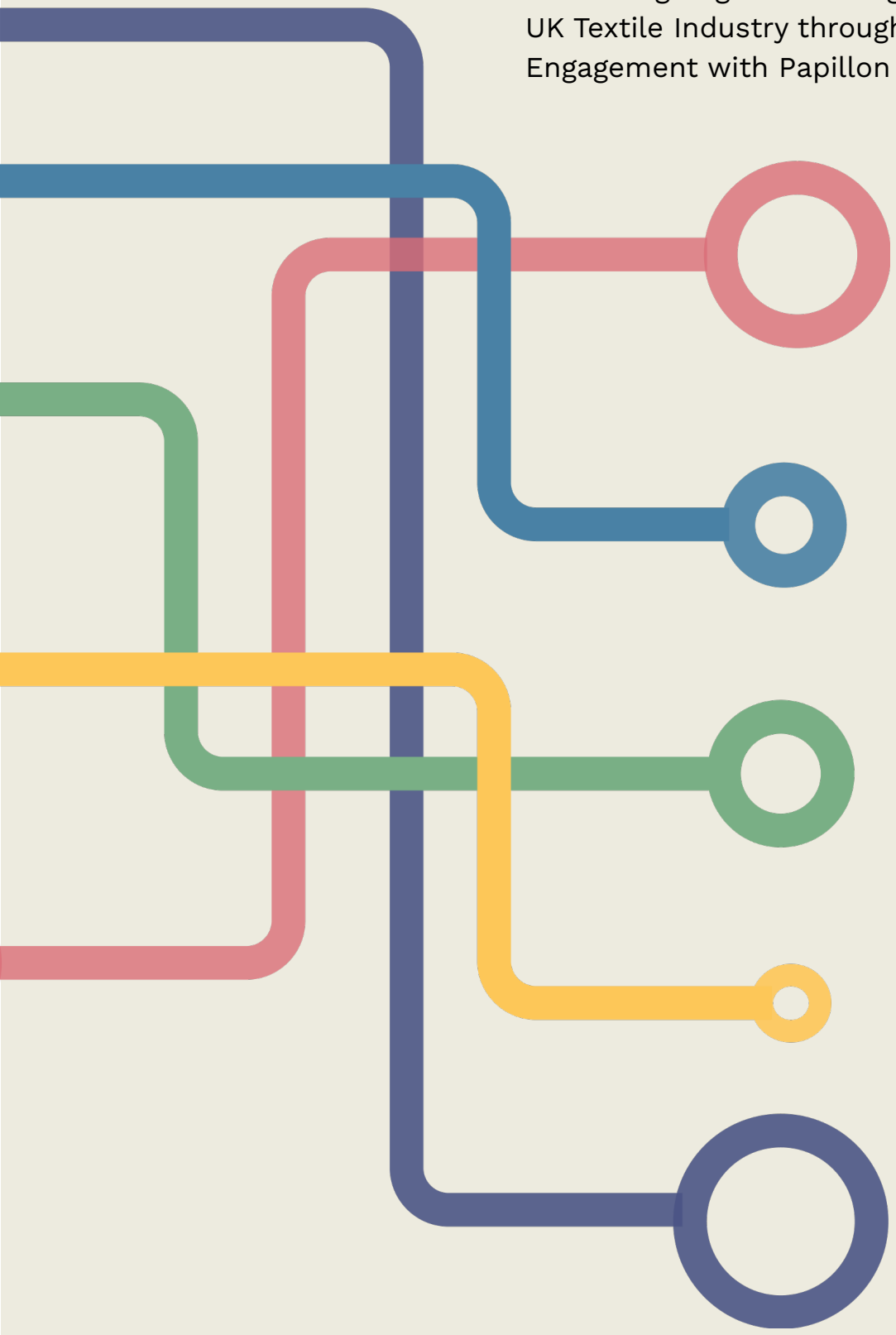
Systemic Design Approach:

Enhancing Regenerative Agriculture in the UK Textile Industry through Collaborative Engagement with Papillon Bleu



By Valeria González Ramírez and
Laura Sofia Granados Bravo

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Politecnico di Torino

Candidates
Valeria González Ramírez
Laura Sofía Granados Bravo

Department of Design Faculty of Architecture and Design

Politecnico di Torino
Turin, Italy

Tutor:
Silvia Barbero

Co-tutor:
Eliana Ferrulli

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- Laura Sofía

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Introduction

Keywords

Systemic design, Regenerative agriculture, Circular economy, Industrial Hemp, Natural fibres, Textile industry, Mixed fibre textiles.

Abstract

The purpose of this thesis is to apply the methodology of systemic design to support the reconstruction of the hemp supply chain in the territory of Leicestershire, UK, adding value to the hemp industry and the region, taking Papillon Bleu, a textile company that operates in the area, as a principal reference. Overcoming the challenges found in the holistic diagnosis of the project could unveil hemp's unrecognised benefits across the industry, production processes, and society.

The core methodology revolves around the Systemic Design method and the Design Value Framework, rooted in sustainability and the analysis of interconnected issues. The five pillars of systemic design guide systemic and sustainable solutions through self-sufficiency, relationship-building, local action, consideration of human needs, and endorsement of circularity.

The opportunities of the systemic project resulting from the analysis and research conducted in the holistic diagnosis are categorised into short-, medium-, and long-term implementation periods. Short-term options include the strategic use of hemp crops as a break crop in the cereal industry and enhancing the website for collaboration and information sharing. A novel approach involving hemp mulch as a natural herbicide and collaboration with local, sustainable product developers adds sustainability to managing the project's outputs. Medium-term suggestions involve education on the management of hemp crops and the integration of sheep breeding into the agricultural system of hemp to improve soil quality and follow regenerative agriculture principles. The long-term emphasis is on building a community among farmers around the company. The proposal envisions a holistic approach to enhancing sustainability, collaboration, and innovation efforts, with phased implementation showcasing a strategic vision.

In conclusion, applying systemic design principles to the textile industry paves the way for a sustainable transition, incorporating systemic design, upcycling, hemp, and regenerative agriculture to foster a circular model. This benefits the environment, promotes collaboration, and drives innovation in the region and the company.

Introduction

The historical tapestry of Leicestershire, woven across eight districts, intertwines administrative, geographical, and historical threads with the East Midlands region of the UK. From the 19th to the 20th centuries, this county thrived as a hub of diverse industries, including hosiery, footwear, engineering, mining, and textiles, fostering employment opportunities for both genders. The apex of this economic capacity was witnessed in the textile industry, propelling Leicester to claim the title of Europe's second-richest city during the 1930s, a period affectionately dubbed the "golden age." However, the rapid expansion of this industry paradoxically led to the erosion of its reputation, triggering a downward spiral of diminished quality, international demand, and legal challenges. This decline, however, provided the impetus for exploration, particularly within the agricultural realm, with new materials and natural fibres of different types.

Within the agricultural sector, Leicestershire's landscape is dominated by the cultivation of cereals, grazing, and various crops. There lies an untapped potential in the form of industrial hemp cultivation between this tapestry. Though currently confined to a modest portion of agricultural land, this cultivation holds promise for the textile and construction industries. However, a thicket of misconceptions and regulatory restrictions impede its growth. Addressing these challenges has the potential to reinvigorate industries and highlight the unrecognised contributions of hemp across production processes and societal spheres.

Additionally, this thesis was developed by collaborating with a textile company from Leicestershire, UK; the company is called Papillon Bleu. It started in 2006, and since then, it has been working towards a more sustainable production. The company has been working on a new pilot for creating and developing a natural fibre called Shemp, a mixture of wool and hemp. This natural fibre is created from 70% wool and 30% hemp of the species Santica 27. Considering this, the company wants to improve their processes and build more circular and sustainable practices. Also, by following the principles of regenerative agriculture, the company wants to manage the waste of the process sustainably and create a community around it to share information and combat the lack of information about the advantages of hemp crops and their products.

Given these nuanced challenges and prospects from the company and the territory, this study adopts a structured and holistic approach to ascertain a sustainable path forward. This methodology begins with a meticulous definition of the issue and a thorough survey of existing literature. This systems-oriented approach is further augmented by stakeholder analyses,

comprehensive data collection, and dynamic visualisation techniques, illuminating the intricate dynamics of the system's current state and potential avenues for an increase.

Central to this research is the Systemic Design method, rooted deeply in sustainability. This method champions an analytical exploration of the intricate and interconnected aspects spanning various contextual landscapes. In an age where sustainability and systemic thinking are becoming increasingly paramount, the intricate journey of reconstructing supply chains takes centre stage. In this way, this thesis embarks on exploration by harnessing the significant potential of systemic design methodology to catalyse the transformation of the hemp supply chain. The canvas of investigation is set within the textile district of Leicestershire, where historical threads interweave with contemporary challenges.

Enveloping this comprehensive methodology comprehends five critical phases. The journey starts with Holistic Diagnosis, a vantage point that transcends isolated analysis to unveil the web of interconnected elements. This analysis unfolds into the Challenges and Opportunities phase, reframing challenges as catalysts for growth, thereby redefining obstacles as opportunities. This project phase requires multifaceted analyses, accounting for territorial and company viewpoints to gain a panoramic understanding. In turn, this analysis gives the entrance to the Systemic Project phase, which navigates through multi-criteria assessments to select transformative opportunities. Moving further, the Outcomes stage explores the far-reaching consequences of paradigm shifts, threading their impact across temporal and spatial scales. As a complementary instrument, the Design Value Framework is unveiled as a tool to holistically assess impacts spanning sociocultural, environmental, democratic, and financial-economic facets.

This proposal contains a collection of carefully considered opportunities organised into short, middle, and long-term phases. Going through the chapters, each opportunity becomes a part of the company's system, like threads are woven together, showing a blend of sustainability, teamwork, and innovation. These proposals, put into action over different periods, are the key to a significant change – a transformation that brings systemic design principles to the textile industry. With these proposals, the project also aims to build strategies that follow the Sustainable development goals (SDG) to use them as a guideline for giving the project a circular and sustainable view. This change is not just about being more sustainable and circular but also about the people in the local community working together to make their area better and more connected.

Thesis Question

This thesis explores how Papillon Bleu, a textile company, can harness Leicestershire, UK's attributes and its rich textile industry heritage to foster a circular production model of natural fibres. By adopting a systemic approach, Papillon Bleu seeks to revolutionise its practices and contribute to the larger goal of transforming the textile industry's landscape in the region. Therefore, the research and project developed in the thesis use as a guideline the following question:

> How can Papillon Bleu exploit the attributes of Leicestershire, UK, and its textile industry to develop a circular production model of natural fibres through a systemic approach?

Objectives

The primary purpose of this thesis is to apply the methodology of systemic design to support the reconstruction of the hemp supply chain, adding value to the hemp industry, the territory and the company.

- Create systemic connections between the company and actors inside the territory to build a structured community to give a base and share information and skills on managing hemp crops.

- Implement the regenerative agriculture principles in the company by integrating different agricultural systems present in the territory and using wastes of the company to build subproducts for improving the soil and territory conditions.

- Involve local actors that work on sustainability, creating smaller products that could be used in collaboration with the company by using unused materials and involving the company in new opportunities to spread their work with the community.

01

Research Methodology

1. Research Methodology

This chapter aims to outline and justify the chosen research methodology, which is the backbone of this Systemic Design thesis. This methodology serves as a compass, guiding this project through the challenges of understanding the complex and dynamic relationships that define today's social and environmental issues. By employing a rigorous and systematic approach, the aim is to delve deep into Systemic Design's core principles and practices while simultaneously exploring its practical application as a potent catalyst for transformative change. All the research and products of the systemic project must be registered and visualised in Gigamaps that will be able to be seen in the Annexes of this thesis.

The research methodology of a systemic design project involves a structured and holistic approach. It begins with defining the problem and conducting a comprehensive literature review. Systems thinking and analysis are essential for understanding the complexity and interdependencies within the system. On the other hand, the stakeholder analysis and data collection provide valuable insights. At the same time, visualisation techniques aid in presenting the system's dynamics, which is necessary to understand clearly the actual state and possible improvements that can be made in the system. Additionally, scenario planning, prototyping, and participatory design contribute to developing inclusive and sustainable solutions that signify having more sustainable practices after implementing them in the system.

Finally, the evaluation and documentation ensure the project's effectiveness and knowledge-sharing with the broader community, as well as to understand which alternatives are more aligned with the territory and company analysed. Therefore, the methodology aims to address complex problems by considering the broader context and interconnections between different elements within the system.

As a first step, it is essential to develop a literature review, as this step is a vital part of academic and research work that examines existing literature on a specific topic. Its importance lies in establishing the context, identifying gaps and research questions, defining objectives, selecting appropriate methodologies, avoiding redundancy, and supporting arguments and analysis.

1.1 Research Question

The textile industry plays a vital role in the United Kingdom's economy, but it also faces significant sustainability challenges, particularly concerning its environmental impact and reliance on conventional agricultural practices. To address these issues, a systemic design approach can be employed to

comprehensively analyse the sector's complexities and uncover pathways for enhancing the integration of regenerative agriculture. This research seeks to explore the application of the systemic design approach in the context of the UK textile industry, explicitly identifying the main challenges and opportunities for promoting regenerative agriculture practices. By adopting this holistic methodology, the study aims to pave the way for a more sustainable and resilient industry future, aligning economic growth with ecological regeneration and social well-being. According to this, the research question used to develop the literature review of the project is:

> How can the systemic design approach be used to identify the main challenges and opportunities of the textile industry in the UK to enhance the use of regenerative agriculture?

1.2 Literature Review

In pursuing new insights, innovative solutions, or a deeper understanding of a specific subject, the literature review is a gateway to an extensive reservoir of past research, theories, and academic discourse. Within this realm of existing literature, a treasure trove of ideas, hypotheses, methodologies, and empirical findings have been diligently drafted by scholars and researchers working before on this thesis.

The primary objective of this literature review is to present a comprehensive synthesis of pertinent academic works and primary sources. By engaging with this rich tapestry of knowledge, it will be possible to build a comprehensive and well-rounded understanding of the subject, recognising the contributions, debates, and gaps that have shaped its evolution over time. According to this purpose, the literature review will be helpful to:

- Identify the systemic challenges and opportunities of regenerative agriculture implementation in the textile industry.
- Evaluate the potential use of natural fibres in the textile industry to encourage circularity and best practices on waste management.
- Analyse how industrial hemp can be used in the textile industry as a central feature for a circular approach.

Taking into account the objectives and questions that were developed for the thesis and the literature review, some words were chosen as the keywords for research; in total, ten of them were essential for the research of the different articles and case studies in the development of the first part of this project.

From these words, four categories were selected that were defined according to their specificness, thinking that some could include others as subcategories or sub-topics that were also important to deep

in, according to *Diagram 1*. The first category of words includes ***Systemic Design***, which contains and guides as a central pillar of the research all the analysis done with the literature review. Following up with the second category, the words presented in this group include ***Sustainable Fashion, Textile Industry, and Mixed fibre textiles.*** In third place, the following category includes words like ***Circular economy, Regenerative agriculture, Industrial Hemp, and Natural fibre,*** which could work as a connection with other more significant words like ***Sustainable Fashion and Mixed Fibre Textiles.*** Last but not least, the last category of words is ***textile waste***

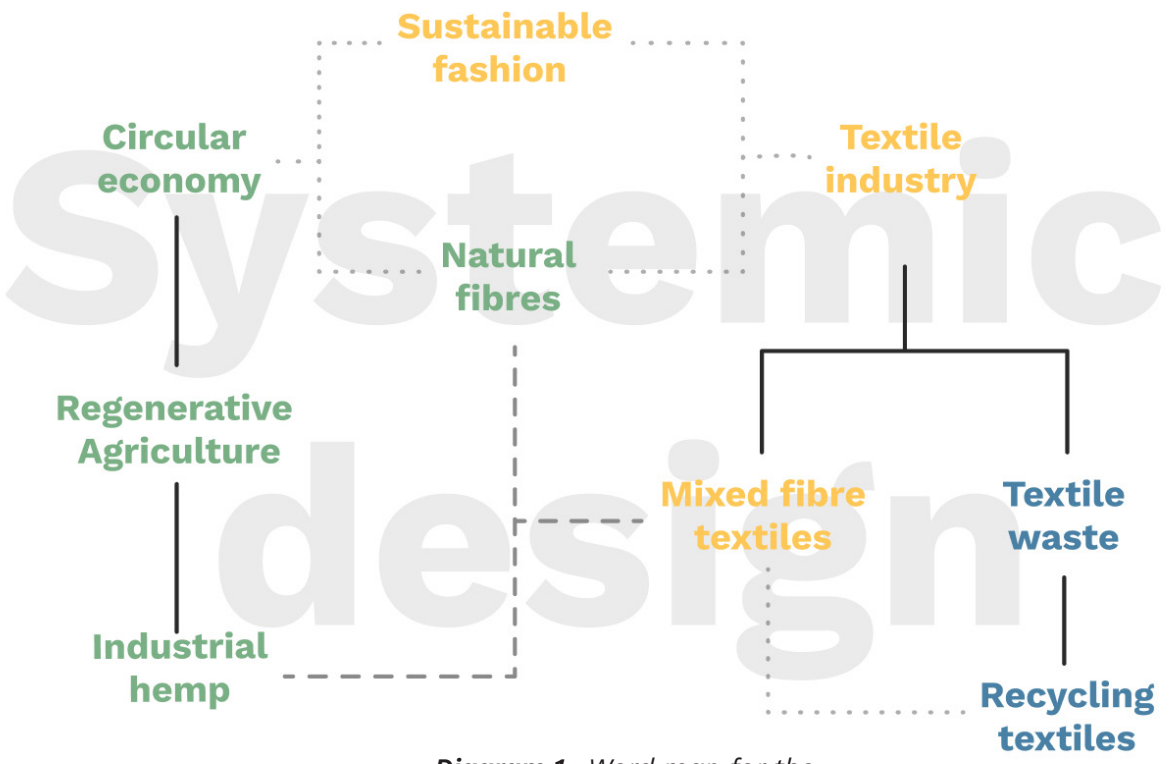


Diagram 1. *Word map for the literature review*

and ***recycling textiles,*** which work as subcategories of the textile industry. As a next step, the keywords were used as the main words for the research, in which the different combinations between them could lead the research to valuable articles and case studies for supporting the development of this project. All the articles and studies found were grouped into six different categories and analysed and related between them to have a comprehensive overview of the topic and the actual conditions concerning this topic. The six main categories were obtained by selecting the six keywords that were considered most relevant for the research. Taking this into account, the main words that could group and include other subcategories inside are ***Systemic Design, Circular Economy, Regenerative Agriculture, Textile Industry, Natural Fibres, and Industrial Hemp.***

Starting with the point of view of the Systemic design, as it was found in essential articles that were relevant to the research and giving context for the

development of this project, it could be said that the systemic design is a trans-disciplinary approach to design that takes into account the complex systems and networks that exist in society and seeks to understand and manage challenges and opportunities presented in a territorial level and a smaller but as well complex context that is the company. Articles such as “A Systemic Design Method to Approach Future Complex Scenarios and Research Towards Sustainability: A Holistic Diagnosis Tool” (Battistoni et al., 2019)) could explain the importance of the systemic design approach and how its methodologies could be applied to every problem and project in different fields, as many components and topics in life should be analysed and solved with systemic solutions and understanding its complexity.

On the other hand, there can be found other articles like “Design a Sustainable Supply Chain for the Textile and clothing industry with Consideration of carbon emissions” (MEZATIO, E. P., AGHELINEJAD, M., AMODEO, L., & FERREIRA, I. (2022)). Furthermore, “Textiles and the Environment: The Role of Design in Europe’s Circular Economy” (European Environment Agency, (n.d.)) has a more specific approach to the textile industry. Furthermore, these articles consider the design and the sustainable focus when creating more sustainable and affordable models or products and also talk about how the creation of these strategies will always have a direct impact in the context that is done.

Taking into account the point of view of the circular economy and following up the articles “The Circular Economy” (Stahel et al. (2016)) and “The Circular Economy in the Textile and Apparel Industry: A Systematic Literature Review” (Jia et al., X. (2020)) it could be said that this economic system is mainly designed to minimise the amount of waste and maximise the use of resources in different productive processes and lifetime of products. According to this idea, the main point that is useful for the research is that the circular economy should also be related to the design for prevention and circular business models, in the sense that the companies should take into account when designing products, services, or both, the possible wastes that could be reduced or prevented. On the other hand, the circular economy could be applied in every phase of the process, and because of this and following all the R’s of the circular economy, the design of process and products could be more focused on closing the loop and in this way reducing wastes and instead of that, giving products a more lasting life.

Another important topic in the research is Regenerative Agriculture, as a holistic approach to farming and understanding the best practices for crop management could help to understand the importance of some practices and ways of managing the land to improve the state of the soil and contribute to carbon sequestration. Taking into account articles like “Long-term effects of crop rotation, manure, and mineral fertilisation on carbon sequestration

and soil fertility" (Triberti et al., 2016).)

Moreover, in the study about Crop Rotation developed by the Center for Regenerative Agriculture and Resilient Systems in Chico State, the possibility of crop rotation could be used as a potential alternative to applying the principles of regenerative agriculture in crop management. Following this idea, the enhancement of break crops in farms means an improvement in soil fertility, reducing the footprint of the materials, and the opportunity to build a sustainable agroecosystem that contributes to carbon sequestration and integrating different supply chains. Therefore, integrating animals and crops can also be an economically viable model, as significant decreases in insect pests and corresponding yield increases were also observed in the studies presented in these articles.

Moreover, considering the categories already mentioned, the next group of articles and research that were useful for this project and literature review are the ones referred to the Textile Industry. First place, the research that was done was "The Textiles 2030 Roadmap" (WRAP, n.d.), which presented a road map done in the UK on how to manage and share the best practices when working in the textile industry, considering the story of UK with the Fast fashion, so all the practices and changes done in this roadmap are focused on improving and taking advantage of the resources and actors of the territory to build a more sustainable model around the main topic of textile Industry and how the different phases of the processes can be also improved.

Additionally, other articles like "Sustainable Process Design for Circular Fashion: Advances in Sustainable Chemistry for Textile Waste Valorisation" (Chopra et al., C. S. K. (2022).), "From Textile Waste to Resource: A Methodological Approach of Research and Experimentation" (Tedesco et al., E. (2020).) and "Scaling textile recycling in Europe–turning waste into value (1st ed.)." (McKinsey Apparel, Fashion & Luxury Group [McKinsey & Company]. (2022).), were helpful to make a more significant focus on how the textile Industry is a global industry that is characterised by having a very high amount of product consumption but as well for being one of the most contaminant industries. These kinds of papers provided a deep analysis of how various methods have been developed over the years and how some strategies have been applied inside the industries to reduce the negative impact of this industry in an environmental, social, and economic way. These articles also talk about how even if there are some methods studied for recycling different kinds of textiles and creating new fibres from used textiles, in general, these materials are very difficult to recycle, especially the ones that are done with more than a type of fibre, and this is why the companies should have strategies on how to manage appropriately the wastes of their production processes with an appropriate design and also thinking about the end of life of their products.

Furthermore and following up with the following category of research,

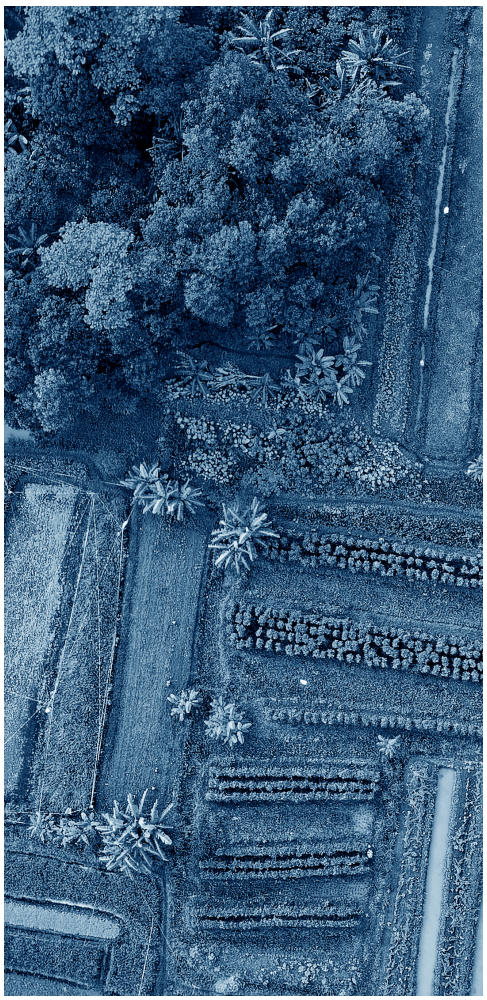


Figure 2. *Crop rotation. (Fisk, 2018)*

Figure 1. *Natural fibre textile. (Swift,2021)*

Figure 3. *Hemp textile. (Vaitkevich, 2021)*

Figure 4. *Textile industry. (Karaivanov, 2021)*

Figure 5. *Regenerative agriculture. (Woon, 2019)*

which is the one related to natural fibres, there are some articles like "Towards sustainable textile sector: Fractionation and separation of cotton/polyester fibres from blended textile waste" (Kahoush et al., N. (2022)) and "Critical aspects in design for fibre-to-fibre recycling of textiles" (Elander et al., H. (2016)) in which the characteristics of different types of natural fibres are described and also show how the versatility and remarkable properties that natural fibres have could be used for creating products of fantastic qualities. Also, in these papers are some descriptions of the recycling process of these organic fibres, especially mixed fibres, with the mechanical processes needed for these materials to be processed and turned into a new product.

Additionally, articles like "Natural fibres reinforcement for earthen building components: Mechanical performances of a low-quality sheep wool ("Valle del Belice" sheep)" (Parlato et al., S. M. C. (2022)) and "Recycled fibres from pre-and post-consumer textile waste as blend constituents in manufacturing 100% cotton yarns in ring spinning: A sustainable and eco-friendly approach" (Arafat et al., A. J. (2022)) describe the processes that are needed to be done with the recycling of these types of fibres and how the mechanical properties are changing on every new material that is done with the already used fibres. On the other hand, in these papers, there are various case studies on different fields of application, where the process of fibre-to-fibre recycling and different uses of these fibres can be seen, showing the criticalities found in the diverse recycling methods and procedures. Also, it could be seen how these organic fibres could have a better end of life with the help of appropriate circular production processes, upcycling and recycling centres, or programs that can be using this organic waste in other fields of the industry like construction, or even in the same textile industry but with other new recycled products that have a more eco-friendly approach.

Finally, with the category of Industrial Hemp, found various articles like "Hemp (Cannabis Sativa L) for high-value textile applications: The effective long fibre yield and quality of different hemp varieties, processed using industrial flax equipment" (Vandepitte et al., V. (2020)) in which different species and kinds of hemp plants are characterised, making emphasis on the excellent properties and multiple uses in the textile industry and other possible industries because of its different types of fibres, its sustainable characteristics and the beneficial properties it has for the soil.

Furthermore, other texts like "Hemp as a Potential Raw Material Toward a Sustainable World: A Review" (Ahmed et al., 2022) and "Industrial Hemp Fibre: A Sustainable and economical alternative to Cotton" (Schumacher et al., J. A. (2020)) talk about the different properties of the plants of hemp and its incredible benefits for the environment. With its characteristics, hemp plants could help to restore the soil properties, as they also help to control the pests and insects from the hemp crops.

