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Paço, A, Leal Filho, W, Ávila, LV and Dennis, K (2021) Fostering sustainable consumer behavior regarding clothing: Assessing trends on purchases, recycling and disposal. *Textile Research Journal*, 91 (3-4). pp. 373-384. ISSN 0040-5175

**DOI:** <https://doi.org/10.1177/0040517520944524>

**Publisher:** Sage

**Version:** Accepted Version

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**FOSTERING CONSUMER SUSTAINABLE BEHAVIOUR REGARDING CLOTHING: ASSESSING  
TRENDS ON PURCHASES, RECYCLING AND DISPOSAL**

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**Textile Research Journal 01 Jan 2020**

**DOI: <https://journals.sagepub.com/doi/10.1177/0040517520944524>**

**Abstract**

The apparel industry, which includes the clothing/garment sector, encompasses the supply chain of clothing and garments, starting with the textile and fashion industry, all the way to fashion retailers and the trade with second-hand clothes and textile recycling. This sector is characterised by substantial wastes, which may be minimised by means of textile recycling. This paper reports on the results of an international study on sustainable clothing consumption. This paper identifies and analyses attitudes and behaviours regarding the clothing industry in a sample of 203 individuals. The results illustrate suggest a number of trends. Firstly, they show the complexity of purchase habits. The reasons why individuals dispose their old or not used clothes are manifold, and include objective and subjective factors. Also, the paper illustrates the existence of disparities in respect of clothing use and disposal behaviour. Finally, the results suggest that there is a need for more awareness-raising initiatives, in order to make consumers more conscious about the options available and the need for a more sustainable use of clothing.

**Keywords:** sustainability, clothing, recycling, consumer behaviour, second-hand textiles

**1. Introduction**

In a sustainable world, all new clothing would be produced from pre-existing fabrics and textiles because resources such as polyester and cotton could be recycled and processed back into their raw material. Clothing textiles are usually woven or knitted and made from natural, manufactured fibres and blended textiles. Natural fibres are cellulosic fibres such as cotton, flax and hemp, or protein fibres such as silk and wool. Unlike these biodegradable natural fibres, manufactured fibres of petrochemical origin are produced from a non-renewable resource and cannot be easily reused because their physical and chemical properties are difficult to reprocess and reuse (Koszewska, 2018). Many advances in chemical recycling have provided the opportunity for the growth of blended textile products that allow garment materials to be recirculated over many generations of products. Such processes

have a consistent and important supply of textile waste (Salolainen, 2018). Both manufactured fibres and natural fibres require a lot of energy, water and chemicals for their production (Payne, 2015). Synthetic fibres are the most common in clothing production and their consumption increased rapidly from 1996 to now, so they dominate current global fibre production (FAO and ICAC, 2013).

A solution to the above problems could be textile recycling. This process includes benefits such as a decrease of landfill space requirements, a reduction of consumption of energy and water, lowering pollution, and the demand for dyes. It is a significant part of the UN Sustainable Development Goals (SDG) to do more with less, in an industry that is the second largest polluter of clean water, and address the issue of 85% of textiles ending up in landfill or being incinerated before the end of their material life (UN, 2020). Although textiles and clothing are not mentioned specifically, resource efficiency is a significant part of the 'European Commission's Roadmap to a Resource Efficient Europe' (European Commission, 2011).

Textile recycling is embedded in the larger global movement toward a closed-loop production and a **circular economy that is aligned with "reduce, reuse, recycle"**, that is different from the traditional textile and apparel industry that has adopted the principle of inbuilt obsolescence, the production of low-cost and easily accessible and fashionable clothes (Ellen MacArthur, 2017). Nevertheless, the fashion industry plays a relevant role in the path towards sustainability and the circular economy (Jacometti, 2019). Moving to a circular restorative economy reduces the impact of a linear economy: discarded products are reused (second-hand use) or used as a source of raw materials (resource efficiency) to create a new product of value (Ellen MacArthur Foundation, 2012, 2013; Koszewska, 2018). Other authors (e.g. Brokstad, 2019) suggest that the solution to combat the unsustainability caused by textiles is to reduce the growing consumption of low quality clothing, "pushing" the industry in a direction where it is possible to produce durable clothing with profit.

**Thus, there is a need to move to a circular economy model, extending the practices of reducing materials and other resources, reusing manufactured pieces or material, and recycling in order to provide inputs to new products, contributing, as defended by Velenturf and Purnell (2017), to the resources recovery. Thus, by reuse or recycle** there will be a huge opportunity to reduce the environmental footprint of textile and clothing industry and as result it will bring several environmental and economic benefits for all society (Shirvanimoghaddam et al., 2020). Here both recycling and reuse are viewed as the act of getting rid of clothes or other textiles. In the first case, the products

are discarded or to be used as inputs in the production of other goods, this is, can be transformed into new products; and reuse is when the product can be used by other owner or with another purpose (Laitala, 2014).

