Abstract

This PhD research aimed to investigate how Systemic Design's approach and tools can foster the transition and implementation of circular textile value chains, in the European framework, through a regenerative and holistic approach by design.

The research focused at the meso-level, aiming to build "textiles ecosystems" which are more localized and circular, and took the hemp value chain as a case study of application.

The research was framed in the broader scenario of the European "Circular Economy Action Plan" and the "Green New Deal", in which the textile sector has been identified as one of the industrial sectors with high potential for conversion to Circular Economy. Since it is overall acknowledged that at the meso-level, innovativeness for circularity is a systemic process (De Jesus et al., 2018; Kazancoglu et al., 2022), this thesis aims to contribute to filling this gap through Systemic Design. Indeed, at the time this research is undertaken, 1) the contribution of Systemic Design for circular textiles is overlooked, calling for new strategic and holistic directions that design may take within textile ecosystems, and 2) hemp value chains are still a niche phenomenon within the academic and industrial panorama, which need further research and actions, in all the fields, including design.

This thesis used the following methods to answer the questions, namely:

• a systematic literature review to scrutinize the available knowledge and identify the research gaps;

• a Systemic Design methodology which provides the theoretical lens and the methodological steps to guide data collection, analysis and interpretation with a systemic perspective and a design approach;

• a multiple case studies methodology which provides real-life contexts to implement and expand the Systemic Design knowledge and generalize the findings.

The two case studies identified in the European scenario were the Leicestershire Textile District (UK) and the Prato Textile District (IT). They were grounded on the application of the Systemic Design methodology at the meso-level, starting from the hemp value chain and its potential to connect to other sectors, through a systemic approach. Even though Europe has not unlocked the full potential of hemp, it can make a crucial contribution to upscaling innovative solutions capable of accelerating the transition towards a regenerative and circular growth model, given its multiple benefits and applications in different industrial sectors, while being a cost-effective crop that can help mitigate Climate Change.

The original contributions of this research are mainly two:

• the advancement of the Systemic Design methodology by formalizing its phases, steps, methods and outcomes in a systematized way;

• the formulation of a Circular Textile Ecosystem (CTE) blueprint specifically designed with a systemic perspective. The proposed blueprint integrates the layers and components of an ecosystem, retrieved from the literature, with the Systemic Design's methods, steps, and tools. Combining these elements allows to frame the current situation within a specific

context, highlighting assets and gaps, keeping a multi-layer approach, and suggesting improvements for the future.

This blueprint, as well as this thesis in general, is relevant for agricultural and textiles entrepreneurs, sustainability advocates, cities and municipalities, innovation clusters, manufacturing companies, and a broader and diverse scientific community.