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Mapping Service-Based Retailing to Improve Sustainability Practices in the Fashion Industry

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Abstract: The fashion industry is recognized among the most impactful industries in relation to environmental and social damage due to unsustainable models. While countless research studies focus on the supply chain and product innovation, the presented inquiry studies the fashion retail sector with the goal of systematizing existing sustainable practices based on service offerings. We present the results of an extensive case-study analysis conducted on 370 initiatives of different natures gathered among international companies and local actors in the European context that offer services oriented toward sustainability. As a result, we propose an ontology that encompasses three areas (services for environmental sustainability, culture of sustainability, and implementation of social sustainability) and comprehensively describes existing sustainability strategies for helping retailers preserve the environment, while promoting socially inclusive practices and disseminating the culture of sustainability. The innovation of retailing from a similar perspective aims at rendering businesses more resilient to survive market and social transformations, especially in consideration of the boost to sustainable and circular transformation advocated by recent European legislation.

Keywords: fashion retail; servitization; environmental sustainability; culture of sustainability; social sustainability

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1. Introduction

In recent decades, attention to environmental issues has highlighted the need for a multidimensional restructuring, bringing to the center of the debate those social and environmental limits first expressed in a structured manner in the report "The Limits to Growth" [1,2] and which continue to reveal their alarming topicality today.

The impairment of the physical environment and the deterioration of the conditions of identity and social integration emerge in contemporary societies, stimulating a new strategic-planning response oriented toward a systemic and multidimensional vision. This vision is capable of grasping the complex system of interdependencies underlying a more sustainable and socially responsible development [3]. Such an approach considers the complexity of the interrelationships and interdependencies between sociocultural, physical–biological, and economic–political spheres as foundations for the realization of a more circular economy.

Nowadays, the fashion industry is subject to a critical examination due to its role as a substantial contributor to global environmental degradation and labor exploitation. Multiple studies have highlighted its impact in terms of its carbon footprint, water usage, and waste generation [4], underscoring the need for more sustainable solutions [5,6].

The concept of sustainability is intricate and multifaceted, making it challenging to adopt a single definition due to the variety of theories and perspectives [7]. It encompasses achieving socioeconomic equity among people, while preserving the natural environment and cultural heritage for future generations [8]. The concept of the "three pillars of

sustainability", closely resembling Elkington's "Triple Bottom Line" [9], is widely accepted as a prominent model in business and management [7,8,10]. Although its origin is not clearly documented and it lacks an explicit theoretical foundation [7], it suggests that an organization's overall sustainability depends on three dimensions: economic, environmental, and social sustainability. Moreover, an organization needs to consider long-term stakeholders' interests and the distant costs caused by social or environmental degradation, which are often overlooked in the pursuit of short-term profits. Considering the properties of irreversibility and non-linearity of natural and social capital deterioration, attention must be paid to the difference between efficiency and effectiveness: although companies may employ fewer resources in production cycles (efficient solution), as a system, we can easily end up consuming much more resources than before [8]. For example, we use fewer fabrics to create garments, but we generally consume more fabric because the industry produces many more items than before. An effective solution must look at the systemic impact of industries and focus on strategies that, from an overall perspective, consume fewer resources and produce more wisely.

The present study explores how fashion retail can support the transition to sustainability by acting as a component of an innovation ecosystem. Such an ecosystem is characterized by evolving relationships between actors, institutions, activities, and products that foster better innovative performance through collaborations and competitions [11]. The objective is to analyze the transition from traditional retail to a more sustainable approach through retail servitization [12]. Based on the studies of SD-Logic [13–15], servitization is considered an application of competencies that, through activities, processes, and performance, can generate benefits for suppliers, customers, and third parties.

Here, the transition from a linear economy, where a product is manufactured, sold, consumed, and disposed of at the end of its life cycle, to a circular economy, where a product is designed, sold, consumed, and then reused, recycled, and regenerated, is leading to new business models, including servitization, based on more sustainable and circular supply chains and new distribution strategies [16]. The retail industry, through a servitization orientation [13,14,17,18], assumes a primary role and fosters circular-economy processes [19,20] by returning a customer experience, which diffuses and codifies new "practices" of meanings, materials, and skills [16,21,22].

In Europe, the retail industry is one of the 14 industrial ecosystems crucial for economic recovery and the one most involved in accompanying businesses toward the green and digital transition [23]. The ecosystem is interconnected with most industrial ecosystems, consumers, primary producers, manufacturers, importers, packaging, waste management companies, transport and logistics service providers, postal and courier service providers, logistics centers, marketing, financial and payment services, shopping centers, and retail properties. It is the largest ecosystem in terms of employment in the EU (it directly employs almost 30 million people in 5.5 million companies, 99.9% of which are SMEs) and serves almost 450 million EU consumers daily [24]. It consists of sales channels, ranging from physical shops, multi-channel, and omnichannel [25] operators to the emerging "phygital" spaces [26] and in e-commerce, platforms, and marketplaces.

Over the past decade, fashion retail has stood out for the growing number of environmental start-ups, which, from 2010 to 2022, grew to now represent the highest percentage (67.81%) among the start-ups that have developed in the other sub-sectors (food, 17.47%; multicategory, 11.00%; furniture, 1.9%; cosmetics, 0.9%; and electronics, 0.83%) [27]. These include various activities, such as online sales platforms facilitating the sharing economy, sustainable product retailers, less polluting packaging solutions development, and start-ups based on digital technology. Most sustainability-related start-ups (60.5%) are retail companies that sell environmentally sustainable products (made from organically sourced or recycled materials) and position themselves as green retail companies. Almost 84% of entrepreneurs developing online platforms are multi-brand online marketplaces, of which 28% are P2P platforms facilitating the exchange or rental of second-hand clothes (e.g., Vinted and Vestiaire Collective) [27].

New business models in the retail sector are based on sustainable and collaborative concepts related to the sharing economy; rental and subscription; servitization; or advanced digital technologies, including artificial intelligence, blockchain and Internet of Things technologies, big data, and data analysis. Considering that awareness of sustainable behavior is gaining a central role for customers [28–30], offering services to extend the life of products simultaneously contributes to a long-term reduction in the use of raw materials and the production of new products [31]. Likewise, adopting such services nurtures the emergence of the process of value co-creation and value in context [32] and contributes to creating social systems through practices or routines [33]. However, a systematic study of how fashion retail servitization practices help promote and consolidate sustainable practices and sustain the related market and environmental and societal benefits is still needed.

Servitization corresponds to the innovative usage of the resources and capabilities of an organization to create increased value by shifting from selling only products to offering a combination of products and services [34]. According to Beuren et al. [35], servitization can be intended as a synonym for "product–service system", which refers to the integration of products and service offerings [36]. For more than a decade, academics have been encouraging a transition to servitization and more attention to the customer's end of the supply chain (i.e., retail businesses) [31] since technological developments enable actions that inform design, improve usage, and maintain products, reaching an ever-increasing level of quality of service delivery that can be tailored to consumers' wishes. In this work, we extend the definition of service, starting from the one provided in the field of design, namely "something that helps someone to do something" [37]. The word can refer to very different things, including actual customer services, specific activities, and pieces of technology that solve identified problems. Therefore, for example, the extension of product life can be supported by a wide range of solutions presenting very different natures, including sensibilization and education actions, as long as they are provided to users by one or more organizations and characterized by a specific end goal. A retail service for sustainability, therefore, is here considered as any form of initiative that offers or valorizes an alternative to the purchase of a new product in a logic of circular economy or that nurtures a wiser usage of the environmental and social capital.