This strategic option can be a source of innovation, by minimizing waste and keeping materials within the production-consumption loop during a considerable period of time (Jacometti, 2019), turning the “waste” into new products (Navone et al., 2020; Shirvanimoghaddam et al., 2020).

Nevertheless, there are authors (e.g. McDonough and Braungart, 2002) that criticised the “reduce, reuse, recycle” approach because it perpetuates a one-way, “cradle to grave” manufacturing model that dates to the Industrial Revolution and casts off as much as 90% of the materials it uses as waste, much of it toxic.

**And what about the role of consumers in this market? As is evident,** the move from slow fashion, long production cycles and classic styles with longevity, to fast fashion characterised by the quick turn over of rapidly changing designs, has dented the environmental credentials of the sector (Brooks, 2014). It has focused the majority of businesses in the textile and clothing industry on low- cost mass-production, sold at low prices, based on the latest fashion trends. This encourages consumers to purchase more and more, resulting in negative impacts to the environment and society (Žurga et al., 2015). Thus, the increasing volume of textile waste has become an environmental issue. As such, it is necessary to pay attention to consumers’ environmental attitudes, concerns and awareness regarding their clothing behaviours. With the increasing complexity of the human lifestyle, the demand for functionalized or high performance textile materials -or 'fast fashion' -has seen a sharp increase. However, the methods for its production are still creating a negative impact on the environment (Weerasinghe, Perera, Dissanayake, 2019).

This study examines the consumers’ clothing disposal behaviour and the thought process behind that behaviour, evidencing aspects such as the philanthropic awareness factor, the concern for the environment, the practical problems of accumulating and storing clothes, etc. The opinions regarding second-hand apparel are also analysed, as well as the factors that influence the consumers’ attitude toward sustainable clothing buying, mainly from the environmental perspective. The present research was conducted in several countries with different levels of industrialization and awareness, exhibiting different approaches to clothing disposal behaviour and buying patterns.

## **2. Literature review**

### ***2.1. Clothing sustainable consumer behaviour***

Sustainable clothing consumption respects the purchase, use, and disposal of clothes. It considers the environmental issues and aims to create less pollution and waste whilst using fewer natural resources. Both the industry and consumer have a responsibility for the pollution generated. In fact, in the last decades, the consumption of fashion items has become increasingly less environmentally and socially harmful (Armstrong et al., 2016; Iran et al., 2019). The textile industry has a significant impact on the production phase of the lifecycle due to the use of energy and non-renewable resources for fibre production, the consumption of large quantities of water, crop land and chemicals and the emissions to both air and water (Blackburn, 2009). In the disposal phase, landfilling of waste textiles creates a further problem related to the decomposition of fibres (Zurga et al., 2015).

There is a growing segment of consumers interested in knowing whether the product they like has been made by a producer that respects the environment and has ethical principles, and if the raw materials were acquired in a sustainable and socially acceptable way. The factors that affect their sustainable clothing behaviour include the role of clothing in self-expression, changes in technology, rising affluence and lower prices (Harris et al., 2016). To these consumers, the industry is expected to contribute solutions to its ecological and social problems, and to handle their products with more eco-friendly consumption patterns. This will slow fashion movement, influencing maintenance processes and improve clothing reusing and recycling (Koszewska, 2013).

From the demand point of view, a piece of clothing, after being used for one season, is often simply thrown away (Jacometti, 2019). However, some changes in consumer environmental ethics are already being felt in the field of activism; translated as the search for products considered more “environmentally friendly” (using recycled and organic materials, fair-trade production, recyclable, etc.) and in the rejection of clothes made from animal skins and paying attention to ecolabels (Sneddon et al., 2014). At this point, Armstrong et al. (2015) consider that there is a growing interest of consumers for product-service systems that use arrangements such as renting, upgrading, redesigning, or lending to reduce dependence on natural resources while, simultaneously, improving product

quality and longevity. Nevertheless, this environmental concern from consumers is not necessarily translated into decision-making and effective behaviour, including sustainable clothing consumption (Armstrong et al., 2016), generating a gap between attitudes and behaviours. Usually, consumers are interested in sustainable consumption, but they prefer the convenience, facility, and low prices for their fashion (Joergens, 2006). This may be caused by the barriers to eco-conscious apparel consumption: limited knowledge of the environmental effects of apparel consumption and negative attitudes towards sustainable apparel.

According to Harris et al. (2016), the intention to buy environmentally friendly clothing is highly influenced by social pressure and the concern for the environment. It is moderately influenced by the feeling of guilt and lack of knowledge and information about environmentally friendly apparel. Even among green consumers, clothing purchases are fundamentally determined by economic and personal considerations, while disposal behaviours are driven first, and foremost, by habits and routines acquired. Sustainable behaviour regarding fashion is also motivated by both positive desires ('ethical hedonism') and negative emotions, such as the suspicion and scepticism regarding the large corporate brands (Harris et al., 2016).

