

Article

Sustainability as a Gateway to Textile International Markets: The Portuguese Case

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Abstract: The textile industry sector is classified as the most polluting sector and has the greatest direct impact on the life of the entire ecosystem. The main objective of this article is to study the role of sustainability (eco-innovation and circular economy) in the internationalization of the textile industry in Portugal. For this, a qualitative methodology was used, through semi-structured interviews applied to four managers of the textile sector, in the north of Portugal. The results of the interviews were submitted to a content analysis and data coding system using the NVIVO software. The results show that sustainability is a pillar of direct and/or indirect internationalization, either through the demand of the consumer for sustainable products or through the availability of the products produced by companies; this is motivated mainly by customers, even if the high price of these products when they reach the market is concerning. With the results achieved, this article shows that the determining factor for eco-innovative and recycled products is the price factor. The high price that eco-innovative and recycled products have when they reach the market is the main concern that the companies interviewed have in terms of investing more in this type of product. However, they claim that there is a clear increase in demand for these products and that it is a differentiating factor in international markets. It also became evident that the existence of products from the circular economy increases the companies' value and acceptance in international markets. This article provides empirical evidence that shows that the transition from a linear to a circular economy requires large investments in most cases; however, it is currently a competitive advantage and a positioning in a differentiating sector, increasing the brand's social responsibility.

Keywords: eco-innovation; sustainability; circular economy; textile; internationalization



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1. Introduction

Corporate Social Responsibility (CSR) has been widely investigated and is already an integral part of many business, especially international ones, and is involved in every step of the manufacturing process, from the raw material supplier to the customer [1]. Recently, CSR has been reconfigured, as a result of the emergence of the sustainability criteria Environment, Social and Governance (ESG); these stand alongside the following 17 Sustainable Development Goals (SDGs), as defined by the United Nations: (i) Eradication of poverty; (ii) Zero Hunger; (iii) Good Health and Wellness; (iv) Quality Education; (v) Gender Equality; (vi) Potable water and sanitation; (vii) Accessible and Clean Energy; (viii) Decent work and economic growth; (ix) Industry, innovation and infrastructure; (x) Reduction of Inequalities; (xi) Sustainable cities; (xii) Responsible consumption; (xiii) Climate action; (xiv) Life underwater; (xv) Life on land; (xvi) Peace, justice and strong institutions; and (xvii) Partnerships for the objectives [2]. In this way, the UN created the aforementioned SDGs in 2015 with the aim of achieving them by the year 2030. However, 7 years have passed and not every indicator for every country is yet visible; there is a relevant emphasis on indicator 13 (Climate Action), for which only 20% of countries provide

data, in contrast to indicator 7 (Affordable and clean energy), for which 80% of countries already disclose data [3].

On the other hand, the textile sector contributes significantly to global environmental pollution, and in only two decades, the manufacture and consumption of clothing has doubled [4]. According to Nimkar [5], more than 8000 chemicals are used in the production of textiles, with a direct impact on human health and the environment. From material selection to product disposal, the value chain has a significant environmental and social impact, related, in particular, to the following: the use of toxic chemicals in the dyeing process; the high energy consumption and the degrading working conditions in the factories; the high quantities of greenhouse gases emitted in transport; and the disposal of clothing in landfills and incineration [6].

Sustainability is increasingly a concern of the textile sector, both in terms of its products and processes [7]. In both cases, driven by regulations, such as requiring traceability throughout the chain, and by increasingly demanding customers, the penalty for when a product is found to originate from an unsustainable process is it being immediately placed on a rejection list by many customers [8]. Lennan et al. [9] point to a sustainable strategy that ensures the transition from the manufacture of polluting products to recyclable, reusable and/or ecological products; this strategy is called eco-innovation, and is a driver of the transition from the verticality to the circularity of products and raw materials, helping to increase sustainability via the creation of products from other products, and thus creating a Circular Economy. The circular economy is defined by the European Commission as “[...] the ability of production processes to retain the value of products, materials and resources in the economy for as long as possible and to minimize, as far as possible, the generation of waste along all stages of the value chain” [10]. Following this definition, the European Parliament obliged the Member States to collect textile waste separately by the year 2025; they bet on circular economy strategies, and thus aimed to combat the linear economy model (take-make-waste) in order to achieve reductions in textile waste, reductions in virgin fibers and emissions from incineration, and a reduction in deposits of this waste [9]. Eco-innovation, environmental innovation, green innovation or sustainable innovation are concepts commonly used to identify innovations that contribute to a sustainable environment through the development of ecological improvements [11]. Eco-innovation, in particular, has been used to identify innovations that contribute to a sustainable environment through the development of ecological product improvements [8]. A study by Loučanová, and Nosál'ová [12], carried out in Slovakia, concluded that in moderate innovation countries (e.g., Portugal), eco-innovation generally positively influences the environmental, economic and social growth of companies.

According to Hazarika and Zhang [13], 90% of studies on eco-innovation focus on technology industries, neglecting other industries such as manufacturing (e.g., textiles). Borowski [14] states that there is another gap associated with eco-innovation, which is the company's own innovation. Innovation must go beyond product and technology innovation, and it must also innovate in the following areas: (i) processes; (ii) the organization of human resources; (iii) marketing; (iv) social issues. The main objective of this article is to study the role of sustainability (eco-innovation and circular economy) in the internationalization of the textile industry in Portugal.

The Portuguese textile sector is considered a traditional sector and is one of the oldest in Portugal. Furthermore, it is one of the most important sectors in terms of foreign trade, with approximately 65% (2020) of its production being exported to 189 countries on five continents [15]. Despite having developed its activity in the 70s and 80s due to cheap labor, leading to a crisis in the sector, it is only from the last decade onwards that the industry has begun to recover and achieve an international reputation due to its strong commitment to innovation, quality and sustainable production. In 2018, the sector consisted of 8821 companies with a turnover of EUR 7.6 billion, contributing to Portugal being the 22nd world exporter of clothing and the 10th in the EU [15]. Exports reached a value corresponding to 5.5% of the total national exports, concentrating on the intracommunity market.

To carry out this study, a qualitative methodology was used, through semi-structured interviews conducted with four entrepreneurs in the textile sector in Portugal who have applied eco-innovation and have contributed to the circular economy. The script used for the interviews was pre-prepared and divided into four main points (company characterization, sustainability, eco-innovation and circular economy). The results of the interviews were submitted to a content analysis and data coding system using the NVIVO 11.0 software.

