

## Applying the Circular Economy Model to Sustainable Fashion Industrial Districts: Case Studies in Europe

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Keywords: circular economy model, sustainability, Europe, case study

**Introduction.** The fashion industry is the second-largest polluter worldwide, including a textile waste problem generated from yarn, fabric residue, and fibers, which are mainly produced in factories (Banacu et al., 2019). Only about 20% of global clothing waste is collected for reuse or recycling (Bressanelli et al., 2022). Accordingly, the European Parliament has formulated a policy using a Circular Economy to promote a lifestyle of reuse and repair for sustainability (Bressanelli et al., 2022). The Circular Economy Model (CEM) refers to a production and consumption model in which existing materials and products are shared, reused, and recycled (Mazzoni, 2020). This concept has been applied to industrial regions in a declining phase, contributing to their revitalization (Henrysson & Nuur, 2021). With fierce global competition and intensive resource use, European fashion industries strive to implement innovative strategies like CEM for their growth and survival. Given that the fashion industry is one of the most environmentally harmful industries, it will be essential to examine the cases in Europe that have been renovated into sustainable fashion industrial districts (SFIDs) by applying CEM.

**Conceptual Framework.** CEM has changed the economic paradigm from the traditional linear model of raw materials extraction, production, and consumption to a circular economy (see

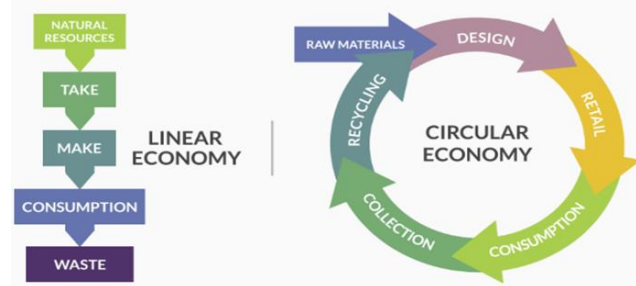


Figure 1). CEM aims to decrease the environmental impact of production and consumption and maximize a product's life cycle from origin to production and consumption to disposal by reusing, repairing, and recycling (Henrysson & Nuur, 2021). The fashion industry mainly embraces the traditional linear model, and only 20% of all

textiles are recycled worldwide (Tamayo & Vargas, 2019). The adoption of CE in the textile industry can lead to impressive

[Figure 1: Linear vs Circular Economy, Harrow (2020)]

reductions in pollution, greenhouse gas emissions, and consumption (Mazzoni, 2020). Due to the importance of CEM, there is an increasing number of studies addressing a CE in the fashion industry (e.g., Bressanelli et al., 2022), but they still mainly focus on supply chain relationships. Little research contains an in-depth analysis of cases where CEM was applied to a declining fashion city and revived as a SFID. Thus, the purpose of this study was to analyze cases that created SFIDs by applying CEM and to discover the factors leading to the revival of SFID's CE. This study thus proposed three research questions: *RQ1) What are the exemplar cases for SFID*

using CEM?; RQ2) How has CEM been applied to SFIDs?; and RQ3) What conditions could stimulate a CE for a SFID?

**Method.** Using a case study approach with a systematic literature review (e.g., government reports and websites, academic journal articles), this study chose the Tuscany region of Italy and the Nouvelle Aquitaine region of France as its geographical context for a number of reasons: 1) Italy and France are well-known European fashion markets which actively seek out sustainable strategies, 2) both countries heavily rely on industrial clusters which play a pivotal role in driving regional economic development (Cariani, 2010; Insee, 2018), and 3) the two regions have adopted the CEM.

**Results.** Each research question was addressed with an in-depth analysis as follows.

- RQ1: In Tuscany, the textile industrial cluster in the province of Prato and the tannery industrial cluster in the province of Pisa are the pioneering industrial districts in Italy to establish a CEM and their leadership in sustainability has resulted in several awards and recognitions (Mazzoni, 2020). Similarly, the Nouvelle-Aquitaine region, which is the biggest industrial district in France, is very active in renovating the fashion industry with a CEM by launching diverse projects with local stakeholders (Real et al., 2020).
- RQ2: The CEM has been applied to SFIDs through resource reuse, recycling, and reduction of waste. The textile cluster in Tuscany uses the recycled water from a water purification plant for dyeing and finishing and recycles wool and reuses fibers obtained from old knitted clothing and from cuttings of new fabrics (“Living in Prato”, n.d.; Testa et al., 2017). The tannery industrial cluster is also very active in reducing its negative impacts on nature through reusing chrome for the tanning process obtained through a local chromium recovery factory (Daddi et al., 2019). The region of Nouvelle-Aquitaine energetically supports reducing the consumption of fashion goods and materials by recycling textile waste, promoting eco-design and a sustainable supply chain, and making products last through reuse, redesign, and repair (Insee, 2018).
- RQ3: *Human resources.* The Italian and French fashion industrial clusters include numerous workers in fashion firms and innovative entrepreneurs. The Tuscany region has over 30,000 workers in its textile firms and about 10,000 employees in tannery enterprises (Testa et al., 2017). Over 7,800 people work in various fashion establishments in the Nouvelle-Aquitaine region (“Nouvelle-Aquitaine”, 2017). Moreover, entrepreneurs have created several born-sustainable fashion brands (e.g., Rifo from Tuscany, Hopaal from Nouvelle Aquitaine) using 100% recycled materials such as textile scraps from the regional clusters (Insee, 2018; Rifo, 2022).

*Related and supporting industries.* Both countries’ fashion industrial regions reveal a production system in a heterogeneous structure of small and medium enterprises. Tuscany is a region with a strong manufacturing sector including approximately 8,200 textile companies and about 900 tannery enterprises (Daddi et al., 2019; Testa et al., 2017). Nouvelle-Aquitaine consists of 410 enterprises in the clothing, textiles, and leather goods segments with over 3,000 professionals in crafts work and close to 2,000 employees in the tableware sector (“Nouvelle-Aquitaine”, 2017). Such diverse sectors have been integrated into the district and have provided a wide range of sustainable products and services (“Nouvelle-Aquitaine”, 2017; Mazzoni, 2020).

*Government support.* Both the countries' governments actively support building the sustainable fashion industrial regions. For instance, Prato in Tuscany was one of the first provinces in Italy to invest in waste collection, and today 48% of all collected materials are recycled, including textiles ("Living in Prato", n.d.). France was the first country in the world to implement a legal guideline for end-of-use clothing, and shoes in order to stop the environmental problems generated by the accumulation of textile waste (Bukhari et al., 2018).

**Discussion.** The results of this case study highlight that despite the fashion industry's wasteful and polluting nature, sustainable fashion industrial districts in Italy and France have moved to radically reduce their environmental impacts through the introduction of CEM. The fashion industry clusters in these regions diversify their sustainable practices by maximizing the application of reduce, reuse, recycle, and repair. Each district in Italy and France demonstrates the analogous conditions (e.g., wealthy human resources and enterprises, complete value chain through related and supporting industries, enthusiastic government and regional supports) to initiate sustainable fashion industrial districts with a CEM. The introduction of CEM will create applicable guidelines for SFIDs in economically different countries characterized by a traditional linear model.

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