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The influence of green fashion products on the achievement of the 12 Sustainable Development Goals for masters and doctoral students

A influência dos produtos de moda verdes no alcance dos Objetivos de Desenvolvimento Sustentável 12 para mestrandos e doutorandos

Ana Carolina Velozo Valenga [I], Silvio Roberto Stefani [I], Luísa Margarida Cagica Carvalho [II], Cláudio Luiz Chiusoli [I]

[I]Universidade Estadual do Centro-Oeste, Guarapuava, Paraná, Brazil
[II]Instituto Politécnico de Setúbal, Setúbal, Lisboa, Portugal

ABSTRACT

Objective: Agenda 2030 encourages sustainable production and consumption through the SDG 12. In this case, the objective of the present study was to analyze how masters and doctoral students consume fashion products, what their conception about products of the circular economy and how this behavior can contribute to the reach of the SDG 12.
Metodology: This is a descriptive and quantitative research with a data collection instrument based on questionnaires, examined using the non-parametric chi-square test to verify the existence of a relationship between the variables according to gender.
Discoveries: Identified that the lack of knowledge of society and students about the subject and price of green products is the main challenge the CE faces. In addition, the reduction of pollution and waste was pointed out by the participants as one of the main influencers in the green products consumption. Regarding the knowledge of Agenda 2030 and SDGs, 91.18% demonstrated knowledge. 37.3% of the respondents are not willing to pay more for the purchase of green products.
Research implications: This study contributes to the literature by extending information on sustainability and consumption and SDG12 in IHE students, focusing specifically on masters and doctoral students.
Practical implications: Studies on perceptions and practices of green product consumption is important and can contribute to the awareness of higher education students and contribute to the achievement of the SDG12.
Originality: This is an innovative study that can serve as a research agenda model for other IHEs and contribute to Agenda 2030 SDG12.

Keywords: Circular economy; Sustainability; Agenda 2030; Awareness; Consumption

RESUMO

Objetivo: A Agenda 2030, incentiva a produção e o consumo sustentáveis, por meio do ODS12. Nesse caso, o presente estudo teve como objetivo analisar a forma como mestrandos e doutorandos consomem produtos de moda, qual sua concepção sobre produtos da economia circular e como esse comportamento pode contribuir para o alcance do ODS12.
Metodologia: Trata-se de uma pesquisa descritiva e quantitativa com instrumento de coleta de dados baseado em questionários, examinados por meio do teste não paramétrico qui-quadrado para verificar a existência de relação entre as variáveis segundo o sexo.
Descobertas: Identificou-se que o desconhecimento da sociedade e dos estudantes sobre o assunto e o preço dos produtos verdes é o principal desafio enfrentado pela CE. Além disso, a redução da poluição e do desperdício foi apontada pelos participantes como um dos principais influenciadores do consumo de produtos verdes. Quanto ao conhecimento da Agenda 2030 e dos ODS, 91,18% demonstraram conhecimento. 37,3% dos entrevistados não estão dispostos a pagar mais pela compra de produtos verdes.
Implicações da pesquisa: Este estudo contribui para a literatura ao estender informações sobre sustentabilidade e consumo e ODS12 em alunos de IES, focando especificamente em mestrandos e doutorandos.
Implicações práticas: Pesquisas sobre percepções e práticas de consumo de produtos verdes são importantes e podem contribuir para a conscientização de estudantes do ensino superior e contribuir para o alcance do ODS12.
Originalidade: Este é um estudo inovador que pode servir como modelo de agenda de pesquisa para outras IES e contribuir para a Agenda 2030 ODS12.

Palavras-chave: Economia circular; Sustentabilidade; Agenda 2030; Conscientização; Consumo

1 INTRODUCTION

The linear logic model of production and consumption has impacted and damaged natural resources, opening space for analysis, reflection and use of a more sustainable production model. In this context, the Circular Economy (CS) can be seen as a transformation pattern of the production process, where the efficiency of the use of resources and the balance of the economy, the environment and society is sought, with attention to the actors involved in projects and innovations (Ostermann; Nascimento, 2021; Farias; Pinto; Araújo; Menezes & Andrade, 2021)

Resources shortage is one of the world's biggest concerns, associated with the barriers to environmental pollution from the manufacturing industry. These aspects oblige industry to work simultaneously with environmental regulations and price instability and resources supply. Moreover, environmental contamination problems have become increasingly acute, causing most governments to initiate waste reduction and recycling programs (Lieder & Rashid, 2016).

