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Circular Economy: the green products on the achievement of the SDG12

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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 (CE) 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; Hennemann, & Sehnem, 2022).

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; Hennemann, & Sehnem, 2022).

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; Pensera, 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, Pensera, Comin & Julkovski, 2021).

It is important to mention that innovation confers competitive advantages to organizations, since innovation capacity refers to the ability to continuously transform ideas and knowledge into new processes and products. This aspect defines the competitive capacity of companies in other economies, determining their productivity and maximizing product quality (Cirani; Silva; Cássia & Pedro, 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 principles, there is an alliance between production and consumption of goods from the Circular Economy and the SDG 12 of Agenda 2030.

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, 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 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. Thus, this study seeks to respond to the following research 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?

2 THEORETICAL FRAMEWORK

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 (Navarro; Ferreira; Sugahara & Conti, 2021).

From an organizational perspective, the creation of green innovations, including environmentally correct technologies, help to reduce negative externalities of production and consumption, creating less polluting products, processes and services and consuming fewer resources. In addition, this type of technology allows for a more efficient management of pollution and related processes (Figueiredo; Di Serio; Guilhermino; Morais & Neto, 2019).

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 & Costa, 2020; Hennemann, & Sehnem, 2022).

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 & 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).

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 Seppälä, 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.

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).

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; Ceglia; Bianchi & Barcellos, 2019; Farias; Pinto; Araújo; Menezes & Andrade, 2021).

According to Medeiros, Studart, De Souza and 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; Hennemann, & Sehnem, 2022).

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).

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 CE 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. The 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 I.

Table I.
SDG12 Description

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: 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 and 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. THE METHOD

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 and 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.

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 and 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 DISCUSSION

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 and 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 and 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 and 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 II.

Table II.

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 III].

Table III.

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 IV].

Table IV.

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 V 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 V.

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 VI]. The data collected confirm the speech by Farias; Pinto; Araújo; Menezes and 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 VI.

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 II, III, IV, V and VI] 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 VII]. 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 VII.

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).

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.

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

Table VIII.

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 IX.

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 and 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 X.

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 and 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 XI.

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).

Table XII.

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).

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 XIII.

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).

Comparing the data of the research carried out with the studies by Carvalho, Moreira, Dias and 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.

REFERENCES

A Agenda 2030 para o Desenvolvimento Sustentável. <https://www.undp.org/content/dam/brazil/docs/agenda2030/undpbr-Agenda2030-completo-pt-br-2016.pdf>

Carvalho, LC; Moreira, SB; Dias, R; Costa, B. (2020), “Circular Economy Principles and Their Influence on Attitudes to Consume Green Products in the Fashion Industry: A Study About Perceptions of Portuguese Students.” In: *Mapping, Managing, and Crafting Sustainable Business Strategies for the Circular Economy*, p. 248-275. DOI:10.4018/978-1-5225-9885-5.ch012

Chiusoli, CL; Dias, JC; Costa, L; Serbai, L. (2021), “Adaptação de estudantes universitários em tempo de pandemia enquanto isolamento social”. *Pesquisa, Sociedade e Desenvolvimento*, v. 10, n. 16. <https://doi.org/10.33448/rsd-v10i16.24162>

Cirani, CBS; Silva, JJ; Cássia, AR; Pedro, SC. (2021). Innovation dynamics in the Brazilian industrial sector: scenario and reflexions. *Innovation & Management Review*, V. 18, N. 2, pp. 145-163. <https://doi.org/10.1108/INMR-02-2019-0019>

Daddi, T.; Ceglia, D.; Bianchi, G.; Barcellos, MD. (2019), “Paradoxical tensions and corporate sustainability: A focus on circular economy business cases”. *Corporate Social Responsibility and Environmental Management*, p.770–780. <https://doi.org/10.1002/csr.1719>

Farias, F. G., Pinto, F. R., Araújo, D. de S., Menezes, B. S. de, & Andrade, R. D. de. (2021). “A decade of studies on circular economy: trends and reflections through international bibliometric analysis”. *Electronic Journal of International Business*, São Paulo, v.16, n. 3, p. 289-305. <https://doi.org/10.18568/internext.v16i3.647>

Figueiredo, JC; Di Serio, LC; Guilhermino, JF; Morais, WAC; Neto, VL. (2019). Research, development and transfer of environmentally sound technologies in Brazil. *Innovation & Management Review*, v. 16, n. 1, pp.2-16, <https://doi.org/10.1108/INMR-08-2018-0065>

Gerhardt, TE e Silveira, DT (2009), “*Research methods. Open University of Brazil – UAB/UFRGS*”. Porto Alegre: UFRGS.

