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FASHION"**

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Table of Contents

List of Figures	III
List of Tables.....	IV
Introduction	1
1. Circular Economy and its application.....	3
1.1 Circular economy: theoretical background.....	3
1.1.1 Definition.....	3
1.1.2 Circular Economy: principles and evolution.....	6
1.1.3 Circular Economy and related concepts	11
1.2 Circular economy business models	19
1.2.1 The Business Model Canvas in circular economy.....	21
2. Circular Economy Business Models and Challenges: Focus on Textile and Fashion Industry	27
2.1 CE Business Models.....	27
2.2 Challenges to Circularity	32
2.3 The role of digitalisation in the circular transition	39
3. Circular Economy: State of Play.....	43
3.1 The European Landscape.....	43
3.2 The Italian Landscape.....	53
3.2.1 Italy and circular economy	53
3.2.2 Circular economy in the textile and fashion industry.....	55
3.3 Virtuous cases and best practices in the Italian textile and fashion sectors	59
3.3.1 The role of clusters and industrial districts: the case of Prato	59
3.3.2 Social Enterprises	61
3.3.2.1 Quid	63
3.3.2.2 Vesti Solidale.....	66
3.3.2.3 Il Melograno	68
3.3.2.4 Lavoro e Solidarietà	69
3.3.3 Traditional companies implementing circular practices.....	70
3.3.3.1 Rifò	71
3.3.3.2 Berto Textile Industry.....	75
3.3.3.3 ID.EIGHT	78
3.3.3.4 WRÅD	79
3.3.4 Results	83

4. Case study: Cooperativa Insieme	85
4.1 Why Cooperativa Insieme?	85
4.2 Design of the case study.....	87
4.2.1 Data collection	87
4.2.1.1 Primary source	87
4.2.1.2 Secondary source	88
4.3 Results.....	88
4.3.1 Products, materials, and production processes.....	89
4.3.2 Partnerships.....	92
4.3.2.1 Company X	92
4.3.2.2 Company Y	94
4.3.2.3 Obstacles to partnerships	96
4.3.3 Difficulties in CE implementation	97
4.3.4 Summing up	99
5. Conclusions.....	101
6. Appendix.....	104
Appendix A – Interview questions.....	104
Appendix B – Interview Codification.....	106
7. References.....	108

List of Figures

Figure 1 - Economy, Society, Environment Nexus	5
Figure 2 - 9R model.....	10
Figure 3 – Circular economy framework definition.....	18
Figure 4 - Comparison of traditional, sustainable, and circular business models	20
Figure 5 - Business model canvas	21
Figure 6 - Adapted Business Model Canvas	26
Figure 7 - Growth in clothing sales and decline in clothing utilisation, 2000 to 2015	28
Figure 8 - Circular Economy System Diagram	29
Figure 9 - Circular Business Models' contribution potential to a 1.5-degree pathway	32
Figure 10 - Leading yearly textile waste producers in the EU in 2016, by country (in metric tonnes)	38
Figure 11 - Yearly total textile waste production per person in the EU in 2016, by country (in kilograms).....	39
Figure 12 - Overview of frequently reported policies that include resource efficiency/the circular economy within other topics	44
Figure 13 - OECD: Evaluation criteria.....	45
Figure 14 - Reported waste-related targets, by type.....	46
Figure 15 - Overview of reported indicators, by type	47
Figure 16 - Trend of net import of materials and GDP in Italy, in the period 2017-2021 (2017=100)	55
Figure 18 - The partnership between Cooperativa Insieme and Company X	94
Figure 19 - The partnership between Cooperativa Insieme and Company Y	96

List of Tables

Table 1 - CE Models	9
Table 2 - Comparison of circular economy concepts	16
Table 3 - How the circular economy principles apply to the components of business model.	25
Table 4 - Barriers to closing the loop in textile and clothing industry (recycling).....	36
Table 5 - Roles of Industry 4.0 in CE	41
Table 6 - Circular economy indicators adopted by France (2017)	48
Table 7 - Companies, divided by activity, 2019 and variation in the period 2010/2019.....	56
Table 8 - Production of waste for hazard class and activity (tons and %) - 2019 and 2010-2019.....	58
Table 9 - Social enterprises and their employees (2018).....	62
Table 10 - Characteristics of Quid	63
Table 11 - Characteristics of Vesti Solidale.....	66
Table 12 - Characteristics of Il Melograno	68
Table 13 - Characteristics of Lavoro e Solidarietà	69
Table 14 - Characteristics of Rifò	71
Table 15 - Characteristics of Berto	75
Table 16 - Characteristics of ID.EIGHT	78
Table 17 - Characteristics of WRÅD	79
Table 18 - Cooperativa Insieme: Findings.....	100

Abstract

The pressure on the environment and the climate emergence are rising the importance of finding alternative solutions to the linear model “take-make-dispose”. In this context, the concept of circular economy is gaining relevance as an alternative. This study, through a literature review and case studies, explores the potential from the implementation of circular practices in the textile and fashion sectors in Italy and the role played by social enterprises and social cooperatives, analysing environmental, social, and economic aspects related to their introduction, as well as the challenges faced by the industry.

*To my family and my friends,
for their care and support during this journey.*

Introduction

The theme of circular economy is gaining increasing global attention as an alternative to the actual (and often abused) linear model based on a "take-make-dispose" logic. There are multiple damages related to the misuse of the linear model, from the depletion of the land, global warming, and consequent increase of natural disasters, like floodings, drought, wildfires, and hurricanes. The consequences of natural disasters caused by global warming can be severe for society. These disasters can lead to loss of life, damage to property and infrastructure, economic disruption, and unemployment. Additionally, global warming can exacerbate existing social and economic inequalities, as natural disasters often disproportionately affect marginalised communities and low-income households. Climate change can also lead to migrations due to desertification and loss of biodiversity, which can have long-term impacts on society. Humanity needs to find a new way to coexist with the environment, and in this scenario, circular economy can play a major role in the solution. The circular economy is a concept that is not only based on the reuse of waste by the industry but also involves a change of mentality in the consumers. Consumers should abandon behaviours too focused on the individual and his short-term desires rather than on the right relationship between necessities and coexistence with the environment that hosts us.

This work will focus on the textile and fashion industry, one of the most impacting human activities that concern pollution and waste creation. Wrong practices, like fast fashion, contribute to worsening the situation. Circular and sustainable practices are directed first of all to reducing the environmental impact of the industry by minimising the use of virgin raw materials, energy, and harmful chemicals, also creating a series of benefits for society. Benefits are not only linked to the health of the environment but also to economic conditions, for example, the increase of employment due to the creation of companies born to meet the growing demands of new circular practices. Circular economy also means education about our habits, and it is not uncommon to see companies which implement circular and sustainable practices also pay particular care to their workers and the inequalities which may arise in the jobs. The study analyses how social enterprises can contribute to the shift, both in production and mentality.

The study starts with a review of the main literature to provide a broad concept of what circular economy means. The following chapters will enter more details about the application of circular business models in the textile and fashion sectors, analysing the main drivers and challenges for the companies. The study also provides analysis, at European and Italian levels, of the adoption of circular economy practices, examination of reports and

policies, as well as the virtuous cases from the Italian fashion sector. In particular, the study focuses on the role played by social enterprises and cooperatives in the Italian textile and fashion sectors, with respect to their role in activities like collection, sorting, repair of garments, partnership with external companies, and promotion of education of the consumers. The main aim of the study is to provide a deeper comprehension of how social enterprises contribute to the development and spreading of circular and sustainable practices, especially in the field of partnerships with companies in the fashion industry.

1. Circular Economy and its application

This chapter will analyse the main concepts behind the term "Circular Economy" through a literature review starting from the basic concepts and arriving at the latest academic definitions. The second part of the chapter introduces the main aspects related to adopting circular business models.

1.1 Circular economy: theoretical background

1.1.1 Definition

The term Circular Economy, often abbreviated to CE, “focuses on slowing, closing, narrowing, and regenerating resource loops to address pressing issues around man-made climate change, biodiversity, and resource strains” (Bocken et al., 2016), in contrast with the concept of the linear economy, which is based on a "take-make-dispose" logic.

The origin of the concept can be found in a book by Boulding (1966) entitled "The Economics of the Coming Spaceship Earth", in which Boulding talk about a global economy based on circular systems as the only way to guarantee the proliferation of humanity in the long-term. Bocken has been one of many that contributed to the development of the concept of CE in the last century. There have been other pioneers, like Pearce and Tumer (1989), who stated that a linear model without a recycling component is unsustainable, suggesting moving to a circular model. They based their reasoning on the second rule of thermodynamics, adapted to the economics by the economist Nicholas Georgescu-Roegen in 1986 in “The entropy law and the economic process in retrospect”, according to which “the entropy of an isolated system will increase over time and, thus, devalue higher order energy or material” (Georgescu and Pietrulla, 2018).

The first examples of application can be found in Germany during the ‘70s. In 1972 Germany emanated the first waste disposal act (BGBI I S. 873). Germany has also been a pioneer in the extension of producer responsibility, promoting the transition to a CE (Andersen, 2007).

The most diffused definition of CE is the one from the Ellen MacArthur Foundation (2016) and the European Commission (2015). According to the definition given by the Ellen MacArthur Foundation (2016) "a Circular Economy is one that is restorative and regenerative by design and aims to keep products, components, and materials at their highest utility and value at all times, distinguishing between technical and biological cycles¹". In general terms, CE can be defined as a closed-loop economy, which “does not generate excessive waste and whereby any waste becomes a resource” (Wisokynska, 2016). The definition given by the

¹ Biological materials can be reintegrated in the natural system; technical materials can be evaluated through recycling without entering in the biosphere

European Commission comes from the EU Action Plan for the circular economy: "In a circular economy the value of products and materials is maintained for as long as possible; waste and resource use are minimised, and resources are kept within the economy when a product has reached the end of its life, to be used again and again to create further value" (European Commission, 2015).

The two definitions agree on the fact that in order to talk about CE, there must be a process of restoration of the resources used; in other words, the inputs for the production, the raw materials, should never be discarded as waste but should enter a closed loop.

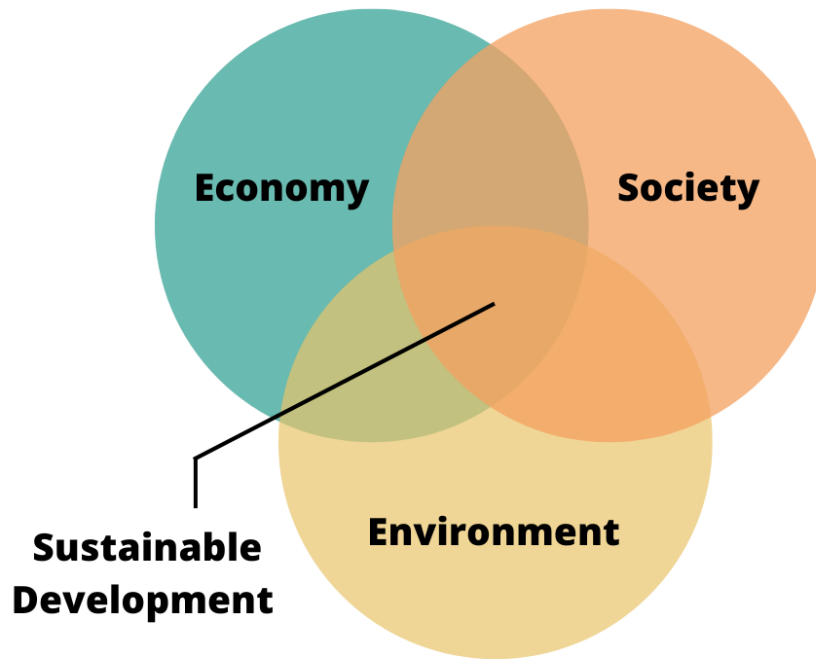
According to the Ellen MacArthur Foundation "while great strides have been made in improving resource efficiency, any system based on consumption, rather on the restorative use of resources, entails significant losses along the value chain" (Ellen MacArthur, 2015).

In addition to the above two most used definitions, we can find multiple variants developed over the years. In 2017, Kirchherr et al., in work "Conceptualising the circular economy: an analysis of 114 definitions", summarised these definitions in order to describe CE as "a regenerative system in which resource input and waste, emission, and energy leakage are minimised by slowing, closing, and narrowing material and energy loops. This can be achieved through long-lasting design, maintenance, repair, reuse, remanufacturing, refurbishing, and recycling".

In work "The circular economy umbrella: trends and gaps on integrating pathways", Homrich et al. (2018) found that the large majority of the definitions of CE are focused on the use of current materials and energy or other resources considered "less virgin", by designing their products in a long-last point of view.

Most of the above definitions of CE mainly consider waste and efficient use of resources. By doing so we are not talking about sustainable development, a definition first introduced by Brundtland (1987), because we are not considering two other significant fields on which CE indirectly exercise significant influence: the environment and the society. Economy, society, and environment form a nexus at the centre of which we find sustainability (Figure 1).

Figure 1 - Economy, Society, Environment Nexus



Source: Created by the author based on “Circular economy and sustainability: management and policy, volume 1” Stefanakis and Nikolaou (2022).

Today, three types of sustainability exist: economic, social, and environmental. They are combined in an equilibrium in which each of them balances with the others, and circular economy has the potential to embrace them all. The effects of adopting CE practices are not limited only to the economic sustainability of the companies moving in that direction. There is a huge potential benefit for the environment in terms of emissions and more sustainable use of resources. In the same way, social sustainability is impacted by CE practices, changing the way of thinking of individuals and institutions, for example, pushing for more environment-friendly laws aimed at financially sustaining companies and activities during the transition phase from the linear model to a circular economy.

When talking about sustainability we can refer to it as weak or strong sustainability. Weak sustainability can be defined as a way to satisfy our needs without compromising the possibility of doing so for future generations. The peculiarity of weak sustainability is the fact that the three areas (social, economic, and environmental) are considered interchangeable between them. For example, a decrease in the environmental sphere is not considered relevant if an increase in the social and economic spheres balances it. In this exchange, a fundamental role is played by technology, seen as an instrument capable of replicating nature through engineered processes like cloud seeding and genetic engineering. On the other side, there is strong sustainability. According to this second paradigm, technology has not the potential to

compensate for the losses, so the three elements are considered complementary but not interchangeable.

The problem with the above two definitions of sustainability is the fact that if it is true that both of them are focused on maintaining the actual balance level in the three fields, none of them thinks about the restoration of the capital that has already been lost.

1.1.2 Circular Economy: principles and evolution

As we have seen in the previous section, circular economy is a business model capable of embracing sustainable development, and creating a healthier environment, economy, and society (Ghisellini et al. 2016). CE can be used to address processes both at the micro-level (the company) and at the macro-level (regional, country...) (Birat, 2015). According to Planing (2015), the principles considered at the core of the circular economy theory can be helpful to push the agents in an economy to move to use of resources more focused on the preservation of the environment. The education of innovators, as well as intermediaries, is crucial to promote and ease the adoption of CE in society.

In some cases, a problem of circular economy is the superficiality of the interpretation of its principles. Often, CE is considered “an approach to more appropriate waste management” (Ghisellini et al., 2016). This is because the approach of CE is often summarised with the 3Rs, considered the core of the theory. The three Rs are:

- **Reduce**

Reduce can generally be seen as the effort to meet more eco-efficient standards in production (DeSimone and Popoff, 2000). The goal in reaching a higher level of eco-efficiency is to "create value while decreasing environmental impact" (Huppel and Ishikawa, 2005), basically increasing the value from both the economic and environmental points of view. Additionally, we need also to consider the long-term benefits of the social dimension given by the increase of the other two dimensions. There are two main strategies that can be used to reach the goal:

- Focusing on the conservation of resources, decreasing the flow of resources, and improving system design (Moreno et al., 2016).
- Create long-lasting products, avoiding their obsolescence through “design for product integrity” (Ghisellini and Ulgiati, 2020) and at the same time, always through improvements in the design phase, avoid the materials’ obsolescence making them easier to be recycled.

According to a survey from Iraldo et al., in 2017, 40% of the companies opted for an "easier to recycle" approach by utilising packaging made of homogeneous products,

and the other 60% opted for a resource efficiency approach, diminishing the number of resources used for each product.

- **Reuse**

It means reusing the product repeatedly for multiple cycles, always maintaining its original function. The reuse logic needs an improvement in the phases prior to production, especially in the design phase, to better design products in view of the cyclical process of “disassembly and reuse” (Ghisellini et al., 2016) to which the product will be subject. Design is not the only obstacle, since in order to successfully implement the reuse principle, customers must be willing to buy products that have been remanufactured at the end of their prior life cycle. People need to be educated about the culture of reuse, ideally from the institutions, but it can also be done by the companies, which then have also to find ways to attract customers, for example, with new marketing campaigns more attentive to the new needs of the customers. In the context of reuse, as we will see in the following chapters, there are significant potential effects on employment and turnover that could be exploited, primarily through digital instruments and online sales.

- **Recycle**

It is defined by European Union (2008) as “any recovery operation by which waste materials are reprocessed into products, materials or substances, whether for the original or another purpose. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels for backfilling operations”. Recycling can be divided into (Bocken et al., 2016):

- Primary recycling (upcycling): starting from waste, converting it into new products, maintaining the same properties or with higher ones.
- Secondary recycling (downcycling): it is the opposite of upcycling, so converting the waste into products with reduced properties compared to the ones from which waste comes.
- Tertiary recycling: decomposing the material to its raw stage, and then creating new materials with the same properties as the original one².
- Quaternary recycling: recover energy from the waste materials. This category cannot be considered as part of the CE, according to the fact that through this practice only a part of the original energy of the material is used again, making

² Depolymerisation and re-polymerisation

this procedure more appropriate in a linear model rather than in circular economy.

If, on the one hand, it is true that the three Rs represent the starting point of the circular economy theory, on the other hand, we have to recognise that, through studies, research, and application, they evolved through the years. Various propositions of the CE model have been given through the years, with different emphases on certain voices. As found out by Kirchherr et al. (2017), before 2012, the main centre of interest was the "recycling" aspect. From 2012 to 2014, it shifted to the "reduce" principle, changing again, after 2014, to "reuse". In 2018, Korhonen et al., in work "Circular economy as an essentially contested concept", classified the various definitions of circular economy, dividing them into definitions based on recommendations from the Ellen MacArthur Foundation or not. The definitions which fall in the first category are the ones which embrace concepts of restoration, regeneration, reuse, and recycling; in the second category, we can find definitions based on the reduction of virgin raw materials, eco-efficiency, sustainable economy, and the other concepts expressed on the various Rs models.

As we said before, the model of the 3Rs (reduce, reuse, recycle) is only the starting point. Over the years, the model evolved by stages with the contribution of various authors, arriving at the model of the 9Rs. Table 1 sums up all the models.

In the 4R model, Hu et al. (2017) introduce the voice of recover, providing in work "Ecological utilisation of leather tannery waste with circular economy model" a clear distinction between recycling and recovering a material. On the one hand, recycling is defined by Hu et al. as "use the wastes as raw materials after simple treatment such as collection, separation and suitable modification, during which core physical and chemical properties should remain"; on the other hand, recovering is defined as "use the wastes as products, or raw materials after technical treatment during which the core physical or chemical properties change in relation to the feeding condition". There is thus a clear distinction, based on the type of treatment to which is subjected the material, with particular attention to the integrity of the "core".

Table 1 - CE Models

Model	Principles of CE	Literature
3R	Reduce, reuse, and recycle	Hongyan (2010), Liu et al. (2017), and Huang et al. (2018)
4R	Reduce, reuse, recycle, and recover	Hu et al. (2011)
5R	Reduce, reuse, recycle, remanufacturing, and refurbish	Mishra et al. (2019)
6R	Reduce, reuse, recycle, remanufacturing, redesign, and recover	Jawahir and Bradley (2016) and Bradley et al. (2018)
7R	Reduce, reuse, recycle, rethink, refurbish, recycle, recover	Kazancoglu et al. (2020)
8R	Reduce, reuse, recycle, repair, rethink, refurbish, recover, re-mine	Kirchherr et al. (2017) and Poponi et al. (2020)
9R	Reduce, reuse, recycle, refuse, rethink, repair, refurbish, remanufacture, recover	Kirchherr et al. (2017)

Source: Alexandros Stefanakis, Ioannis Nikolaou (2022) "Circular economy and sustainability management and policy, volume 1".

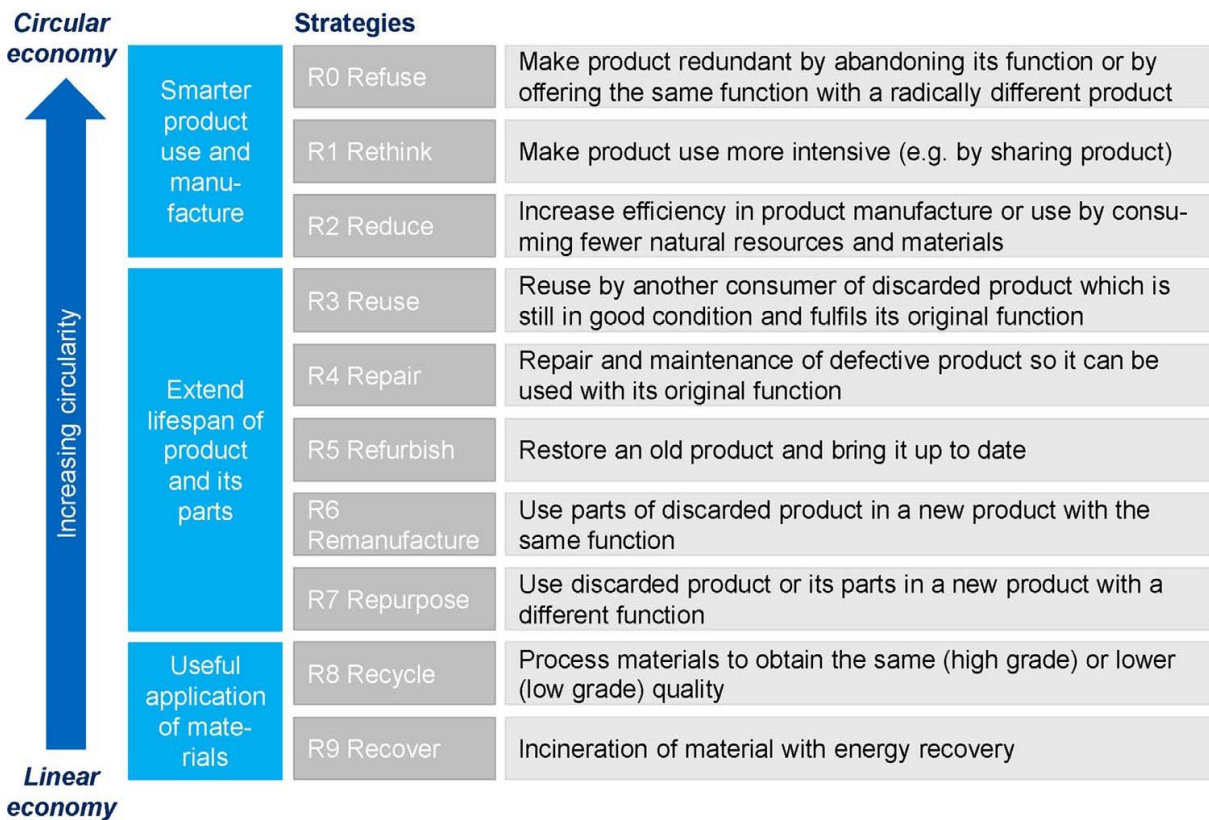
The 6R model by Jawahir and Bradley (2016) brings two new voices: redesign and remanufacturing. The redesign is intended to redesign products "which would use components, materials and resources recovered from the previous lifecycle, or previous generation of products" (Jawahir and Bradley, 2016). Remanufacturing is intended as the "reprocessing of already used products for restoration to their original state or a like-new form through the reuse of as many parts as possible without loss of functionality" (Jawahir and Bradley, 2016).

In this model, even if the concept of recovery is maintained, we have to underline that the definition given by the authors is different from the definition of recover provided in the work of Hu et al. (2017). In fact, in this case, recover is defined as the "collection of products at the end of the use stage, their disassembling, sorting, and cleaning, for utilisation on subsequent lifecycles of the product" (Jawahir and Bradley, 2016), which differ from the previous definition for the fact that in this case is mentioned the product, not the material, and for no explicit references to chemical properties and core of the material.

In the model of 9R from Kirchherr et al. (2017), the voice of "redesign" is missing, and the concepts of refuse, rethink, repair, recover, and refurbish are introduced. Figure 2

shows all the concepts, ranked from those closer to the circular economy concept to those closer to the linear model.

Figure 2 - 9R model



Source: Kirchherr, J., Reike, D., Hekkert, M. (2017) "Conceptualising the circular economy: an analysis of 114 definitions".

As we can see, are added two new strategies, Refuse and Rethink, that are considered by the author closer to the concept of CE. The model ends with the Recover strategy, which is far from the concepts of recovery expressed above by Hu et al. (2017) and Jawahir and Bradley (2016).

Analysing all the models and all the variations made by different authors is not the core of this work; however, from this brief comparison, we can observe how circular economy is a concept constantly changing, often to adapt to the context in which it is inserted, and under study, how each researcher brings its own approach, mainly based on philosophical and practical approaches, contributing to continuous development of CE.

1.1.3 Circular Economy and related concepts

The circular economy model is not the only concept that tries to provide a framework for the development of a value chain based on sustainable values and on the recovery of materials with the aim of contributing to the three main areas of impact of sustainable development (social, economic, and environmental). Over the years, multiple authors have created models that tried to solve the incompatibility of our production and consumption system. The models took into account, even if showing differences among them, have a common starting point: all of them aim at reducing the production activities' impact on the environment. The differences between the models are in the suggested practices to achieve the results: some of them are more focused on efficiency increases; some try to provide ways of closing the loop in the production process; others take inspiration from nature and how it works to develop systems with a reduces environmental impact; others try to combine multiple approaches to propose a comprehensive system.

Nine models stood out for their common points with the circular economy. A brief description of each of them is provided below.

- **Cradle-to-cradle**

The concept of cradle-to-cradle has been introduced by Braungart and McDonough, respectively a chemist and an architect, with the work “Cradle to cradle: rethinking the way we make things” (2002). Often abbreviated to C2C, the goal of this concept is to increase the sustainability of the production processes, create better practices of distribution and disposal, and make more products considered more socially responsible in order to minimise the damage to the environment (Visser, 2010). C2C can be seen as a closed-loop supply chain, at the end of which there is a product recycling process (De Pauw, Karana, and Kandachar, 2013). After the process of recycling, the materials obtained can be used both “for the same purpose or to produce different products” (Geisendorf and Pietrulla, 2018). The C2C concepts also stress the design phase of the products, by designing products and their components in a way that best fits the concept of CE and reutilization of products at the end of their life.

C2C takes inspiration from the “biological metabolism”, and it tries to convert this concept into a “technical metabolism” (McDonough et al., 2003). According to this view, C2C divides materials into two main categories: technical and biological materials (McDonough and Braungart, 2002). C2C also takes into account the "diversity from natural systems" (Geisendorf and Pietrulla, 2018), promoting a

symbiotic approach to increase the “local social responsibility” (Geisendorf and Pietrulla, 2018).

comSummarising, “C2C is a holistic framework that aims at creating efficient, sustainable, and waste-free systems. C2C is by far the concept with the most overlap with CE and is often used synonymously” (Geisendorf and Pietrulla, 2018).