## **2.2. Second-hand clothing**

There has been a huge increase in the economic power and global scope of the second-hand clothing trade since the early 1990s (Xu et al., 2014). According to Norris (2015, p.183) "*second-hand clothing is thereby culturally framed as waste, as a surplus, and as a morally charged product that has a powerful redemptive capacity for donors, multiple recyclers and secondary consumers*". Donations to humanitarian organisations tend to be the method most commonly used for disposing of apparel. A considerable number of consumers give their unwanted textile waste to charity shops (Hiller, 2010). In the recycling units, clothes are sorted and sent to Africa, East Europe and Asia, where they are reused; the items that cannot be sold or donated are transformed into cleaning rags or sold to other industries (Domina and Koch, 2002; Žurga et al., 2015). Thus, whereas some textiles are disposed of, there is a significant part that is recycled or reused, depending on the needs and the facilities offered by the industry and country.

Usually, studies are more focused on the barriers to buying second-hand goods. However, for consumers with a lack of economic resources, this option is practised (Yan et al., 2015). On the other hand, concerns about the

environment have also begun to increase consumers' tendency to buy second-hand products. Additionally, the consumers' interest in environmentally friendly fashion and retro/vintage clothing has contributed to some growth in this clothing market (Beard, 2008).

Darley and Lim (1999) defend that the national interest in extending the life of the products is one of the major factors that enhanced the second-hand clothing industry. Another aspect contributing to this growth are the consumers, (mostly younger) which have shown a high interest and concern for the environment (Yan et al., 2015) and have been creating and expressing their social consciousness through choosing choice second-hand clothing. Even if they are not ready to support environmental sustainability by acquiring high priced green products, they may be able to contribute by purchasing second-hand clothing items, which will reduce the volume of new products produced in the future.

Research exploring consumer attitudes towards second-hand apparel has focused only on the segment of consumers who already buy second-hand apparel regularly. Some studies report that consumers' willingness to purchase used apparel depends on her/his knowledge about the issue; other barriers are related to the (negative) opinions of others, the condition of used apparel, the availability of stores, and the myth that second-hand apparel is associated with lower income (Žurga et al., 2015). Another finding is presented by Janigo and Wu (2015): if consumers already purchase second-hand clothing or have friends who do so, the acceptance of used and recycled clothing could lead to an interest in purchasing redesigned and recycled clothing.

The use of second-hand channels is motivated by two main reasons: to find unique or rare products that are not usually available through traditional retailers, or to dispose of clothing that is old or out of style (Yan et al., 2015; Xu et al., 2014). Young consumers are usually the most predisposed to shop for textiles at second-hand markets due to environmental reasons, lack of money or seeking vintage fashion. The young consumers are often not very concerned with the question of contamination, and they do not care about the "social stigma" associated with second-hand products (poverty, embarrassment, etc.).

### ***2.3. Clothing recycling and disposal***

Clothing disposal practice can be defined as discarding of an outfit or item by giving it to others, throwing it away, using it for another purpose (reuse, redesign) or selling it (Kwon et al., 2019; Wai Yee et al., 2016). Textile recycling involves reclaiming pre-consumer waste or post-consumer waste (garments, vehicle upholstery, household items and others) (Hawley, J., 2014).

There are a number of different recycling processes possible within the textile and apparel context (Hawley, 2015; Lewis et.al, 2017). Recycling means the breakdown of a product into its raw materials (usually through a melting process) (Worrell & Reuter, 2014). In this way, material is recovered from waste and can be used for new products (Brown, 2014, Shah, 2015). When the new product (after the recycling) is of lower value, the recycling process is called ‘down cycling’ (Worrell & Reuter, 2014). In turn, ‘upcycling’ means to use a certain material again but for a different purpose, for instance, the chemical recycling of cotton (Brown, 2014, Lewis et al., 2017).

Domina and Koch (2002) found that consumers dispose for a variety of reasons: inadequate size, changes in taste, lack of space and changes in style and fashion. The act of discarding textiles may be related either to convenience or to the lack of information about the existing options for recycling. For example, Domina and Koch (2002) concluded that the availability of curbside recycling programmes positively influences the participation in textile recycling. Additionally, Way Yee et al. (2016) study demonstrated that clothing disposal behaviour is also affected by philanthropic awareness. This variable measures the consumer’s altruism in clothing disposal practices and their willingness to help the needy. **In line, Joung and Park-Poaps (2013) study reported that in United States altruistic concern was the primary motivation for donating clothes. Thus, there are several ways for consumers to dispose of their clothing evidencing an altruistic attitude, for example by donating to charity or give away to family or friends or other members of the community. However, Ha-Brookshire and Hodges (2009) state that altruism is not the main reason for the removal of apparel; the motivation for removal is more related with the lack of closet space and the “need” for something new.**

In turn, Lang and Armstrong (2016) refer that personal attributes, especially fashion trend sensitivity, price consciousness and demographics, are factors that may motivate and influence clothing disposal behaviours.