Guo, S.; Choi, TM e Shen, B. (2020), “Green product development under competition: A study of the fashion apparel industry”. *European Journal of Operational Research*, v. 280, p. 523–538. <https://doi.org/10.1016/j.ejor.2019.07.050>

Hennemann, H. da Silva, T. and Sehnem, S. (2022), "The circular economy and Industry 4.0: synergies and challenges", *Revista de Gestão*, v. 29, n. 3, pp. 300-313. <https://doi.org/10.1108/REGE-07-2021-0121>

Hong, Z.; Wang, H. e Yu, Y. (2018), "Green Product pricing with non-green product reference". *Transportation Research Part E*, v. 115, p. 1-15. <https://doi.org/10.1016/j.tre.2018.03.013>

IPEA, Instituto de Pesquisa Econômica Aplicada. (2019), "Objetivos de Desenvolvimento Sustentável". <https://www.ipea.gov.br/ods/ods12.html>.

Karman, A. e Pawlowski, M. (2022), Circular economy competitiveness evaluation model based on the catastrophe progression method. *Journal of Environmental Management*, v. 303, n. 114223. <https://doi.org/10.1016/j.jenvman.2021.114223>

Korhonen, J.; Honkasalo, A. and Seppälä, J. (2018), "Circular Economy: The Concept and its Limitations". *Ecological Economics*, v. 143, p. 37-46. <https://doi.org/10.1016/j.ecolecon.2017.06.041>

Laurett, R., Paço, A. e Mainardes, EW (2022), "Sustainability in higher education institutions: a case study of project FUCEPE 120% sustainable", *International Journal of Sustainability in Higher Education*, Vol. ahead-of-print. <https://doi.org/10.1108/IJSHE-02-2021-0053>

Lieder, M. e Rashid, A. (2016), "Towards circular economy implementation: a comprehensive review in context of manufacturing industry". *Journal of Cleaner Production*, v. 115, p. 36-51. <https://doi.org/10.1016/j.jclepro.2015.12.042>

Medeiros, HS; Studart, LBA; De Souza, L; Moura, HJ. (2017), "Influences of social media on purchase intention for green products". *CPMARK*, v. 5, n.3, p. 89-102.

Mondéjar, L; M.; Triguero, A. e Cuerva, M. C. (2021). Exploring the association between circular economy strategies and green jobs in European companies. *Journal of Environmental Management*, v. 297, n. 11343. <https://doi.org/10.1016/j.jenvman.2021.113437>

Navarro, AC; Ferreira, DHL; Sugahara, CR; Conti, DM. (2021), "Economia circular: um estudo bibliométrico". *Revista Visão*, vol. 10, n. 2, pág. 17-23.

Ostermann, CM e Nascimento, LS (2021), "Sustainable consumption of fashion from the perspective of the circular economy: an agenda for future research". *RACEF*, v. 12, n. 2, p. 166-184. DOI: <http://dx.doi.org/10.13059/racef.v12i2.818>

Pansera, SP; Comin, LC e Julkovski, DJ (2021), "Circular economy in second-hand businesses". *Revista AOS*, v.10, n.1, 2021, p. 41-63. DOI:10.17648/aos.v10i1.2089

Pereira, RSC. (2021), "The Circular Economy system and the 2030 Agenda: analysis of the evolution in Portugal". *E3 - Journal of Economics, Business and Entrepreneurship*, v.7, n. 1, p. 97-124. DOI:10.29073/e3.v7i1.381

Scarpellini, S. (2021), “Social impacts of a circular business model: An approach from a sustainability accounting and reporting perspective”. *Corporate Social Responsibility and Environmental Management*, p. 1–11. <https://doi.org/10.1002/csr.2226>

Xie, X.; Huo, J.; Zou, H. (2019), “Green process innovation, green product innovation, and corporate financial performance: A content analysis method”. *Journal of Business Research*, v. 101, p. 697–706. <https://doi.org/10.1016/j.jbusres.2019.01.010>