- **Blue Economy**

The concept of Blue Economy is relatively recent, developed by Pauli in 2010. Blue Economy is defined by nineteen principles, grouped in the following three main areas (Blue Economy, 2022):

- Driving inspiration from nature (and water)
- Changing the rule of the game (of business)
- Living on our territory

In synthesis, the blue economy aims to use mechanisms based on nature, protect the ecosystem, and keep in contact with the local environment to develop more socially responsible and sustainable solutions, with a look at the social dimension too.

- **Regenerative design**

The regenerative design model was developed by Lyle (1996).

The roots of this approach can be found in the closed-loop input-output model (Cole, 2012). Usually, the model uses concepts of biomimicry (about which we will talk in the following points) (Lieder and Rashid, 2016). In the regenerative design model, "all materials and waste should be reintroduced into the system, or metamorphosed into new valuable resources without destroying them” (Geisendorf and Pietrulla, 2018).

This model aims to use the resources available in the local environment without destroying them. However, the research on the concept slowed since the arrival of the C2C model, which surpassed the regenerative design model in terms of covered aspects and, consequently, became more attractive to researchers.

- **Closed supply chain**

The closed supply chain, often known as CSC, shares the core idea with the CE model, but the two differ in a significant number of details. In the CSC model, recycling and reusing are the factors that consent "closing the loop" (Savaskan, Bhattacharya, and Van Wassenhove, 2004). Another issue taken into consideration by the CSC model is the structure of the governance, which can facilitate but also

interfere with the adoption of a circular mechanism. In their work, Sarkis, Zhu, and Lai (2011) identify five key factors in the business processes considered fundamental for the adoption of "reverse side activities of CSC" (Geisendorf and Pietrulla, 2018):

- Collection of products through buy-back or other methods.
- Use of the reverse logistic³.
- Division of the returned goods into six categories, which, according to Krikke et al. (2004), are "direct reuse, repair, refurbishment, remanufacturing, cannibalisation, scrap".
- Recovery of the product or material, preferably in the same supply chain, is also possible in other supply chains.
- Redistribution of the products coming from the upstream supply chain in the "usual forward chain" (Geisendorf and Pietrulla, 2018).

- **Natural capitalism**

According to Costanza and Daly (1992), the term natural capitalism is used to indicate "the world's natural assets such air, water, soil, and other organisms" (Geisendorf and Pietrulla, 2018). In the model of natural capitalism, many forms overlap between environment and business. Natural capitalism is based on the following four principles (Hawken et al., 2013):

- Increase in the productivity levels of the natural capital, and by consequence, the lifecycle of the resources through the use of new technologies.
- In order to obtain a drastic reduction, or even the complete elimination of waste, the closed-loop models focus on production models based on biological mechanisms.
- In alternative to the classic model based on the sale of products, move to a "service-and-flow" (Hawken et al., 2013) model.
- The savings made through the adoption of the previous points should be "reinvested in natural capital", favouring the regeneration ratio of the environment.

³ The term is generally referred to all the upstream movements of products. It can also include practices like remanufacturing or refurbishing.

- **Industrial ecology**

The term industrial ecology, also referred to as IE, can be found for the first time in 1989 in the article "Strategies for manufacturing" by Frosch and Gallopoulos. The aim of IE is twofold: on the one hand, try to optimise the use of raw materials and energy consumed in the production processes, on the other hand, minimising the waste as much as possible. These two aims can be reached only through an examination of the environmental impact of each product. The examination level can be either the micro-level or the macro-level (regional or global). The analysis must consider factors like the quantities of used materials and energy, aiming to reduce the harm to the environment as much as possible. In the IE, the management of waste plays a central role. IE can be defined according to three dimensions:

- Analytic: which aims to understand “how the industrial system works (Erkman, 1997)
- Methodological: introduction of regulations on the “interaction with the biosphere” (Erkman, 1997) by the industrial system.
- Proactive: interact with the firms and the governments to suggest new strategies useful to increase the level of sustainability of the economy (Berkel, Willems, and Lafleur, 1997).

According to Geyer and Jackson (2004), the main focus of IE is the environment rather than the profitability.

- **Performance economy**

The concept of performance economy was developed by Stahel (1994), and is defined as "a utilisation-focused service economy through resource efficiency and product-life extension". The model's focus is the movement from the concept of selling goods to the concept of selling services, today also known as servitisation. The use of servitisation can greatly impact the production and consumption stages, significantly contributing to the reduction of environmental damage. Performance economy aims to extend the life and use of products to their maximum through a service-based system to increase sustainability (Mont, 2002). According to Product Life (2016), the three aims of PE are: reducing resource consumption, increasing the number of jobs, and increasing wealth.

- **Biomimicry**

Biomimicry, already mentioned above, is a concept based on the idea of imitating nature's designs in order to create more sustainable innovations (Reap, Baumeister, and Bras, 2005). According to Benyus (1997), the aim of biomimicry is to reduce the environmental impacts by developing products or processes that work like the ecosystem's natural components. This is also done through the utilisation of only natural materials.

- **Reverse logistics**

The concept of reverse logistics, already mentioned above, is defined by the European Working Group on Reverse Logistics (REVLOG) as "the process of planning, implementing, and controlling backwards flows of raw materials, in process inventory, packaging, and finished goods, from a manufacturing, distribution or use point, to a point of recovery or point of proper disposal" (De Brito and Dekker, 2004). The model's primary focus is the reuse of materials, but it does not exclude other practices like remanufacturing and refurbishing.

The above concepts have been analyzed by Geisendorf and Pietrulla (2018) in their work. The aim of their work was to compare these concepts with circular economy, in order to provide a more extensive definition CE. The authors developed a list of characteristics based on the relevant literature available for each model and then compared them to circular economy to identify common points and differences. The comparison has been made through the use of a table. Table 2 lists six broad categories: motivation(s), proposition for waste management, guidelines and tools, economic sectors covered, economic scope, and activities during the lifecycle stages. For each category, some characteristics are expressed, for a total of twenty-four. For each model or concept are marked all the characteristics that, according to the literature review made by Geisendorf and Pietrulla, define the concept. The table is then used to identify the concepts more closely related to CE, and also to identify the deficiencies of the circular economy in order to fill the gaps by taking useful practices and concepts from the other models.

Table 2 - Comparison of circular economy concepts

Categories	Characteristics	Concepts									
		Circular economy	Cradle to cradle	Closed supply chains	Regenerative design	Blue economy	Industrial ecology	Reverse logistics	Performance economy	Natural capitalism	Bio-mimicry
Motivation(s)	Focus on environment	●	●	●	●	●	●	●	●	●	●
	Focus on profitability			●				●			
	Including social aspects	●	●		●	●			●	●	
Proposition for waste management	Efficiency and waste reduction	●	●	●	●	●	●	●	●	●	●
	Zero waste	●	●		●						
	Technological/biological substances	●	●								
Guidelines and tools	Business model perspective	●	●			●				●	
	Focus on operations		●	●	●		●	●			
	Measurability	●	●	●		●	●	●	●	●	
	Policy	●		●			●				
Economic sectors covered	Primary sector	●	●		●	●	●			●	
	Secondary sector	●	●	●	●	●	●	●	●	●	●
	Tertiary sector	●	●		●	●			●	●	
Economic scope	Macro-economic perspective	●				●			●	●	
	Meso-economic perspective		●	●			●				
	Micro: company level	●	●	●	●		●	●			
	Micro: product level	●	●		●			●			●
Activities during life cycle stages: Circular design of ...	Product development	●	●	●	●	●			●	●	●
	Raw material sourcing	●	●	●							●
	Production processes	●	●	●		●	●	●			●
	Use	●	●						●		●
	CRM							●	●		
	End of life/disposal	●	●	●	●	●	●	●	●	●	●
	Transportation	●	●	●	●	●	●				

Source: Geisendorf S, Pietrulla F. (2018) “The circular economy and circular economic concepts—a literature analysis and redefinition”.

In Table 2, we can observe that C2C (cradle-to-cradle) is the concept with the higher number of common characteristics with CE. Both of them lack a focus on profitability, and there are lacking points in both of them between the characteristics under “economic scope”. In the comparison between the various concepts, we can see how CE, C2C, and Regenerative design are the only concepts that incorporate a philosophy of zero waste. Going further, CE

and C2C are the only two concepts that distinguish between technological and biological substances.

With the only exceptions of Regenerative Design and Biomimicry, all the other concepts developed their own measurability indicators, highlighting how the ability to measure the level of sustainability provided by the adoption of the various models is a fundamental part of the path toward closing the loop. Only some of the models developed the same typologies of indicators, with some of them more focused on profitability indicators while others take into account also indicators for social and environmental metrics.

From the results obtained in Table 2, Geisendorf and Pietrulla (2018) try to determine possible improvements to the definition of circular economy. They make a further distinction between enabling factors and framing conditions of CE rather than core parts of the definition of CE.

On the profitability side, it is not considered a fundamental characteristic of CE's definition, but rather a requirement for the correct functioning of a business model based on circular economy. This is done because the profitability per se is not only linked to CE, but also to a series of external factors that are independent from the adoption of circular economy principles. Examples of that can be the political influence in the industry or the technology level. The same conclusion is true for social benefits, like new job creation and impact on employment, which are not criteria for assessing the circularity.

Talking about efficiency, it is maintained separated from the primary characteristics of CE. From a certain point of view, this could seem counterintuitive, but since efficiency is an economic concept, there is not a clear analogue in nature. Applying nature's logic to CE means that the extent of economic activities should be balanced, considering the availability of resources in the environment and the ability to recycle waste.

Product-as-a-service falls under the same categorisation of efficiency. If, on the one hand, it is true that both of them can help in maintaining products for a longer time in the economy and maximising the value deriving from the use of each product, on the other hand, this result is obtained thanks to the efforts made in the design phase of the product, or through CRM, not being accountable as a part of the core definition of CE.

According to Geisendorf and Pietrulla (2018), "at the core of the CE concept, the circularity of resources in the system is achieved by implementing a circular design at all activities during the stages of product and material lifecycle in the economy".

The meso-economic and macro-economic perspectives should also be analysed and coordinated from a circular point of view, for example, by tracking the level of resources at the regional or global level, as well as other important factors like regeneration capacities.

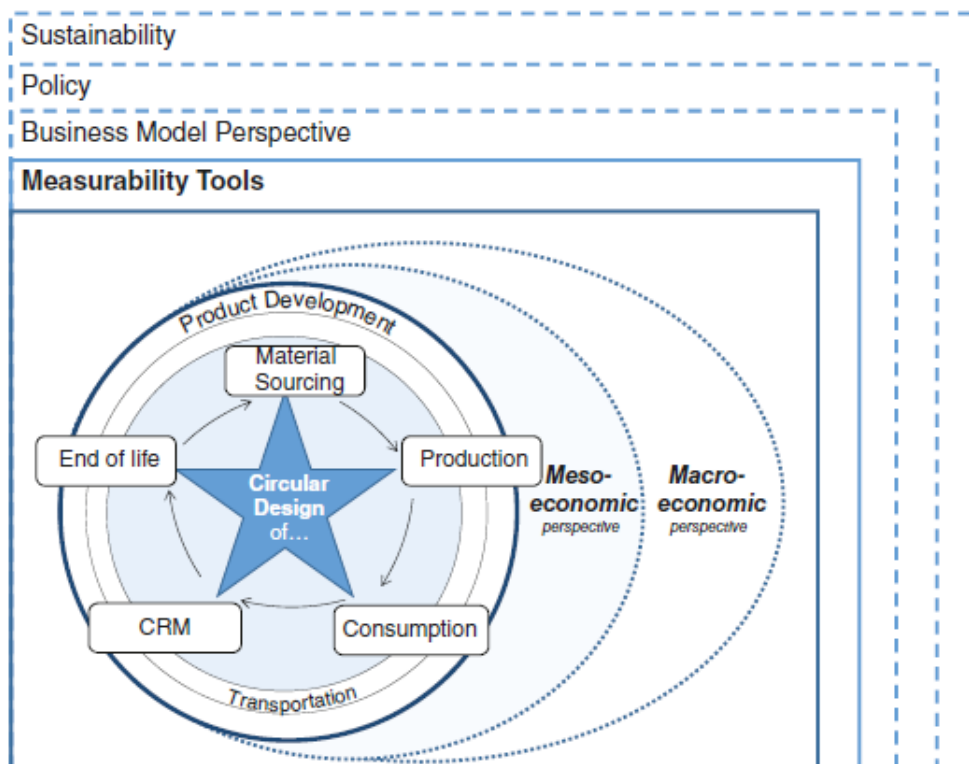
These kinds of analyses, especially those done at the macro-level, should also help push the local governments to implement policies useful to guide the changes.

“In a circular economy, the value of products and materials is maintained, waste is avoided, and resources are kept within the economy when a product has reached the end of its life” (Geisendorf and Pietrulla, 2018). According to their definition of CE, as we can see from Figure 3, the starting point of circular economy for the authors is the circular design of the various steps of a product in the economy (material sourcing, production, consumption, CRM, end of life). This consents a sustainable product development.

Slightly detached from the core, we can find the application of the circular design to the meso and macro-economic perspectives.

External to the core, we can find for first the measurability tools, essential to identify the extent of circularity of a project. After that, there is the business model perspective, which is fundamental to evaluate the profitability and feasibility of a project. Successively, we find the policies useful to support a circular economy business model with laws and eventually financial support to help the large-scale implementation. Last, there is sustainability, intended, for example, in terms of social sustainability.

Figure 3 – Circular economy framework definition



Source: Geisendorf S, Pietrulla F. (2018) “The circular economy and circular economic concepts—a literature analysis and redefinition”.

1.2 Circular economy business models

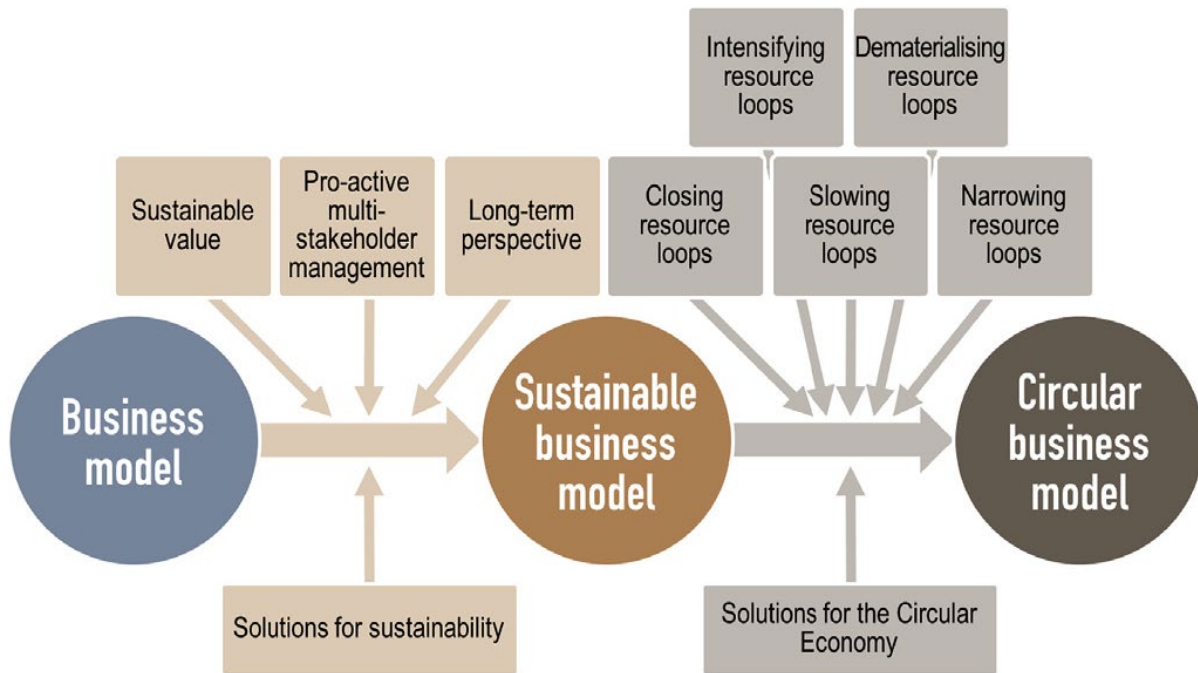
The shift from the "old" linear model to more circular business models is becoming a reality at the macro level between the big firms, which are realising the benefits from the adoption of these new models, but also at the micro level among small firms. As noted by Lewandowski (2016) "existing business models for the circular economy have limited transferability and there is no comprehensive framework supporting every kind of company in designing a circular business model".

Circular business models are defined as "a business model in which the conceptual logic for value creation is based on utilising the economic value retained in products after use in the production of new offerings" (Linder and Williander, 2015).

Various business model concepts have been developed for the previously mentioned models (C2C, CSC, regenerative design, blue economy, industrial ecology, reverse logistics, performance economy, natural capitalism, and biomimicry) using different approaches in pursuing sustainability. Boons and Lüdeke-Freund (2013) identified four main areas necessary for the development of sustainable business models, which are the balance of the three dimensions, social, economic, and environmental: the creation of a value proposition able to balance all the needs from economic, social and ecological areas; an increase in the customers' responsibility; the creation of more sustainable supply chains through the involvement of the various actors; a proper division of costs and benefits between the actors adopting the business model.

Starting from the traditional business models, designed to fit the linear model "take-make-dispose", Geissdoerfer et al. (2018) highlighted the necessary action to move first to sustainable business models, and then to circular business models, as shown below in Figure 4.

Figure 4 - Comparison of traditional, sustainable, and circular business models



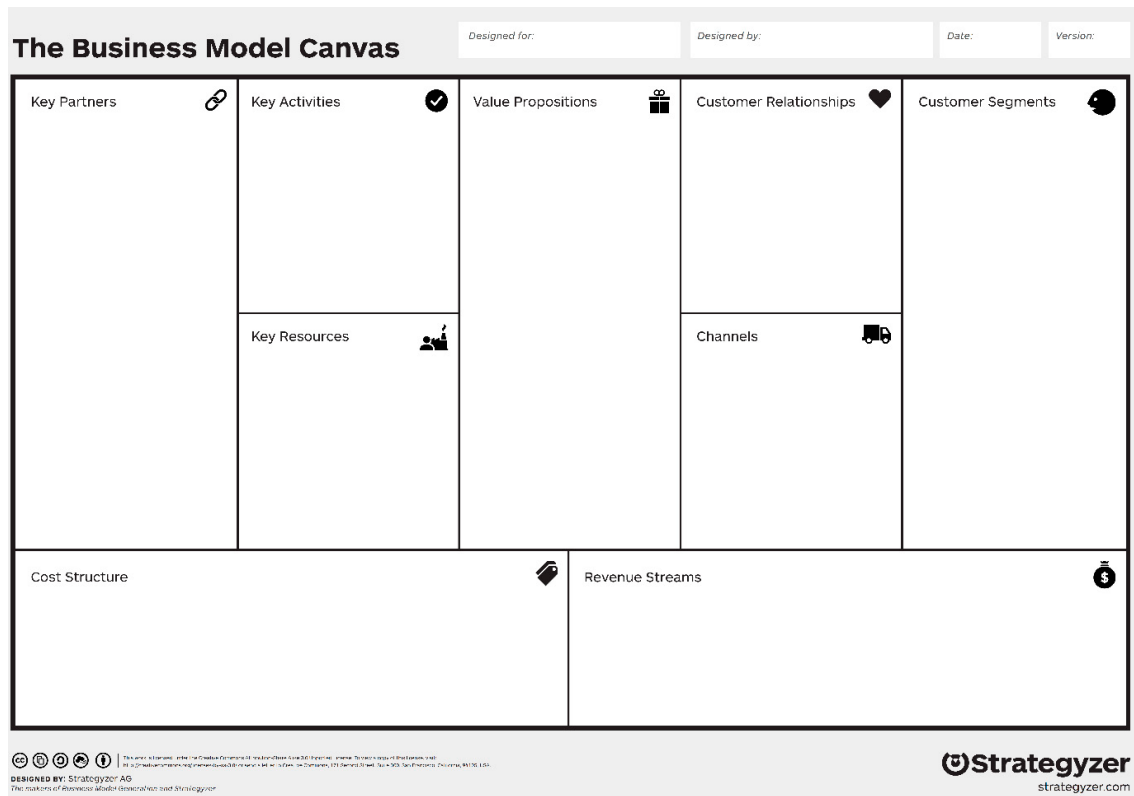
Source: M. Geissdoerfer, S. N. Morioka, M. Monteiro de Carvalho, S. Evans (2018) "Business models and supply chains for the circular economy".

The business model canvas is an "already in use" framework useful to define a business model (Osterwalder et al., 2005; Osterwalder and Pigneur, 2010). The BMC is composed of nine blocks (Lewandowski, 2016):

- Value proposition
- Customer segments
- Customer relationships built and maintained with the customer segments served
- Channels used in order to communicate the value proposition to the various segments
- Revenue streams resulting from the delivery of the value proposition
- Key partners in the supply chain consist of all the actors that adopt a specific business model and provide the necessary resources to carry on the activities.
- Key activities needed to deliver the previous items
- Key resources needed to deliver the previous items
- Cost structure resulting from the business model

The graphical form of the BMC is illustrated in Figure 5.

Figure 5 - Business model canvas



Source: Osterwalder and Pigneur (2010) "Business model generation: a handbook for visionaries, game changers, and challengers". Created by Strategyzer.com and Strategyzer AG.

BMC have already been used for the formulation of sustainable and circular business models in various areas (Lewandowski, 2016), e.g., Lüdeke-Freund (2010) applied it to the concept of eco-innovation.

In order to respond to the new needs arising from circularity and sustainability, the BMC model has been improved with two additional items by Dewulf (2010), that added the blocks of societal costs and societal benefits. Other authors developed different frameworks starting from the BMC. An example is Mentink (2014), who developed the business cycle canvas, aimed at analysing the “circulation of materials in a closed loop” (Lewandowski, 2016).

1.2.1 The Business Model Canvas in circular economy

The principal component of a business model is the value proposition. The product/service must fulfil the needs of the potential customers but also be able to deliver additional benefits in order to be attractive in the market. Clearly, a successful value proposition must also contain sufficient incentives for the customers in order to be viable. As

seen before, some elements linked to CE are of great importance for the customers when talking about value proposition, like increasing the life of a product through maintenance, repairing, and refurbishment, or giving second life to products through reselling and recycling. These particular aspects of the CE can be implemented in the Circular Business Model's (CBM) value proposition, both as pure services and services related to the product, which makes it more attractive for the customers.

The company's customer segment must be appropriately evaluated when moving to a circular business model. Although sustainability is gaining relevance in customer choices (Fashion Revolution, 2020), there is still a lack of customers' education. This shortcoming may have a more significant impact on some kinds of products rather than others; for example, customers may consider (often wrongly) that recycled or remanufactured products, even if sustainable, are of poor quality, avoiding them when purchasing. Companies have, first of all, to evaluate their customer segment according to the kind of products they sell. If there is the aforementioned danger, companies have the possibility to put in place a series of actions directed at inverting the trend. It all starts with the education of the customers, and companies, especially ones implementing circular practices, should be in the first line. However, education is not a universal remedy, especially if the final goal is selling products in order to create an economically viable business model. It must be performed in concert with other strategies, e.g., marketing. A good marketing strategy could be linking the product's sustainability to something important for the utiliser. A perfect example is Quiksilver, a brand producing mainly clothes for surfers. In 2014 Quiksilver started a program to recycle used plastic bottles, mainly collected from the sea, and turn them into surf clothing. In doing so, Quiksilver has been able to create high-quality circular products and increase the emotional engagement of its customers, creating a link between the purchase of its products and the recovery of the marine ecosystem, to which its customers are strongly connected.

Moving the focus to the distribution channels, Lewandowski (2016) points out the great importance of digitalisation and virtualisation: instead of producing physical products, companies can virtualise their offer, e.g., mp3, significantly reducing the waste generated from production and disposal. In the context of reducing waste, the development of customer relationships is helpful in gaining more profound knowledge about the customers' tastes and needs, and delivering them specific messages that can increase their circular and sustainable habits.

In the context of revenues, the concept of servitization becomes increasingly linked to CE. Beyond the classical strategy of pay per product/service, offering products or services can be based on strategies like subscriptions with periodic fees, e.g., monthly; pay per use; pay

per performance. When analysing their revenue streams, the companies must also consider that in the context of circular economy, the revenues are not attributed only according to the difference between the cost of production (plus the additional costs for transportation, marketing, CRM and so on) and the price paid by the customers. As we have already seen in the previous chapter, closing the loop consists in the collection of waste and its reintroduction in the market after processes of remanufacturing and refurbishment, impacting on the cost of the raw materials/components, and by consequence on the field of the key resources (BMC). The state of play of technologies used to perform these processes must be evaluated in order to estimate the balance between the costs and benefits that could derive from their adoption.

The company's key activities to implement its value proposition can embrace circular and sustainable practices in many ways. For example, looking at the 3R model, firms can develop their activities to:

- **Reduce:** can be obtained through an increase in production efficiency, which leads to lower waste generation and lower consumption of energy and resources. Keeping pace with technology is crucial to exploit the benefits that technology can offer in moving to the circular economy and to increase the feasibility of adopting a circular business model.
- **Reuse:** linked with processes of remanufacturing and refurbishment, can become part of the core activities that a firm carry on according to its value proposition, and with a beneficial impact on revenues. The company can, for example, collect back damaged or dismissed products, providing an incentive to the customers to do so, and then sell them through its channels as a line of refurbished products. In doing so, the company is able to embrace a concept of circular economy, and at the same time, reduce the costs of virgin raw materials and the whole production process, reducing by consequence also waste generated and energy consumption.
- **Recycle:** as for the previous point, increasing recycling efficiency can have a significant positive impact on the utilisation of virgin raw materials and the environment.

Clearly, there are many other ways to design activities to make them more circular, also based on different principles. Examples can be the focus on the product design to create durable products, facilitate the disassembling and substitution of the components, or provide retrofitting services to avoid the dismissal of machinery and other technological products.

Cooperation between the actors in the supply chain is fundamental when companies move to a circular business model, given that only a few companies have all the necessary knowledge and facilities to deliver the value proposition contained in the business model. In

this context, we talk about circular supply chain management (CSCM) (Geissdoerfer et al., 2018). Geissdoerfer et al. (2018) provide a broad definition, defining the CSCM "as the configuration and coordination of the organisational functions marketing, sales, R&D, production, logistics, IT, finance, and customer service within and across the business units and organisation to close, slow, intensify, narrow, and dematerialise material and energy loops to minimise resource input into and waste emission leakage out of the system, improve its operative effectiveness and efficiency and generate competitive advantages". The resulting network of firms consents to exploit benefits in various fields for all the involved companies. Each company constitutes a node in the network. According to certain attributes, like trust, distribution of risk, and geographical position (Geissdoerfer et al., 2018), companies can cooperate and support each other in areas like R&D, product design, production, marketing and many others. New business opportunities may arise, e.g., Alisea, an Italian company, collects and recycles the scraps from other companies and give them a new life, transforming them into design objects and office supplies. Considering this, it is clear that cooperation is fundamental also from the point of view of key resources and key activities. Cooperation between companies in the supply chain can be of various types, from informal, for example, non-contractual agreements, to more official forms, like joint ventures.

In his work, Lewandowski (2016) exposed how the principles of CE interact with the business model, with the addition of two voices, useful in the design of circular business models, created according to the ReSOLVE framework, as reported in Table 3.

The two additional voices are the take-back system and the adoption factors. The first, means that "products, their components and/or materials can be cascaded (in case of biological nutrients), and reused/redistributed, remanufactured/refurbished, or recycled (in case of technical nutrients)" (Lewandowski, 2016). The take-back system refers to technical materials, which should be collected from the consumers, with reverse logistics support. To create an effective collection system consumers should receive an incentive in

Table 3 - How the circular economy principles apply to the components of business model

BM Components	Regenerate	Share	Optimise	Loop	Virtualize	Exchange
Partners		X		X		
Activities	X		X	X	X	
Resources	X		X	X	X	
Value proposition and customer segments		X		X	X	
Customer relationships						
Channels					X	
Cost structure	X		X	X		X
Revenue stream		X		X		
Potential to develop the BM framework						
Take back system				X		
Adoption factors	X	X	X	X	X	X

Note: X indicates that the circular economy principles apply to the particular component of the business model.

