Systemic strategies to overcome silo-mentality of the T&C sector within North East Romania

Politecnico di Torino

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Enhacing the know-how of the region, while reinforcing the transdisciplinary relationships inside this ecosystem

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List of Abbreviations

- ICT: Innovation, Communication and Technologies.
- IOT: Internet of things.
- NE-RO: North East Romania.
- RDI: Research, development and innovation.
- RIS3: Regional Innovation Strategies for Smart Specialization.
- RDA Regional Development Agency.
- Regional cluster: industrial agglomerations, associative structures with a strong training and research foundation (at the academic level) and technical transfer institutions, competitive advantages backed by significant export numbers, and solid innovation results (patents, publications, PhD researches).
- T&C: Textile and Clothing Sector.

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Abstract

The following study uses a systemic approach done through a holistic diagnosis of the ecosystem, in which the garment producer Katty Fashion operates as a good practitioner of sustainability and circularity in the T & C sector within the NorthEast region of Romania (NE-RO). Currently, this ecosystem is characterized by a silo mentality and high dependency on external actors, which inhibits them to focus their efforts towards systemic development. Therefore, the purpose of this thesis is to promote the creation of local connections between relevant sectors within Romania, that will encourage the achievement of their own solutions using their abundant resources and technological development. By recognizing the role of the region inside the dynamics of the country, and the current strategies to face the challenges of the sector.

Italian

Per svolgere lo studio è stato applicato l'approccio del design sistemico fondato sull'analisi olistica della regione nord-orientale della Romania, in cui è inserita l'azienda di produzione di abbigliamento Katty Fashion, in qualità di "good practitioner" della sostenibilità e della circolarità nel settore tessile. Attualmente, questo sistema è caratterizzato da una "mentalità a silos" e da una grande dipendenza da fattori esterni, che impediscono loro di concentrare i propri sforzi verso lo sviluppo sistemico. Pertanto, l'obiettivo principale di questa tesi è promuovere la creazione di connessioni locali tra i diversi settori coinvolti nella produzione che si trovano all'interno del territorio della Romania, così da suggerire linee guida per indirizzare le sfide dell'azienda e del territorio, utilizzando le abbondanti risorse naturali e le nuove tecnologie. Inoltre, si mette in luce il ruolo della regione all'interno delle dinamiche del paese e delle strategie del settore per affrontare la sfida del cambiamento verso lo sviluppo sistemico.

Spanish

El siguiente estudio utiliza una visión sistémica hecha a través de un análisis holístico del ecosistema al que pertenece la empresa productora de ropa Katty Fashion, como una good practitioner de sostenibilidad y circularidad en el sector textil dentro de la región nororiental de Rumania. Actualmente, este ecosistema se caracteriza por una "silo mentality" y gran dependencia en actores externos, que les impide potenciar sus esfuerzos hacia un desarrollo sistémico. Por lo cual el principal objetivo de esta tesis es promover la creación de conexiones locales entre sectores de Rumania, y así incentivar la resolución de sus propios problemas utilizando sus abundantes recursos y desarrollos tecnológicos. A través del reconocimiento del rol que cumple la región dentro de las dinámicas del país y las estrategias del sector para enfrentar estos desafíos.

Research Question

How does the clothing and textile culture inside North east Romania could enhance the attributes of the territory through connections between the stakeholders of the sector ?

Goals

- Create systemic connections between the company and actors inside the territory to reduce the environmental impact of the unsustainable practices of the sector.
- Make visible the skills of the Romanian know-how inside the clothing and textile sector through Katty fashion products.
- Implement a clear communication channel between Katty Fashion and their clients about their good practices to make an efficient introduction of the systemic approach.

Introduction

To face a reality that marks a breaking point from a consumption without precedents, to one that requires awareness of the responsibility that comes with the actions and decisions needed to cease the reproduction of previous patterns, shows that the perspective from where the human practices were viewed, need to change. For instance, studying a common and present matter in the daily lives of most people since ancient times, such as clothing as a necessity and fashion as a way of expression, is not surprising if some hidden impacts emerge due to an extremely planned fashion consumption by seasons and trends.

Centering the attention on the Textile and Clothing (T&C) sector, these impacts are frequently related to the productive process of garments, based on the transformation of the materials into yarn and the dyeing of the fabrics, together with the overproduction of the leading fashion brands, generating a large amount of waste and labor exploitation, revealing only a part of the problem that is perceived under a reductionist vision of the situation. This vision, which comes from the middle ages, viewed the world as an unstoppable machine focusing on isolated parts of the perception of human actions, inhibiting the comprehension of the complexity of its challenges by having a non holistic and non linear approach. (Capra, 2016)

However, projects like the European Clothing Action Plan (ECAP) adopt a systemic method to evaluate the problematic of the T&C sector as a whole, serving as a tool to integrate all of the possible aspects that uncovers the hidden impacts appearing from the start of the planification of the product, till the disposal of the garment, viewing in detail the complexity of each part of the value chain and all the actors involved in the creation of a single garment. Some of the unrevealed repercussions shown in the ECAP are: the poor decision making through the design process related to the selection of the fabric, the textures and the life of the product, together with the unawareness of the user of taking non responsible decisions and the pollution of water caused by the washing of clothes due to the microplastics thrown to the oceans, generated by the vague fabric choices.

Positioning this situation in a T&C producer region inside Europe, Romania, that is characterized by being rich in resources and raw material, in contrast with the long lasting corruption and poverty which affects the economy of the region, together with the economic sectors suffering from other issues based on the absence of interactions inside them, specifically being evident in the silo mentality of the companies of the T&C sector and their lack of awareness on how to introduce circularity to their practices (Staicu & Pop, 2018), making even bigger the impact of the sector.

Hence, this research is going to present a holistic analysis of all the situations described above, pointing out the main insights to propose the strategies that would acknowledge their real needs and the ways to develop their own processes of innovation based on their resources and abilities to approach the gap between the east pragmatic knowledge and the technologies of the western Europe that affects their path to sustainable progress.

Having this in mind, and understanding the context of this study, to comprehend all of these dynamics it was necessary to work in collaboration with a company that is part of this situation. That is how Katty Fashion, a garment producing company inside Romania was chosen to be the main subject of this thesis.

The first approach to the situation of the company was based on the project led by Politecnico di Torino and other european partners called Retrace, which included Katty Fashion as a participant to evaluate the systemic and circular approaches they were introducing.

This project has underlined the importance of policy making to introduce circularity inside the territory, and in addition has presented different cases of good practitioners of circularity and sustainability inside of Europe in order to facilitate the process for other companies.
In order to do so, the study presents some conclusions that would contribute with the structuring of the present study: how the death of a product is strongly linked with the lack of strategies from companies and producers to determine the use of a product and also the disposal. Specifically inside the textile sector the authors point out "Fashion increasingly becomes a system for creating cultural models that define the lifespan of a product, whether it's a garment, a gadget or an object of design. The industry invents concepts like "season," "2017 style," or"color of the year." An expiration date is artificially created; it is symbolic, dictated by the "logic of fashion," the superficial and impalpable version of the monocratic logic of a dictatorship" (Barbero, S 2017). That is why the sector has a big responsibility connected to consumers' habits and the perception of their products.

On the other hand, this situation points out the importance of the diffusion of good practices inside the sector, and with the Retrace Project it was concluded that it is necessary to create connection between good practitioners and new companies to share the strategies, but also combine the capabilities and resources to create more interlinked and scalable projects. As a result, this thesis would serve as the starting point to comprehend how Katty Fashion could become the channel to spread more circular practices inside the sector, along with the platform to develop new strategies to introduce sustainability to their value chain.

Methodology

Systemic Design

It deals with complex scenarios built on interconnections, enabling systemic and interlinked solutions given through a transdisciplinary approach that encourages all actors to communicate at the same level. To reach this point, the systemic design methodology uses five steps: holistic diagnosis (hd) with field and desk research, definition of problems and leverages for change, design of a system; the new production model, study of the outcomes, implementation and analysis of the results and feedback.

The holistic diagnosis is based on differentiated knowledge and supports the premise that the whole is more than the sum of its parts. It is created by the mapping of foundational data about the current scenario (the context, products, processes, and services). It goes via various layers of observation, including demographic, cultural, economic, geographic, and agricultural.

This method works on various levels of comprehension (ARCVI) This path is related to the assessment what needs to be considered on the research and how to structure the collected data (qualitative and quantitative), which can be done through desk and field research, and then the information is transformed into a visual representation to make it more accessible to those who are interested in it. Finally, a holistic assessment is conducted to interpret from a new perspective on how to address the problem by connecting all of the project's components (Politecnico di Torino [Systemic Design Lab], [video], 2021).

With these results, it is possible to identify the criticalities and potentialities which are evaluated through the systemic design principles* which are considered problems and leverages for change to encounter the project from a holistic view while proposing eco-guidelines, for the definition of new complex systems. With the design of a new system, new relationships between processes and actors emerge, optimizing the energy and material flows while valorising the waste as resources.

Later, the last step used inside this methodology applied in this thesis is the study of the outcomes, that evaluates the benefits of the new system in terms of environmental, economic and social level. After this step the methodology includes two other steps related to the future implementation evaluating the feasibility of the new business plan and ending with the analysis of the results and feedback.

Source: *(Battistoni,Giraldo Nohra & Barbero 2019)*

Systemic design principles*

These principles serve as **guidelines** to conduct a systemic approach and contribute with the **evaluation of the circular solutions** for them to be truly applicable to the realities of the context.

- **Output–input:** to diminish the waste created in a system the goal is to r**eintroduce the outputs as new inputs** that serves as a resource for another system.
- **Relationships:** makes reference to interconnections between the different actors to create **new flows of information and resources.**
- **Autopoiesis:** as a base characteristic of **living systems** is related to the qualities of **self- maintenance,** reproduction and coevolving.
- **Acting locally:** this aspect gives value to the **context resources** that are fundamental for autonomous growth.
- **Human centered design:** human needs are essential for the development of a project related to the creation of better human **interactions between themselves and the environment.**

Source: *(Battistoni,Giraldo Nohra & Barbero 2019)*

T&C Sector

Introduction

This manufacturing sector is based on the **complete value chain of the production of a garment**, including its design, the industry that transforms the raw material into yarns, the producers and the retailers. This sector usually takes an important role in the economy of the countries, but at the same time is also the protagonist of **relevant impacts for the environment and society.**

The sector is going to be analyzed in this chapter as it is where the company Katty Fashion, the main subject of the thesis, belongs.

1.1. History of the sector

It is relevant to comprehend the foundations that gave rise to what is now known as the **Textile and Clothing sector**, as well as a brief journey through time to understand how textile and clothing have evolved over time and how a simple necessity, such as dressing, has become into a **fundamental part of a social statement for many cultures.**

The first textile evidence was discovered in **Neolithic societies** about 5000 BCE, and it is thought that **woven cloths** originated in the production of baskets.