The presented research investigates emerging approaches to fashion retail around sustainability principles and how these approaches help retailers transition toward a service-based business model that aims to preserve the environment, while promoting socially inclusive practices and disseminating the culture of sustainability by educating customers. The current goal is to identify a model to comprehensively describe fashion retail sustainability services for helping retailers adopt servitization and more sustainable business models.

2. Literature Review

A preliminary literature review was conducted to articulate the study's theoretical framework. The objective of the literature review was to analyze the state of the art of sustainable retail in the fashion sector and to verify which main approaches are proposed and applied, within which sustainability domains, and if and how the servitization orientation is addressed in relation to the sustainable and circular transition. This analysis also allowed us to investigate which comprehensive frameworks and models exist to systematize retail services to promote more sustainable and responsible practices and processes in both physical and digital retail environments.

The review was conducted through the Scopus database, which is considered a comprehensive academic source and routinely used for systematic review studies. The first step was the identification of search keywords that would allow the inclusion of relevant articles in retail and distribution and sustainable and circular practices, while focusing on the fashion sector. For this reason, the authors chose search terms that covered both the areas of retail (retail* OR store*), sustainability (sustainab* OR circular*), and fashion

(fashion OR textile). The authors chose to keep the search broad, not focusing from the very beginning on the areas of service and servitization, to allow the inclusion of articles for which these issues were secondary or not strictly coded. The study covered a time horizon of 10 years (2014–2024), and the articles were only in English. Moreover, the search was limited to the subject areas of social sciences, business and management, economics, engineering, and environmental studies.

The search returned 410 articles, which were subsequently screened for an initial reading of titles and abstracts to check the publications' relevance to this study's objectives. At this stage, articles with limited or no focus in the areas of fashion and retail, which presented qualitative or quantitative research on a singular aspect of sustainability or circularity (e.g., research in sustainable materials and life cycle assessment) or which focused on consumer studies, were excluded. Conversely, publications were considered to explicitly or implicitly refer to the implementation of service systems both in the more circumscribed context of distribution and retail and in the broader domain of circular business models. This initial screening led to the selection of 31 publications. Subsequently, a thorough reading of the full text allowed the selection to be reduced and consolidated to 16 articles. The literature review process is shown in Figure 1.

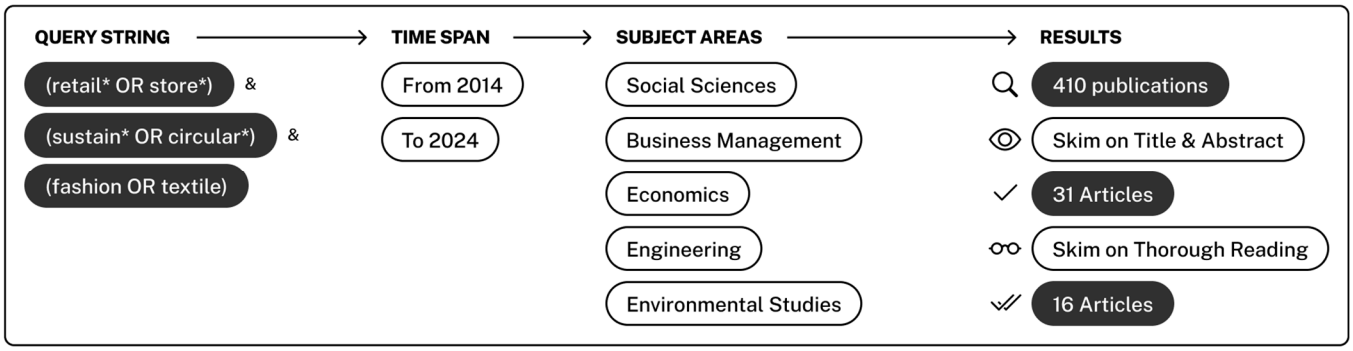

Figure 1. The diagram summarizes the methodological approach of the presented literature review. The special characters "*", "OR", "&" correspond to query operators in the Scopus search engine.

The literature review has shown that the topic of sustainability in fashion retail appears fragmented within different disciplinary fields, from business to consumer studies, from engineering to marketing, and that the servitization orientation, although established as one of the possible levers to promote circular business models [38], is relatively poorly explored in the fashion industry. Most contributions discuss the impacts and barriers of sustainable practices and their implementation within circular business models by defining capabilities through which organizations should manage circular practices [39,40], key aspects of business model development [41,42], and its implementation [43,44], or digital technologies as facilitators of circular processes [45–47]. Within these studies, sustainability is primarily considered from an environmental perspective in terms of reducing used resources, reuse of materials, and minimization of waste. However, some studies consider multiple pillars of sustainability within their analysis, including the environmental and social pillars [48,49]. Prado et al. [49], in particular, propose mapping more than 50 practices to promote environmental, social, and economic sustainability in fashion retail. The mapping, derived from a bibliographic analysis, includes tools, programs, guidelines, and concepts and represents the first theoretical framework for the authors to build the present inquiry on fashion retail-sustainability services. Finally, few studies cohesively investigate the role of product–service systems in the fashion sustainability area, predominantly adopting the point of view of collaborative consumption (such as rental, resale, and related support services such as repair and redesign) [30,50] and examining the influence of fashion leadership on purchase intentions [51] or investigating the transformative role of services to generate well-being at various levels [52]. Table 1

provides an overview of the main domains addressed in the selected articles, Table 2 provides summaries of their purpose and findings.

Table 1. Selection of documents resulting from the literature review: main domains addressed.

Article	Year	Service Orientation	Sustainable Practices	Circular BMs	Digital Transformation
"Product destruction: Exploring unsustainable production–consumption systems and appropriate policy responses" (Roberts H. et al.) [53]	2023			X	
"Digitalization as a Provider of Sustainability?—The Role and Acceptance of Digital Technologies in Fashion Stores" (von der Assen L.) [45]	2023				X
"Orchestration capabilities in circular supply chains of post-consumer used clothes—A case study of a Swedish fashion retailer" (Sandberg E.) [39]	2023		X	X	
"Practical solutions for circular business models in the fashion industry" (Dragomir V.D. and Dumitru M.) [43]	2022		X	X	
"Textiles in a circular economy: An assessment of the current landscape, challenges, and opportunities in the United States" (Schumacher K.A. and Forster A.L.) [44]	2022		X		
"Exploring the nature of digital transformation in the fashion industry: opportunities for supply chains, business models, and sustainability-oriented innovations" (Casciani D. et al.) [46]	2022			X	X
"Sustainability in retail services: a transformative service research (TSR) perspective" (Dodds S. et al.) [52]	2022	X	X		
"Sustainability in fashion retail: literature review and bibliometric analysis" (Prado N.M. et al.) [49]	2022		X	X	
"Fashion-as-a-Service: Circular Business Model Innovation in Retail" (Poldner K. et al.) [30]	2022	X	X	X	
"Digitalization in the textiles and clothing sector" (Pal R. and Jayarathne A.) [47]	2022				X
"Dynamic capabilities for the scaling of circular business model initiatives in the fashion industry" (Sandberg E. and Hultberg E.) [40]	2021		X	X	
"Product-service systems and sustainability: Analysing the environmental impacts of rental clothing" (Johnson E. and Plepys A.) [50]	2021	X	X		
"Changing the game to compete: Innovations in the fashion retail industry from the disruptive business model" (Jin B.E. and Shin D.C.) [41]	2020			X	
"Business model development for sustainable apparel consumption: The case of Houdini Sportswear" (Holtström J. et al.) [42]	2019	X	X	X	
"Fashion leadership and intention toward clothing product–service retail models" (Lang C. and Armstrong C.M.J.) [51]	2018	X	X		
"Strategic approaches to sustainability in fashion supply chain management" (Macchion et al.) [48]	2018		X		

Table 2. Selection of documents resulting from the literature review: studies purpose and findings.