Source: Lewandowsky (2016) "Designing the Business Models for Circular Economy—Towards the Conceptual Framework".

exchange for the return of the product, and must also be paid attention to the design and management of the collection system. Creating a new voice is justified by the fact that, as highlighted by Lewandowski (2016), creating a collection system often means involving "different partners, channels, and customer relations". The latter regard the factors, both internal and external, that could prevent the implementation of a circular business model (Lewandowski, 2016):

- Internal factors are intangible and mainly linked to knowledge, organisation, and HRM, e.g., the motivation of the employees in supporting the shift.
- External factors consist in factors over which the company has no control, for example, the state of technology and the political and social landscape, e.g., the legislative support for the implantation of circular business models and the level of education of consumers.

The result from the addition of these two new items in the BMC is shown below in Figure 6.

In conclusion, there is not a single framework useful to implement a circular business model. Literature provides some valuable tools to understand the direction and the key aspects to take into account when deciding to move to a CBM. However, each company has to make an accurate self-evaluation of its position in the market, products and their value for the customers, and processes, methods, and approaches used to perform the business, in order to

comprehend its weaknesses, exploit new business opportunities, and empower the networks with both suppliers and clients.

Figure 6 - Adapted Business Model Canvas

Partners <ul style="list-style-type: none"> Cooperative networks Types of collaboration 	Activities <ul style="list-style-type: none"> Optimising performance Product Design Lobbying Remanufacturing, recycling Technology exchange 	Value Proposition <ul style="list-style-type: none"> PSS Circular Product Virtual service Incentives for customers in Take-Back System 	Customer Relations <ul style="list-style-type: none"> Produce on order Customer vote (design) Social-marketing strategies and relationships with community partners in Recycling 2.0 	Customer Segments <ul style="list-style-type: none"> Customer types
	Key Resources <ul style="list-style-type: none"> Better-performing materials Regeneration and restoring of natural capital Virtualization of materials Retrieved Resources (products, components, materials) 		Channels <ul style="list-style-type: none"> Virtualization 	
	Take-Back System <ul style="list-style-type: none"> Take-back management Channels Customer relations 			
Cost Structure <ul style="list-style-type: none"> Evaluation criteria Value of incentives for customers Guidelines to account the costs of material flow 			Revenue Streams <ul style="list-style-type: none"> Input-based Availability-based Usage-based Performance-based Value of retrieved resources 	
Adoption Factors <ul style="list-style-type: none"> Organizational capabilities PEST factors 				

Source: Lewandowski (2016) "Designing the business for circular economy - Toward the conceptual framework".

2. Circular Economy Business Models and Challenges: Focus on Textile and Fashion Industry

The first part of the chapter analyses the main business models related to circular economy in the textile and fashion sectors. The second part of the chapter focuses on the challenges companies face when implementing the aforementioned business models and the role that digitalisation plays in the transition.

2.1 CE Business Models

In recent years, we have been exploring more and more a new ways of doing business in the textile and fashion sectors. Practices like resale and rental are now spreading in the fashion industry. From adopting these practices, the benefit is double: a significant increase in the revenues of those who apply these strategies and, consequently, a benefit for the environment. However, what we can observe, also according to the Ellen MacArthur Foundation (2021), is that the potential benefits are not always reached, limiting the positive effect on the firms and the environment.

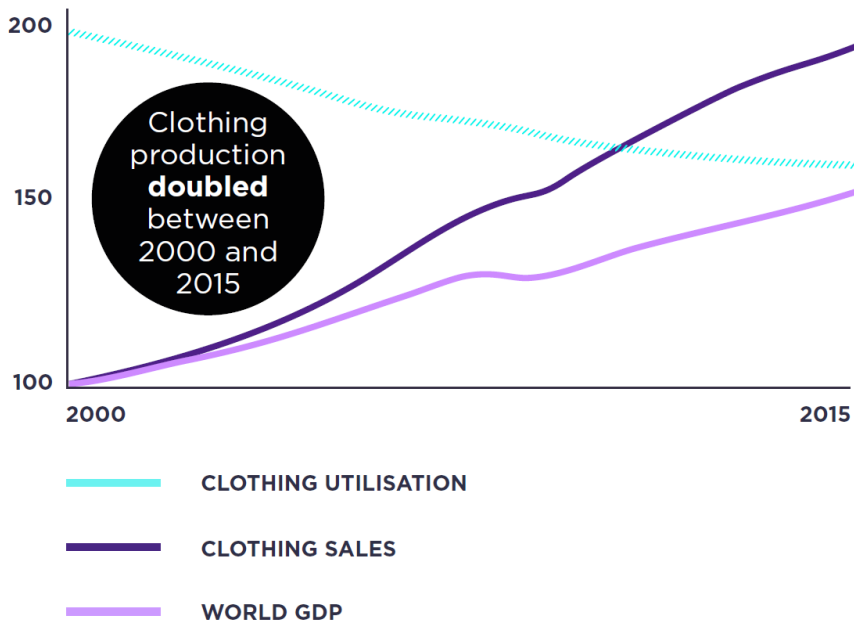
Looking at the past two decades, we can observe how the industry doubled the production of clothes in the period 2000-2015, and at the same time, the rate of utilisation of garments⁴ decreases by 36% as we can see in Figure 7 (Ellen MacArthur Foundation, 2017). This trend, clearly in line with the linear model "take-make-dispose" logic, has aggravated the impact on the environment.

In addition, also the profit margin of the sellers has been eroded, a reduction that according to Morgan Stanley (2019) is on average of 40%. This happened due to the factors like overstock and stockouts, which have affected the sector. The situation drastically aggravated in 2020 due to Covid-19, with the textile sector's turnover contracted by 9.2%, and a contraction of 18.1% for the fashion industry, compared to the previous year (Eurostat, 2020).

According to the Global Fashion Agenda & Boston Consulting Group (2017), the global production of clothes is expected to grow by 63% by 2023. Without a change in the way of doing business in the fashion sector, the aforementioned trends are expected to stay. If this is the case, the greenhouse gas emissions related to the fashion industry will reach approximately 2.7 billion tonnes a year by 2030 (McKinsey & Company and Global Fashion Agenda, 2020).

⁴ How many times a garment is worn before the owner discontinues its use.

Figure 7 - Growth in clothing sales and decline in clothing utilisation, 2000 to 2015



Source: Ellen MacArthur Foundation (2017) “A new textiles economy: redesigning fashion’s future”.

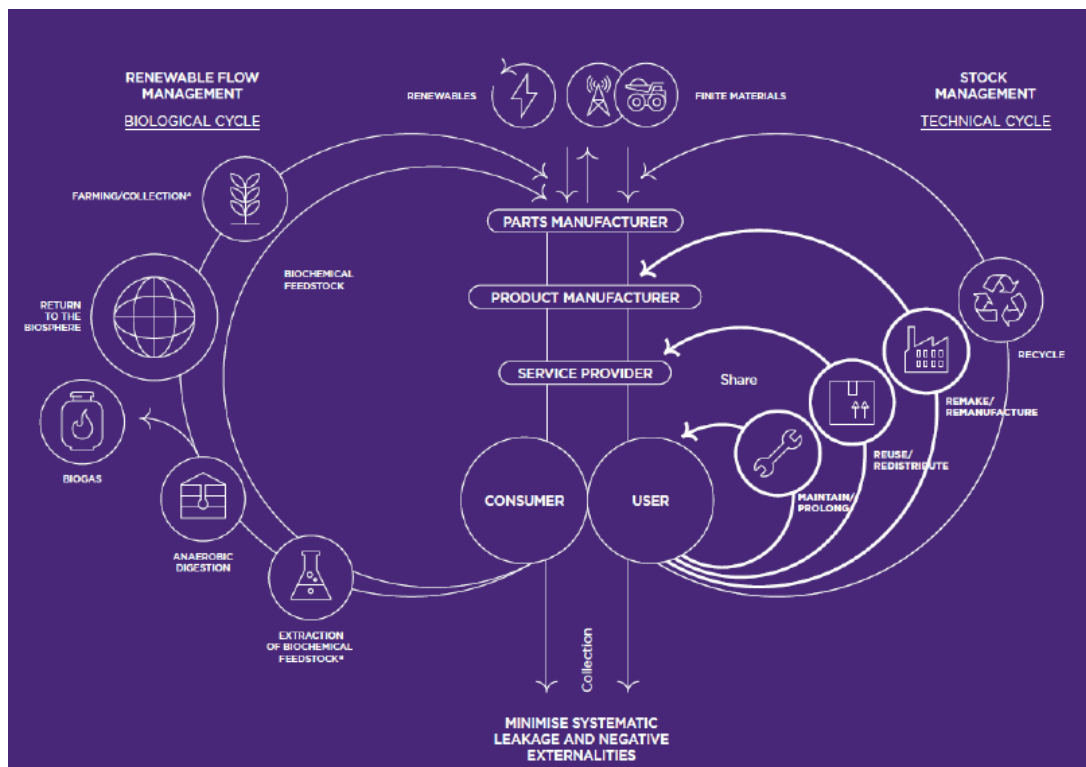
The shift toward a circular business model could help the sector regain a share of the lost profits by maximising the value of the resources used, having at the same time environmental benefits: "In doing so the GHG emissions, pollution, and pressure on biodiversity associated with virgin fibre production, processing, and product manufacturing are reduced" (Ellen MacArthur Foundation, 2021a).

The most impactful elements in the lifecycle of garments can be found first in the energy consumption for manufacturing and finishing processes. Then there is the consumption of water and the use of chemicals to treat the raw materials and other processes, like dyeing. Also, the wastes generated at the end of the lifecycle contribute to the emissions, and finally, we do not have to forget the impact on the CO₂ emissions given by the transportation of materials and products between supply chains globally dispersed (Resta et al., 2016)

Before implementing a circular strategy for the fashion industry, we need to make a distinction. As we have seen in the previous chapter, there are two types of materials: biological and technical. This distinction is also valid for the fashion industry. In a linear model, first of all, the materials are collected. After that step, the raw virgin materials are treated, and once ready, they become garments. The garment is then sold to the final customer. After using it for a certain period, it will stop utilisation, and the garment in question will end up in a landfill or an incinerator. In a circular model, after the first user has decided to dismiss the garment, it can be resold in the market, increasing the use value of the

garment in question. In the case in which it needs to be repaired, specialised companies could provide the service, and then reintroduce the garment in the market. Going further, if it is impossible to repair, it can be remade, creating a new garment, without losing the raw materials needed for production. A recycling model can assist this circular business model. It is useful when the fiber can no longer be recovered to make a new cloth, to compost them and return the nutrients to the environment (if possible). These steps are illustrated in the graph depicted in Figure 8.

Figure 8 - Circular Economy System Diagram



Source: Ellen MacArthur Foundation (2021a) “Circular business models: redefining growth for a thriving fashion industry”.

According to the Ellen MacArthur Foundation (2021a) the circular business models for the fashion industry can fall under three main categories:

- **More use per user:** increase the time a garment can be worn by a user, both physically and emotionally.

When talking about physical durability, and as a consequence, the product's longevity, there is an increase in energy and water use, due to more washings needed per garment, by the moment its life is longer. However, the increased consumption is compensated by the fact that are needed lower volumes of production, and there is a

reduction of waste. An example of that is provided by WRAP (2017), according to which increasing the life of clothing by nine months means a reduction of carbon emissions around 30% in a year. Increases in physical durability can be obtained, for example, through a rise in the textile quality of the product. Moving to emotional durability, it creates an emotional link between the product and the user, increasing the time the garment will be worn before being dismissed. Two ways to obtain such result are customisation and storytelling: allowing the customer to attach to the product something closely related to him/her (customisation) or creating a narrative that explains the social initiatives behind the product (storytelling) will increase the chances of creating an emotional link, independently from fashion trends.

A potential side effect beneficial for the company is the one linked to the increase of quality of the products done to increase their longevity: the customers will notice the increased quality, being more satisfied of their products, with potential benefits for the business and brand reputation.

Applying a model based on "more use per user" requires an increase in the attention paid by the producer in choosing materials and chemicals; in providing instructions for the correct maintenance; educating customers to recognise the superior quality; and, eventually, intra-firm or inter-firm collaborations in order to provide services like repair or maintenance of the garments. In addition, the local government could also apply policies to incentivise this practice, for example, increasing the taxation on less durable goods (Coscieme et al., 2022).

- **More users per product:** this strategy is linked to realities like Vinted, which allows users to sell the clothes they have dismissed to another user, facilitating the circulation of products between users, increasing the life of the products and reducing the waste generated. Another example of these realities is Rent the Runway, which provides a designer clothing rental service, shifting to the product-as-a-service model. The firm charges a periodic fee, or a price based on pay-per-use, to customers who need an expensive garment worn for a special occasion or only a limited number of times. With the introduction of the "more users per product" models based on rental, the benefit is twofold: on the one hand, increasing the rate of utilisation of each product; on the other hand, the firm to increase revenues will have to maintain garments useable for as much as possible, leading the firm or the third parties in charge of this step to follow the best practices for the correct maintenance of the products. A

possible side effect of the rental model is the cost and impact related to the collection and transport of garments to the customers and back to the company.

Clearly, these models are inevitably related to the increase of the quality of the products from the producers, in order to offer the best experience to each customer, also after several uses.

- **Beyond physical products:** this strategy is meant to complement the users' fashion needs through the use of digital products, or in any case, non-physical products. Examples of going beyond the physical products are the fashion items designed for avatars, a possibility that seems even more likely with the development of the Metaverse and the VR experiences.

Nowadays, four main business practices have shown a strong potential in increasing the revenues for the firms and, at the same time, the benefits for the environment:

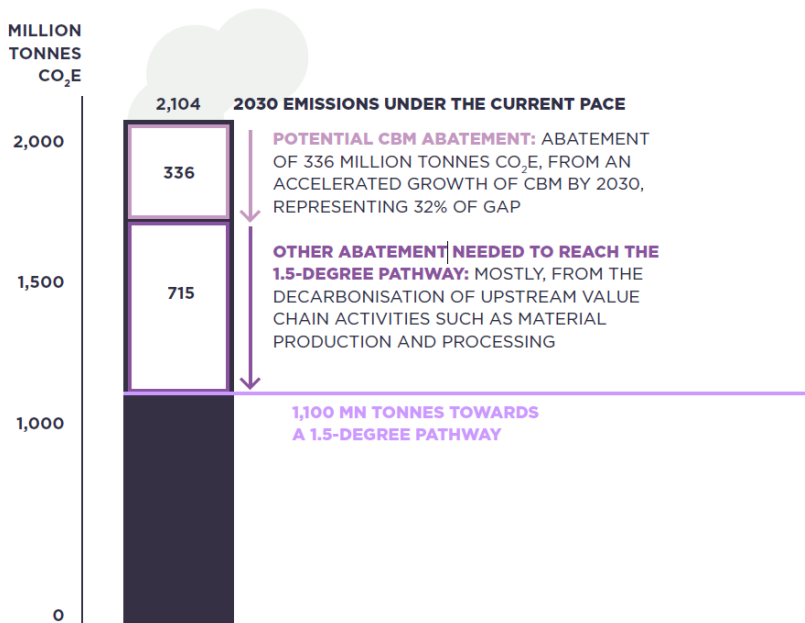
- **Resale:** user-to-user sales, second-hand market (online and offline), and re-commerce by own-brand (Ellen MacArthur Foundation, 2021a).
- **Rental:** rental between private users but also at level of dedicated platforms or even brands through the subscription to a rental service.
- **Repair:** a practice that consents to revert a garment to a useable condition.
- **Remake:** disassembly of an existing product and subsequent creation of a new product from the retrieved materials.

These four practices have seen a significant expansion in the last decade, and referring to the US market, they represented a market of 73 billion USD in 2019 (BoF and McKinsey & Company, 2021). Resale represents the largest share, which accounts for about 63%, followed by rental, with 20%. The last two business models, repair and remake, account together for 17% (Ellen MacArthur Foundation 2021a). The two most important business models have shown growth even during and after the Covid-19 pandemic, which marked an increment in the attention and importance given to sustainability by customers when purchasing. An example is the increase in the valuations of seven platforms, all based on one or more of the aforementioned business models. Vinted, Depop, The Real Real, Poshmark, Vestiaire Collective, Rent the Runway, and thredUP all reached valuations exceeding USD 1 billion (Ellen MacArthur Foundation, 2021a). According to the analyses of the Boston Consulting Group made for Ellen MacArthur Foundation (2021a), in 2019, the share of the global fashion market occupied by resale, rental, repair and remake was 3.5%, with a potential to grow up to

23% by 2030. The most important market for these business models will be Europe, with a share of 38%, followed by Asia Pacific, with 36% and North America, with 24%.

The resale, rental, repair and remake practices go beyond the goal of increasing the revenues for the brands, also significantly impacting the reduction of GHG emissions. In 2020 the emissions of GHG from the fashion industry amounted to 2.1 billion tonnes. In order to contribute to reaching the goal of keeping global heating at a level not higher than 1.5 C°, the fashion industry is called to reduce its emissions to 1.1 billion tonnes by 2030 (McKinsey & Company and Global Fashion Agenda). According to the analysis of the Ellen MacArthur Foundation in collaboration with Boston Consulting Group (2021a), if in 2030 the share of the circular business models in the fashion industry will reach 23%, this would mean a decrease in the emission up to 16%, slightly less than a third of the reduction needed to reach the quantity of 1.1 billion of tonnes, Figure 9.

Figure 9 - Circular Business Models' contribution potential to a 1.5-degree pathway



Source: Ellen MacArthur Foundation (2021a) “Circular business models: redefining growth for a thriving fashion industry”.

2.2 Challenges to Circularity

The circular business models exposed above are not easy to implement, and various barriers can impede them from expressing their economic and environmental potential fully, leading the industry to maintain the "old" linear logic (Ellen MacArthur Foundation, 2021a):

- **Adjustments in performance indicators**

The existing performance indicators for the fashion industry are mainly focused on the number of items sold, or business volume. In line with this logic, customers are provided with incentives focused on selling more new products. Often brands do not apply circular business model practices as core strategies for running the business but use them in tandem with the linear model, which remains the prevailing part of the business. There is a need to update the performance indicators, otherwise, the impact of CBM will remain limited in scope.

- **Product design**

There is a lack in the design phase of products. They are not developed to endure, which is fundamental for both resale and rental, otherwise, there will be the need to produce more garments than the quantity needed in the case in which a design made to resist in time is implemented. The importance of the design phase is underlined by the estimates of its environmental impact. According to the European Commission (2020a) "up to 80% of the environmental impact of a products is determined at the design phase". In the design phase are crucial the choices of the designer regarding the materials used for the garment, the type of construction, and the product finishes (Gwilt, 2014; Muthu, 2018). These factors assume great importance in the context of disassembling and recycling the garment.

There are various types of designs which can be implemented in order to increase the sustainability of a product (Stefanakis, Nikolaou, 2022):

- Design for assembly and design for disassembly (DfA, DfD) are helpful to support the activities like repairing and recycling. In order to successfully apply this design, the designer must take into account also who will be in charge of assembling/disassembling the product (could be a repair service or a technician, but also the final consumer). The designer must also consider the problem of intellectual property protection in the case in which the individual in charge of disassembling the product is not from the company that produces the product. The designer can cope with this problem, for example, implementing a design that requires particular or unique tools for disassembling.
- Design for maintainability (DfM) is fundamental in order to avoid consumers dismissing the products too early. In the textile sector, DfM could mean, for

example, the possibility of cleaning the product easily, or additional services like repair provided by the company (e.g. Patagonia).

- Design for repair (DfR) is based on the approach used in DfA and DfD.
- Design for remanufacture.
- Design for recycling or composting implies minimising the use of chemicals and foreseeing collection and sorting practices.
- Design for sustainable behaviour is based on a few measures that can be taken in order to direct the consumer in the right direction, for example a repair program or a correct recycling of the product. To obtain this result, the firm must first create a stronger relationship between the customer and the purchased product, preventing him/her from dismissing it too quickly, e.g., through customisation. Secondly, creating products which are independent from the trends of the market can also help prevent the customer from dismissing the product too early. Clearly, those solutions must go hand in hand with an increase in the circular education of customers, ideally up to the institutions, but as we see nowadays also on the producing companies, through blogs, articles, and sensitisation campaigns.
- Design for sharing economy means designing long-lasting products, taking into account that different consumers will handle the products differently.

Clearly, in a sector like fashion, with a high level of interdependence between the parts in the supply chain, designers are not the only ones on which rely in order to make a shift toward CE. As highlighted by Eionet⁵ (2019) is needed the support of various figures in the fashion organisations and fashion industry, as well as policymakers, to increase the level of fashion education. Additionally, Eionet suggested some actions to favour the switch from a linear to a circular business model, like focus on design choices, focus on sustainability, an extension of the producer responsibility and others, most of which will become legislation from 2025.

The interviews conducted by Dan and Østergaard (2021) confirmed, in accordance with Raven (2008) and Acklin and Fust (2014), that fashion designers have limited influence. Giving designers more decisional power is up to the management, who have to be predisposed to listen to designers' ideas and, in some cases, to train them. Dan and Østergaard (2021) identified three future roles for designers:

- Role of preventing, by pursuing a sustainable design in the design phase

⁵ European Environment Information and Observation Network

- Role of facilitating, helping middle managers in applying the design to “tactics, systems and processes”
- Role of advising, reporting to the top management, in order to favour the implementation of a circular business model

These three roles are strictly related to the skills and capabilities of the individual designer, which may only be able to cover some of the three roles in certain cases.

- **Supply chain**

One of the first problems faced at the supply chain level when implementing a CE-based business model is the responsibility of applying it. As Salmi and Kaipia (2022) point out, the large majority of the companies have "a niche position in the supply chain", and often the production of garments is outsourced to third parties. Companies tend to consider CE actions in the production phase as a responsibility of the third parties with which they collaborate. Generally, as found out by the authors, companies with internal production have more freedom and chances of applying CE practices to their business models.

In order to maintain a product for various lifecycles, there is a need for specific services, like repair, remanufacture, cleaning, delivery, inter alia. The absence of a local presence of "cost-efficient reverse logistics infrastructure and skills" could act as a barrier to the implementation of CBM strategies. Therefore, the need to analyse multiple factors, like the presence of infrastructures and the composition of products, to assess the feasibility, both economical and practical, of recycling and reusing raw materials of the product or repairing and reintegrating it into the market. Durability and the possibility of repairing or recycling the product are factors which are determined in its design phase. But, designing a product to increase its degree of coherence with the circular standards is one of many challenges for designers. They also need to combine those aspects with the product's desirability to maximise its environmental impact. In doing so, designers often have to blend various fibers too meet the customers' needs. This practice can lead to difficulties in repairing or separating when recycling the product, or the cost of those practices needs to be lowered to be economically viable for both the consumer (repair) and the company (recycle). Concerning recycling, particular attention must be paid to disposal practices. To optimise the recycling process, proper collection and sorting systems must be set up. This is up to the producers and the consumers, who need to be educated to adopt

the correct behaviours when disposing of their unwanted clothes, as summarised in Table 4.

Moving to the source of the problem, another challenge to face, in this case for both the producers and consumers, is waste creation. Minimisation of waste, or even better, its elimination, is a process which involves not only the industry but also needs the sensitisation and education of consumers (Danigelis, 2017; Koszewska and Małgorzata, 2018).

Table 4 - Barriers to closing the loop in textile and clothing industry (recycling)

Consumer behaviour and education	Disposal practices, collection and sorting infrastructure and process	Recycling technologies
<ul style="list-style-type: none"> • Poor consumer demand for recycled textile products, which tend to be perceived as lower quality • Consumers' unawareness that textiles should be recycled and how they can be disposed of in the most responsible manner 	<ul style="list-style-type: none"> • Collectors focus on "re-wearable" textiles while neglecting streams of waste that require more costly recovery solutions • Lack of mainstreamed, up-scaled processes and know-how to collect and sort textiles by fiber type • Low availability of infrastructure on local and regional levels 	<ul style="list-style-type: none"> • Lack of commercially viable recycling technologies for low-grade textiles fraction • Lack of mainstreamed, up-scaled processes and know-how to separate fiber types from the mixed blends and composite structures • Costly recovery process • The recycling end-market is dominated by low-quality materials and blends • Costly logistics and low availability of textile recycling plants
<ul style="list-style-type: none"> • Lack of traceability in the global waste chain • Policy frameworks in which collectors, recyclers and waste managers operate 		

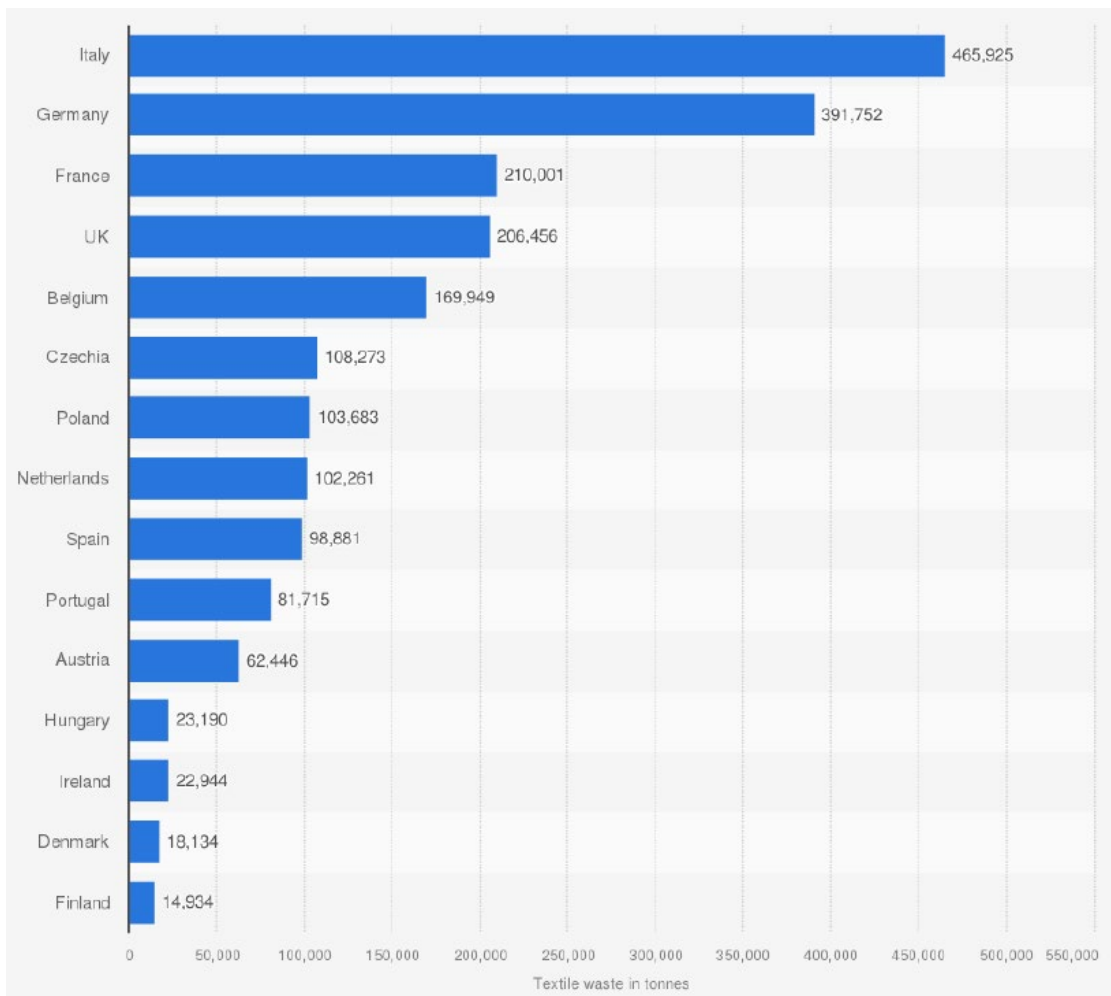
Source: Koszewska, Małgorzata (2018) "Circular Economy - Challenges for the Textile and Clothing Industry" based on: De Paoli (2015) "Towards the circular economy: Identifying local and regional government policies for developing a circular economy in the fashion and textiles sector in Vancouver, Canada"; Prieto-Sandoval et al. (2018) "Towards a consensus on the circular economy".