According to Joung (2013), attitudes toward general waste recycling (e.g. paper or glass) are good predictors of clothing disposal behaviours (such as reuse, resale, giving to other people and donation), which is in line with the



findings of Bianchi and Birtwistle (2010) and Morgan and Birtwistle (2009). Further, it was found that consumers who were familiar with recycling in general, preferred apparel made from recycled fibre (Žurga et al., 2015). Nevertheless, of the disposal possibilities, throwaway is the most common way consumers get rid of clothing that they do not use or do not want anymore. The numbers are dramatic, as is stated by Claudio (2007), especially when it comes to damaged or worn-out textiles.

Research by Bianchi and Birtwistle (2012) found that environmental consumer awareness and individuals' age have an influence in donating behaviour. In a previous study, Birtwistle and Moore (2007) found that donating to charities and giving away to family and friends were the most common and convenient ways of sustainable clothing disposal. These two methods allow a considerable saving of resources in the disposal process, benefiting the needy. Other methods, such as reuse and redesign, help to prolong the life of the clothing.

Joung and Park-Poaps (2013) analysed the factors motivating and influencing clothing disposal options, and found that donation and resale were explained by environmental concerns. In another study, Koch and Domina (1997) found that while environmental attitudes were highly correlated with the donation and reuse of textiles, they were not related to resale. Bianchi and Birtwistle, (2010) examined sustainable clothing disposal behaviours in terms of environmental consumer awareness, and reported positive relationships between awareness of the environment and general recycling behaviours in the two sampled countries. Awareness of the environment was positively related to giving to family or friends, but it was not related to donation to charities in both countries.

There is also a type of consumers that “ignore” the clothes they do not wear or use. These consumers simply hoard their unwanted clothing in their closets, and this can be explained by several factors, amongst which mention can be made to the investment value (expensive items, perceived value), weight management and emotional value (Morgan and Birtwistle, 2009; Joung, 2013).

There are also consumers who are concerned with recycling clothes that use the most environmentally friendly dyes. This is due to the fact that there are synthetic dyes in some dyeing products (Yujuan, W., Xiaofei, M. Wang, S. Xin, Z., Baolei, S, 2019). Despite that, some material have a huge environmental footprint (e.g. cotton and polyester). In the case of polyester, there is a significant waste of water, and due the fact that it is not biodegradable, it causes several pollutions (Koszewska, 2018).

There are some areas where considerable improvements could be made to increase the recycling rate. These improvements include better infrastructure and communication flow between textile producers and recyclers, curbside collection programmes, promotion and increase in end-user markets of waste recyclables, and educational programmes of consumers (Domina and Koch, 1997). Understanding the motivation for behaviour is therefore crucial in understanding the obstacles for clothing reuse and recycling LG (Laitala, 2014). In fact, little is known about the diversity of reasons behind clothing disposal, or the condition of disposed clothing that is delivered either to garbage collection or recycling. The technical and social aspects of clothing disposal should be studied (Laitala, 2014).

### ***2.3.1. Barriers to recycling***

As a polluter and ecological time bomb, the textile and clothing industry has come under scrutiny from many sectors (Fletcher, 2007; von Busch, 2008; Fuad-Luke, 2009; Julier, 2013). Its socio-political structures are questioned for their reliance on sweatshop type conditions as well as its manufacturing processes, both of which have been put under the microscope for the manner in which materials (and people) are used and abused (Curwen, Park and Sarkar, 2013; Labour behind the Label, 2014). Time, distance and connections are all important concepts within the industry, especially in relation to the speed of production and consumption, the global spread of the industry, and the diverse and fragmented linkages that characterise modes of manufacture. Therefore, when considering the barriers that occur when attempting to recycle within this context, many different factors come into play. WRAP (2008) in their report “Barriers to Recycling at Home” highlighted how obstacles occur due to situational, behavioural, attitudinal and knowledge based contexts. This implies that in order to recycle effectively, appropriate mechanisms are needed that take into account the environment in which people find themselves, their lifestyles, beliefs and values. If the methods of recycling are present but the population are unwilling to recycle, or if there is a willingness to recycle but there are no means to do so a dichotomy occurs between practice and theory. This section will consider the barriers that exist in the recycling of textile and clothing waste from the perspective of manufacturing and retail based scenarios. It draws on practical experience as well as theoretical frameworks and research.