Egypt was the first to **employ cotton, silk, and wool**; and India followed it around 3000 BCE with cotton and China with silk. Textiles allowed many cultures to **manifest beauty via patterns and colors**; examples may be seen in Roman ruins dating from the 2nd century BCE, Chinese tie-dyes from the Tang dynasty (618-907 CE), and even printed textiles from India dating from the 4th century BCE.

Turkey had tribes that specialized in the **production of carpets**, towels, and rugs throughout the Middle Ages, and subsequently, this nation along with **Sicily** (Palermo) and Greece, became **skilled in the production of textiles**.

Following the French conquest of Sicily in 1266, some weavers migrated to Italy, and **knowledge and technique** began to **spread throughout the country**, beginning in Lucca and later in Florence, where velvet was first produced, and which later became very representative in Genoa and Venice during the middle of the 16th century.

Later, other European countries began to improve their manufacturing capabilities. France began producing woven silks in 1480, and until 1589, **the majority of the materials were Italian**, as Francis I recruited some Italian weavers to produce tapestry for the King. Later, at Savonnières, Henry IV established the royal carpet and tapestry workshop.

Before Europeans invaded America, **textiles played a significant role in the culture** of the continent. The textiles from Peru were identical to those made in ancient Egypt, despite the fact that the two cultures had no contact. The **Inca** community's **cotton and wool garments were of remarkable quality**, and they were artistically decorated with designs that were mainly human shapes.

The textile industry continued to flourish and improve in the years that followed, but it wasn't until the **industrial revolution** that the **mill system** began to expand. The flying shuttle by John Kay and **mechanical spinners** by Sir Richard Arkwright and Samuel Crompton, were two of the technologies that contributed to this advancement. Then, with the advent of **steam power**, the manufacturing capacity of the machinery was increased, and the factory system was developed, first in England and then in the United States.

Following this pivotal time in textile history, most advancements have centered on **improving production capacity** and introducing automatic equipment, as well as, more recently, the invention of **synthetic fibers** that have enabled the introduction of new methods and materials.

Synthetic fibers are distinct from natural fibers in that they are made from chemical compounds rather than natural materials. **Fabric,** on the other hand, can be classified according to how it was formed: interlaced, needle woven, or composite textiles made by **combining two types of materials.**

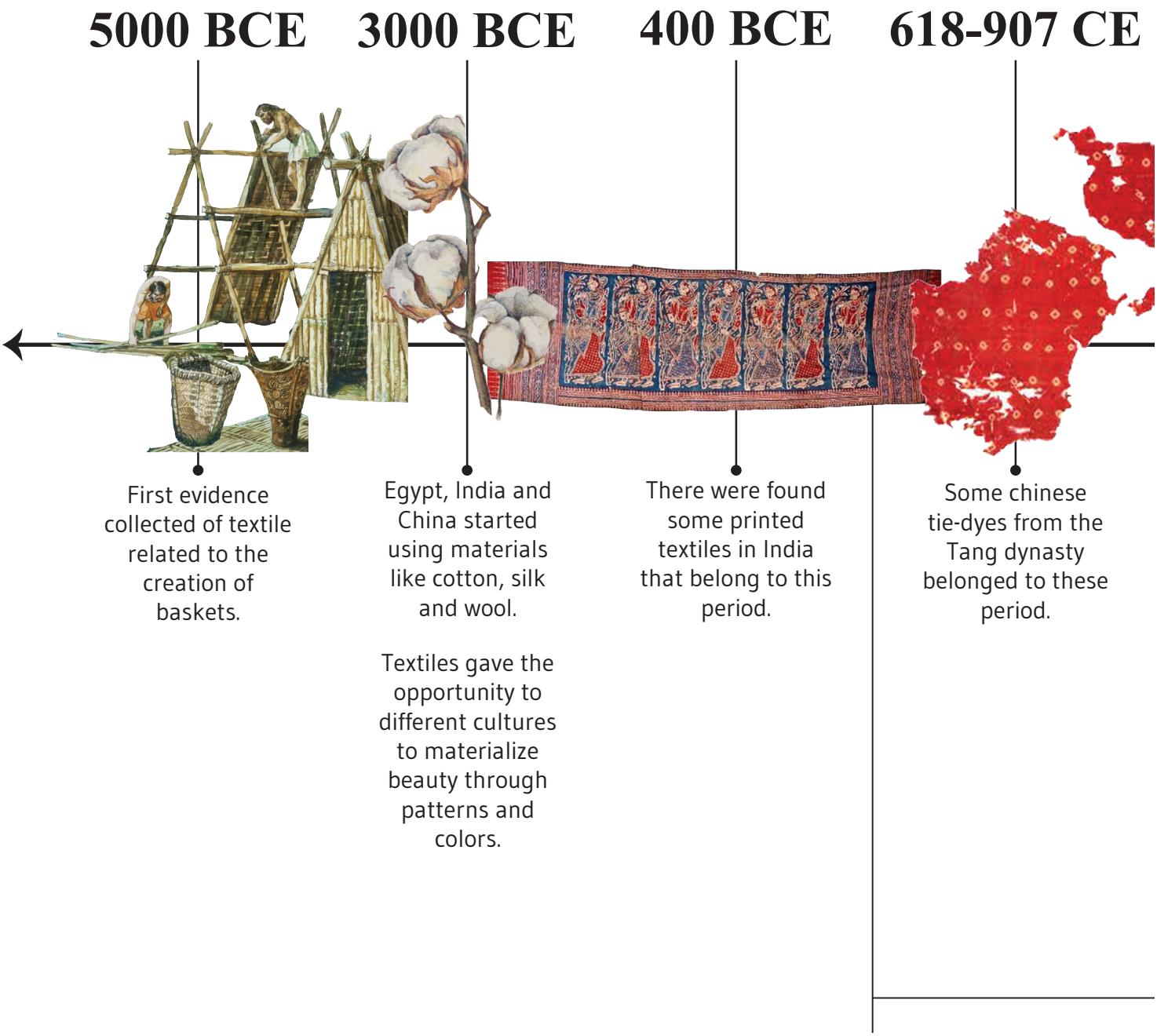
Along with textile history, the history of clothing began to **evolve from the use of animal skins and leaves to protect against the elements**, or simply for rites and other types of **ancestral celebrations**, to the use of different fabrics such as felt and cotton in Ancient India around 5000 BC, and later linen in Egypt for cloth and the **creation of mummification bandages.**

With the advancements in textile manufacturing noted above, Greece and Rome began to use fabrics such as wool for clothing, but because wool was expensive, **they avoided cutting and stitching in it by wearing loose robes cut in a rectangular shape and attached with a pin in the shoulder.** In Greece, women's robes were called peplos and men's robes were called chlamys; both ladies and men wore a tunic called chiton, which varied in length from shorter for women, to longer for men.

Clothes were also employed in **medieval times** to **indicate the sort of group a person belonged to.** The **dying of textiles** and the production of patterns later in the 12th and 13th centuries led to the creation of fashion and clothing that were already being worn in the next century. Wool remained the most popular material, but linen and hemp began to gain popularity, and as the textile industry developed, clothing began to evolve as well, with the use of **cheaper materials, new methods**, and the introduction of new patterns.

Even though technology has advanced over time, there is one constant in the textile and clothing industry: it is highly focused on human labor, which is why industry from developed countries has migrated to developing countries because **labor costs are lower**. This is in line with the foundation of **globalization**, which **decentralized production within each country but also brought inequality, poor working conditions, and human exploitation.**

Today, globalization has brought **fashion at lower prices**, with a trend within the industry known as **fast fashion**, which produces in large quantities, supplies many countries, and is **seasonal**, meaning that the **number of garments produced each month is extremely high**, and their **lifespan is extremely brief**. For many years, the fast fashion model has been the standard, forcing many businesses to adapt to this type of production and system. Even though this model made **"fashion" accessible to all sorts of consumer**s, it also imposed a high level of accountability on the industry in terms of **environmental effect** and how it encourages consumption. Making **consumers demand more in shorter periods of time, lowering the quality of materials and merchandise**, forcing corporations to cut prices and, as a result, spend less for the production process, and producing clothing with extremely poor standards that are eventually **discarded after just a few uses.**



1.1. History of the sector

1266

Weavers migrated to Italy after the french conquest of Sicily contributing to the expansion of this knowledge in new territories.

Later, velvet started to be produced in Florence.

1480

France developed its own skills but still most of the fabrics were italian.

1589

After this year Francis I brought italian weavers to France to produce tapestry for the king.

Later, Henry IV founded the Royal Carpet and Tapestry Factory at Savonnières.

Industrial Revolution 1760 – 1840

The mill system began to expand.

The flying shuttle was invented by John Kay and the mechanized spinners were produced by Sir Richard Arkwright and Samuel Crompton.

The introduction of steam power accelerated the capacity of production of the machinery and that is how the factory system was established starting in England and later in the United States.

Middle Ages 500-1600
Current Era

During these year, Turkey had tribes that focused on the manufacture of carpets, towels and rugs, and later this country with Sicily (Palermo) and Greece became skillful in the manufacturing of fabrics.

Source: *History of Clothing - History of the Wearing of Clothing. (n.d.).*

1.2. Characteristics of the sector

After understanding the historical significance of this sector, it is important to comprehend the main aspects that characterized the T & C sector in our current reality and inside Europe, the economical impact and the principal regulations needed, this will give an overview of the context that is going to be deeply analyzed below.

What is a textile?

To start, it is essential to know that textiles are considered as any **type of filament that could be transformed into a fabric** or even the material itself. The name comes from the Latin word textilis and the French texere, that means to weave or interlace. *(Whewell, Abrahart, Edward 2020)*

Therefore, the textile and clothing industry includes the **transformation of the materials** both natural (cotton, flax, wool, etc) and synthetic (polyester, polyamide, etc.) into textiles, as well as the **creation of garments**, bed sheets, and yarns, among other.

1.2.1. The T&C sector in Europe

Today, both the textile and clothing industry have a big impact inside the European economy **employing 1.7 million people** and generating a **turnover of EUR 166 billion** reported by the European Commission.

Employing

1,7 millons

generating a turnover of

EUR 166 billion

reported by the European Commission.

The European textile and clothing industry is a **leader inside the market** with the productions made for the **hygiene, automotive, medical sector and high quality clothing.**

1.2.2. Regulations

The European Commission has presented the following **European textile regulation:**

Regulation 1007/2011

Textile items must be **labeled or tagged** anytime they are accessible on the market, according to the Regulation.

The **indication of the product's fiber content** is required at all stages of its industrial processing and commercial distribution.

The Regulation applies to all items having at least 80% by weight of textile fibres, including raw, semi-worked, worked, semi-manufactured, semi-made, and made-up products. Size, place of origin, and wash/care labeling are not covered by the Regulation."