Wastes in the textile industry can be classified into three main classes (Koszewska and Małgorzata, 2018):

- Post-industrial waste: considered an adverse effect of the manufacturing stage.
- Pre-consumer waste: faulty and unsold products.
- Post-consumer waste: garments dismissed by consumers due to damages or changes in fashion trends.

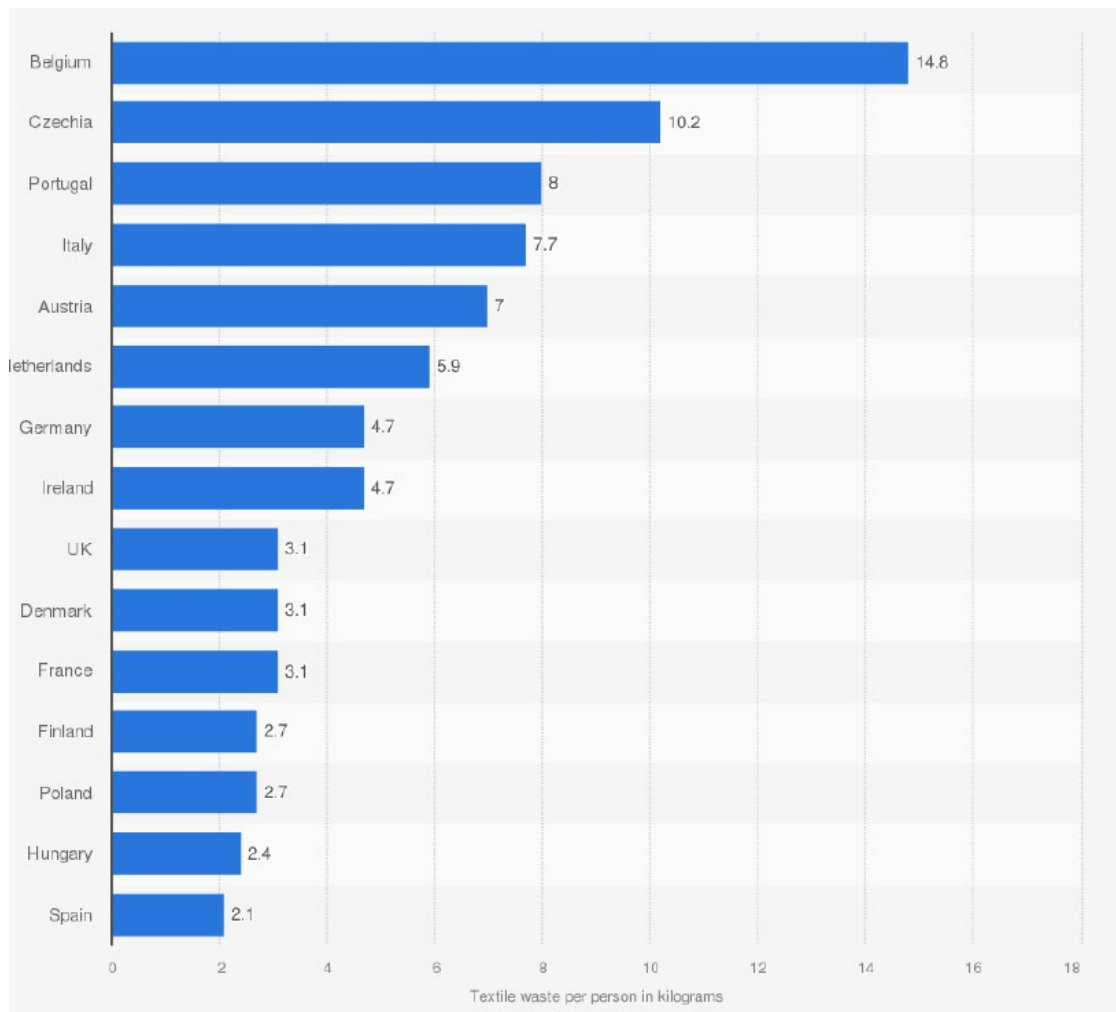
Most items in the previous three categories are usually incinerated or finished in a landfill. Looking at EU, Italy is considered one of the worst countries, according to Eurostat and Labfresh (2016), as we can see in Figure 10, with a yearly production, in 2016, of 465,925 metric tonnes of textile waste. The situation is slightly different when looking at the textile waste generated per person in the same year, but Italy remains one of the bigger producers of textile waste in Europe (Figure 11).

Figure 10 - Leading yearly textile waste producers in the EU in 2016, by country (in metric tonnes)



Source: Eurostat, Labfresh (2016); retrieved from Statista.

Figure 11 - Yearly total textile waste production per person in the EU in 2016, by country (in kilograms)



Source: Eurostat, Labfresh (2016). Retrieved from Statista.

2.3 The role of digitalisation in the circular transition

Adopting a circular model in the textile industry goes hand in hand with technological and social progress. From a technological point of view, digitalisation can give excellent assistance. "Digitalisation will lead to transparency, faster and more efficient supply chains, and new business models where supply and demand can meet in real time" (Matthes et al., 2021).

As seen in the previous chapter, digitalisation is already taking effect in shaping new business models, like resale and renting, in the textile and fashion industry. However, this is only the first step: digitalisation must embrace the whole supply chain, which is comprehensive of both B2C and B2B markets.

One of the recent trends created by digitalisation is the advent of platforms like Alibaba and Amazon, which consented to international companies to create customer bases

worldwide without needing to move physical facilities. The arrival of the big marketplaces and the growing importance for brands of developing their digital presence pushed many small and independent retailers out of the market, which need more resources to expand in that way. In the first period of novelty, with a society more concentrated on the individual benefits gained by the possibility of having almost infinite online catalogues at its fingertips and less on the environmental damage caused by the adoption of such systems, the digitalisation process, especially in combination with fast fashion, contributed significantly to the worsening of the environmental impact of the already polluting textile and fashion sectors. However, in recent days, with continuously growing attention paid to the environmental cause, it's clear that digitalisation is necessary in order to restructure the old linear system on which is based the global textile and fashion industry. Digitalisation will not limit its impact only to renewing the business models of fashion companies; it also involves internal practices, production and management of resources, leading to increases in the efficiency and transparency of the textile supply chain.

One of the first benefits that come to mind when thinking about the link between circularity and digitalisation is the potential impact on the production processes. Digitalisation can help companies to achieve results in various areas, like the flexibility of production or increasing the possibilities of customisation of products. These results can be reached with the creation of the so-called "smart factories", which according to Ghoreishi and Happonen (2022), have to create an ecosystem with "smart networks" and "smart products". Turning these terms into practice means digitalise companies and their products through the use of technologies like RFID and sensors, which consent to gain a broader view on the processes, which in turn will increase the ability of developing more flexible and efficient systems and practices, through real-time monitoring of the processes and remote control of the instruments. Industry 4.0 technologies and IoT can also be used to reduce faulty products and make more precise assessments of the products' lifetime (Ingermarsdotter et al., 2020). Zhong et al. (2017) drew up a list of items which identify the tasks of Industry 4.0 for favouring the adoption of circular economy practices (Table 5).

Table 5 - Roles of Industry 4.0 in CE

Design	Maintenance	Control	Scheduling	Monitoring
<ul style="list-style-type: none"> • Smart design • Smart prototyping • Smart controller • Smart sensors 	<ul style="list-style-type: none"> • Real-time control and monitoring • Collaborative decision making 	<ul style="list-style-type: none"> • Big Data analytics • Data-enabled prediction • Data-based modelling 	<ul style="list-style-type: none"> • Marketing • Warehouse management • Transports 	<ul style="list-style-type: none"> • Technology makes the real-time sharing of information possible

Source: Designed on the basis of Zhong R. Y., Xu X., Klotz E. Newman S. T. (2017)

“Intelligent Manufacturing in the Context of Industry 4.0: a review”; Ghoreishi M., Happonen A. (2022) “The Case of Fabric and Textile Industry: The Emerging Role of Digitalization, Internet-of-Things and Industry 4.0 for Circularity”.

Digitalisation, except for direct benefits linked to efficiency increases, has an indirect effect on CE practices and assumes relevance, especially when talking about transparency in the industry. The digitalisation process involving the entire supply chain generates enormous amounts of data, which can be used in several ways to implement circular business practices. A first example is traceability: the streams of data can be used in order to provide detailed information about the products' materials, origin, processes, and chemicals used, providing customers who are willing to make more sustainable purchases with all the details about the products. Information is not only valuable for the final customer but also for the variety of actors in the value chain. Starting from the final customer, which is growingly demanding more sustainable products, producers can exploit this market opportunity by using the data coming from the digitalisation process to meet the consumers' needs. This could mean both a change in their supplier in favour of certified sustainable ones, e.g., the ban on sandblasting jeans by ALDI and LIDL (Matthes et al., 2021), or pressure on existing suppliers in order to convert them to circular and sustainable practices, in some cases also by providing training.

Another opportunity from the combination of IoT technologies and CE practices is linked to servitization strategies. An example is clothes rental, which can be defined as the application of servitization to the clothes (generally high-end and costly ones). As we know, to successfully implement a servitization business model, the starting point is the collection of data. Data are necessary to correctly assess a system's performance and efficiency, which translates into correct pricing and attractive offer to the client. In this field, IoT technologies, like RFID, can hugely impact the collection of data from the garments without having

intermediaries, e.g., retailers, and in helping the management define and propose more attractive servitization-based services.

Digitalization also has a significant impact on reducing the length of the value chain. "Digital networks and interaction can create an integrated system of actors, assets and stakeholders where not only supply chains can be real-time tuned with the factory but also retail channels and even products and final customers can communicate and exchange data within the system" (Bertola and Teunissen, 2018). The effect of digitalisation is cutting out the retailers and, consequently, the additional markup on prices, consenting to companies to contact directly with their customers through websites or apps, both in B2C and B2B markets. By entering into direct contact with customers, new business opportunities can be exploited, for example, mass customisation, which, as we already seen, can help in providing support to circular business practices, increasing the emotional value between the customer and the product.

Finally, digitalisation has a central role in a new emerging market in the fashion industry: digital fashion. In the past few years, more and more digital services, like social media's AR filters, videogames like Fortnite, the Metaverse launched by Meta, and services dedicated to creating our online avatars are introducing time after time new customisation opportunities for their users. Between the various customisations of our digital images, there is also fashion, and users are increasingly asking for new possibilities to express themselves in their avatars. Vogue Business (2021) reports that "brands are increasingly partnering with metaverse platforms to provide digital clothing and creating their own virtual spaces and customisable avatars". If correctly intercepted by companies, this new trend could become an important business opportunity and a significant revolution in the fashion industry.

Happonen and Ghoreishi (2022) underlined the lack of studies which deeply analyse the relationship and benefits coming from the intersection of digitalisation and circular economy in the context of textile and fashion industry. The topic is gaining growing attention, especially in terms of academic research, but the books, publications and conferences are still scarce.

3. Circular Economy: State of Play

This chapter focuses on analysing the state of play of the circular economy in the textile and fashion industry. The first part of the chapter focuses on the European level, exploring reports and future goals of the EU. The second part of the chapter focuses on the Italian level, analysing reports and providing examples of virtuous cases in the field of the circular economy.

3.1 The European Landscape

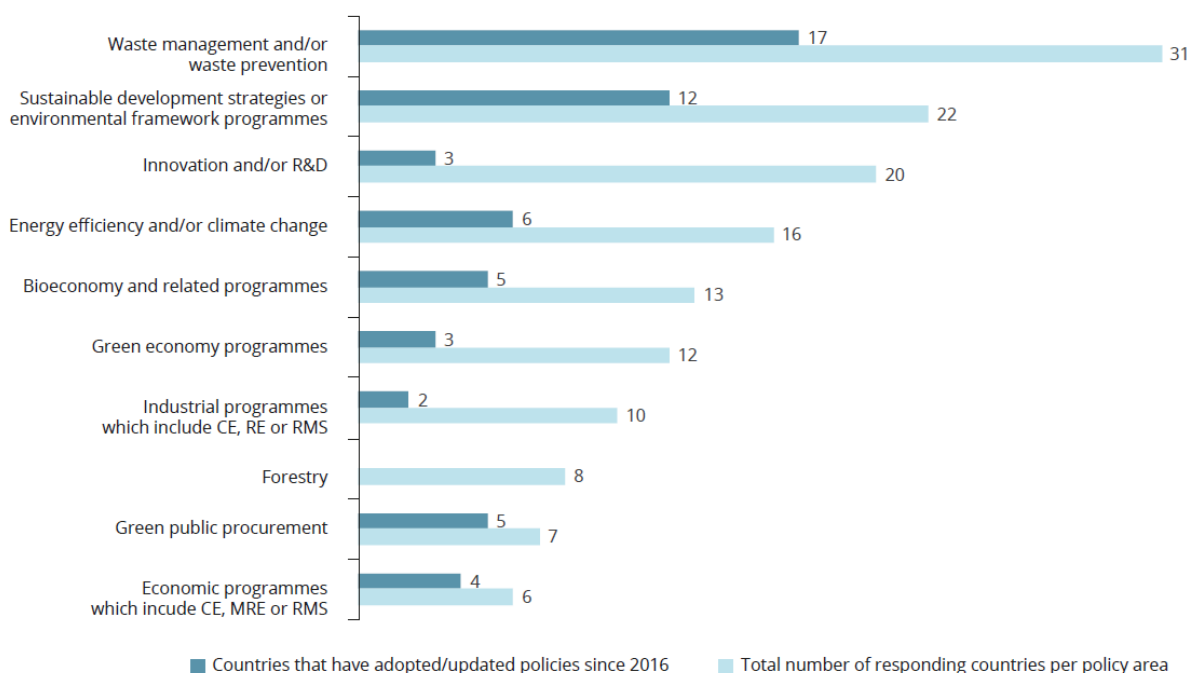
Europe, among the other industrialised countries, has always been a pioneer in the field of sustainability and circular economy. The European Environment Agency (EEA) released various reports and plans for adopting circular models and increasing resource efficiency in the past years. Examples are the report "More from less: material resource efficiency in Europe" (2016) and its second version "Resource efficiency and the circular economy in Europe 2019 – even more from less" (2020). The latter explores various dimensions, like resource efficiency, the policy framework, various national strategies for raw materials, and indicators to monitor the progress, among others. According to the report, among the 32 countries and regions participating, everyone reported introducing various policies related to the development of the circular economy. As we can see in Figure 12, waste management is at the top of the practices adopted by the countries, followed by sustainable development strategies or environmental framework programmes and innovation or R&D.

In the report section (EEA, 2020) dedicated to assessing the policies introduced, there are evaluations both ex-ante and ex-post the introduction of the policies. The evaluations made ex-ante takes into account the regulatory impact and, as mentioned by Italy and other countries, a cost-benefit analysis. Other countries also included "calculation of economic and environmental effects on society and of economic effects and administrative burdens on business".

In order to make a correct ex-post evaluation, some countries, e.g., Switzerland, created national guidelines to regulate how the impact of the policies is assessed. Generally, most of the countries adopt evaluation criteria established by European institutions, e.g., EEA and OECD, which are focused on the evaluation of (OECD, 2019) (Figure 13):

- **Relevance:** is described as “the extent to which the intervention objectives and design respond to beneficiaries, global, country, and partner/institution needs, policies, and priorities, and continue to do so if circumstances change”.

Figure 12 - Overview of frequently reported policies that include resource efficiency/the circular economy within other topics



Notes: RE, resource efficiency; RMS, raw material supply.

Source: EEA (2020) “Resource efficiency and the circular economy in Europe 2019 – even more from less”.

- **Coherence:** consists of the evaluation of harmony between the adopted policy and the other policies of a country. Coherence can be internal or external. In the first case, it is considered as the fit between the policy and the other policies emanated by the government or adopted from the international law; the latter evaluates the level of harmonisation and coordination between the policy and policies from other actors, in the context of avoiding the duplication of efforts.
- **Effectiveness:** it is the evaluation of the achievement (reached or expected) of the policy's goals.
- **Efficiency:** defined as “the extent to which the intervention delivers, or is likely to deliver, results in an economic and timely way”.
- **Impact:** can be considered as a broader view of the effectiveness, oriented on evaluating indirect effects, both positive and negative, on a longer term compared to the goals of the policy. It can also include effects on the social and environmental dimensions.

- **Sustainability:** measures if the benefits coming from adopting a policy continue in time, including an analysis of the capacities needed to keep up the benefits in the long term.

Figure 13 - OECD: Evaluation criteria

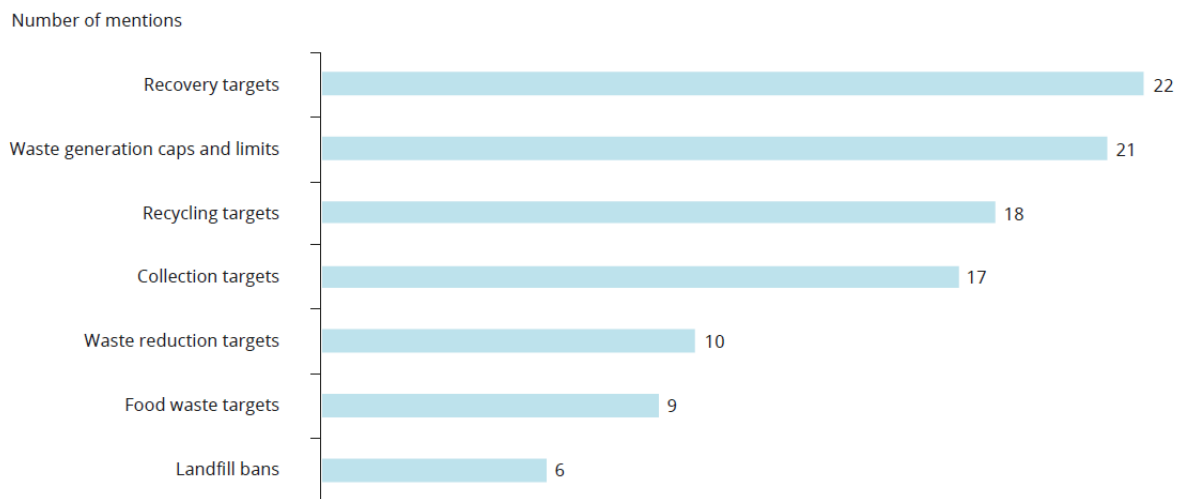


Source: OECD (2019) "Better criteria for better evaluation: revised evaluation criteria, definition, and principles for use".

In the EEA's report (2019), the participating countries also indicate their target, providing goals which are measurable over time. "Twenty-six countries reported adopting targets related to resource efficiency, the circular economy or raw material supply (EEA, 2020). According to the report, the central area of action is waste, with twenty-five countries, among the thirty-two respondents, that indicated targets on waste. The number decreases considerably when looking at targets for raw materials supply (five countries) and circular economy (one country). However, it is essential to note that waste targets comprehend, among the other practices, recycling, and in some cases, even the use of secondary materials, which are key aspects of the circular economy, consenting us to consider some of the waste targets as circular economy targets. In Figure 14, the targets reported by the twenty-five countries are classified according to the general type of origin. As noted above, many of the targets for waste recycling, like recovery, collection, and reduction, can be traced back to the circular economy principles and practices. Most countries with waste targets have also expressed specific quantitative parameters to reach, e.g., France aims to recycle 100% of plastic waste by 2025. In the second place, there are the economy-wide resource productivity targets

reported by eight countries. The 2020 report from EEA also underline the differences from the previous one (EEA, 2016). Expressly, in the field of resource productivity targets, it is noted how some countries, like Austria and Poland, are no more following these targets, while other countries, like Germany, empowered their targets with additional goals, e.g., also considering the imported resources.

Figure 14 - Reported waste-related targets, by type



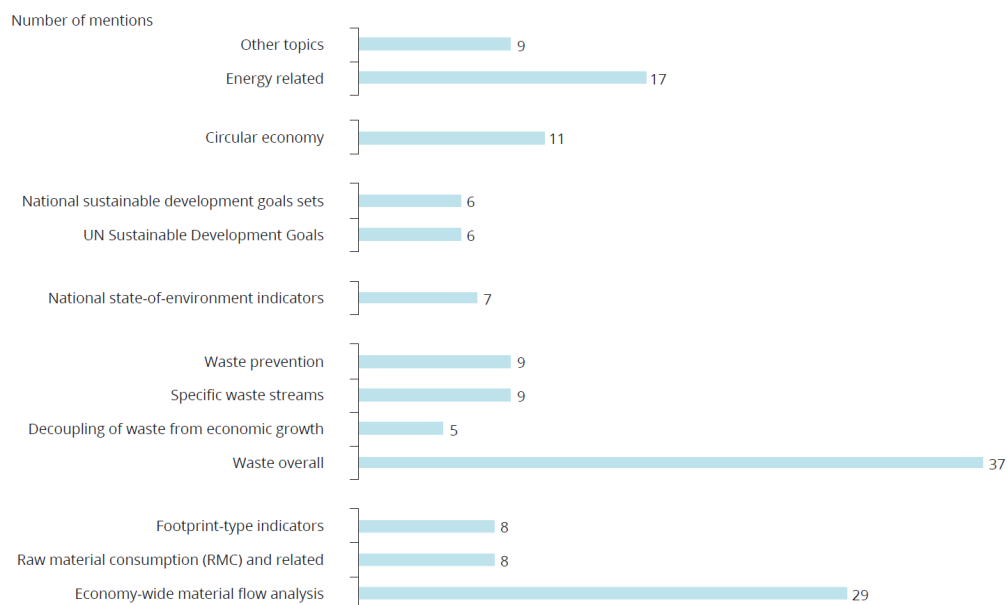
Source: EEA (2020) "Resource efficiency and the circular economy in Europe 2019 – even more from less".

Differently from waste targets, among the eight countries having resource productivity targets, the only one with a specific strategy is Germany, while the other countries indicated more general roadmaps (EEA, 2020).

Each country developed a set of indicators to monitor the progress toward the targets, from general to more complex ones. The EEA (2020) report observes that one of the most used sets of indicators to monitor progress is Eurostat's economy-wide material flow account (MFA). If, on the one hand, this is not surprising, by the moment that for EU countries, MFA indicators are mandatory when reporting, on the other hand in the report is observed how also countries external to the European Union adopted the same indicators. In Figure 15 are summarised the indicators reported by the thirty-two respondents.

Confirming what was stated before, we can see how the MFA indicators are largely used (twenty-nine countries), especially if compared to raw materials consumption (RMC) indicators, which also include related indicators, like the GDP/RMC, used "only" by eight countries. However, once again, we can see how the real main character are waste indicators, used by all the responding countries to monitor their progress toward their waste targets.

Figure 15 - Overview of reported indicators, by type



Source: EEA (2020) "Resource efficiency and the circular economy in Europe 2019 – even more from less".

Besides, eleven countries have developed (at various levels) circular economy indicators. Between them, the only one with a properly developed set is France, while other countries are still refining them (EEA, 2020). The indicators adopted by France are reported in Table 6. The other countries, including Italy, are in different stages of development of CE indicators. Specifically, Italy is developing indicators based on analyses on micro, meso, and macro levels.

In March 2020, the European Commission published the Circular Economy Action Plan, one of the blocks composing the EU Green Deal. The goal of the Circular Economy Action Plan is to create a "strategy for a climate-neutral, resource-efficient and competitive economy" in response to the high emission levels and loss of biodiversity due to human activities. According to European Commission (2020a), the movement toward a circular economy in the EU can bring multiple economic, environmental, and societal benefits. If, on the one hand, the benefits for the environment from the adoption of CE are straightforward, like the reduction of consumers' footprint and preservation of biodiversity and resource boundaries, on the other hand, the European Commission provide more precise estimates in the economic and social areas.

Table 6 - Circular economy indicators adopted by France (2017)

Indicators for sustainable production	Indicators for sustainable consumption	Indicators for waste management
<ul style="list-style-type: none"> • Domestic material consumption per person • Resource productivity • Number of ecolabel holders • Number of industrial symbiosis projects 	<ul style="list-style-type: none"> • Car-sharing • Food waste • Household spending on product repairs and maintenance 	<ul style="list-style-type: none"> • Quantities of waste sent to landfill • Use of recycled raw materials in production processes
<ul style="list-style-type: none"> • Employment in the circular economy 		

Source: Developed on the basis of data reported in EEA (2020) "Resource efficiency and the circular economy in Europe 2019 – even more from less".

Cambridge Econometrics, Triconomics, and ICF (2018), estimate that a switch to a CE industrial strategy could increase the EU GDP by 0.5%, leading to the creation of 700.000 new jobs. The contribution to the social area is not limited only to employment but takes into account also its quality, evaluating how the adoption of new business models can increase the knowledge of the worker, create new types of jobs, and deliver better products to the customers. Additionally, the European Commission (2020a) underline the advantage also the micro level for single companies: by the moment that almost 40% of the costs are due to materials, the adoption of a circular system that closes the material loop can help to reduce the prices fluctuations and to increase the profitability of companies. Great relevance is also given to digitalisation and its advantages in reaching customers' needs, creating new business models, and supporting efficiency increases within the companies.

The Circular Economy Action Plan first addresses some types of products, specifically electronics, ICT, textiles, furniture, and high-impact intermediary products. The European Commission aims to regulate and create sustainability principles addressing various aspects. Among those aspects, we can find fundamental principles of CE, like creating more durable products, facilitating repair and upgrade, increasing energy and resources efficiency, recycling, and remanufacturing. Additionally, there are more specific principles, like the "ban on the destruction of unsold durable goods", the provision of incentives for the adoption of product-as-a-service business models, and the creation of rewards for products with high levels of sustainability performance.

From the consumers' point of view, the Circular Economy Action Plan's goals are, first of all, to provide all the relevant information on the products to the customers, like the availability of repair services and spare parts, but also to create a shield against premature obsolescence and greenwashing, through the use of sustainable logos or labels. An example is the adoption in February 2022 by the Committee on the Environment, Public Health and Food Safety (ENVI) of the rules proposed for regulating batteries. In practice, these rules aim at the creation of labels indicating the carbon footprint linked to the batteries, fixing a maximum value, requiring the use of minimum levels of recycled materials for their production, and also facilitating the replacement of batteries at their end of life, especially for those of smartphones and tablets, often discarded for the high costs of substituting the battery due to their current design. This does not mean a return to the old designs with removable batteries, which would be in contrast with the existing smartphone standards, but rather a shift to the eco-design, with the creation of smartphones and other electronic devices with easier-to-remove batteries.