After the industrial revolution, companies with programmed obsolescence (disposable) spread the “era of fashion and style”, influencing the thought of disposable acquisition, known as linear consumption behavior, which occurs through resource intensive use of natural resources, eliminating impurities from the environment and generating serious environmental consequences (Lieder & Rashid, 2016; Ostermann & Nascimento; 2021).

CE can offer an effective configuration for the balance among the economy, society and the environment, integrating sustainability and business models, as well as helping to change the design of consumption and production. Thus, the circular economy encourages organizations to rethink the use of their resources and can be a leverage practice in emerging economies through radical innovations (Farias; Pinto; Araújo; Menezes & Andrade, 2021; Pansera, Comin, Julkovski; 2021)

However, the linear consumption model still predominates in the fashion industry, based on the purchase of a large number of parts, with less durability, rapid psychological obsolescence and lower value, resulting in a brief disposal. From this perspective, the consumption of used products is also an option to promote environmental sustainability, since the consumption of this type of clothing and accessories reduces the quantity of discarded products (Ostermann & Nascimento, 2021, Pansera, Comin & Julkovski, 2021).

In 2015, the UN (United Nations) established the Agenda 2030 consisting of 17 Sustainable Development Goals (SDGs). Among the 17 goals set, the SDG12 aims to ensure sustainable patterns of production and consumption through 11 goals. The 12.5 goal, which implies that by 2030 there will be a considerable reduction in waste generation through prevention, reduction, recycling and re-use, is highlighted. With a view to Agenda 2030 and the EC R principles, there is an alliance between production and consumption of goods from the Circular Economy and the SDG 12 of Agenda 2030.

This research seeks to respond to the following problem: What is the awareness of masters and doctoral students regarding the consumption of green

fashion products, and how can this behavior influence the scope of SDG12? Thus, the objective of this research is to analyze the consumption behavior of masters and doctoral students in relation to the products of the circular economy, and how this behavior can contribute to the reach of the SDG12 of Agenda 2030, as well as the occurrence of significant difference in the opinion of the researched, by gender.

This study is justified by the theoretical and practical contribution it makes, since the circular economy is a model of production and consumption that can contribute to the reach of the SDG12 of Agenda 2030 and, furthermore, few works are found that collaborate on the theme enrichment. Through the study, it will be possible to identify how people with higher education behave in relation to the circular economy and fashion products derived from this economic model, as well as their knowledge about their consumption. The theoretical background is presented below.

2 THEORETICAL BACKGROUND

In the last 30 years, the crisis of natural resources has intensified, as a result of unbridled consumption and waste disposal in the environment. This situation has alarmed the population and organizations to raise awareness of the consequences of their activities. In this context, the Circular Economy (CS) appears as an economic model for the reuse of materials and waste, seeking to integrate sustainability principles into economic activities. This production model values regeneration and restoration, improving and preserving natural capital (Navarro; Ferreira; Sugahara & Conti, 2021).

Circular Economy is the result of a process in which the waste produced is converted into raw material and put back into the production system. Thus, waste and materials, instead of being discarded, are reused more frequently, potentiating natural resources (Carvalho; Moreira; Dias; Rodrigues & Costa, 2020)

According to Karman and Pawlowski (2022), the CE competitiveness occurs through the combination of real, better living standards and economic results. In this

sense, the Circular Economy seeks to separate resource consumption from the creation of value, which occurs through the incorporation of new technologies and business models in order to increase the value taken from asset and material stocks. Thus, the change to CE is stimulated by both ecological and economic benefits.

In a circular economy, there is a reduction in the rate of depletion of resources and waste generation, because it involves managing the values of the resources used. In this case, the R principles are primary for the efficacy of circularity: reduction, reuse, recycling, rethinking, remodeling, repair and redesign (Lieder & Rashid, 2016; Carvalho; Moreira; Dias; Rodrigues & Costa, 2020)

In addition to the production chain, the stages of use and disposal are significant for the generation of pollution and have great relevance in the context of the fashion industry combined with the CE. The product destination after its use is a personal choice of the consumer and can enable recycling and reuse. Adhering to fashion consumption according to CE means consuming less and prioritizing fashion of higher quality and durability (Ostermann & Nascimento, 2021).