Textile and clothing waste emanates from a number of processes and transactions, which include the manufacture, marketing, consumption, and design of products (Larney and van Aardt, 2010). The quality and quantity of this waste is in turn determined by industrial tendencies and consumer preferences, which dictate the types of products on offer, the rate of consumption and the means through which these products may be recycled. For instance some EU countries like UK, Germany and Austria increase their textile waste from 2004 to 2012, and others (e.g. Greece, Romania, Portugal, Norway) decreased significantly their level of waste in this industry (Koszevska, 2018). With the growth in fast fashion practices, which render many products psychologically obsolete before their physical demise, it would appear that increasingly effective waste management systems that people understand, use effectively, and which draw on both intrinsic and extrinsic values and modes of behaviour are needed. Having been identified as one of the fastest growing environmental concerns, barriers to recycling within the textile and clothing industry need addressing in order to uncover potential obstacles and lead to safer and more effective practices. In their study into the South African apparel sector, Larney and van Aardt (2010) argued that the imperative underlying the effective management of waste was perpetuated by the “increasing cost, decreasing availability of landfill space and dwindling of natural resources” (p.36). As space in landfills becomes sparser and the cost of this space increases, manufacturers are facing dilemmas about modes of manufacture and resultant inputs and outputs. A key barrier in this context thus centres upon the need to balance environmental concerns with commercial competitiveness (Abend, 1994).

Recycling can be defined as the process of treating things that have already been used so they can be used again. Barriers to harnessing this process include the shortage of markets for recycled products, the lack of equipment and technology to recycle, the labour intensiveness of processes and their associated high cost, and pressures due to competitiveness with countries with lower standards of environmental practices (Larney and van Aardt, 2010). There is also often the perception that products containing recycled raw materials are inferior in quality, which in turn stymies growth in recycling practices. Remanufacture presents itself as an associated practice in which items are disassembled, cleaned, inspected, repaired, replaced and reassembled into a new product (APSRG, 2014). This should lead to a product that, if not superior to the original, should at least be equal to it. It is argued that growth in this area is hindered by the lack of a clear definition of what this entails, regulated policies, legislation and warranties for remanufactured products (Sinha, Muthu and Dissanayake, 2016).

Within manufacturing, cutting room waste is seen as a primary environmental concern, and approximately 15% of virgin cloth gets discarded (Rissanen and McQuillan, 2016). Presently, a large proportion of this waste is sent to landfills (US) or landfills and incineration (UK), and therefore a key challenge in manufacturing is to find methods for more effectively utilising this waste. Zero pattern cutting techniques have been developed, but barriers to their growth lie within the commercial value of these, especially as how they relate to mass production. Within the charity retail sector, personal observation and communication has highlighted how time, space, knowledge and quality have all contributed to the ability of staff and volunteers to recycle textile and clothing waste. In many stores, space for sorting is limited and there is often a need to move stock out quickly. Knowledge relating to the material composition of products can also be limited and this means that items become mixed without a clear delineation in material types.

Given all the above, this study aims to examine the consumers' clothing disposal behaviour, and its motivations, as well as the perceptions regarding second-hand apparel and the factors influencing the consumers' attitude toward sustainable clothing buying. Thus, with consideration to the literature review presented, three research hypotheses arise:

H<sub>1</sub>: Consumers prefer to give/donate old/not-used clothes than to reuse or sell them.

H<sub>2</sub>: The main reasons for clothing disposal are not related to altruistic aspects.

H<sub>3</sub>: Consumers do not make their clothing choices with environmental factors in mind.

### **3. Methodology**

There is a wide difference in the levels of research on textiles, and a limited number of international studies which have investigated the complex relations between behaviour and textiles use. In order to explore the consumer behaviour regarding recycled and second-hand clothing and use of second-hand textiles and its disposal, an extensive literature review was performed. This was done in order to find adequate scales, already tested, to measure such behaviours and attitudes. It was also meant to identify possible problems. In some cases, it was considered a better option to adapt and re-create new measures.

An enquire-based approach was used to test the proposed hypotheses. The chosen method of data collection was a survey, an internationally used method for data collection among different groups, taking the format of a self-

administered questionnaire. The questionnaire consisted of mainly closed questions, covering three main sections: (i) clothing disposal behaviour (to know what individuals do with the old/not-used clothes); (ii) clothing buying behaviour (to know the factors individuals take into account when buying, and the reasons why some of them don't buy second-hand clothing); and (iii) demographics (age, gender, level of education, job and country). The survey was pre-tested by a group of 10 individuals in order to identify any language or understanding problems.

The respondents were asked to mark their opinion using a five point scale varying from 5= totally agree to 1= totally disagree; individuals were also asked to point out their level of frequency of certain buying behaviours by again using a five point scale ranging from 5= always to 1= never.