The following are the main elements covered by the regulation. The principal element covered by the regulation are:

- *General obligation to state the full fibre composition of textile products;*
- *Minimum technical requirements for applications for a new fibre name;*
- *Requirement to indicate the presence of non-textile parts of animal origin;*
- *Exemption applicable to customised products made by self-employed tailors;*
- *Empowerment of the European Commission to adopt delegated acts amending the technical Annexes of the Regulation, in line with Article 290 of the Treaty on the Functioning of the European Union;*
- *Reporting on the implementation, review clause, and study on hazardous substances to be undertaken by the Commission.*

(European Commission, n.d.).

1.2.3. Labels

As seen in the regulation above, it is indispensable the use of labels, as they have been used to communicate the standards that the clothing is following and the instructions for the correct care of it. Part of the standards that it usually communicates is where the garment was produced (Made in) and the percentage of the materials present in the garment.

According to the European Union, (n.d.), product labeling regulations are outlined in EU legislation to ensure that the information is accurate. **Mandatory information requirements** are the name given to these rules explained in the European Union (Textile Fiber Names and Related Labeling and Marking of the Fiber Composition of Textile Products) Regulations 2012 [S.I. 142 of 2012]. Explaining that labels for textile products sold in the EU must provide: the **textile product's material composition** (also known as the fiber content), **names and descriptions of fibers**, the **percentages of the materials used** in the item and the **care guidelines.**

As illustrated in the article, "Origin Marking in the European Union: Mandatory or Voluntary?": Aside from some special requirements covering food products and cosmetics, there is currently **no single harmonized legislative regulation governing origin marking on non-food items imported** into or manufactured inside EU borders at the European Union level. Furthermore, the issue of origin marking has been crammed into the Directive 2005/29/EC17 on unfair commercial practices, where **EU manufacturers and importers can choose whether or not to include origin information on their products**. If they prefer to use it, the product label must not contain incorrect origin references referring to a certain country's origin that is not there in fact. Due to the lack of precise laws, '**Made in the European Union' or 'Made in the EU' cannot be acknowledged as a legal designation of origin.**

Additionally, according to **Think Tank Textile Revolution**, a label of origin, such as **"Made in the EU",** may not always reveal the **complete story of your clothing's origin**, because the **intricacy of the supply chain** makes pinpointing the origin of an item of apparel difficult. Garments are made up of several elements and frequently include accessories that add to the complexity, **undergoing numerous stages of production across several countries or continents.** Not to mention that, while the "Made in the EU" badge is intended to signal a shift toward a more socially and environmentally responsible approach, it does **not ensure environmental or human rights protection** during the production process.

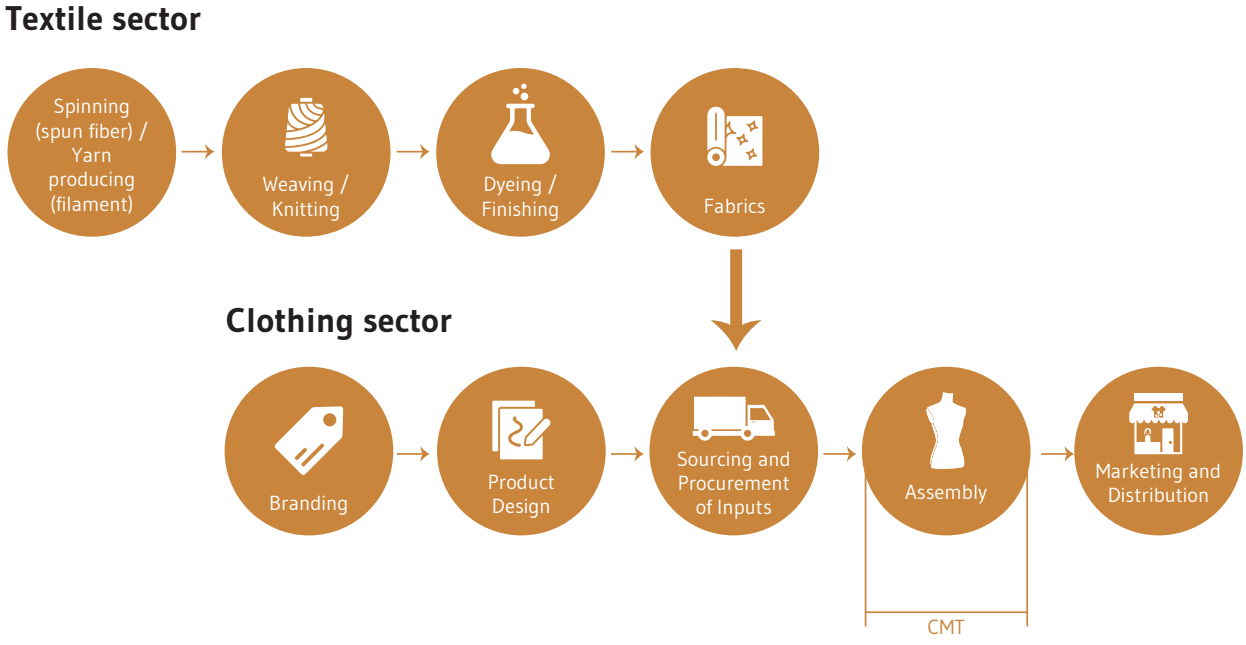
1.2.4. Value Chain

According to the report of the OECD et al. (2005), the **global value chain represents the processes that are required for the creation, production and distribution that lead to the configuration of economic relationships acrossborders**. The garment value chain is **buyer driven**, these so called **buyers are retailers, brand marketers, brand manufacturers, and trading firms**, that dictate the global garment production according to **the final consumer desires** and the **capacity of the industries in developing countries.**

The way in which developing **countries are selected** depends on the **requirements made by the "buyers"**, related to the product quality, production volume capabilities, lead times, compliance with different social and environmental standards, as well as the distance from the source to the final markets (2005). On the other hand, their role is usually characterized by **labor-intensive activities** with a low knowledge intensity like cutting, making (sewing), and trimming (CMT).

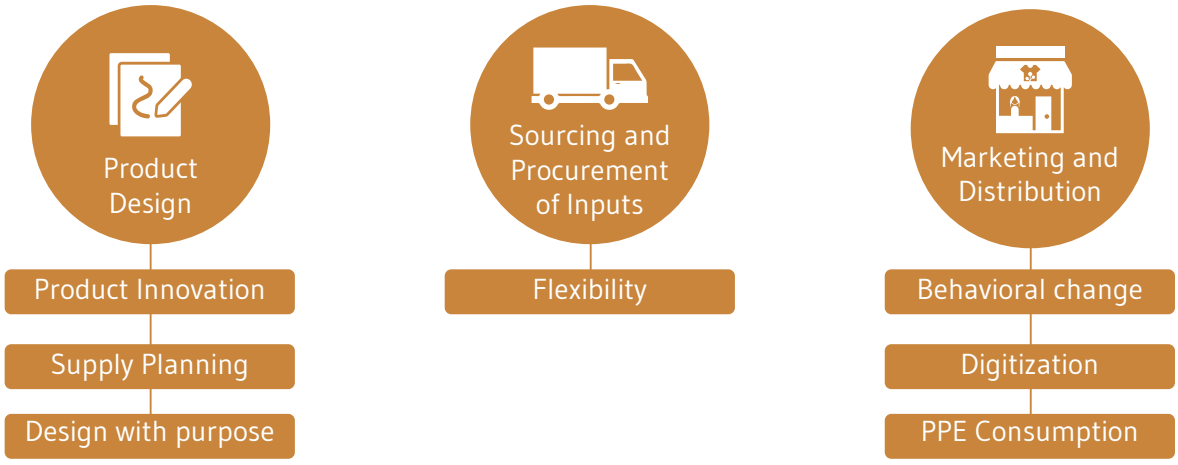
Buyers provide all of the input materials based on their specifications, meaning that the suppliers don't have any responsibility related to the product design, sourcing decisions of input materials, distribution arrangements, and marketing.

In the clothing value chain, **process improvement** may be accomplished by implementing **new technologies or reorganizing current manufacturing methods**. The majority of manufacturing technological innovation has happened in the **pre-assembly processes**, such as **pattern creation** and **fabric cutting**. Due to the limited alternatives of people and capital, **sewing activities continue to be labor-intensive.** Nonetheless,investigations have shown that advanced technology transfer has become increasingly significant in process and product upgrading(2005).In conclusion the value chain of the garment production is:



Source
(OECD et al. 2005)

Due to the covid pandemic the focus of the innovation previously mentioned, is directed in three categories: **Design and Product Development, Sourcing and Manufacturing and Wholesale/Retail Distribution and Consumers** (Zhao & Kim, 2021).Each of these factors have key points where the innovation should be concentrated, due to **new habits of consumption** and what has been determined as the **new normal.** Design and Product Development includes aspects like the creation of new products with a **minimal aesthetic** with a different purpose, Sourcing and Manufacturing, concentrates on **adding flexibility to sourcing to deal with the dependency** that has caused damages to the sector during this period, and lastly Wholesale/Retail Distribution and Consumers, highlights the importance on recognising the **role of the consumer** and the **transformation on consumption habits**, how most of the consumption has become digital and the increase of Personal Protective Equipment (PPE) consumption.



Source
(Zhao & Kim, 2021)

1.3. Environmental Impact

Due to the **drop in garment prices over time**, consumers have been able to purchase more clothing. This is caused by **fast fashion*** and low garment costs, which allows **contemporary generations to own more clothes** than previous ones. The issue with this fashion trend has a **direct impact on the environment**, **the lives of workers, and everyone's health.** *(Sustain Your Style, n.d.).*

Fast Fashion*

It is well known that fast fashions have generated **massive environmental impacts**, as a result of **the creation of cheap and throwaway apparel that is mass-produced in large quantities**. **Countless new collections are released each year,** making people feel the need to **continually update their wardrobe** while encouraging people to **carry on buying more.**

Fast-fashion manufacturers release **52 micro-collections every year** instead of the traditional two seasons, and these clothing are **worn on average seven times before being discarded**, according to estimates. In an article written by Cho, (2021) of the Columbian climate school, **polyester is also the primary material** used in its creation, and its usage in fashion has expanded nine-fold in the previous 50 years.

But this tendency has not always worked in this way, as the fashion industry operated on a four-season system until the mid-twentieth century: fall, winter, spring, and summer.The planning of the seasons was done by the designer many months in advance, leaving aside the opinion of the users, which were only people from of the high society, and were determined to follow the standards.

And it was in 1960 where marketing proved that the society was prepared for faster fashion, but it was only in the mid **2000s that fast fashion became a real thing**. (Stanton, 2022).