According to the authors, this attitude allows the reduction of the use of new resources, because the production of a fashion article, according to linear production, consumes natural and chemical raw materials, and eliminates impurities that are commonly discarded in the oceans, seas and rivers. However, this practice involves some challenges, such as access to parts and the price of clothing, since sustainable products usually have high value when compared to linear products.

In terms of Circular Economy, considering sustainable development, one of the key issues to consider is how resources can be saved and redirected to sustainable consumption practices. The CE principles, when incorporated by consumers, may result in a reduction in the level of consumption. However, if the current (linear) consumption culture is not broken, the Circular Economy will be nothing less than a technical tool that cannot change the current unsustainable system (Korhonen, Honkasalo E Seppäla, 2018; Ostermann & Nascimento, 2021).

Mondéjar, Triguero and Cuerva (2021) point out that in addition to the environmental beneficial effects, there are social effects that must be considered in an CE, such as green jobs. This means that, in addition to the efficient use of scarce resources, the circular economy also implies more sustainable jobs than a linear production system.

According to Guo, Choi and Shen (2020), faced with the sustainability needs they face, companies are seeking to compete with products developed in a sustainable way, with green materials. The concept of green product refers to good ecological and social performance while the organization seeks its own economic benefit. However, in the fashion industry, the development of green products remains fragile and, nevertheless, its consumption is a great managerial challenge, due to the high rate of return and handling costs.

Adhering to CE fashion consumption means consuming less and prioritizing fashion of higher quality and durability. However, this practice involves some challenges, such as access to parts and the price of clothing, since sustainable products usually have high value when compared to linear products (Ostermann & Nascimento, 2021).

According to Oliveira, Gaio and Bonacim (2009) there are experiences lived by men and women in organizations that are not subject to broad and dichotomous man/woman generalizations. Thus, the thought related to the female and male genders, in research and studies, must be rethought, taking into account the social changes that transcend the empirical and theoretical importance.

Taking into account the sustainable perspective, factors such as gender influence the attitudes of individuals, considering that they have different needs and interests, and consequently different contributions related to sustainability. In this sense, women tend to adhere to more positive attitudes towards the environmental aspect, being more prone to active attitudes towards sustainable behavior (Cruz, Gomes, Figueiredo, Sampaio, Dias Filho & Ferreira Neto, 2020)

Xie, Huo and Zou (2019) explain that, although some consumers are not willing to pay more for green products, in general, having an ecologically correct

image is very important for companies to win customers who are willing to buy green products, regardless of the price that has been allocated to them. The green image of a company refers to organizations that have a perception of environmental commitment and concern.

To strengthen the theme Circular Economy, it is important to develop social awareness, changing ways of seeing consumption and production. The relevance of this awareness is proven through external communication strategies, which affirm the importance of ensuring the quality of EC products, as well as the need for clear communication on this aspect. Nevertheless, it can be said that education is the best way to speed up the CE effectiveness and to encourage the substitution of linearity by circularity, guaranteeing future sustainability (Daddi, 2019; Farias; Pinto; Araújo; Menezes & Andrade, 2021).

According to Medeiros, Studart, De Souza & Moura (2017), consumers of ecological products participate interactively in social media, seeking information about the products and their characteristics. The use of social networks has the power to influence potential consumers and can be efficient vehicles of promotion for user engagement in green product consumption practices.

Regarding green product prices and those resulting from the circular economy, it can be said that, strategically, the consumers environmental concerns must be taken into account, since environmental awareness affects purchasing and consumption decisions. Moreover, when consumers are more environmentally conscious, they do not care about the amount of green elements presented during an advertisement or propaganda, always opting for environmentally friendly products. Thus, the higher the level of environmental awareness, the more consumers will be willing to pay for environmentally friendly products (Hong, Wang & Yu, 2018).

Currently, the linear consumption model still predominates in the fashion industry, based on the purchase of a large number of parts, with less durability, rapid psychological obsolescence and lower value, resulting in a brief disposal. From this perspective, the consumption of used products is also an option to

promote environmental sustainability, since the consumption of this type of clothing and accessories reduces the quantity of discarded products (Ostermann & Nascimento, 2021, Pansera, Comin e Julkovski, 2021).