Moving to the focus of this work, as said before, one of the main sectors of interest in the Circular Economy Action Plan is the textile industry. The EEA Briefing report of November 2019 indicates how the textile sector is the fourth most impacting sector in terms of usage of raw materials and water and in fifth place for what concern greenhouse gas emissions. The plan of the EU comprehends a set of diversified measures pursuing the goal of innovating the textile sector through circular practices, helping it also in gaining competitiveness. The European Union wants to create a circular market for textiles through the use of various measures (European Commission, 2020a):

- Applying a framework which has as a starting point the application of eco-design is fundamental for the correct implementation of further measures. The framework also includes particular attention to the chemicals used to reduce health and environmental risks, measures to push private and business customers to choose sustainable textiles, empowerment, and increased accessibility to services like repair and reuse.
- Provide incentives to textile companies moving to circular production, with particular attention to product-as-a-service-based models, production processes, and cooperation and transparency at the international level.
- Empower the recycling phase of the garment through greater attention in the separation phase, easing the following recycling and remanufacturing processes.
- Improve "sorting, reuse and recycling of textiles" by innovating the sector both from the industrial and regulatory point of view, in a way that increases the producer's responsibility.

Many EU programs monitor the progress in circularity in the textile and fashion industry across the EU. One of those is ECAP, a project funded by the LIFE Programme, an instrument for funding initiatives for climate and environmental action in the EU. Among the other activities of sensitisation in the industry, ECAP also realised reports aimed at understanding the consumers' habits and preferences, like the consumer research for ECAP from 2016 to 2019 (WRAP, 2019), conducted in four countries, Italy, Germany, Denmark, The Netherlands. The results from the research show an increase in the number of items donated, for example, via charity, in Italy and Denmark. The four nations have also seen significant increases in second-hand purchases, and in Germany, the average longevity of garments increased from 3.8 years to 4.4 years in the period analysed. A significant trend for companies trying to find the best incentives to implement a collect-back system can be observed in Italy, and in Denmark, with respect to the exchange of clothing for vouchers. In Italy, in the group of consumers analysed, 68% of them were in line with the practice. Additionally, always in Italy, 39% of the group expressed a propensity toward clothing subscription services. However, it must be noted that the most receptive age group is the one between 18 and 34 years old, which denotes how younger people are looking for new consumption models that align with a circular context.

Another helpful survey to understand consumers' behaviour and attitude toward circularity was published by Fashion Revolution in 2020. The Consumer Survey Report exposes the results from a survey of the five largest European markets (Germany, Italy, France, Spain, and the United Kingdom). The respondents were 5 000, aged between 16 and 75 years old, and were asked to answer eight multiple-choice questions. The results obtained, to be the more specific as possible, have been divided according to age, gender, income, and country. From the results, we can observe that (Fashion Revolution, 2020):

- In the choice of products, the production of garments without harming the environment is indicated by 33% of the respondents. The use of recycled or organic materials is nevertheless in the last two positions, with consumers preferring safe job conditions, fair wages, and avoiding child labour (in the first position with 45% of the votes). These results may indicate that consumers are willing to shift production toward a model that also takes care of the environment, but education on how to reach these results still needs to be improved.
- The results change when asking consumers which factors are essential when choosing a brand. Even if the results may be misleading, by the moment that all the choices provided in the survey are more or less related to the circular economy, the rates of agreement are significantly higher, with sustainability certification in the first place

(80% of the respondents). All other possible choices, like ethical certifications, environmental policies and impact, information for repairing, and taking back clothes for reuse or recycling, show adherence rates higher than 70%. The results exhibit the critical role that brands will have in the circular transition. Customers tend to choose brands with which they identify, for their values or lifestyle. The switch to circular approaches by the brands can have a double impact in educating the consumers and providing a competitive advantage to the brand.

- When talking about the habits of the customers in terms of utilisation of the garments, the results are encouraging from the point of view of circularity. More than 60% of the respondents say that they have worn their garments for at least a few years, and more than 50% pass their clothes to someone else when they dismiss them. Going even further, 40% of the respondents repair the garments when damaged, and slightly less than 50% wear them until the clothes fall apart.
- When it comes to shopping habits, the linear model still prevails. The percentage of respondents who at least tried to purchase garments at a reduced price is slightly less than 40%, which is significantly higher (49%) when looking at Italy. When looking specifically at circularity, all the possible choices, like concern about environmental impact, environmentally sustainable production, certifications, e.g., Fair Trade, and purchase of second-hand garments, show percentages of agreements that float between 15% and 20%, with a percentage of people choosing garments made from recycled materials even lower, 8%. The only exception is on garments designed to be durable. Even if the results may seem discouraging, it is undoubtedly true that moving from one consumption habit to another is not achievable in the short term, and the price is still the main factor when purchasing an item. Education and technological progress that help lower the costs of production of circular garments are two factors that will be fundamental in the future to determine the successful switch to a circular and sustainable fashion sector.
- It also has to be noted that 70% of the respondents think that the government should have a role in ensuring sustainability in the production of clothes and in facilitating the purchase. The percentages are the highest in Italy, respectively with 76% and 78%, and the lowest in Germany, 56% and 64%. Italy also shows the most remarkable propensity among the other countries to regulate by law all the stages of making/selling products. Cultural reasons could explain this difference, and the perception, often overestimated, that some problems are related to lacking government policies rather than the actions of the individual members of the community. If, on the

one hand. the government intervention in matters like the circular economy is fundamental, for example, by requiring brands to provide details on the emission and the environmental impact of their products to the customers, on the other hand, pretending that the large majority of the monitoring is up to government agencies risks to deresponsibilize individuals, compromising the correct implementation of a circular system, in large part also based on the switch in consumers' mentality.

Summing up, the results of the survey conducted by Fashion Revolution are encouraging, but also put into light some criticisms and perceptions in the consumer habits and mentality, which, as well as the changes in the industrial and brand side, need to be corrected, or at least mitigated, through the use of the correct instruments, to provide a successful shift from the actual and unsustainable fashion market to a circular and responsible way of doing fashion.

In March 2022, the European Commission sent a communication to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, which encloses the EU strategy for sustainable and circular textiles. The strategy starts with the mandatory implementation of eco-design, intending to extend the life of garments and textile products. According to ECOS (2021), the main factors that lead to the dismissal of textile products are related to colour fastness, resistance of the tissue, and the quality of the zippers. The European Commission wants to improve those aspects to increase the longevity and durability of the products, allowing, as already expressed in the previous chapters, reductions in emissions and usage of virgin raw materials. The European Commission also underlines the importance of eco-design in the recycling phase.

Another critical point for the European Commission regards the destruction of unsold textile products. The Commission aims at creating a "transparency obligation requiring large companies to publicly disclose the number of products they discard and destroy [...] and their further treatment in terms of preparing for reuse, recycling, incineration or landfilling" (European Commission, 2022). The final goal is to ban the practice of destroying unsold products in the textile industry.

From the point of view of customers' protection, but also the point of view of the communication along the supply chain, the European Commission (2022) aims at introducing, also through a review of the regulation on products' labels, the Digital Product Passport for products of the textile industry. For the customers, this means having access to a series of detailed information on the product when purchasing, allowing them to make more informed choices and avoiding greenwashing. On the other hand, for the actors in the supply chain, this

means having more information on the raw materials for the producers, but also detailed information on the composition for recyclers, increasing the efficiency of the process.

There are also additional measures that the European Commission is willing to implement, like measures directed at extending the producers' responsibility in order to create markets for reuse, sorting, collection, and recycling, among others. The Commission also plan to provide incentives to companies that embrace their production process circular items. Moreover, European Commission focuses on changing the fast fashion paradigm, addressing this role mainly to companies, especially those who, in the previous decades, abused the fast fashion market, encouraging them to move to circular business models. Finally, the Commission set guidelines for the creation of a new sustainable fashion industry, setting as goals the creation of a common industrial technology, promoting the creation of partnerships between the companies to develop all the needed skills for the creation of an international circular business model, also addressing matters like exports of materials and shipment of waste.

In conclusion, we can definitely recognise that the efforts which in the years made Europe a pioneer in the adoption, development, and regulation of circularity, cover a multitude of aspects and sectors. However, due to the high level of heterogeneity, there are still significant differences among the level of circularity of the various members of the EU. The process of harmonisation will certainly require more time and effort to reach the level expected by the EU and its bodies.

3.2 The Italian Landscape

3.2.1 Italy and circular economy

In terms of circular economy, Italy, according to the report published by the Circular Economy Network⁶ in 2022, which compares the performance of circular economy between five important members of the EU (Italy, Germany, France, Spain, and Poland), is performing better than all the other countries. The data refer to the year 2020, and the top three countries are, in order, Italy, France, both with a score of 19, and Spain, with a score of 16. To obtain the score, the report aggregates seven dimensions related to the circular economy, giving each dimension a score between zero and five. The overall performance of the circular economy in a country is the result of the sum of the single scores in the various fields. The fields taken into account by the report are:

- Resource productivity
- Rate of circular use of the materials

⁶ Group of companies and organisations in collaboration with the Foundation for the sustainable development, which operate to sustain the transition toward circular economy.

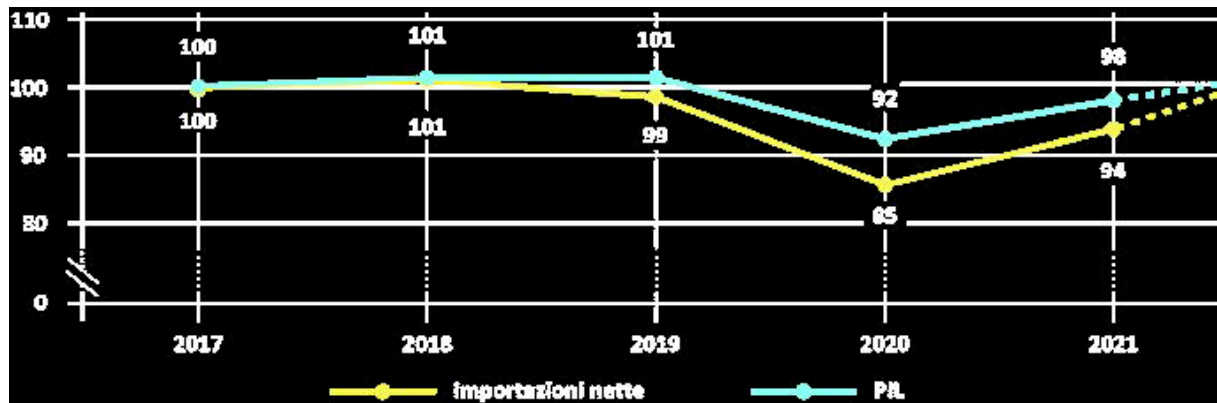
- Consumption of renewable energy
- Management of waste
- Rate between waste and consumption of materials
- Land use
- Repairment of goods

Italy performs particularly well, with a score of five out of five, in the field of resource productivity, and management of waste. Resource productivity is defined as the number of euros of GDP per kilogram of resources consumed. Italy, with a value of 3,5€, exceeds the average European value (2,1€) by 60%. Moving to waste management, Italy shows the best performance in all the EU: with a production of 173 million tons (Mt), the rate of recycling in Italy is 68%, almost doubling the EU average, 35%. However, when looking at the percentage of waste that goes to landfill, Italy, even if positioned under the EU average (22,8%), still has to improve. In fact, if in Italy 20,1% of the waste goes to landfill, countries like Germany, Denmark, Finland, and Switzerland show rates lower than 1%. Italy is also showing promising results concerning the rate of circular use of materials and the consumption of renewable energy, both with a score of three out of five. The first is defined as the rate between the use of circular materials and the overall use of virgin raw materials. The value obtained by Italy, 21,6%, is surpassed only slightly by France, and exceeds of almost 10% the followers, like Germany and Spain. However, the leaders in the sector are The Netherlands and Belgium. The latter, analyse the percentage of renewable energy used in the country. In this case, Italy takes second place among the five countries analysed in the report, with a value of 18,2%, that anyway is under the average level of the EU, which is 19,7% (in 2019). In the other two categories, land use and repairment of goods, Italy is not really performant, showing a score of 1 out of five in the fields of land use and repairment of goods.

Generally, we can state that Italy is proceeding in the right direction in terms of circular economy, also showing increasing trends over the past years in the areas evaluated by the Circular Economy Network. However, we need to take in consideration also another statistic, which is less promising for the future of CE in Italy: the rate between net import of materials and GDP. As can be seen in Figure 16, from 2018 Italy showed a decoupling trend between net import of materials and GDP: this means that net import decreased, while GDP increased. After the significant impact of Covid-19, this trend seems to have stopped, returning to the "old" trend, with increases in GDP granted only by higher net import levels. This data could be interpreted as a decrease in the quality of produced goods, that has been sacrificed in order to increase the recovery of the economy after Covid-19. This is not a

problem only for Italy, and the Circular Economy Network report (2022) reported that the rate of circularity fell all over the world, with an overall increase in the use of raw materials and energy consumption.

Figure 16 - Trend of net import of materials and GDP in Italy, in the period 2017-2021 (2017=100)



Source: ISTAT-Coeweb.

3.2.2 Circular economy in the textile and fashion industry

In Italy, the industrial fabric is mainly composed of SMEs, and among them, the textile sector is one of the most relevant, making up about 13% of the companies and 9% of the workers (L'Italia del Riciclo, 2021). According to the report "L'Italia del Riciclo", among the principal criticism in the Italian textile industry, there are:

- Use of aggressive chemicals for the treatment of the products, with a negative impact on the environment.
- Huge use of water in the production phase.
- Sales doubled in the fashion sector and the rate of utilisation of the garments reduced by almost half.

The increase in sales and the reduction in the average utilisation time of garments, a distinctive element of fast fashion, means an increase in the waste generated by the sector, due to landfilling or incineration of unsold items and by the products discarded by the customers. Additionally, the report underlines also the critical aspect behind washing synthetic garments: in the process of washing, thousands of tons of microplastics are dispersed in the environment, and a considerable part of them finishes in the sea, contaminating the ecosystem and also our food.

The largest share of companies in the textile and fashion sector operates in distribution, representing more than 60% of the companies, followed by packaging and repairing, slightly above 25%, and in third place textile industry, with "just" the 9% of the

companies. As expected, the number of workers for each sector follows the companies' distribution according to the macro-areas. However, it has to be noted that the ranking according to labour intensity is inverted, with the highest level in the textile industry, followed by packaging, and finally, distribution. The exact number of companies, in the year 2019, can be found below, in Table 7.

Table 7 - Companies, divided by activity, 2019 and variation in the period 2010/2019

Attività	Gruppo Ateco	Descrizione Ateco	Imprese	Variazione % 2019/2010
Industria tessile	13.1	Preparazione e filatura di fibre tessili	1.622	-25,8
	13.2	Tessitura	2.391	-31,2
	13.3	Finissaggio dei tessili	2.857	-19,1
	13.9	Altre industrie tessili	7.913	-13,2
	Totale Industria tessile			14.783
Confezionamento e riparazione	14.1	Confezione di articoli di abbigliamento	38.113	-6,3
	14.3	Fabbricazione di articoli di maglieria	4.335	-39,2
	95.2	Riparazione di articoli tessili	2.331	162,2
	Totale Confezionamento e riparazione			44.779
Distribuzione	46.4	Commercio all'ingrosso di prodotti e articoli tessili	23.274	6,3
	46.7	Commercio all'ingrosso di fibre tessili	302	-2,6
	47.5	Commercio al dettaglio di prodotti tessili	12.866	-29,9
	47.7	Commercio al dettaglio di articoli tessili	74.791	-17,7
	Totale Distribuzione			111.233
Totale			170.795	-14,0

Source: Elaboration of Ecocerved based on data from Registro Imprese, published by Fondazione per lo sviluppo sostenibile, FISE UNICIRCULAR (2021) “L’Italia del Riciclo”.

Table 7 is not only limited to dividing and counting the number of companies but also provides data about the variation in the number of companies in the period 2010-2019. This data is particularly interesting because we can observe a negative trend in all the three macro-areas and generally negative trends for all the micro-areas analysed. The only exceptions are companies in the wholesale trade of textile products and articles and repairing textile articles. If, on the one hand, the wholesale trade increased by 6,3% in the nine years taken into account, in the other hand the number of companies operating in the repairing of textile articles had a disruptive increase of 162,2%, which is a positive signal for the circular economy.

When looking at the value of import and export of textile products and garments in Italy, the situation is similar, with a prevalence of export in both fields (elaborations by Ecocerved based on ISTAT data, published in the report "L'Italia del Riciclo"). The main differences are in the customers and suppliers. In the field of imports, textile products come mainly from China, Turkey, and Germany, with a reduction in the import from this last one in the period 2010-2019, and for what concern garments, the main countries from which Italy imports are China, which despite being in first position shows a significant reduction in the import in the period 2010-2019, followed by Bangladesh and Spain. As said before, the situation is different when looking at the export, which for both the categories has as main countries France and Germany, with the addition of Switzerland for the garments and Romania for the textile products. From this picture, it appears that the export, also due to the fame of "Made in Italy" in the textile sector, are mainly directed to EU countries where customers have higher disposable incomes and willingness to pay. This is reflected also in the added value of the products, estimated by Ecocerved to be higher than thirty billion euros in 2019, mainly generated in the distribution sector (almost half), which is also the area that has seen the higher increases in the period 2010-2019, followed by packaging, and textile industry.

Moving to waste production, which data are provided by the companies operating the waste management, there is the need to introduce a fourth category: the consumers. According to the data reported in the report "L'Italia del Riciclo", for the year 2019, the textile and fashion sector produced almost 480.000 tons of waste (Table 8). Approximately half of the waste comes from the textile industry, followed by post-consumer, packaging and repair, and distribution. In waste, we can observe the two sides of the coin: if, on the one hand, in the period 2010-2019, hazardous waste was reduced by almost 50%, indicating increased attention to the choice of chemicals and processes for the production of garments and textile products, on the other hand, the overall production of waste in the same period increased by almost 40%, and when looking to non-hazardous waste we can observe how the increase of waste from the post-consumer phase increased tremendously, resulting triple if compared to 2010. This trend, mainly attributable to fast fashion and bad consumers habits, is the perfect example of how the road toward circularity cannot be based only on technology, processes, business models, and recycling, but a radical shift in habits and constant pressure on providing education about the topic is fundamental, today more than ever.

A better situation appears from waste management (Ecocerved, data based on MUD, 2019). Compared to 2010, in 2019, the relative weight of the landfilling and incineration, and recovery of material from waste are basically stable, respectively with 11% and 46%,

nevertheless it's observable an increase in terms of quantity (in tons) for landfilling and incineration. At the same, the area that in the period shown the higher growth are the intermediate operations, which in 2019 represented the 43%, usually intended as pre-treatment and stocking.

Table 8 - Production of waste for hazard class and activity (tons and %) - 2019 and 2010-2019

Attività	Non pericolosi	Variazione % 2019/2010	Pericolosi	Variazione % 2019/2010	Totale	Variazione % 2019/2010
Industria tessile	229.682	9,9	15.540	-50,6	245.222	2,0
Confezionamento e riparazione	54.304	54,0	1.094	51,5	55.398	54,0
Distribuzione	32.244	44,2	442	29,6	32.686	44,0
Post-consumo (raccolta RU)	146.074	227,9	/	/	146.074	227,9
Totale	462.304	48,6	17.076	-47,5	479.380	39,5

Source: Elaboration of Ecocerved based on data from MUD⁷, published by Fondazione per lo sviluppo sostenibile, FISE UNICIRCULAR (2021) “L’Italia del Riciclo”.

In particular, when looking at post-consumer waste, it is evident the contribution to the circular economy of the cooperatives and companies which provide collection, stocking, sorting and reusing services. The waste is divided between waste that can still be reinserted in the market through second-hand sales and waste that needs to be sent to companies which provide treatments directed to reuse, and, in the case in which this is not possible, recovery of the materials.

In conclusion, the Italian textile and fashion sector is following the right path. This is confirmed by multiple factors, like the increase of companies in the business of repairing; the increase in the added value combined with the overall reduction of the production, indicating a movement toward quality rather than quantity; the growth of the intermediate activities, with particular attention to the post-consumer waste; the increase in the recovery of materials. However, there are still many gaps, especially for what concern the increases in the overall production of waste, and specifically the explosive growth of post-consumer waste, indicating that the concepts of sustainability and circular economy are still not permeated in the socio-cultural fabric. This shift in future will probably push the overall good results obtained by the industry even further.

⁷ Modello Unico di Dichiarazione ambientale

3.3 Virtuous cases and best practices in the Italian textile and fashion sectors

Italy is known all around the world for its textile and fashion culture. We can find a multitude of examples of companies that implement a circular business model, or, at least, circular business practices in their activities. Another distinctive element of the Italian industrial fabric are clusters, which are present in various sectors and locations. This section will analyse the best practices carried on in industrial clusters and in selected companies.

3.3.1 The role of clusters and industrial districts: the case of Prato

In the Italian industrial fabric, mainly composed of SMEs, we have observed in multiple instances how clusters and industrial districts or clusters contributed to the development of companies and business practices.

Before proceeding, a distinction between industrial clusters and industrial districts is necessary. An industrial cluster is defined as “Clusters are geographic concentrations of interconnected companies, specialised suppliers, service providers, firms in related industries, and associated institutions (for example, universities, standards agencies, and trade associations) in particular fields that compete but also cooperate” (Porter, 1998). “The geographic scope of a cluster can range from a single city or state to a country or even a network of neighboring countries” (Porter, 1998). On the other hand, an industrial district is defined as “a socio territorial entity which is characterised by the active presence of both a community of people and a population of firms in one naturally and historically bounded area” (Beccattini, 1990).

The main advantages related to the presence of a company in an industrial district/cluster are:

- Knowledge spillovers.
- Labour pooling.
- Creation of a network of suppliers and customers.

These advantages can translate into multiple opportunities for the companies located in a cluster. Labour pooling and knowledge spillovers between firms operating in the same sector can lead to higher rates of innovation and share of best practices. Additionally, creating a reliable network of suppliers and customers geographically close can play a significant role in reaching high levels of flexibility in production.

One of Italy's most known industrial districts for textile and fashion sectors, relevant also in Europe concerning wool, is the one located in Prato. Prato, as an industrial district and city, is renowned for its attention to sustainability and eco-innovation, with projects like the urban jungle carried out by the municipality. The European Union has also identified Prato as one of the one hundred cities that will participate in the mission "100 Climate-Neutral and

Smart Cities by 2030", a project which is an experiment to understand how to spread practices aimed at climate neutrality and digitalisation across Europe's cities.

Industrial districts (ID) are starting to move to circularity and adoption of sustainable practices, creating models based on the attention to the environment, defined by ISPRA in 2014 as "Ecologically Equipped Productive Areas". According to Cainelli (2012), clusters have the potential to increase their levels of eco-innovation thanks to their intrinsic characteristics, in particular, the creation of a network of companies inside the cluster consent to achieve the levels of cooperation necessary to develop radical eco-innovations. Additionally, Cainelli (2008) and Mazzanti and Zoboli (2008) also underlined the role played by the firms' geographical proximity, which led to spillovers and workers' movement between the companies increasing technological and eco-innovations.

In the field of textile and fashion, the ID of Prato can be distinguished for its sustainable and circular practices, like the use of remanufactured carded⁸ wool from waste. In 2008, the certification "Cardato Recycled" was born to certify and valorise the carded textile products produced in Prato. The certification can be released only for textile products and yarns, which are produced inside the Prato industrial cluster, with at least 65% of recycled materials, and for which have been measured the impact in terms of water, CO₂, and energy used (Cardato.it).

The ID of Prato comprehends about 7200 companies specialised in the field of textile and fashion products and is divided into three "Macrolotti" (0, 1, and 2), which can be defined as areas of the cluster divided for productive purposes. Mazzoni (2021) analysed Macrolotto 1 in terms of: water and energy usage, services and facilities.

Concerning water, the cluster of Prato, specifically Macrolotto 1, is the first ID that implemented a centralised water recycling plant (Cariani, 2013). Implementing this system has been crucial for a resource that is fundamental for the textile industry and contributed to lightening the impact of an ID of such dimensions on the environment and the population in the area. The benefit is twofold: ensuring water for the population and the other activities in the area and granting the textile companies the water needed to carry on their activities. Additionally, a system for recycling water increases the level of safeguarding of the environment from the point of view of the dispersion of toxic materials. In creating this recycling system, the government's contribution has been essential: the government provided incentives for the utilisation of recycled water rather than primary water, allowing a reduction in costs for companies and, at the same time, a benefit for the environment and the population.

⁸ The carding process consists of brushing the fibres to organise them (Custom Woolen Mills)

In 2009, CONSER, reported that companies using recycled water have been able to save up to 300.000 per year thanks to the incentives provided.

In terms of energy used, the measure adopted regarding the use of clean energy is the use of a photovoltaic system built on the roofs. This solution allowed, in addition to the switch to cleaner energy, the exploitation of already existing buildings for the construction of the system, avoiding unnecessary land use.

Last, in terms of services and facilities, the adopted measures are linked both to the environment and social areas of influence. Mazzoni (2021) underlines how in Macrolotto 1 have been built centralised parking lots, services like grocery stores, pharmacies and a kindergarten, to provide precious services to the workers and reduce pollution linked to the traffic and transport in the cluster.

Summing up, the practices adopted in Prato'sID, from the creation of a certification of sustainability to the implementation of a system for recycling water and services to workers, can be intended as practices linked to the concept of circular economy and sustainable development reported in Section 1.1.1, with the implementation of economic, social, and environmental practices contributing to the creation of an industrial fabric integrated with the environment in which companies operate.

3.3.2 Social Enterprises

Legislative Decree N. 112/2017 establishes that “all private entities [...] which, in accordance with the provisions of this Decree, carry out a permanent and principal 'activity' of enterprises of general interest, not for profit and for purposes civic, solidaristic, and of social utility, adopting modalities of responsible and transparent management and promoting the widest involvement of workers, users and other subjects interested in their activities” can acquire the status of social enterprise.

Between social enterprises, social cooperatives represent almost the totality. According to Iris Network, in 2018, the number of enterprises recognised as social enterprises by law was 16.557, of which more than 95% constituted by social cooperatives (Table 9)

Table 9 - Social enterprises and their employees (2018)

	Number of enterprises	Number of employees
Corporate enterprises, non-profit enterprises, partnerships	806	6.379
Social cooperatives	15.751	451.843
Total	16.557	458.222

Source: Iris Network (2020), based on Istat data.

Law N. 381/1991 defines the roles of social cooperatives, which “are intended to pursue the general interest of the community to human promotion and social integration of citizens”. Additionally, the law divides social cooperatives into two categories, A and B, according to their activities:

- A) The management of social health and educational services
- B) Conduction of different activities (agricultural, industrial, commercial or services) aimed at the employment of disadvantaged people

In the field of waste management, recycling, and education, social cooperatives have a significant role in Italy. There are various cooperatives and consortia which operate in the field of textile and fashion. Generally, as we will see shortly, social cooperatives operate in multiple sectors, not only in the textile and fashion, which may have different relevance in the various cooperatives. Additionally, the level of cooperation between social cooperatives is high, and they often form networks to support each other. The same is not true for partnerships with traditional firms, which are rarer. Last, social cooperatives, especially in fashion, are usually intermediate rings in the value chain of recovery, carrying out mainly activities of collection, sorting, and selection. In the strict sense of the term, recovery is carried out by entities specialising in the recovery of specific kinds of waste.

This section will analyse four social cooperatives and their circular practices in the field of textile and fashion. The information is retrieved from the cooperatives' websites. The four cooperatives have been selected as examples of three main fields they address: focus on textile and fashion (Quid), waste management (Vesti Solidale), social services (Il Melograno) collection and management of dismissed garments (Lavoro e Solidarietà). For each cooperative, a table will report:

- The location, eventually indicating the presence of the company in an industrial district/cluster.
- The main activities carried out by the cooperative.

- The practices related to the adoption of the circular economy in the textile and fashion sectors.
- Participation of the cooperative in a network of cooperatives/other entities.
- Partnerships with traditional companies or social enterprises in the textile and fashion sectors.
- Sustainability certifications for textiles.
- Social commitment.