Additionally, the articles evaluate the possibility of using hemp as a brake crop in some industries and also mix other textile materials to get new textiles with improved properties for new textile products, which could also help in restoring the carbon sequestration process in the soil and creating materials with a more sustainable impact to capture and store carbon dioxide (CO2) from the atmosphere and having a better impact in nature.

1.3 Systemic Design Method

The systemic design method, according to Battistoni, C., Giraldo Nohra, C., & Barbero S. (2019), is a design approach focused on sustainability that is centred on giving the possibility of analysing complex problems that are found nowadays in various contexts and realities. Those problems are characterised by being interconnected with different complex systems; in this way, all these complex problems need to have complex solutions. Following the systemic design method, the best way of obtaining complex and more accurate solutions is developing a holistic analysis of the context in which the solution is going to be applied and taking into account the systemic projects and analysis need to follow three crucial contexts of impact, social, economical and environmental.

Additionally, the systemic design method follows five essential pillars of action: ***Autopoiesis, Relationships, Act Locally, Humanity Centred Design, and Outputs-Inputs.*** All these pillars work as a guideline for people implementing this method to understand how the solutions applied are required to be systemic and, therefore, sustainable.

These five pillars guarantee that the system is autopoietic and can keep functioning without a part or adding new parts to it to self-create and self-maintain its structure. Also, these pillars are focused on enhancing relationships among different

Diagram 2. *Systemic Design Approach (Barbero, 2022)*

actors around the system. Another characteristic of the pillars is that they prioritise acting locally and building solutions, considering the humanity-centred design to consider all the actors involved in the system and its needs. On the other hand, the last pillar of sustainability talks about how systemic projects should consider using the outputs of a process as inputs of another to build more circular and sustainable practices.

However, for obtaining these solutions and analysis, it is essential to

follow five principal steps that help to develop projects, products, or services based on holistic diagnoses that include a general overview of the system and context in which an intervention is willing to be done. Below, these steps will be described and characterised to understand better how the systemic design method is developed.

1.3.1 Holistic Diagnosis

In pursuing a comprehensive and profound understanding of complex problems, traditional diagnostic approaches often focus on isolated aspects, failing to capture the intricate connections between various elements, which is essential for the systemic design approach. However, recognising the interdependence between all system components, Holistic Diagnosis (HD) has emerged as a robust methodology. HD involves an analysis incorporating field and desk research to discern the current scenario while considering the surrounding context and the flow of energy, matter, and information.

Holistic Diagnosis operates on the foundational premise that the components of any system, such as a biological ecosystem, a social community, or an industrial process, are intricately intertwined. By examining each element in isolation, valuable insights and some details might be missed, leading to incomplete and limited solutions. HD, therefore, seeks to transcend reductionism and adopts a holistic perspective, acknowledging the dynamic and complex relationships between the parts of the system. By moving beyond reductionism and acknowledging the holistic nature of reality, HD provides a more accurate and comprehensive assessment of current scenarios. Using this profound understanding, stakeholders can make informed decisions and implement effective solutions considering their actions' broader implications. Because of this, along with this project, two holistic diagnoses will be developed.

First, the HD needs to be done from the perspective of the territory (Leicestershire, UK) to understand all the possible connections and opportunities that can be found in the territory in which the project will be applied. After this, the holistic diagnosis will be applied to the company (Papillon Bleu) to understand its nature, goals, and ideals to design a system that responds to all the needs and ideals of the company, acknowledging that it is part of a bigger context inside a territory, with connections with other actors.

1.3.2 Challenges and Opportunities

Implementing the Holistic Diagnosis has changed the organisation's approach, providing an interconnected and profound perspective of the territory and the company's operations. This method has led to a comprehensive understanding of various influencing factors in the organisation's ecosystem.

With this broader vision, Holistic

Diagnosis has uncovered various challenges impacting the current scenario. Rather than viewing these challenges negatively, the approach encourages a shift in perception. Each challenge is seen as an opportunity for growth and positive change, potentially improving the entire system.

This mindset shift empowers the organisation to approach challenges with curiosity and enthusiasm, recognising them as catalysts for innovation. The interconnected nature of the Holistic Diagnosis enables a deeper understanding of the system's intricacies, leading to the exploration of holistic and multifaceted solutions. Additionally, the Holistic Diagnosis provides a broad and encompassing perspective, allowing the organisation to navigate complexities with greater efficiency. Equipped with this comprehensive vision, the organisation can propel itself toward growth and resilience, embracing opportunities for improvement to create a dynamic and adaptable future amid ever-changing circumstances.

Different levels of analysis must be considered to identify the territory's challenges, including the environmental, economic, social, and flows, to analyse the territory from different points of view, obtaining a more extensive panorama of the context. On the other hand, when analysing the company, the axis of analysis needs to be focused on the criticalities of the productive process for what concerns: supply chain and relations (logistics, suppliers, customers...), productive process (energy, efficiency, impacts...), and finally, flows of energy, matter and information (quality of inputs and outputs, waste management).

The systemic project could be developed more appropriately and systemically by crosscutting the two analyses to determine the connections and the relations between the different levels. However, to identify system challenges, it is necessary to rely on both desk research, involving literature reviews on official databases, and field research, which includes interviews with relevant stakeholders at all levels within the territory and company. This critical combination ensures a comprehensive and well-informed understanding of the issues that are being studied.

Besides, the identification and analysis of opportunities must also be done from the point of view of the territory and the point of view of the company, understanding that all of the challenges obtained in the last analysis could be seen as an opportunity for the systemic project to valorise the company and the territory. In this way, for each level of challenge, multiple opportunities must be identified, as well as possible solutions for the problems. For this phase, desk and field research will also be used to have an extended range of analysis and possible ideas.

1.3.3 Systemic Project

The rigorous examination of Challenges and Opportunities has yielded diverse, well-suited solutions

with great possibilities for the company and its territorial context. By delving into the complexities of the challenges and seeking out opportunities, a comprehensive understanding of the system's dynamics has been achieved, paving the way for transformative changes.

The next crucial phase, the Systemic Project, entails a meticulous definition of multi-criteria analysis. This thoughtful approach identifies and selects the most optimal opportunities for the given scenario. With a keen focus on integrating the best options into the system, this step sets the stage for implementing impactful improvements and fostering positive transformations, comparing the initial production process and the one modified with the systemic project to ensure benefits and positive changes in the company and territory.

This thorough evaluation sheds light on the advantages and potential drawbacks of the new approach and offers invaluable insights into the system's adaptability and resilience. By embracing a systemic perspective and adopting a multi-criteria analysis, the organisation is empowered to unlock the full potential of its resources and seize opportunities for sustainable growth and progress. This holistic methodology ensures that every facet of the system is considered, leading to innovative solutions that propel the company and its territorial environment toward a brighter and more prosperous future.

After this, the next step would be to select the opportunities that match more appropriately with the system that is being designed. Only some opportunities perfectly align with the unique context of the application and its distinct characteristics, necessitating a careful and customised approach. A tailored multi-criteria analysis is employed to achieve this goal, specifically tailored to the context and project at hand. This analysis serves as a compass to navigate the many opportunities and identify the most fitting ones that align with the organisation's goals.

In defining these selection criteria, it is crucial to consider the five fundamental Systemic Design principles and leverage the insights gleaned from the Holistic Diagnosis. By adhering to these foundational principles and drawing upon a comprehensive understanding of the system's intricacies, the project can be supported with a well-informed and strategic decision-making process that leads to optimal outcomes.

After identifying and selecting the opportunities, it is time to set them in motion and seamlessly integrate them into the system. As these chosen opportunities take hold, a remarkable transformation unfolds, redefining the system's flows, processes, and features, leading to the emergence of novel relationships, actors, and boundaries. This shift marks a departure from the conventional linear model, giving way to a dynamic and interconnected systemic model for the future.

1.3.4 Outcomes

The transition from a linear to a systemic model instigates a cascade of consequential effects, permeating the company and its broader context. The significance of this transformation demands a thorough examination that goes into a deeper level of observation. A comprehensive analysis with a holistic and extensive perspective becomes indispensable to gain a deeper understanding of these intricate consequences.

To comprehend the outcomes arising from this paradigm shift, a meticulous correlation of data obtained from the Holistic Diagnosis with the new elements introduced in the Systemic Project is imperative. This correlation allows for a nuanced exploration of the potential repercussions, shedding light on the dynamic interplay between various system components. Through this exploration, the objective is to establish a series of practical assumptions and precise quantitative/qualitative forecasts of the results stemming from adopting a systemic model in a specific territory.

According to this, examining Outcomes encompasses various categories, encompassing diverse aspects of the system's functioning. Furthermore, the analysis explores this paradigm shift across different possible scales and timeframes, offering a panoramic view of the potential long-term and short-term impacts.

This foresight empowers decision-makers to devise strategies that optimise the benefits of the systemic model while proactively addressing any potential challenges. Exploring these outcomes, the path of discovery, reveals insights that enable the organisation to adapt to systemic transformation confidently. Armed with this comprehensive understanding, the organisation stands ready to embrace innovation, foster sustainability, and effect transformative change on a grand scale.

1.4 Design Value Framework

The Design Value Framework was created by the Design British Council in their Design Economy research, aiming to reveal and assess the social, environmental, and democratic impacts of design alongside financial metrics. This framework will be instrumental in evaluating the overall value of the design economy. It can serve as a valuable tool for designers and commissioners to recognise the holistic value of their projects.

Developed collaboratively with BOP Consulting and the Social Design Institute (SDI) at the University of Arts London (UAL) through a deliberative research process involving stakeholders across the Design Economy, the Design Value Framework is an ongoing project. It was intended to further refine it during 2022-23 by applying it in various sector organisations. It not only builds upon existing design sector-specific tools but also, for the first time, provides a unified framework applicable across the entire design sector, encompassing a comprehensive set of values. This framework intends to

demonstrate the vital role of design in addressing pressing global challenges and advocate for integrating these vital values into the heart of all design practices.

The Design Value Framework serves as a structured and comprehensive tool for mapping and assessing the impact of design across four interconnected domains of value: sociocultural, environmental, democratic, and financial-economic. This framework enables recognition of both positive and negative impacts resulting from design endeavours.

One of its primary functions is identifying and measuring the significant impact, guiding design with intentionality. The Design Value Framework further offers suggested indicators and references to tools that can be utilised to quantify these impacts.

Comprising two essential elements, the framework consists of a Value Map, which outlines the four domains of design value (sociocultural, financial, environmental, and democratic), highlighting the two mechanisms of design where impact occurs (design projects and processes and the activities of design organisations), along with the diverse activities encompassed within them.

Additionally, the framework incorporates a Value Assessment Table, presenting example indicators and referencing relevant tools that can be employed to measure the impact of design. With the Design Value Framework, it is possible to understand and evaluate the multifaceted effects of design, giving the possibility of making informed decisions and designing with a purposeful and positive impact on society, the environment, and democracy.

1.5 Conclusions

In conclusion, according to the literature review and evaluation of the impact and importance of the systemic design method, embracing a systemic design approach in the textile industry presents a transformative opportunity to move toward a more sustainable way of managing waste. Prioritising upcycling mixed fibres over recycling them can significantly enhance the industry's sustainability. This shift aligns with the principles of the circular economy, fostering a regenerative and collaborative environment for local industries on the territory.

With its vast potential for improvement, the textile industry can undergo a profound transformation through systemic design. By embracing this approach, the industry can forge a better model that aligns with the circular economy principles, where waste is repurposed into valuable resources. In this context, hemp crops emerge as a promising avenue to explore, offering a sustainable and eco-friendly alternative to traditional materials. Integrating hemp into the industry upholds circular economy principles and supports regenerative agriculture practices, nurturing the land and revitalising local ecosystems.

The combination of systemic design principles, upcycling, and the incorporation of hemp crops enhances the textile industry's environmental impact and paves the way for a more resilient and collaborative future. A dynamic and mutually beneficial relationship is established between the textile industry and the local community through regenerative agriculture practices. This synergy fosters innovation, promotes sustainable growth, and creates a thriving environment that values and uplifts local industries.

Applying systemic design principles to the textile industry, coupled with the emphasis on upcycling, hemp crops, and regenerative agriculture, represents a pivotal shift towards a circular and regenerative future. By embracing these opportunities, the industry can set a transformative example for sustainable practices, leading toward a more harmonious and prosperous end for the textile industry and the community it serves.

02

Holistic Diagnosis of the Territory

2. Holistic Diagnosis of the Territory

This chapter focuses on the comprehensive development of research on various territory components. These components encompass demographics, culture, economy, agriculture, and other pertinent aspects. The primary focus of this thesis revolves around a specific company in Leicestershire, United Kingdom. An extensive range of resources was employed to establish a robust foundation for studying the territory in-depth, including reports, scientific articles, academic databases, books, scientific journals, and relevant government agency pages. This exhaustive approach ensured a clear understanding of the territory, enabling the possibility of identifying its strengths and weaknesses effectively. For this part of the project there was created a Gigamap for the analysis of the territory holistic Diagnosis that could be seen in the Annex 1, where all the analysis and compilation of data was summarised and can be visualised.

2.1 Territory

2.1.1 U.K. / Leicestershire

1. North West Leicestershire
2. Charnwood
3. Melton
4. Hardborough
5. Oadby and Wigston
6. Blaby
7. Hinckley and Bosworth
8. City of Leister

Figure 1. *Location of Leicestershire, UK*

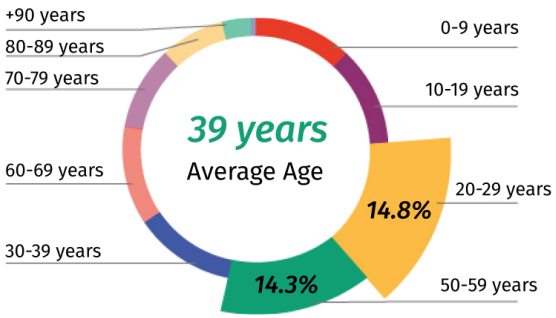
Leicestershire emerged as a significant county divided into eight districts tying in the administrative, geographical, and historical aspects that connect it to the vibrant East Midlands region in the U.K. From the 19th century until the end of the 20th century. This land was a melting pot of robust industries that left a mark on its history. The hosiery, footwear, engineering, mining, and textile sectors interwoven the fabric of its development, shaping a solid economic landscape; names like Corah, Wolsey, Bentley, Stibbe, the British United Shoe Machinery Company, and the British Shoe Corporations echoed both within their borders and beyond. Such was the magnitude of Leicestershire in this area that the land was established as a haven for employment for men and women in various areas of the industry it sheltered.

Due to the scale of the clothing industry in Leicester, it was named the second-

richest city in Europe in the 1930s. This period is remembered as the golden age, which at the beginning of the 20th century was recognised for 'dressing the world' thanks to the significant presence of the textile industry and people who came to the territory in search of their products. Sometime later, Leicestershire had such a large increase in the industry that it fell into the production of fast but low-quality garments, leading to a bad reputation, a decline in international customers, and legal repercussions in the industry. In 2019, the European Union presented the European Green Deal, a roadmap for making the E.U.'s economy sustainable by turning climate and environmental challenges into opportunities across all policy areas; this promoted environmental awareness among companies and called attention to the amount of waste they were generating.

2.1.2 Demography

Leicestershire, in its demographic condition, has a population of 712,300 inhabitants that give life to its streets and industries; the county reveals a population density of 495 individuals per square kilometre, tracing a dynamic and diverse population, of which 51% give life to female identity, in confront of the 49% of male identity, generating a balance that enriches the community. Also, the population of Leicestershire has an average age of 39 years, of which the

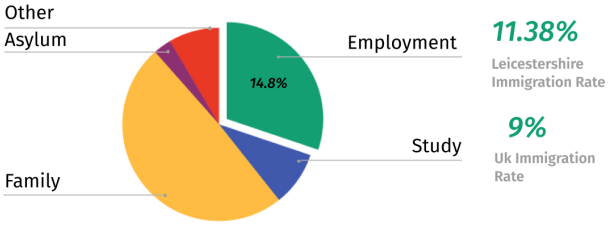


Graphic 1. *Leicestershire inhabitants divided by age groups*

highest percentage corresponds to the range between 20-29 years with 14.8% and 50-59 years old with 14.3%, which means that the community has an average working age and can also contribute much more to the economy and the industrial territory.

However, this region has a storied history of immigration, with a significant percentage of 11.38% of its population stemming from diverse origins. In 1972, in Uganda, under the grip of a dictatorship of that time, the expulsion of all Asians residing in the country was decreed. This led to individuals of Asian descent and their families emigrating to the U.K., settling mainly in Leicester. Since then, the fusion of Asian, African, and British cultures has profoundly enriched the cultural life of the territory; these immigrants have left their mark on the economy, gastronomy, and local culture, resulting in a harmonious blend present today.

Considering this profound historical



Graphic 2. *Leicestershire immigration reasons*

context, the motivations behind migration in this territory are multifaceted. A remarkable 49.2% of individuals choose to relocate for family unity, strengthening the bonds that bind generations across borders. Job opportunities also play an essential role, with 30.2% seeking employment prospects that transcend national borders. Pursuing education is another driving force, as 9.2% opt to enrich their academic journey within the diverse Leicestershire community. In essence, Leicestershire's demographic composition forms a resilient and united community. The threads of history and migration have interwoven to create a tapestry of humanity, where stories from different corners of the world are intricately connected.

2.1.3. Geography

Leicestershire has a total area of 2,157 km2; within the territory can found different altitudes with a maximum of 274 masl and minimum of 17 masl that make up a territory full of geographic diversity, as it has several hills, valleys, important lakes such as the Charnwood lake with an area between 100 thousand and 150 thousand square metres, the Stoney cove or the Belvoir lake that delves between

TOTAL AREA **2157 km²**

MAX ALTITUDE **274 masl**

MID ALTITUDE **97 masl**

MIN ALTITUDE **17 masl**

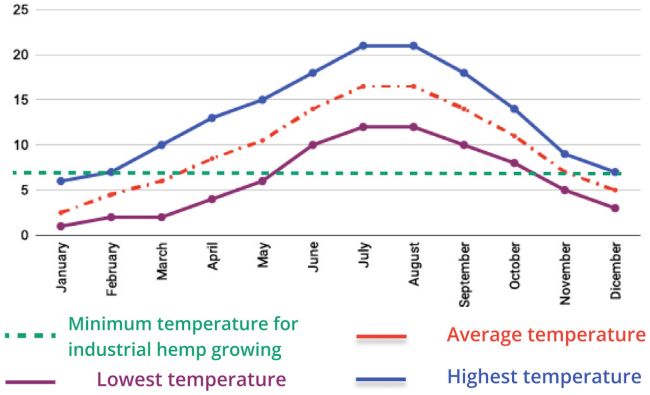
GEOGRAPHICAL COORDINATES

52.6386° N 1.1317° W

Figure 2. *Area, altitude and coordinates of Leicestershire*

50 thousand and 100 thousand square metres, rivers with lengths up to 400 kilometres as the Jordan river, or slightly smaller ones like the Tweed River, Welland, Soar or Avon, volcanic sandstones, coal deposits, or forests like Fosse Meadows Nature Area, Charnwood, Swithland Woods, Martinshaw Wood, among others.

The diverse range of altitudes and soil compositions results in varying regional temperatures. On the one hand, the annual average



Graphic 3. *Average temperature per year*

temperatures exhibit distinct patterns: spring temperatures fluctuate between 6ºC and 15ºC, summer temperatures span from 16ºC to 23ºC, autumn settles within a range of 15ºC to 8ºC, and winter temperatures fall between 0ºC and 5ºC. This climatic diversity has a significant impact on the region's overall well-being. Depending on its location, the territory can experience positive effects on agriculture since 80% of the territory is occupied by agriculture. This dynamic climate proves advantageous for cultivation and trade, as different seasons and plant types find conducive conditions for growth.

2.1.4. Economy

As far as the county's economy is concerned, there is a notable advantage in its strategic position. The territory hosts the second-largest cargo airport in the U.K., giving it significant logistical potential. In addition, its network of main railway lines extending from south to north and from east to west further contributes to its connectivity and attractiveness as a critical point for trade and distribution. Hence, the region generates approximately £9.2 billion in Gross Value Added (GVA) annually. GVA is a metric that assesses the worth of goods and services created within an economy's specific geographic area, industry, or sector. It plays a critical role in calculating the Gross Domestic Product (GDP), a vital indicator of a nation's economic health and growth. GDP represents the total monetary value of all products and services generated within a country during a specified time frame. This measurement empowers the region to explore various avenues for growth and recognition across its diverse industries.

On the other hand, concerning the industry and its productive sectors, Leicestershire is distinguished by having a 97% employment rate, in sharp contrast to a 3% unemployment rate, according to data recorded in 2022. This is highly advantageous because the abundance of industries and small businesses makes finding employment more effortless compared to other places. Regarding the business fabric that is in the territory, in 2017, large companies made up 0.03%, medium-sized companies occupied 0.6%, small businesses covered 7.1%, while micro-enterprises accounted for an impressive 92.27%. This scheme highlights the overwhelming presence of micro-enterprises, suggesting the possibility of creating economic clusters essential to emerging industries on the territory.

These companies are divided by type of industry and by productive sector; present in the territory are about 75.4% of companies in the third sector and 19.8% in the second sector. On the other hand, the leading industrial

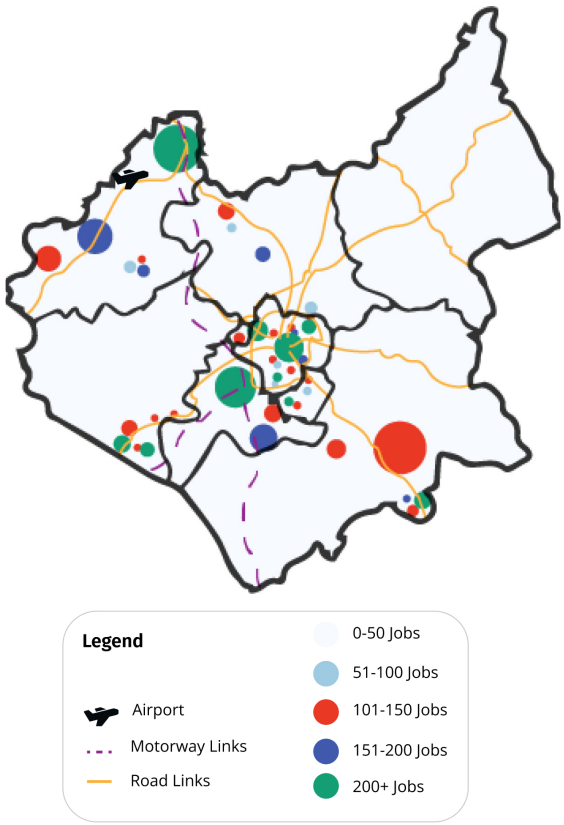
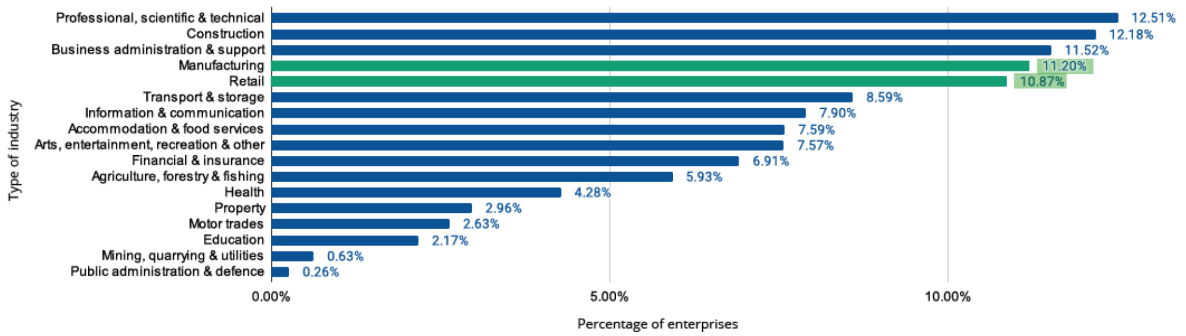


Figure 3. *Work activity in terms of jobs and job opportunities per year*

types of the territory are the construction, manufacturing, and retail industries. This can mean that different industry sectors can generate collaborations in different parts of the productive process and have collaborative growth between different industries and products to launch in the market.



Graphic 4. *Enterprises by type of industry*

2.1.5. Agriculture

Regarding agriculture, Leicestershire is fortunate to have 80% of the agricultural area divided into approximately 2,162 farm holdings that use their land and cultivate different products. Among those, some grow cereals with approximately 95,000 hectares, equivalent to 50.1% of the territory, representing many people and farms dedicated to this crop and a high demand in the food industry. Moreover, grazing livestock has almost 35,000 hectares, corresponding to 18.5% of the territory, which means the second highest percentage in the territory and which, thanks to the geographical characteristics of the territory, allows different types of grazing in the place, for example, there is a characteristic sheep of the territory called Bluefaced Leicester sheep or the Welsh Mule that place the territory as the focus of some companies whose focus is breeding or wool products. This type of sheep, in particular, is characterised by having the softest wool in the U.K., being light and having a long and firm structure.

On the other hand, other smaller percentages are found in agriculture. These include mixed crops, which represent 14.5%, daily crops 8.3%, general crops 6.4%, and 0.8% dedicated to horticulture. In terms of the poultry industry, it occupies 0.6% of the territory, while pigs occupy 0.5%.

Additionally, a tiny percentage of

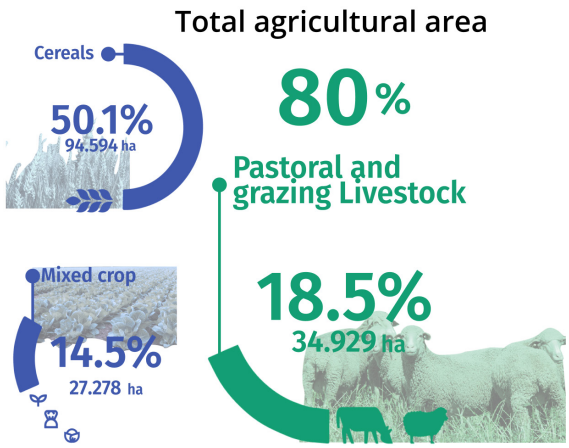


Figure 4. *Percentage of area in agriculture*

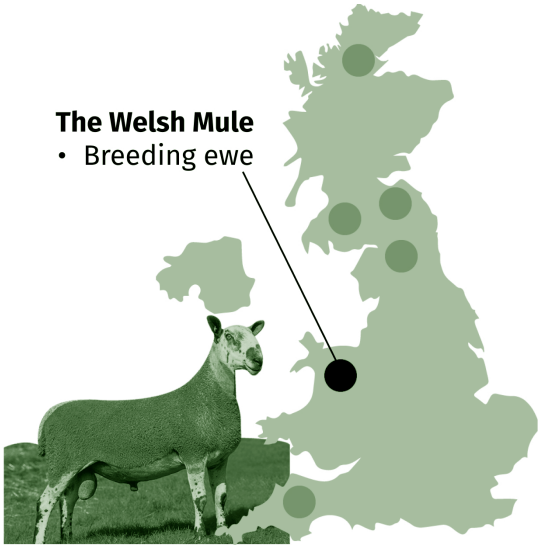


Figure 5. *Location of different breeds of sheep in U.K.*

0.002% of the land has not been classified, from which a piece can be attributed to hemp cultivation, as the soil is quite suitable for its cultivation and growth in different seasons. In comparison with statistics of the U.K. are 17.2 million hectares, of which only 800 hectares are dedicated to the cultivation of cane, which means 0.005% of the territory is dedicated to the production and cultivation of industrial hemp; this small percentage is mainly due to misconception about the plant because is often confused with its close relative marihuana, is subject to various misconceptions that hinder a clear understanding of its potential benefits. The most common misconception is that hemp can induce a psychoactive "high" similar to marihuana due to its association with the cannabis plant; however, the true potential of hemp is that it is a very versatile plant with different applications in textiles, construction materials, biofuels, paper, and more. Nevertheless, in the same way in the legal aspect, there are some strict guidelines and regulations that put a barrier to being able to grow this type of crop; that is why so many of the farmers who today have this type of crop see flaws in that these licences to have this type of crops are effective too late for the time when the hemp is grown, or that these types of licences are too expensive to subsidise by themselves. Hence, they look for alternatives in banks or other people when they say that the U.K. government should subsidise it in a certain way. This makes hemp like a rough diamond whose value and benefits are not fully recognised by many. With stronger government regulations and laws that promote more effective management and informed disclosure, some companies could take more significant advantage of their qualities and promote the correct use of this plant.