After the oil sector, the fashion industry is the **world's second-largest polluter**.It is estimated that this industry accounts for **10% of human-caused greenhouse gas emissions** and consumes more energy than the aviation and shipping industries combined. (Cho, 2021)

Even if the environmental impact of this industry is **difficult to quantify due to its global expansion**, the European Parliament reported (2019) a study conducted by GFA and the Boston Consulting Group published in the Pulse of the Fashion Industry report of 2017 estimated that

"the global textiles and clothing industry was responsible for the consumption of 79 billion cubic metres of water, 1 715 million tons of CO_2 emissions and 92 million tons of waste. It also estimated that by 2030, under a business-as-usual scenario, these numbers would increase by at least 50 %".

The impacts could be divided in 5 categories:

Raw Material production:

It is one of the most significant consequences since it is **linked to the extraction and transformation of natural resources** such as cotton, which requires a **large amount of water, fertilizers, and pesticides** to manage its growth across vast swaths of land. Silks contribute to the **loss of natural resources**, whereas wool contributes to **greenhouse gas emissions.**

The processing:

There are several operations behind the fabric, such as changing materials into yarn, dyeing the fabric, and generating various textures and resistances, all of which include **many chemicals that damage water resources**. As Pulse of the Fashion Industry mentions in the report of 2017 *dyeing could require almost 150 liters of water for each kilogram of fabric.*

Transportation and distribution:

As the majority of the **raw materials** used in this business are **imported** from outside the EU, the **carbon emissions generated during transit** are included in the sector's environmental impact, along with all of the materials and tags used.

Use:

The major focus is on how people take care of their clothes, which is **linked to the detergents** they use and **the quantity of water and energy** they need to wash the garments, as well as **microplastics that are thrown to water.**

Disposal:

It's still **unclear what buyers will do with their clothing once they are worn or are no longer wanted.** Donating is still a habit that is not widely practiced or structured throughout the world, although **secondhand** stores are becoming increasingly relevant inside cities, promoting a solution to the problem.

Environmental Impact

Transportation and distribution:

Raw materials inside this industry are **imported**.

Disposal:

There arent clear guidelines to dipose the clothes, some of them are **incinerated** or dipose with other types of waste.

93 million tons
go to landfill every year.

Less than 1%
of the materials recycled are used in new clothing.

Half of recycled donated clothes
are sold overseas. The rest, is usually turn into industrial material or goes to landfill and gets incinerated.

The processing:

Transformation of materials into yarn, **dyeing** the fabric and creating the various textures and resistances.

Raw material production:

Use of **fertilizer and pesticides** for the production of natural material.

60% PET
production goes to textiles and
30% to water bottles.

Use:

Is related on **how the consumers take care of their garments** and what they do when they dont want it anymore.

The most harmful practice is when the washing process, where **microplastics and chemical substances are thrown to the water.**

Source
Sustain Your Style, (n.d.), (Cho, 2021), European Parliament reported (2019).

1.4. Social Impact

"Fast fashion isn't free.
Someone, somewhere is paying."

Lucy Siegle
Documentary "The True Cost"

The environmental impact is not the only type of impact that the T&C sector has caused, as it brings other consequences related to the people that work inside the sector or that are indirectly related to it. The social impact is determined by the **massive production and the lack of regulation** that characterizes the sector, allowing the use of **dangerous processes, toxic chemicals** and **uncontrolled use of the resources.**

In terms of working conditions within the industry, it is well known that companies are always looking for **locations with the lowest labor costs**, implying that the bulk of apparel is manufactured in countries where **workers' rights are restricted or non-existent.** That is why, the current working conditions of garment workers in places like Asia are being referred to as **"slave labor"** by the European Parliament.

Sadly, if **labor conditions improve in one nation, businesses will just go to another**. This is where the importance of what **customers are demanding have to change**, so that corporations or governments are going to be **forced to re-evaluate their business** as usual, and that is when they will offer new fair alternatives, becoming responsible also for wage theft in their supply chain. (*Sustain Your Style, n.d.).*

Another invisible impact is the effect that the **massive production is causing on people's habits of consumption**, as it is creating accelerated consumption, changing the relation people have with the product that they consume, making clothes something that no longer represents them to something **disposable that generates a social segregation** related to the **statement that trends create.** But still, this impact is determined by a **social division** where only people of **privilege can break this flow of consumption and create their own statement**, that later could become part of the masses.

The main problems of this working conditions are:

Wages in the fashion industry :

Most manufacturing countries, including China, Bangladesh, India, and Indonesia, have a **minimum wage that is half to a fifth of the living wage**, which implies that fashion labels **pay their staff 5 times less than the necessary minimum to live a dignified life.**

Working hours:

Workers are required to **labor seven days a week for 14 to 16 hours each day.** Because of the poor earnings, they accept these circumstances, which **might worsen during high seasons.**

Health and safety conditions :

Following the collapse of the Rana Plaza in 2013, the world was made **aware of the fashion industry's unacceptable working conditions**. People operate in locations with **no ventilation**, where they are continually **exposed to poisonous compounds and fiber dust**, as well as being at risk of **accidents, fires, injuries, and infections.**

Child labour in the fashion industry :

Workers in the fashion business require **low-skilled labor**, which is why child labor is a popular industry, with **168 million of children being forced to work.**

Unions restrictions in the fashion industry:

In some countries, **garment workers are not allowed to organize unions in order to collectively protect their rights** within the fashion sector; some factory owners also **threaten or physically harm union members** or fire them.

Forced labor in the fashion industry:

Uzbekistan, one of the world's leading cotton exporters, **compelled one million employees to resign from their employment and mobilized children to work** in the cotton sector by picking up or harvesting cotton. With the International Labor Organization's campaign against child and forced labor, **this was nearly abolished by 2020.**

Social Impact

Working hours

some companies make their employees work **more than the allowed quantity of hours.**

7 days a week
is the normal working shedule.

Workers must work
until 2 or 3 am
during peak season to meet **deadlines imposed by fashion brands.**

14 to 16 hours
Per day is the average working schedule in most manufacturing countries.

Wages in the fashion industry

Fashion brands are paying **less than the bare minimum** to have a dignified life.

Child labour

in the fashion industry.

Health and safety conditions

unacceptable working conditions.

1,134 workers

lost their life on the collapse of a textile factory in Bargladesh in 2013.

114 people

were killed in a fire at the Bangladeshi firm Tazreen Fashion in 2013.

50 workers

have died and another **5000 are sick** due to blasted sard inhalation in denim factories in Turkey.

Source
Sustain Your Style, (n.d.).

1.5. Circular Strategies

Influencing design practices

The goal is to extend the lifespan of garments since the first process of the supply chain.

Sourcing more sustainable fibres

By sharing the knowledge of new methodologies with the companies and Support participants in implementing their sustainable fibre strategies.

Following an examination of all of the negative consequences that the T&C sector has on the environment and the lives of people, for both employees and customers, it was necessary to investigate what **current strategies** organizations are planning and implementing to **mitigate these effects.**

Moving from a linear approach of taking, using and disposing to one that recognizes and introduces the **earth cycles inside the practices of consumption** as it is proposed by the circular economy. It is possible to create capital, and that is how the role of systemic design takes place, by **transforming the systems around the industry allowing more interconnectedness between local companies** and their resources to **reduce the impact** created by the uncontrolled and high scaled production.

Putting together this approach and the industry, circular fashion aims to **reduce the amount of fabric turned into waste** during the production process and **elongate the life of the products** as much as possible, by promoting the **second hand shops** mentioned before or the process to recycle the fabrics inside the industry. Both of these alternatives are connected with the trends and strategies that stimulate conscious consumption and timeless fashion.

European clothing action plan (ECAP)

Design for longevity

After understanding the impact of the industry it was important to research what type of tools and strategies had been developed inside Europe to give a response to it. **The European Clothing Action Plan** is a project created during 2019 to discuss sustainability inside the textile and clothing sector.

Some of the participants were, ALDI North and South, ASOS, Blycolin, Bonobo Jeans and Fashion Revolution, among others. Their involvement was done for them to be **part of pilots and sharing their insights,** contributing with the creation of action plans and introducing the **"Love Your Clothes"** campaign to share a message for **environmental awareness** by giving value to used clothes. This with the main goal of giving training and support to businesses to learn about circular approaches as a way of expanding the objective of the project (ECAP).

Influencing production practices

Utilize virgin fibres and recycle back the waste into textile and other sectors, material leftovers can be optimised in a system that effectively deals with pre-consumer material.

Influencing public procurement

The idea is to use the power of public sector buyers to set an example for other buyers in the private sector on what to buy and where to buy.

Engaging European consumers

Initiatives to help consumers know how to buy, care/repair and dispose of clothing in a more sustainable way.

Improving textile collection rates

To increase the recovery rates of clothing and recycling more waste materials that will reduce clothing waste to landfill and incineration.

Integrating recycled fibres

Reduce the use of virgin materials by recovering fibres and turning them into new garments.

Source
The European Clothing Action Plan, (2019).

The project is focused on embracing a *"sustainable design, production, consumption, public procurement, collection, recycling and reprocessing"*.

By analyzing all the clothing supply chain in 8 different areas of action:

1. Influencing design practices

By changing the current design practices the goal is to **extend the lifespan of garments.** The first process of the supply chain is fundamental for the **decision making** corresponding to the creation of products and its environmental impact.

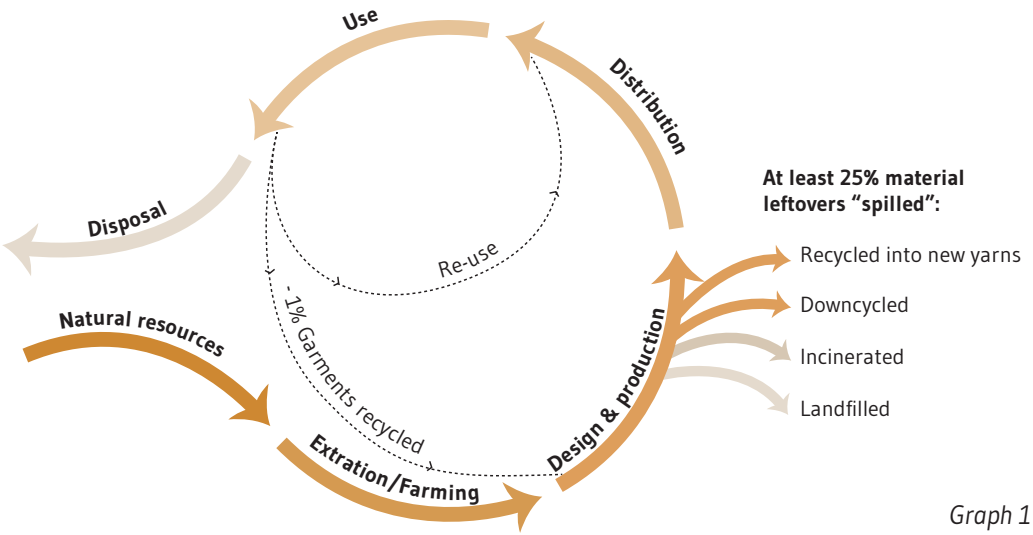
As a response the **Design for Longevity platform** is created to **promote awareness and empower designers** to develop new ways of designing to support a circular economy by inspiring innovations, helping the sector to **shift the actual perspective into one industry**, and considering solutions from impacts even from the ideation process.