For each cooperative will be provided a description containing information on its history and development path (when available), as well as a more detailed analysis of the items contained in the table.

3.3.2.1 Quid

Table 10 - Characteristics of Quid

Location	Verona
Main activities	<ul style="list-style-type: none"> • Creation of sustainable garments collections sold through its own stores • Cooperation with traditional companies to improve their sustainability in the textile sector and create sustainable products
Circular practices in the fields of textile and fashion	<ul style="list-style-type: none"> • Reuse • Reduction of CO₂ emissions • Recycle • Upcycling • Eco-design
Participation in networks	n.a.
Partnerships	<ul style="list-style-type: none"> • L'Oreal • Fendi • IKEA ... and 28 more
Certifications (textile)	n.a.
Social commitment	B2B and B2C education

Source: author processing.

History and general overview

Quid is a cooperative born in 2013, based in Verona (www.quidorg.it). The cooperative is based on three main values: recover, create, and construct. Initially, the cooperative started by producing garments in collaboration with tailoring workshops offering exclusively female employment, but soon after, in 2014, it started its own laboratory and launched its first collections. In the following years, Quid will improve its productive capacity by creating its first production facility in Avesa (VR) in 2015. In the same year, the cooperative opened its first Quid Store in Verona, followed by the Quid Outlet in Vallese (VR) in 2016, and the Quid Stores of Mestre (VE) and Bassano del Grappa (VI) in 2017. Additionally, in 2017 the cooperative opened a second Quid Outlet, this time outside the Veneto region, in Cadriano dell'Emilia (BO). Last, in 2019, two Quid Stores opened, one in Milan and one in Genova. With the growth of the company additional welfare measures for the employees have been introduced. Over the years, the cooperative started partnerships with big companies and in the fashion sector, also assuming the role of consultant for what concern circular practices in the textile and fashion sectors.

Products, materials, and production processes

In the context of production, the materials employed by Quid in its garments are retrieved from big textile brands, as donations or at a discounted price, and then used to create its own collections. According to the company, 95% of products are produced with materials from other companies' overstocks. The majority of the fabrics come from Italy (90%), retrieved from companies in a range of 250 km, a useful practice, as already seen in other companies or in the Prato District, to reduce the pollution related to transport. The products of Quid are then sold in its five stores and two outlets.

In the field of environmental impact, the company has two main initiatives. The first is Cirqular, a project focused on maximising recovery of products coming from overstocks, reducing CO2 emissions in their facilities, and sensibilisation at B2B and B2C levels through the use of an innovative environmental impact reporting system. The second is QuidLAB, which is based on innovation. QuidLAB focuses on digital competencies, training, and fleet renewal to increase efficiency and sustainability and also to acquire technical and soft skills.

Partnerships

Quid is not only limited to creating a proprietary collection, but also has collaborations and partnerships with more than 31 big companies. Some examples are L'Oreal, Fendi, and IKEA.

The partnership with L'Oreal is based on creating shoopers, pochettes, and other accessories for beauty. Additionally, there is a supply of uniforms for sales personnel and t-shirt for an internal event. Quid estimate that more the 25.000 bags have been produced during the collaboration starting from stocks acquired from other companies.

Another collaboration worthy of mention is the one carried on with Fendi. Quid realised for Fendi the iconic "I am" t-shirt, born in quid laboratories and translated in all languages. The cooperative estimated the creation of 1.050 t-shirt, for a total of 10.000 meters of cotton recovered.

The collaboration with IKEA is based on upcycling. The project was to recover sofas' covers, recover the material, and transform it in limited edition accessories. This collaboration gave birth to the cushion's covers Återställa, realised through a process of upcycling and creativity, starting from the materials provided by the overstocks of IKEA.

Social commitment

Finally, Quid also distinguishes itself for its social commitments: they pay particular attention to the working conditions of its employees. Quid's employees are mainly women (about 80%), and the cooperative also pays particular attention to the inclusion of marginalised workers and vulnerable workers. In 2018 the cooperative created LIBERAMENTE, a welfare program to support its workers, and in 2019 started the project SHEWILL, a project of inclusive partnership co-designed by the employees. Additionally, the cooperative started a program named "Worldplaces-Lab", aimed at training and supporting the most fragile workers emotionally. The practices adopted through Worldplaces-Lab are then shared with traditional companies, and the project takes the name "Worldplaces-NET".

In the field of education and sensitisation, Quid is active in both B2B and B2C markets. In 2021 the cooperative reported two in-store events; thirty-two events in the third sector; seventee events in schools and universities; three international events; and ten events in collaboration with its partners.

Summing up

Quid is a cooperative born with a specific focus: recovering textile overstocks and transforming them into sustainable products. Quid looks atypical compared with other cooperatives operating in the Italian landscape. The focus on one kind of waste, the production facilities, and the high number of partnerships and collaborations with profit companies are traits not easily found in the Italian cooperative's landscape. However, these traits are the strong points of Quid, in particular collaborations with profit companies, which

have a great potential impact in spreading sustainability and circularity and good human capital practices in the textile and fashion sectors.

3.3.2.2 Vesti Solidale

Table 11 - Characteristics of Vesti Solidale

Location	Cinisello Balsamo (MI)
Main activities	<ul style="list-style-type: none"> • Collection and recovery of waste • Waste management consulting
Circular practices in the fields of textile and fashion	Reuse
Participation in networks	<ul style="list-style-type: none"> • Farsi Prossimo consortium • National network CGM • SHARE Second Hand Reuse
Partnerships	n.a.
Certifications (textile)	n.a.
Social commitment	<ul style="list-style-type: none"> • Provision of affordable garments to people in need • Investment of the revenues from the previous activity in social initiatives

Source: author processing.

History and general overview

Vesti Solidale is a social cooperative Onlus located in Cinisello Balsamo (MI). The cooperative was born in 1998, as an entity operating in human, environmental, and social services, in the context of "system of cooperatives" promoted by Caritas Ambrosiana as a consortium named FARSI PROSSIMO. The company's activities are mainly based on the separate collection of hazardous and non-hazardous waste and consultancy in the field of waste management. Their core activity consented them to open to new projects, like recovering technological and electronic equipment. In addition, the cooperative is also active in the second-hand fashion industry through a network of shops (actually seven).

Products, materials, and production process

In the textile and fashion sectors, Vesti Solidale is active in the field of reuse, and created a network to collect and re-sell dismissed garments. The network, called SHARE (Second HAnd Reuse), collects dismissed and thrown-away garments through donations of

garments and collection through dedicated boxes. The company proceeds to select the garments in the best conditions, which are then re-sold in their shops. There are four shops located in Milan. Three other cooperatives joined the network, opening new stores in Varese, Lecco, and Naples. The garments that do not pass the selection phase are sold to other companies, located in Italy and Europe, active in the field of collection and selection of garments.

Networks

Vesti Solidale is present in three networks of cooperatives. The first, SHARE, was born from Vesti Solidale, with the aim of promoting the reuse of garments through dedicated shops. The second is the consortium Farsi Prossimo, promoted by Caritas Ambrosiana. It is composed of twelve social cooperatives. In the aims of the consortium, we can find the promotion of the emancipation and autonomy of individuals; social intervention; promotion of the social cooperation culture. Last, Vesti Solidale is also part of the National Network CGM. The cooperative group Gino Marnelli was born in 1987 and comprehends 58 consortia and 701 social cooperatives. The idea at the base of the network is simple: social cooperatives, operating in the small dimension, have the possibility to enter in contact with the real problems of individuals. However, to solve the system's flaws, the dimension of the social cooperative is inadequate. Creating a network can support small social cooperatives in the task of promoting values of fairness and equality throughout the system.

Social Commitment

The items in the SHARE shops are sold at an affordable price, and the revenue generated every year is invested in social projects in Lombardy. In this way, the company exploits its core business and contributes both the circularity of the fashion industry, but most importantly, contributes to society, providing high-quality garments at affordable prices and sustaining marginalised categories supporting social initiatives.

Summing up

Vesti Solidale, unlike the above-mentioned Quid, is not primarily focused on textiles and fashion. However, is remarkable the initiative of creating a reuse network, involving also other cooperatives. The cooperative is an example of how social cooperatives, in general, are moving from their core businesses, using their know-how and facilities to exploit new opportunities in the circular economy and sustainability field.

3.3.2.3 Il Melograno

Table 12 - Characteristics of Il Melograno

Location	Segrate (MI)
Main activities	Social services
Circular practices in the fields of textile and fashion	Reuse
Participation in a network	Dona Valore R.I.U.S.E
Partnerships	n.a.
Certifications (textile)	n.a.
Social commitment	<ul style="list-style-type: none"> • Strong orientation to personal care • Funding of social projects

Source: author processing.

History and general overview

Il Melograno is a social cooperative that, as the previous one, is not primarily focused on the fashion area. The cooperative was born in 1984 and is based in Sagrate (MI). The cooperative mainly operates in the field of services to the community, e.g., services for minors and families, people with disabilities, foreigners and migrants, and older people, among others. Il Melograno also has a dedicated section for the green transition, which comprehends various activities, e.g., green maintenance, recycling and reuse, and careful consumption. In particular, the company also provides a collection service in the field of recycling and reuse.

Products, materials, and processes

Il Melograno is active, especially in the field of reuse. The cooperative joined the project Dona Valore, promoted by Caritas Ambrosiana. The boxes are managed by the network R.I.U.S.E. (raccolta indumenti solidale ed etica). Participation in the R.I.U.S.E. network is limited to non-profit social cooperatives and social enterprises. The chain is divided into three phases. First, through dedicated boxes disseminated in the territory, used garments are collected. Subsequently, the project's commercial partners buy the garments and activate a project of sorting and selection. The garments in good condition are re-sold, and the other garments are recycled to obtain recovered yarns for the textile and fashion industry. The revenues from the project are finally used to fund social projects in the territory. Other

cooperatives, like Abad, participate in the project Dona Valore, creating a network of cooperatives with the same goal.

Social Commitment

Il Melograno is strongly focused on social commitment, starting from its multiple services, dedicated to various categories of people in need. However, over the years the company developed also a section dedicated to ecological transition, promoting reuse and a careful and conscious consumption model.

Summing up

The case of Il Melograno, which embraced the circular transition, is particularly relevant because shows how social cooperatives, even if initially not related to circular economy projects, are starting to embrace sustainability, becoming the spokespersons of the transition, with a potential impact on both B2B and B2C areas.

3.3.2.4 Lavoro e Solidarietà

Table 13 - Characteristics of Lavoro e Solidarietà

Location	Verolengo (TO)
Main activities	Collection and management of dismissed garments
Circular practices in the fields of textile and fashion	<ul style="list-style-type: none"> • Reuse • Recycle
Participation in a network	n.a.
Partnerships	n.a.
Certifications (textile)	n.a.
Social commitment	<ul style="list-style-type: none"> • Education • Inclusion of marginalized and fragile workers

Source: author processing.

History and general overview

Lavoro e Solidarietà was born in 2002, and is based in Verolengo (TO). The aim of the cooperative is to combine ecological services and hob creation for disadvantaged individuals. Differently from other cooperatives which manage multiple kinds of waste, Lavoro e Solidarietà is focused on the collection and management of textile waste. The reasons behind

the choice, according to the cooperative, are the semi-durable nature of textile waste and the absence of separate collection for this typology of waste.

Products, materials and processes

The cooperative collects the garments through specific boxes (1.500) scattered in the area. The collected garments are then sorted and selected, according to their condition. Garments in good condition are destined to reuse. The garments are sold at favourable prices in extra-UE markets, which are not specified on the cooperative's website. Garments unsuitable for reuse are destined to recycle. They are disassembled, and the recovered materials are used for the creation of industrial rags, yarns, and padding. According to Lavoro e Solidarietà, 60% of the collected garments are destined to reuse, 20% to industrial rags, 18% for fraying, and 2% to landfill. The cooperative carries on another parallel project: RI-SCARPA. The project, through dedicated boxes, collects dismissed shoes. After the collection, sorting, and selection, the shoes are managed as the garments, and destined to reuse or recycle.

Social commitment

Lavoro e Solidarietà, like the other social cooperatives, is active in the inclusion of marginalised individuals in the labour market. Additionally, the cooperative is also active in the field of education. In its website the cooperative report a list of 200 schools that joined the project RI-SCARPA by placing the dedicated boxes and distributing informative material.

Summing up

Lavoro e Solidarietà is a social cooperative that has made a specific waste sector its strong point. Worthy of mention is the distinction, through different kinds of boxes, between garments and shoes, which on the one hand, helps the cooperative in the phase of sorting and selecting, and, on the other hand, sensitizes consumers about the correct way of disposal.

3.3.3 Traditional companies implementing circular practices

Circularity and sustainability in the recent years is becoming one the main factors on which fashion brands focus for their campaigns. However, there is a huge difference between talking of sustainability and doing sustainability. The risk is to fall into greenwashing, a practice which indicates the construction of a facade ambientalism.

In this work, four companies operating in the Italian textile and fashion industry have been selected as examples of good implementation of circular practices, according to their

contribution to adopting and innovating principles related to the circular economy. The data are retrieved from the websites of the companies and, when available, from their sustainability reports. The companies have been selected as examples of circular economy implementation according to their kind of products and services: production of garments (Rifò), production of denim fabric and products (Berto), sneakers (ID.EIGHT), and design (WRÅD). The criteria used for the analysis of the aforementioned companies will be slightly different from the ones used for social enterprises. It is necessary to identify the target market (B2B or B2C), and instead of indicating the main activity, will be indicated the products and the services offered by the companies. For each company, a table will report:

- The location, eventually indicating the presence of the company in an industrial district/cluster.
- The target market of the company: B2B or B2C.
- The main typologies of products/services provided.
- The main practices related to circular economy.
- The extent of their partnerships.
- Sustainability certifications.
- Social commitment.

Additionally, for each company, will be provided a description containing information on its history and development path (when available), as well as a more detailed analysis of the items contained in the table.

3.3.3.1 Rifò

Table 14 - Characteristics of Rifò

Location	Prato's industrial district
Target Market	B2C
Products	Any kind of garment, with the exception of shoes
Services	Collection at home of dismissed garments made of wool and cashmere
Circular economy practices	<ul style="list-style-type: none"> • Use of secondary raw materials recovered by local companies • Use of organic raw materials in combination with recovered ones • Collection of dismissed garments • Eco-design

Circular economy practices	<ul style="list-style-type: none"> • Avoidance of unsold stocks • Eco-packaging
Partnerships	<ul style="list-style-type: none"> • NaturaSi and Nuvolari: Re-Think Your Jeans • BettaKnit: RE-Cashmere skeins • Muji: a collection of jeans and cashmere. • Levi's and Flo Concept cooperative: dismisses jeans upcycling • VD: a capsule collection • C.S. Lebowski: the creation of hats and scarfs made of recovered wool for the team
Certifications	B-Corp, GOTS, GRS, OEKO-TEX, RWS.
Social commitment	<ul style="list-style-type: none"> • Nei Nostri Panni: project for the training and inclusion of five young people in a vulnerable position • Funding of various social initiatives

Source: author processing.

History and general overview

Rifò is an Italian fashion brand, located in Prato's industrial district, that produces garments using recycled materials. Rifò was officially founded, after a crowdfunding and a start-up acceleration program, in 2018. Rifò have goals related to the circular economy, and by consequence to the environment, like the innovation of production processes and sustainable production, but also aims at contributing to society through new working opportunities for vulnerable people and promotion of gender equality (Rifò Sustainability Report, 2021). Rifò makes extensive use of circular economy practices and sustainable certifications. Starting from the latter, Rifò has become Società Benefit. Società Benefit, or Benefit Corporation, identifies a corporate entity that, usually in its statute, expresses the intention of pursuing profit while aiming at providing benefit also to society, in terms of positive impact on the environment and communities.

Products, materials and production process

Rifò can boast a diversified catalogue, comprehending almost every type of garment, excluding shoes. The company stands principles of fast fashion in two main ways:

- In order to avoid one of the critical aspects of the fast fashion industry, the unsold goods, Rifò adopts the pre-sale model, which consists in launching products on pre-

sale at a discounted price, and the products are delivered after 2-5 weeks. The pre-sale model, in a certain way similar to the JIT (just-in-time) model, is made possible by the concentrated Rifò's supply chain, which consents to achieve high levels of flexibility.

- Paying particular attention to eco-design is the other principle of Rifò. By preferring small quantities over large-scale production, the company can create durable garments, contrasting the programmed obsolescence and respecting the times of the artisans that produce the garments.

In the field of materials, Rifò, following the principles of "already produced resources are the more sustainable", uses mostly recovered materials, from both pre and post-consumer sources, in the production of its garments, like recovered cashmere, wool, carded wool cloth, cotton, silk, polyester. The materials are provided by local suppliers, a possibility given by the location in Prato's industrial district. In this context is important to note how the large majority (more than 65%) of recycled materials comes from collected garments from post-consumer sources. From the post-consumer sources, Rifò collects mainly denim, cashmere, and wool. The only exception is cotton, which comes from pre-consumer sources, due to the industry's high amount of cotton waste. In this field, the relevance of external partners is clear, which collect, sort, and recover the materials used by Rifò. Additionally, the campaigns launched by the company for collecting post-consumer jeans, wool and cashmere sweaters are also worth mentioning. The company incentivised consumers to give their old clothes through boxes placed in partners' stores in exchange for a discount on the new products they were buying. Impossible-to-recover materials are employed by Rifò for the packaging of its products.

Certifications

In 2020, Rifò was certified as B-Corp, a certification provided by B Lab after assessing the impact on workers, society, and the environment. According to their Sustainability Report for 2021, Rifò, in its products, employs almost exclusively recycled, natural and organic materials, and most of them (more than 75%) comes from Italy. In fact, the supply chain of Rifò is mainly located in Prato's textile district (in a radius of 30 km), an important choice from the circular point of view, by the moment that it limits pollution related to transporting. Additionally, the company can count on multiple sustainable certifications for its products:

- Global Organic Textile Standards (GOTS) is a certification for garments produced with organic fibers from organic farming, like cotton.
- Global Recycle Standards (GRS) certifies garments produced with recycled materials.

- OEKO-TEX is a certification for the suppliers of fabrics, which guarantees environmental eco-compatibility and the absence of harmful substances.
- Responsible Wool Standard (RWS) certifies the proper rearing and treatment of sheeps for wool production.

Partnerships

Rifò can count on a considerable number of partnerships with multiple companies and associations.

The company cooperates with NaturaSì and Nuvolari in the campaign Re-Think Your Jeans. Through boxes placed in the stores, the company collects garments made of denim (95-100%). The customer, in exchange, receives a coupon for its future purchases. The garments are then selected by And Circular, a project of the cooperative LA FRATERNITÀ and subsequently frayed to fiber in the Prato's industrial district. After the process, Pinori Filati create a recovered yarn, which in turn will be used for the production of new garments. Cashmere and wool are subject to the same procedure, with the difference that, in this case, the garments can be collected at home by a courier or through boxes also placed in the Muji store in Milan.

Rifò also has an active partnership with Bettaknit, a brand which produces yarns for knitting. The yarns are made of recovered cashmere provided by Rifò.

The company has an additional partnership with Levi's and the social cooperative Flo Concept. The partnership is based on the upcycling process. Customers can bring their dismissed jeans to Levi's store in Milan and receive a credit in Levi's app in exchange. Subsequently, the jeans, through the collaboration with Flo Concept, are transformed into new accessories. The first experiment of upcycling was creating a denim bucket hat.

The company carries out two additional partnerships: a partnership with VD, based on the production of sustainable t-shirts and a partnership with C.S. Lebowski, a football club and a cooperative, for the creation of wool hats and scarfs.

In the field of recovered materials, Rifò relies on: Filpucci SPA for the supply of recovered cashmere and wool; Mapel SPA for the carded wool cloth; Marchi and Fildi for the cotton recovered from textile waste; Pinori Filati SPA for the cotton recovered from old jeans; Belda Llorence for recovered cotton mixed with organic cotton. Except for Belda Llorence, all the suppliers are located in Italy and can count on one or more of the above-mentioned sustainability certifications.

Social Commitment

As mentioned above, Rifò is not only focused on the production and environmental areas, but has multiple projects aimed at bringing benefits to society. The company contributes to various solidarity projects. According to the Sustainability Report, in 2022, they also launched a project aimed at training the new artisans of textile recycling, called "Nei Nostri Panni", directed at young people in difficult situations. The company also funds multiple social initiatives, e.g., a project of Legambiente Prato for the valorisation of a mountain refuge and a project directed to Nigerian mothers to enhance family relationships.

Over the years, the company also developed a preference for the employment of permanent staff rather than stages and collaborators and increased up to 60% in 2021 the rate of women in the company.

Summing up

Looking at the future, Rifò continues to take steps toward sustainability and full circularity, for example, with the decision of relying on a green-energy provider for their stores and offices, with the long-term aim of also involving their partners in the choice of green energy.

Concluding, Rifò is the perfect example of an Italian fashion company following circular economy principles and practices, starting from the design of their garments, and even before with their supply chain, and following the phases of production, use of energy, packaging, recycling, and closing with the support to the local community through education, promotion of initiatives, and fair working conditions. Clearly, the choice of the already analysed district of Prato plays an important role in the company's ability to pursue its strategy and goals. However, Rifò is also the demonstration of the perfect integration of circular principles at all stages without compromising the ability of the company to generate profits, while simultaneously bringing benefits to society.

3.3.3.2 Berto Textile Industry

Table 15 - Characteristics of Berto

Location	Bovolenta (PD)
Target Market	B2B
Products	Denim
Services	(n.a)
Circular economy practices	<ul style="list-style-type: none">• Use of recovered second raw materials

Circular economy practices	<ul style="list-style-type: none"> • Use of organic cotton • Creation of a system for water treatment
Partnerships Partnerships	<ul style="list-style-type: none"> • Bugatti • DSM Dyneema • Quid
Certifications	GRS, GOTS
Social commitment	Berto For Young Talents

Source: author processing.

History and general overview

Berto is a textile industry, active in the B2B market, located in Bovolenta (PD), Veneto. The production facilities of the company are all based in Bovolenta. The company was born in 1887 as a sails manufacturer for Venice's ships, and over its life specialised in multiple sectors, like fabrics for workwear and shirting. Today it is specialised in denim production. Berto has a vision based on five Rs: respect, recycle, reuse, repair, and reduce. As stated on their website, sustainability is not their first goal but rather a shared value inside the company. The company adopts circular practices in the field of production, from the supply of materials to dyeing, waving, finishing, and quality control. The internal processes have been redesigned to increase the levels of efficiency and sustainability.

Products, materials and production process

As said above, the company specialised in the production of denim. The denim can be sold as fabric or a final product to other companies in the B2B market. Thanks to the extreme versatility of the material, there are no limits to its employment in various products, from classic jeans, as well as jackets and coats but also furniture coatings.

According to the company's website, they employ more than 60% of remanufactured cotton, and other recycled materials coming from production waste, all complemented by the use of natural and biodegradable products in the production phase.

Last but not least is the consumption of water. In the denim industry, the use of water has always been a critical aspect. To deal with this criticism, Berto developed a water purification system, an approach similar to the one seen in the Prato district. In this case, the company opted for a biological depuration system, which means that to purify water from production, bacteria are used instead of chemicals. This method, in addition to the benefits related to the classic recycling system, also consents to reuse sediments deriving from the purification system as fertiliser, that in turn, can be used in the local agricultural industry.

Certifications

The company can also rely on certifications that guarantee sustainability standards. The first certification is the Global Recycle Standard (GRS) certification, obtained through the use of recycled materials in the production phase and the attention to the environment in the supply chain. The second certification is the Global Organic Textile Standard (GOTS), which is related to the use of organic cotton, and guarantee that the materials, productive activities, and chemicals respect specific standards in terms of environmental and social criteria.

Partnerships

Berto carries on a partnership with Bugatti, a men's clothing brand. The collaboration is in the field of Bugatti's project "Made in Italy", in which Berto provides jeans 100% made in Italy, and produced according to Berto's standards and practices.

Another partnership is carried on with DSM Dyneema. Dyneema is the producer of an ultra-resistant and lightweight fiber. The collaboration between Berto and Dyneema is aimed at patenting a technology for producing an "almost indestructible denim", called Armstrong. This partnership can be framed in the perspective of improving eco-design through the realisation of durable and ultra-resistant garments.

The two partnerships described above are not the only ones. As said before, Berto operates almost exclusively in the B2B market, and this consent to its products and fabrics to be employed by a multitude of other companies, clients of Berto, contributing, even if more indirectly, to spreading circularity and sustainability in the textile and fashion sectors.

Social Commitment

Berto's website does not report particular initiatives directed to the community. However, Berto For Young Talents is worth of mention. The project aims to sustain new generations' creativity and entrepreneurship by providing the know-how acquired by the company over its long history and tradition in the textile industry and fabrics for their creations.

Summing up

During a speech (UNITI Economia Circolare, Palazzo della Salute, Padova, 27/10/2022), the CEO of Berto pointed out how a problem in the production of sustainable clothing is the client's perception. As explained, following ethical and sustainable standards inevitably create new costs, which are then translated to the product's price. People, even if moving to a greener way of purchasing, still base their purchasing choice on factors like price, in line with the 2020 Consumer Survey Report by Fashion Revolution (Section 3.1), and in

some cases, struggle to understand the reasons behind the higher cost of a product, preferring cheaper ones but sacrificing quality and sustainability in doing so.

Even if Berto can not be considered at the same level of circularity as Rifò, it is a perfect example of how to manage the criticism of a specific production, in this case, denim, and adopt targeted strategies aimed at reducing their impact on the environment bringing at the same time benefits to the community in which they are integrated.

3.3.3.3 ID.EIGHT

Table 16 - Characteristics of ID.EIGHT

Location	Florence
Target Market	B2C
Products	Sneakers
Services	n.a
Circular economy practices	<ul style="list-style-type: none"> • Use of recycled materials, like cotton, polyester, paper and rubber • Use of fabrics made of agricultural by-products • Eco-packaging
Partnerships	n.a.
Certifications	VVV+
Social commitment	n.a.

Source: author processing.

History and general overview

ID.EIGHT is an innovative start-up focused on producing sneakers, born in Florence in 2019. The products of the company are produced according to two main pillars: attention to the design of the products and a strong orientation toward sustainability. On the sustainability side, ID.EIGHT employs mainly materials derived from waste or by-products of agricultural and industrial activities.

Products, materials and production process

The four main typologies of materials used for their sneakers are: AppleSkin and Vegea, both obtained through a process of bio-polymerisation, respectively, of apple husks and cores, and grape-pomace from Italy; the third material is the Piñatex, realised through the use of ananas leaves. In this case, the material is realised in Spain with leaves coming from

the Philippines; last, there are recycled Lycra⁹, mesh¹⁰, and polyester. Some parts of the sneakers also use materials like recycled cotton, rubber (30%), and paper.

The company also pays attention to the packaging of its products, which is entirely made of recycled and recyclable cardboard, and the use of compostable bags. An interesting initiative of the company is to provide in each pack a seed bomb, covered with earth and clay, that can be planted in a vase.

There are few details on the production process of the materials used, and the production process of the sneakers. The company only specifies on its website that the materials, except for Piñatex, come from Italy, and that the sneakers are produced in a small family-run business, which employs a semi-industrial system, but that at the same time needs large amounts of manual labour and experience in the sector.

Certifications

ID.EIGHT can count on the Animal Free Certification VVV+ by LAV, thanks to the fact that in their products are not used materials of animal origin.