The motivating factors for the consumption of second-hand products involve the promotion of sustainability, short time of use, fast-changing fashion and, above all, money saving. Thus, it is verified that consumers are influencers of organizational practices and therefore of sustainable activities. This occurs through the consumption of products and services, their maintenance and the way they are discarded (Pansera, Comin and Julkovski, 2021; Ostermann & Nascimento, 2021).

However, Scarpellini (2021) reports that although the CE activities carried out by the companies have a positive impact on society as a whole, there are negative social consequences that can be generated by adherence to the circular production model, since the linear model favors the generation of jobs and materials. Cycles are closed by CE. In this case, organizations focusing on the Circular Economy need to adopt measurement structures that take into account the potential social, economic and environmental impacts.

The circular economy, green production and sustainable consumption contribute to the achievement of the SDG12, proposed by Agenda 2030. Thew Sustainable Development Goal Number 12 seeks to establish sustainable production and consumption, resulting in the reduction of waste generation. This objective has a global and local focus, paying attention to the most diverse sources of wastes and wastes generation, turning to public and private organizations, and seeking the most efficient use of resources (IPEA, 2019).

SDG 12 consists of eight targets listed and 1 to 8 and three targets referenced in a, b, and c. Some of them were adapted in Brazil, and others were maintained as prepared by the UN. The objectives are exposed through Table 1.

Table 1 – SDG12 objectives

Goal	Description
12,1 br	To implement the Plan of Action for Sustainable Production and Consumption, together with the states.
12.2	By 2030, to achieve sustainable management and efficient use of natural resources.
12.3.1 br	By 2030, to reduce food waste per capita at national, retail, and consumer levels, and reduce food losses across production and supply chains, including post-harvest losses.
12.3.2 br	To establish a regulatory framework to reduce food waste in Brazil.
12.4	By 2020, to achieve environmentally sound management of chemicals and all waste throughout its life cycle, in accordance with agreed international structures, and significantly reduce its release into the air, water and soil to minimize their negative impacts on human health and the environment.
12,5 br	By 2030, substantially reduce waste generation through Circular Economy and its prevention, reduction, recycling and reuse actions.
12,6 br	To encourage companies, especially large and transnational companies, to adopt socio-environmental liability parameters and practices and to integrate information about these practices into their systems, databases and reporting cycle.
12,7 br	To promote public procurement and management practices based on sustainability criteria, in accordance with national policies and priorities.
12,8 br	By 2030, to ensure that people everywhere have relevant information and awareness about sustainable development and lifestyles in harmony with nature, in line with the National Environmental Education Program (PRONEA).
12.a	To support the developing countries to strengthen their scientific and technological capabilities to change to more sustainable production and consumption standards.
12.b br	To develop and implement tools to monitor the impacts of sustainable development for tourism, accessible to all, that generate decent jobs and work, improve income distribution and promote local culture and products.
12.c	To rationalize inefficient fossil-fuel subsidies that encourage excessive consumption by eliminating market distortions according to national circumstances, including through tax restructuring and phasing out such harmful subsidies, if any, to reflect their environmental impacts, taking full account of the specific needs and conditions of developing countries and minimizing potential adverse impacts on their development in a way that protects the poor and affected communities.

Source: Adapted from IPEA (2019)

Thus, it is possible to realize that the fashion industry is one of the sectors that has a great stake in the elimination of impurities and residues in the environment and in the excessive use of environmental resources, and therefore, the circular production model should be taken into account, aiming to reach the SDG12 by the year 2030.

Moreover, according to (Navarro; Ferreira; Sugahara & Conti, 2021), there is a large gap in Brazilian publications about CE when compared to international publications. Hence the need to invest in studies on the theme, seeking to accelerate the transition from the linear system to the circular system and directing Brazilian organizations to the pillars of sustainability. The study methodology is presented below.

3 METHODOLOGY

This is a descriptive and quantitative research, where results can be quantified, based on mathematics to describe phenomena and their causes (Gerhardt & Silveira, 2009).

The data collection instrument was based on the questionnaire applied in the study by (Carvalho; Moreira; Dias; Rodrigues e Costa, 2020) seeking to identify the interviewees' perception of the intention to buy green in the fashion industry. The sample was probabilistic for convenience, allowing the participation of any and all members of the selected population. Thus, this research was comprised of Masters and Doctoral students of Community Development, Management and Education at a University of Paraná State, Brazil.