2.1.6. Education

Regarding education in Leicestershire, the county strongly emphasises promoting and delivering high-quality learning experiences across all levels, from early childhood to college. Moreover, there is a more significant number of nurseries (522 schools with approximately 5,700 students) compared to secondary schools, indicating a more concentrated infrastructure (114 schools with around 73,000 students). Regarding university programs at both the undergraduate and postgraduate levels, Business and Management emerge as the most sought-after field, accounting for 17.9% of enrollments in England. Programs in the medical field follow closely with 12% enrollment, while Social Sciences garner 10.3%. Additionally, Design,

Creative and Performing Arts studies attract 7.46% of students, and Engineering and Technology programs hold a 6.5% share.

In this way, in terms of universities or higher-level programs, Leicestershire has a wide variety of programs and opportunities for students to specialise in their areas of interest, from sciences, humanities, social sciences, and design, among others. It should be noted that Leicestershire has a history linked to the textile industry; different universities and master's programs are intensely focused

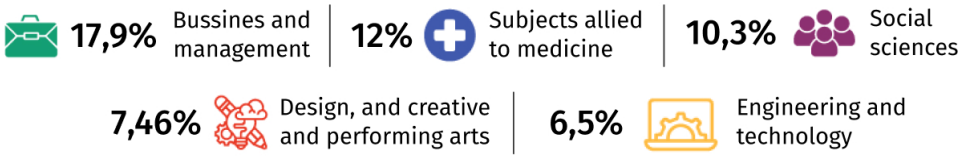


Figure 6. *Most chosen carreers in England*

on education in the textile and fashion world. For example, the University of Leicester, which is known for its research initiatives and contributions to various academic fields, covers topics such as textile technology, fashion trends, design techniques, sustainable processes and practices and more; this gives its students a broad vision as to the roles that they can occupy in the industry in fashion design, textile engineering, merchandising related fields.

In addition, the emphasis on textile education in Leicestershire is not only due to its historical importance but also as a way to promote and reinforce the territory's characteristics, encouraging talent and innovation in the textile and fashion sectors. Also, as the industry continues to evolve, grow, and become recognised, universities play a crucial role in the contribution and development of industry in the territory.

2.1.7. Innovation

Considering the above points, Leicestershire stands out as a county firmly committed to cultivating an environment of innovation, encompassing both the educational and industrial fields. Through this global perspective, the local community has pioneered forward-looking initiatives, showing advances ranging from remarkable advances at the product level to profound changes in production processes. The engineering field, in particular, has seen a momentous leap forward, with the textile industry emerging as an excellent example. Here, the integration of automation has not only reinvented conventional processes but has also driven exploration to the forefront of manufacturing techniques and technologies.

In parallel with this dynamic wave is the remarkable impetus that has ignited the growth and proliferation of numerous startups. These new

Figure 7. *Universities in Leicestershie*

companies, in turn, are uniquely engaged in innovative software engineering, developing digital marketing solutions, and shaping modern e-commerce contours.

Likewise, the far-reaching influence of recognised university institutions has acted, to a large extent, as a catalyst for innovative research initiatives and indelible entrepreneurship with a commitment to sustainable innovation. An example of this is the Sustainable Clothing Action Plan (SCAP), which aims to reduce the ecological footprint of the textile industry. This effort extends beyond the mere dimensions of waste management, resonating deeply with the broader community while permeating every stage of the production process itself.

These dynamics have strengthened the link between academia and industry and led to solid collaboration frameworks between the academy and some governmental entities. As a result, training centres have been established, which function as true centres of flourishing talents, resulting in experts in their work and tune with the demands of sustainability, thus laying a firm foundation for a future in which innovation coexists harmoniously with the welfare of the environment and the community.

2.1.8. Culture

The culture of Leicestershire is a fusion of various historical and ethnic influences that are reflected in all aspects of life in this county of central England. With a rich historical heritage dating back to Roman times and a central city, Leicester, which houses mediaeval monuments and historical sites, the region boasts an ethnic diversity that enriches its cultural fabric, such as the Belvoir Castle, Rockingham Castle, Shackerstone Museum, Charnwood Museum, National Space Center, among others. Diverse cultural traditions are manifested in gastronomy, entertainment, and equally lively art, with theatres, art galleries, and places for live music that stand out in their innovation. In addition, the territory has numerous festivals and events throughout the year, such as the Leicester Diwali Festival, the St George Festival, the Leicester Caribbean Carnival, and the Riverside Festival, that celebrate cultural diversity and reinforce the region's unique identity. However, it is not just the grandeur of the castles that shapes Leicestershire's identity; it is

the cultural fusion that colours every aspect of existence.

Figure 8. *Artisans, needlework and jewellery. (Goodbar, 2020)*

Nevertheless, it is not only in the grand celebrations and architecture that Leicestershire's essence shines. The everyday lives of its people, from the nimble fingers of artisans crafting intricate needlework and jewellery to the masterful strokes of artists painting their visions, contribute to a living embodiment of culture and creativity. The meticulous craftsmanship is a nod to tradition, a bridge between ages that brings the past into dialogue with the present. Moreover, they are present in various productive pursuits, including intricate needlework, knitting, jewellery crafting, artwork creation, ceramics, and waxwork, adding to the region's rich tapestry.

This diversity of craftsmanship resonates with the broader narrative of Leicestershire's culture, which is an intricate fusion of historical roots and contemporary influences, ultimately crafting its distinctive and exceptional identity within the broader context of the U.K. This blend of history and modern life creates a unique story that is genuinely Leicestershire. These are different things that work well together, like old and new, and a community proud of its diverse heritage. Leicestershire culture shows how diversity and change can work harmoniously in the U.K. landscape. This means that having so many small communities present on the territory, there may be opportunities for artisans to grow as a community along with their work or to make future partnerships and collaborations with small clusters to highlight their work and the scope of their products be much higher.

2.2 Textile District

The textile industry is part of a fundamental economic sector of the global economy and is one of the largest generators of employment in the world, mainly in developing countries. It covers the production of a wide variety of products related to textiles and clothing. It is an enormously diverse and constantly evolving industry. It has evolved from the artisanal production of fabrics to become a complex and interconnected network of activities ranging from the creation of fibres and fabrics to garment making and fashion accessories, which is an essential part of the daily life of people worldwide. It is also an industry that promotes creativity, technology and global trends that have made various

professionals, such as designers and engineers, work together to innovate in materials or production processes.

From the beginning, humans have searched for ways to cover and protect their bodies using natural materials such as wool, silk or cotton. Over time, however, the industry has undergone radical transformations driven by innovation and technology. The introduction of synthetic fibres revolutionised textile production by offering improved properties and greater versatility in terms of design and functionality. This has led to mass consumerism and fast fashion being considered the second most polluting industry on the planet, requiring large amounts of water to carry out its processes, emitting harmful gases into the atmosphere and generating large volumes of solid waste.

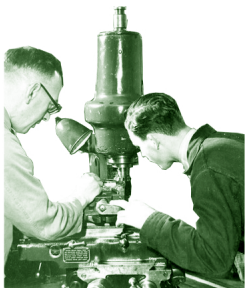
2.2.1 History

From the 1800s until the close of the 1900s, Leicestershire experienced a transformative era as several robust sectors converged to record its legacy in the country's history. The territory was intricately woven by domains covering hosiery, footwear, engineering, mining and textiles. Renowned names such as Corah, Wolsey, Bentley, Stibbe, the British United Shoe Machinery Company, and the British Shoe Corporations resonated within territorial borders and far beyond. The expansion of Leicestershire had such importance in this area that it became a centre of employment, attracting both men and women through many protected industries within.

Given the scope of the textile sector in Leicester, it was the second most prosperous city in Europe during the 1930s. This epoch is the era of magnificence, recognised as the "golden age", a period of the early twentieth century where the region's substantial textile industry gained a worldwide reputation, adorning

Figure 9. *Advertising -History of Leicestershire (Burrow, 1947)*

Figure 11. *Activity of the textile industry. (Shvets, 2020)*



Footwear **Engineering**.

Figure 12. *Main domains of the territory. (White, 1945)*

1.500 firms
In Leicester and Leicestershire

700 factories
that produce one million garments a week in Leicester

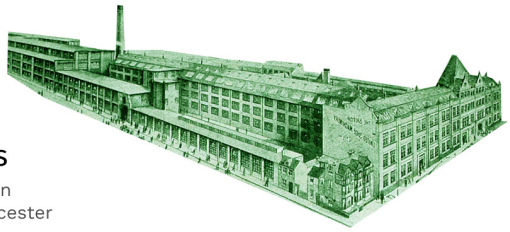


Figure 10. *Firms and factories on the textile district*

Figure 13. *Machinery of textile industry. (Kumar, 2021)*

Figure 14. *Fabric rolls. (Pexels, 2020)*

Hosiery

Figure 15. *Main domain of the territory. (White, 1945)*

the world and helping the livelihood of approximately 25,000 people who depended on the continued prosperity and persistence of the textile and clothing industry. In the case of women in this city, the field of clothing and textiles emerges as the primary employer, constituting approximately 20 percent of the total. Moreover, for those women who finish their early education, the textile and clothing industry emerges as the pioneer employer, opening the doors of their first work experience.

Over time, since the recession of the 1970s and the early 1980s, the industry has consistently struggled against these effects, as it led to a decline in demand for textiles and clothing products because consumers tended to reduce their spending. This directly affected the production and turnover of textile companies in the region. Many companies faced declining orders, which led to reduced production and, in some cases, the need to cut the workforce. From then on, Leicestershire witnessed an unprecedented rise in the industry, inadvertently entering the realm of fast but poor clothing production, also called 'fast fashion'. Added to the situation in Britain with Brexit and the instability of the pound sterling, which generated a blurred reputation, a decline in demand and international sponsorship and legal ramifications within the sector.

By 2019, the European Union unveiled the European Green Deal, an exhaustive blueprint steering the E.U.'s transition toward a sustainable economy by metamorphosing climate and environmental challenges into avenues for progress across all sectors. This initiative catalysed a heightened ecological consciousness among enterprises, spotlighting their burgeoning waste footprint.

Today, the textile district of Leicestershire ranks second in size, only after Manchester. Moreover, it has different types of organisations collaborating in different parts of the textile industry, like Next, Boden or Missguided. These entities contribute innovative projects that enrich the industrial landscape. However, between the confines of Leicester and Leicestershire, there are around 1,500 companies, of which 700 are factories that, in Leicester alone, generate approximately one million garments in a week. This sector comprises at least 2,000 local businesses, of which three-quarters are micro-enterprises.

Equally, the county capitalises on its strategic position as a distinctive element that positively impacts both micro-industry and macro-industry. This region hosts the second-largest cargo airport in the U.K., giving it significant logistical potential. In addition, its network of main railway lines, which extends from south to north and east to west, further contributes to its connectivity and makes it a key point for trade and distribution, either nationally or internationally, towards nearby ports. As a result, the territory generates around £9.2 billion in GVA annually, providing a solid foundation for expanding and recognising its various industries in all directions.

2.2.2 Fast Fashion

Fast fashion, characterised by the rapid production of trendy and cheap clothing, has found a foothold in Leicestershire due to its historical textile heritage and manufacturing capabilities. This approach has led to an increase in the volume of garment production, with a focus on quick turnarounds and staying abreast of the latest fashion trends.

In itself, this has many adverse effects on both society and the environment. The accelerated production and volatility of fashion trends encourage intensive consumption of clothing and natural resources, energy and water. The expansion of fast fashion has led to intense global competition, in which local companies in Leicestershire compete with international giants. This rivalry can pressure local businesses to cut costs and keep pace with the latest trends, which can sometimes affect the quality and sustainability of products. At the time, it was estimated that between 75% and 80% of total production in Leicester focuses on fast fashion.

In addition, this excessive consumption results in many discarded garments, contributing to increased waste and pollution in the county. Despite this, some companies in Leicestershire are adopting more responsible practices, such as using green materials and implementing fair working conditions.

Furthermore, given that it is a territory with a relatively high percentage of job opportunities, Both students and locals and foreigners desperately seeking work are taken advantage of by companies that need staff and pay poor wages of up to 3 pounds an hour and almost a complete absence of employment contracts, medical or work insurance. Of these workers, 33 per cent are foreigners. This put Leicestire at the centre of fast fashion, leading to several legal import implications or strict re-regulation related to quality, occupational safety and environmental protection.

This brought some social implications; for example, with the COVID pandemic, some companies doubled their staff, and some employees began to have health problems, so not getting an answer from any job

Figure 16. *Fast fashion workforce (Perinelli, 2022)*

insurance companies, they began to file complaints with official bodies like HSW (Health and Safety at Work) and HSE (Healthy, Safety, and Environment) that are entities that are focused on ensuring a safe and healthy work environment for employees. This includes identifying and mitigating workplace hazards, safety training, promoting good practices, and implementing policies

and procedures to prevent accidents and injuries in the workplace. Given this situation, they took action in the matter and today are investigating and being aware that fair contracts are made, there is a good working environment, and no human rights are violated.

2.2.3 Waste Management

Waste is divided into different categories to facilitate its proper disposal. On the one hand, there is the category of general waste, which in Leicestershire, for example, reaches 305,000 tons per year. Of this amount, 45% is recycled in different subcategories, such as clean plastic residue, liquid residue, clean paper residue, pharmaceutical residue, hazardous wastes, glass residue, organic residue, clinical residue, chemical residue, textile waste, metal waste, industrial waste from surrounding companies (including oil or asbestos waste), wood waste and electronic waste. These efforts position the territory with a significant recycling percentage compared to other counties.

On the other hand, retail waste includes waste generated in the commercial sphere, especially in shops and points of sale. This waste includes packaging, boxes, bags and packaging, unsold labels and discarded products. It is estimated that at least 16,838 tonnes of retail waste are disposed of annually in the U.K.

There is also textile waste, which includes waste generated along the textile and clothing production chain. This ranges from surplus fabrics and scraps to waste generated during garment making, including garments discarded by consumers. These wastes can have an organic origin, such as cotton, linen or silk, and a synthetic origin, such as nylon or polyester. In this context, it is estimated that at least 921,000 tonnes of textile waste are disposed of in the U.K. 67% are used textiles collected for reuse or recycling, giving rise to new garments or other products made from this material. The remaining 33% is intended for household waste, that is, clothing or material that is not easily

Figure 17. *General retail waste (Mukhina, 2023)*

recyclable or compostable and usually ends up in landfills or incineration.

Given this situation, there are some entities and organisations that are aware of the situation and that are tempted to make a difference and an impact on the environment; for example, “Textiles 2030” represents a cutting-edge initiative that capitalises on the knowledge and experience of U.K. sustainability leaders, to drive the country’s textile and fashion industry towards a circular economic model. This roadmap brings together various textile and clothing entities in the U.K., encouraging collaboration for bold science-backed progress on climate action and a more circular

approach. This agreement stems from the learning and success base of SCAP 2020 (Sustainable Clothing Action Plan), which previously successfully brought together fashion retailers, charities and textile recyclers to mitigate the impact of clothing consumption in the U.K. Over the period from 2012 to 2020, this pioneering industry-led action plan generated positive environmental and economic results for fashion and textile entities in the U.K. with a progressive perspective.

2.2.4 Initiatives / Material Innovation

Considering the above, it is worth highlighting some organisations and entities that try to fight against all forecasts of fast fashion and textile waste in the country and the county, each putting a grain of sand to create innovative initiatives. To begin, a climate action NGO born in the U.K. in 2000 called WRAP wants to address the causes of the climate crisis and give the planet a sustainable future, taking into account that as much as the government, companies and citizens work differently, they want to inculcate a circular model in all industries they can. Likewise, WRAP is taking on a challenge working with the textile industry since it is a sector that contributes significantly to the global economy. However, with the production and consumption worldwide that generate severe environmental and social impacts, this NGO wants to take steps to transform the way textiles and clothing are bought, used and reused to create a circular economy for textiles and reduce GHG emissions (GreenHouse Gasses), water and pollution in general.

Also, within this organisation, different initiatives are developed to reach the common goal of making the textile industry more circular, among them the "Textiles 2030" mentioned above, which leverages the knowledge and experience of sustainability leaders to accelerate the advancement of the textile and fashion industry towards circularity and change in the UK. so is the "Textile Action Network" that brings together companies, governments and citizens to transform the landscape of the industry by working collaboratively, but each in its local context, sharing practices and knowledge to gradually go creating a circular economy for fashion and textiles, in the same way, have created a guide "Retailer Clothing take-back guide" designed for these retailers that help reuse or recycle the waste generated by their store by creating plans for returning clothing, also creating awareness among recurring customers of these types of sellers.

Figure 18. *Example of some Upcycling centres (ReWorKing, 2023)*

Figure 19. *Leicester Innovation Hub. (LIH, 2021)*

Figure 20. *SCAP: Sustainable Clothing Action Plan. (Lodhia, 2022)*

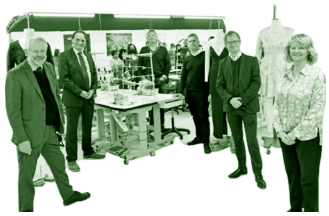


Figure 21. *Textile Training Centre (Short, 2021)*

Many of these initiatives were inspired by SCAP 2020, which was very present and was a success as it successfully brought together fashion retailers among them, industry-leading fashion brands, retailers, manufacturers, local authorities, recycling, reuse and waste management companies to reduce the impact of clothing consumed in the U.K. from 2012 to 2020, which generated environmental results (such as reducing carbon, water and textile waste impacts) and economic benefits for fashion and textile organisations. More than 90 organisations representing more than 48% of retail clothing sales in the U.K. voluntarily committed to SCAP, supported by several business associations, academic organisations, researchers, innovators, charities and campaign groups.

There are also initiatives promoted by the Leicester City Council, such as the "Net Zero Strategy", which establishes an action plan to achieve zero net emissions identified in six key areas: Transport, construction and energy, resources and waste, businesses/ enterprises and economy, community and nature and land use. The study aims to inform the development of coordinated climate action by citizens, businesses, public authorities and other stakeholders in Leicestershire. This implies that, in this case, companies must be more responsible with the materials and processes they perform in the company, as well as the waste and the environmental impact that this has, looking for reuse alternatives or applying proper recycling of waste.

On the other hand, in the county's textile industry, for example, the "Textile Training Centre" is another initiative that was born as an innovative project by the Leicester City Council to provide accredited learning and training for the textile industry and has partnered with leading training provider, Fashion Enter Ltd and local clothing company Ethically Sourced Products Ltd to develop this new centre of textile skills, the Leicester Fashion Technology Academy (LFTA) with the specific aim of working with its partners to address issues, raise standards and highlight best practices in the local textile industry. This "Textile Training Center" from Leicester is managed by Fashion-Enter Ltd, a provider specialising in technical training. It will allow people to work towards entry-level qualifications in the basic skills of the industry, including pattern making, tissue inspection, placement and cutting, machine maintenance and

sewing. Moreover, people can work to obtain advanced certificates and progress in one of Fashion-Enter's learning plans for retail/retail employers.

Last but not least, another initiative initiated by the University of Leicester in 2017 called the "Leicester Innovation Hub" fosters great ideas and makes them a reality by providing incubation space, support for innovation and access to facilities and funding for technical and academic expertise. It also supports students looking to launch their own startups to develop their entrepreneurial skills and identify essential opportunities in the industry. The University's commitment is to regional economic growth that relies on the combination of activities at the School of Business, the Leicester Innovation Hub and the Space Park Leicester to provide growth opportunities, business innovation and increasing productivity by adopting new digital technologies.

2.3. Industrial hemp

Industrial hemp, known scientifically as Cannabis sativa L., is a variety of cultivated plants due to its usefulness in various industrial and commercial applications. It is distinguished by its deficient levels of tetrahydrocannabinol (THC), the psychoactive compound present in marihuana; industrial hemp lacks psychoactive effects thanks to its minimal concentration of the compound mentioned above. This versatile plant finds applications in various industrial spheres, ranging from the production of fibres and textiles to the obtaining of oils, their incorporation in food and nutrition, the creation of construction materials, the elaboration of bioplastics, the manufacture of paper and the generation of chemicals and fuels.

Industrial hemp has fallen victim to several misconceptions despite its valuable historical contribution. It has been argued, for example, that its influence on health could be questionable, even attributing possible psychoactive effects. Also, the confusion with marihuana has been a constant. However, it is crucial to emphasise that any legal product derived from industrial hemp complies with stringent regulations, ensuring deficient THC levels. This misunderstanding overlooks the striking diversity of historical uses of industrial hemp. Over the centuries, this plant has played a significant role in various societies' economy, technology and culture worldwide.

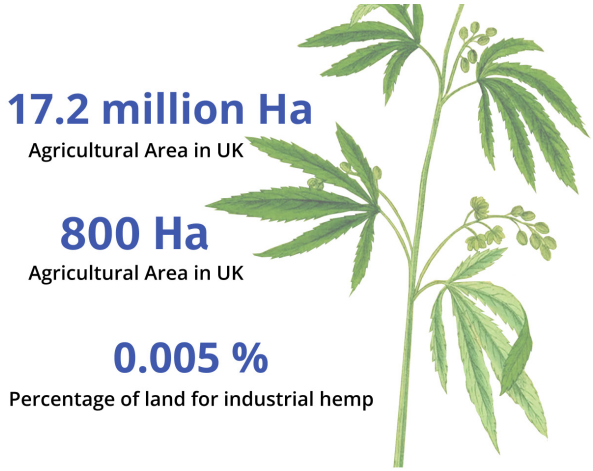


Figure 22. *Percentage of land for hemp*

Speaking of industrial hemp, it also has different advantages for the environment or land where it is grown, as it has excellent resistance and can thrive in regions where other crops would not survive. Nevertheless, it grows best at latitudes farther north, from the 42nd to the 45th parallel. It can withstand different temperatures or conditions, such as drought, high temperatures and frost conditions. In addition, its cultivation can be carried out without pesticides or other chemicals. However, there is the possibility that it suffers from the pest of harmful insects. It also does not require large quantities of water or constant and thorough care. Its growth and development rate is fast, reaching heights of up to 4 metres in just four months. In the case of Leicestershire, the best time to grow industrial hemp is between May and November, as average temperatures do not fall below 6 degrees and the crop grows in better conditions. This means that hemp growers seek to have the paperwork and licences ready for this season to start producing as soon as possible.

2.3.1. History of industrial hemp

This plant has its origins in Central and East Asia, more than 10,000 years ago, where ancient civilisations were highly valued due to its many applications that included the production of oils, fibres and other products. For example, China, India and Mesopotamia used the hemp fibres to make ropes, fabrics and paper. Even in European and American civilisations, this plant was a significant crop because it made fishing nets, textiles, ropes, and candles immensely appreciated because of their durability. In addition to its practical industrial applications, hemp was used for medicinal and spiritual purposes in various cultures to reduce pain and different medicinal aspects.

Throughout the centuries, hemp spread worldwide, driven by conquests, migrations and trade routes woven throughout history. His arrival in Europe during the 12th century B.C. marked the beginning of his growing influence in that region. However, during the Industrial Revolution, demand for hemp reached new levels, especially for the manufacture of ropes and sails indispensable in navigation and machinery. However, as this era progressed, hemp-based textile production began to be gradually displaced by cotton fibres.

In the middle of the 20th century, many nations began to impose restrictions on hemp cultivation because of its connections to marijuana. Today, however, society is witnessing a resurgence of interest in industrial hemp, motivated by its diversity of applications and its ability to deliver substantial environmental benefits. These benefits include soil regeneration and decontamination, water purification, carbon dioxide capture and the low need for pesticides and herbicides. The evolution of regulations at a global level has facilitated the gradual

increase in hemp cultivation, thus encouraging the proliferation of products, innovations and companies dedicated to taking advantage of this versatile material.

2.3.2. Industrial Hemp in the U.K.

In the 16th century at the end of the 16th century, hemp was legal throughout the United Kingdom. Its importance was such that in 1595 King Henry VIII issued a mandate requiring all farmers to cultivate a quarter acre of hemp for every 60 acres of their land. This decree was driven by rapid crop growth and superior strength compared to cotton, making it particularly valuable for producing ropes and sails for the navy.

Moving into the 1900s, the advantages of hemp growing became widely recognised worldwide. Unfortunately, this progress came with its disadvantages, and in the early 1900s, it became more profitable to import hemp from abroad than to cultivate it at home. As a result, hemp production in Britain fell steadily and sharply. The situation worsened when, in 1928, all forms of cannabis, including hemp, were banned in the U.K., a ban that included marihuana.

However, there was hope for the hemp industry in 1942 when an American chemist, Roger Adams, made the pioneering discovery of CBD, a non-psychoactive cannabinoid found in hemp. This was the first time a clear distinction was made between CBD and psychoactive THC in hemp; the following decades brought with them a deeper understanding of how these compounds interact within the human body. In 1993, the same year that cannabinoid receptors were discovered, hemp was legalised again in the U.K., laying the foundation for advances in the field for many industries that would emerge years after.

By the 2000s, in January 2004, after more than 75 years as a class B drug, cannabis was reclassified as a class C drug in the U.K. This was due to emerging evidence linking cannabis use to schizophrenia, which led to a hemp reputation being blurred again. However, five years later, cannabis was again reclassified as a class B drug. Recent studies indicate that schizophrenia is more likely to drive cannabis use than otherwise.

In 2010, in 2018, the then Secretary of the Interior, Sajid Javid, announced the intention of the U.K. Government to reconsider the classification of cannabis for medicinal purposes. Although CBD's possession, purchase and sale had become legal in the U.K., as long as their THC levels remained within specific limits, advertising with medicinal claims was still restricted. Nevertheless, in 2019, a significant development occurred when all CBD products, a staple of modern hemp use, were reclassified as "new foods." This caused many small businesses to emerge, and hemp grew in food, other textile products and construction products.