2. Sourcing more sustainable fibers

To reduce the environmental impacts that the sector generates, such as the impacts of carbon, water and waste of clothing sold on the European market, the project (ECAP) is focused on **supporting brands and retailers to switch from conventional fibers to source more sustainable ones.**

3. Influencing production practices

The problem starts when manufacturers producing textiles and clothes for many of the world's major fashion brands and retail outlets **are "spilling" an average of 25% of virgin material resources**, creating waste that could be used as an input.
(graph 1 and 2).



Graph 1
Source
The European Clothing Action Plan, (2019).

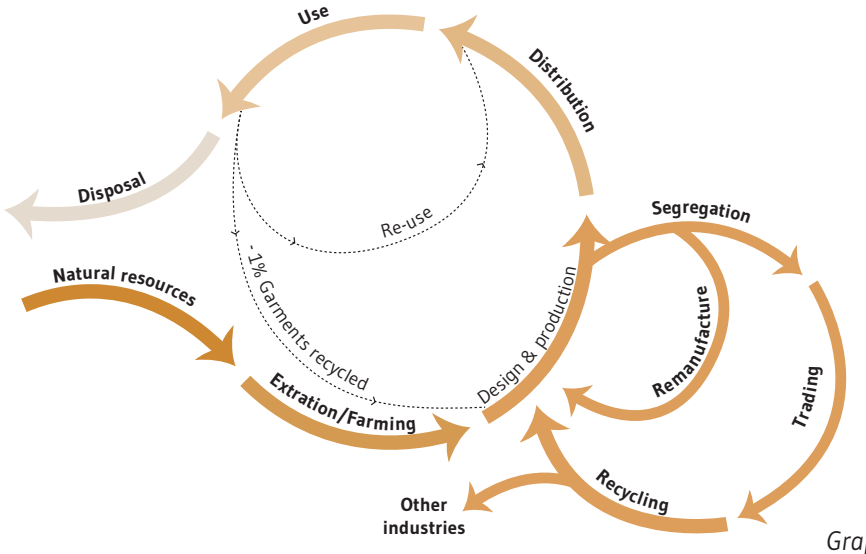
This initiative was created as a **response to the pre- consumer waste that is being thrown in early stages of the production**; most of these materials get down-cycled, incinerated or dumped.

The idea is to utilize **virgin fibres** and r**ecycle back the waste into textile and other sectors**, so material leftovers can be **optimised in a system** that effectively deals with pre-consumer material, as well as **creating awareness** for brands and retailers of this pre-consumer textile waste that is not visible but has an effect on the environment.

There are 3 strategies of engaging brands and retailers:

- Re- manufacturing trials is a process of **reincorporating the output**/ leftovers of fabrics after the production of the object.
- Recycling trials: With a **matchmaking service**, the goal is to link the factory that creates leftovers to a recycling partner.

A pilot project to start **tracking and creating visibility on their leftovers.**



Graph 2
Source
The European Clothing Action Plan, (2019).

4. Influencing public procurement

The aim is to reach environmental goals by using the power of **public sector buyers to set an example** for other buyers in the private sector **on what to buy and where to buy.**

The ECAP **developed a best practice guide** to educate on the steps countries can take in their own procurement projects to stimulate circularity in their workwear that is being taught in masterclasses.

5. Engaging European consumers

This action is focused on consumers engagement, as over **6 million tonnes of clothing wasted in the EU in 2015**, the idea is to understand consumer behavior and make an intervention with the objective of creating initiatives such as guidance and campaigns, **to help consumers know how to buy, care/repair and dispose of clothing in a more sustainable way.**

6. Engaging young consumers

There is an initiative london- based called The London Waste and Recycling Board. The aim of the campaign is to **educate younger consumers** on the clothes' impact on the environment by **sharing knowledge and encouraging behaviour change.**

The activities done include re-designing and positioning textile recycling banks to make people donate their old clothes, use second hand clothes, pop up shops and swap or borrow.

7. Improving textile collection rates

The focus of this initiative is to increase the recovery rates of clothing and recycling more waste materials that will reduce clothing waste to landfill and incineration.

The problem is that in most Western European countries, **only 30-50% of discarded textiles from households is collected,** so valuable materials are being lost due to many high rise buildings and less space to collect. This solution is urgent because according to the new European Waste Directive *" by 2025 EU member states are obliged to have a system in place for separate collection of textiles, not only re-wearable garments".*

8. Integrating recycled fibres

The aim is to reduce the use of **virgin materials by recovering fibres and turning them into new garments**. It was developed as a guidance tool for professionals working for the textiles industry, like designers, fashion brands, retailers, workwear suppliers and textile recyclers; **to help them learn from pilots, policy and market developments.**

Having a clear path on how the implementation of circular solutions can reduce environmental and social impacts, it is critical to understand the **current role of consumers in this industry** and whether they are truly aware of the problems, the solutions, and if will accept these **new methodologies in order to make the necessary shift.**

With this line of reasoning, the first aspect to search was the ongoing trends inside the T&C sector, seen in the perspective of the consumer after the prevailing situation of the COVID pandemic.

1.6. COVID 19 Pandemic

As the COVID pandemic has brought many changes into the way people consume and live, the profile of the consumers inside the textile sector has changed too. **The WGSN, a global agency that forecasts the future trends, presented the 3 possible fashion consumers profile for 2022**, that would determine how brands should proceed with their work:

1.6.1. Trends

The Stabilizers

their answer to all of the uncertainty that pandemic has brought is stability, that is why they **prefer a calm and simple approach from the retailers.**

The Settlers

they want to create a statement by **redefining their roots in their community through the concept of "local".**

The New Optimists

the uncertainty that pandemic brought has given them **the drive to bring joy to their lives.**

Source
WGSN, (2020).

Following the changes of the people's perception of consuming goods after the pandemic, the trends have also changed, during 2020 the article *"Trends in the Fashion Industry. The Perception of Sustainability and Circular Economy: A Gender/Generation Quantitative Approach"* presented how fashion trends are now being determined by **sustainability, circularity and generations.**

By the analysis of the authors it was concluded that the transformation of the lifestyle of the consumers to a more digital consumption should make the companies transform their business model to a one that is **strongly focused on user experience, clear communication and to a one that pays attention to the complete value chain in terms of sustainability**.

With these concepts already being part of the reality of the consumption, *Fashion revolution*, one of the biggest collectives of fashion activism, had also presented an article during the current year that showcases **how climate change impacts in a direct way women.**

"The struggle for climate justice is also the struggle for racial, gender, sexual and economic justice. The gendered impacts of climate change mean we must ensure an equal balance between men and women at all levels, especially within the COP26 senior management team. It is difficult to see how the current predominantly male-led COP26 team will ensure that women's voices and needs are heard." – Farhana Yamin, Founder Track 0, Climate Lawyer.

This article shows how the textile sector has an important responsibility in terms of the social impact, as **most of the people that are in charge of producing the garments are women**, who are also in a constant fight for equality and the respect of their rights.

Understanding all of these aspects, the trends of consumption as the article presented above, are clearly determined by the environmental crisis and the social impact that is intrinsically part of it.

An answer to both of these situations is a transformation of the strategies that define the fashion industry and introducing new ones like:

Slow fashion

Short-Life Fashion: design for material recovery

The objective is to design for **multiple-short cycles** with the idea of recollecting and transforming it into new materials. Concepts such as **biodegradability**, **mono materiality** and **low-energy** production are used.

This approach will reduce impacts linked to laundry and material production, by **designing a system to connect existing industries** like fiber, fashion and waste recovery, to process raw materials.

As a response the eco-friendly fast fashion trend was born claiming to use more sustainable materials and reusing old clothes, but are these promises real?

According to a video published by DW made by Amanda Coulson-Drasner if each part of the process or the claim is **deeply analyzed** it becomes something much **more complex** where the current strategies are not enough. This is where topics like materials and transparency are evaluated in **different degrees of "green" or less harmful.**

Long-Life Fashion: Designing to Prolong Material Use

The key ideas for this concept are **durability, adaptability and personal connection to the product.** In this way the idea is to design for **long use single- cycle to extend the life of a specific product.**

The approach needed is to create new business models by **connecting retailers and garments designed with consumers.** This will help reduce impacts linked with material production and manufacture processes, by **recirculating clothes to users as many times as possible** while ensuring their value.

Source
Earley, R., & Goldsworthy, K. (2015).

1.7. Conclusions

Over history there have been some sustainable tendencies to extend the life of the garment as the production of the fabrics required some expensive processes. One of the most relevant alternatives was to avoid cutting the fabric, while just adapting it with pins. The same situation is brought to the present but to face the environmental impact, as it is crucial to evaluate each part of the value chain, starting from the design process where all of the decisions of the garment are taken and will impact the environment in an exponential way along the complete value chain, while recognising that sustainability is a complex strategy, and that there are various "degrees of green", that is why it is valuable to know that it can not be applied just from one perspective.

Through the investigation of the trends inside the Textile and Clothing sector, it was evident that it is necessary for companies that want to adapt to base the business model in strategies related to sustainability, the creation of an efficient user experience and clear communication of their values. And it is fundamental to build connections linking good practitioners and inexperienced companies to contribute to the development of more interlinked and scalable projects.

But now, considering the conditions that the covid pandemic has brought to the sector, it is essential for the developing productive countries to upgrade their technologies and start developing their own to follow the rhythm of innovation of the sector. Along with promoting the value of the origin of the product, it would also reduce the social injustice caused by the sector in these countries.

On the other hand, it is important to highlight the role of women in these countries by being the producers and the most common consumer around the world, as it is in them the possibility to share the tradition, not as a gender factor but a knowledge based one.

This is how responsibility is a key factor that each of the actors in the value chain, including the consumer, should take while making a design and consumption decision. Making an essential part, the interconnectedness between them and their perspective.


NE
Romania

Introduction

In this chapter the main aspects of the territory evaluated (North East Romania) are going to be presented through a holistic diagnosis to understand in a **simple and clear way the situation of the region, based on file and desk research, to visualize the demographic, cultural, geographic, educational, economic and innovative perspective in the current scenario (The region).**

North East is one of the seven regions of **Romania,** and it has six counties: Suceava, Botoşani, Bacău, Neamţ,Vaslui and **Iași** which will be the main area of diagnosis of the thesis as the **company Katty Fashion** which is the case study of the thesis **is located in it.** Nevertheless some of the information will take into account the situation of the **whole region** as it could have an influence on what could be done or what has been done in Iași. Without ignoring the situation and characteristics of the **complete country.**

2.1 Holistic Diagnosis of the territory

Romania is a country that became part of the EU in 2007 along with Bulgaria. And is characterized by having a **difficult social situation**, as **corruption** has invaded all of the areas of growth for the country, **affecting their health care, education and economic system.** Additionally, the country is divided between the **West part, connected to the developments of Europe** and some parts of the **east that suffer from illiteracy and disconnection from the resources** that are present in the center and western part of the country.