The researched variables were presented in 12 tables, showing: the understanding of the meaning and awareness of the lower impact of green products, the alternatives for reducing waste in production, the challenges for the consumption of green products, the actions that influence the consumption of products arising from of the circular economy, and, finally, the understanding and link between the SDGs and the circular economy/green products.

In most of the questions, 5-point ordinal scales were used, where the first one corresponded to agree/fully aware, the fifth corresponded to disagree/not aware and the others corresponded to an intermediate level of response. In the other questions, two-point ordinal scales were used, corresponding to “yes” and “no”.

Thus, 67 questionnaire were collected through google forms which were examined through the chi-square non-parametric test to verify the existence of a relationship among the variables according to sex.

This test, according to Chiusoli; Dias; Costa & Serbai (2021, p.5) “is statistic used that evaluates whether the non-paired observations between two variables independent of each other, being applied at a significance level of 5%, to test whether or not to reject the postulated hypotheses”. Still according to the authors, when the p-value obtained is greater than 5%, the hypotheses should not be rejected, otherwise, when it is lower than 5% ($p \leq 0.05$), the variables are independent and the hypotheses should be rejected.

In this case, the study hypothesis is:

H0: there is no significant difference in the participants' opinion in relation to the variables surveyed segmented by gender (male and female). Next, the data analysis is presented.

4 RESULTS AND DISCUSSIONS

Based on the results collected, it was verified that, of the 67 responses, 65.7% were female, 38.2% were male and 1.5% were identified as non-binary. Thus, it is possible to realize that the female gender predominated in the study, reaffirming the study by Carvalho; Moreira; Dias; Rodrigues & Costa (2020), in Portugal, where both studies present a higher presence of the female sex. However, on the other hand, the study by Carvalho; Moreira; Dias; Rodrigues & Costa, (2020) was not performed exclusively with graduate students.

Most interviewees were born between 1980 and 1994, with a percentage of 59.7%, followed by those born between 1995 and 2010 with 23.9%, and those born between 1965 and 1979 with 14.9%. There was only one response identified with birth in 1964 or earlier. Compared to the study carried out by Carvalho; Moreira; Dias; Rodrigues & Costa, (2020), there is a difference between respondents, where

most of the respondents in Portugal are born from 1995 onwards. The sample revealed that 100% of the respondents are Brazilian and that most know the meaning of Circular Economy (62.7%).

The results show that most interviewees consume more than 500 reais (approximately 80 euros) in clothes per season, corresponding to 31.3%, followed by those who consume more than 250 reais (40 euros) per season, with 20.9%.

It can be said that most respondents understand the benefits of CE (mean of 24 responses to “very conscious”), since of the 67 respondents, only 3 or 4 participants identified themselves as unaware of the benefits of the circular economy related to competitiveness, environment, innovation and employment. However, this number rises when asked about the knowledge of the basic principles of Circular Economy where the mean is between 7 answers for “I have no knowledge”.

Regarding products labeled as green, 78% of the interviewees stated that they knew the meaning, while 22% of the interviewees stated that they did not know, as presented in Table 1.

Table 1 – Understanding the meaning of Green Products

Scale	Female	Male	grand total
Yes	73%	86%	78%
No	27%	14%	22%
grand total	**100%**	**100%**	**100%**
chi-square	0.2295		

Source: research data (2022)

However, 90% of the participants indicated that they were aware of the lower impact of green products on the environment and human health, which indicates a small contradiction between the interviewees [Table 2].

Table 2 – Awareness of the lower impact of green products

Scale	Female	Male	grand total
Yes	89%	90%	90%
No	11%	10%	10%
grand total	**100%**	**100%**	**100%**
chi-square	0.8673		

Source: research data (2022)

These data complement the vision of Hong, Wang, and Yu (2018) that show that increased consumer environmental awareness brings benefits to retailers and manufacturers who have ecologically correct activities. However, through the data collected, it is observed that when questioned about the reputation of the green products available in the fashion market, the percentage of notoriety decreases. These results also corroborate the study by Guo, Choi and Shen (2020), where they state that, in the fashion market, the performance of green product development remains fragile, as well as there is limitation in the use of sustainable materials and products in the market.

Still in this context, the greatest awareness occurs about the clothes extracted and sold in thrift stores, in which, of the 67 interviewees, 32 were defined as very conscious. Still, 99% say they are aware that the thrift stores are alternatives that help to reduce the production of textile waste [Table 3].