In the same way, in parallel, organisations such as the University of York, the Biorenewables Development

Figure 23. *Workforce textile industry. (Unsplash, 2020)*

Figure 24. *Textile use of hemp. (Kang, 2020)*

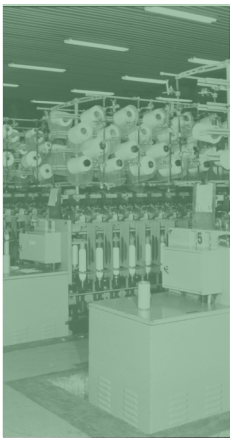


Figure 25. *Paper use of hemp. (Freestocks, 2017)*

Figure 26. *Use of hemp in construction. (Miroshnichenko, 2021*

Figure 27. *Leaf of hemp crop. (Freepik, 2019)*

Image 14. *Fabric rolls*

Figure 28. *Use of hemp in ropes. (Otto, 2018)*

Centre, Lucid Insight and Kepier & Company (Business and Management Consultants) developed a project called the Hemp-30 that consists of a strategy of 10 years until 2030 to increase the amount of cane grown at least 100 times a year than it is at the moment, this would make industrial cane become a crop of high importance in the U.K. The project is divided into two phases. In the first stage, more than anything, a study and debate are developed with the hemp production chain's stakeholders and the field's strengths and weaknesses are analysed. In turn, in the second stage, it is more practical to develop and demonstrate the innovations that are to be implemented, such as the breeding of new varieties of hemp, the development of new technologies to increase the yield of cane per hectare, demonstration of innovative on-farm technologies and development of U.K. supply chains, value and innovation for industrial waste. This project includes much valuable information for understanding the production chain and how farmers need more information and management of crops. Such initiatives are outstanding, as they seek to boost, educate and inform about a topic for many unknown.

2.3.2.1 Uses of Industrial Hemp

Industrial hemp offers a remarkable range of applications, showing its incredible versatility. Its robust fibres give rise to resistant and ecological textiles, while its seeds, rich in nutrients, serve to create food and supplements. In addition, hemp contributes to sustainable construction with innovative materials such as "hempcrete", and its oil forms a crucial ingredient in cosmetic and therapeutic products. In addition, the prospect of harnessing hemp for bioplastics, biofuels and soil restoration positions it as a strategic crop for a more sustainable future in multiple sectors.

The adaptability of hemp serves as the basis for various processes and the extraction of different substances. From leaves, roots and flowers, valuable organic components, such as oils and dry extracts, apply to nutraceutical and pharmaceutical products. These same elements are helpful in culinary and aromatic infusions. Simultaneously, the stems produce the essential fibre for textiles, biocomposites, packaging and nonwoven fabrics. These stems emerge useful tows, which serve as the basis for paper and fibre-related nutrition. In addition, Hurd, extracted from the stems, finds purpose in construction, soundproofing, animal bedding and biofuel. Finally, residual dust is beneficial in agricultural and

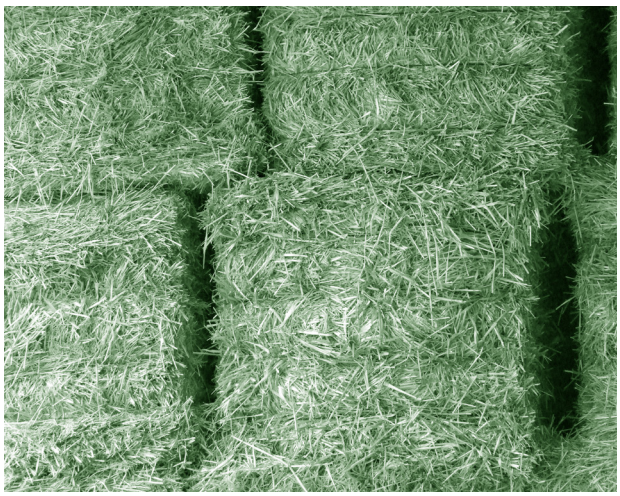


Figure 29. *Use of hemp in animal bedding. (Bazan, 2022)*

hydroponic contexts.

Likewise, seeds, an integral part of hemp cultivation, offer a treasure of resources. Omega-rich oil and oil seed cakes are valuable assets that serve human and animal nutrition, cosmetics, and agriculture.

The economic value of hemp is classified into four main categories: fibre hemp, oilseed hemp, hemp for medical applications and hemp for recreational markets. Fibre hemp applications include horticultural materials, biodegradable fertilisers, moulded products, paper, building materials, insulation, animal bedding, plastic composites and cellulose plastics. Hemp from oilseeds is mainly used in oil extraction, producing oil rich in essential fatty acids. In the medical and recreational sectors, hemp products contain compounds like CBD and THC. The combined potential of fibre and hemp from oilseeds embodies industrial hemp, reinforced by its role as a bioenergy crop, underlining its economic importance. In short, industrial hemp plays an essential role in promoting sustainability and diversification of industries. Its versatility, from textiles to food and construction materials, shows how it can contribute significantly to the economy and the environment. As more applications and benefits are discovered, hemp is consolidated as a valuable resource to drive a more sustainable and multifaceted future.

2.3.2.2 Regulations

The regulation of industrial hemp in the United Kingdom is overseen by the Misuse of Drugs Act 1971 and the Misuse of Drugs Regulations 2001. These guidelines stipulate that permits can be granted for the cultivation of cannabis plants containing minimal THC levels and for the production of hemp fibres for industrial use or the acquisition of seeds, subject to specific conditions and regulations. First, the THC content must be strictly below 0.2%, thus ensuring that hemp is not used for recreational purposes. Second, the processing and trade of any derivative of these plants are limited; only the trade in fibres, seeds and oils is allowed, excluding the use of “green” parts, i.e., leaves and flowers, because they are controlled parts of the plant.

Several types of licences are available to apply for at least three growing seasons, approximately three years. For example, applying for a new licence for industrial hemp can cost around 580 pounds, while renewing it may require around 326 pounds. In the case of requiring a compliance visit, the cost is £1,371. Furthermore, if it is a request for a licence to grow cannabis with high THC content, the cost can amount to 4,700 pounds. This shows that maintaining a crop and a hemp-based enterprise is challenging due to the great responsibility and cost of properly maintaining it.

However, the high investment in these licences, as noted in the “Hemp-30” mentioned above, has led many farmers to seek external financing or recourse to entities that can guarantee the economic viability of their crops. For this reason, many argue that

since it is an emerging industry, the government should consider subsidising these licences or providing support for the maintenance of these crops. This is because potential large-scale users would only invest in hemp as raw material if the supply is secure due to a limited number of producers. In turn, producers would not scale up their operations until markets for their products are secured. This could benefit both the government in boosting an emerging industry and for farmers and their businesses.

Moreover, certifications play a crucial role in ensuring the quality, sustainability, and transparency of products based on industrial hemp. The GOTS (Global Organic Textile Standard) certification enables the global commercialisation of organic textiles, guaranteeing their adherence to stringent organic standards. Similarly, the Organic 100 certification by Textile Exchange ensures the traceability of organic textiles across the globe, assuring consumers of their eco-friendly origins. Also, the EUROPEAN ECOLABEL certification actively promotes products with a reduced environmental impact, motivating manufacturers to adopt sustainable practices. Furthermore, the OEKO-TEX certification meticulously monitors and controls harmful substances throughout the manufacturing process, upholding the integrity and safety of natural fibre-based textiles. These certifications collectively contribute to a more sustainable and ethically conscious textile industry.

2.3.2.3 Hemp in the Textile Industry

Considering the past sections, hemp plays a rather important role in the history of man and, thus, the textile industry. This is because it is a natural fibre with very positive characteristics for the environment and the qualities of a high-quality textile.

Hemp fibre-based textiles are characterised by being quite solid and durable, which makes the fabrics wear-resistant without losing their structure. Even this type of textile is breathable and provides

Figure 30. *Hemp in the textile industy. (Poo, 2018)*

excellent ventilation to the body, as it can absorb moisture from the body, keeping people relaxed and comfortable. In addition, hemp is an ecological option as it requires less water and pesticides in its cultivation, which aligns with the growing demand for sustainable textiles. Its insulating and antibacterial properties provide comfort, and its versatility allows it to be mixed with other natural fibres.

Also, hemp, being natural, offers a distinctive fashion look.

Incorporating hemp in the textile industry responds to the need for environmentally friendly alternatives. From clothing, shoes, bags, accessories, home textiles such as bedding and towels, and even industrial textiles for applications such as automotive interiors, hemp offers durable and stylish options, contributing to sustainability and innovation in the textile sector.

These qualities converge to turn hemp into a crop of immense value with multiple potential benefits. Consequently, various entities and organisations are investing in developing and analysing new products derived from industrial hemp. This not only augurs a considerable increase in demand for industrial hemp but also promotes greater social recognition of a plant that not only lacks harmfulness but, on the contrary, confers significant benefits for everyone.

2.4. Conclusions

After a thorough and complete analysis of this territory, a series of key conclusions emerge that outline its potential and its future direction. First, it highlights its strategic location and connectivity, this advantageous geographical position is presented as a valuable asset that can be exploited to boost growth and prosperity in the region. Livestock and agriculture are essential pillars of its economy, supporting diversification and economic resilience, two sectors of great importance that contribute significantly to its economic development. These primary resources not only represent an essential source of income, but also support economic diversification and resilience to external challenges.

Also, Leicestershire's rich historical legacy in the textile industry allows a solid foundation from which the territory can excel in the current textile sector. Combining inherited skills and adapting to contemporary market demands can be engines of significant growth in this area. As regards the management of industrial waste, it is essential to recognise that, although steps are being taken to address this issue, there is still room for further progress. Especially in the context of fast fashion, the review of production processes and a more conscious approach to waste management could have an even more positive and sustainable environmental impact.

Finally, a significant advantage for the territory lies in the presence of numerous innovation programs and initiatives supported by governmental entities and organisations. These initiatives play an essential role in promoting circular production practices and raising environmental awareness in a variety of industrial sectors that can drive the territory towards development. Together, these conclusions set out a promising path for the future development of this region.

03

Holistic Diagnosis of the Company

3. Holistic Diagnosis of the Company

This chapter is focused on a holistic diagnosis that arises as an indispensable tool for the understanding and strategic development of the company Papillon Bleu; the objective is to analyse the essence of the company's fundamental aspirations and values and build a system that transcends mere functionality, aligning perfectly with their diverse needs and general ideals by involving relevant factors of territory and at the same time interconnected with various interest groups. For this same, be a guide for the analysis and be able to make a roadmap that not only navigates the complexities within the company itself but also navigates with the territory and its surrounding actors. Additionally, for this part of the project, a Gigamap was created for the analysis of the company holistic Diagnosis, which can be seen in Annex 2, where all the analysis and compilation of data was summarised and can be visualised.

3.1. Company: Papillon Bleu

Papillon Bleu is a textile company in the heart of Leicestershire, United Kingdom, with its origins in 2006. Over the years, this enterprise has embarked on a journey of growth and evolution, channelling its efforts towards creating textile products derived from natural fibres. In its pursuit of excellence and innovation, the company has meticulously crafted its strategies and operational processes, firmly anchored in four fundamental pillars that stand as the cornerstones of its development:

Sustainability: Papillon Bleu profoundly emphasises sustainability, recognising the importance of responsible and eco-conscious practices. The company is committed to minimising its environmental footprint while promoting practices that ensure the preservation of our natural resources.

Regenerative Agriculture System: At the core of its operations, Papillon Bleu champions a regenerative agriculture system. This approach prioritises sustainable farming practices and aims to revitalise and enhance the land's ecological health, creating a harmonious ecosystem.

Figure 1. *Main principles of the regenerative agriculture*

Ethical Production: Ethical production is a guiding principle for Papillon Bleu, reflecting its unwavering commitment to maintaining high ethical standards throughout its supply chain. The company takes great care to ensure fair treatment of workers, transparency, and ethical sourcing of materials.

Social Benefits: Beyond its business pursuits, Papillon Bleu actively seeks to contribute to the well-being of society. The company believes in harnessing its success for the greater good, endeavouring to create positive social impacts through various initiatives and community engagement.

Papillon Bleu has taken significant strides by forging partnerships with crucial territory stakeholders. Their overarching objective is to establish a robust hemp value chain within their organisation, primarily aiming to produce a groundbreaking natural fibre known as “Shemp”. This innovative material is crafted by blending 70% wool with 30% hemp fibre, a ratio that Papillon Bleu envisions evolving to an equal 50-50 proportion in the future. To accomplish this, the company is developing a pilot with the collaboration of various stakeholders.

Figure 2. *Variety of uses of the material. (Lion, 2020)*

This pioneering effort is the nucleus for the initiatives that Papillon Bleu is willing to undertake. Foremost among these is the company’s commitment to adhering to regenerative agriculture principles, ensuring that its production processes align harmoniously with environmental sustainability goals. Furthermore, the company is diligently steering its production procedures towards achieving a zero-waste paradigm, minimising environmental impact while maximising resource utilisation.

In tandem with these sustainability endeavours, Papillon Bleu aspires to foster community and knowledge-sharing among its workforce. The company is contemplating the establishment of a farmer community, a platform that would enhance the skillsets of its employees and facilitate meaningful engagement with the local communities within the territory. This community-centric approach bolsters the company’s human capital and solidifies its ties with the region it calls home.

Moreover, Papillon Bleu is proactively building a network of partnerships with like-minded companies that share their dedication to growth, innovation, and sustainability; additionally, the company is improving their web page to facilitate communication. These collaborative actions extend beyond their operations, creating a collaborative

ecosystem where knowledge, expertise, and sustainable practices are shared and amplified.

In essence, Papillon Bleu's visionary pursuits extend far beyond the realm of textile production. They encapsulate a holistic commitment to innovation, sustainability, community building, and collaborative progress, exemplifying the company's role as a trailblazer in the textile industry and a catalyst for positive change within the territory.

3.1.1 Hemp Productive Process Analysis

Papillon Bleu has established a pilot program for producing Shemp, needing a well-structured and efficient industrial hemp production process. The company strongly prefers an industrial approach where each phase of the production process is automated using machines. The reason behind this preference for mechanisation lies in the potential for scalability. Automating the process increases efficiency and facilitates seamless expansion as it is already geared towards automation. The production process of industrial hemp at Papillon Bleu is distributed across various geographical areas within the Leicestershire territory. Initially, the first three phases of the process are undertaken within the company fields. At the same time, the subsequent stages are carried out in collaboration with a local stakeholder known as Huit Farm. This production process encompasses several critical stages, from cultivation to producing textile products from different types of fibres. Therefore, here is a comprehensive overview of our production process, which can be seen in Annex 2:

Cultivation: It all begins with the cultivation of hemp plants. Hemp seeds are sown densely to encourage the growth of tall, slender stems with a higher concentration of fine fibre. Proper cultivation practices are essential to ensure the quality of the final product.

Harvesting: Hemp plants are harvested after they have flowered but before they start producing seeds. This is because the fibres tend to become coarser once seeds form. The primary outputs of this stage are the hemp stalks and flowers, which are valuable raw materials for the textile industry.

Retting: Retting is a crucial step where natural processes, such as exposure to moisture or chemical treatments, break down the pectins that bind the hemp fibres to the plant's woody core. This process loosens the fibres and prepares them for further processing.

Breaking: The hemp stems are passed through a breaker or fluted rolls after retting. This mechanical process separates the fibres from the woody core and generates energy as a valuable byproduct.

Scutching: Scutching involves the meticulous separation of the desired fibres from the woody core of the hemp plant. This stage results in multiple outputs, including wood from the stems, hemp hurd (inner woody fibres), hemp mulch, and seeds, which can be further utilised.

Hackling: In this stage, the fibres are combed to remove any remaining woody particles and to align them into a continuous sliver. Hackling produces various materials, including dirt, soil, woody particles, and long and short hemp.

Roving: The sliver produced during hackling is twisted and drawn out further to improve its strength. It is then wound onto spinning bobbins. While this stage consumes water and energy, it yields fibres better suited for textile applications.

Spinning: The fibres go through the spinning process, which can involve various sub-stages such as separation and refining, blending, carding, and ring spinning. Fibres can be dry spun, or water spun depending on the desired thickness of the yarn. This phase generates outputs like water and energy, vegetation waste and short fibres.

Weaving: Once the fibres are spun into yarn, they are woven into textiles. Hemp textiles have the advantage of improving and softening with age, and they are known for their resistance to mildew, making them a desirable choice for textile production.

Dyeing: While dyeing is optional, it can be integrated using natural dyes or certified colours, depending on the intended textile product's specifications.

The end products from this hemp textile production journey encompass short fibres, which are applied in various industrial uses, and shorter inner fibres are primarily used in paper production and as fillers. Meanwhile, the extended outer fibres serve as the backbone of textiles and technical fabrics, imparting a remarkable softness and flexibility to the final textile product.

Overall, the production process of industrial hemp for the textile industry is a meticulously choreographed sequence of stages engineered to yield both superior quality and sustainable and adaptable textile materials.

Furthermore, this process is notable for generating valuable byproducts, including post-use wastes and cut fibres. These byproducts underscore the eco-friendly and efficient nature of industrial hemp fibre production for the textile industry, aligning with environmental responsibility and resourcefulness principles.

3.1.2 Regenerative Agriculture

Regenerative agriculture represents a method for farming and land management that goes beyond sustainable practices to actively restore and improve the health of ecosystems and the overall well-being of the land. It is a holistic and forward-thinking approach that seeks to enhance soil health, biodiversity, water quality, and the overall resilience of agricultural systems. Fundamental principles and practices of regenerative agriculture include:

Soil Health: Regenerative agriculture strongly emphasises improving and maintaining soil health. Fewer tillage, cover cropping, and crop

rotation are used to build and protect soil structure, fertility, and microbial diversity.

Biodiversity: Encouraging biodiversity is a fundamental aspect of regenerative agriculture. Farms adopting this approach often integrate diverse crops and, in some cases, incorporate livestock. This diversity can help reduce pest pressures, improve pollination, and enhance ecosystem health.

Reduced Chemical Inputs: Regenerative agriculture seeks to reduce or eliminate the use of synthetic chemicals like pesticides and synthetic fertilisers. Instead, it emphasises organic and natural pest control and nutrient management methods.

Figure 3. *Regenerative agriculture in practice. (Shvets, 2020)*

Water Management: Improved irrigation efficiency, water conservation, and the restoration of wetlands and watersheds are part of regenerative agriculture efforts to improve water quality and availability.

Carbon Sequestration: The practices of regenerative agriculture have the capacity to capture carbon dioxide from the atmosphere and retain it in the soil, helping to mitigate climate change. Cover cropping and no-till farming are practices that contribute to carbon sequestration.

Resilience: The goal of regenerative agriculture is to establish robust farming systems that can effectively ensure environmental challenges like extreme weather events and shifts in climate conditions.

Economic Viability: While regenerative practices can initially require adjustments and investments, they are often considered economically viable over the long term. Improved soil health, reduced input costs, and increased crop resilience can contribute to economic sustainability for farmers.

Local Communities: Regenerative agriculture often supports local communities by promoting local markets and food systems. It can enhance the social fabric of rural areas and strengthen connections between farmers and consumers.

Regenerative agriculture represents a shift from traditional, resource-intensive farming practices and aligns with broader sustainability goals. It recognises the interconnectedness of ecological, economic, and social factors in agriculture and aims to create farming systems that are both environmentally friendly and economically viable for the long term.

In light of these considerations, it can be affirmed that Papillon Bleu places regenerative agriculture at the forefront of its strategic planning. This approach is a vital compass guiding the company's decision-making processes and responses to the evolving dynamics within its operating territory. As a result, the company's pilot program and overall production processes are steadfastly oriented towards aligning with these regenerative principles, with the ultimate goal of consistently advancing toward a more sustainable and environmentally responsible operational framework.

3.1.3 Stakeholder Analysis

The company's stakeholders are dispersed across various regions within the United Kingdom, as illustrated in Annex 2, where they have been categorised into three distinct groups based on their significance: critical, potential, and vital current stakeholders.

From the extensive exploration of the company's production processes and collaborative efforts, nine distinct companies have been identified as integral stakeholders, each operating within diverse spheres of influence. Among them are suppliers of natural fibres and recycled materials, which hold the potential to serve as primary resources for Papillon Bleu's production processes. Additionally, some stakeholders are essential facilitators, bridging connections between the company and other stakeholders engaged in sustainable fashion production and related domains.

One of the pivotal stakeholders integral to the analysis is Camira, a company in which Papillon Bleu is interested in building a collaboration and having it as a stakeholder. This esteemed company specialises in designing and manufacturing upholstery and panel textiles, catering to various sectors ranging from commercial and educational to healthcare, hospitality, and passenger transport. Camira's extensive reach and influence make it a cornerstone in our collaborative efforts, as they actively engage with the company in the project's development, working diligently to align with Papillon Bleu's objectives and aspirations.

Another significant stakeholder in this analysis is Sustainable Angle, a non-profit organisation and the driving force behind the #FutureFabricsExpo. They are dedicated to initiating and supporting projects centred on sustainability in fashion, textiles, and related industries, including food and agriculture. Our collaboration with Sustainable Angle aims to provide Papillon Bleu opportunities to participate in sustainability and textile-related events. This collaboration not only holds the potential to foster the growth and expansion of our company but also serves as a platform for enhancing the skills of our workforce and disseminating information about our work to a broader audience.

On the other hand, The Natural Fiber Company is a leading actor in the

Figure 4. *Current stakeholder map of the company*

company process, renowned for its unwavering commitment to natural fibres such as wool, mohair, and alpaca. This esteemed company stands as a beacon of expertise, offering an extensive suite of processing services and invaluable support to empower its customers to enhance these exquisite fibres' value. With a deep-rooted passion for sustainability and quality, they play a pivotal role in the value chain, guiding their clients through every stage of the transformation process. From cleaning and carding to spinning, weaving, and knitting, The Natural Fiber Company covers the entire processing spectrum, ensuring that each customer's unique goals and requirements are met and exceeded. In essence, they are an indispensable partner for those seeking to harness the inherent potential of natural fibres in various industries, including textiles and fashion, while upholding the principles of ethical and responsible production.

iinouiio is a company with humble beginnings rooted in a small family business focused on wool recycling.

From these origins, they have evolved into a pioneering force in the textile industry, driven by a profound commitment to sustainability and responsible practices. iinouiio's primary mission is to create textiles using the most environmentally responsible materials and methods. Their journey began with a dedication to recycling wool, but it has since expanded into a broader vision of transforming the textile industry through ethical and sustainable production. With a deep respect for the environment and a dedication to responsible sourcing, iinouiio is at the forefront of shaping a more sustainable and conscious future for the world of textiles.

According to this, Papillon Bleu has strategically engaged with various vital collaborators and partners who share a profound commitment to sustainability, responsible production, and ethical practices in the textile industry. Companies like Camira and Sustainable Angle, among others, have been identified as instrumental stakeholders in Papillon Bleu's journey towards sustainability and innovation. These stakeholders bring expertise, resources, and valuable networks, reinforcing Papillon Bleu's dedication to regenerative agriculture and responsible textile production. As Papillon Bleu continues to evolve and develop its pilot project, the collaboration with these stakeholders holds the promise of catalysing growth, expanding knowledge, and enhancing the company's ability to create textiles that align with its vision of sustainability and responsible stewardship of natural resources.

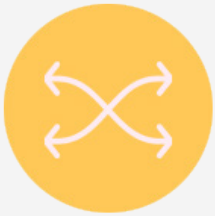
While Papillon Bleu benefits from having stakeholders situated in various parts of the UK, which undoubtedly aids in the company's expansion efforts, it is essential to consider the foundational principles of systemic design and regenerative agriculture. In doing so, an opportunity emerges to include more local actors within Leicestershire as stakeholders. The company can foster a rich and interconnected ecosystem by cultivating a diverse network that encompasses both local farmers and communities. This multifaceted collaboration broadens Papillon Bleu's field of action and offers a more comprehensive perspective on sustainability and the textile industry. It harmonises global outreach with a localised approach, creating a dynamic network that aligns seamlessly with the company's commitment to systemic design and regenerative agriculture.

3.1.4 Wool Textile Productive Process Analysis

The analysis of the wool production process for the manufacture of textiles was carried out in response to the interest of our company in collaborating with this industry sector. This research has become essential to understand in depth the input and output elements of the production process to compare them and determine at which stages of the process both hemp and wool could be efficiently integrated into the other's process.

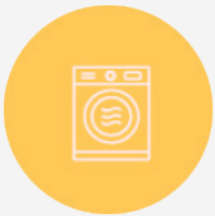
Shearing: This process involves using electric or manual clippers to cut the sheep's fleece in order to obtain wool fibres. It is performed annually and is essential for the welfare of the animals.

Grading: Classification depends on the quality and the body part of the sheep, including its fineness, length, colour, and cleanliness. This process is essential to separate the wool into different categories, each suitable for specific applications in the textile industry.



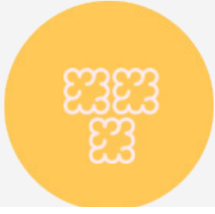
Blending: Combines wool from various bales to ensure the yarn is as even as possible; this helps achieve uniformity in the final textile product. It can be done manually or with the assistance of machinery.

Scouring: The raw fibre needs to undergo scouring three times to effectively remove the majority of contaminants. This process has traces of the material as, for example, Dirt, Wool wax, Salts from suint, Non-wool protein material, Skin pieces, Lanolin Energy, Water, and Rinse.



Drying: Continuous drying is followed by a machine that mechanically removes the sand and other impurities. This stage is crucial to prevent mould, mildew, or other damage to the wool fibres.

At this stage of the production process, two more specific sub-processes can be identified. The first is the *"Worsted Processing"*, which focuses on treating longer wool fibres. This method creates flatter tissues, lighter and softer to the touch. Within this thread, the following steps are followed.



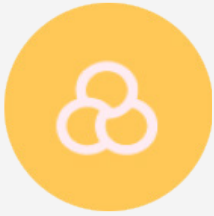
Worsted carding: This is done to untangle the strands and separate the wool into individual fibres. Form the fibres into slivers.

Gilling: By pulling it through metal teeth to align the fibres and make them ready for combing

Combing: The sliver is pulled through a fine tooth comb, leaving short fibres and any contamination behind.

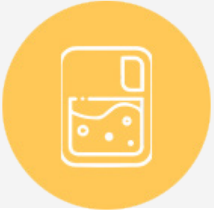
Roving: It must be significantly reduced in thickness, approximately 40 times, by the process of 'drawing' it into a fine sliver known as roving.

Worsted spinning: This step involves adding enough twist to the yarn to secure the fibres together, ensuring it possesses the strength needed to endure the subsequent processing stages.



Dyeing: Colour is applied and fully absorbed. It can be coloured with synthetic or natural dye.

The second thread is *"Woollen Processing"*, which focuses on processing shorter wool fibres. This approach is used to make woven garments of greater thickness and weight, as well as for the manufacture of knitwear. Within this thread, the following steps are followed.



Carbonising: removes the vegetable matter, such as seeds, burs and grass. This process has traces of the material as, for example, Energy, Sulphuric acid, Water, and Dirt.

