (2021)
Close the loop: Evidence on the implementation of the circular economy from the Italian fashion industry	Colucci and Vecchi (2021)
Investigating the determinants of behavioral intentions of generation Z for recycled clothing: an evidence from a developing economy	Chaturvedi et al. (2020)
The management of sustainable fashion design strategies: An analysis of the designer's role	Claxton and Kent (2020)
Fast fashion avoidance beliefs and anti-consumption behaviors: The cases of Korea and Spain	Yoon et al. (2020)
How small suppliers deal with the buyer power in asymmetric relationships within the sustainable fashion supply chain	Talay et al. (2020)
Fashionable detachments: Wardrobes, bodies and the desire to let go	Mellander and Petersson McIntyre (2020)
The impact of fast fashion retailers' sustainable collections on corporate legitimacy: Examining the mediating role of altruistic attributions	Miotto and Youn (2020)
Sustainability efforts in the fast fashion industry: consumer perception, trust and purchase intention	Neumann et al. (2020)
Eco-fashion adoption in the UAE: Understanding consumer barriers and motivational factors	Munir (2020)
The anatomy of circular economy transition in the fashion industry	Mishra et al. (2020)
Trends in the fashion industry. The perception of sustainability and circular economy: A gender/generation quantitative approach	Gazzola et al. (2020)
Developing sufficiency-oriented offerings for clothing users: Business approaches to support consumption reduction	Freudenreich and Schaltegger (2020)
Integrating circular economy, collaboration and craft practice in fashion design education in developing countries: A case from Turkey	Atalay Onur (2020)
Consumers' knowledge and intentions towards sustainability: A Spanish fashion perspective	Blazquez et al. (2020)
Sustainable planning strategies in supply chain systems: Proposal and applications with a real case study in fashion	Y. N. Fung et al. (2020)
Traceability management systems and capacity building as new approaches for improving sustainability in the fashion multi-tier supply chain	Mejías et al. (2019)
Management of sustainable fashion retail based on reuse: A struggle with multiple logics	Hedegård et al. (2020)
Circular textiles: Closed loop fiber to fiber wet spun process for recycling cotton from denim	Ma et al. (2019)
Recent sustainable trends in Vietnam's fashion supply chain	Nayak et al. (2019)
From singular to plural: Exploring organizational complexities and circular business model design	Pedersen et al. (2019)
Circular fashion supply chain through textile-to-textile recycling	Sandvik and Stubbs (2019)
Waste, dirt and desire: Fashioning narratives of material regeneration	Norris (2019)
Environmental prospects for mixed textile recycling in Sweden	Peters et al. (2019)
Exploring young adult consumers' sustainable clothing consumption intention-behavior gap: A behavioral reasoning theory perspective	Diddi et al. (2019)
The physicochemical investigation of hydrothermally reduced textile waste and application within carbon-based electrodes	Randviir et al. (2019)
Ethical consumer behaviour in Germany: The attitude-behaviour gap in the green apparel industry	Wiederhold and Martinez (2018)

(Continued)

Appendix 1. (Continued)

Title	Authors
People gather for stranger things, so why not this? Learning sustainable sensibilities through communal garment-mending practices	Durrani (2018)
Developing a national programme for textiles and clothing recovery	Bukhari et al. (2018)
Second-hand clothing consumption: A generational cohort analysis of the Chinese market	Liang and Xu (2018)
Strategic approaches to sustainability in fashion supply chain management	Macchion et al. (2018)
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Effective disclosure in the fast-fashion industry: From sustainability reporting to action	Garcia-Torres et al. (2017)
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A Triple Bottom Line Approach for Measuring Supply Chains Sustainability Using Data Envelopment Analysis	Cortes (2017)
The four faces of apparel consumers: Identifying sustainable consumers for apparel	Park et al. (2017)
A strenuous path for sustainable supply chains in the footwear industry: A business strategy issue	Ciasullo et al. (2017)
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Sustainable rent-based closed-loop supply chain for fashion products	Hu et al. (2014)
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Proud to be sustainable: Upcycled versus recycled luxury products	Adıgüzel and Donato (2021)
CSR statements in international and Czech luxury fashion industry at the onset and during the COVID-19 pandemic – slowing down the fast fashion business?	Pelikánová et al. (2021)
Solving the puzzle of sustainable fashion consumption: The role of consumers' implicit attitudes and perceived warmth	Grazzini et al. (2021)
Novel sustainable alternatives for the fashion industry: A method of chemically recycling waste textiles via acid hydrolysis	Sanchis-Sebastiá et al. (2021)
Consumer attitude towards sustainability of fast fashion products in the UK	Zhang et al. (2021)
Product-service systems and sustainability: Analysing the environmental impacts of rental clothing	Johnson and Plepys (2021)

Appendix 2

Survey questionnaire

Post-consumption reverse logistics and circular economy of fashion items (clothes, shoes, accessories, etc.). We would like to invite you to participate in a survey by the Logistics, Transport and Sustainability Laboratory (LOGTRANS/UNIFEI), focusing on post-consumer reverse logistics and circular economy of fashion items (clothing, shoes, accessories, etc.). Your help as a consumer of these items will be of great importance. Completing this form takes just 10 minutes. We emphasize that all data are confidential, and we will treat them in aggregate form, respecting the principles of research ethics.