Structurally, this article begins by analyzing the state-of-the-art concepts used in corporate sustainability, eco-innovation and circular economy. Then, the results obtained from the interviews carried out with the companies in the textile sector are presented and the main conclusions are presented.

2. Literature Review

2.1. Corporate Sustainability

In 1987, the United Nations introduced the visionary paradigm “Sustainable Development.” The World Commission on Environment and Development (WCED) defined Sustainable Development in very basic terms in the “Brundtland Report”, as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” [16] (p. 8).

Corporate sustainability can be considered as a sub-concept of sustainability-oriented CSR, considering social and environmental concerns [17]. The concept of CSR in business is defined as “the obligations of businessmen to follow policies, make decisions or follow lines of action that are desirable in terms of the goals and values of our society” [18]. Later, Carroll [19] highlighted that CSR is a multidimensional concept that involves the economic, legal, ethical and discretionary perspectives that society has of organizations (ESG) at a given time. The ESG concept for corporate social engagement was developed much later, in 2004, and refers to the integration of environmental, social and governance concerns into business models; this makes ESG a broader terminology than CSR, which indirectly involves governance issues in environmental and social considerations [20,21]. Environmental criteria include the company’s energy use, waste, pollution, conservation of natural resources and treatment of animals, which can help assess any environmental risks a company may face and how those risks are managed. The social criteria refer to the company’s relationship with suppliers, the local community, and the health and safety of employees. Governance encompasses several issues, such as board size and diversity, CEO independence, corporate transparency, and ethical/legal practices [22].

According to Schaltegger and Burritt [23], modern corporations are complex institutions that must consider numerous ecological aspects. The degree of public exposure faced by a company with global stakeholders has been intensified by the rapidly changing and highly diverse operating environment, and the modern information and communication infrastructures. A sustainable company is an organization that is capable of anticipating strategies and innovating according to the needs and requirements of the present and future generations of stakeholders, promoting activities that protect and preserve the environment, while preserving its own performance as a company [24]. According to Hallstedt et al. [25], the implementation of a sustainability strategy in a company can be distributed by categories (Organization; Internal processes; Tasks; Tools) and by elements, such as those that follow: (i) Organizational support from the CEO; (ii) Create and raise awareness of a culture of sustainability from process development to product innovation; (iii) Leverage procurement expertise and experience early on to support and research partners with expertise in the field; (iv) Include social aspects throughout the product lifecycle in the value chain; (v) Assign responsibility for implementing sustainability to the product innovation department; (vi) Have a systematic way of sharing knowledge and building skills in the field of sustainability so that new processes and products are already created with this culture; (vii) Use tools to guide decisions as a complement to assessment instruments; and (viii) Use tools that incorporate a “backcasting” perspective, based on a definition of success.

A positive example of implementation is that of Sbordone et al. [26], who studied the process of a company in the textile sector and concluded that by applying the Lean methodology, it was possible to reduce the following: (i) The time lost in operations that are not valued in the final product; (ii) The amount of waste generated; and, consequently, (iii) The consumption of raw materials, water and energy required for the same amount of production. Peyravi and Jakubavičius [27], carried out a study in which they analyzed the factors that determine the ability of a company to transform itself in order to eliminate the obstacles that hinder the path to sustainability; they concluded that eco-innovation is one of the pillars of sustainability in order to close the circle of linearity and increase the focus of the circular economy. Along the same lines is the study by Pichlak and Szromek [28], in which they argue that the link to closing the circle of the circular economy starts with the implementation of a sustainable system between production and the consumers, which will involve the creation of eco-innovative products that help guide the introduction of new products into the manufacturing process, by the hands of consumers.

2.2. Eco-Innovation

Eco-innovation (EI) is seen as a main principle of sustainability, being a source of survival, differentiation and competitiveness [29]. Zhang et al. [30] refer to eco-innovation as the engine for green development. According to Kemp and Foxon [31] (p. 4), eco-innovation is the “production, application or exploitation of a good or service, production process, organizational structure, management or business method that is new to the company or employee and which results, over its life cycle, in reduced environmental risk, pollution and negative impacts of resource use (including energy use) compared to relevant alternatives”. According to some authors [32,33], there is a broad path to achieving eco-innovation, which may arise from several areas with the creation of eco-innovative processes from “clean” production; these are products that are made from recyclable or recycled materials, are achieved through renewable energies, and are managed by eco-innovative organizations concerned with working conditions and organizational well-being.

Companies in different regions can develop different practices and strategies that respond to market pressures and environmental characteristics, concluding that local specificities influence the way EI is implemented and/or managed [29]. As a competitive advantage, companies must openly innovate and cooperate to achieve the creation of eco-innovative products that actively contribute to environmental sustainability [34]. Valdez-Juárez and Castillo-Vergara [34] analyzed 648 Mexican companies and concluded that, in order to achieve this objective, there is a set of important measures to be implemented, such as the following: (i) Intensify open innovation activities (interacting more frequently with stakeholders); (ii) Adopt disruptive technology and open source software to improve processes; (iii) Establish relationships with research centers and universities for the development of technological, innovative and ecological projects; (iv) Seek support from the national government or foreign entities for the development of technological and innovative projects; (v) Adopt continuous training programs for organization members; (vi) Adopt certifications centered on ecological practices for product development.

Having numbered a set of indicators for the successful development of and commitment to corporate sustainability, it would not be wise to forget human resources, insofar as any and all tasks come from their intervention. According to a study by Bucea-Manea-țoniș et al. [35], the influence of smartworking on eco-innovation, in a study of 29 countries on the European continent, is that innovative companies are able to provide better working conditions; these include, for example, teleworking, fully flexible hours and a flexible workplace that, in practice, from the company’s perspective, results in a saving of resources, since it does not require infrastructure that is designed for all employees, and has advantages for the employee, in terms of time and the cost of daily travel. In a study carried out with SMEs in 27 EU countries, EI offers more environmental innovation in processes and organizational structures than in products. However, market share only has a significant

positive influence on Eco-product and Eco-organizational innovation, while cost savings are only present in Eco-processes [36]. In technological terms, Hazarika and Zhang [13] identified the following technologies that could potentially boost EI and sustainability: (i) the Internet of things (IoT), in which choosing the new concept of taxis means that, by using a mobile application, we can call the one closest to us; (ii) Cloud computing, which allows access to information available anywhere in the world; (iii) Smart factories, which use, for example, 3D printing, easily allowing Big Data to understand their performance in terms of waste; and (iv) Artificial intelligence, which can, for example, predict energy consumption, allowing it to be optimized [37]. For Zhang et al. [30], EI can increase the Total Productive Factor (TPF); however, after the analysis carried out in the Chinese market and companies, an incremental increase in technology caused, in contrast to EI, the TPF to decreased. The same authors concluded that EI and targets for carbon emissions are holding back China's development, consequently decreasing the value of exports [30]. Frigon et al. [29] address the driving factors of EI and divide them into three categories: (i) internal factors; (ii) market factors; and (iii) institutional factors. These eco-innovation drivers are further divided into three main innovation dimensions: (i) eco-processes; (ii) eco-products; and (iii) eco-organization [38].