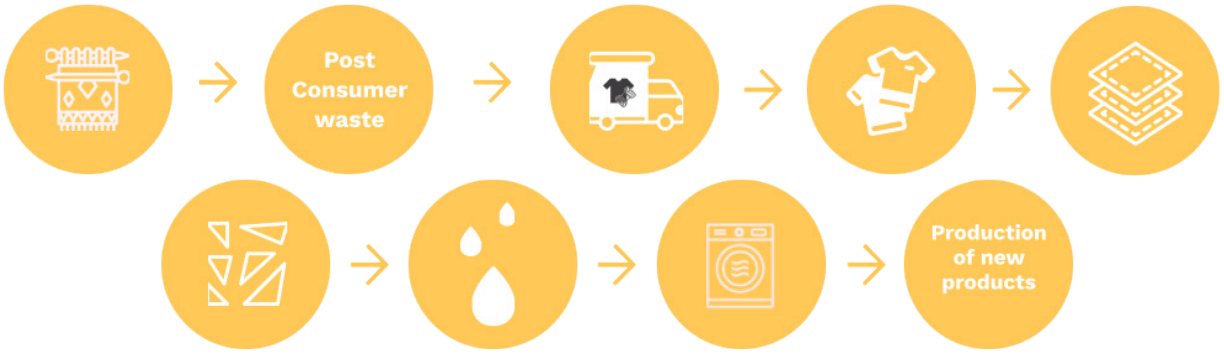
Woollen carding: The woollen fibres are passed through metal teeth, which separate and blend into stabbings.

Woollen spinning: The stabbings from the woollen carding are given only a little stretch before twisting — just enough to maintain cohesion.

Dyeing: Colour is applied and fully absorbed. It can be coloured with synthetic or natural dye.

From here on, the process for either of the two types of wool is equal and continues with weaving, where the woollen yarn is woven into the fabric, then transferred to a store and sold. After the wool-based textile is purchased and used, it can be recycled, although these fibres are generally of lower quality than virgin wool fibres. Sometimes, mixing short fibres with virgin fibres to enable respinning into yarns and achieve the required quality is necessary.

The recycling process starts with people discarding this type of garment or textile in special containers to be transported; then, these containers are transported to a collection centre where non-textile products not adhered to clothing are removed, for example, buttons, zippers or labels. In this way, the textile can be classified manually according to the type of treatment made, the type of wool, fabric and colour to be crushed and converted into recycled wool fibres. Once these pieces are ready, they are moistened to reduce the resistance of the fabric, maintaining the natural elasticity of the fibres, dry and are ready



for the production of new products at the hands of organisations that make upcycling or at the hands of craftsmen who enjoy the qualities of the material to do beautiful things.

3.1.5 A wool-hemp blended fabric: Shemp

Shemp, a groundbreaking natural fibre achieved through the blending of wool and hemp, represents an innovative fusion that marries wool's softness and exceptional insulating properties with robust durability and environmentally friendly qualities. Papillon Blue has successfully secured the patent for this remarkable fabric, which currently boasts a composition of 70% wool and 30% hemp in its production. However, one of the pivotal challenges faced by the company revolves around the need to ensure that both farmers engaged in cultivating this unique plant and employees involved in the manufacturing process possess the indispensable knowledge and expertise to handle this material across all stages of production.

However, a significant obstacle arises: Despite extensive documentation of the necessary techniques, there is a need for more practical tools to disseminate and impart this critical information efficiently. In a proactive response to this situation, Papillon Blue has devised a Shemp production chain model that not only streamlines the process but also fosters mutual benefits. Within this innovative model, the company offers a wealth of information and training opportunities to farmers who express interest in growing the hemp plant. In return, farmers supply the harvested material to the company, thus fostering a symbiotic relationship in which both the producer and suppliers of materials share a level playing field. This approach fosters more excellent communication and lays the foundation for the gradual emergence of a tightly knit community of people dedicated to advancing the Shemp industry.

Figure 5. *Phase in the wool production process. (Bartus, 2018)*

Figure 6. *Phase in the hemp production process. (Eren, 2022)*

Looking at the horizon, there are great aspirations to refine the Shemp

blend further, relentlessly striving towards achieving a perfect 50/50 fibre combination. This envisaged balance represents a concerted effort to harness the unprecedented strengths of wool and hemp materials, with the ultimate goal of creating an ideal material that will cater to a wide range of textile applications. This quest seeks to perfectly combine the elements of comfort and sustainability within the vast realm of natural fibres, thus charting a transformative path forward in the world of textile innovation.

3.2 Conclusions

In conclusion, this chapter has provided a comprehensive vision of Papillon Bleu, delving into the fundamental aspirations of the company, its values, and its holistic approach to understanding and developing its strategic direction. The company's commitment to sustainability, regenerative agriculture, ethical production and social benefits is a cornerstone of its mission. Also, the Shemp fabric, which combines wool and hemp to create a unique textile material and which, with experience and care, is a material that can become very promising for the industry.

It is also essential to know, design and implement strategies to disseminate knowledge, foster collaboration among farmers, employees and various stakeholders in the industry and rely on local organisations and companies. The company proactively addresses the challenges of sharing essential information through a production chain model, reflecting its commitment to building a supportive and interconnected community.

Looking to the future, the company's ambitions to perfect the Shemp blend, aiming at a balanced 50/50 fibre mix, exemplify its dedication to innovation and sustainability in the textile industry. In essence, this chapter underlines the role of Papillon Bleu in the textile industry and how it is ready to generate positive change within the territory and beyond.

04

Challenges and Opportunities

4. Challenges and opportunities

Various challenges and opportunities were carefully identified after conducting a holistic diagnosis in the last two chapters. Drawing from the insights obtained is the moment to move on to the next crucial phase of the project. To ensure a comprehensive approach, it was considered from both perspectives: From the territory and the company. For this part of the project there was created a Gigamap for the analysis of the challenges and opportunities as a result of the holistic diagnosis developed in the previous step. This Gigamap could be seen in the Annex 3, where all the analysis and compilation of data was summarised and can be visualised.

For the internal aspects of the company, the challenges and opportunities were developed following the levels used in the holistic diagnosis, such as the flows of energy, supply chain, and relations, to enhance the understanding of the productive processes. On the other hand, this analysis also encompasses the environmental, economic, and social aspects concerning the insights gathered from the territory.

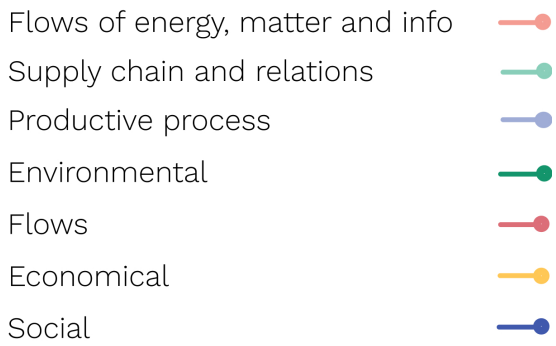


Figure 1. *Levels used to analyse challenges and opportunities*

By incorporating these diverse levels of analysis, there is a better-equipped way to address the identified challenges and capitalise on the opportunities ahead. This comprehensive approach allows for developing a well-informed strategy that embraces both the internal workings of the company and the broader context in which it operates. In this way, taking into consideration the results of the analysis, it was possible to determine and identify the following challenges for the project:

1. ***Hemp is not optimised, is expensive, and is difficult to access.*** This hinders its widespread adoption and utilisation in various industries.

2. ***The largest upward contribution to the annual inflation rate for agricultural inputs was from fertilisers and soil improvers.*** Various agricultural inputs, fertilisers, and soil improvers have made the most significant upward contribution to the annual inflation rate. This inflationary impact can affect the overall cost of crop production. According to Producer price inflation, UK - Office for National Statistics in the report of Producer price inflation, UK: January 2023

3. *Producers will not grow at scale until the markets for their products are secure.* The reluctance of producers to grow hemp at scale is linked to the insecurity of markets for their products. With secure markets, they may see the potential for profitability in investing heavily in hemp production.

4. *Potential large-scale users will not invest in hemp as a raw material because supply is insecure with limited numbers of producers.* Potential large-scale users of hemp as a raw material are hesitant to invest due to supply insecurity. With a limited number of producers, the reliability of a steady supply chain becomes a concern.

5. *They often rely on word of mouth from colleagues or supplier advice with data from outside the UK.* Information dissemination about hemp cultivation practices often relies on word-of-mouth from colleagues or advice from suppliers, and there needs to be more comprehensive data within the UK.

6. *Farmers do not know how to manage the crop after it has grown.* Farmers face challenges in managing hemp crops after reaching full maturity, indicating a need for improved knowledge and guidance.

7. *The performance of industrial hemp is poorly characterised and has a misconception related to marihuana.* Industrial hemp suffers from poor characterisation, and there is a common misconception about its association with marihuana. This misperception can impact public perception and regulatory considerations.

8. *There are strict guidelines and rules to get licences and permits to grow hemp.* Strict guidelines and regulations for obtaining licences and permits to grow hemp can present barriers for potential farmers and investors willing to work with this material.

9. *Papillon Blue has a textile that already has a patent and needs both farmers and employees to have training to handle the material in all its phases.* The company possesses a patented textile and requires training for farmers and employees to handle the material effectively through all stages of production.

10. *The company needs to find strategies to incorporate the regenerative agriculture principles into their supply chain for a more sustainable process.* Incorporating regenerative agriculture principles into their supply chain is crucial for Papillon Bleu to achieve a more sustainable and environmentally friendly process.

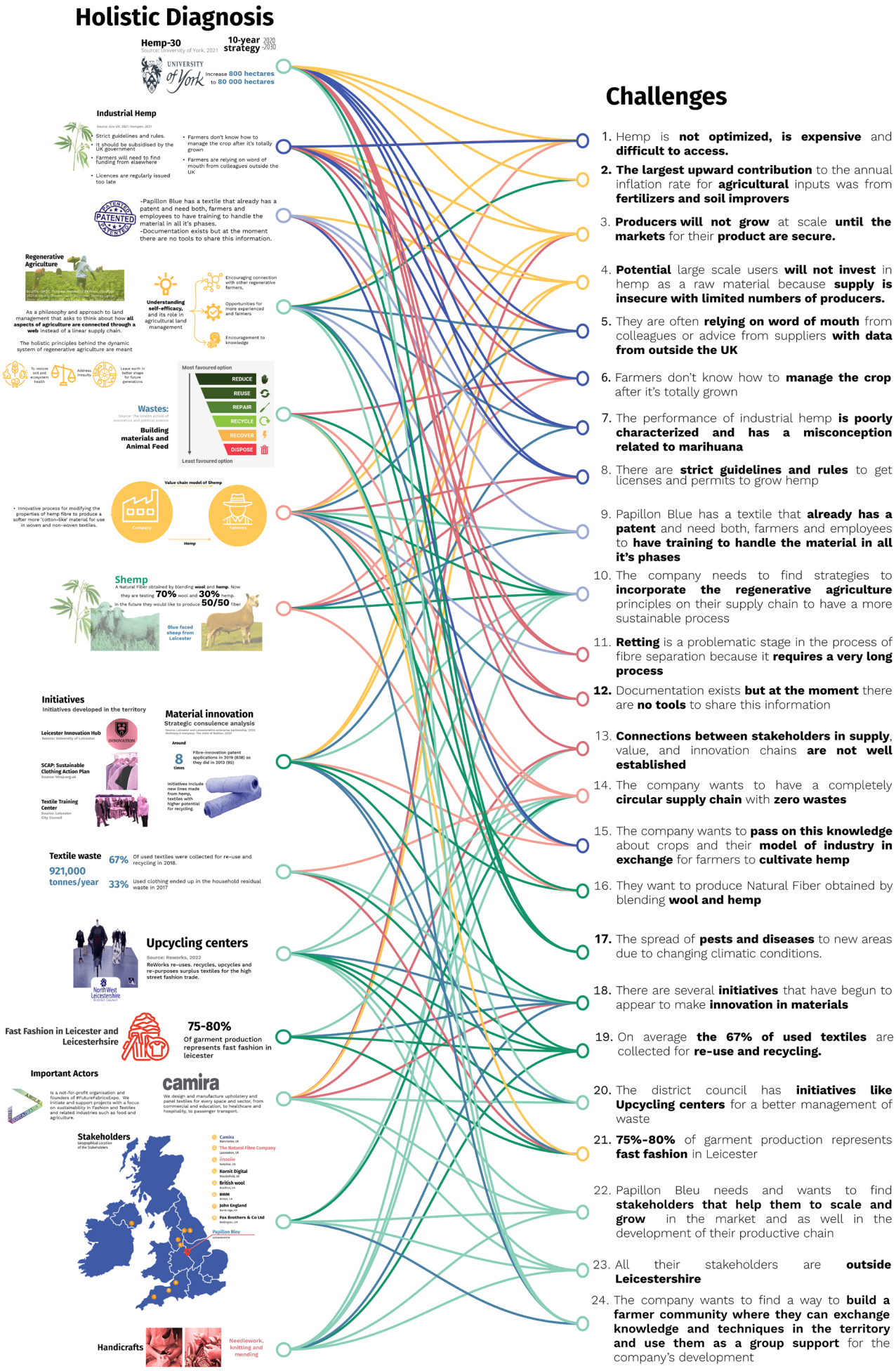


Figure 2. *Challenges and opportunities table, part 1*

11. ***Retting is a problematic stage in the process of fibre separation because it requires a very long process.*** Retting, a crucial stage in the fibre separation process, presents challenges due to its lengthy and complex nature, requiring innovative solutions for more efficient processing.

12. ***Documentation exists, but at the moment, there are no tools to share this information.*** Although documentation exists, more tools to share this information are needed to allow access to valuable resources and knowledge about hemp cultivation.

13. ***Connections between stakeholders in supply, value, and innovation chains are not well established.*** The connections between stakeholders in the hemp supply, value, and innovation chains need to be well-established, hindering collaboration and growth within the industry.

14. ***The company wants to have a completely circular supply chain with zero waste.*** The company's vision is to achieve an utterly circular supply chain with zero waste, reflecting its commitment to sustainability.

15. ***The company wants to pass on this knowledge about crops and their model of industry in exchange for farmers to cultivate hemp.*** Papillon Bleu aims to share knowledge and industry models with farmers in exchange for their hemp cultivation, fostering a cooperative farmer community.

16. ***They want to produce Natural Fibre obtained by blending wool and hemp.*** The company plans to produce Natural Fibre by blending wool and hemp, emphasising its commitment to innovative and eco-friendly materials.

17. ***The spread of pests and diseases to new areas due to changing climatic conditions.*** The spread of pests and diseases due to changing climatic conditions threatens hemp cultivation, requiring adaptation and management strategies.

18. ***Several initiatives have begun to appear to make innovations in materials.*** Various initiatives are emerging to promote innovation in materials, which can benefit hemp-related industries, universities, and research centres.

19. ***On average, 67% of used textiles are collected for reuse and recycling.*** Used textiles are collected for recycling and reuse, indicating a growing trend towards sustainability in the fashion industry, also trying to improve the situation with fast fashion present in the territory's history.

20. ***The district council has initiatives like Upcycling centres for better management of waste.*** The district council supports waste management initiatives like Upcycling centres to promote responsible waste handling and resource utilisation.

21. ***75%-80% of garment production represents fast fashion in Leicester. In Leicester,*** a significant portion of garment production represents fast fashion, highlighting the need for more sustainable alternatives.

22. ***Papillon Bleu needs and wants to find Stakeholders that help them to scale and grow in the market and as well in the development of their productive chain.*** Papillon Bleu seeks stakeholders who can help scale and grow their business, facilitating the development of their supply chain.

23. ***All their stakeholders are outside Leicestershire.*** Papillon Bleu's stakeholders are outside Leicestershire, indicating the company's global reach and collaborations.

24. ***The company aims to create a farmer community to exchange knowledge and techniques in the territory, fostering support for Papillon Bleu's development.*** The company wants to find a way to build a `Farmer community where they can exchange knowledge and techniques in the territory and use them as group support for the company's development.

After identifying the challenges through a careful selection process, extensive desk and field research was conducted to explore potential opportunities to address these challenges effectively. The aim was to propose solutions aligning with and tackling the identified challenges. To visualise the relationships between challenges and opportunities, the Annex 3 was developed, which serves as a comprehensive mapping tool.

The colours in the graphic are essential for representing distinct levels of analysis, including flows of energy, matter, and information, as well as supply chain and relations, productive processes, and other relevant aspects such as environmental, social, and economic considerations. Each connection in the graphic corresponds to one or more challenges, indicating how various opportunities can be strategically linked to address specific issues. This visual representation enables a clearer understanding of the interdependencies between challenges and potential solutions across multiple levels of analysis, fostering a more holistic and systematic approach to problem-solving.

According to this, the opportunities proposed for the systemic project of this thesis are:

a. Involve the company in innovation and sustainable fashion events

b. Create a community of farmers around the company to help them share information about improving processes and skills between them and with other farmers in the UK

c. Implement an integrated agricultural system that includes sheep breeding and hemp crops

d. Implement hemp as a break crop in the crops of the cereal industry inside Leicestershire

e. Establish partnerships with upcycling centres or artisans of the territory to make the post-consumer phase of their products more circular

f. Take advantage of the web page design to include important information about hemp and the new material the company is building

g. Use the Hemp mulch that is considered a waste of the textile industry process as an ecological protector that works as a natural alternative for herbicides

h. Create an open material where everyone can be informed of how to manage hemp crops and their benefits

i. Camira, as a future partner, could work with Papillon Bleu to build new products because it provides the ultimate in sustainable design of environmentally sensitive fabrics using yarns based on recycled materials

j. Find new stakeholders that help the company making it part of the community, focusing on sustainable materials and supporting projects with a focus on sustainability and fashion

k. Construction, retail, and manufacture sectors are in the 5 most important economic sectors in the UK in which the wastes of the productive process could be reused as primary resources of Companies like Avon Hemp Solutions

l. Find new stakeholders like Unyte hemp, Fibershed, and ATMF that could help the company making it part of the community focusing on sustainable materials

m. Manage hemp wastes of the company for using them in the cosmetic sector, with companies like Urban CBD and CBD oil supplies.

With the aid of the graphic done in the Gigamap presented in the Annex 3, the interrelationships among various elements of the research become visually evident, facilitated by lines connecting different themes and aspects pertinent to the project. Particularly in this annex, a more intricate portrayal of the connections between challenges and opportunities emerges, giving rise to the following associations:

Considering that each opportunity could be associated with more than one challenge, the connections were analysed from the opportunities to understand which challenges are being solved with each opportunity. ***Opportunity a***. has three types of connections, the ones connected at a supply chain and relations level (Challenges 3, 4, 22, and 23), as the opportunity talks about participating in events and involving the company in this type of situation in which there could build connections and new relations with possible stakeholders, which could help the company to spread also information about their work with hemp and the benefits of it.

Figure 3. *Hemp plant. (Pexels,2021)*

The following connections are at the flows of energy, matter, and info level (Challenges 7 and 10); this is because the opportunity talks about involving the company in spaces to spread and share information, helping and improving the misconception that could be having the hemp concerning marihuana, also this spread of information could help stakeholders and other actors involved in the production process the benefits that hemp could represent and how with the regenerative agriculture principles, Papillon Bleu is working on projects to become a more sustainable company.

Finally, the last connections for this opportunity are at the level of flows (Challenges 12 and 13); with these connections, the company can build materials and information to share with new stakeholders from innovative and sustainable fields of action, building new relationships for the supply chain.

For the ***opportunity b***. There are three levels of connection, starting with the social level (Challenges 1,2, 9, 12, 24); as the company creates a community of farmers, there will be a more structured network around the company and its workers. In this way, the information about the crop and

Challenges

1. Hemp is **not optimized, is expensive** and **difficult to access.**
2. **The largest upward contribution** to the annual inflation rate for **agricultural** inputs was from **fertilizers and soil improvers**
3. **Producers will not grow** at scale **until the markets** for their **product are secure.**
4. **Potential** large scale users **will not invest** in hemp as a raw material because **supply is insecure with limited numbers of producers.**
5. They are often **relying on word of mouth** from colleagues or advice from suppliers **with data from outside the UK**
6. Farmers don't know how to **manage the crop** after it's totally grown
7. The performance of industrial hemp **is poorly characterized and has a misconception related to marihuana**
8. There are **strict guidelines and rules** to get licenses and permits to grow hemp
9. Papillon Blue has a textile that **already has a patent** and need both, farmers and employees to **have training to handle the material in all it's phases**
10. The company needs to find strategies to **incorporate the regenerative agriculture** principles on their supply chain to have a more sustainable process
11. **Retting** is a problematic stage in the process of fibre separation because it **requires a very long process**
12. Documentation exists **but at the moment** there are **no tools** to share this information
13. **Connections between stakeholders in supply**, value, and innovation chains **are not well established**
14. The company wants to have a completely **circular supply chain** with **zero wastes**
15. The company wants to **pass on this knowledge** about crops and their **model of industry in exchange** for farmers to **cultivate hemp**
16. They want to produce Natural Fiber obtained by blending **wool and hemp**
17. The spread of **pests and diseases** to new areas due to changing climatic conditions.
18. There are several **initiatives** that have begun to appear to make **innovation in materials**
19. On average **the 67% of used textiles** are collected for **re-use and recycling.**
20. The district council has **initiatives like Upcycling centers** for a better management of waste
21. **75%-80%** of garment production represents **fast fashion** in Leicester
22. Papillon Bleu needs and wants to find **stakeholders that help them to scale and grow** in the market and as well in the development of their productive chain
23. All their stakeholders are **outside Leicestershire**
24. The company wants to find a way to **build a farmer community where they can exchange knowledge and techniques in the territory and use them as a group support** for the company's development

Opportunities

a. Involve the company into **innovation and sustainable fashion events**

b. Create a **community of farmers around the company** to help them share **information about improving, processes and skills,** between them and with other farmers in UK

c. Implement an integrated agricultural system that includes **sheep breeding and hemp crops**

d. Implement the **hemp as a break crop** in the crops of the **cereal industry inside Leicestershire**

e. Establish **partnerships** with **upcycling centers or artisans of the territory** to make the post-consumer fase of **their products more circular**

f. Take advantage of the web page design to include **important information about hemp and the new material** the company is building

g. Use the **Hemp mulch** that is considered as a waste of the textile industry process as an **ecological protector** that works as a **natural alternative for herbicides**

h. Create an **open material** where everyone can be informed of **how to manage hemp crop and its benefits**

i. Camira, as a future partner could work with Pappillon Bleu for **building new products**, because provides the ultimate in sustainable design of environmentally sensitive fabrics using **yarns based on recycled materials**

j. Find **new stakeholders** that help the company making it part of the community **focusing on sustainable materials and** supporting projects with a focus on **sustainability and fashionv**

k. Construction, retail and manufacture sectors are in the 5 more important **economic sectors** on UK in which **the wastes of the productive process** could be reused as main resources of Companies like **Avon Hemp Solutions**

l. Find **new stakeholders** like, **Unyte hemp, Fibershed and ATMF** that could help the company making it part of the community **focusing on sustainable materials**

m. Manage hemp wastes of the company for using them in the **cosmetic sector,** with companies like**, Urban CBD and CBD oil supplies.**

Figure 4. *Challenges and opportunities table, part 2*

the best practices to take care of it could be well spread around to reach more people related to the company, which could mean a key actor in the company's production process. Also, this opportunity could reinforce the sense of belonging to the community and the company, improving according to the regenerative agriculture principles, the practices with the land, and the general production process of the company.

On the other hand, this opportunity has connections at the level of flows (Challenges 5, 6, 11) as the building of the community of farmers will mean the building of a community to improve skills, share knowledge and improve techniques to achieve the best practices for treating the crops in the best way. In this way, the existence of this community could help build a group of support to treat the crops better and help the company improve their production process.

Finally, the last connection for this opportunity is at the level of Flows of energy, matter, and info (Challenge 15); the presence of a community of farmers represents the opportunity for building strategies and materials to manage the sharing of knowledge and techniques between farmers, to connect between the different workers of the company and all the different techniques and practices, which could help to standardise processes and information.

For ***opportunity c.,*** there are three types of connections; the first group is at the level of Supply chain

Figure 5. *Community of farmers. (Cantarelli,2020)*

and relations (Challenge 23), as in the territory and its surroundings, there are many businesses around the sheep breeding industry, with this opportunity, the integration of two agricultural systems like sheep breeding and hemp cultivation will have an impact with the inclusion of new local actors in the system and productive process of the company.

After this, the opportunity connects to the flow level (Challenge 17). This opportunity is significantly related to the regenerative agriculture principles, which are focused on improving the state of the soil. Implementing the two agricultural systems could help reduce the amount of pests and diseases present in the crops.

The opportunity of integrating the agricultural systems is directly connected with a productive process (Challenge 10), in the way that the processes and steps that are needed to be done could be different if integrating sheep breeding and hemp crops also implies having the sheep or

crops in new territories or with new conditions that could change in some way the normal productive process.

Finally, this opportunity has a last connection in the level of flows of energy, matter, and information (Challenge 16) in the way that as one of the goals of the company is to develop a textile mixing wool and hemp, the unification of the two agricultural systems could mean an easier obtention of wool for including and using it in the production process of the company; also it includes the access to the knowledge of the sheep breeders to have crucial information about this material, which could be helpful for the production process of the company.

Following the ***opportunity d.*** in the level of flows, there is a connection with challenges 1 and 17 in the way that according to the principles of regenerative agriculture, having break crops could benefit the soil and, therefore, improve its properties; this integration of hemp as a break crop could help with the reduction of diseases and pests in the soil. Additionally, considering that there are a large number of cereal crops in the territory, the opportunity could help improve the properties of an essential part of the territories and soil around the company.

Figure 6. *Collection of cereal crop. (Freidenfelds, 2019)*

On the other hand, this opportunity is connected to the level of the productive process with challenge 10, in the way that in the first phases of the production process of the company will be connected and integrated in the first phases of the production process in some crops of the cereal industry, which makes part of the principles of the regenerative agriculture.

Finally, the last connections of this opportunity are in the economic aspect (challenge 2,3,4) because the break crops improve the health of the soil. The hemp crops also have some anti-pesticide properties, which could mean the reduction of pests and also the connection between two industries, building networks and a better bases for having a more established way of producing hemp and spreading the knowledge about it from the farmers that take care of the hemp crops and other farmers like the ones working in the cereal industry. This could have an economic benefit as fewer pesticides are needed, and markets will have more support for investing in hemp crops.

On the other hand, for the ***opportunity e.*** the first connections are given in the level of flows of energy, matter, and info (Challenge 14) as an exciting

option for building a more circular productive process is improving the management of wastes and giving them a second life through the creation of new products from wastes.

Also, this opportunity has four connections, taking into account the environmental level with the challenges 18, 19, 20, and 21 as this opportunity means the reduction of the obtention of waste and the creation of innovative products from used materials, giving the company the opportunity of building a more circular production process and improve the situation with fashion, production of wastes and the creation of innovative solutions and creation of new materials and strategies towards circularity in the territory.

On the other hand, ***opportunity f.*** has some connections at a flow level, with challenges 1, 12, and 24, as the building of a web page will help the company to share information about their work, the material they are developing, and their hemp crops and essential techniques or general information. This is an excellent opportunity for the company to spread information and create support for sharing with other companies, between the community's farmers, and with their workers, for them to understand the importance of hemp, all its benefits, and the techniques used.

There are also connections in the flows of energy, matter, and info aspects, with challenges 5,8 and 9. With this flow of information and materials focused on the crops and their management, the company will be able to give support and a base of information that could help the farmers, workers, and interested people to know more about the essential details about these crops and the new material Papillon Bleu is producing.