Table 3 – The thrift stores (second-handed clothing stores are alternatives for reducing textile waste

Scale	Female	Male	grand total
Yes	100%	95%	99%
No	0%	5%	1%
grand total	**100%**	**100%**	**100%**
chi-square	0.2359		

Source: research data (2022)

These data are compatible with the theory, since the second-hand products collaborate to minimize the amount of discarded products and promote environmental sustainability.

Table 4 shows that most of the interviewees have already consumed in thrift stores, which are in line with the statement by Pansera, Comin and Julkovski (2021). The authors claim that the main feature of the second-handed products market is the opportunity for people to save by buying used products a more affordable price and giving new destination to unused resources.

Table 4 – Consumption of green mineralized fashion products and sold in thrift stores

Scale	Female	Male	grand total
Always	57%	32%	49%
Neutral	13%	27%	18%
I never use it	30%	41%	34%
grand total	**100%**	**100%**	**100%**
chi-square	0.1312		

Source: research data (2022)

It is verified that second-hand products are the most consumed type of green product in the day-to-day of respondents, representing 20 responses (29.85%) for “I always use”. The green products with the lowest use pointed out by respondents were: fashion products made with liquid animal skin, shoes made with recycled plastic and shoes and clothing made with recycled denim fabrics, with respectively 34, 29 and 28 respondents for “I never use”.

Most interviewees indicate that the lack of knowledge of society is the main challenge of green products in the fashion industry [Table 5]. The data collected confirm the speech by Farias; Pinto; Araújo; Menezes & Andrade (2021), which affirms the need to carry out a continuous work of social awareness, seeking the transition of the existing linear business models to the Circular Economy model.

Table 5 – Unfamiliarity of society as the main challenge of using green products in the fashion industry

Scale	Female	Male	grand total
I agree	78%	82%	79%
Intermediate	17%	14%	16%
I disagree	4%	5%	4%
grand total	**100%**	**100%**	**100%**
chi-square	0.9255		

Source: research data (2022)

In addition, this pieces of information confirm that social awareness, through educational programs, is very important for a successful transition from a linear economy to a circular economy, as customers are an integral part of a production and consumption model, collaborating with the data evidenced by the study by Lieder and Rashid (2016).

By using the chi-square test, it was verified that all the variables mentioned so far [Tables 1, 2, 3, 4 and 5] are above 5% significance and, therefore, the hypothesis (H0) should not be rejected.

Still, some believe that the price of these products is also one of the challenges for the consumption of green fashion products [Table 6]. However, it is observed that the significance percentage of this variable was below 0.05, demonstrating that H0 should be discarded for this issue:

Table 6 – Higher price is a challenge for using green products in the fashion industry

Scale	Female	Male	grand total
I agree	54%	32%	47%
Intermediate	17%	55%	29%
I disagree	28%	14%	24%
grand total	**100%**	**100%**	**100%**
chi-square	0.0069		

Source: research data (2022)

In addition to being a challenge for consumption, the results show that 37.3% of the respondents are not willing to pay more for the purchase of green products. These data contrast with the study by Hong, Wang and Yu (2018), mainly when they claim that individuals with greater environmental awareness tend to choose to buy green products, not worrying about the price of goods.

Through the research, it can be realized that these aspects do not match with what was experienced by the sample, since a considerable part of the respondents would not pay a higher price for green products, even knowing their benefits.

Thus, it is identified that the fashion industry based on green production remains fragile, in view of the onerousness of this type of production system when compared to conventional and linear productions, which justifies the underdevelopment of green fashion products, and proves the study by Guo, Choi and Shen (2020).

When asked about the influencers of the consumption of products of the Circular Economy, the interviewees reported marketing and communication campaigns [Table 7], and social networks [Table 8], and the reduction of pollution and waste as the main influencers of green products consumption [Table 9].

Table 7 – Marketing and Communication actions influence the green products consumption

Scale	Female	Male	grand total
I agree	65%	41%	57%
Neutral	7%	9%	7%
I disagree	28%	50%	35%
grand total	**100%**	**100%**	**100%**
chi-square	0.1604		

Source: research data (2022)

These data reflect what was suggested by Ostermann and Nascimento (2021) where the authors state that new studies would indicate new perspectives and actions aimed at product development, brand positioning and communication. The

importance of the communication and marketing process for the advancement of the circular production model is highlighted.