Summing up

The company does not specify on its website particular partnerships and social initiatives, and this may be due to its relatively young age. However, the peculiarity of ID.EIGHT, which made it worthy of mention, are the materials used. The company has been able to exploit new materials, coming from an industry, agri-food, which produces huge amounts of waste each year, and give them new life into products that at first sight might seem unrelated, the sneakers. Certainly, there is room for improvement in the circular practices of ID.EIGHT, but they can definitely be an inspiration for the future use of materials derived from the agri-food sector in the fashion industry.

3.3.2.4 WRÅD

Table 17 - Characteristics of WRÅD

Location	Vicenza
Target Market	B2B and B2C
Products	Mainly t-shirts, shirts, hoodies, and jackets
Services	<ul style="list-style-type: none"> • Communication strategy

⁹ A material belonging to the synthetic fibers Elastam

¹⁰ A fabric made of PVC with a structure similar to a net

Services	<ul style="list-style-type: none"> • Identity and purpose definition • Business model innovation • Product strategy • Supply chain innovation
Circular economy practices	<ul style="list-style-type: none"> • Technology innovation • Re-discovery of sustainable production practices, especially for dyeing. • Water and energy use reduction • Use of recovered and upcycled materials
Partnerships	<ul style="list-style-type: none"> • Fiat • Acqua di Parma • YOOX and YOOXIGEN • Starbucks • Penelope • WSM/WHITE • Candiani • PULSE
Certifications	GOTS, GRS, OEKO-TEX
Social commitment	<ul style="list-style-type: none"> • Social media education • Training for communication, design, management, and sales force

Source: author processing.

History and general overview

WRÅD is a company born in 2015 and located in Vicenza. The company has its own product lines, however, its core activities classify it as a design company. The project started in 2015 as an Instagram page with the goal of educating "ourselves and others on the true cost of fashion while backpacking through Europe" (wradliving.com). The company's founders researched and discovered ways of increasing sustainability in the fashion industry, also employing methods used in antiquity. In the years, they started collaborations with various companies, officially becoming a focus design and communication company in 2018.

Products, materials, and production process

WRÅD, as said before, is a company specialised in design. However, on its website are available a few items branded WRÅD that customers can purchase, like their iconic product, the GRAPHI-TEE, a t-shirt made using a patented dyeing method, called G_PWDR®.

In the field of materials, Wrad introduced interesting practices, from the types of materials to the dyeing methods. The base is the use of upcycled fabrics for their products. However, going further, the company made use of graphene obtained from corn cobs as a thermoregulating material for their garments, recycled polyester, recycled cotton and wool, and hemp, a fiber often undervalued but with important characteristics in terms of sustainability and durability. Additionally, they also employ beeswax to increase the levels of breathability of the garments.

In their products, Wrad employs sustainable and innovative techniques of dyeing. In particular, they use graphite powder, through G_PWDR® Technology, a technology patented by Alisea, another important player in the field of Italian circular economy. Graphite powder is the by-product resulting from the production of electrodes. The use of graphite to dye products dates back to the time of the Romans. The "re-discovery" of this technique consent to WRÅD to transform waste from an industry unrelated to textile and fashion. By employing it in their clothes, they contribute to closing the loop at the intra-firm level. They also use natural dyes like Rosso Ercolano and a smart indigo dye for denim which avoids the use of chemicals, which are substituted by a technology that uses caustic soda and electricity. Wrad also employs technologies to reduce energy and water use, e.g., using organic cotton.

Certifications

WRÅD's products can count on three certifications, already seen in the previous cases: GOTS, GRS, and OEKO-TEX.

Partnerships

WRÅD, as a focus design and communication company, can count on multiple partnerships with companies not necessarily involved in the textile and fashion sectors.

The first example is the partnership between WRÅD and Fiat. The partnership, named WRÅDx500e, was aimed at creating an innovative collection to celebrate the new 500 model. The result is a collection of sweatshirts and hoodies dyed with the G_PWDR technology. The peculiarity was the source of the graphite powder. In fact, for this collection, the graphite powder employed was (in part) coming from Fiat's waste.

WRÅD then contributed to the strategy for sustainable development of the brand Acqua di Parma, a company producing perfumes, creating the sustainable systemic plan named Acqua di Parma Futura.

Another partnership outside the fashion sector was the one carried on with Starbucks, aimed at the creation of a collection and designs to celebrate four historical buildings in which are active the Starbucks Reserve Roasteries.

Moving to partnerships with companies from the fashion sector, the first mention (and first collaboration) of WRÅD was with YOOX in 2017. For YOOX, WRÅD created a collection with artworks related to the zodiac, based on the sustainable practices that characterise the company. The partnership between the companies continued in 2019 with the collaboration in the design of a collection to celebrate the 10-year anniversary of YOOXIGEN, a project launched by YOOX to promote sustainable behaviours through products realised according to eco-sustainability standards.

A partnership based on creating a strategic communication was carried out with Candiani to promote their biodegradable and compostable elastomer. In this case, WRÅD created an in-store experience to sensitise customers about the importance of solutions like the one provided by Candiani in the world of fashion.

Social Commitment

However, the company has always retained sight of the goal with which it was born: education. It all started from the creation of the Instagram page. The founders created a community, participated in events hosted in high schools to promote circular and sustainable habits in new generations, and created various campaigns in partnership with known brands in the fashion industry, for example, the interviews, talks, and workshop during the Milano Fashion Week, commissioned to WRÅD by WHITE, in collaboration with Camera Moda. The last step made by the company is the creation of the School of WRÅD, an "independent and digital open-source platform dedicated to the culture of sustainability with a focus on design, communication and management" (wradliving.com).

Summing up

In conclusion, even if WRÅD cannot be compared to the other mentioned companies in terms of production, their activities are worthy of mention in the field of circular economy for their efforts in empowering eco-design through the discovery, or re-discovery, and the high levels of innovation to find alternative methods and materials. Even if mainly focused on the textile and fashion sectors, the idea of focusing more on design rather than on the product

consented to WRÁD to start partnerships with companies from different sectors, promoting the circular and sustainable culture even more. Last but not least, the continuous focus of the company in the field of education is crucial because, as already been mentioned in the previous chapters, it is fundamental for the evolution of the consumers' habits and the future spreading of circular and sustainable practices, not only in the fashion industry.

3.3.4 Results

Many other cooperatives and companies in Italy are firmly committed to the empowerment of circular economy and innovation of sustainable practices. The eight companies and cooperatives mentioned above are only examples in eight different areas of the fashion industry (clothes, denim, sneakers, design, collection, recycling, reuse, and education) which shows how the creation or conversion of a company or cooperative based on the adoption of circularity is possible. From the analysis emerges an important role of cooperatives in the circular economy: they usually are the most active in the collection and sorting of used garments, which is the first step for correctly implementing a circular approach. In addition to the significant impact in the social area through the promotion of initiatives addressing to most vulnerable people, cooperatives which made as their core activity recovery of textile and fashion products, as we will also see in the next chapter, could create a network of partners in the fashion industry, contributing to the development of a circular mindset and spreading of circular practices in the sector, made possible by the accessibility and sharing of materials, of knowledge, and procedures.

An important criticism that emerged from the comparison are certifications. Comparing social enterprises and traditional companies, we can observe how the latter can boast multiple sustainability certifications, but the same is not valid for social cooperatives. In the four social cooperatives cases considered, no one has a sustainability certification. Not even Quid, which received multiple awards for its products, production process, and commitment, can count on a sustainability certification. It seems a contradiction by the moment that the four social cooperatives operate in the field of circular economy and with recovered and reused materials. However, as will be seen in the next chapter (the case study), there are specific reasons behind the absence of certifications, strictly linked to the nature of social cooperatives.

Clearly, in the actual market, there are other difficulties that should not be underestimated, from customers' perception of recycled fabrics to the prices of production and technology needed. Further studies should also analyse the just mentioned aspects in order to

understand the difficulties that can arise, especially in the Italian industrial context, mainly based on SMEs.

4. Case study: Cooperativa Insieme

The focus of this dissertation is analysing the role played by social enterprises and social cooperatives in the transition to a circular economy in textile and fashion sectors. In particular, the dissertation aims at understanding the role that aforementioned entities have in sustaining the shift in traditional companies through collaborations and partnerships. The study focuses on the analysis of a social cooperative, Cooperativa Insieme. The social cooperative is analysed paying particular attention to the partnerships carried on by Cooperativa Insieme, the circular practices implemented by the cooperative, and the difficulties faced in the two previous areas.

The first part of the chapter will provide the theoretical background for qualitative case studies. The following sections describe the themes discussed in the interview with Giorgia Dall'Osteria, an employee in Cooperativa Insieme's R&D department. The last part exposes the interview results, with particular attention to circular economy practices, partnerships, and, finally, difficulties in implementing the CE model.

4.1 Why Cooperativa Insieme?

Cooperativa Insieme is a social cooperative Onlus born 1979, with the aim of transforming waste into a resource and giving a second chance to people in need. The cooperative is based in Vicenza, Veneto. Cooperativa Insieme, since its foundation, has carried on the waste management activity. Over the years, the cooperative diversified its activities in the field of waste management. Today, the cooperative provides:

- Management of bulky waste resulting from clear-outs in companies and homes
- Companies' waste management. Treated waste covers various typologies, including a line dedicated to RAEE¹¹
- Home collection of bulky waste

These are not the only activities carried on by Cooperativa Insieme. Additionally, the cooperative provides services of:

- Upcycling of garments, accessories, furniture, small home appliances, and many others.
- Furniture restoration
- Bar management, using recycled and upcycled materials for the interior design and providing fair-trade products

In the field of textile and fashion, the cooperative provides two main services:

¹¹ Line for the treatment and recycling of electric and electronic materials

- Collection, sorting, and selection
- Upcycling

Last but not least, Cooperativa Insieme is active in the social dimension, promoting events, collaborations, and workshops to sensitise consumers on ethical consumption and sustainable habits.

For many years the cooperative has been a reality independent from the external world, with no direct contact with companies. The social nature of the cooperative also implies a different approach than a company. Turnover, even if still a relevant factor, is complemented by the attention to the community's needs and the willingness to include marginalised and fragile individuals in the workplace.

Cooperativa Insieme has been chosen as a case study for three main reasons:

- **The cooperative can boast a long tradition in the management of textile waste:** this led to acquiring high levels of know-how in the sector, which is an important factor in the actual industrial landscape. The study aims to identify how the acquired knowledge is managed, internally for the activities of the cooperative, and externally in relation to spreading virtuous practices to other companies in the sector.
- **The attention to circularity, reflected in the values and the activities of the company:** circular economy is the main focus of this work. The aim is first to analyse the main practices carried on by Cooperativa Insieme, and second to identify the criticism linked to their adoption.
- **Collaborations with traditional companies in the textile and fashion field** are a crucial point of this work. The recent trends in the textile and fashion industry have shown significant growth in sustainability and the promotion of circularity. However, most of the companies in the fashion sector started basing their activities on fast fashion principles. Cooperativa Insieme is in possess of precious knowledge in the field of sustainability and circularity. The study focuses on analysing the cooperative's partnerships to comprehend how these partnerships can help companies, and by extension, the whole society, adopt circular practices and sustainable behaviours. Additionally, the study focuses on underlying the obstacles and difficulties faced during the process.

4.2 Design of the case study

4.2.1 Data collection

4.2.1.1 Primary source

The primary source of information has been a semi-structured interview. The interview was telematically conducted with Giorgia Dell'Osteria, previously employed in Cooperativa Insieme's security and environment office and now moved to the R&D office. To facilitate the process, the interview has been recorded. The codified interview can be found in Appendix B.

The interview, divided into ten questions, is aimed at investigating three main areas of interest: the role of the social cooperative in the circular economy through the sustainable services offered to the consumers and the companies; the extent of partnerships with external companies from the textile and fashion sectors; the main difficulties faced by the cooperative during the implementation of circular and sustainable practices.

The questions and the analysis of the ratio behind them are provided below.

The interview

The interview is divided in three main blocks. The full list of question can be found in Appendix A.

First Section – General questions on circular practices

As said before, the first part of the interview is based on the circular practices implemented by the social cooperative. The first two questions are aimed at investigating the starting point of Cooperativa Insieme. These two questions are mainly focused on exploring when and how the social cooperative decided to enter the waste management field, with particular attention to the management of textile waste. In particular, the second question, is important because the lack of know-how, which is the focus of the question, is one of the major factors preventing the correct disposal and management of waste in the textile and fashion sectors, both from the industry and the consumers' point of view. Nowadays, firms often have to outsource, delegating these activities to external companies, that in the years, developed skills, practices, and hardware which can be spent in the sector, or recur to consulting services provided by the same companies. Question three is focused on discovering all the circular practices carried out by Cooperativa Insieme. The question investigates the leading practices linked to the circular economy according to the relevant literature.

According to the social nature of the cooperative, particular relevance is also given to education, which, as mentioned several times in this work, is fundamental for the effective

adoption of a community-based model like circular economy. The fourth question specifically addresses one item linked to the circular economy: certifications.

Second Section - Partnerships

The second section of the interview is composed of five questions, some more specific than others, which investigate the extent of partnerships carried on by Cooperativa Insieme. For privacy reasons, the two partners mentioned in the interview will be named Company X and Company Y. The first two questions of the section aims at introducing the topic of partnerships. The following three questions focus on the specific partnerships with Company X and Company Y. The goal is to identify the object of the partnership and the actor from whom the partnership request was made, and the reasons that led to the successful implementation of the plan.

Third Section - Difficulties

The third and last section of the interview is composed of a single question and focuses on identifying the main criticisms linked to the adoption of circular practices. Despite it being a single question, the scope is very broad, providing the chance of collecting considerable information. Between the difficulties, particular relevance, in relation legal form of social cooperative, is given to the relations with suppliers and customers, and the difficulties related to access to the needed technology.

4.2.1.2 Secondary source

The secondary source of information for the development of the case study are the website and the channels of the company. An analysis of the website, its content, and the available documents, complemented by an analysis of the company's social media (Facebook, Instagram) has been conducted. The retrieved information has been used to complement the result of the interview.

4.3 Results

The results obtained combining the interview and the information obtained analysing the cooperative's website and social media are reported below. Results are divided in three main blocks, reflecting the three main areas of interest in the analysis of Cooperativa Insieme:

- The first block reports the main activities related to the circular economy carried on by the cooperative.
- The second block analyses in detail the partnerships carried on by the cooperative with Company X and Company Y and tries to assess the main criticism in the field of partnerships with traditional companies.

- The last block analyses the difficulties faced by Cooperativa Insieme during the design and implementation of its circular activities.

4.3.1 Products, materials, and production processes

Over the years, Cooperativa Insieme expanded and improved its activities. In line with recent trends, contact with companies, which are the producers of the waste managed by the cooperative, has become a reality. This can be considered a peculiarity of Cooperativa Insieme, which did not adjust to match the market demand, but was born with a specific mission that later revealed to be an important resource. This is particularly important from the know-how point of view: the knowledge built in years of activity, before today's concern about waste and consequent market demand, consented to Cooperativa Insieme to be competitive in terms of waste management know-how when the demand for this activity exploded. Clearly, as underlined by Giorgia Dell'Osteria during the interview, in light of recent trends, and seeing the level of organisation around them, the cooperative started investing more in developing an adequate internal structure, for example, with the creation of the R&D department, and writing projects to have access to funding and expand its activities. An example of this strategy is the recent funding that will be used to complement the mainly manual work-based activities of sorting and selection of textile and fashion waste. These improvements are helpful in dealing with problems specific to the management of textile and fashion waste, e.g., the use of a machine able to detect the kind of fabrics that compose a garment, favouring proper selection for disposal or utilisation in subsequent processes.

Looking in particular at the textile and fashion waste management, the circular activities carried out by Cooperativa Insieme are:

- **Collection of textile and fashion waste**

The cooperative collects mostly waste in the form of finished products. The garments come from producers and distributors with unsold stock, which can be due to changes in fashion trends or manufacturing defects. An additional source of garments are donations made by single individuals. It has to be noted that the cooperative does not collect fabric rolls from the industry. Other sources of garments, in particular through partnerships, will be discussed later.

- **Sorting and selection of waste**

Sorting and selection of textile and fashion waste is the main activity carried on by Cooperativa Insieme. The workers manually select the garments from various sources in the textile departments. According to their state, the garments are then redirected to

the appropriate next step. In this step, technology can be particularly relevant. As mentioned before, thanks to the recent funding received, the cooperative is planning to introduce equipment that complements human labour, by facilitating activities like the detection of the fibers which compose a garment, easing the process of redirecting.

- **Re-sell of second-hand garments in their stores**

After the selection and sorting process, the garments in better condition are directly placed in the stores of Cooperativa Insieme. The cooperative can count on four stores that sell second-hand clothes without additional processing, contributing to the spreading of reuse culture. Customers can buy garments still in good condition at affordable prices, with all the implications for the environment discussed in the previous chapters. This practice can be particularly advantageous in the case of garments disposed by producers or distributors due to minor imperfections that, however, classify them as unfit for sale in stores. In this case, the garments are usually disposed by the producer or the distributor, ending up in a landfill or incinerator, causing double damage: the garments in question are never worn despite the pollution linked to their production, increasing the already existing amounts of textile waste. Cooperativa Insieme is not only giving new life to products which have already been used, decreasing their environmental impact, but is also entering into the market products that otherwise will account only as sources of waste and pollution.

The cooperative can also count on a wholesale store. In this case, Cooperativa Insieme pays particular attention to the traceability of their products: they prefer to select a few wholesalers, e.g., wholesalers who operate in local markets, in order to be sure about the destination of the products, avoiding commonplaces like containers full of garments directed to Africa that, basically, only move the problem in another country.

- **Direct materials to plants specialised in the recovery of fabrics**

The role of the cooperative as an intermediary is fundamental to improve the correct disposal of materials, increasing their rate of circularity. Cooperativa Insieme is not equipped with a plant able to recover yarns from the garments. The cooperative is more focused on efficiently sorting the garments according to the types of fabrics used, and then redirect them to specialised external companies. For example, suppose a 100% wool sweater is not suitable for reuse. In that case, Cooperativa Insieme will direct the sweater to an external plant specialised in the recovering wool yarn, which in turn will sell the recovered material to companies for production.

- **Upcycling**

Cooperativa Insieme carried out this internal practice in their tailoring workshop. This procedure consists of selecting materials unsuitable for any other activity and giving them new life. This category comprehends garments unsuitable for direct reuse due to damages, but also not suitable for recycling, recovery, or destined to become rags. This is usually the case with mixed fabrics, which are used in the fashion industry and almost impossible to separate to recover the yarns, and that will end in landfilling or incinerating. The activity of the cooperative in this field, through the tailoring workshop, is directed at renovating the garment from an aesthetic point of view, e.g., by cutting and shortening it, making it again attractive for the customers. Actually, the project is limited in scope, according to the fact that in the tailoring workshop are employed three workers. However, this practice, in addition to being useful to minimise, even if in limited quantities, the number of items directed to landfilling and incineration, has a strong social impact, sensitising consumers on the problems related to the choice of materials and on the possibility of obtaining a new garment by one who seems dated and out of fashion, in contrast with the principles of fast fashion.

- **Creation of rags**

Selected garments, like sheets and shirts unsuitable for reuse and upcycling, are repurposed into cleaning rags.

- **Education**

In the field of education, the social role of the cooperative is carried out with a three hundred and sixty commitment. First of all, they operate with other institutions, not necessarily focused on the recovery of waste, to promote events. An example is a collaboration with the already mentioned Fashion Revolution, to promote activities, quizzes, and curiosities directed to the community, to stimulate a change in the way of living their fashion and consumption habits. The aim is to create a network with other entities in the territory, spreading the circular culture and promoting healthier consumption models. Cooperativa Insieme is also active in schools. The cooperative, additionally, hosts workshops, for example, on creative knitting, ways to recover products, and the value of products. Education and sensitisation directed to companies will be analysed below in the context of partnerships.

4.3.2 Partnerships

Moving the partnerships carried on by Cooperativa Insieme, they are essentially of two types:

- Collaborations with other cooperatives and entities, with the aim of creating networks helpful to acquire and spread knowledge and circular culture.
- Partnerships with external companies seeking to increase the circularity of their value chain.

For what concern the first category, Cooperativa Insieme is involved in multiple networks with other cooperatives in the territory, for example, as mentioned before, to improve the levels of education of consumers. The cooperative participates in the European network RREUSE, which consists of "an international network representing social enterprises active in reuse, repair and recycling" (rreuse.org). RREUSE is born in 2001 as a network aimed at sustaining social enterprises and their role in the shift toward a circular economy. They mainly focused on waste prevention practices, like reuse and repair, and are aligned with the directives contained in the European Green Deal analysed in Section 3.1. Additionally, Cooperativa Insieme is also part of Rete 14 Luglio, a network of Italian cooperatives. Participation in these networks has been useful to Cooperativa Insieme's know-how, particularly when planning the empowerment of its textile divisions. As reported in the interview, the network RREUSE, in addition to providing know-how to its affiliates, also funds trips in other countries, e.g., to see a textile recovery plant, to boost innovation.

Moving to partnerships with external companies, Cooperativa Insieme faced both opportunities and difficulties. All Cooperativa Insieme's partnerships are with Italian companies, not necessarily located near the cooperative but also with offices located throughout the Italian territory. This choice is linked to the stringent regulations in matter of waste, which makes difficult the movement of waste from one country to another. This work will analyse two main partnerships, with Company X and Company Y. Additionally, Cooperativa Insieme carries on other partnerships, for example, with Sportler, a technical and sporting equipment distributor, which adopts the RE3 model.

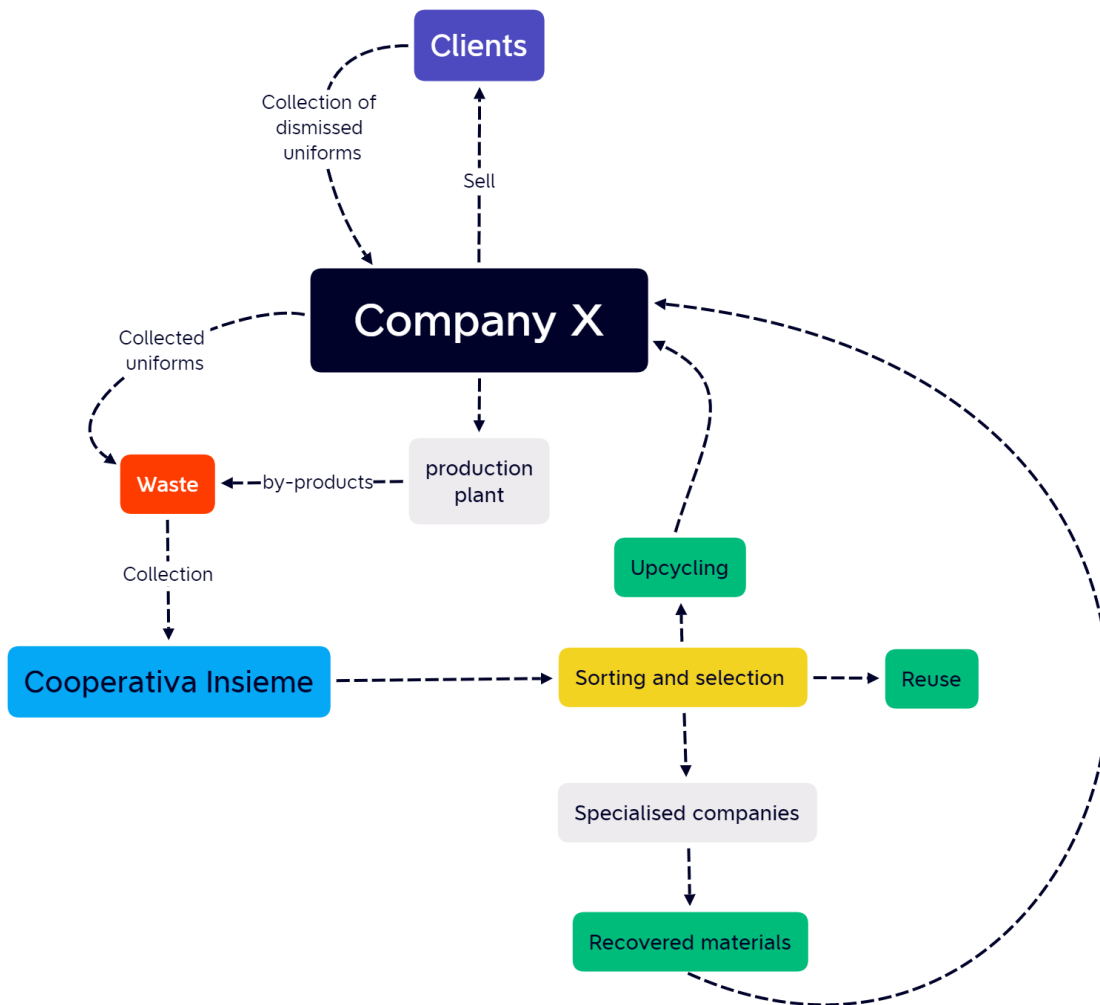
4.3.2.1 Company X

Company X specialised in the production of work uniforms. This is particularly relevant, because the waste coming from the textile and fashion industry is often addressed as a consequence of overstocks, fast fashion, and changing trends. However, the just mentioned reasons do not apply to work uniforms. Work uniforms are usually made using valuable technical materials linked to the necessities of the worker, e.g., fireproofing or increased resistance. However, usually work uniforms stay out of the reuse and recycle circuit, going

directly to the lower level, the landfill, or the energy recovery through incineration. Due to the high-stress levels to which garments are subjected, or due to legislation changes in matter of workers' security and protection, there is a significantly high rate of replacement of work uniforms. The partnership proposal came from Company X and is aimed at recovering the working uniforms. Company X, when providing the new uniforms to its clients, collects back the old ones, which, in turn, are collected back by Cooperativa Insieme. The cooperative, after collecting the uniforms, sorts them and decides if uniforms: can be reused as they are; can enter their process of upcycling; can be disassembled to recover the materials, which can be then redirected to the producers of work uniforms. To facilitate the collection, sorting, and selection processes, the partnership also plans to create a common line. The common line, in combination with a shared design of the uniforms, can play a crucial role in maximising the recovery of garments and its beneficial effects. For example, suppose Company X, instead of heat-sealing two fabrics, get the same result using clip buttons. In that case, the slightly higher cost due to clip buttons is then recovered thanks to the higher rate of recovery of the garments. Clearly, this level of integration between the two partners can be reached only with extensive communication to understand the needs of the producing company and the cooperative, trying to match them. The extent of the partnership is not only limited to the benefits linked to the empowerment of circular practices of Company X, but also has a reputational return. In fact, Company X can benefit from the image of a "company committed to the environmental cause" sent to the market and, additionally, add the service of collecting back uniforms from its clients, moving from being a simple supplier of products to also being a services supplier, potentially exploiting a new market.

Figure 18 represents the partnership graphically.

Figure 17 - The partnership between Cooperativa Insieme and Company X



Source: author processing.