In 2020, a report suggested that approximately **46% of the population lives in rural areas** (ESPON EGTC 2020), making **agriculture** the most relevant way of **producing money**. By consequence, the territory experiences a **low rate of young workers** as they tend to **migrate to other countries** with the goal of having better **working and living conditions**, this added to the fact that **old people** are the ones **continuing with the manual labor**, meaning that it won't have the opportunity to be transmitted through generations, making it **impossible** for their **traditions to transcend through time.**

The current situation of Romania is also **divided** into different **areas of development** as the situation presented above suggested, and due to the role of the government related to the complicated social dynamics , most of the projects and **initiatives introduced** are motivated by the private sector through **private agencies** capable of connecting and sharing this, to bring international and national attention. Another **tool** inside the country used to promote the collaboration and growth of its **economy** is the creation of **clusters** as a **conglomeration of actors that share an interest** and can provide in a **cooperative** way, strategies and insights from their practices to contribute with the **development** of a specific sector. They are presented on the cooperative platform CLUSTERO, that is incharge of sharing information and supporting the development that acknowledges innovation and internationalization.(Clustero, 2021)

The situation of the country can be described by the type of activities, traditions and potentiality, that each of the 7 regions have:

Bucharest, which is located in the **Ilfov development region** and is the **capital of the country,** has a strong potential for **innovation and economic growth,** compared with other cities that are far behind.

Nord-Est development region

This region is part of the boundaries proposed for the project as the company studied is located in **Iași**, the most representative city of the region. Is characterized by focusing its **economic growth** on **agriculture, forestry, food industry, textiles and biotechnologies.** Part of their **traditions** are related to **pottery, embroidery, wood-work, weaving, home textiles, the creation musical instruments** (Battistoni,Giraldo Nohra & Barbero 2019) and a strong catholic influence on their practices, as almost **81.9% of the population are Orthodox** Christians.

Analyzing the **level of innovation,** NE-RO is the **second region** making reference to the number of **innovative companie**s and the **fourth** in terms of the quantity of **patents** presented from the years 2009-2012 (2019), but still **circular economy is not widely spread** on the region, enabling the application of strategies that would **benefit the territory** as it contributes with the efficient use of the **resources linked with quality of the relations** created between relevant actors.

The region is **well-served in terms of education,** with seven public universities (each with 79 research centers), two private universities, 15 state-owned research institutes, and 36 well-known research centers. In addition, Iași is home to Romania's oldest university, and has over 60,000 students divided among five of the public universities.

Sud-Est development region

This region is influenced by the presence of many river banks like the Danube Delta(2020) and has one of the **highest levels of poverty,** evidenced by the low levels of **drinking water** and its accessibility as most of its population **transport by water**.

Sud - Muntenia development region

It has a strong base in the **industry sector** including the **manufacturing of cars** due to the presence of the factory of Ford Motor in Craiova, the food industry and energy production. And as part of their **development goals** the region wants to implement **strategies for circular development**, the introduction of Bio-economy and Eco-nanotechnology. (2020)

Vest development region

As being one of the regions connected to the west part of Europe, this territory like the previous one is focused on **manufacturing,** specially in the areas of **Timis and Arad.** The last one is specialized in the production of vehicle motors, transport equipment, furniture, computers and electronics.(2020)

Nord-Vest development region

Its role is determined by being on the **border** with other countries of the EU, making it a **tourism** common destination along with its potentialities related to food, textile, wood and furniture, automotive, ICT and other creative industries (Interreg Europe 2017).

Centru development region

Along with the previous region the center region also receives a lot of **immigrants**, as Transylvania is part of its counties and has a strong recognition due to the relation with the Count Dracula. On the other hand, **almost a third of its population are Hungarians** and some others are from Italy and Germany, adding cultural diversity to the region (2017).

2.1.1. Current situation of Romania

Romania in EU

In 2007[2]

Romania and Bulgaria joined the EU.

Total contribution to EU budget [3]

€ 1.655 billion (equivalent to 0.83 % of the Romanian economy).

Total EU spend in Romania [3]

€ 4.865 billion (equivalent to 2.45 % of the Romanian economy).

Despite the GDP growth rate [4]

Romanian society still suffers from many corruption problems.

Bucharest [5]

is offers modern services and has a higher income per capita than most EU.

Poverty[1]

Highest
poverty rate in the EU.

Over a quarter of people lives on less tha
US$5.50 a day

28%
live off subsistence agriculture.

Conditions[1]

3 - 5 million
Romanians live and work in other parts of the EU.

Cluj-Nap
Big university ce

136,400
legal foreigners

The strategical position at the border of the EU brings tourism.

1/5
of rural people lack access to **potable water**.

1/3
live without access to a **flush toilet.**

Main Activities
ICT
Automotive

Education deficit[1]

40 %
of Romanian students are functionally illiterate.

Focus in manufacturing, especially in the counties of Timis and Arad.

25.6 %
Romania's tertiary education attainment is the **lowest** in the EU.

Main Activities
Agrofood
Automotive
Tourism

Migration[1]

8,758
illegal migrants on the first 6 months of 2021.

It has a strogn focus on the automotive field due to the presence of a *Ford Motor factory in Craiova.*

6,138
aslylum applications were submitted in 2020.

23%
of Romanians mention immigrants as people they would not like as neighbour.

Approx. 46%
of the population lives in rural areas.

Difficult access to utilities
In the mountainous areas and Danube Delt

Main Activities
Geothermal studies

North West Region

Privileged in accessibility of road connections.

Cultural diversity

Central Region

Main Activities
Wood work
Potery and Wine

42.5%
represents the active population.

Poor accessibility as transport is mostly done by water.

Some villages don´t have clean drinking water.

Romania

South East Region

30 %
people at risk of poverty.

Main Activities
Tourism
Shipbuilding and logistics

South Region

45%-55%
concentration of small and medium sized enterprises close to regions that surround Bucharest.

Main Activities
Agrofood
Automotive
Tourism and Electronics

București Ilfov

Main Activities
Agrofood
Fashion
Construction material and publishing

Has the strongest potential research, development and innovation in the country.

South West Region

Source
1. ESPON EGTC. (2020),2. European Parliament. (2013),3. European Union. (n.d.)4. Newsletter European. (2019),5. De Rosa, D., & Kim, Y. S. (2018),6. Interreg Europe. (2017)

The following tables present the information collected related to the specific characteristics of North-East Romania. The ones highlighted in light purple specify the properties of **Iași** as it is the city where the company of the study of this thesis is located.

2.1.2

Category	Sub-category
DEMOGRAPHY	
Inhabitants [1,2] Population density is highest in Bacau, Iasi, Botosani, Neamt and Suceava Counties.	Population North East Population in Iași Population of Bacău Population of Botoşani Population in Suceava Population of Neamţ Population of Vaslui
Age [3] Iași is the second city with the youngest population and with Botoșani the two cities have the highest percentage of inhabitants under the age of 18 - 19.1%.	Average age
Gender [4]	Women Men
Employment [5]	Monthly minimum wages - bi-annual data Employment rate of each sector

Description	Year
3,198,564	2019
318,012	
171,396	
114,783	
105,796	2021
102,688	
69,225	
40 years	
470,300 (50.37%)	2018
469,059 (49, 63%)	2018
466.72 euros/2300 leu	2021-S2

Agriculture employs the most people (39.46%), followed by the services sector (37.7%), but just **16.5 percent work in industry,** and 6.33 percent work in construction. Between 2010 and 2014, the average pay increased by 17%, but it remains below the national average (84.68 percent).

Source

1.Institutul naţional de statistică. (2019), 2.Population of Cities in Romania (2021),3. Digi24. (2019), 4. Direcţia Judeţeană de Statistică IAŞI. (n.d.),5. Eurostat. (2021).

2.1.3

Category	Sub-category
CULTURE **Traditional habits** 1,2,3,4 Many of the historic occupations are still alive in the Region, and are being passed down to younger generations.	Common activities Christmas in Bucovina Feast of the Exaltation of the Holy Cross Decorating the eggs Costumes Social Life
Identity 5	
Religion 6	Orthodox Christians Protestant Christians Roman Catholics

Description

Some of the most common habits are **pottery, embroidery, wood-work, weaving, home textiles, and musical instruments** and because the majority of the population are **orthodox (85%),** many of the events held in the Region are tied to these **customs and religious holidays.**

Pre-Christian customs and ritual practices symbolically recreate a new beginning, rituals of rebirth of time through magical practices, such as **cutting the pig, preparing ritual food, turning off and on lights, driving away evil spirits and the dead through dances and masked games,** all of which illustrate the pre-Christian background of the winter holidays.

Clebrated on September 14th.

In Romanian folklore **Easter eggs** are said to have supernatural properties , such as **healing diseases and protecting animals**. Their ornamentation is a work of art.

Embroidery is a significant part of the romanian culture as it communicates part of their beliefs and **the ornaments vary between vegetable, geometric and avi / zoomorphs forms.**
Masks play an important role in New Year's Eve, funerals (Chipăruşul), agricultural, and hunting rites. Dances from pre-Christian times are performed at these occasions.

It is linked to the offer of **cultural centres** and festivals, museums, memorial houses, **religious and historical monuments.**

NE achieves its **main economic results in Textiles**, Food, Agriculture and Furniture industries.

81.9 %

6.4 %

4.3 %

Source
1. Consiliul Judetean Suceava. (2011),2. Folclor Radio Iasi. (2011),3. Rodnitchi (2020),4. Moțoc, A. (2020)5. European Comission. (n.d.-a),6. ESPON EGTC. (2020)

2.1.4

Category	Sub-category
ECONOMY	Entrepreneurship
Main activities 1	Development
	Contribution of each county
Economic Sectors 2	Agriculture
	Services
	Industry
	Construction
Number of Companies 3	Manufacturing industry
Work 4	Average number of employees inside manufacturing industry in 2018
	Average number of employees inside manufacturing industry in 2018

Description

With only 10.66 percent of the national number of firms, **NE-RO is in sixth place in the country,** but it is on the rise, particularly in terms of SMEs (99.71 percent of the total number of enterprises in the region; 16.83 / 1000 inhabitants).

Agriculture, forestry, and food industry, textiles, development of new materials, and biotechnologies are the economic sectors that provide substantial employment and **relevant input into the region.**

Two counties are primarily agricultural (Botosani and Vaslui), two are mostly industrial (Neamt and Suceava), **Iasi is mainly service-oriented**, and Bacau is principally construction-oriented.