With this opportunity, there is also a connection in the social aspect, with challenge number 7, as it could help the farmers' community have a base of information and support between farmers. Also, with this, the farmers could improve and share their techniques and best practices to guide other people interested.

Finally, the environmental aspect is also involved with this opportunity, in connection with challenge 18, as the information shared through all the material and the web page created could be a source to inform and share information that could help improve and change the misconception that people and companies have between hemp and marihuana.

On the other hand, with the ***opportunity g.*** There are three types of connections; the first one is at the level of supply chain and relations, with challenge 22, as the use of hemp mulch in other types of crops or also for the same hemp crops will mean the creation and expansion of the network of stakeholders, as the hemp mulch could be used with the cereal crops and with other types of crops that could be used in the process.

Additionally, this opportunity connects with challenge 14 in the level of flows

of energy, matter, and information, as the use of the hemp mulch will be the opportunity for the company to use this waste as a bioproduct for their crops and other crops involved in the process and in this way construct a more circular and sustainable productive chain.

Finally, with challenge 18, there is a connection in the environmental aspect, in the way that the hemp mulch could work as a natural herbicide for different crops and at the same time as a secondary product from the wastes of the principal productive process of the company, which could be seen as an innovative material that is given a second life and could help to improve the state of the soil and protect the plants in a more eco-friendly way.

Additionally, analysing the ***opportunity h.*** There could be found many connections with different challenges and considering various aspects. Firstly, the analysis axis in flows energy, matter, and information, with challenges 4, 9, 17, and 24. These connections appear because creating an open material could contribute significantly to informing the farmers, other companies, and investors who could be involved in the company's production process and its materials. This opportunity to share knowledge about the materials and processes of the company could help build the community, informing the public or people interested about the crop's characteristics and benefits, improving the conception about hemp and its remarkable properties.

On the other hand, this opportunity has a connection in the social aspect with challenges 15 and 8 due to the possibility of sharing information and giving a base of information and data about the production process and materials of the company, supporting the different actors of the system, helping them to create community and the sense of belonging with the activities done and proposed by the company.

Also, this opportunity has many connections in the aspect of Flows, in the sense that the open material could improve the acknowledgement of the subject of hemp and its excellent properties and the process to develop with it. In this way, this opportunity could contribute to the spread of information between the interested actors and work in the improvement of the misconception about hemp and the differences with marihuana. Also, by sharing this type of data, the properties of hemp could be well used in other activities like protecting the crops as natural herbicides, thanks to its excellent properties.

Finally, this opportunity, connected with challenge 11, could inform producers or workers about the different phases and characteristics of the production process of hemp. In this way, complex and critical phases like, for example, the retting could be better characterised and seen from different points of view that could work as a guide and a step-by-step instruction for improving the practices and procedures of farmers in the different phases of the hemp

Figure 7. *Natural materials. (Grabowska,2020)*

Figure 9. *Sheep breeding. (Pexels 2020)*

Figure 11. *Innovation in materials. (ThisIsEngineering, 2020)*

Figure 8. *Textile material. (Pexels,2020)*

Figure 10. *Creation of community. (Levis,2022)*

Figure 12. *Construction field. (Quiros,2019)*

production process.

For the ***opportunity i.*** The collaboration with Camira is connected to the supply chain and relations aspect of challenge 13 because this could improve the connection between different stakeholders, which means new possible actors and steps in the production process in collaboration with other companies like Camira.

Taking this into account, the company, in collaboration with Camira, could have this company as support that provides information, materials and knowledge on how to improve its production process and techniques and develop a quality material, like the Shemp, which needs hemp and wool fibre, in this case, there is a possible connection in the axis of flows with the challenge 16.

Finally, the last connection of this opportunity is with challenge 14 in the flows of energy, matter, and information aspect, as having a circular process could be possible with the collaboration of Camira, a company that works with circular products and could work as a guide and big help in the process of use sustainable materials and build circular process.

For the ***opportunity j.*** There are connections in the supply chain and relations aspect with challenge 4 as having new prominent stakeholders that guide the process and understand the building of sustainable materials and process is an excellent opportunity for having a more solid and established productive process that could be known by other producers or actors in the sector, giving more visualisation in the market to the materials and productive process that the company has developed.

Furthermore, in this context, other connections exist within the energy, matter, and information flows (related to challenges 18 and 3). This involves having stakeholders who can propel the company forward by adopting and improving its sustainable practices. Also, collaboration with these new stakeholders could mean building more structured and solid parameters to be shared with other actors interested in the process and products of the company.

Moreover, this opportunity presents an economic linkage to challenge 13. These interconnections signify a collaborative, supportive, and participatory engagement with the new stakeholders, potentially resulting in mutually advantageous gains. Furthermore, this partnership can attract fresh clients and enhance the company's recognition among other stakeholders and the general public.

Finally, for this opportunity, there is one more connection at the level of flows with challenge 16, with the fact that having this kind of stakeholders that work in the sector of sustainable fashion could inspire and work as a support for the company when developing the project of this new material called Shemp.

On the other hand, the ***opportunity k.*** has a connection in the level of supply

chain and relations with challenge 22, mainly because having the opportunity to manage the wastes of the company with the help of other companies in sectors like, for example, the construction sector, will give the company the opportunity of scaling and growing the development of their productive chain, as new sectors different from the textile sector could be involved in the process of the company.

Additionally, this opportunity has another connection in flows of energy, matter, and information with challenge 14. This connection is mainly given in terms of flows of matter and energy because collaborating with a construction company will allow Papillon Belu to manage their wastes in an alternative way, with a more circular focus and involving other local actors from other industry sectors.

Besides, for the ***opportunity l.*** There are various connections in different axes of analysis; first of all, the connection in the axis of supply chain and relations is given by the connection with the challenge 22 in terms of having new connections with key stakeholders that work in different ways with the sustainable sectors. This could encourage the company to participate in events or build a vital network with the support of more prominent companies from different parts of the territory.

When considering connections within energy, matter, and information flows, recalling challenges 16 and 14 is imperative. The effort of creating innovative materials using hemp, such as Shemp, aligns seamlessly with the overarching objective of fostering a more circular and sustainable approach to production and techniques.

Furthermore, within production processes, a significant correlation emerges with challenge 18. These new stakeholders possess the capacity to navigate various events and engagements that could serve as guiding forces, leading the company towards involvement in topics concerning sustainable fashion. This correlation also extends to the environmental axis since the company would be acquiring knowledge and immersion in pioneering waste utilisation and creating sustainable textiles through innovative techniques. This interconnection resonates strongly with challenges 19, 20, and 21.

Figure 13. *Variety of uses of the material. (Lion,2020)*

The latest ***opportunity m.***, marked by its connectivity to the supply chain and relational analysis axis, intertwines with challenge 22. This challenge underscores Papillon Bleu's

Figure 14. *Construction industry. (Padron,2022)*

desire to locate stakeholders who can aid in their market expansion efforts and concurrently enhance waste management through inventive means. This juncture offers a favourable prospect for refining waste management practices, potentially collaborating with companies spanning diverse sectors, such as the cosmetics industry.

Considering this insight, it becomes evident that this opportunity holds substantial ties with challenge 14, specifically concerning energy, matter, and information flows. The company aspires to forge a well-defined strategy for waste management, striving for a waste-free approach and a more sustainable production chain. This aspiration comes into view particularly if the company can redirect its waste materials to other industry sectors.

Taking into account the opportunities resulting from the project, there could be created five groups of opportunities, which make analysing and understanding all the impacts on the system easier. Those groups, with their respective opportunities are:

1. ***Events and projects focused on innovation and sustainable fashion:***
   - Opportunity a.
   - Opportunity j.

2. ***Partnerships focused on sustainable materials:***
   - Opportunity i.
   - Opportunity l.

3. ***Using Outputs as inputs:***
   - Opportunity k.
   - Opportunity e.
   - Opportunity g.

4. ***Creating community, share skills and knowledge:***
   - Opportunity b.
   - Opportunity h.
   - Opportunity f.

5. ***Regenerative Agriculture Principles:***
   - Opportunity c.
   - Opportunity d.

05

Systemic Project

5. Systemic project

Following a comprehensive analysis of challenges and opportunities, the subsequent crucial step entails thoroughly evaluating all the identified opportunities. These opportunities are then intricately linked with the existing production process, allowing for a comprehensive exploration of the potential transformations that would occur upon their integration into the company's operational landscape. By delving into the intricate details of how these opportunities would manifest in the company's reality, an insightful study can be conducted to anticipate the systemic shifts that would transpire.

Such a methodical approach serves as the bedrock for assessing the feasibility and practicality of the proposed changes. Through this meticulous evaluation, the viability of these proposals can be thoroughly gauged, providing a foundation for decision-making and strategic planning. Additionally, the systemic project will be analysed and understood more profoundly, taking into account different methodologies, frameworks of evaluation and sustainable development goals to understand the impact of the project being implemented in the reality of the company. For this part of the project there was created a Gigamap for the presentation of the systemic project that could be seen in the Annex 4, where all the analysis and compilation of data was summarised and can be visualised.

5.1 Multi-Criteria Analysis

Following the comprehensive analysis and interconnected examination of the presented challenges and opportunities, the subsequent phase involves the evaluation of the diverse opportunities that have been identified. This evaluation is carried out using a multi-criteria matrix, which serves as a valuable tool for assessing various fundamental aspects to consider when selecting the opportunities to be pursued within the scope of the systemic project.

The process of Multi-criteria analysis is executed through a matrix. This pragmatic tool offers a systematic approach to assessing each opportunity within the five fundamental pillars of systemic design: Autopoiesis, Relationships, acting locally, Humanity-Centred Design, and Outputs-Inputs. This matrix-based evaluation aims to determine the extent to which the identified opportunities align with and contribute to creating a more sustainable and holistic proposal.

Additionally, in the multi-criteria matrix were introduced four supplementary factors aimed at a more precise evaluation. The new factors are Raising awareness,

Using the hemp properties to implement the R.A. principles, Ease of implementation and Implementation time. These factors target specific variables tightly linked to Papillon Bleu's operational reality, ensuring a comprehensive understanding of how each opportunity aligns with the company's unique context, challenges, and objectives. This combined approach underscores the commitment of the thesis to a thorough assessment, guiding the project towards opportunities that resonate deeply with Papillon Bleu's vision and constraints.

By subjecting each opportunity to this multidimensional evaluation, it was given a nuanced perspective on its inherent strengths and weaknesses and illuminated the synergies and trade-offs inherent in its integration. This approach underscores the importance of a holistic view, where an opportunity is not evaluated in isolation but as a dynamic part of a more extensive interconnected system.

In the end, the goal of this comprehensive analysis is twofold: to ensure that the selected opportunities possess the potential to contribute to the broader goal of sustainability and systemic advancement and to give the project a well-informed roadmap for shaping a proposal that encapsulates the intricate interplay of these crucial pillars within a unified framework.

After evaluating the opportunities with these nine criteria of analysis, each was given a grade from one to five, with a minor impact and five the more significant impact concerning the different analysis criteria. In the end, adding all the points in every criteria, every opportunity was evaluated with a maximum punctuation of forty-five points.

Upon assessing the opportunities through these nine analytical criteria, each opportunity received a grade ranging from one to five. A score of one signifies a minor impact, while a score of five denotes the highest level of impact concerning the various analytical criteria. Ultimately, by summing the points across all criteria, each opportunity was assigned a score where the maximum possible score was forty-five points.

With this evaluation method, it was possible to identify which opportunities are suitable for being applied in the system. According to this, most opportunities are viable and suitable for development. However, there is an opportunity that, after analysing it, could be applied in the long term and also will mean changing almost completely the productive process of the company or building a new productive chain, as the primary product obtained for cosmetic products is the oil from the hemp seeds, which nowadays is not produced in the company, as all the seeds are grown to create their primary product that is hemp fibre.

Because of this, this opportunity will not be taken into account in the design of the system; even so, the other opportunities can take place in different time frames, as they were categorised as short (one

year), medium (two to four years) and long (five to seven years) term taking into account their complexity and importance with the company goals.

Finally, with this analysis, the ***opportunities l. and j.*** were integrated, as both talked about finding new opportunities with stakeholders that impulse the company and included it in new initiatives related to sustainability and fashion; in this way, it was only used the opportunity j to build the system and relate the opportunity with the other opportunities of the proposal.

5.2 Proposal

Considering the previous evaluation and analysis, the opportunities given need to be firstly divided into the time categories determined previously to have a better implementation in the system. In this way, to build the final system, the opportunities are implemented one by one, taking into account the short, medium and long term, which leads to the construction of three phases of the final system.

- ***Short Term Opportunities***

Taking into account the fact that 50.1% of the land of the territory is used for the harvesting of cereal crops and the excellent properties that hemp could provide to the land, helping it to improve its properties, it can be said that the hemp crops of the company could work in a very efficient way as a break crop of the considerable amount of cereal corps founded in the land ***(Opportunity d.)***. In this way, it benefits both industries, as the cereal industry could have an opportunity to restore the properties of the land, and the hemp industry could have the opportunity to use more land for their crops.

For the implementation of this part of the system, a possible interested stakeholder is Leicester and Rutland Wildlife Trust, which participated in some projects with the cereal industry into initiatives to improve the process of the cereals and protect the wellness of animals and plants of the territory, In this way, the cereal industries could provide as an input for the process available land for crops and as an output the company could grow its plants in these territories for then go back to the productive process in the phase of harvesting to continue with the transformation and obtention of hemp fibres.

Figure 1. *Cereal crop. (Pixabay, 2016)*

Another opportunity added in the short term is to take advantage of the improvement of the web page that the company is developing ***(Opportunity f.)*** and include more information about the company, its work and the possibility of building a community with different farmers of the territory. This opportunity is also based on a case study seen in the research of a company named Fibershed, which, through its web page, has developed a strategy for creating a channel of communication with possible collaborators and participants of the community. This web page feature has helped them build collaborations with around 62 possible actors around different countries.

In this way, the company will have a very important touch point in which the public and interested actors could search for information about the company and contact or interact with it. According to this, an output from the company's productive process to the opportunity is information about their products and strategies that the public or interested actors could see on the web page. On the other hand, as input for the productive process, the company will also have information about the people interested, new clients and new collaborators, and in this way, the company could spread and share the information about their work.

Moreover, a short-term opportunity involves the utilisation of hemp mulch, an output from the hemp fibre production process ***(Opportunity g.)***. This resource can serve as a viable natural substitute for traditional herbicides. The needed amount of material per plant ranges between two to three inches, offering applicability not only to the company's hemp crops but also to other regional crop varieties.

This approach presents a dual advantage: effective output management within hemp cultivation and the establishment of a self-sustaining system. Incorporating hemp mulch as an organic herbicide mirrors a commitment to circularity. The output product seamlessly reintegrates into the cultivation process during the initial stages,

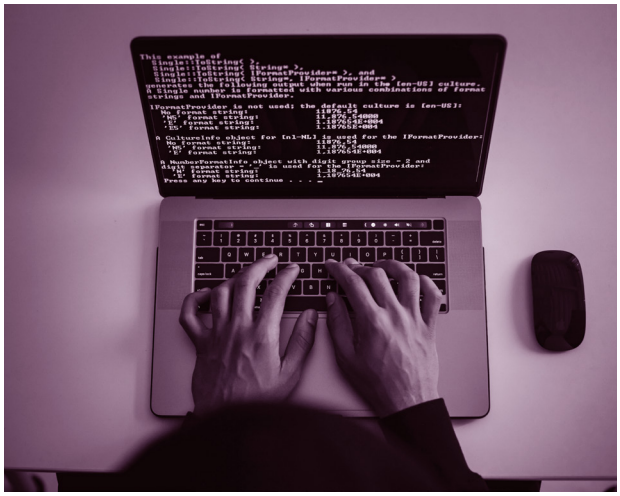


Figure 2 . *Web page creation. (Shimazaki, 2020)*

exemplifying a pragmatic and environmentally conscious solution.

The next opportunity that will be implemented in a short-term period is having a company like Camira as a partner for building new sustainable products ***(Opportunity i.)***. This opportunity is already an idea that a company has and has started developing with this company in the past few years. With this collaboration, the company will receive as input

new materials and clients and build a good network by participating in the events that could be developed in collaboration with Camira.

Lastly, the upcoming short-term initiative involves forging a strategic alliance with local upcycling centres and artisans ***(Opportunity e.)***. This move is rooted in the compelling statistic that approximately 75-80% of garment production in Leicester pertains to fast fashion. Given this landscape, the opportunity presents an intriguing prospect: establishing collaborative communities that unite artisans and upcycling centres to reuse the pieces of fibre after being used and the lasting pieces from the company's productive process.

The primary objective of this endeavour is to efficiently repurpose the entirety of waste and byproducts generated during the fibre production process. By fostering these partnerships, the company can pioneer the creation of novel products, stimulate the emergence of new small enterprises, and foster innovative endeavours, much like the ongoing work of artisans and the transformative capabilities of upcycling centres.

Considering this information, the outputs generated by the production process consist of residual fibre fragments and products that have entered the post-use phase. On the input side, the company will be furnished with details concerning this collaboration and emerging innovative products.

- ***Mid Term Opportunities***

In the medium term, There are different opportunities to be implemented; the first is the creation of an accessible open material detailing hemp cultivation and its myriad benefits ***(Opportunity h.)***. This visionary initiative stands poised to offer the company a powerful tool for disseminating valuable insights to an eager audience. Notably, this comprehensive material holds the potential to inform the interested public and foster continuous growth in the expertise and proficiency of the farmers and workers of the company. Such an endeavour underscores our commitment to knowledge-sharing, enabling us to remain at the forefront of industry innovation.

For this opportunity, there was desk research to understand which kind of open materials could be better applied to the company. Therefore, three examples of open materials were found by universities and are essential for producing the fibre.

There are Oaksterdam University, Cannabis Training Technology and edX with a course called Cannabis Awareness and Prevention. From these online courses, the people who develop it will be able to have a certification, material and sources that will prove their knowledge and improve their skills in the field of hemp fibre production.

This material, developed by Papillon Bleu, may have the necessary information about all the aspects of the Santica 27 and work as a

Figure 3. *Natural herbicide. (Shah, 2020)*

suitable methodology for learning, but also to help the company to share the information about the patents, strategies and technologies they want their employees to apply. According to this, the inputs and outputs, in this case, are, as an output from the company, the information and techniques that the company wants to share. On the other hand, as input for the company, new knowledge and skills will enter the system in the whole process, as the farmers manage the crops in the entire productive process.

The next opportunity for the middle term is to implement an integrated agricultural system that includes sheep breeding and hemp crops ***(Opportunity c.)***. According to the Chico Center for Regenerative Agriculture and Resilient Systems (CRA), incorporating animals back into agricultural systems for crop production brings about significant advantages, including enhanced soil quality, lowered vulnerabilities linked to monoculture farming, decreased expenses on fertilisers and animal nourishment, minimised labour and machinery outlays, and heightened carbon storage. Considering this information, the opportunity includes the agricultural system of sheep breeders, as the company is willing to produce a new material called Shemp, made from a percentage of wool and another one of hemp.

This opportunity could also signify a new collaboration with sheep breeders, as they could give the company input on the wool needed for the production process. On the other hand, the company can give sheep breeders the possibility of having some hemp crops on their land and some sheep breeding in their territories for growing hemp. In order to help the soil and the environment have benefits and improve their properties, this collaboration could be beneficial according to the studies based on regenerative agriculture.

For developing this opportunity,

Figure 4. *Sheep. (Carmo, 2022)*

there are some stakeholders like The Allerton Project, who researchers within the region who specialise in studying the impacts of various agricultural practices on the environment and wildlife could be valuable partners for the company when it comes to implementing these two farming systems.

Moreover, by implementing the opportunity on the system, there will be some outputs from the production process of the company, such as hemp crops or seeds to be used in the territory of the sheep breeders and change, the company will receive new possible spaces for growing their crops, additionally, as another input, the company will receive new information, skills and knowledge about the application of these agricultural systems and skill for cultivating hemp crops in these new conditions. However, for this opportunity, it is essential to say that before implementing it in the system, there will be a need for a phase of research to understand

Figure 5. *Construction materials. (Pexels, 2020)*

Figure 6. *Upcycled textiles. (Pexels, 2020)*

the compatibility level of these two activities, as the research found were between sheep and other types of crops that could be similar to hemp.

Additionally, the next opportunity is about integrating the wastes of the company's productive process into an input for other value chains like the construction sector ***(Opportunity k.)***. According to the case studies analysis and the holistic diagnosis developed previously, the construction sector in the territory is 34.5%, which makes the idea of using hemp in this field possible.

As hemp is a very versatile material, it could be used as raw material for different products in the construction sector. Moreover, in the research, it was found that in the sector, there are different construction companies, such as Avon Hemp Solutions, which could be critical stakeholders in the goal of integrating this opportunity into the system, as are local companies that could be found in the territory.

In this way, the company will have as an output the Hemp hurd and

other woody particles, which could be used for producing these different construction materials. On the other hand, the inputs received by the company will be information about new sub-products done from the wastes of the company and information about the versatile uses and applications of hemp in the construction sector of the territory, as well as new collaborations with local companies.

Moreover, the next opportunity is focused on finding stakeholders that help the company make it part of the community and projects focused on sustainable materials and fashion ***(Opportunity j)***. This could be possible as in the territory, there were found different companies and associations that work with manufacturers, designers, innovation centres and other actors that encourage the company to be part of a community that works with sustainable and fashion initiatives at a local level. Some companies that could work as a stakeholder are The Sustainable Angle, Unyte Hemp and the ATMF.

According to this, the company will collaborate with different companies to expand their business and participate in the community. To accomplish this work, the company will have as output all their products and sub-products that could be included in these collaborations and used in sustainable and fashion works and participations, like textiles, clothes and new products created for their collaborations with other companies. In this way, the input for the process is information, new knowledge and new networks and contacts with local actors, which will enter the company and help improve skills, processes and products, promoting the name of the company and its work.

Finally, the last opportunity to be applied in the medium term is to Involve the company in design, innovation and sustainable fashion events ***(Opportunity a.)***. As this opportunity is about collaborating with other companies to make part of events about sustainability and fashion, it is essential to find some critical stakeholders that could participate with the company in these events and help Papillon Bleu to be involved in collaborations in the sector.

According to this and doing some desk research, some local companies were found, like Design Leicestershire and Design & Technology Association, which develop every year some events and fairs like the Design Season, focused on innovation, new textile materials and sustainability, which could involve the company in the topic.

For this opportunity, the outputs of the process are the products and subproducts that could work for the collaboration in events, for example, fibre samples, products, and subproducts from the outputs of the process. On the other hand, the inputs obtained by the company with this opportunity are information about sustainability, collaborations and the possibility of building new networks. Also, all this could promote the work of the company.

- ***Long Term Opportunities***

Figure 7. *Farmers working. (Stebnicki, 2021)*

For the long-term opportunities, only one opportunity is planned to be applied in this period, as its development requires more time and planning. This opportunity is to create a community of farmers around the company, improving processes and skills ***(Opportunity b.)***. For developing this opportunity, the community of Yorkshire farmers as a reference and with desk research, some other communities that are localised in the territory of Lester and Leicestershire, for example, Leicestershire Rural Partnership, Leicestershire communities and Leicestershire YFC.

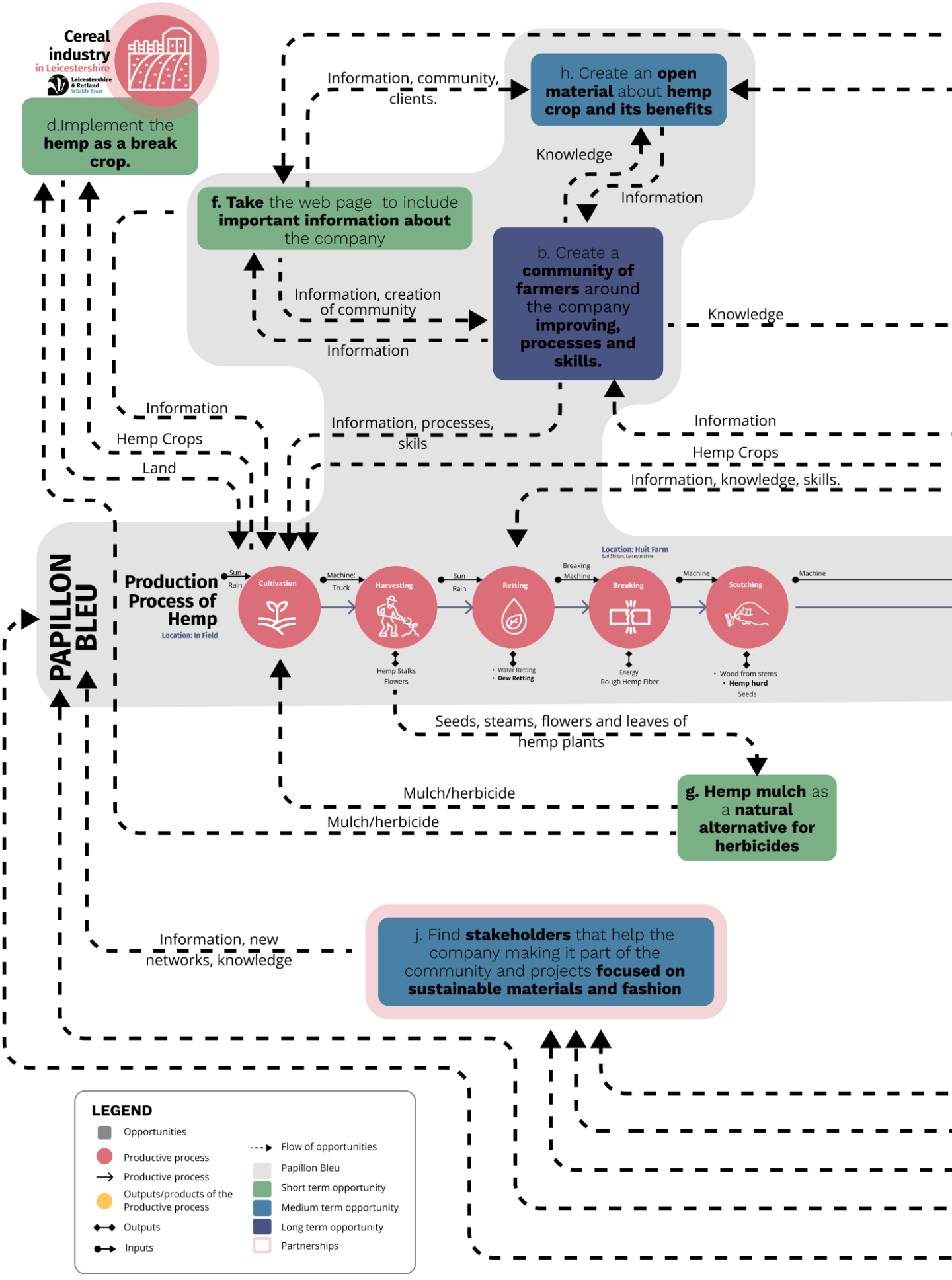
With these communities, the company could have the opportunity to participate with them in events or include them in activities with the company. These communities could also be a good referent for building a community in the territory. According to this, the company will have as output the information about the processes, materials and techniques managed by the company to expand this information and share it with the farmers that participate in the community. Finally, the inputs that the company will receive are information, new skills and techniques that the farmers will acquire when working with the company and managing hemp crops.