The nine statements to measure Clothing Disposal Behaviour (CDB) were adapted from Bianchi and Birtwistle (2010, 2012) because of their capacity to measure a diversity of actions usually associated with sustainable disposal behaviour. Žurga et al (2015) have also used some of these variables in their study. All these studies were also used to inspire the construction of a set of reasons that could explain the disposal behaviour. The tendency to contribute positively to the natural environment by having a certain *Clothing Buying Behaviour* (CBB) was measured by a set of questions based on Žurga et al (2015). In order to examine the second-hand behaviours in terms of barriers, the Yan et al. (2015) research was used.

The questionnaire was used in its original form and language (English), but it was also translated into Portuguese using standard back-translation protocol in order to cover a larger audience. Some adjustments were made to ensure that the respondents understood the questions, after the pre-test, which included 15 individuals from Portugal, Brazil and Germany. The final version of the questionnaire was made available on the online platform, SurveyMonkey, for three months. After collection, the data was statistically analysed and interpreted using the statistical software SPSS 25. Descriptive analyses and parametric tests were used to analyse the data.

The questionnaire was available during the period from 01<sup>st</sup> October to 31<sup>st</sup> December 2018. In total, approximately 1200 emails were sent to people from different regions of the world. In total, 258 responses were received, but 55 did not complete the survey and were discarded, totalling 203 valid answers from the following countries: Germany, Brazil, Thailand, Mexico, India, Indonesia, England, Tanzania, Italy, Switzerland, Malaysia, Zambia, Liberia, Sweden, United States, France, Kenya, New Zealand, Bangladesh, Australia, Cameroon, Republic of

Liberia, Aruba, Canada, Hungary, Chile, Albania, Luxembourg, Norway, Netherlands, Ireland, Guinea, Croatia and Portugal, as shown in figure 1.

**Figure 1.** Participating countries



The 203 respondents came from 33 countries in various regions of the world, covering all continents. They have a mean age of 37 years, 74.38% are female and 25.62% are males. 42.5% have a master's degree, 28.5% a Higher education degree (bachelor's degree), 22.12% a PhD, and 7.88% a Secondary School degree. In addition, participants held positions such as CEO, manager, researcher, professor, social worker, senior lecturer, and students, among others. It is important to note that the sample of 203 participants from different regions of the world is representative for the discussion of evidence, especially since it is about analysis of attitudes and behaviors towards the clothing industry. Several international studies with a similar sample as Avila et 2019, and Leal Filho et al, were published in high impact journals.

#### **4. Results and Discussion**

In order to examine the results of the questionnaire and discuss the hypotheses stated previously, several statistical tests were carried out. The variables used to measure the relevant phenomena were presented in the format of Likert scales (min 1, max 5), where 3 is the indifference value. Values below 3 (the median point of the scale)

represent negative values in the scale, and above 3 are the positive values. The first analysis performed aimed to know the clothing disposal behaviour of our sample (table 1).

**Table 1.** Clothing disposal behaviour – descriptive analysis and one-sample t test

<b>What do you do with your old/not used clothes?</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>t</b>
I give to members of my family	2,97	1,33	-,316
I give to friends	2,54	1,34	-4,86
I swap with family members and friends	1,84	1,15	-14,39
I give to charity shops and humanitarian organizations	3,51	1,32	5,52
I deposit in humanitarian bins	2,70	1,45	-2,95
I throw into the trash bin	1,55	0,92	-22,2
I use as cleaning rags	2,42	1,18	-6,90
I repair and/or redecorate	2,19	1,20	-9,54
I sell	1,62	1,03	-18,92

Note: t-test with 202 degrees of freedom and test value 3

The garment industry is mostly focused on low-cost mass production, seeking to sell its products at low prices based on the latest fashion trends. This encourages consumers to buy more and more, resulting in large consumption. Aiming to avoid waste, the survey showed that only 1.55% put the clothes in the trash. It can be observed that the main percentage of user behaviour is directed towards donations to charitable and humanitarian institutions or to family members and friends.

Regarding *H<sub>1</sub>*: *Consumers prefer to give/donate old/not-used clothes than to reuse or sell them*, it is possible to confirm the formulated hypothesis, considering the mean scores of the five first sentences related with giving/donation, with the exception of “I swap with family members and friends”. In general, these behaviours present a higher score than the ones related to reuse or sell (the last three sentences). Additionally, the lack of significant differences in the respondents’ behaviour regarding the clothing disposal method “I give to members of my family” should be noted, individuals tend to have similar behaviour regarding this aspect. In fact, donations to humanitarian organisations tend to be the method most frequently used for clothing disposal, as stated by Birtwistle and Moore (2007) and Hiller (2010). **Additionally, Koch and Domina (1997) noticed that while environmental attitudes were highly correlated with the donation and reuse of textiles, they were not related to resale.**

Table 2 presents the results of the main reasons why individuals dispose their old or not used clothes and the one-sample t test.