	39.45 %
	37.70 %
	16.50 %
	6.33 %

Number of employees	Number of companies in 2016
0-9	1,019
10-49	277
50-249	80
250	18

	28189
	1422

Source

1. (Battistoni,Giraldo Nohra & Barbero 2019),2.(Battistoni,Giraldo Nohra & Barbero 2019),3. Direcţia Judeţeană de Statistică IAŞI. (n.d.-a),4.Institutul Naţional De Statistică Direcţia Judeţeană De Statistică Iaşi. (2019).

2.1.5

Category	Sub-category
GEOGRAPHY	
Landforms [1]	Utility of the land
	Location of the forest
	Species of trees

2.1.6

AGRICULTURE [2]	
Cultivated Area With Main Cultures	Grain cereals Corn grain Oily plants
Average production per hectare, for the main crops	Sugar beet White cabbage Tomato
Surface of the land fund according to the mode of use	Agricola Arable Pasture
Fruit production by tree species	Apples Plums Cherries

Description	Year
Given the landform distribution, **agriculture occupies 57 % of the area**, with most farms operated by families in a traditional semi-subsistence manner. This is reflected in **the tiny size of the typical farm, which is 2,69 ha for crop farms and 31,39 ha for breeding farms.** **Forests represent 33% of the land**, influencing residents' occupations and industrial specialization throughout the centuries and even today, with wood exploitation and processing being one of the most important industries within the regional economic system. **30%** are located in the **mountains, 24% in the hilly regions and 10% on the plains.** **Conifers aree 30%, beech (pure and mixed) 30% oak species 19%, hard broad leaves varieties 14% and soft borad leaves 6%.**	
134.99 ha 91.165 ha 42.781 ha	2017
36.013 kg/ha 18946 kg/ha 18232 kg/ha	2017
381256 ha 256098 ha 84231 ha	2014
11030 tones 8388 tones 7565 tones	2017

Source
1. (Battistoni,Giraldo Nohra & Barbero 2019), 2. Direcţia Judeţeană de Statistică IAŞI. (n.d.-b).

2.1.7

Category | **Sub-category**

EDUCATION

Public Universities 1

The region has 7 state universities (with 79 research centres), 2 private universities, 15 state owned research institutes and other 36 research centres of national and international relevance, with various affiliations.

Iaşi

Suceava

Neamţ

Bacău

Vaslui

Botoşani

Description

Iași is the **home of the oldest Romanian university** and to the first engineering school, Iași is **one of the most important education and research centres of the country**, and accommodates over 60,000 students in 5 public universities.

Universitatea Tehnică "Gheorghe Asachi"

Specializations on Industrial Engineering (Industrial design, Textile technology and design, Knitting and garment technology, Technology and design of leather garments and substitutes), Chemical Engineering (Textile chemical technology, Chemical technology of leather products and substitutes), Engineering and Management (Economic-industrial engineering).

Universitatea de Medicină și Farmacie "Grigore T. Popa"

Universitatea de Arte "George Enescu"

Faculty of Visual Arts and DesignTextile Arts - (Textile Design, Design, Fashion)

Universitatea de Științele Vieții "Ion Ionescu de la Brad"

"Ștefan cel Mare" University

University of Bacău

Industrial Engineering (Design, Quality Engineering and Management, Machine Building Technology)

"Universitatea A.I. Cuza - Filiala Botoșani
Filiala Botoșani - Universitatea de Medicină și Farmacie Gr. T. Popa Iași"

Source
1. Università in Romania. (2014)

2.1.8

Category	Description
INNOVATION	
Level of innovation [1]	The North-East Region **ranks the 2nd place** at national level regarding the number of **innovative companies.** The region is **ranked fourth** in the country in terms of **patent requests** per million people submitted to the EPO, with a 250 percent rise from 2009 to 2012. The ability of the North-East Region to **valorize and encourage** the efficient use of its resources is critical to its development. Economic activity is concentrated in a few conventional industries (wood, food, and textiles), which provide employment, turnover, and exports but have poor added value.
Policy Gaps	Establishment of **systemic design techniques in key industrial sectors.** **Increasing awareness** of the systemic design approach. **Support** for the use of **eco-innovation**, eco-design, and remanufacturing techniques. Education and Training on the **skills needed for the transition towards a Circular Economy.**
ASTRICO CLUSTER **Clusterul Astrico Nord-Est Textile** **http://www.astricone.eu/en/** [2]	The Association ASTRICO NORD-EST includes **producers of yarn, knitwear, clothing and from other fields** (furniture, packages) from the North-Eastern development region of Romania. It has a Silver Cluster Excellence Label. The mission of the Astrico Nord-Est Cluster is to create the premises of durable development in the innovative context of the textile industry in the North-Eastern part of the country, identifying possibilities of assimilation of new products that will ensure the consolidation of the textile industry on the principle of developing new products, with increased added value.

Category	Description
North-East Regional Development Agency [3]	**Vision:** To change the regional economic situation and become, through smart innovation and specialization, a leading "leading region" in Europe. **Objectives** • Developing entrepreneurial skills and mentality based on talent and creativity. • Smart and efficient use of regional resources. • Increasing innovation and TT, co-operation between companies and the R & D sector. • Find solutions to societal challenges together with Q4 representatives. • Encouraging networks and associations related to development. • Increasing region attractiveness for investors and tourists.
Companies with potential innovation [4]	Agro-food, textiles, ICT, biotechnologies, environmental engineering, and tourism.

Source
1. (Battistoni,Giraldo Nohra & Barbero 2019),2. European Comission. (n.d.),3. Agentia pentru dezvoltare regionala. (2018),4. (Battistoni,Giraldo Nohra & Barbero 2019)

2.2. Covid Pandemic

To better understand the current situation in Europe and Romania, it was necessary to investigate the impact of the pandemic through the following questions.

- **What is the current health situation ?**

Source: Fairwear Organisation. (n.d.)

- **Which were the Impacts of COVID-19 crisis on T&C value chains?**

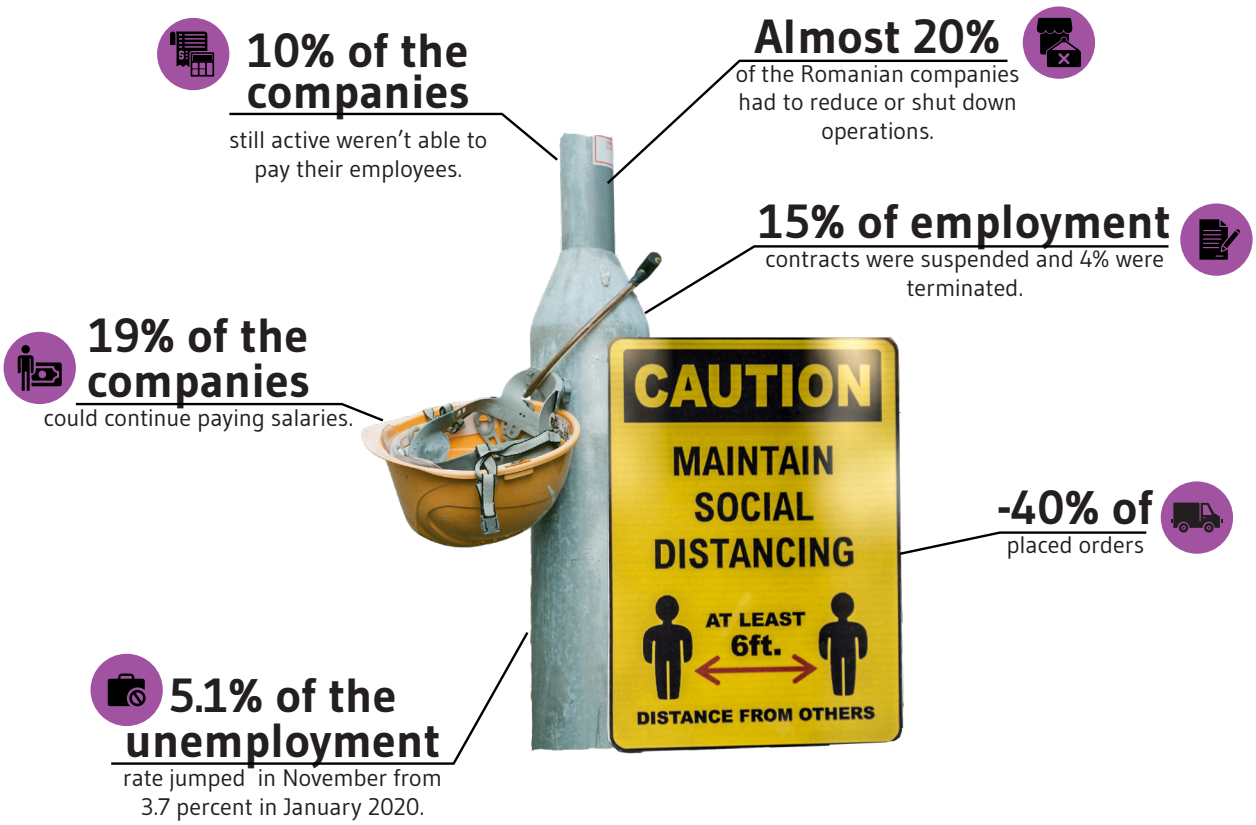
As reported by Fair Wear, the major impact of the COVID-19 pandemic was the **delays in the supply of raw materials** since the beginning of it. Many brands moved to Turkey to produce what they were no longer able to produce in China. In the beginning of the pandemic **the decrease in orders was 40 % compared to the previous year,** as well as a decrease in production capacity as a **result of layoffs of about 30% in fabric.**

Furthermore, according to the European Civil Society Strategy, a collapse in the global demand of clothing led brands and retailers to take advantage of suppliers and workers in terms of cancelling orders for goods (including those already in production or produced), delaying payment terms or **demanding discounts up to 30% to EU producers such as Romania, Bulgaria and Poland.** This led to devastating consequences, on the one hand suppliers said that **72% of them were unable to pay workers** when furloughed, that **80% were not able to provide compensation** when orders were canceled and **90% didn't receive support from brands.** On the other hand, the fabrics that were already cut and sewn produce unnecessary waste that affects at large the environment.

- **How did the COVID affect the textile sector inside Romania?**

According to an article published by Digi 24 on february of 2021, **the textile sector was strongly affected by the coronavirus**, as many of the big international companies that were linked to the national companies stopped placing orders, as a consequence the textile **sector fell 9,4% during 2019 having also an impact on the clothing segment and the leather one.**

The Federation of Employers of Textiles, Clothing and Leather (FEPAIUS) stated that " **there were difficulties in the supply of raw materials and accessories** due both to the decrease in transport between Romania and Italy, China, as well as the cessation of activity of many Italian manufacturers, while exports from Romania to Italy amount to 4.7 billion RON."