Article	Year	Study's Purpose and Findings
"Product destruction: Exploring unsustainable production–consumption systems and appropriate policy responses" (Roberts H. et al.) [53]	2023	Through an exploratory qualitative study, the article investigates the upstream and downstream factors that drive companies—retailers and manufacturers—toward the unsustainable practice of product destruction. It proposes a mix of policy interventions to change the behavior of different actors, from producers and retailers to consumers and reuse organizations.
"Digitalization as a Provider of Sustainability?—The Role and Acceptance of Digital Technologies in Fashion Stores" (von der Assen L.) [45]	2023	The article presents a digitization maturity model (Digitization 4 Sustainability Framework) showing the relationship between the application of digital technology at the point of sale (PoS) in fashion stores and the related digital and sustainable impacts.
"Orchestration capabilities in circular supply chains of post-consumer used clothes—A case study of a Swedish fashion retailer" (Sandberg E.) [39]	2023	Based on the theoretical lens of orchestration capabilities, the article presents a framework bridging the three main capabilities through which organizations should manage circular practices and related empirical indicators.
"Practical solutions for circular business models in the fashion industry" (Dragomir V.D. and Dumitru M.) [43]	2022	The article provides empirical evidence on circularity solutions adopted by major companies in the fast fashion industry, analyzed using a complete circular value chain model (including distribution and retail, customer use, and post-consumer garment collection).
"Textiles in a circular economy: An assessment of the current landscape, challenges, and opportunities in the United States" (Schumacher K.A. and Forster A.L.) [44]	2022	The article presents current practices employed, challenges, and opportunities for advancement regarding the collection, sorting–grading, and recycling of textiles, with a primary focus on the U.S. system.
"Exploring the nature of digital transformation in the fashion industry: opportunities for supply chains, business models, and sustainability-oriented innovations" (Casciani D. et al.) [46]	2022	The article provides an overview of the digital transformation (by focusing on the adoption of 3D virtual and digital technologies) of the fashion industry and describes the opportunities for and influences on supply chains, business models, and sustainability-oriented innovations that it offers.
"Sustainability in retail services: a transformative service research (TSR) perspective" (Dodds S. et al.) [52]	2022	Adopting a transformative service research (TSR) perspective, the article explores the nexus between sustainability, well-being, and service systems and develops a "sustainable retail service wellbeing ecosystem" framework to unveil the transformative potential of retail service ecosystems to generate well-being of key actors, including the environment.
"Sustainability in fashion retail: literature review and bibliometric analysis" (Prado N.M. et al.) [49]	2022	Through an analysis of the scientific literature, the article presents an overview of sustainability in fashion retail and a mapping of the 55 most important practices (including tools, programs, guidelines, concepts, etc.) to promote sustainability in fashion retail.
"Fashion-as-a-Service: Circular Business Model Innovation in Retail" (Poldner K. et al.) [30]	2022	Built on the literature and a single in-depth case study of a pop-up store, the article presents a model that offers three key strategies for circular business-model innovation for fashion retail: Fashion-as-a-Service, place-based value proposition, and community as co-creator.
"Digitalization in the textiles and clothing sector" (Pal R. and Jayarathne A.) [47]	2022	The article discusses the impact of digitalization on the clothing supply chain (CSC) organized along the value chain (including distribution, retail, and return processes) and provides a summary of main digital technologies and their implications in leading to CSC transformation and barriers.
"Dynamic capabilities for the scaling of circular business model initiatives in the fashion industry" (Sandberg E. and Hultberg E.) [40]	2021	The article presents an exploration of the micro-foundations of dynamic capabilities (DCs) in scaling circular business models (CBMs) (predominantly based on repair, resale, redesign, collecting garments, and rent activities), aiming to provide new insights into sustainable business practices, and provides practitioners with a matrix tool for identifying, understanding, and organizing the necessary dynamic capabilities for different CBM scaling logics.
"Product-service systems and sustainability: Analysing the environmental impacts of rental clothing" (Johnson E. and Plepys A.) [50]	2021	The article investigates whether business models as product–service systems (PSSs) offer the environmental benefits they claim by conducting a life-cycle assessment (LCA) in a rental-clothing case study in Stockholm, Sweden.

"Changing the game to compete: Innovations in the fashion retail industry from the disruptive business model" (Jin B.E. and Shin D.C.) [41]	2020	The article analyzes the nature of disruptive business model innovations (born-digital brands, AI-enabled demand forecasting, product design, and collaborative consumption) and their impact on the fashion retail sector by defining which needs are unmet by current business models they address and which operational models they suggest.
"Business model development for sustainable apparel consumption: The case of Houdini Sportswear" (Holtström J. et al.) [42]	2019	Based on a single case study in the apparel sportswear sector, the article identifies key aspects of business model development for sustainable apparel consumption rooted in product–service systems (from product idea, product development, production, and sales/rental to repair, reuse, and, finally, recycling) and potential obstacles in their adoption.
"Fashion leadership and intention toward clothing product–service retail models" (Lang C. and Armstrong C.M.J.) [51]	2018	The article examines and evaluates the influence—as an obstacle or catalyst—of fashion leadership on consumers' purchasing intention in sustainable clothing product–service systems (CPSSs), including the sale of redesigned clothing, clothing repair/alteration service, clothing renting, clothing swapping, and style-consultancy service.
"Strategic approaches to sustainability in fashion supply chain management" (Macchion et al.) [48]	2018	Through a case-study analysis, the article aims to identify strategic approaches used in fashion supply chains to embrace sustainability in various areas (including delivery, retail, and return), revealing three distinct approaches. The findings detail the environmental and social practices implemented within each approach and the contextual factors, drivers, and barriers that influence them.

3. Materials and Methods

The presented research was conducted through a threefold methodology that includes (1) a generative workshop conducted with six design researchers—including authors—active around fashion design and with a focus on fashion retail, as described in Section 3.1, and designed to identify scenarios for sustainable fashion retailing; (2) a mapping of business cases and actors, selected according to the criteria described in Section 3.2, whose initiatives can prompt significant innovation to the sector; and (3) the systematization of results aimed at the identification of a theoretical framework for the retail servitization, described in Section 3.3.