General information:

1. E-mail:

2. Age:

3. Gender:

4. Academic education:

( ) Undergraduate

( ) Graduate

5. University city and state:

6. Name of university or institution:

7. Course Name:

In your opinion:

8. Should companies offer non-toxic items with compostable materials?

Should not offer under any circumstances   1( ) 2( ) 3( ) 4( ) 5( )   Should offer under any circumstances

9. Should companies offer fashion items produced by biodegradable materials?

Should not offer under any circumstances   1( ) 2( ) 3( ) 4( ) 5( )   Should offer under any circumstances

10. Should companies offer fashion items produced to minimize waste?

Should not offer under any circumstances   1( ) 2( ) 3( ) 4( ) 5( )   Should offer under any circumstances

11. Should companies offer fashion items produced with minimized extraction of new virgin material?

Should not offer under any circumstances   1( ) 2( ) 3( ) 4( ) 5( )   Should offer under any circumstances

12. Should companies offer fashion items produced through water recovery and raw material reuse?

Should not offer under any circumstances   1( ) 2( ) 3( ) 4( ) 5( )   Should offer under any circumstances

13. Should companies offer fashion items produced with renewable energy (e.g. wind and solar energy)?

Should not offer under any circumstances   1( ) 2( ) 3( ) 4( ) 5( )   Should offer under any circumstances

As a consumer I believe I should. . .

14. Buying fashion items made from recycled materials instead of new raw material products.

Strongly Disagree   1( ) 2( ) 3( ) 4( ) 5( )   Strongly Agree

15. Buying fashion items that can be easily repaired to maximize product lifespan.

Strongly Disagree   1( ) 2( ) 3( ) 4( ) 5( )   Strongly Agree

16. Buying fashion items that can be easily redesigned (personalized) to maximize material use.

Strongly Disagree   1( ) 2( ) 3( ) 4( ) 5( )   Strongly Agree

17. Buying fashion items that can be easily dismantled to facilitate effective reuse or material recycling.

Strongly Disagree   1( ) 2( ) 3( ) 4( ) 5( )   Strongly Agree

18. Buying used fashion items instead of new items.

    Strongly Disagree   1( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )   Strongly Agree

19. Donating unused fashion items to friends or relatives who might wear them.

    Strongly Disagree   1( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )   Strongly Agree

20. Donating worn or irreparable fashion items to a recycling station for use as raw material (or components) as inputs to produce new fashion items.

    Strongly Disagree   1( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )   Strongly Agree

As a consumer. . .

21. I like the idea of returning my old, used, or unwanted fashion items to fashion stores/companies for recycling.

    Strongly Disagree   1( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )   Strongly Agree

22. I like the idea of fashion companies accepting returned fashion items that customers no longer use.

    Strongly Disagree   1( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )   Strongly Agree

23. I like the idea of buying clothes at second-hand stores.

    Strongly Disagree   1( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )   Strongly Agree

24. I like the idea of buying second-hand clothes on the internet.

    Strongly Disagree   1( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )   Strongly Agree

25. I like the idea of buying clothes with dual functionality, for example, a dress that can be used as a skirt.

    Strongly Disagree   1( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )   Strongly Agree

26. I like the idea of buying clothes made from recycled fibers.

    Strongly Disagree   1( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )   Strongly Agree

27. I like the idea of buying clothes made from biodegradable fabrics.

    Strongly Disagree   1( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )   Strongly Agree

28. I like the idea of buying clothes with ecofriendly fabrics (made from materials like organic cotton, hemp, linen, soy silk or orange silk).

    Strongly Disagree   1( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )   Strongly Agree

29. I like the idea of buying more sustainable denim clothes.

    Strongly Disagree   1( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )   Strongly Agree

30. I like the idea of buying different products made from recycled materials, like sunglasses made from recycled acetate material (reused waste produced during conventional glasses production).

    Strongly Disagree   1( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )   Strongly Agree

Indicate how often you do or have done the following actions:

31. Return fashion items I no longer use to stores that use these items.
    I never did this   1( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )   I always did this

32. Make purchases from second-hand stores.
    I never did this   1( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )   I always did this

33. Online shopping for second-hand clothes.
    I never did this   1( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )   I always did this

34. Shop for clothes with dual functionality, for exmaple, dresses that can be used as skirts, double-sided t-shirts, etc.
    I never did this   1( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )   I always did this

35. Purchase clothes made from recycled fibers.

I never did this   1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )   I always did this

36. Purchase clothes made from biodegradable fabrics.

I never did this   1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )   I always did this

37. Shop for clothes made with ecofriendly fabrics.

I never did this   1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )   I always did this

38. Shop for more sustainable jeans.

I never did this   1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )   I always did this

39. Purchase various products made with recycled material, like sunglasses made from recycled acetate material (reused waste produced during conventional glasses production).

I never did this   1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( )   I always did this