2.3. Circular Economy

The textile industry is increasingly aware of the ecological footprint it causes and realizes that following this path is increasingly unsustainable [5]. As such, it is urgent to find alternatives and put them into practice, leveraging, for example, a strategy that promotes sustainability and a circular economy in the textile sector; this is promoted by the European Union, where it is hoped that, by the year 2030, this sector will have created its own eco-system that is capable of recycling and reintroducing, always with the lowest possible consumption of resources and energy, recycled products into the market [9]. A circular economy is a system that intentionally replaces, designs and prepares the product, so that at the end of its use, it has a reuse, instead of an end of life; this is the concept that sees a linear economy transition into a circular one [39]. The circular economy contributes to environmental sustainability by raising awareness of the scarcity of goods, and leveraging its innovation so that there is a relationship between ecosystems and economic growth [40].

In recent decades, supply chain management has focused on the development of sustainable practices that incorporate ecological issues in order to minimize the unintentional destructive effects that manufacturing processes have on the environment [40]. Although the implementation of the circular economy is often structuring, Vecchi [41] states that companies end up creating subsidiaries in order to provide significant benefits mainly to achieve the following: (i) Cost reduction; (ii) Development of a self-sustaining organizational innovation and creativity engine; (iii) The opening of possibilities for new ventures; and (iv) The creation of new disruptive business models that drive sustainable competitive advantage. As the textile sector is rich in research and is in constant development, organizational capacity can translate into a sustainable competitive advantage [41]. Circular economy retains significant potential in reducing resource use and its efficacy is proven by several studies [42–45]. However, Bocken and Ritala [46] raised a series of concerns that were raised by the entrepreneurs interviewed in their study; these include the following: (i) can I count on current customers? Or will I have to find others?; (ii) Do we create a digital platform to reuse and share resources?; (iii) Can I create a structure to maintain, repair and reintroduce materials and equipment?; (iv) Do reintroduced materials have the same warranty?; (v) Have we established a reverse logistics logic for collecting equipment?; and (vi) At what price is it reasonable to re-introduce the product? In addition to the doubts of entrepreneurs and managers, Colasante and D'Adamo [47] carried out a series of interviews with 402 Italian consumers and realized that there are conflicting attitudes in terms of the consumption of bio-based products and the consumption of second-hand products; these are the main reuse points that are inherent to the circular economy concept. These consumers were open to paying more to buy products made with biological bases

(+23%) and were receptive to buying second-hand products (−57%). The explanation that the authors find for this fact is that organic products are environmentally friendly products and that second-hand products are poor quality products [47].

With regard to the challenges involved in the implementation of the circular economy, Mathivathanan et al. [48] identifies the lack of technicians and people with sufficient know-how to transform the companies' processes, a lack of training for the teams involved, and the resistance to moving from a linear economy to a circular one on the part of the administration and the top managers. As drivers for the circular economy, Mathivathanan et al. [48] identified the following factors: (i) Advanced technology; (ii) Need for resilience and competitive advantage in the business; (iii) Efficient use of resources; (iv) Product design and efficient process; and (v) Concern with corporate social responsibility and ethics.

2.4. The Role of Sustainability in Internationalization

Currently, the development of multinational companies has an unquestionable pillar, the pillar of sustainability [49]. An example is the one mentioned by Arora and De [50], who show that in Latin countries, sustainability has been a key element in opening up opportunities in international markets for some time, with a considerable growth in exports being felt.

Hojnik et al. [51] show that the commitment to sustainability can be a win-win, that is, international companies have access to experiences and information that makes them develop more easily, gaining a competitive advantage in terms of sustainability. On the other hand, companies with sustainable and ecologically evolved products have more to offer and thus greater potential to enter into foreign markets [51]. Bagheri et al. [42], based on a study of 116 small and medium-sized companies in the United Kingdom, concluded that internationalization is boosted by the controlled innovation of the company, in the sense that it will have to continue to innovate in the domestic market in order to enter into international markets in a more sustainable way. An example of this is the pulp and paper industry sector. Indeed, given its degree of inherent pollution, the targets defined for this sector are very demanding; this requires quick adaptation and productive readjustments, motivated in a large part by the taxes and regulations applied, which, according to authors Johnstone et al. [52], are going through eco-innovation. In the opposite direction, Costantini and Crespi [53] studied the energy sector and reached similar conclusions, in which environmental regulations are the main motivation in the development of environmental innovation solutions. Lanoie et al. [54] studied this effect in Canada and found that by increasing regulations, there is an immediate effect on environmental innovation over a period of two to three years. However, Porter and van der Linde [55] and Brock and Taylor [56] state that, due to environmental regulations, companies would pay a cost of compliance; consequently, prices would increase and, in turn, exports would fall. Hwang and Kim [57] tested these hypotheses and showed that the theory would be partially present, but they also obtained the variable associated with knowledge for environmental innovation, that is, the more regulations there are, the greater the domain of environmental innovation; thus, the ability of a company or product to be accepted in a foreign country increases.

In addition, to clarify this duality, Quiles et al. [58] reviewed a set of investigations that were developed between 1996 and 2019, and the results showed a positive relationship between EI and exports, influenced by social performance, environmental regulations, strategic cooperation, employment and the level or size of the company. Frigon et al. [29] concluded that there is a need to disseminate information, develop green skills in companies and increase consumers' motivation to consume green products. With regard to exports, there is a growing interest in this issue within the agri-food sector, since the benefits of an adequate environmental policy, based on innovation, are very important to promote exports [58].