3.1. Generative Workshop

The workshop aims to identify valuable trajectories for conducting a structured mapping activity of services for sustainable retail. It was conducted with six design researchers—including authors—specialized in fashion retail. Participants include two professors, one junior assistant professor, one PhD student, and two research fellows. All participants are active in the field of fashion retail design but have different expertise, from interior design to omnichannel strategies, from data visualization to collaborative and circular distribution processes (e.g., resale and rental models). The one-day activity is organized in two moments. The first moment, "mapping the area of intervention", is dedicated to delimiting the area of intervention according to possible themes, strategies, recipients, partners, and available tools identified thanks to the expertise of participants. The activity consisted of brainstorming, supported by a digital board, aimed at creating a mind map in which participants could propose topics and ideas related to six pillars defined by authors: retail, fashion industry, design industry, sustainability, urban regeneration, and cultural heritage. According to participants, retailers can experiment more with the transition to a revenue model based on services for prolonging the life of garments and can produce a significant impact on the sensibilization of customers and in the adoption of more sustainable behaviors. The second activity stimulated the participants to reflect individually on the emerging themes and briefly outline which areas of intervention retailers are focusing on the most and which might be the most promising for implementing sustainable and circular models. According to participants, retailers could experiment with strategies such as the implementation of models based on collaborative consumptions [54]; the offering of their space for workshops, courses, and other event formats; the creation of

guides for consumers; the configuration of service packages; communication consultancies; and the tracking of products' life cycles.

The discussion of a large variety of topics and arguments suggests better leverage of the strategic position of retailers, connectors between suppliers and consumers [55], in initiatives for sustainability. The workshop allowed researchers to share a broader conception of fashion retail spaces and processes, suggesting mapping meaningful initiatives even if beyond the current reach of retail businesses. Researchers' assumption, indeed, is that retail could benefit from the contamination with activities conducted by other actors that are active in the areas of sustainability by adopting an open approach to innovation processes [56,57].

3.2. Business Cases and Service or Service-Correlated Providers Mapping

Data were gathered through a case-study analysis [58] of sustainability-related services (Figure 2). The list of cases is composed of the results of the generative workshop, literature review, and "netnography" research, which refers to the observation and gathering of information about communities, markets, and consumer behavior in computer-mediated communications [59,60]. The conduction of the case-study analysis itself acted as a snowballing process that allowed for the identification of further examples, reaching a total amount of 370 items.

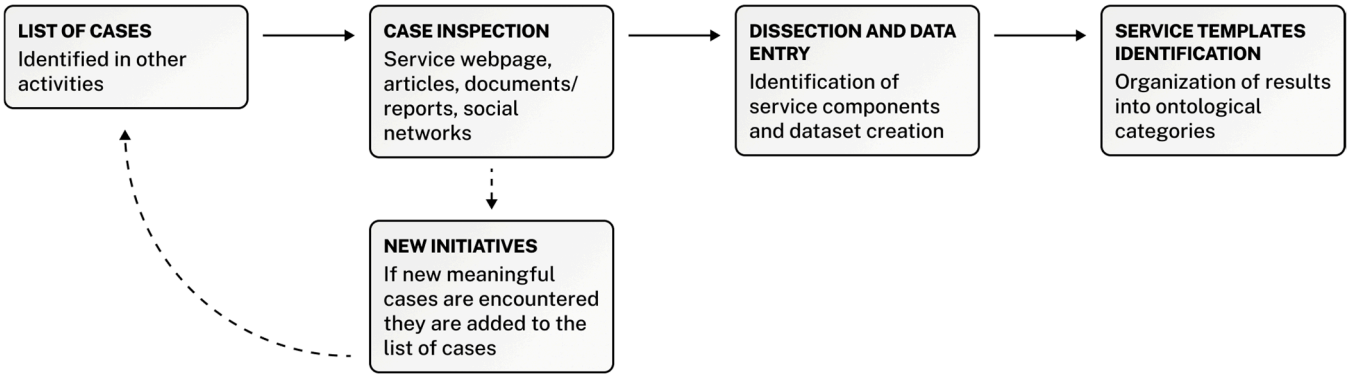

Figure 2. The diagram summarizes the methodological approach of the presented research. The dashed arrow indicates the followed procedure in case new cases are discovered.

Cases represent service offerings of entities of different natures gathered among international companies and local actors in the European context. A consistent part of the collected examples represents distribution activities in the fashion industry, carried out in physical, digital, or "phygital" [26,61] contexts by national or international businesses. However, the research sporadically includes other non-retail actors providing services to prolong the life and use of garments or virtuous businesses that may fall into design and lifestyle areas and that, due to their practices and processes or to the principle of cross-fertilization, may be supportive to the fashion industry. The heterogeneous group of identified actors is united by the manifested interest in sustainability practices that may benefit the fashion retail sector. For each collected case, the following pipeline was applied: (1) inquire about the case from public primary (e.g., companies' websites, annual and sustainability reports, and social networks) and secondary sources (e.g., scientific publications, industry or market reports, trade publications, and newspapers' articles)); (2) inspect and dissect the case to identify fundamental components (e.g., logistics, online interfaces, online/offline controls, etc.); (3) store the collected information on a digital board; and (4) using a snowballing approach, inspect the "sustainability" page on the consulted websites (or other forms of online resources) to identify further meaningful initiatives run by the same actor and add them to the list of cases to be analyzed. The process is interrupted as a level of saturation is reached such that, from the point of view of the

sustainability strategies employed, the cases collected no longer add novelty and relevance to those already collected.

3.3. Systematization of Results

The systematization of results is performed following a grounded theory approach based on open coding [62,63], with the purpose of creating an ontological organization of services for sustainable fashion retail. The results of the case-study analysis are dissected by researchers to understand their characteristics. Then, they are reorganized according to the fulfillment of similar goals to identify groups of similar cases that constitute the ontological categories described below. Groups of services have been created according to theories derived from the literature on the topic of sustainability, with relevance attributed to the themes of circular economy [38], education to sustainability [8], and distributive justice [55].

4. Results

The results are organized into three areas: environmental sustainability, culture of sustainability, and implementation of social sustainability.

4.1. Services for Environmental Sustainability

The first area collects solutions oriented to a fashion product or process that support retailers and customers in adopting behaviors oriented to a wiser usage of planet resources (Figure 3). They can be examples of circular economy in the fashion industry or examples of linear economy that make a wise usage of energy and materials. Most of the discovered cases are implemented into a profitable business model.