Table 8 – The social networks influence the green products consumption

Scale	Female	Male	grand total
I agree	61%	41%	54%
Neutral	9%	5%	7%
I disagree	30%	55%	38%
grand total	**100%**	**100%**	**100%**
chi-square	0.1572		

Source: research data (2022)

Through the responses, it is noted that social media are one of the ways to develop the products communication and dissemination. The result corroborates the conclusion of Medeiros, Studart, De Souza & Moura (2017) who state that social media influence purchases of ecologically correct products through personal communication, search, advertisements, among others. They are therefore essential for a brand and product arising from the Circular Economy to become known and consumed by a large number of people.

Table 9 – Reduction of pollution and wastes influence the green products consumption

Scale	Female	Male	grand total
I agree	63%	45%	57%
Neutral	11%	23%	15%
I disagree	26%	32%	28%
grand total	**100%**	**100%**	**100%**
chi-square	0.3011		

Source: Research data (2022)

This contextualization complements the thinking of Lieder and Rashid (2016) who claim that the rate of depletion of resources and waste generation is higher in a linear economy than in a CE.

Regarding the principles of circular economy applied in the day-to-day, the most important ones were reduction (principle used by 28 respondents), reuse (27 participants) and recycling (26 respondents). Data show that, although the level of schooling of the interviewees is higher, there is a deficit in relation to the application of the principles of the circular economy in the day-to-day, as well as the consumption of green products and those resulting from circularity.

This scenario brings about concern, since the use and disposal steps have significant effects on environmental pollution. In this case, the study by Carvalho; Moreira; Dias; Rodrigues & Costa, (2020) is compared, since the data collected in Portugal show that all the principles of CE have a direct effect on consumer attitudes.

Regarding the knowledge of Agenda 2030 and the Sustainable Development Goals, 91.18% demonstrated knowledge, compared to 8.82% who said they did not know the Agenda. The percentage decreases in relation to the knowledge of SDG12 (sustainable consumption and production), where 82% claim to know the objective and 18% show lack of knowledge.

Table 10 – I have heard of Agenda 2030 and the SDGs

Scale	Female	Male	grand total
Yes	86.96%	100.00%	91.18%
No	13.04%	0.00%	8.82%
grand total	**100.00%**	**100.00%**	**100.00%**
chi-square	0.2721		

Source: research data (2022)

The lack of knowledge of the Sustainable Development Goal 12 is an aggravating factor for its fulfillment by the year 2030, because it depends on society's awareness of green consumption. But only knowledge about the SDGs is not enough, requiring the acquisition of new customs, abandoning linearity and its consequences.

Table 11 – I have already heard of ODS12

Scale	Female	Male	grand total
Yes	83%	82%	82%
No	17%	18%	18%
grand total	**100%**	**100%**	**100%**
chi-square	0.9362		

Source: research data (2022)

Table 12 – I believe that Circular Economy can influence the SDG12

Scale	Female	Male	grand total
I agree	87%	86%	87%
Neutral	4%	9%	6%
I disagree	9%	5%	7%
grand total	**100%**	**100%**	**100%**
chi-square	0.6318		

Source: research data (2022)

Finally, most participants agreed that the circular economy can influence the scope of the SDG12 and that, through participation in the study, it increased their awareness of the importance of the circular economy and green products. This result reflects the data exposed by Pereira (2021) where the author mentions that SDG12 is directly related to the principles of the CE, and the achievement of its objectives depends on the implementation of circular economy systems.

It was observed that most of the tested variables by Chi-square show a percentage above 0.05, which indicates that the hypothesis (H0) should not be rejected. Therefore, through this study it is possible to claim that there is no significant difference in the participants' opinion in relation to the variables surveyed segmented by gender (male and female).

Thus, in view of the perspective punctuated by Cruz, Gomes, Figueiredo, Sampaio, Dias Filho and Ferreira Neto (2020), where women tend to obtain more positive attitudes towards sustainable behavior than men, it appears that the

results obtained through this study contradict this statement, with no significant difference between genders.

Comparing the data of the research carried out with the studies by Carvalho; Moreira; Dias; Rodrigues & Costa, (2020), in Portugal, it is confirmed the need to develop the social consciousness, which is seen by most participants as a challenge for green production in the fashion industry. An option for this awareness occurs through education and education, where the transition to a sustainable consumption and production model is encouraged.