3. Methodology

3.1. Type of Study and Selection of Cases

For the development of this article, a qualitative methodology was used, through semi-structured interviews with companies in the manufacturing industry in the textile sector. For Yin [59], the qualitative methodology examines the current phenomenon in its context, especially when the boundaries between phenomenon and context are not clearly defined. In a research with a qualitative approach, the sample size can be small, since depth and richness are the key elements, with no need to generalize or replicate the findings [60]. According to Eisenhardt [61] and Yin [62], qualitative methods should be used when there is a need to deeply analyze certain processes, certain characteristics of organizations and/or the vision or experience of individuals. To carry out this study, companies were selected based on the following criteria: (i) companies in the textile sector that focus on the international market; (ii) companies that in recent years have concerns about sustainability; (iii) companies that bet on eco-innovation; and (iv) companies that have adopted circular economy practices.

3.2. Data Collection and Analysis

According to Tuli [63], data collection serves to obtain a set of information that addresses the topic under study and, at the same time, captures the contextual complexity. In this sense, for the development of this study, we resorted to obtaining primary data through interviews, both individual and semi-structured, that were conducted in reference to a previously elaborated guide of questions. The interview guide was divided into five groups. The first group contained questions relating to the characterization of the interviewee and the second contained questions relating to the characterization of the company. Group 3 addressed issues related to the terms under study in this investigation and that were relevant in the literature review carried out; these were sustainability and corporate sustainability, both terms that are inherent and inseparable from environmental sustainability. Group 4 was created using questions around the term eco-innovation, a term that was also the subject of an exhaustive survey of its presence in articles published in indexed journals and that are available on the Web of Science and Scopus platform. Finally, group 5 is present in the script, with questions around the term circular economy, with the aim of exploring how knowledge about this topic reached the interviewees and what they have been doing to enhance it.

The Interviews allowed for the collection of more complete responses through interaction between the interviewer and the interviewee, thus avoiding problems related to the interpretation of the questions [64]. These interviews took place between July and September of the year 2022 and lasted an average of 20 min. In Table 1, there is a summary of the profile of the interviewed companies, in terms of the number of employees, the sector of activity, the percentage of exports and location.

Table 1. Characterization of the companies interviewed.

Participant	Number of Employees	Activity Sector	% Export	Localization
Interview 1	711	Manufacturing—Textile	90%	Guimarães
Interview 2	581	Manufacturing—Textile	90%	Esposende
Interview 3	16	Manufacturing—Textile	70%	Famalicão
Interview 4	20	Manufacturing—Textile	90%	Famalicão

Table 2 shows the profile of respondents from each company, considering gender, age, academic training and position held in the company.

Table 2. Characterization of respondents.

Participant	Genre	Age	Academic Education	Position in the Company
Interview 1	Male	44	Master in International Relations	Market Manager
Interview 2	Male	52	Master in economics	Export Director
Interview 3	Male	32	Master in International Relations	International market manager
Interview 4	Male	34	Master in International Relations	Manager

These interviews and all the information obtained were analyzed and processed through coding using the NVIVO 12.0 software. This software allowed for the extraction of useful and segmented information, which will be detailed in the following subtopics.

4. Results

4.1. Characterization of the Textile Sector in Portugal

Environmentally, the textile sector is a fundamentally polluting sector. This sector is the main contributor to environmental pollution, as pollution is present throughout its production chain, from fiber production to the final completion of the fabric [65]. In addition, in recent decades, unfavorable consumption patterns have become popular, which have contributed to the aggravation of these effects. Globalization and growing world competition encouraged production in countries with cheap labor, allowing the sale of clothing items at reduced prices and of lower quality [66]. This phenomenon incited frequent consumption behaviors and rapid disposal, which, encouraging the intensification of production, contributed to the adoption of unsustainable production techniques [67]. Simultaneously, the industry encourages these consumption habits [68].

Currently, one of the differentiating elements and strategic pillars of the Portuguese fashion sector is the commitment to sustainability combined with innovation, thus guaranteeing products with greater added value and, consequently, the economic sustainability of the business [15]. According to Neto et al. [69], more and more Portuguese companies, and, in particular, those in the textile sector, are betting on overcoming the problem of pollution, or at least minimizing it; this is motivated by economic and environmental benefits and, above all, by a differentiating cooperative image that improves its position in the market. Some good sustainable practices adopted in the Portuguese textile sector include the recovery of wastewater [6], the use of sustainable materials, the development of man-made fibers and the training of employees, with a greater focus on social measures in manufacture compared to earlier stages of the process, which demonstrate a greater environmental impact. There are also companies that are dedicated exclusively to the recovery of textile waste [15].

According to the document “Prospective Vision and Strategy of the Textile and Clothing Industry 2030”, between 2009 and 2019, the reputation of the Portuguese textile and clothing cluster was consolidated; today, it is considered one of the most modern and innovative in the world, particularly renowned its private label model and for its avant-garde technical textiles [70]. With regard to the maturity of companies, the largest share is represented by companies with more than 20 years of activity, whose sizes are mostly at the micro-enterprise level (PORDATA—Database of Portugal, 2022). Table 3 presents some important indicators of the Portuguese textile industry.

Table 3. Characterization of the textile sector in Portugal.

Portugal	Textile Sector	National Total
Companies (2021)	3463	1,316,256
Investment (% wealth) (2020)	12.30	22
Exports (M€) (2021)	5738.90	63,476.70
Imports (M€) (2021)	4889.30	82,518
Coverage rate of imports by exports (2021)	117%	76.90%
Employment (Thousands) (2020)	195.97	4701.37
Gross Added Value (M€) (2020)	3907.68	174,768.00
Apparent labor productivity (€) (2020)	19,939.90	37,173.84

Source: PORDATA—Portugal Database, 2022.

According to Table 1, the textile sector is responsible for creating an added value to the product of around 4000 million euros, exporting around 65% of its production, which represented around 5700 million euros in 2021. In 2018, Portugal was the 22nd world exporter of clothing and the 10th in the EU [15]. Exports reached a value corresponding to 9% of total national exports, concentrated on the intracommunity market [71], particularly in Spain. The US is the main market outside Europe, with a share of 4% [71]. In the Portuguese textile industry, garments are the main group of exported products, particularly knitted garments and accessories. Finally, the productivity indicator shows that the textile sector earns 19,939.90 euros per worker it employs, a value substantially below the national average.