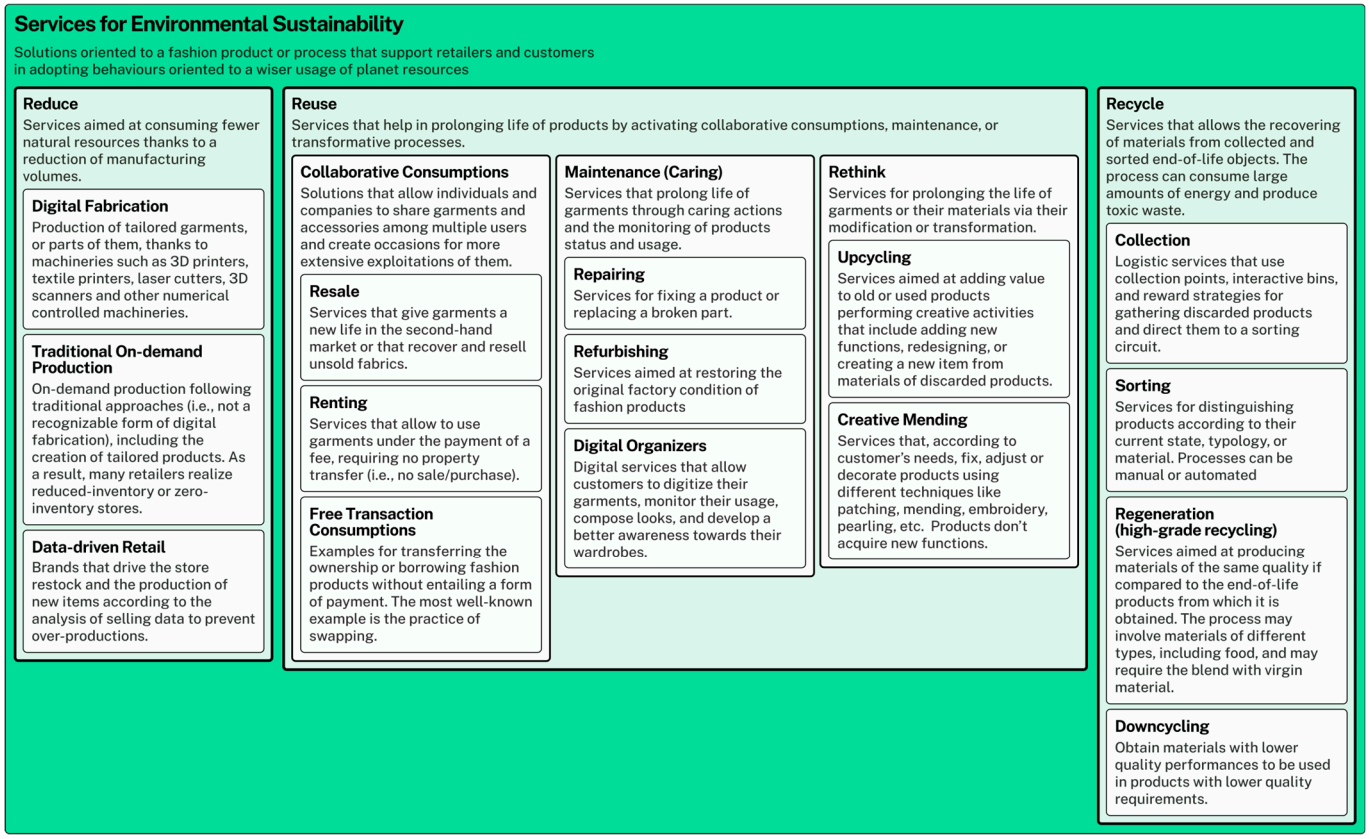

Figure 3. The diagram summarizes the services for environmental sustainability that emerged from the case-study analysis. Categories are represented as boxes with a brief description and are organized into three main clusters: reduce, reuse, and recycle.

4.1.1. Reduce

In the *reduce* cluster are positioned services aimed at consuming fewer natural resources thanks to a reduction in manufacturing volumes. From the following examples, it is visible how retail activities are in direct dialogue with production processes; they can inform supply chain activities and can be the site of small productions. *Digital Fabrication* processes allow for the production of tailored garments, or parts of them, thanks to types of machinery such as 3D printers, textile printers, laser cutters, 3D scanners, and other numerically controlled machinery. Similar processes can be implemented within digital fabrication laboratories, in which customers can engage in DIY experiences or in retail spaces of brands that make on-demand products according to customers' needs. *Traditional on-demand productions* leverage services offered to customers to perform on-demand production following traditional approaches (i.e., not a recognizable form of digital fabrication), including the creation of tailored products. As a result, many retailers realize reduced-inventory or zero-inventory stores. Tailoring or customization processes can take place in-store or online: in the former case, the store can assume the guises of a micro-factory; in the latter, the customer is supported by an interactive product configurator. In the market, there are available examples of white-label configurators that simplify the adoption of services for on-demand production and support brands in the management of the supply chain. *Data-driven retail* refers to examples of brands that drive the store restocking and the production of new items according to the analysis of selling data to prevent over-production.

4.1.2. Reuse

Reuse is the biggest and most faceted among the recognized clusters. It includes currently distributed services that help prolong the life of products by activating collaborative consumptions, maintenance, or transformative processes (i.e., rethink). *Collaborative consumptions* in the fashion industry are solutions that allow individuals and companies to share garments and accessories among multiple users and create occasions for their extensive exploitation [54,64]. They can assume the form of a B2C activity, in which a business is directly providing customers with one or more services; a P2P platform, in which a platform run by a business earns from exchanges among users or the provision of collateral services; or a B2B solution, in which companies are focused to offer individual services to other businesses in support of their collaborative consumption offering. At times, B2B services come under the guise of white-label all-in-one solutions. The last two cases, P2P and B2B, are considered related to retail because they affect the offering of distribution services. Multiple examples of collaborative consumptions are flourishing in the sub-cluster of *resale*, the group of services that gives garments a new life in the second-hand market or that recovers and resells unsold fabrics. Resale solutions can be both online and offline but with limited contaminations among the two. When online, the main distinction can be operated among e-commerce stores and marketplaces: the former refers to businesses implementing their own online store, possibly supported by B2B services that facilitate the supplying of used products, sanitization, pricing, communication, selling, and logistics; and the latter refers to websites designed to accommodate multiple sellers that offer used items to customers which, in specific cases, can benefit from curation and authentication services that guarantee against counterfeiting and bad quality. Sellers can be businesses (e.g., multi-brand retailers) or peers (e.g., someone keen on fashion), and in the market, there are cases of cross-marketplace listing software that allow sellers to be simultaneously present on multiple marketplace platforms. Additionally, second-hand retail can be driven by influencers who attempt to set trends or sell their own garments, or blend examples of vintage and thrift stores, offering pay-per-weight and all-you-can-grab sale formats. In the group *renting*, there are services that allow the use of garments under the payment of a fee, requiring no property transfer (i.e., no sale/purchase). Usage can be offered on different timeframes according to product type and

customers' needs, ranging from a few days to several months. Renting can entail a subscription format, with garments regularly delivered to customers and returned to businesses and a purchase option at the end of a leasing period. Similar to resale services, renting can take place in a B2C brand-owned e-commerce, possibly facilitated by B2B services, or in marketplaces where P2P activities are more frequent. In the group *Free Transaction Consumptions*, there are examples of transferring ownership or borrowing fashion products without entailing a form of payment. The most well-known example is the practice of swapping, which mostly takes place in brick-and-mortar stores, marketplaces, and dedicated events; swapping is also practiced inside subscription communities, where customers can swap among rented or bought products. Free transaction consumptions are often implemented by actors with a social purpose and, therefore, are not oriented to a profitable business model; it is more likely that they are aimed at supporting socioeconomic equity.

In the group *maintenance (caring)*, there are examples of services that prolong the life of garments through caring actions and the monitoring of product status and usage. In *repairing* are services for fixing a product or replacing a broken part; when offered by brands, they can be in-store, postal, in a network of trusted artisans, or as a traveling laboratory, which also acts as the communication channel to engage with customers and promote the brand's values. In the case of long-lasting items or luxury products, there are companies that offer lifetime free repairs. Beyond brands, there are local shops offering cheap repairs, as well as dedicated platforms for the aftercare management of products that act as marketplaces for maintenance services offered by artisans. B2B maintenance services and DIY repair laboratories have also been registered. *Refurbishing services* are distinguished from repairing because they are aimed at restoring the original factory condition of products, but they are mostly organized as in the above categories. The most noteworthy difference is observed in brands' offering of refurbished products in their existing selling channels. *Digital organizers* are digital services that allow customers to digitize their garments, monitor their usage, compose looks, and develop a better awareness of their wardrobes. In specific cases, it is possible to stock and retrieve garments from a dedicated warehouse, activate caring routines, and list them on marketplaces.