Laurett, Paço and Mainardes (2022) report the results of a sustainability project of a Higher Education Institution, where several sustainable actions were incorporated and linked to the triple bottom line (TBL) and linked to sustainable development objectives (SDGs), in particular SDG12 (responsible consumption and production), SDG13 (climate action) and SDG 17 (partnerships for THE goals).

5 CONCLUSIONS

This research allowed to reach the objective proposed: to analyze the consumption behavior of masters and doctoral students in relation to the products of the circular economy, and how this behavior can contribute to the reach of the SDG12 of Agenda 2030, as well as the occurrence of significant difference in the opinion of the researched, by gender.

Through the study, it was possible to identify that most interviewees are defined as aware of some benefits of circular economy and green products. However, although most have demonstrated that they take into account the benefits and importance of the CE and green products, it is clear that a considerable percentage does not know or does not apply the principles in their day-to-day lives, which still shows the lack of commitment of the society toward sustainability. It is also understood that this information does not differ according to the respondents' gender.

The proposed research problem was answered through data analysis, which enabled us to identify relative awareness of the advantages of the Circular Economy products. Thus, the behavior demonstrated by the respondents has a direct effect on the scope of SDG12, since this objective aims to guarantee sustainable patterns of production and consumption by the year 2030, taking into account considerable production in waste generation through prevention, recycling and reuse.

Price is one of the main challenges facing the fashion and green products industry, since most respondents do not propose to pay more for parts coming from CE, even if they are aware, an aspect that confronts the theory.

The information collected was compared with data showed by other studies within the themes discussed. This research was carried out with individuals with a high level of schooling - master's and doctoral students, who correspond to people with greater access to information and greater environmental and social awareness, which demonstrates the difficulty of green production in the fashion industry to stay in the market, competing with linear products.

Aspects of the circular economy and green products should be worked socially, because the study indicated that a large percentage of interviewees do not apply, or apply few principles of CE in their day-to-day lives. Thus, the lack of knowledge of CE is one of the challenges that should be faced by the fashion industry.

As a study limitation, it is possible to point the difficulty of the individuals' participation, since it was performed in a pandemic scenario, where contacts were only online. This made it difficult for individuals to adhere to the present research and was one of the limitations faced in the study.

This research has contributed with a better vision of the Circular Economy and the green products of the fashion industry, with a view to a change in productive and consumption behavior, which collaborate for the SDG12, one of the goals that Brazil proposed to achieve by the end of the year 2030.

It is suggested, for future investigation, the application of this study in other segments of the market, seeking to identify the adherence and awareness of consumers regarding different products arising from the circular economy.

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Authors

1 – Ana Carolina Velozo Valenga
Institution: State University of the Midwest
Irati, Paraná, Brazil
Master in Management from UNICENTRO
Orcid: https://orcid.org/0000-0001-7738-1102
E-mail: carol.velozo@hotmail.com

2 – Silvio Roberto Stefani
Institution: State University of the Midwest
Guarapuava, Paraná, Brazil
PhD in Business Administration from the University of São Paulo
Orcid: https://orcid.org/0000-0002-5871-8686
E-mail: silviostefano@unicentro.br

3 – Luísa Margarida Cagica Carvalho
Institution: Polytechnic Institute of Setúbal
Setúbal, Lisboa, Portugal
PhD in Management from the University of Évora
Orcid: https://orcid.org/0000-0002-9804-7813
E-mail: luisa.cagica.carvalho@gmail.com

4 – Cláudio Luiz Chiusoli
Institution: State University of the Midwest
Guarapuava, Paraná, Brazil
PhD in Business Administration from the University of São Paulo. Master in Business Administration from the University of North Paraná
Orcid: https://orcid.org/0000-0002-7844-3632
prof.cludio.unicentro@gmal.com

Contribution of authors

Contribution	[Author 1]	[Author 2]	[Author 3]	[Author 4]
1. Definition of research problem	√	√	√	√
2. Development of hypotheses or research questions (empirical studies)	√	√	√	√
3. Development of theoretical propositions (theoretical work)	√	√	√	√
4. Theoretical foundation / Literature review	√			
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7. Statistical analysis				
8. Analysis and interpretation of data	√			
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