5.3 System

Considering the proposals presented in the previous section, these opportunities are integral to the transformation process of the company's system, each playing a significant role in shaping a sustainable, collaborative, and innovative narrative. The implementation strategy involves systematically progressing through these opportunities, aligning them with distinct timeframes to establish three phases of the final system.

In the Annex 4 it is possible to see the mapping of the Systemic project with all the opportunities implemented in the company's system. When a comparison between the linear and systemic processes is made, it can be highlighted that with all these new proposals, the five pillars of the systemic design had been considered when designing the systemic project.

According to the five pillars of


Cereal industry in Leicestershire
Leicestershire & Rutland Wildlife Trust
d.Implement the hemp as a break crop.
Information, community, clients.
h. Create an open material about hemp crop and its benefits
Knowledge
Information
f. Take the web page to include important information about the company
b. Create a community of farmers around the company improving, processes and skills.
Information, creation of community
Information
Knowledge
Information
Hemp Crops
Land
Information, processes, skils
Information
Hemp Crops
Information, knowledge, skills.
PAPILLON BLEU
Production Process of Hemp
Location: In Field
Location: Huit Farm
Earl Shilton, Leicestershire
Sun
Rain
Cultivation
Machine: Truck
Harvesting
Hemp Stalks
Flowers
Sun
Rain
Retting
Water Retting
Dew Retting
Breaking
Machine
Breaking
Energy
Rough Hemp Fiber
Machine
Scutching
Wood from stems
Hemp hurd
Seeds
Machine
Seeds, steams, flowers and leaves of hemp plants
Mulch/herbicide
Mulch/herbicide
g. Hemp mulch as a natural alternative for herbicides
Information, new networks, knowledge
j. Find stakeholders that help the company making it part of the community and projects focused on sustainable materials and fashion
LEGEND
Opportunities
Productive process
Productive process
Outputs/products of the Productive process
Outputs
Inputs
Flow of opportunities
Papillon Bleu
Short term opportunity
Medium term opportunity
Long term opportunity
Partnerships

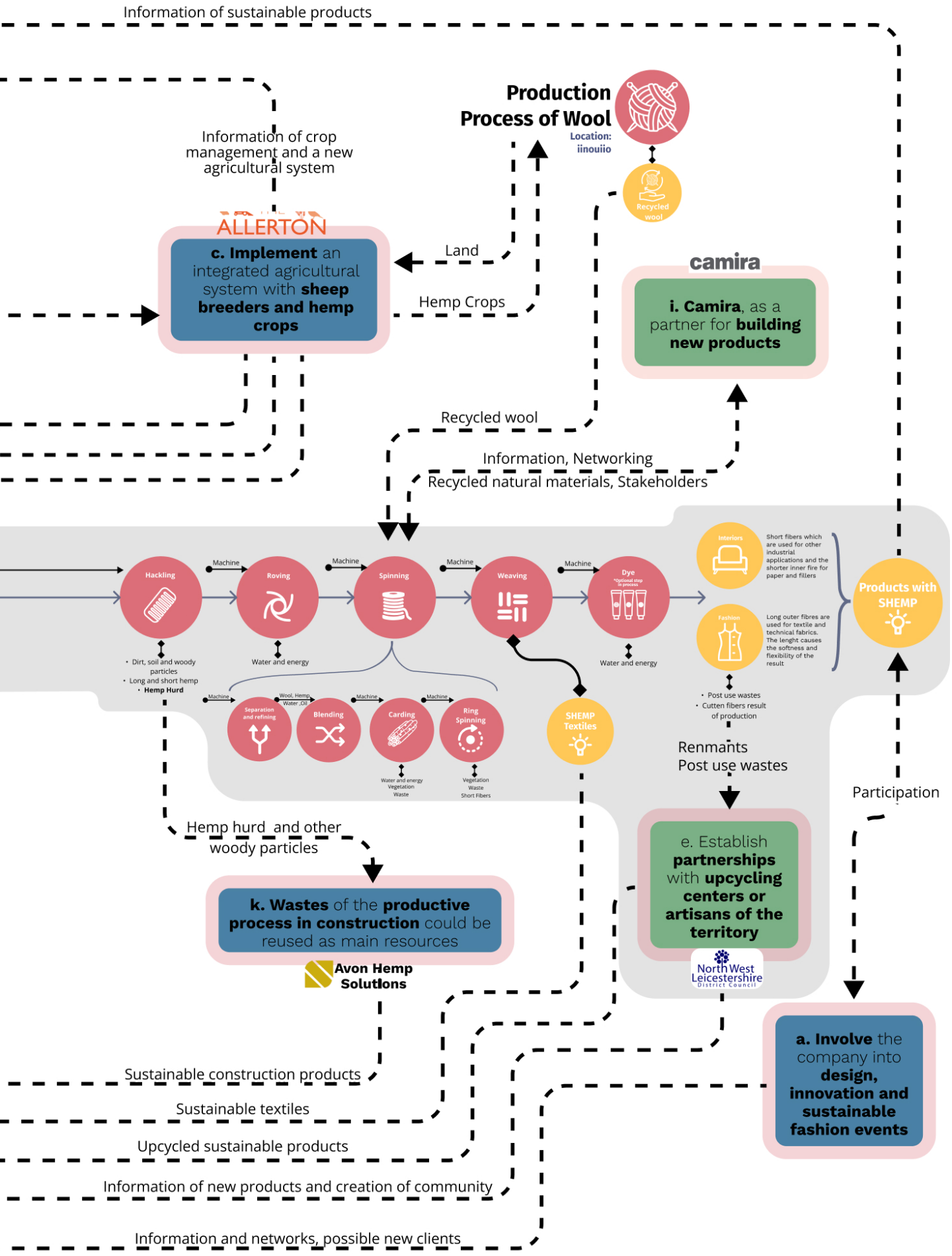


Figure 8. *Systemic project*

systemic design, the first condition that the system must follow is the possibility of having an autopoietic solution. It can be said that the system project represents an autopoietic system in the way that there are different actors and parts involved in the process, and if any of the actors are for different reasons at any time, the company could have other options, as the territory has more local stakeholders that could support the system when an actor or opportunity is missing. Additionally, if an actor leaves the system, the territory has different conditions that could help the company to find locally or nearby more possible stakeholders, as the proposal is focused on activities typically done in the territory.

The next pillar focuses on the relationships that are established with the proposal. The systemic project presents the eleven opportunities identified and all the possible actors and stakeholders that could be included in the development of the systemic project. Considering all the opportunities, almost for each opportunity, at least one new actor or stakeholder of the territory is critical for developing the corresponding opportunity. In this way, the project enhances relations between local actors that accomplish different activities, such as artisans, upcycling centres, associations, cereal companies, textile companies, construction companies, and other agricultural activities.

Following the next pillar, there is the condition of acting locally. In the systemic project, the actors that are connected in the process are local actors that, as said before, work on different areas of the territory's economy. Therefore, this condition may be fulfilled as the associations, communities, and companies taken into account on the project are from Leicestershire or Leicester. However, there are some actors like, for example, Fibershed and ATMF that develop part of their work at a more significant level, like Britain or the U.K., but also have a focus or operation centre in Leicestershire. This fact allows the company to someday scale the project and expand the relationships on a higher level.

The next pillar of systemic design is humanity-centred design. According to this pillar, the project was designed so that the opportunities are focused on the inhabitants of the territory and the main activities developed locally. One crucial part of the project is focused on creating networks around the company by involving it in events and initiatives that connect the company with the actors that work around the system. Additionally, Papillon Bleu is a company interested in sustainability and following the principles of regenerative agriculture. Part of these principles is to improve the skills, knowledge and well-being of the workers or people who could be involved in the system. According to this, the project focuses on creating a community between farmers, so between them, an improvement of skills and a base of information is created to improve their work and know-how.

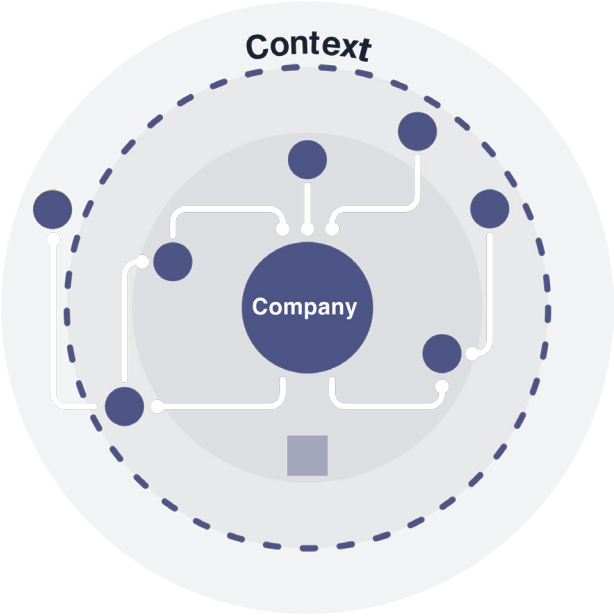


Figure 9. *System (Barbero, 2022)*

Finally, the last pillar is to turn outputs into inputs, which is also one of the main focus of the project, in the way that the productive process of the company was analysed and evaluated to identify the possible wastes and sub-products and how they could be applied in other productive process present in the territory and collaborating with the local companies. In this way, the company, by applying the project, will be able to collaborate with companies that work on other economic activities like, for example, construction, sheep breeding, cereal industry and wool production. Additionally, the post-user phase of the products developed by the company was also taken into account, as Papillon Bleu could create collaborations with artisans and upcycling centres in order to create new products with unused materials and materials that already accomplished their life cycle and could be transformed into new products.

In conclusion, the opportunities of this project collectively contribute to the strategic evolution of Papillon Bleu. The short-, medium-, and long-term implementation approach ensures a gradual, well-rounded transformation that aligns with the company's sustainability, collaboration, and innovation goals. Moreover, the systemic project encapsulates these five pillars, forming a comprehensive approach that exploits Leicestershire's unique attributes and harnesses local partnerships. The project paves the way for Papillon Bleu's transformation into a catalyst for positive change within the textile industry and throughout the local community and economy.

5.4 Outcomes

The shift from a linear to a systemic framework yields significant ramifications for the entire landscape, encompassing the company and its surrounding environment. A broader and all-encompassing analysis is required to gain a more comprehensive comprehension of these consequences. For this part of the project there was created a Gigamap for the analysis of the outcomes of the project that could be seen in the Annex 5, where all the analysis and compilation of data was summarised and can be visualised.

Examining the Consequences involves aligning the information derived from the Comprehensive Diagnosis with the novel components integrated into the Systemic Project. The aim is to establish a set of pragmatic conjectures and quantitative/

qualitative predictions regarding the effects stemming from the transition to a systemic paradigm within a specific region. This analysis covers diverse categories and various potential scopes and periods.

5.4.1 Evaluation

This comprehensive analysis phase employed a multifaceted approach to evaluate the project's potential impact. To achieve this, a spider web diagram was employed as a visual tool, aiding in understanding the nature and scope of the project's influence across different dimensions. This evaluation process was meticulously conducted using a scaled system ranging from one to five, where a rating of five signifies the highest potential impact. It is important to note that all the evaluations performed in this analytical phase are firmly rooted in the data and insights garnered from extensive research and the iterative development journey of the project.

Each opportunity is evaluated meticulously considering five distinct criteria: environmental, economic, sociocultural, communication, and logistical. By subjecting each opportunity to these rigorous criteria, a comprehensive overview of how the impact is distributed among the various opportunities comes to light. As a visual representation of this evaluation, the spider web diagram serves as a strategic tool to portray the project's potential influence across these diverse dimensions. This visual mapping enhances the clarity of the project's potential and provides a means to prioritise strategies based on the varying strengths and impacts of each opportunity within the larger project framework.

Using the spider web diagram for impact evaluation exemplifies a comprehensive approach that helps stakeholders and decision-makers understand the far-reaching implications of each opportunity. Furthermore, this approach facilitates data-driven decision-making and is essential in shaping the project's trajectory towards sustainable, collaborative, and innovative outcomes. By visually depicting the project's impact across multiple dimensions, this analysis offers valuable insights into the project's alignment with the Sustainable Development Goals and its overall contribution to the spheres of decent work and economic growth, responsible production and consumption, and life on land.

After conducting individual analyses for each project opportunity, an overarching assessment of the project's impact can be derived from the cumulative evaluations. This results in a comprehensive spider web

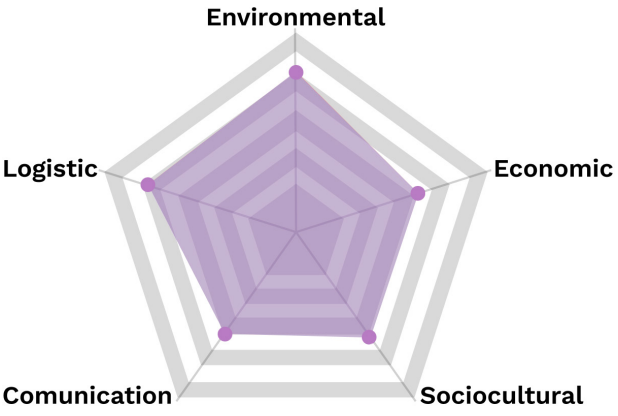


Figure 10. *Spider web evaluation*

diagram that centres on the project's holistic influence. From the combined evaluations, the environmental aspect emerges as the highest-rated element, achieving a score of four out of five. Subsequently, the logistic and economic dimensions follow closely with ratings of three point eight and three point five, respectively.

According to this previous analysis, it is possible to emphasise that the project's primary objectives encompass community building, network establishment, local actor collaboration, and enhanced practices – all working synergistically to achieve a more sustainable production approach. Because of this, even if all the aspects have a substantial weight on the project, these aspects rated with a more considerable value are vital for developing the proposal.

5.4.2 Scale

A critical phase to consider when evaluating a systemic project revolves around the feasibility of its scalability to encompass diverse contexts, realities, or territories. This multifaceted assessment is paramount because it can lay the foundation for prospective expansion, affording opportunities for sustained growth for both the system and the associated company. Such growth can be realised when it aligns with the intentions and strategic planning of the involved stakeholders.

In line with this perspective, it is essential to underscore that the project outlined in this thesis is firmly grounded in the foundational principles of systemic design, with a distinct emphasis on the principle of local action. This specific pillar carries immense significance, particularly in assessing the project's potential for scalability and long-term success.

To elaborate further, the cornerstone of the project's approach is the commitment to act within the immediate local environment and engage closely with the diverse array of actors and stakeholders present within the territory. This approach is the bedrock for the project's ambition to foster sustainable and enduring solutions.

By conscientiously acknowledging and collaborating with the various local entities, the project attains a deeper understanding of the unique challenges and opportunities inherent to the specific region and establishes robust relationships with key players. These local connections are vital in propelling the project towards scalability and widespread applicability.

Henceforth, it becomes evident that the project boasts substantial potential for scalability. This potential is rooted in the comprehensive diagnosis conducted during the research phase, which pinpointed the territory's primary activities and key stakeholders. Identifying these crucial actors lays a solid foundation upon which the project's systemic design is meticulously crafted to align with the unique attributes of the territory and its involved stakeholders.

Having these actors firmly identified,

the project possesses a substantial reservoir of knowledge and experience tailor-made to the territory's specific dynamics. This implies that should there be a desire to expand the project into other territory regions; it can be seamlessly adapted and implemented, drawing upon the existing relationships and insights garnered from the initial groundwork.

In essence, the project's scalability is underpinned by its inherent adaptability. This adaptability stems from the project's original alignment with the territory's characteristics and the collaborative engagement with its actors and industries. As a result, extending the project to different parts of the territory becomes a considerably smoother process, as the accumulated wisdom and established connections can be leveraged to navigate new challenges and opportunities effectively.

Furthermore, the presence of a well-entrenched network of actors and industries within the territory facilitates scalability and contributes to the project's sustainability. When extended to other areas of the territory, the project benefits from the pre-existing rapport with these local stakeholders, fostering a sense of continuity and shared purpose.

5.4.3 Timeframe

Another integral component of the project's evaluation phase entails the delineation of action timeframes, as elucidated in Annex 6. This section is presented in the form of a table, meticulously detailing the requisite steps for the realisation of each opportunity and the fulfilment of their respective requirements within specific periods.

In Annex 6, the table serves as a structured roadmap, offering a clear and organised depiction of the chronological sequence of activities and milestones essential for the development of each identified opportunity. It delineates the actions required and assigns them to discrete timeframes, ensuring a systematic and well-coordinated approach to project implementation.

The inclusion of these timeframes in the project evaluation process serves several purposes. Firstly, it provides a comprehensive overview of the project's anticipated trajectory, establishing realistic expectations and objectives. Secondly, it allows for effective project management and resource allocation, as stakeholders can allocate resources and personnel according to each opportunity's

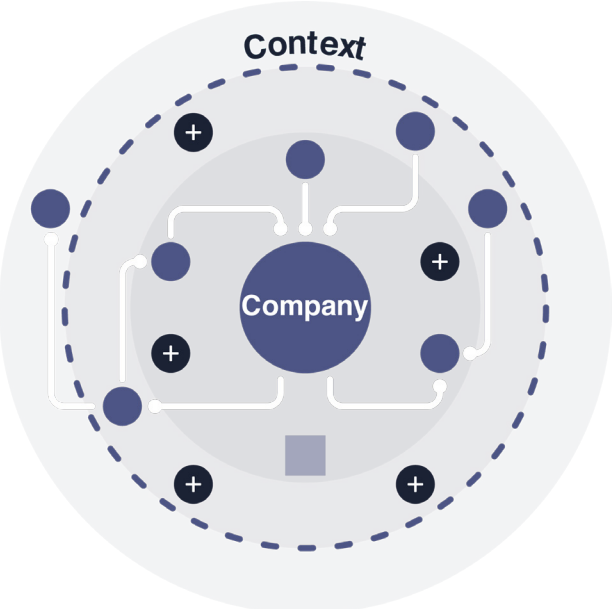


Figure 11. *Outcomes. (Barbero, 2022)*

specific needs and deadlines.

Another crucial consideration when assessing the project's timing is incorporating the subdivision previously outlined in prior presentations of the opportunities. Given that specific opportunities are slated for implementation in the short, medium, or long term, the analysis of time frames must align with these temporal requirements. Recognising that some opportunities necessitate more extensive logistical planning, material procurement, stakeholder engagement, or collaborations with other actors is essential.

Consequently, the entire project can be strategically divided into three distinct phases:

Short-term Opportunities: These opportunities are earmarked for implementation within the project's initial year. They typically involve actions that can be swiftly initiated and completed.

Medium-term Opportunities: This category spans up to the project's fourth year, encompassing opportunities that demand a more extended timeframe for execution. These may involve more complex logistics, resource coordination, and stakeholder engagement.

Long-term Opportunities: The long-term opportunities extend up to the seventh year, representing endeavours that require sustained effort and investment over an extended period. Such opportunities often involve substantial collaborations, infrastructure development, and comprehensive sustainability planning.

Establishing these three distinct phases not only aids in efficient project planning but also enables the allocation of resources and efforts systematically. It aligns the project's trajectory with the varying timelines of each opportunity, allowing for a cohesive and well-organised approach to execution.

Furthermore, the timeframes serve an additional crucial function. They delineate the specific actions required to maintain the viability of each opportunity over time, contributing to the project's overall sustainability. This proactive approach ensures that the system remains viable and effective throughout its lifecycle, adapting as necessary to changing circumstances and evolving requirements.

The comprehensive analysis of timeframes, rooted in the subdivision of opportunities and their respective temporal demands, is a cornerstone of effective project management. It not only facilitates the successful execution of the project but also promotes long-term sustainability by addressing the evolving needs of each opportunity within a structured and adaptable framework.

06

Design Value Framework

6. Design Value Framework

The Design Value Framework is a structured approach that assesses the impacts and implications of design decisions across various dimensions. It provides a comprehensive framework for evaluating the value generated by a design solution, considering diverse factors such as sociocultural, environmental, democratic, and financial-economic impacts. This framework is often used to guide design processes and decisions, ensuring that designs align with broader goals, values, and sustainability objectives.

This evaluation methodology aims to move beyond traditional measures of success, like purely financial metrics, and consider the broader effects of a design solution on different aspects of society and the environment. This framework facilitates more informed and responsible decision-making in design projects by systematically analysing the impacts and trade-offs associated with design choices.

This methodology has two main parts; the first analysis can be seen in the Annex 7, called the Value Assessment Table *(Table 1)*, presenting indicators and referencing relevant tools that can be employed to measure the impact of design. In this first part, the analysis is done in two axes of evaluation: the first one is from the point of view of the project and its benefits when the company applies the strategies, and the second one is from the point of view of the company and their actual job before applying the systemic design project.

In the first part of the Table, the project is evaluated in three important aspects: design, production and lifespan, which crossed with the main pillars of the Design Value Framework (DVF) (sociocultural, financial, environmental, and democratic) *(Image 1)*, giving an idea on how the systemic project has an impact on the diverse context of action. According to this analysis, the project significantly impacts all the axes as it brings together relationships and network building between the community, takes care of environmental aspects, and follows regenerative agriculture

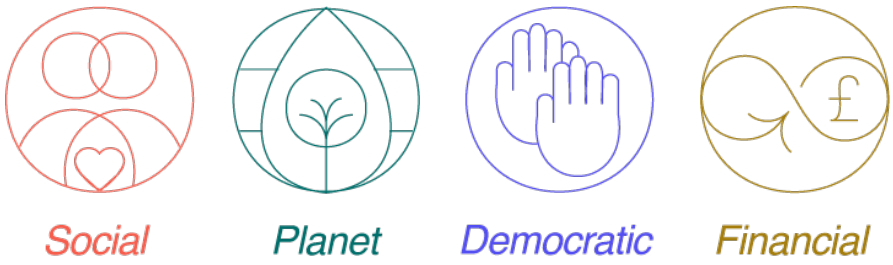


Figure 1. *Pillars of the Design Value Framework. (Design Council, 1996)*

	DESIGN PRACTICES AND PROJECTS				ORGANIZATIONS USING DESIGN			
VALUES	1. DESIGN	2. PRODUCTION	3. LIFESPAN	7. OVERALL CONSIDERATIONS	4. STRATEGY	5. OPERATIONS	6. INFRASTRUCTURE	8. OVERALL CONSIDERATIONS
Socio-Cultural	The design phase of the system brings together different actors of the territory and builds up strategic partnerships that built relationships between companies and communities of the territory	When the system is brought into the territory it builds new communities between local actors and connects different agricultural systems and pats of the economy like the breeding, cereal industry, upcycling centres making possible the construction of networks and building of knowledge	The system includes the use of the wastes of the production process of the company into other productive process of other companies and the creation of new products form used materials collaborating with artisans and up-cycling centers, helping change the misconception society has about hemp	With some parts of the system like the creation of community and the development of the web page , the trust and the sense of community is built	*The company is thinking about creating a community around their production process and its products, in this way additionally creating an environment of well being between farmers*	The company has been working into different strategies in order to develop the new material Shemp around different collaborations with companies and communities of farmers	The company is working on the improvement of their web page in order to have tools for building the community of farmers and also information about their work	The company works already with different actors and entities that are interested in creating the different communities of farmers in order also to improve and spread the best practices around the growing of hemp
Environmental	The design of the system is focused in using the principles of the regenerative agriculture in order to bring value to the land of the territory and benefit different parts of the economy of the territory	The development of the system implies the improvement of the properties of the land having into account the principles of the regenerative agriculture used in the systemic project	The system includes the using of wastes of the production process like for example hemp hurd that could be useful as hemp mulch for an alternative to herbicides and in this way improve the properties of the land	The strategy can help the farmers and members of the community to improve their soil, plants and the state of their agricultural systems	*The company focuses their strategy in order to reduce the wastes as much as possible in order to have a circular production process.*	The company focuses their operations in order to reduce the wastes as much as possible in order to have a circular production process.	The company is working towards implementing the idea of regenerative agriculture and in this way creating community, taking into account the importance of creating community between farmers around the company	The organization will use the principles of the regenerative agriculture, which will mean a creation of community around the company. Enhancing the sense of belonging between the members of the community and in connection with the land
Democratic	The design process of the system also includes the licensing and legal components that are taken into account for the company to implement the system in their production process	The Production phase of the system includes that the company needs to develop and follow up some requirements in order to obtain the licenses needed to develop the project.	In the lifespan phase, the company will be needing to have into account different regulations and laws in order to have an appropriate management of the wastes of the process, with materials like the hemp mulch or materials for construction.	The strategy could help clarify and explain how the regulations and legislation work, in order to help the farmers and communities that want to know more about possible products from hemp.	The company already has a patent on the material and is managing the needed licenses to grow hemp and collaborate with farmers and expanding their crops	The company is building a interdisciplinary community between farmers and workers in order to comprehend the importance of shearing the knowledge about hemp and its uses and benefits	The company is investing on the improvement and creation of the web page. Also with the participation on local events, the company is connected with possible networks needed for the development of their products	The company is interested on building community, for which it works hand by hand with the farmers and other interested companies like for example Camira that is a referent for sustainability and the application of a production process mainly focused on circular economy
Financial	The design process of the system also includes collaboration between different companies and associations that could bring a profit to the company	In order to develop the project, the company will need to build up collaborations with different companies, which could mean paying or receiving some fees in order to participate in these collaborations and events, which will bring to the company the possibility of improving their production process	With the new products obtained by using different wastes of the hemp fiber production process, the company will be wining a profit from the new lines of products and collaborations done to use all the materials in a more circular way	With the strategy, the collaborations between the company and other actors of the territory could mean a financial benefit for both actors.	*The company is investing in the improvement of their web page and increasing the amount of crops and lands used for their processes and products.*	The company is currently developing the web page, and running different tests for the creation of the shemp, and participating on events that imply the participation on the local economy.	The company is investing in the improvement and creation of the web page. On the other hand, the company also is working on the expansion of land that they have available for growing the hemp crops and the creation of knowledge	The company is working on building a change toward regenerative economy having into account that the collaborations and participation with new local actors, could mean new profits and gaining in financial terms that not only benefit the company but also the collaborators involved

Table 1. *Value Assessment table. (Design Council, 1996)*

ideas.

On the other hand, the project means a profit for the company as it establishes collaborations with different local companies; also, the improvement of waste management allows the company to create new products and subproducts to reuse unused materials with other companies. Additionally, the project must have some regulations and licences to be feasible and implemented in the company's reality. Also, when managing the waste and implementing it in other productive processes, the democratic aspect is crucial and critical when applying the project.