In *rethink* are services for prolonging the life of garments or their materials via their modification. The categories include services for *upcycling* that are aimed at adding value to old or used products and performing creative activities that include adding new functions, redesigning, or creating a new item from materials of discarded products. This category mostly collects examples of artisans or small brands that sell via e-commerce or marketplaces their upcycled garments (e.g., boxers created from used shirts), even if big brands are also launching upcycling collections, usually in the form of special collections, that are the result of creative reparation or combination of unsold items (e.g., The North Face Purple Label). It is possible to identify actors that offer B2B upcycling services, namely that identify strategies to upcycle unsold items and production leftovers; it is not uncommon to encounter, among these examples, actors with a social purpose. *Creative mending* refers to services that, according to customer's needs, fix, adjust, or decorate products using different techniques, like patching, mending, embroidery, pearling, etc. Mending is used as a synonym for "repair", and the product does not acquire new functions. These services can be offered in a postal format.

4.1.3. Recycle

The category *recycle* contains an example of a service that allows the recovery of materials from collected and sorted end-of-life objects. It is important to remember that the recycling of materials can be a process that consumes large amounts of energy and produces toxic waste [38], and it is useful to sort out products whose conditions allow for a form of reuse. In this category, it is common to encounter services run by actors driven by a social purpose. In *collection* are logistic services that use collection points, interactive bins, and reward strategies for gathering discarded products and directing them to a

sorting circuit. The service mostly exists on a local scale, in which users go to a collection point, usually a bin, and deposit used garments. Additionally, it can take place as a postal service, as a touring station, or as a network of actors that agree on hosting materials before they enter the recycle or reuse circuit. There are examples of B2B reverse logistics services for the collection of garments, also in the form of white-label all-in-one solutions. In *sorting* are services for distinguishing among products that can be gathered via collection services, according to their current state, typology, or material. Processes can be manual or automated (in this case, they can be supported by artificial intelligence). In *regeneration*, also called "high-grade recycling", are services aimed at producing materials of the same quality if compared to the end-of-life products from which it is obtained. The process, only partially related to retailing, involves discarded materials of different types, including food, and may require the blend with virgin material. There are examples of in-store regeneration services, but they appear incapable of satisfying real market demand and are, therefore, considered forms of process demonstrations or communication channels. A minimum number of analyzed cases refer to *downcycling* services, namely aimed at obtaining materials with lower quality performances to be used in products with lower quality requirements.

4.2. Culture of Sustainability

The second area, *culture of sustainability*, collects services that support the adoption of more sustainable practices and that nurture awareness or behavioral change (Figure 4). This includes the provision of initiatives that leverage disclosure, consultancy, educational activities, events, and heritage value of products. Among the cases described below, there are examples of services addressed to retail businesses (so not to consumers) and aimed at improving their competencies in relation to sustainability (resources for retailers). Others are forms of services that retailers can provide to build more sophisticated interactions with customers and support their education (i.e., make them more aware of production cycles, materials, circular practices, etc.).

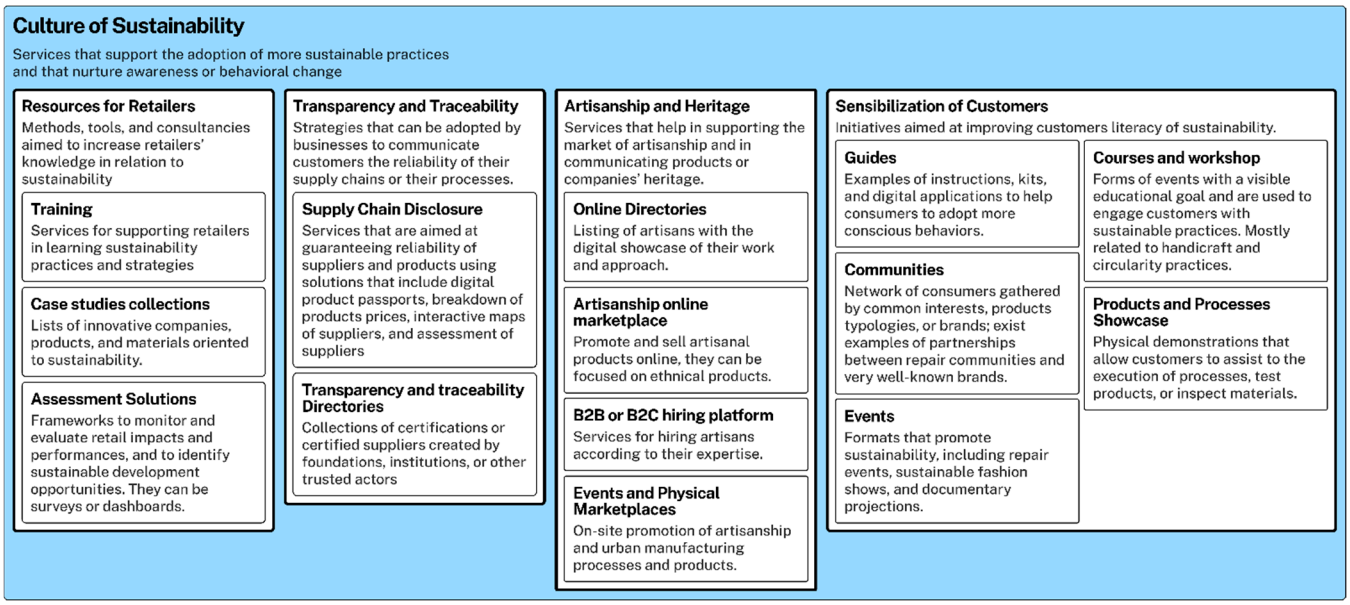

Figure 4. The diagram represents services and initiatives that can be leveraged to achieve better sustainability awareness in retailers and customers.

4.2.1. Resources for Retailers

In the category *resources for retailers*, there are methods, tools, and consultancies aimed to increase retailers' knowledge in relation to sustainability. *Training* collects examples aimed at supporting retailers in learning sustainability practices and strategies. They

can assume the form of frontal lessons, online courses, strategy consultancy, and innovation hubs. *Case-study collections* are repositories that list innovative companies, products, and materials oriented to sustainability; actors like retailers can benefit from these resources to become more knowledgeable about sustainable products and processes. *Assessment solutions* are frameworks to monitor and evaluate retail impacts and performances. Such solutions can come in the form of surveys or dashboards. In the latter case, they encompass several indexes, including marketing and sustainability metrics, and support companies in identifying sustainable development opportunities. Dashboards can be used to analyze data deriving from e-commerce websites (see Section 4.2.2, "Transparency and Traceability").