4.2. Sustainability in the Textile Sector

The issue of pollution is increasingly important customers and this is reflected in their opinions. International agencies, as well as governments, aim to reduce the ecological footprint of each person, process, city, country, etc., as much as possible; consumers sense this message, and, in turn, it reaches companies. Arduoso et al. [72], find evidence for and quantify a problem that the world is increasingly aware of, proving that the amount of textile polymers that wash up on beaches in various parts of the world is immense. In this context, sustainability is increasingly popular in society and is part of the short-term goals of most companies [40]. Thus, there are several authors [22,73] who advise companies to combine the governance pillar, which demonstrates how the company operates its activities, with the social and environmental pillars, which show how the company's activities affect people and the planet, in order to create superior customer value.

According to the opinions of the interviewees, it appears that there is, indeed, a concern with sustainability. The requirement/concern with sustainability, according to the interviewees, reached most companies through customers. Clients went from not worrying about the issue to demanding to the implementation and control of the entire value chain in the textile sector. On the other hand, the issue of textile pollution and its classification as the most polluting industry, considered by various governmental and non-governmental associations, lead to the following statements:

Interviewee 1: “[...] Being a polluting industry, and increasingly “suffering” from “persecution” by customers, in this sense, we have to improve our practices.”

Interviewee 2: “[...] it is a concern that we have had over the years, we are among the first to install electric chargers for employees, we have photovoltaic panels, we invest annually.”

Interviewee 3: “[...] given that the textile industry is one of the most polluting, investment in this regard is imperative.”

Interviewee 4: “[...] the future and the present are guided by the search for greater and more sustainable production.”

In this context, Figure 1 presents the main challenges pointed out by the interviewees.

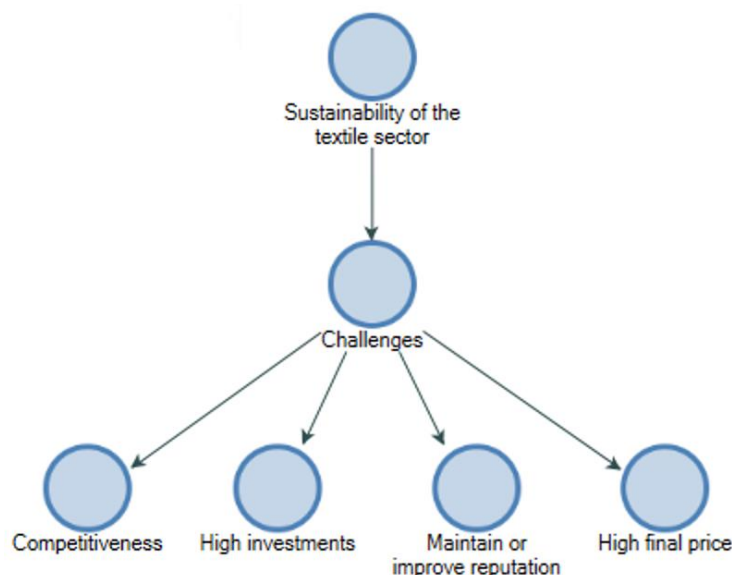


Figure 1. Challenges in the textile sector.

Figure 1 shows the interviewees’ perception of the main sustainability challenges in the textile sector. With regard to competitiveness, the interviewees see innovation as the main pillar of sustaining the carbon neutrality movement. For this, it will be necessary to reformulate new products and processes, which leads to a new challenge, one that was reported by the interviewees: necessary investment. This refers to the fact that, when it comes to an incremental innovation, the risk is low, and some adaptations to the existing product are necessary; however, major problems in terms of consumer opinion may not be foreseen. When it comes to exploratory innovation, such as completely new products, the risk grows and it may leverage the company; or, it may have the opposite effect, and the entire investment is lost. This fact leads to another challenge that was pointed out by the interviewees: maintaining or increasing the company’s reputation with the introduction of completely new products. Although based on the stamp of sustainability, which is increasingly popular, we are heading, however, towards the last challenge that was pointed out by the interviewees: the final price of the product increasing. In this field, although the stamp of sustainability is, in some cases, a competitive advantage, it is a disadvantage when the price of sustainable production is higher than that of a competing product that may have been produced without any environmental concern.

Below is a selection of excerpts from statements collected from the interviews, which characterize the main challenges:

Interviewee 1: “[...] the biggest challenge will be, in the case of Portugal, to continue to be competitive in terms of price and to build an image of an evolved or constantly evolving sector.”

Interviewee 2: “challenges for the sector are:—making the production and reproduction of the research being carried out in the sector competitive, in order to be able to fight with countries like China, Bangladesh etc.”

Interviewee 4: “The biggest challenge will be to combine sustainability and profitability/competitiveness.”

Figure 2 illustrates the motivations extracted from the interviews carried out.

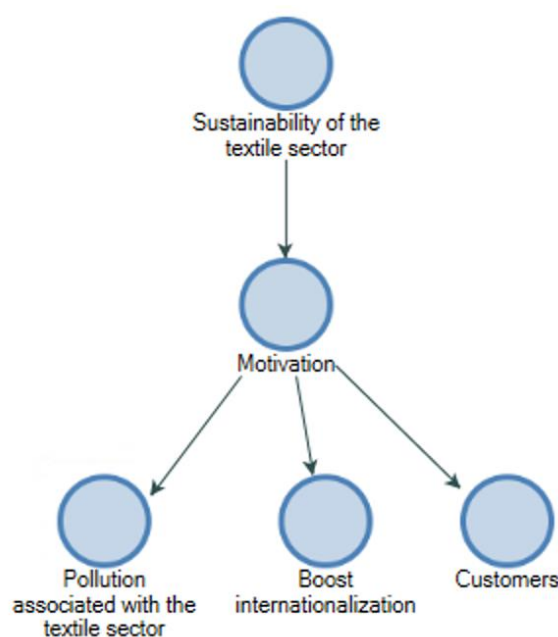


Figure 2. Motivations for companies in the textile sector to bet on sustainability.