The second part of the design value framework is the Value Map *(Diagram*

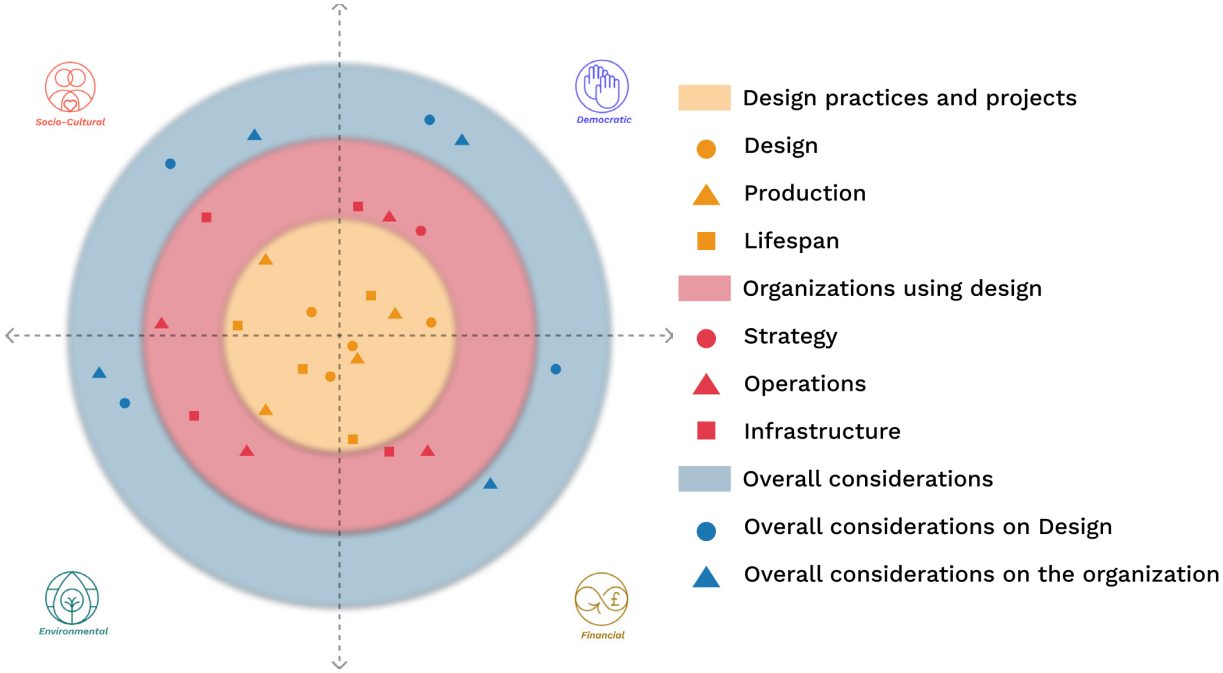


Figure 2. *Value map. (Design Council, 1996)*

1), which is an ideal tool for representing the results of the analysis done in the previous step in a cartesian plane with four quadrants that represent the four aspects of the DVF. This Value Map gives an overall view of the essential aspects of the project and the influence of each of the four axes of action presented in the evaluation.

In the same Annex 7, there are the results of the evaluation and, therefore, the results of the Value map of this value framework. With this analysis, the project fulfils and has an essential impact on all the aspects of the design value framework. However, the aspects that are more relevant according to the DVF analysis are the sociocultural and environmental axes, as the project is focused on aspects like creation of community, building knowledge and sharing information, as well as waste management, improving the use of land and follow the principles of regenerative agriculture for taking care of the land. The possibility of analysing the project through this value framework gives an overview for understanding the impact of the project on the territory and the company.

07

Project conclusions

7.1 Project conclusions

In conclusion, the opportunities meticulously presented in this project drive Papillon Bleu's strategic progress. The structured rollout across short-, medium-, and long-term intervals ensures a methodical and all-encompassing change that aligns with the company's vision of sustainability, collaboration, and innovation. At its core, the systemic project exemplifies the five pillars of systemic design, engendering a comprehensive strategy that leverages Leicestershire's distinct attributes and enhances local partnerships. This initiative involves Papillon Bleu as a proactive catalyst for positive transformation, radiating influence within the textile sector and across the territory.

The culmination of the presented initiatives in this project directly aligns with crucial Sustainable Development Goals (SDGs), prominently encompassing the objectives of *Decent Work and Economic Growth* **(SDG 8)**, *Responsible Production and Consumption* **(SDG 12)**, *and Life on Land* **(SDG 15)**.

Firstly, the project's phased implementation strategy prioritises Decent Work and Economic Growth (SDG 8) by fostering collaboration and innovation within Papillon Bleu and the local community. As the proposed opportunities unfold over short, medium, and long-term periods, they contribute to the company's evolution into a sustainable catalyst for positive change. This approach generates new avenues for employment, knowledge-sharing, and skill enhancement, promoting a healthier work environment and economic prosperity within the region.

Secondly, the project resonates with the principles of Responsible Production and Consumption (SDG 12) as the goal that has more impact in the project. The initiatives encourage a fundamental shift in the textile industry's production paradigm by focusing on circularity, sustainable materials, and collaborative partnerships. The systemic approach and engagement in sustainable events and collaborations pave the way for Papillon Bleu to play a pivotal role in advocating responsible practices. The transition from linear to systemic design embodies the essence of reduced waste, increased resource efficiency, and a heightened commitment to sustainable consumption patterns.

Furthermore, the project's intricate alignment with Life on Land (SDG 15) signifies its dedication to enhancing environmental well-being and biodiversity. The project demonstrates a profound commitment to regenerative practices that restore soil quality, support wildlife, and mitigate environmental degradation through initiatives like hemp cultivation, upcycling, and integrated agricultural systems. By incorporating hemp into various applications, the project promotes sustainable land use and

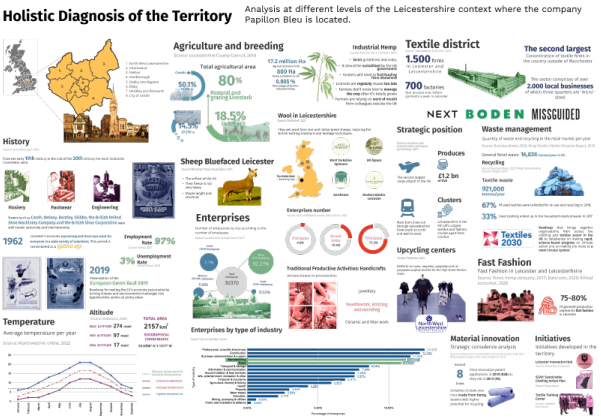
contributes to the preservation of terrestrial ecosystems, thereby aligning with the goals of SDG 15.

The project's multi-faceted approach intertwines with the core values of Decent Work and Economic Growth, Responsible Production and Consumption, and Life on Land. It embodies a transformation that transcends industry boundaries, encompassing a holistic narrative of sustainability, collaboration, and innovation that enriches the local community and the environment.

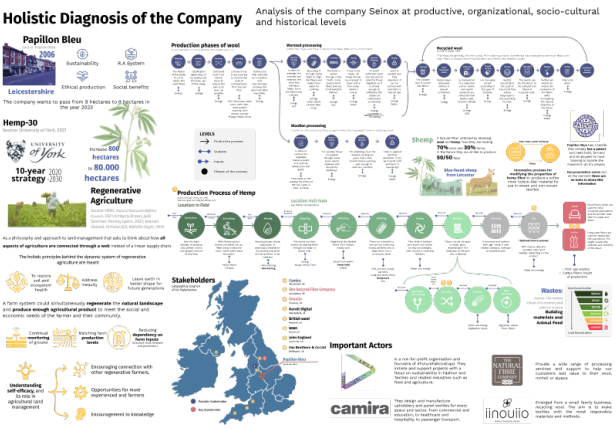
7.2 Annexes

In this section of annexes, all complementary materials that support and enrich the information presented in the previous chapters will be presented in a concise and organized manner. These annexes include gigamaps and tables that contribute to a more complete understanding of the topic addressed in this thesis.

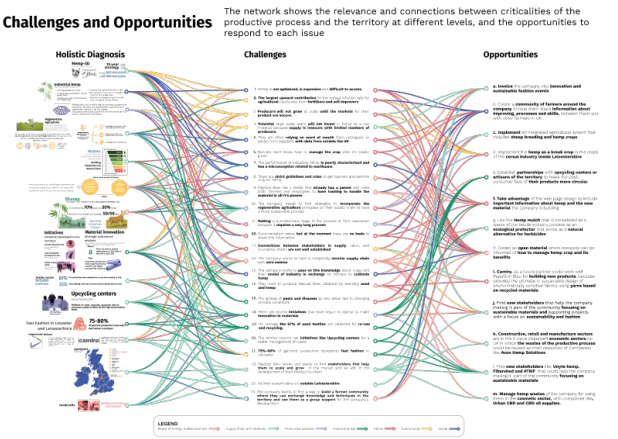
Annex 1: Holistic Diagnosis of the Territory



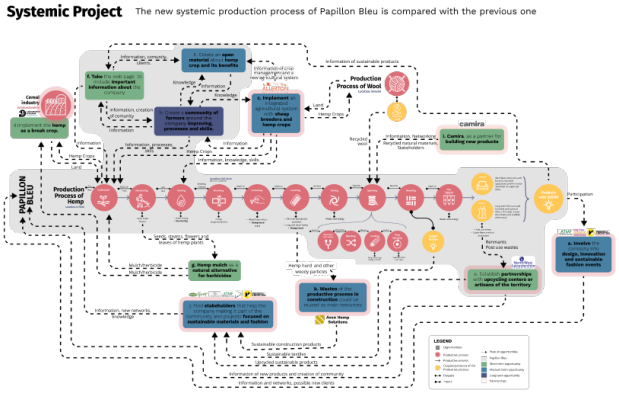
Annex 2: Holistic Diagnosis of the Company



Annex 3: Challenges and Opportunities



Annex 4: Systemic project



Annex 5: Outcomes

Outcomes

Consequences of the new systemic model starting from its outputs to complete the project, performed on several categories and analyzing different possible scales and timeframes

Short term

Starting point - 1st year

Outcome	Supporting data *(Good practices)*	Timeframes
f. **Take advantage** of the web page design to include **important information**	• Fibershield has at the moment **62 collaboration** with **companies around different countries** that could be reached with the web page	PHASE: 1. Make a general overview of the information in both the company and the territory; 2. Collect and organize information on both hemp crops and their benefits; 3. Establish a point of contact with the community; 4. Establish communication strategies to connect with the community; 5. Contact a designer for the development of the web page; 6. Keep the page active for the benefit of the company and the community. — 1– 4 Months / 5–8 Months / 9–12 Months
d. Implement the **hemp as a break crop** in the crops of the **cereal industry inside Leicestershire**	• The **Multihemp project** (2017) reported that hemp can be cultivated in crop rotations; • The **cereal industry** is about the **10.1%** of the land in **Leicestershire.**	PHASE: 1. Establish discussions and relations with cereal companies in the territory; 2. Plan the agreement in terms of commercial and economic profits; 3. Establish logistics for crops and new material collection; 4. Establish the raw material collection points. — 1– 4 Months / 5–8 Months / 9–12 Months
i. **Camira**, as a future partner for **building new products** using **yarns based on recycled materials**	• They are training **70% wool and 30% hemp**, in the future they would like to produce 50/50 fiber; • There are some initiatives on **Re-Wool** and **Re-Verse** **new lines made from hemp textiles** with higher potential for recycling.	PHASE: 1. Establish discussions and relations with Camira; 2. Establish logistics for the collection of new products with new and recycled raw materials; 3. Plan the agreement in terms of commercial and economic profits; 4. Product definition and sales strategy; 5. Strengthen the relationship between Pavillon Blau and Camira by launching many more products on the market together. — 1– 4 Months / 5–8 Months / 9–12 Months
e. Establish **partnerships** with **upcycling centers or artisans of the territory**	• **75–80%** Of garment production represents fast fashion in process; • In the territory there are artisans that work on Jewellery, Woodworking, weaving, **crochet, knitting and mending**; • There are already **upcycling courses, classes and workshops**	PHASE: 1. Establish conversations and agreements with groups of artisans and up cycling centers of the territory already formed; 2. Propose a joint action plan for sustainable products based on textile waste; 3. Develop communication strategy that reinforces the idea of community sustainability; 4. Definition of products and their sales or propagation strategy; 5. Include these new allies as a key part of the post-consumer phase. — 1– 4 Months / 5–8 Months / 9–12 Months
g. Use the **Hemp mulch** as an **ecological protector** that works as a **natural alternative for herbicides**	• The **cereal industry** is about the **10.1%** of the land in **Leicestershire** • **Hemp mulch** provides many benefits, for example: weed suppression, moisture retention, temperature moderation, soil improvement, etc. • It is recommended to spread a layer around **3–3 inches** thick around plants.	PHASE: 1. Collect materials considered waste on the harvesting phase; 2. Establish an agreement with main cereal industry to offer an environmental protector by product that leaves the production chain; 3. Establish the periods in which they want to apply the product to see how much mulch is needed; 4. Establish the periods in which these companies would need this product; 5. Expand this project in all companies of the cereal industry in the territory. — 1– 4 Months / 5–8 Months / 9–12 Months

Medium term

2nd year- 4th years

Outcome	Supporting data *(Good practices)*	Timeframes
h. Create an **open material** where everyone can be informed of **hemp crop and its benefits**	• There are existing **materials, books and web pages**, where they teach some aspects of plant care, but they do not go into detail for the case of the territory; • In the **Hemp 30** identified the **lack of accessible material** of everyone	PHASE: 1. Collect the necessary information from all parts of the process of care and growth of hemp crops by taking the website reference and expert advice; 2. Establish the strategic order in which to communicate the information; 3. Make the loci virtual and easy access for Pavillon Blau workers; 4. Improve cultivation and management techniques of the hemp making production more efficient; 5. Expand the use of the material and make it available to those interested in the type of crop that the company makes. — 1st and 2nd year / 3rd year / 4th year
c. **Implement** an integrated agricultural system that includes **sheep breeding and hemp crops**	• According to **Chico Center for Regenerative Agriculture and Resilient Systems (CRA) reintegrating animals** into agricultural systems provides **considerable benefits in improved soil health**; • There are companies both **sheep breeding or studying** these behaviors in the territory	PHASE: 1. Search and characterize the possible compatibility between sheep breeding and hemp crops; 2. Run a pilot crop with both agricultural systems together to prove the success of the process; 3. Establish relationship between farmers or sheep breeders in order to maintain a local relationship and involve local actors; 4. Establish the land that will be used in the process and prepare it to adapt to both agricultural systems; 5. Start running the model; 6. Scale the model to include other sheep breeding farms. — 1st and 2nd year / 3rd year / 4th year
k. **Construction, retail and manufacture sectors** in which the wastes could be reused as main resources of Companies like **Avon Hemp Solutions**	• The **construction, retail and manufacture sector** is about the **34.26%** in **Leicestershire** • The companies in Leicestershire **which already implement the hemp** as a raw material	PHASE: 1. Collect the hemp hurd on the hackling phase; 2. Establish an agreement with main hemp fiber solutions to offer a by product made from hemp hurd; 3. Establish the periods in which they want to apply the by-product to see how much hemp hurd is needed; 4. Establish the periods in which these companies would need this product; 5. Expand the product to other construction companies on the territory. — 1st and 2nd year / 3rd year / 4th year
j. Find **new stakeholders** that help the company making it part of the community **focusing on sustainable materials and** supporting projects with a focus on **sustainability and fashion**	• Some **stakeholders** work with **sustainable fashion, manufacturers, designers, brands, innovation centres** dedicated to promote quality production that utilizes local industry; • Design Leicester is a **cross-disciplne collective of design businesses and designers working** with the city's creative hub LCB.	PHASE: 1. Contact and search about the stakeholders founded in the territory; 2. Establish alliances with these stakeholders in order to collaborate and have the possibility of gaining new contacts and knowledge about the different sectors of the territory; 3. Collaborate with these companies for participating and build new possible events and activities that could be added to the events that already exist; 4. Spread the model and collaboration to other types of companies and also different territories. — 1st and 2nd year / 3rd year / 4th year
a. **Involve** the company into **innovation and sustainable fashion events**	• Some organizations work with **promote the innovation and sustainable textiles**, so the company could be involved in these events; • Design Leicester is a **cross-disciplne collective of design businesses and designers working** with the city's creative hub LCB.	PHASE: 1. Search and establish alliances with organizations that host events related to fashion and sustainability to involve the company in these events; 2. Plan the logistics of how and with which product the company is going to participate in these events; 3. Design and start producing products for these types of projects; 4. Communicate through the website the participation to these events; 5. Participate in the events; 6. Expand the participation of the company in more events on the territory. — 1st and 2nd year / 3rd year / 4th year

Long term

5th year - 7th year

Outcome	Supporting data *(Good practices)*	Timeframes
b. Create a **community of farmers around the company** to share **information about improving, processes and skills**	• In the territory **there are different organizations that aim to create community** around rural areas; • **Reference** communities **Landworkers' Alliance** has taken to create **strong networks of contacts** sharing knowledge, skills and experiences	PHASE: 1. Contact the farmers that are willing to participate and be part of the community; 2. Organize events and activities for meeting between them and share ideas and knowledge about the growing and farming process; 3. Give workshops and information about crops, techniques and new possible ways that could improve their skills; 4. Establish the times and periods for meetings and activities in order to build community. — 1st to 5th year / 6th year / 7th year

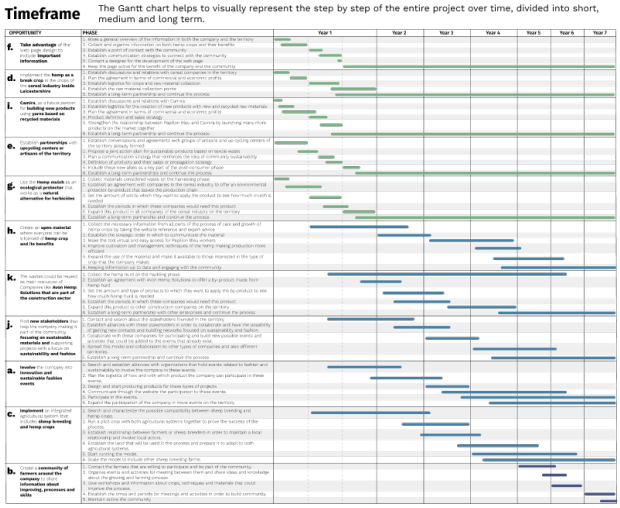
Based on the whole system

4/5 Environmental	Reducing waste from the production chain and giving them a second life
3.5/5 Economic	Giving the company new income from what used to be waste
3.4/5 Sociocultural	Creating community and making people more aware of the benefits and uses of the plant
3.3/5 Comunication	Improving society's perception of the plant and demonstrating its different uses
3.8/5 Logistic	Creation of a local network and community to work and collaborate from your specialty

Annex 6: Timeframes

Timeframe

The Gantt chart helps to visually represent the step by step of the entire project over time, divided into short, medium and long term.



Annex 7: Design Value Framework

Design Value Framework

Is a structured way of mapping and assessing the impact of design in four interconnected domains of value: socio-cultural, environmental, democratic and financial-economic.

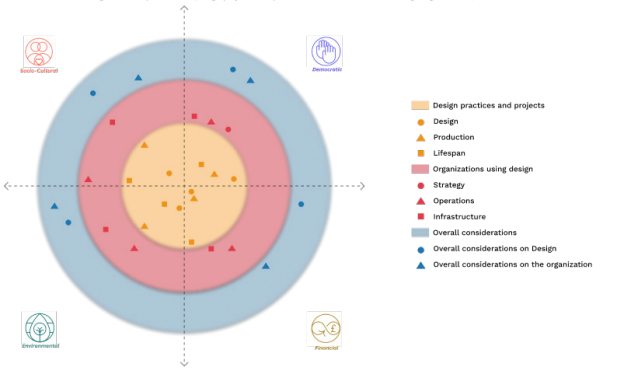
1. Value Assessment table

This table present some indicators and relevant tools that can be employed to measure the impact of the design process.

	DESIGN PRACTICES AND PROJECTS				ORGANIZATIONS USING DESIGN			
VALUES	1. DESIGN	2. PRODUCTION	3. LIFESPAN	7. OVERALL CONSIDERATIONS	4. STRATEGY	5. OPERATIONS	6. INFRASTRUCTURE	8. OVERALL CONSIDERATIONS
Socio-Cultural	The design phase of the system brings together different actors and it is crucial to build strategic partnerships between the territory and companies in the territory.	When the system is brought to life, it is crucial to build and maintain local actors and connect different companies and actors in the economy by creating local networks, cooperating with artisans and up-cycling centers, and to change the consumption society has about them.	The system includes the use of the waste of the production chain of companies that offer solutions, products, or other companies and the territory, creating a network and relations, collaborating with artisans and up-cycling centers, and to change the consumption society has about them.	With some parts of the system still in the development phase and the development of the web page , the trust with the sense of community is built.	The company is thinking about creating a community around the company and the territory, but additionally planning to collaborate and being between farmers.	The company has been working into different strategies in order to build a strong network and stories around different collaborations with companies and communities of farmers.	The company is working on the improvement of their web page in order to have a tool for building the community of farmers and also information about their work.	The company works directly with different actors and entities that are interested in building a strong network and communities of farmers in order also to improve and create a positive impact around the growing of hemp.
Environmental	The design of the system is focused in a deep knowledge of the regenerative agriculture and how the company is able to contribute to bring value to the territory and the economy of the territory.	The development of the system implies the improvement of the regenerative agriculture and how the company is able to contribute to the regenerative agriculture used in the systems project.	The system includes the using and waste of the production process like for example hemp hurd and how the company is able to find a solution for an alternative to herbicides and in the way to improve the properties of the land.	The strategy can help the farmers and members of the community to maintain their land and to create a circular agricultural system.	The company focuses their strategy in order to reduce the wastes as much as possible in order to have a circular production process.	The company focuses their operations in order to reduce the wastes as much as possible in order to have a circular production process.	The company is working towards implementing the role of regenerative agriculture and how the company is able to bring into account the importance of creating relationships between farmers around the company.	The organization will use the principles of the regenerative agriculture, which will impact a positive impact around the land of the company, enhancing the sense of belonging between the farmers and the land, and also and in connection with the land.
Democratic	The design process of the system also includes the collaboration between the territory and other actors in order to obtain the business model to develop the project.	The Productive phase of the system includes that the company will be involved in the local economy in order to collaborate with companies in the territory and other actors in order to obtain the business model to develop the project.	In the lifespan phase, the company will be involved in the local economy in order to collaborate with companies in the territory and other actors in order to obtain the business model to develop the project.	The strategy could help clarify the model how the regulations and legislation work, in order to help other farmers and companies who want to learn more about possible products from hemp.	The company already has a stance on the material and a strategy in order to continue to grow hemp and collaborate with farmers and expanding their crops.	The company is building a interdisciplinary community around the company in order to implement or investing in the improvement of the land and its uses and benefits.	The company is investing on the improvement and creation of the web page. Also with the collaboration with artisans the company is connected with possible networks needed for the development of their products.	The company is interested in the improvement of the land, having to hand with the farmers and other interested parties in the area, and the company is connected with possible networks needed for the development of their products.
Financial	The design process of the system also includes collaboration between companies and associations that could bring a profit to the company.	In order to develop the project, the company will be involved in collaborations with different companies, which could mean a profit for the company. In order to participate in these collaborations and events, the company will be creating a new possibility of growing their production process.	With the new products developed by using different seasons of the hemp, the company will be selling a profit from the new lines of products and services that could add to the existing ones, in a more circular way.	With the strategy, the collaborations between the company and other actors in the territory could bring financial benefits for both actors.	The company is investing in the improvement of their web page and the creation of crops and areas used for their processes and products.	The company is currently developing the web page, and the collaboration with artisans of the area, and participating on events that could bring exposition on their local economy.	The company is working on the improvement of their regenerative farming, having into account that the collaboration with artisans and with new local actors could mean new profits and gaining in exposition, which could also benefit the artisans but also the collaborators involved.	

2. Value Map

It outlines the four domains of design value (sociocultural, financial, environmental, and democratic), highlighting the two mechanisms of design where impact occurs (design projects and processes, and the activities of design organisations) evaluated in the table above.



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08

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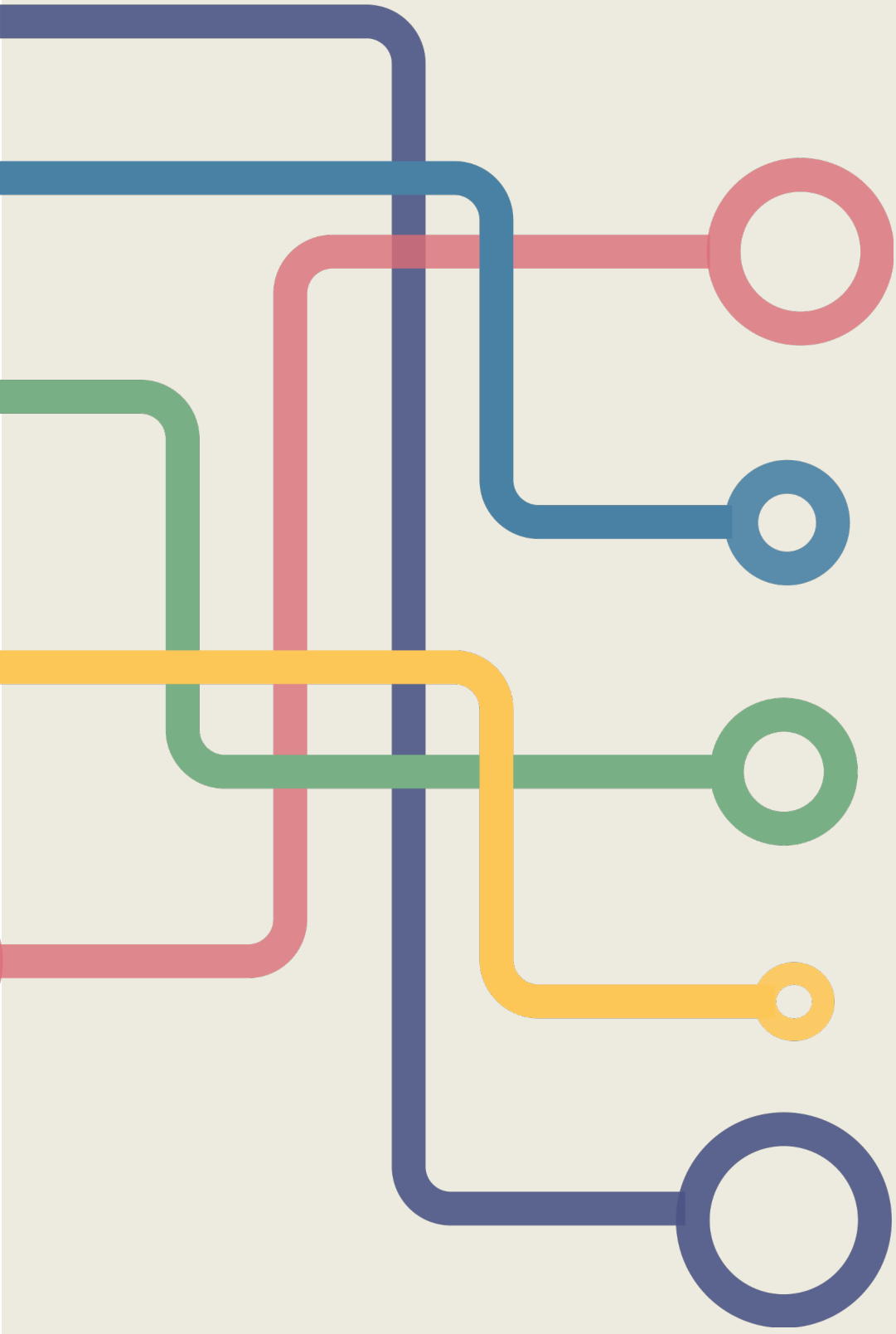
Contacts:

- Valeria González Ramírez

gonzalezramirezvaleria0@gmail.com

- Laura Sofía Granados Bravo

laurasofia.gb@outlook.com



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