4.3.2.2 Company Y

The partnership with Company Y is more focused on collecting used garments from the final consumers, granting high levels of traceability and transparency in the process. Company Y was born as a producer of swimsuits made of remanufactured yarns. Over the years, the company developed multiple lines of products in addition to swimsuits, maintaining the high levels of sustainability that characterised the company at the time of its foundation. Company Y has a high level of sustainability and circularity in its supply chain: it is a certified B Corp and can count on multiple certifications, like GOTS, GRS, and OEKO TEX 100. Additionally, the company pays particular attention: to the geographical location of its productive services, located in a range of 100km from the company; to the packaging, using

compostable and biodegradable shipping bags; to the logistics, selecting a specific partner and compensating the emissions contributing to climate protection projects. A relevant element in the partnership between Company Y and Cooperativa Insieme is the adoption by Company Y of the RE3 Model. RE3 model is based on three main cornerstones: re-sell, re-use, and re-generate. The model works in the following way: when purchasing a new item, both in-store and online, the customer can decide to give back a garment (through a dedicated bin when in-store, with free shipping when online). According to the characteristics of the garment, they are then classified as suitable for:

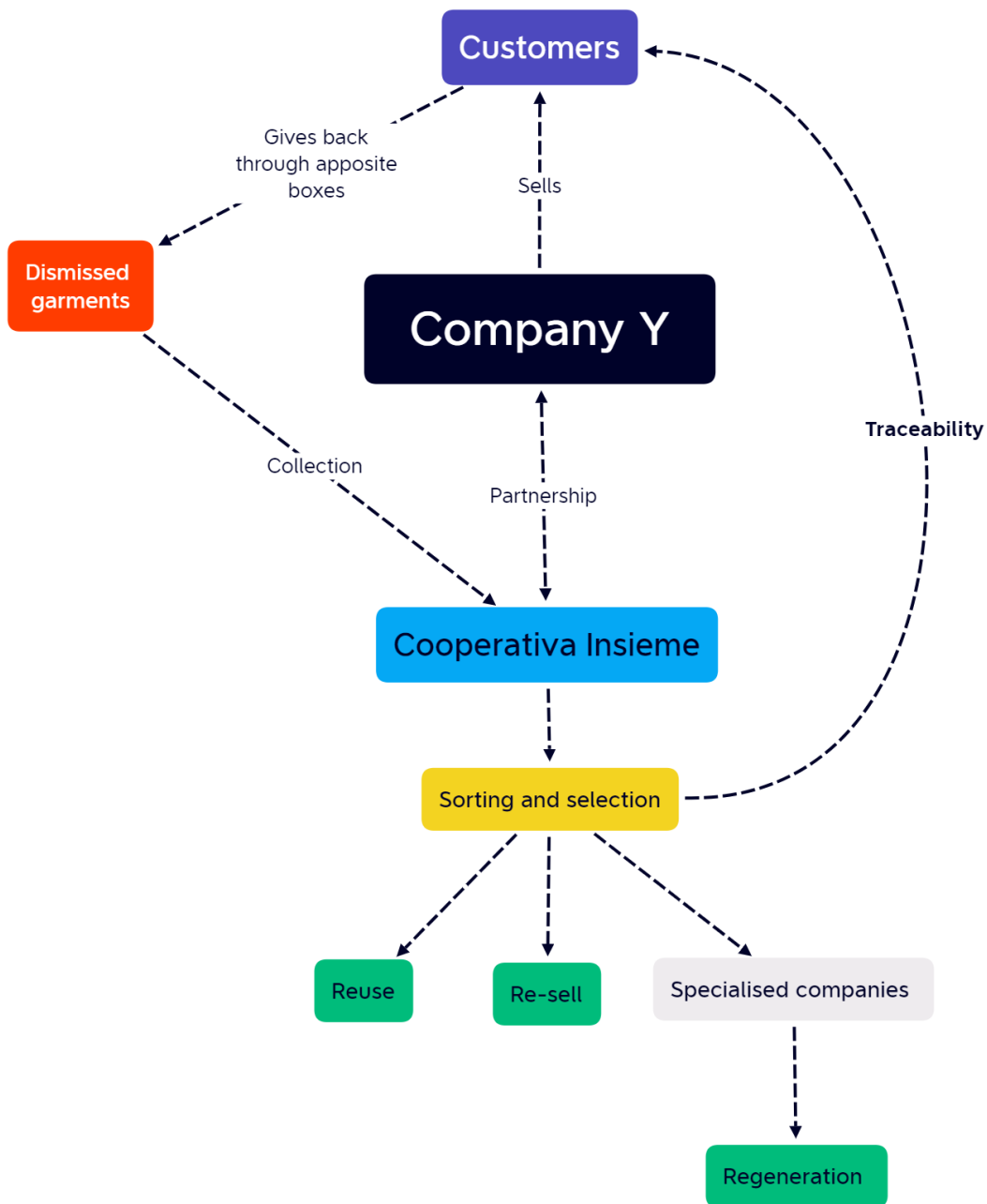
- Re-sell, as vintage clothing, after sanitisation and refurbishment.
- Re-use, which means that the garments will be donated to people in need, after sanitisation.
- Re-generate, in the case the garment presents aesthetic or functional damages. The garment is then regenerated to produce new recycled products.

Finally, according to the garment's conditions, if it is suitable, the customer will receive a discount (or a cashback, in case of online purchase) on the new product bought.

The role of Cooperativa Insieme is strictly linked to the RE3 model adopted by Company Y. The role of Cooperativa Insieme is based on the provision of traceability of garments returned by the customers to ensure transparency, as required by the RE3 model. To each returned garment is applied a QR code and an identical one is applied to the new garment bought by the customer. After sorting and selection, Cooperativa Insieme specifies to which activity (re-sell, re-use, re-generate) the garment is destined. By scanning the QR code applied on its new garment, the customer can receive information on the destination of the returned garment. This practice has the potential to build a strong trust between the customer and the company and in sensitising the customer on the value of products he/she wants to dismiss. Providing such a level of transparency helps avoiding to fall into greenwashing practices and also educates consumers about the quality of the products they are buying, because only garments above a certain threshold of quality are eligible to obtain the discount on the new garment bought, creating a vicious cycle in which customers buy quality products and give back quality products.

Figure 19 represent the partnership graphically.

Figure 18 - The partnership between Cooperativa Insieme and Company Y



Source: author processing.

4.3.2.3 Obstacles to partnerships

Generally speaking, Cooperativa Insieme faced multiple difficulties in the field of partnerships. The first emerged difficulty is related to the legal form of social cooperative. The basic principles of a social cooperative and its internal practices and structure differ from those of a profit-making company, leading to difficulties in communication. As reported

during the interview, "we speak two different languages". There are different needs, and sometimes companies try to hurry the partnership only to communicate to the customers their involvement in a sustainable initiative, following the market trend, but without the necessary development of strategies and practices needed to guarantee a good partnership performance. This problem, also known as greenwashing, emerged multiple times during the interview. Circular economy and its practices are being built today, and it is necessary for companies to understand that it is not sufficient to give their waste to cooperatives or other entities active in the field of sustainability to claim themselves as "green", with the risk of also involving the partner in greenwashing practices. Circular practices must be built through communication, as in the case of Company X and the plan of creating a plant in coordination with Cooperativa Insieme, to meet not only the productive needs of the company but also the recovery needs of the entity in charge of collecting, sorting, selecting, and giving new life to the products. On the other hand, the legal form of social cooperative can also be an advantage. As said before, a characteristic of social cooperatives is the inclusion of marginalised and fragile individuals in the workplace. For a company collaborating with Cooperativa Insieme, communicating to their customers a partnership based on the improvement of their sustainability, combined with the inclusion of the aforementioned workers, can be good publicity, with a boost in their reputation. This aspect, and the cooperative's ability to treat multiple levels of sustainability, has been a trampoline for Cooperativa Insieme to revert the stereotyped commonplaces on social cooperatives and activate more profitable partnerships with other companies. As said at the beginning of the chapter, this expansion pushed Cooperativa Insieme to review its internal structure, adapting it to the new needs of communication with external companies.

4.3.3 Difficulties in CE implementation

Moving to the other difficulties faced by Cooperativa Insieme, the first mention is for technology. New technologies are becoming more and more fundamental to operate in the context of circular economy efficiently. An example previously mentioned in the chapter is the machine for detecting the composition of fabrics, which helps give more precise instructions on waste redirection. The first problem related to technology is the finding of suitable machines. As seen in Section 3.3.1, and also reported in the interview, some of the examples of best structured plants in Italy are located in the Prato cluster. The problem with that plants is that they usually employ big machines to manage large volumes of waste, a factor linked to the location in Italy's most significant textile cluster. Cooperativa Insieme needed to find smaller machines to complement the handwork. In this research, the affiliation to national and international networks, like RREUSE, has been helpful in retrieving the know-

how and contacts necessary to carry out their empowerment plan. For example, as reported during the interview, one of the machines will be bought abroad because, according to their findings, it is produced only here.

Another difficulty strictly related to the adoption of new technology, is funding. Cooperativa Insieme and social cooperatives in general, are not mainly focused on profit. This can be an obstacle to the expansion of their activities, especially when the improvements require expensive machines or the creation of new plants for managing the increasing volumes of waste. Luckily, the new guidelines, also at the European level, like the European Green Deal, are destining resources to support entities working in the context of the circular economy. Thanks to the funding received, Cooperativa Insieme has been able to plan and implement the empowerment of its textile line. Sustaining the circular transition requires the policymakers' support to grant the right assistance to both companies and other entities working in the sector.

The third problem mentioned during the interview is related to sustainability certifications. Sustainable certifications are tied to standardised products, which can be a considerable problem for Cooperativa Insieme, which work with leftovers. The first problem is the quantities of waste, often irregular, preventing the company from creating a specific line and ensuring materials for constant production. The second problem is standardisation. Even if in the cooperative's tailoring workshop new garments are produced starting from the others, there will always be differences between one product and another by the moment that the work made is based on the specific product and is impossible to replicate it on another one. These two factors prevent products realised by Cooperativa Insieme from being provided with a certification of sustainability, even if the product is made of 100% recovered materials. The ones who enjoy certifications are usually companies, that buy the materials recovered by specialised companies, which nevertheless receive them from Cooperativa Insieme, in charge of the sorting, selecting, and redirecting processes, which does not get the beneficial effect from the certification. In the field of certification, stronger partnerships with companies could be helpful to overcome this problem. With a stronger collaboration, for example, with the creation of shared practices mentioned before, the cooperative could secure a standard supply in terms of quantities and type of garments, having the possibility of obtaining certifications on its products.

There are also other problems that Cooperativa Insieme needs to face, like strict policies on waste management, which sometimes can be an obstacle for the entities operating in the sector, especially when trying to establish relationships with companies based in another country. Last, but not least, there is the evergreen problem of customers' willingness

to pay. As seen in the previous chapters, the price of a product still plays an important role in consumers' choices. Often, even if considered, the sustainability of the garment fades into the background when talking about its cost. Circular practices like re-selling in second-hand shops can help reduce the problem, offering a valid alternative to customers. However, the main problem to face remains education on shopping habits. Sustainability and quality certainly come with a cost. However, an education based on fewer products bought but of higher quality is a huge step in moving our consumption habits in the field of fashion toward sustainability and circularity.

4.3.4 Summing up

Summing up, Cooperativa Insieme plays an important role, first of all, as an intermediary. Plants are usually specialised in the recovery of one or a few kinds of materials, consenting the management of one, or few, kinds of waste. At the same time, companies, even if specialised in certain typologies of products, produce very different types of waste. For this reason, the activity of the cooperative is fundamental, in order to ensure, through a careful process of sorting and selection, that all the waste is redirected to the right destination to maximise the circularity of the system. Additionally, the new partnerships with external producing companies, through a strict collaboration and exchange of information, can boost the sharing of know-how and culture about circular practices and their implementation, affecting the whole productive system. Last but not least, we must remember the education and inclusion projects carried on by Cooperativa Insieme, without which a full circular transition will not be reached. The main findings are summarised in Table 16.

There is certainly room for improvement, as the recent cooperative's projects demonstrate, and there are still various difficulties to overcome, but Cooperativa Insieme is undoubtedly following the right path.

Table 18 - Cooperativa Insieme: Findings

Circular practices	Internal	<ul style="list-style-type: none"> • Collection of textile waste • Sorting and Selection • Redirection of waste • Upcycling
	External	<ul style="list-style-type: none"> • Re-sell • Reuse • Education (consumers and companies)
Partnerships	Activities (Companies X and Y)	<ul style="list-style-type: none"> • Collection, sorting, and selection • Recovery of materials's maximisation • Upcycling • Reuse • Re-sell • Traceability and transparency
	Difficulties	<ul style="list-style-type: none"> • Different internal structures • Greenwashing • Collaboration
Difficulties	Technology	<ul style="list-style-type: none"> • Funding • Find suitable machines
	Certifications (textile)	<ul style="list-style-type: none"> • Standardisation • Stable supplies
	Social dimension	<ul style="list-style-type: none"> • Legislation (international partnerships) • Customers' willingness to pay

Source: author processing.

5. Conclusions

In conclusion, transitioning to a circular economy in the textile and fashion sectors is imperative for a more sustainable future. The current linear production, consumption, and disposal model has contributed significantly to environmental degradation, resource depletion, and social inequality. The fast fashion industry, focusing on cheap and trendy garments, exacerbates these problems by creating massive amounts of waste and promoting unsustainable business practices. The fast changes in trends often leave products unsold, leading to overstock situations, meaning additional waste for landfills and incinerators, composed of unused products. Consumers have been used to a system based on unsustainable consumption habits. As observed by the Ellen MacArthur Foundation (2017), there is a growing production of garments and simultaneously a decrease in the rate of utilisation of products. Based on purchasing many cheap garments to follow the fashion trends, the average consumption habit in industrialised countries has multiple implications. Consumers usually prefer quantity over quality, which means higher emissions linked to production processes but also lower durability of garments, which, combined with the utilisation of mixed fabrics, generates a high amount of waste that is impossible to be recycled and recovered, going to landfills and incinerators.

The circular economy offers a solution by promoting the principles of closed-loop production, where waste is minimised, resources are preserved, and materials are kept in use for as long as possible. To reach these results, the circular economy model prioritises the use of sustainable and environmentally friendly production methods, promoting social responsibility and economic sustainability. In particular, in the case of fashion, the adoption, first of all, of eco-design is a fundamental starting point for circularity in the value chain. The development of products based on eco-design needs the participation in the process of multiple actors along with designers, e.g., entities operating in recycling and recovery activities, which cooperation is fundamental to maximise the sustainability of the designs. Cooperating means developing production practices and standards which, on the one hand, are viable for the producer and, on the other hand, consent to the entities operating with post-consumer waste and industrial waste to optimise the recycling and recovery processes of materials, fundamental to close the loop. In this field, a significant impact can also come from the institutions and policymakers, which can accelerate the standardisation of practices in both production and recycling fields through laws.

A circular economy does mean not only the recovery of materials but also a change in the way of doing business. Durable products, collections detached from fashion trends, preferring quality to quantity, are integrant parts of the circular economy model in fashion.

Companies need to change the parameters on which they have based their businesses so far, also by exploiting the possibilities given by digitalisation. The work has analysed multiple emerging business models based on the readjustment of known business models complemented by digitalisation. The most striking examples are business models based on the online sales of second-hand garments and rental services, which have seen in technology and digitalisation a huge boost. Fundamentally, the strength of these practices in the field of sustainability is the maximisation of the utilisation rate of products, strongly linked with the impact coming from their production. In improving their business models, e.g., by adding services to their offer, companies can exploit new business opportunities and increase their profitability.

Education is another crucial point in the implementation of the circular economy. Education involves not only the consumers but also companies. On the one hand, consumers must be educated to comprehend the impact of their habits in terms of pollution and damage to the environment and the value of the products they buy and dismiss, moving from a focus on trends to a focus on the quality and the overall background of the products, even if this means higher prices, often (but not always) justified. On the other hand, education is also necessary for companies. The recent enthusiasm toward circular economy and sustainability risks to result in greenwashing, a dangerous practice, especially when considering that one of the fundamental elements to support the change is to gain the trust of customers. The circular economy in the textile industry has seen a development delay compared to other sectors. The reasons behind this delay are also cultural. Generally, consumers consider garments they dismiss not as waste in the strict sense of the term but as products to foist to relatives or friends. Most of these products, in practice, have never been reused and, sooner or later, finished in a landfill. Consumers must understand the value of the garments they dismiss in the context of "real" reuse and recovery, without delaying their reintroduction in the loop, which leads to the need for additional raw materials rather than recovered ones.

The role of social cooperatives and social enterprises must not be undervalued in this transition. As seen in Cooperativa Insieme, social cooperatives play a crucial role as intermediaries. These organisations provide a powerful alternative to traditional business models, promoting values of fairness, transparency, and community engagement. Additionally, the competencies, know-how, and skills acquired in years of activity by cooperatives and social enterprises are becoming a precious source of knowledge for companies. Companies which in the past hardly considered profitable collaborations with cooperatives, with the recent trend toward sustainability, can find in entities like Cooperativa Insieme precious partners. The partnerships between cooperatives and traditional companies

can significantly boost knowledge sharing in the field of the circular economy and open the way to new business opportunities. Once again, it is essential to remember the role of cooperation and discussion between the two partners to avoid harmful outcomes like greenwashing. Additionally, the knowledge and social commitment of cooperatives and social enterprises have an important impact on the education of consumers, through activities in collaboration with various entities, workshops, and services provided to the community, e.g., second-hand stores, support to individuals or families in difficult, and funding of social initiatives. Finally, social enterprises and cooperatives also play a relevant role in the social area, promoting fair treatment for workers and inclusion of discriminated, marginalised, and fragile categories in the labour market. By prioritising social and environmental outcomes, social cooperatives and social enterprises can play a key role in driving the shift towards a circular economy in the textile and fashion sectors.

Furthermore, adopting a circular economy in the textile and fashion sectors has the potential to bring numerous benefits, including waste reduction, resource efficiency, and improved social and environmental outcomes. Cooperation of government, businesses, and consumers is fundamental for creating a more sustainable future through the promotion of a circular economy. An important step forward is the commitment of European policymakers to addressing criticisms of the productive system, e.g., mandatory eco-design, transparency improvements, and incentives for companies complying with circular economy practices.

In conclusion, the shift from a linear to a circular economy in the textile and fashion sector is not only necessary, but also offers numerous benefits for our planet, people, economy, and communities. The importance of social cooperatives and social enterprises in this transition cannot be underestimated, as they represent an important conjunction ring between the environmental needs, companies, and communities. The time has come for all the stakeholders to take action and embrace a more sustainable through the adoption of circular economy in the textile and fashion sectors.

The purpose of this thesis was to conduct an initial exploration of the role of cooperatives and, in general, social enterprises, in the shift to a circular economy. Further studies are needed to deeply understand the connection and full potential of the interaction between social enterprises and traditional companies, for example, analysing more in detail the impact of collaborative networks of social enterprises or analysing on a large scale the frequency and scope of partnerships with traditional companies.

6. Appendix

Appendix A – Interview questions

Interview questions:

- 1) On which kind of products did the cooperative focus at the time of its foundation?
When did you start handling garments?
- 2) Initially, did you have the necessary know-how or collaborations, consultants, and partnerships with external firms, expert in the field of sustainability, were necessary?
- 3) Actually, which circular economy practices do you apply in the production phase and which do you provide to your customers and partners?
 - Reduction/efficiency increases in the utilisation of energy and materials
 - Attention to eco-design to increase the durability and recyclability of the garments
 - Repair
 - Refurbishment
 - Reuse/re-sell
 - Remanufacture (use of discarded parts for the realisation of a product with the same function as the original one)
 - Repurpose (use of discarded parts for the realisation of a product with a different function than the original one)
 - Recycle
 - Rent
 - Education about circularity, both to B2C and B2B customers
- 4) Do you apply any certification to your products?
- 5) Are your partners mainly based in Italy or also abroad? In the case of international partnerships, which are the main countries?
- 6) Do you rely on external partners for the production/sale/recycling of your products? If yes, in which fields is the cooperation stronger?
 - Design
 - Supply of materials
 - Production
 - Selling/marketing
 - Collection
 - Recycle
- 7) In particular, in the partnerships with Company X and Company Y, to which fields is the collaboration aimed?

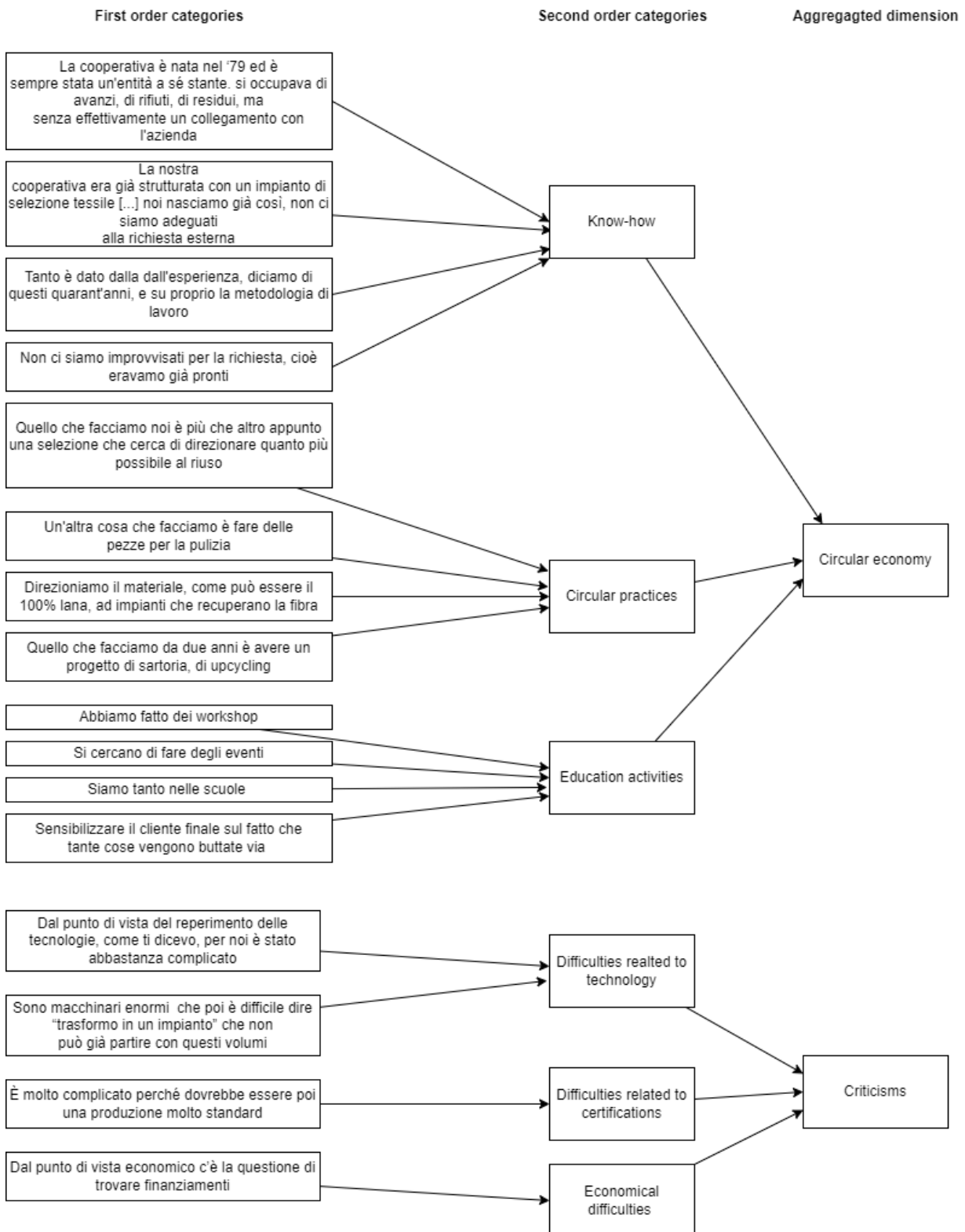
- 8) Who was the first to express the intention to create a partnership between the two companies?
- 9) For which reasons did you propose/accept the partnership?
- 10) Which are the main difficulties encountered during the implementation of models and practices based on the circular economy?
 - Low customers' willingness to pay for the products
 - Difficulties in finding reliable suppliers
 - Difficulties in obtaining sustainability certifications for the products
 - Difficulties in finding reliable partners for the processes of production or sale
 - Difficulties in the accessibility of the technologies needed to guarantee a high level of circularity
 - Cost of technology needed for sustainable production
 - Difficulties in developing the know-how necessary for the implementation of sustainable practices and models

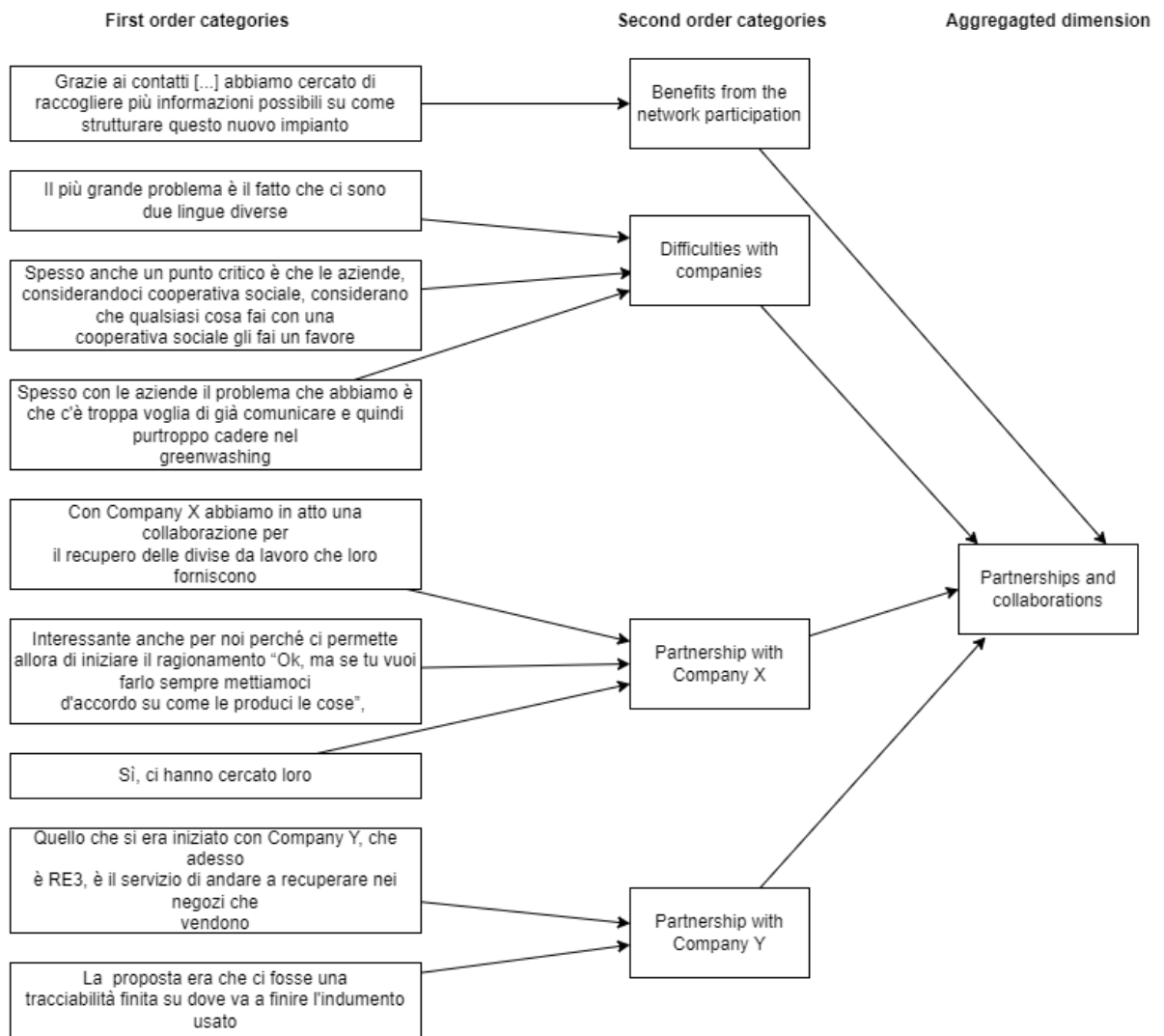
Appendix B – Interview Codification

Interview codification: Giorgia Dall'Osteria – Cooperativa Insieme.

Date: 27/01/2023 at 15:00

Platform: Zoom meetings





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