As can be seen in Figure 2, the main motivations for companies in the sector to embark on the path of sustainability are as follows: (i) Environmental pollution issues associated with the textile sector; (ii) Drive for internationalization; and (iii) Customer-specific requests. With regard to environmental pollution issues, the opinion is unanimous among the interviewees: the sector's pollution is evident and has to be worked on very quickly. There are more and more independent institutions that are able to project and cite pollution situations that might, in little time, call the reputation and trustworthiness of a certain brand into question; in extreme cases, this trust may even disappear. To prevent such a situation, companies should work on and invest in innovation, in order to create alternative, "greener" and, if possible, reusable products. The main driver that encourages a company to innovate is its customers, who increasingly want to know where the produced products come from and where they go. Sustainable products are increasingly sought after by international markets and, as they are still scarce, can lead to a very favorable positioning of brands that manage to place their products in these international markets. These motivations are justified by the interviewees, as follows:

Interviewee 1: "[...] more efficient, as well as being an important player in changing habits, with regard to the industry [...] the international market is increasingly aware of the importance, and they are looking for alternatives to Asian production, which is known to be not very sustainable."

Interviewee 3: "To increase the company's visibility in the international market, the first objective is commercial."

Interviewee 4: "[...] the theme of sustainability... comes mainly at the request of customers."

With regard to barriers to implementing sustainability in the textile sector, respondents point to readjustment issues or even the creation of foundations in some processes, such as acquiring new equipment to increase efficiency, guaranteeing the separation of raw materials, saving energy and ensuring product quality. All this requires very large investments which, naturally, will be reflected in the final price of the product. Answers pertaining to these issues were communicated by the following interviewees:

Interviewee 1: "[...] increased the number of processes to be able to separate the material to recycle versus the non-recyclable [...]"

Interviewee 3: “The main obstacle is investment. This is because the return is not immediate. Although brands are more open to these products, when closing a deal, the price still prevails in the vast majority [...]. We have invested in renewable energies, more efficient machines, with less use of water, electricity, etc [...].”

Interviewee 4: “The price increase for the final consumer is, in our view, the biggest obstacle.”

4.3. *Eco-Innovation in the Textile Sector*

Eco-innovation is increasingly focused upon by customers and, as a result, companies feel pressured, in addition to the environmental standards that are appearing in different markets, to create an innovative business culture that is oriented towards the improvement in and efficiency of its operational processes, both in terms of reducing unnecessary costs and in terms of improving the working environment [73]. This change brings challenges to companies, since it involves having to live with the duality of eco-efficiency and economic efficiency; this often leads sustainable development to the design of new products, to the detriment of adapting the existing ones [74]. With this, according to those interviewed in this article, the path to eco-innovation is based on the choice of raw materials, which can start from strategic partnerships with other companies, or even with universities and other higher education institutions. The interviewees’ motivation to eco-innovate is driven, above all, by the request/requirement of customers, who, in addition to the product itself, increasingly want to know how it was made and whether it was made using the controlled consumption of natural resources or recycled materials; customers also want to know what they will do with the product they have just purchased at the end of its life. The interviewed companies have products on the market that use eco-innovative products, such as the following:

Interviewee 1: “We have been developing functional finishes, using natural bases and more sustainable materials using fibers or natural products to, for example, dye our products with natural bases.”

Interviewee 2: “[...] we’ve had lyocell for a few years, now seacel, organic cotton [...].”

Interviewee 3: “[...] We have been using more sustainable fibers, opting to increase the offer of pre and post-consumer recycled products [...] using recycled cotton fibers, plastic from the oceans, seaweed fiber, etc [...].”

Interviewee 4: “[...] use of sustainable fibers such as cotton and recycled polyester.”

It is clear that advantages and disadvantages exist in terms of the use and massification of the concept of eco-innovation; this is in line with a study by Padilla-Lozano and Collazzo [75], who interviewed 325 manufacturing managers in Ecuador and observed that eco-innovation drives the transition from a cost-saving policy to a policy based on the responsible innovation strategy, and positions itself in the market with products that offer a competitive advantage, known as the sustainability label. The four interviewees in this investigation refer to the same thing; for them, eco-innovation has several disadvantages: the first is that the final price of the product is higher, and the second is that there are still some customers who are not interested in the subject and are not willing to pay more. However, the trend is strongly reversed, that is, the demand for this type of product is increasing. As such, the interviewees point to the fact that the environment as an advantage, as the products are designed for consumption and post-consumption; thus, in the market they are seen as innovative products. This innovation is achieved, in a large part, due to new partnerships and connectivity between new suppliers. These partnerships are created to be able to place the product on the market, which makes it a highly complex task with a strong work history; as such, the process is difficult to replicate in a short time, which, in the eyes of the interviewees, means that the products still have a competitive advantage

in the market. Figure 3 outlines the advantages and disadvantages collected during the interviews.

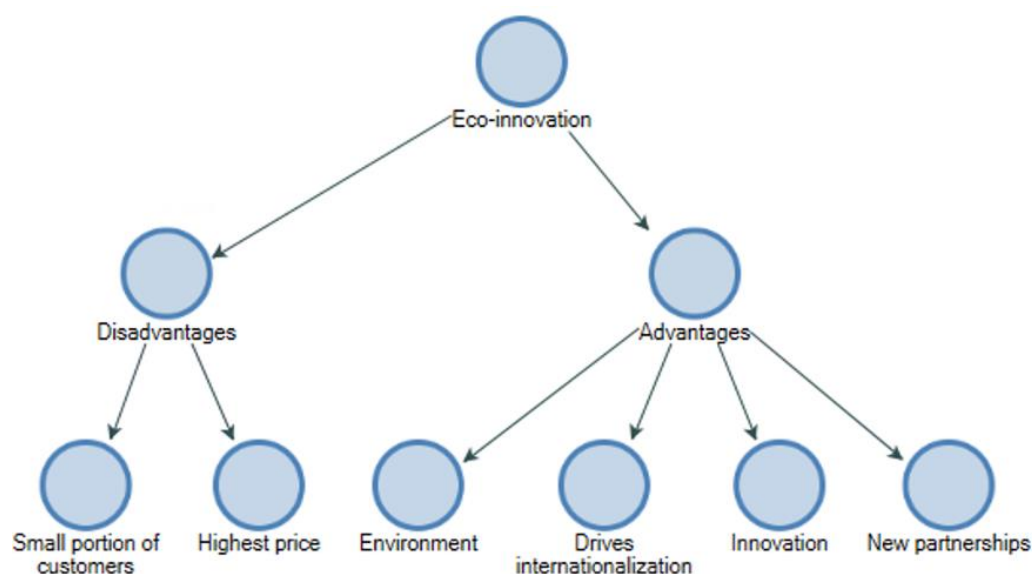


Figure 3. Eco-innovation in the textile sector.