**Table 2.** Reasons for clothing disposal - descriptive analysis and one-sample t test

Reasons for clothing disposal	Mean	Standard deviation	T
Shortage of space	2,86	1,44	-1,35
Unfashionable items	2,74	1,35	-2,75
Confectioner defects	2,57	1,29	-4,70
Uselessness	2,87	1,39	-1,31
Inadequate size	3,54	1,34	5,68
To make some money	1,62	1,10	-17,81
To help others	3,68	1,21	7,94
Recycling efforts will bring good impact on the environment	3,77	1,32	8,30

Regarding the reasons for clothing disposal, more than 200 respondents from the 34 countries replied that they would recycle to have a positive impact on the environment and to help others. The ability to recycle is one of the objectives of industries that aim for responsible and sustainable production, which will allow part recovery of the energy and material used. The barriers to more efficient recycling could be overcome by the integration between existing methods of textile production/ready-made design and improved coordination of post-consumer waste collection. **In order to recycle effectively, appropriate mechanisms are needed that take into account the environment in which people find themselves, their lifestyles, beliefs and values (WRAP, 2008).**

The second hypothesis ( $H_2$ : *The main reasons for clothing disposal are not related to altruistic aspects*), is not confirmed as the mean scores of the items are higher in the altruistic indicators (help others, good impact to the environment), contrary to Domina and Koch (2002) who found relevant factors for disposal due to incorrect size, the lack of space and the changes in fashion and style. However, there are no significant differences in the two individualistic reasons – a shortage of space and no longer used (consumers tend to converge into these two reasons for disposal). **Also Ha-Brookshire and Hodges (2009) found that altruism was not the main reason for the removal of apparel, pointing instead the lack of closet space and the “need” for something new.**

Aiming to know how respondents buy and their attitudes regarding sustainable clothing behaviour, a set of questions related to the topic was analysed (table 3).



**Table 3.** Clothing buying attitudes and behaviour – descriptive analysis and one-sample t test

<b>How is your clothing buying behaviour?</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>T</b>
I acquire apparel made from environmentally preferable material	2,74	1,11	-3,26
I avoid buying certain apparel products	2,86	1,30	-1,50
I buy second-hand clothes	2,31	1,29	-7,60
I consider the material's composition	3,12	1,36	1,28
I buy clothes with environmental labels	2,51	1,12	-6,18
I prefer to follow the fashion trends	2,83	1,22	-2,01
I consider the origin	3,23	1,31	2,51

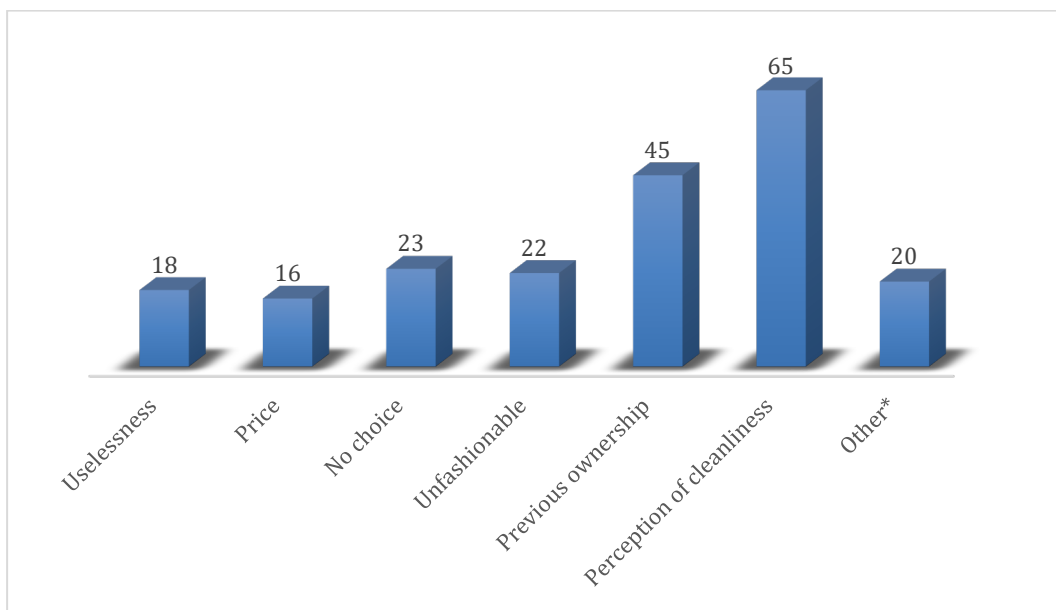
The results point to small differences between users who evaluate the origin of the material, composition of the material and those that follow the trends. It is appropriate for users to select their products by assessing the origin and composition of the material used and the company's social responsibility, since many industries focus on low cost and do not worry about the environment. Every day, consumerism is growing and, as a consequence, increasing the gradual degradation of the environment. There are several impacts caused to nature by new technologies and products such as clothing, footwear, electronics, cosmetics and other items acquired in an excessive and unnecessary way. In order for this situation to be reversed, or at least stabilized, actions are required that target the implementation of sustainable development, starting with more conscious consumption habits. Conscious consumption does not mean having to deprive yourself of a more comfortable life, but reduce, recycle and reuse everything that is possible in order to contribute to the preservation of the environment and the balance of the planet. In fact, the most efficient way to reduce these impacts is to increase the usage, because even the second user will add other impacts to the process of production-consumption (e.g. transportation, redesign, etc.).