4.2.2. Transparency and Traceability

In the category *transparency and traceability* are strategies that can be used to communicate to customers the reliability of supply chains or processes. Most of the collected examples exist in the market in the form of B2B services designed for retailers or producers; in fewer cases, they appear as brands' independent initiatives. Under *supply chain disclosure*, we find examples of services that are aimed at guaranteeing the reliability of suppliers and products using solutions that include digital product passports, breakdown of product prices, interactive maps of suppliers, and assessment of suppliers. In sporadic examples, the research revealed examples of in-depth communications, including reports, for disseminating a brand's sustainability assessment performed on itself or on its suppliers or the adoption of e-commerce widgets used to indicate how products or processes meet a list of pre-defined sustainability metrics; such widgets are usually matched with assessment dashboard, suggesting the idea that they are also used to collect customers' data on e-commerce websites. *Transparency and traceability directories* are collections of available certifications or certified suppliers created by foundations, institutions, or other trusted actors active around fashion sustainability. These services list and explain certifications that businesses can acquire, rank companies according to their overall transparency, or give access to a network of certified suppliers.

4.2.3. Sensibilization of Consumers

In the category *sensibilization of customers* are collected initiatives aimed at improving customers' literacy of sustainability. Examples in this group belong to very diverse typologies, but they all address the goal of increasing the awareness of flaws and finding viable solutions to improve the fashion industry. Under *guides* are examples of instructions, kits, and digital applications to help consumers adopt more conscious behaviors. They can explain how to appropriately sort discarded products, distinguish materials for recycling, and repair items in functional or creative ways. Some companies provide repair kits that may include tools and consumables or offer guides for applying appropriate caring processes, at times with digital assistants that automatically decode laundry symbols. There are cases of guides explaining fabric properties and carbon footprint calculators. In *communities* are networks of consumers gathered by common interests, product typologies, or brands. They can live on social media (accounts, pages, and groups), be hosted by a brand's website, or be an online platform run by companies that gather DIY repair enthusiasts; there exist examples of partnerships between repair communities and very well-known brands. In addition, there are rewarding apps that nurture the adoption of more sustainable behaviors and that are sponsored by brands and retailers. In *events* are formats that promote sustainability, including repair events, sustainable fashion shows, and the launch of brand films. *Courses and workshops* are other forms of events with a visible educational goal used to engage customers with sustainable practices. They are mostly related to handicraft and circularity practices, with a strong proliferation of upcycling and creative reparation. They can be organized independently by retailers or with the services offered by other actors, including design studios and associations. The last group is named *products and processes showcase*, in which are collected physical demonstrations that allow

customers to assist in the execution of processes, test products, or inspect materials. Demonstrations can take place in brick-and-mortar shops, temporary shops, or exhibitions.

4.2.4. Artisanship and Heritage

Artisanship and heritage areas embody values that directly or indirectly resonate with sustainability. For instance, they promote high-quality and long-lasting products, facilitate the existence of local supply chains, and cultivate the skills needed to perform professional repair of valuable items. Services offered by artisans can relate to practices of circularity and have already been listed in the first section (services for environmental sustainability). In this category are services that help support the market of artisanship or communicate their heritage. Such cases appear to be *Online Directories* for promoting activities and their handicraft approaches or *Artisanship Online Marketplaces* for selling products that may also present an ethnical nature. There are examples of B2B or B2C *Hiring Platforms* that hire artisans according to their expertise, as well as numerous dedicated physical *events and physical marketplaces* that promote artisanship and urban manufacturing processes.

4.3. Implementation of Social Sustainability

The third and last area is built around the social dimension of sustainability, and it is devised to inquire how retailers can participate in ethical initiatives that foster distributive justice [55] in their supply chain: besides caring about a positive environmental impact, retailers can also act on the social fabric that surround them, connecting with actors focused on creating a social impact. In this group are organized forms of social initiatives that are identified in direct or indirect connection with retail business services, both with environmental and cultural value. The services can be provided by non-profit associations and social enterprises that successfully accomplish actions like labor inclusivity, socioeconomic equity, inter-cultural and inter-generational contaminations, and neighborhood engagement (Figure 5).

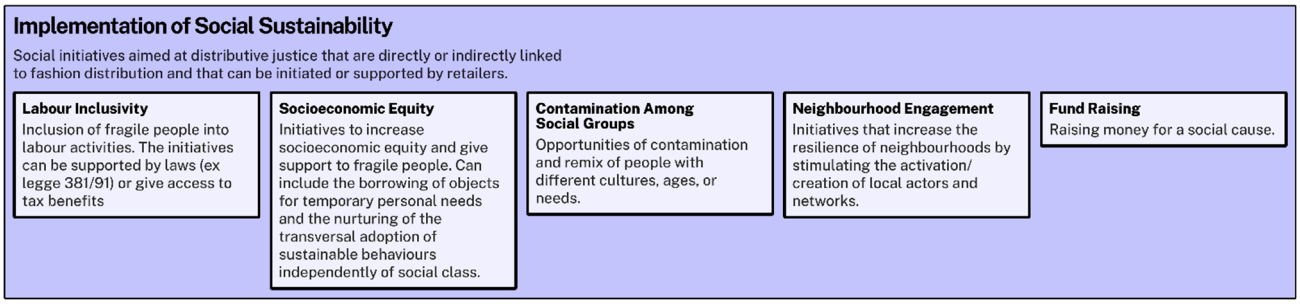

Figure 5. The diagram represents the initiatives with a social value that can be directly or indirectly implemented by retailers to support distributive justice along their supply chain.

4.3.1. Labor Inclusivity

In this category, the identified forms of *labor inclusiveness* that are implemented in retail business or among associated sustainability services are collected. They entail the inclusion of vulnerable groups [65,66], like incarcerated people, ex-incarcerated people, migrants, people with physical or cognitive disabilities, addicted people (drugs or gambling), and people who are victims of violence. The inclusion primarily takes place in second-hand brick-and-mortar stores and collecting services; in addition, it can take place in relation to upcycling processes, courses, and workshops. Similar initiatives are fostered by laws (e.g., the Italian law 68/199) and give access to tax benefits.

4.3.2. Socioeconomic Equity

In this category, initiatives to increase *socioeconomic equity* are collected. They include the sharing of objects for personal needs, the organization of activities that act as barriers to school dropout, and the provision of well-being services for women victims of violence. In many cases, the initiatives nurture the adoption of sustainable behaviors in a way that is transversal to social classes.

4.3.3. Contamination among Social Groups

In this category are initiatives realized by non-profit associations and social enterprises that appear connected to retail via offered services (e.g., repair, upcycle, or collection). They offer opportunities for contamination, mostly in the form of events, courses, or workshops, to people belonging to different cultures and generations. Furthermore, many urban laboratories are the sites of unstructured opportunities for knowledge and know-how sharing between people belonging to different social groups.

4.3.4. Neighborhood Engagement

In the categories are collected initiatives designed to increase the resilience of neighborhoods by stimulating the activation of local actors and social networks. The analyzed examples include the involvement of brick-and-mortar shops in projects for the improvement of the neighborhood (e.g., the collection of materials, and augmentative and alternative communication) and the creation, by local institutions, of gathering places that host inhabitants' recreational activities and create room for retail business.

4.3.5. Fundraising

Retailers participate in fundraising initiatives for a social or environmental cause, both on a local and global scale.

5. Discussion

This study was conducted to understand the possibilities and roles of retailers in creating a positive impact in relation to sustainability problems of the fashion industry. As discovered in literature, considerations about sustainability extend beyond the environment and are connected with themes of culture and society.