Figure 3 represents the main disadvantages and advantages described by the interviewees, where the main concerns lie with the final price of the product and the number of people who are motivated to buy this product. From past experience, businessmen in the sector fear that rising prices could be a limiting factor in positioning the product on the market; however, they assume that there are more and more customers looking for products with a sustainable label and that value this characteristic, i.e., the characteristic of a sustainable product currently differentiates a product on the market. The type of customers who look for this type of product are not the customers who are looking for the product at a low price, produced without any environmental concern; this, therefore, achieves the positioning of the brand, product and company in the market. The customers, according to the interviewees, then buy more and more, without worrying about price increases, compared to the competing “polluting” product.

As far as the advantages are concerned, eco-innovation makes it possible to introduce products onto the market with a sustainability stamp, thus showing environmental concern; this is increasingly sought after by customers, national and international, which, according to the interviewees, is a window into internationalization. For this, companies need to innovate, create or improve their products. Innovation can be applied to products, processes and even the business structure, so that the products created or that have undergone changes in their value chain, in order to achieve the stamp of sustainability, evolve; this is the case whether it is the result of the company’s internal adaptation, or a result of the adaptation or introduction of partnerships that satisfy environmental requirements so that the final product is sufficiently sustainable and innovative in order to stand out in the market. As an example, follow the quotations produced by the interviewees during the interview:

Interviewee 1: “the main advantages are the fact that in an investigation path, until we find the answer we are looking for, we reach some other small answers that give us inputs for the creation of articles as well as for the resolution of problems that arise.”

Interviewee 2: “the university of Minho, [...] since 2010, has helped a lot, we develop products for the world markets [...].”

Interviewee 3: “Use of recycled fibers from cotton, ocean plastic, seaweed fiber, etc”.

Interviewee 4: “There is a growing demand for these products, although in the vast majority of cases there is no order due to the plus that this innovation adds to the price.”

Despite the impact of price, it is unanimous among the interviewees that the differentiation factor, in terms of the type of benefits that eco-innovative products offer when they are placed on the market, is in growing demand. Customers are increasingly choosing the label that has clear information about the origin of the product. In addition, a study carried out in Sweden on car consumers concluded that more and more consumers are concerned about the environment and value eco-innovative products [76]. It is unanimous among all those interviewed that the higher price still leaves some customers indecisive, but as time goes by, the trend is becoming stronger. With this concern, the transparency of processes and the ecological innovation of products is leading companies to a unique level of recognition in all markets, mainly the international and most ambitious ones.

4.4. The Circular Economy in the Textile Sector

The circular economy is, in most cases, the transition from a linear economy to a circular economy, which goes through product design strategies, business models and learning [77]. The circular economy arises in response to the sustainability paradigm, so that it is able to fragment economic growth, resource consumption and waste generation [78]. When the subject is the textile industry, the abundance of waste produced or wasted is notorious, but it is in a phase of change and transition towards sustainability; this is shown by Costa and Broega [79], who argue that, by applying ethical and linear solutions to the principles of a circular economy, which abandons the current production process of the extraction, production and disposal of finite resources, at imminent risk of running out, companies are able to promote the circularity of products and reintroduce them back into the process in a productive way. Figure 4 represents the information extracted from the interviews, in the context of the advantages and disadvantages pointed out by the interviewees in the product circularity process.

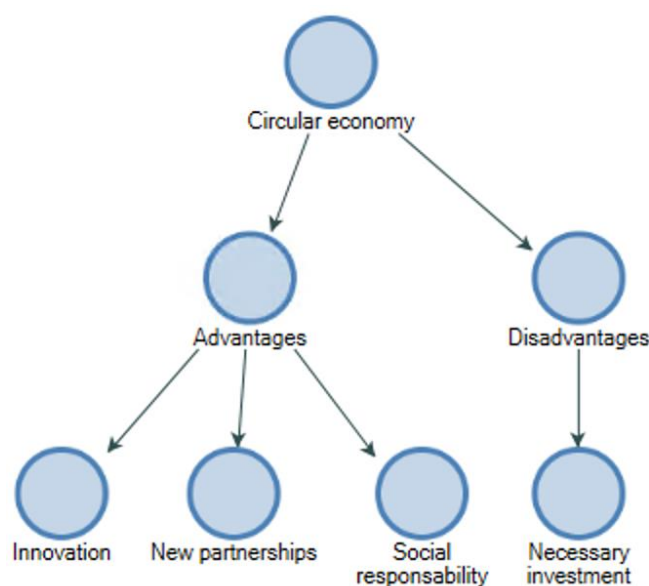


Figure 4. Circular Economy in the Textile sector.

Figure 4 represents the advantages and disadvantages that the interviewees pointed in terms of the implementation of the circular economy. Thus, they mentioned that the main disadvantage is the investment required to be able to recycle and reintroduce products

into the chain. Investments are able to adapt to processes, to structural adaptations in the company itself and to the existing product, in order to comply with recycling and reuse requirements, and raise the awareness of people internal and external to the company. However, by doing so, they achieve a high level of social responsibility, greatly valued by international markets. As another advantage, according to the interviewees, they get new partnerships, which are capable of dealing with the entire process of separating and reintroducing recycled raw materials, new raw materials and new products into the market. However, their opinions were also unanimous in believing that the circular economy is still at an early stage. However, concern about adapting to this challenge was evident. Consequently, in order to adapt, they will have to innovate. By innovating, they will be improving their products, introducing new sustainability features, which will only be achieved if they investigate, exploring and creating partnerships so that the entire chain bears the stamp of sustainability and reaching a level of circularity in the use of raw materials. As such, below are excerpts from the interviews that help support the diagram in Figure 5.

Interviewee 2: “We have partnerships with recycling companies, I think we were the first, at least here in the area. We work with one of the largest recycling companies, we have very well identified the products in the production area, it is the company’s culture to recycle.”

Interviewee 3: “The company entered into a partnership with two companies in order to recycle clothes, transform them into yarn and knit them. Therefore, the products we supply contain a high percentage of recycled fibers [...]”

Interviewee 4: “We use external companies, which collect and supply recycled material.”