Regarding  $H_3$ : *Consumers do not make their clothing choices considering the environmental factors.* Whether the apparel is made from an environmentally preferable material and buying clothes with environmental labels is one of the lowest factors, confirming, at least partially, the hypothesis.

In their study, Bianchi and Birtwistle, (2010) found that awareness of the environment was taken into account when consumers choose clothes. In fact, there is a considerable number of consumers interested in sustainable

clothing, and very concerned with environment preservation (Yan et al., 2015), but the convenience, low prices and fashion tend to prevail (Joergens, 2006). There are no significant differences in the responses of the second and fourth items (avoid buying certain products and consider the composition). This means that for all the rest of the attitudes and behaviours the respondents present differentiated opinions.

Additionally, we asked respondents, when applicable, to indicate the three main reasons why they were against buying second-hand apparel (Figure 2).



(\*) Hard to find stores/articles (7), Contamination (4), Prefer to buy new (3), New is more durable (2), Culturally not acceptable (2), Associated to poverty (1), Composition (1)

Concerns about the environment contributed to the increase of consumers' propensity to buy second-hand products (Yan et al., 2015). However, barriers to this behaviour continue to exist: the opinion of others, the state of the clothes, the difficulty in finding, etc. (Žuriga et al., 2015). As observed in table 4, the main obstacle for respondents is the perception of cleanliness/contamination (also pointed by Yan et al., 2015) and the previous ownership (previously reported by Žuriga et al., 2015). The lack of choice and not being fashionable were other relevant barriers pointed out by the individuals sampled.

## 5. Conclusion

The rapid growth in fast-fashion retailing has led to the disposal and destruction of tonnes of clothing around the world, some of which are in very good condition. To protect the environment, consumers must make more responsible decisions between the reuse of clothing and its disposal, and be prepared to buy these items in a rational way. Here, education can have a crucial role. It is necessary to educate citizens, since early age, making them aware of the importance of “Reduce, Reuse, Recycling” the apparel, given the high impact this industry can have in the natural environment. Thus, public policy should direct a special effort not only sensitizing the industry of this sector being more sustainable, but also contributing for a better education and providing of information to the consumers.

~~Although materialism is most common in developed countries, where consumers focus on the consumption of new goods, in developing countries consumers are more flexible and often welcome the chance to reuse clothes if they are in good condition, especially among family members.~~

As this paper has shown, the advantages of reuse and recycling comprise both environmental and economic benefits. At present, most consumers are increasingly urged to stop throwing away their old clothes and recycle them, preventing resource and environmental depletion. However, sustainable consumer behaviour cannot alone solve the problem of excessive pollution caused by the consumption of textiles and apparel. We need a change in mindset. For instance, motivation of the population- especially but not only in wealthy countries- towards the reuse of clothes among family members and friends would significantly contribute to the reduction of the environmental impact of clothing production and make it more sustainable.

Some implications for second hand businesses can be also draw. It's possible that initially, low prices were the main reason for consumers to buy these pieces, but today's buyer has begun to associate reuse with reducing the amount of disposed clothing sent to landfills, therefore causing less environmental pollution. Thus, it is necessary to target this segment of consumers that starts to be really concerned with the depletion of resources, and is available to try other options, like buying second hand clothes or switching to more sustainable clothes (made from recycled materials). Also, ecological clothing retailers should promote their stores and brands by associating wearing used clothing with reducing negative impacts on the environment, hence reaching a more environmentally-conscious part of the population.

This study has some limitations. Firstly, the generalisability of this study is limited to the sample, since non-probability sampling was used. Secondly, it did not take cultural issues into account. A similar study comparing consumers of different cultures would be a useful addition to the literature. Thirdly, the study did not focus on specific consumer groups. For example, the mature consumers that are reaching retirement age. They may need to replace their career-related apparel by apparel that fits their new lifestyles. These older consumers care about future generations, and tend to help others. Thus, a future study may focus on older consumers' clothing and their recycling and disposal behaviours. Despite the analysis by age, the multicultural variables should be considered for future studies. Moreover, the survey managed to obtain information from a small sample of respondents, many more could be reached if more resources were available for the study. Finally, one further limitation is that the study was aimed at investigating very specific aspects, and was not designed to look at the apparel industry at a larger scale. This work nonetheless sheds light on the complexity of consumer behaviours as it relates to clothing, and may provide a basis for further studies.

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