In the first area, services for environmental sustainability, cases are organized around the "reduce, reuse, recycle" paradigm [38], which is widely used in discourses of circular economy. The area is the broadest, and it includes many well-known examples oriented toward fashion products or processes. With the exception of Free Transaction Consumptions, all cases are operative in connection with a profitable business model. A small part of these cases, however, has a secondary connection with the retail business (e.g., digital fabrication laboratories or associations and communities dealing with social innovation by means of retailing projects): these have been nonetheless collected because they were considered a source of inspiration and experience for retailers open to experimentation and thus as possible opportunities to activate cross-sectoral innovative processes. Many companies, indeed, are building services based on new technologies, innovative processes, and urban trends to efficiently extend product lives, perform maintenance, sort materials, valorize the heritage of products, and more. The research reveals that the market of services for prolonging garments' life is gradually opening to forms of outsourcing, like selling on marketplaces or adopting all-in-one white-label solutions, possibly because of intrinsic economic advantages or exploitation of providers' expertise. In these cases, the omnichannel approach in the distribution of products is partially present, but it appears to be poorly applied in many of the analyzed examples. Authors argue that it can be a facilitator in the provision of services and in the adoption of more sustainable behaviors.

The cases collected in the second area, culture of sustainability, are mostly discovered starting from the circles of actors that provide one or more services presented in the first

area. These cases are designed to increase the knowledge of retailers so that they can better communicate the reliability of products, processes, and heritage, or to improve the sustainability literacy of customers. The definition of service is broadened to include the provision of courses, guides, and other means to offer customers the occasion to be engaged in a way that supports reflection and hands-on activities or discourages mechanic purchase behaviors. Several examples entail a form of outsourcing, such as sustainability consultancy, adoption of third parties' contents, or organization of events and workshops. According to the gathered data, there is not sufficient information to understand if the activities can be profitable, and some of the cases appear to be forms of investment for businesses that count on other revenues, including the selling of new products.

In the third area, implementation of social sustainability, are listed the encountered initiatives that can be carried out in direct or indirect connection with retail businesses and in synergy with institutions, non-profits, and other social enterprises. The listed cases demonstrate the existence of projects aimed at environmental benefits and sustainability consciousness that can be supported by promoting effective social inclusion, support, and economic equity based on sustainability practices.

Although it can be argued that, on a broader scale, retailers are influenced by supply and manufacturing chains, it is clear from the research that there are strategies for retailers to modulate production, limit inventories, and reduce stock and, at the same time, have a positive impact on the social fabric. We assume that, in order to produce a significant impact on the sustainability of the fashion industry, the efforts of retailers should be orchestrated with other strategies, for instance, designing products to be more easily repaired or introducing policies to support practices for the longevity of products. In future works, the authors aim to exploit the presented case-study research to create participatory tools and work with retailers to nurture the adoption of services and innovate their business model in a sustainable fashion. Within this context, a significant push in this direction will come from the recent adoption by the European Parliament of the proposal to revise the EU Waste Framework Directive (2008/98/EC) to tackle food and textile waste [67,68]. Concerning textiles in particular, the proposal envisages introducing Extended Producer Responsibility (EPR) schemes in all EU Member States to make producers responsible for the entire life cycle of textile products. This resolution will certainly impact design, take-back, recycling, and final disposal strategies and processes, forcing companies to comply with the new legislation. The roll-out of existing retail services or the design of new ones in the near future will, therefore, play a relevant role both in terms of competitiveness and differentiation of companies and as an opportunity to create extended partnerships and alliances between companies, service providers, associations, and public bodies.

6. Conclusions

This research focuses on the active role that retail can play in sustainability and circular economy processes through a service orientation.

In the broader context of the service literature, studies focusing on retail as a proactive actor in sustainability and circular-economy processes still need to be expanded. However, existing contributions agree on recognizing the positive relationships between retail, sustainability, and services. This article enriches the discussion on the servitization of fashion retail.

The study is conducted to understand the possibilities and roles of retailers in creating a positive impact concerning sustainability issues in the fashion industry by systematizing the areas of intervention within which a service orientation can lead to positive and feasible results. The conducted analysis started with services that create environmental benefits and then expanded to inquire about cultural and societal implications. According to the differences that emerged from a close analysis of cases, multiple nested categories were created to comprehend and communicate results. Categories group services according to their goals, characteristics, and recipients (primarily divided into customers or retailers).

The study shows how servitization can take different forms, with different impacts on the different pillars of sustainability, and returns an ontological organization of services for sustainable fashion retail, realized following a grounded theory approach. The results are organized into three areas: environmental sustainability, sustainability culture, and implementation of social sustainability. The first area, environmental sustainability, is oriented toward a fashion product or process, which supports retailers and customers in adopting behavior oriented toward a wiser use of the planet's resources (e.g., data-driven retailing, resale, rental, repair, and recycling). The second area, the culture of sustainability, brings together services that support adopting more sustainable practices and nurture awareness or behavioral change. This area includes the provision of initiatives that leverage outreach, consulting, educational activities, events, and product asset value. The third and final area is built around the social dimension of sustainability. It is designed to investigate how retailers can participate in ethical initiatives that promote distributive justice in their supply chain. In addition to being concerned about having a positive environmental impact, retailers can also act on the social fabric around them by connecting with actors focused on creating a social impact.

This article contributes to the debate on the implications of the servitization of fashion retail on sustainability by taking a systemic view and considering the pillars of sustainability. However, this research shows some limitations that open the door to further research. Firstly, the process of case identification was initially based on the authors' experience and then snowballed, with the risk of presenting a market overview that prioritizes authors' situated viewpoints. Secondly, limits are related to the source of information, mostly from primary and secondary publicly available sources, given that researchers were not in the position to conduct on-field research for all identified actors. Finally, future studies are believed to expand this work in relation to the tools and methods to support stakeholders in the transition toward more sustainable business models.

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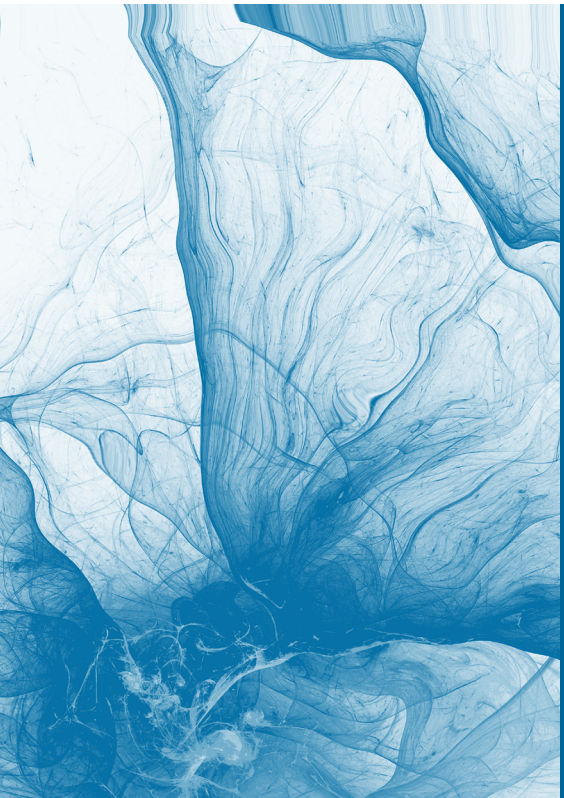

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