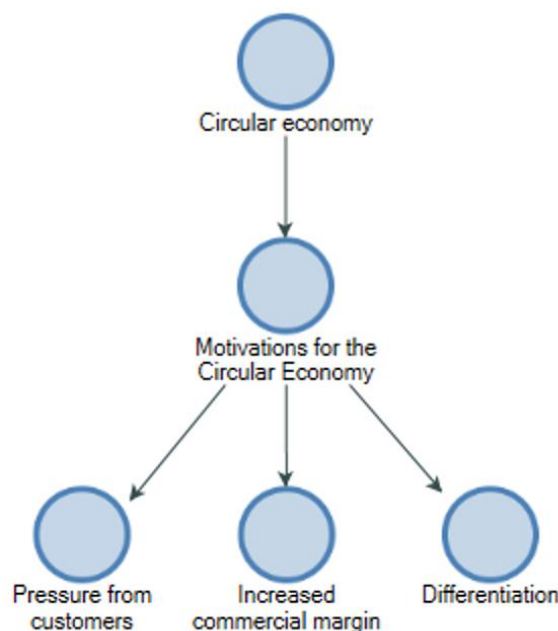


Figure 5. Motivations for applying the circular economy concept.

Here, we find references to partnerships, through universities/polytechnics, through partner companies, or both, as the main ally to the circular economy. As a motivation for the circular economy, respondents refer to constant requests from customers about recycled products. In this context, Figure 5 represents the information extracted from the interviews.

As we can see in Figure 5, in the opinion of the interviewees, recycled products are still presented as a differentiating factor in the market. Similar to what was mentioned by Shi et al. [80], adopting the circularity of the products as a naturally indeterminate

extension of the raw material can reduce the extraction or use of finite goods, raise the company's social factor, and consequently improve its reputation. Considering this, the interviewees suggest that the offer of these products can lead to a competitive advantage, having been mentioned as one of the main motivations for the circular economy. Thus, while the introduction of a circular economy product, where customers have all the details from the beginning to the end of the life of the product they are purchasing, is a reason for differentiation, recycled products are accepted at a higher price in the market; this reverses the trend in the market that sees consumers asking for products at the lowest possible price. Finally, as these products are still scarce on the market, according to the interviewees, the demand for these products is increasing. Customers increasingly ask for and seek recycled and recyclable products, as such, they end up being drivers of a growing market, leading brands to focus their efforts on placing products of this type on the market.

With this in mind, a list of excerpts taken from the interviews that substantiate these arguments follows:

Interviewee 1: "The demand for these products has been growing. And as a company, we believe we are the future."

Interviewee 2: "[...] are customer requests for products that are recycled or come from sustainable processes [...]."

Interviewee 4: "Customers are increasingly looking for products with this type of label [...]."

5. Conclusions

Although the value attributed to sustainable practices depends on the business model and vision of the company, the textile sector is an industry in which sustainability is of special importance. In addition, more and more companies are turning to sustainability to benefit from growth opportunities and operational benefits through obtaining competitive advantage and improving business performance, in addition to contributing to the satisfaction of environmental and social objectives [81,82]. In the case of the Portuguese textile industry, in recent years, the number of companies with sustainability concerns has been growing significantly due to the gains achieved with the international reputation. This reputation has ensured that Portugal is a leader in innovation and sustainability in this sector.

According to the results of interviews with employees from four companies in the textile sector, it was noticeable that there is a concern with sustainability and the creation of fully recyclable products. Products that re-enter the circuit after their end of life allow them to move from a linear logic that is highly associated with the textile sector, to a circular logic that, in turn, adds value to the product that is placed on the market. International customers are increasingly concerned about the environment and are looking for products that help reduce their ecological footprint, even if they have to pay more for the products to do so; this motivates companies in the sector to bet on innovative and ecological products. These products, given their scarcity and the notable increase in demand, are products that currently provide a competitive advantage to companies as they offer a label with environmental certification; in addition, their entire value chain is very well publicized and certified. Another advantage has to do with the commitment to the customer; when purchasing a recycled product and/or an eco-innovative product, at the time of purchase, customers have the perception that the product they are purchasing has a normal path of use that, at the end of its life, will be used to reintroduce value into the chain. This follows the logic of low production cost for products whose end-of-life use was not considered, many of which would only have a single use and would be immediately discarded. With this article, it was possible to analyze and explain the path that the textile industry is developing in order to transform from being categorized as the most polluting industry to a sustainable circular industry. With this, the paths of eco-innovation and circular economy are listed so that at any time of the project, the path of the product is known,

from its creation to its end of life. In terms of the theoretical implications of this study, it is expected to contribute to the literature through its guidance on the development of new products, which will have to be created by eco-innovators in order to captivate the much-desired international market. In addition, given that there is a reduced number of articles in the textile sector, this article also contributes to the enrichment of the literature on eco-innovation and circular economy, highlighting the importance of creating ecological products from the design phase.

In addition to the theoretical implications, this study offers important practical implications, starting by showing the ability of a company to react to the inputs that the market gives it and to its position in terms of eco-innovative and recycled products; in this process, partnerships are important, in order to accompany international trends or influence these trends with constant resilient (eco)innovation. This allows managers or decision makers to contribute, particularly those who wish to be at the forefront of the process and provide sustainable products in the market, which is increasingly aware of international sustainability. It is also hoped that this article will help policy makers to direct their efforts to promote the term sustainability, in a sector such as the Portuguese textile sector.

Throughout this study, there were some limitations. The first limitation is related to the subjectivity of the results. Although all precautions have been taken care of, studies of a qualitative nature always present some subjectivity in the analysis of the results and in the coding and categorization system of the interviews. Another limitation is related to the fact that the requirements, including company with eco-innovative products, company with implementation of circular economy measures, textile manufacturing company and company with a focus on internationalization, are present in a limited number of companies in the sector in Portugal. In addition, it was only possible to obtain an interview with four interviews, despite the textile sector being essentially located in the north of the country, more specifically, in the Vale do Ave area, according to the Pordata database; this points to the highest concentration of companies in the sector in this geographical area.

Based on this article, it would be interesting to further investigate other sectors and compare the level and format they are adopting to eco-innovate, and whether they are moving from a linear to a circular logic. Another suggestion would be to replicate the study in another country, to see if they share the same motivations for sustainability evolution. As a last suggestion for future investigations, a comparison with the processes of other sectors in Portugal would be recommended; this would focus on eco-innovation, the circularity of raw materials, and the measurement of the evolution of the textile sector in comparison to other sectors, for example, in order to create a Portuguese sustainability indicator.

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