Source: Fairwear Organisation. (n.d.)

Mihai Păşculescu,president of the Employers' Federation of Textiles, Garments and Leather:

" In 2020, about **30% of companies have disappeared** somewhere, especially those that subcontracted, **and the other 70% work at 30-50% of capacity.** "

- **Which are the strategies Europe used after coronavirus to overcome the crisis on Romania?**

Europe had to overcome the **crisis through funds** for the most needed countries that had to r**e-stimulate their economy** after the impact inside consumption due to the **behavioral changes** that the pandemic caused. **Romania** was one of these countries as it "has **benefited substantially from the flexibility provided under the Coronavirus Response Investment Initiative** to tackle the impact of the coronavirus crisis"European Commission. (n.d.-b). Part of the **funds** given to Romania were for the acquisition of **IT equipment for education** to contribute to the resilience of the sector, which at the same time will support the d**evelopment of other important sectors for the country.**

- **How did the consumption of Europeans change with COVID?**

According to an ING Think article *(Leering, 2021)* COVID made the habits of consumers change significantly, starting with **online shopping,** as many consumers could overcome the fear of not receiving what they ordered, and on the other hand working from home had also changed the perspective of the role of the employees and how a business could work.

Both of these aspects have **accelerated the digitisation of consumers' experiences and interactions.** Based on the McKinsey's article *(Catena, Hazan, Ortega, Schmidt Spillecke, & McKinsey's Marketing & Sales, 2020)* this behavioral changes have produced 5 trends:

1. Shift to value, as the pessimism of consumers related to the economy is really strong.
2. Flight to digital.
3. Caring commerce, trust and values have become a key aspect to maintain clients linked to a brand and that is why some of them are preferring **smaller brands as they have the possibility to build a better relation with consumers.**
4. Shock to loyalty.
5. Homebody economy, as the situation is taking more than expected to go back to "normal" most of European **consumers have adopted habits that are strongly linked to being at home,** such as cooking, watching TV or online streaming.

2.3. T&C sector inside North East Romania

The Textile and Clothing sector is part of the **tradition of the territory** as it has been a producer for a long time. That is why, the community has used embroidery, knitting and other forms of textile as a way of communication and expression, and through this labor the region has created strong **bases for the development of the sector by transmitting the knowledge across generations.**

Acknowledging its tradition, the sector has **potential for innovation** as the region has **local resources** that could contribute to it, along with the introduction of high tech into their practices to transform them into **industry 4.0,** that intents to make a more efficient use of the resources and **improve the communication between the actors that take part of it, such as the active workers and the suppliers.**

On the other hand, the sector is characterized by the **introduction of digital fashion and circular economy strategies,** that even if they are in the first stages of development, prove the capacity of the sector to adapt to the current situation adding **resilience to their practices.**

Without forgetting a key aspect of the sector, the territory has a c**onsiderable amount of active companies** that potentiate the growth of the sector in NE-RO and encourages producer wise businesses to continue improving. This progress is also inspired by the growing intention of **universities to continue educating younger generations on specialized knowledge that support their traditions**, that is why the courses related to the sector are also an important aspect that could add to the capacity of the region and the T&C sector to overcome the challenges that they are currently facing.

Some of these challenges are related to the fact that **most of its workers are aging,** and new workers are not arriving, as it was mention during an interview with the RDA, making universities a crucial factor to stop this pattern, by encouraging young people to learn about these practices with the integration of new technologies, and sustainable strategies that address innovative potentialities inside the sector.

Another of the challenges of the territory and the sector, is related to the fact that **most of the raw material is being imported,** showcasing the need of collaboration with other sectors that are capable of transforming the local raw material into material for the sector, to tackle the potential innovation and also the resilience of the territory.

After understanding the basis of the situation of the sector inside NE-RO, it is relevant to point out issues that are being faced related to circular practices implying some deeper analysis.

According to Staicu, D. *(2021)* on her study that evaluated **sustainability-oriented innovators and the potentialit**y of the sector to introduce circular practices inside their processes, **54%** percent of the participants of the study (Founders, cofuounders of business) concentrated most of their efforts towards

recycling as their main sustainable strategy, and the most common sustainable model is circularity which is based on **revaluing the waste inside the sector and is used by 82% of the participants.**

On the other hand, **the role of consumers is generally as individuals, consuming mainly by design (32%),** the social mission of the company (24%) or the quality of the product (20%). **Highlighting the importance of how the companies share their values and transmit them through the design of their products.**

Staicu further explained in the research Mapping the interactions between the stakeholders of the circular economy ecosystem (2018) applied to the textile and apparel sector in Romania, that I**n 2008 the European commission emphasized their efforts on waste prevention and reuse, setting a legal obligation to adopt waste prevention programmes by the end of 2013.** But until January of 2018, Romania adopted a National Waste Management Plan. In 2017, a circular economy stakeholders' platform was launched to help stakeholders create a channel of communication in which they could share their solutions and team up to focus on specific challenges.

Therefore, Daniela Staicu mapped the interactions between 27 stakeholders to better understand the next steps to a transition from a linear to a circular economy in Romania. In this research the main assumption of the lack of collaboration was found to be valid, which explains that **"a weak circular ecosystem applied to the textile and apparel sector in Romania is determined by poor interactions among the stakeholders".** Meaning that the majority of the actors have a **lack of awareness** on how to apply the circular economy inside the sector, because of challenges like "no support from the public authorities, the diminishing number of qualified workers (lack of schools/education and teachers/specialists), lack of opportunities to specialize and lack of entrepreneurs dealing with waste"(2018). Advocating how an important shift is needed inside the sector from a **"silo mentality"** to a collaborative one, understanding how an individual interest can become a group interest by applying **circularity as a way of staying connected and sharing their acquired knowledge.**

The silo mentality according to Tshidi Mohapeloa (2017) on his study of how the silo mentality could impact the ICT business, is the act of not sharing information, skills and knowledge, that could impact any sector at any level, because it **blocks the opportunity of preventing the repetition of negative patterns inside the practices of the actors as they can not share their experiences.** In his study he proposes that these impacts could also be transmitted inside the areas of the company as it becomes a **matter of habits,** this means that the individualism that this type of mentality promotes could permeate all of the actors in the sector. This particular situation makes evident how the potential of the sector inside NE-RO could be acknowledged by **introducing a channel that would allow the sharing of active feedback** to recognize and evolve their practices, that later will allow them to approach circularity in various ways rather than just from recycling.

On the other hand, all of these issues lead to a bigger challenge that is the situation of the sector in Romania, compared to Europe. During an interview with Ms. Ailiesei the CEO of Katty Fashion, it was addressed that **her company and probably many others have encountered a gap between the practical work that supports**

their businesses and the technologies they are using. Part of this gap is due to the separation that exists between the companies that develop these types of technologies in the Western part of Europe and the companies that use them in other parts of the continent, meaning that there is not active participation from the people that use them with the ones that create them.

This gap **makes the innovative strategies of the sector an actual problem for the company, as the time that takes to understand the processing of the machines is making their work slower and with lower quality.**

Moving forward to the structure of the sector, NE-RO has 3 clusters integrated by enterprises, researchers, institutes, universities, NGOs and public institutions that have the accreditation from clustero. Those are ASTRICO of textiles, IMAGO MOL of health care and EURONEST dedicated to ICT services.

"The ASTRICO NORD-EST CLUSTER – ASTRICO NE"is the only one that makes reference to the T&C sector and it includes producers of yarn, knitwear, clothing and furniture. But according to the interview made with one of the representatives of the **Regional Development Agency (RDA)*** this cluster has a strong focus in knitting, leaving aside some parts of the textile sector.

During 2010 ASTRICO NE created a partnership with:

- The North-East Regional Development Agency (RDA);
- The Technical University "Gheorghe Asachi" Iasi – Faculty of Textile , Leather and Industrial Management;
- The National Research & Development Institute for Textiles and Leather- Bucharest;
- Inno Consult SRL- Bucharest

This is where the RDA took an important role as an intermediary inside the sector to connect the companies with other companies to create associations for fundings, facilitate the introduction of innovation and encourage collaboration. Part of projects of the RDA were based on mapping all of the companies that are part of the sector, to comprehend their strengths and weaknesses, to identify how to support them as a local channel to bring external cooperation.

- *The Regional Development agency contributed with the information provided on this thesis by allowing the creation of a meeting to exchange information and explaining how their approach to the situation of the sector is.*

ADR®
Agenția pentru Dezvoltare Regională
N O R D - E S T

"The North-East Regional Development Agency is a non-governmental organization of public interest, established by law in 1999. The agency's mission is to act as a generator of economic and social development in the North-East Region of Romania. The North-East RDA develops strategies, attracts resources, identifies and implements financing programs and offers services for stimulating sustainable economic development, partnerships and entrepreneurial spirit." - Interreg Europe 12/03/2018 https://www.interregeurope.eu/clusterix2/news/news-article/2773/introducing-north-east-regional-development-agency/

Continuing the efforts to increase the quality of the North-East Region's Research and Innovation Strategy for Smart Specialization the RDA conducted a study *(North East Regional Development Agency, 2021)* that facilitated the identification of some strenghts and weaknesses related with the textile industry inside the country.

Strengths

- Locally available resources.
- Potential innovation with the cooperation between sectors.
- Specilized courses that enhance culture and traditions.
- Well prepared human resources.
- Education and RDI entities focused on the sectors with potential innovation.
- Cooperation through the creation of clusters.
- Environmental and agricultural policies encourage the use (recovery) of waste and the development of new crops for natural fibers, contributing with the creation of new employment.
- Large number of active companies.

Weaknesses

- Many of the raw materials are being imported.
- Skilled workers are aging.
- Natural materials are becoming more important for consumers.
- Absence of qulified workers.
- Weak connection between academia and the actors of the private sector.
- Excessive bureaucracy for business development.
- Insufficient interdisciplinary cooperation.
- Law is not functional or it cannot be applied efficiently to social initiatives.

Challenges

- The added value of the products is poor.
- Lack of collaboration between industry and research sector leading to a vague exchange of knowledge and projects.
- Aging and emigration of skilled workers
- Lack of introduction of digital tools to the textile supply chain specifically inside the production and marketing.
- Poor product certification.

Source: (North East Regional Development Agency, 2021)

2.4. Conclusions

Putting together the information of the NE-RO region and the T&C sector is important to highlight:

- The region and the country in general, have a **strong connection with their cultural roots** based on traditions like knitting and embroidery, and this has not been addressed on the development of the T&C sector as a way to approach the challenge of the lack of young people being interested in these types of labors.

- Even if the territory has abundant resources from the perspective of agriculture, the economy of the **territory is not adding potential to it as it lacks cross sectoral participation,** that could match the resources with the technologies from other sectors, for their transformation into products.

- The lack of cross-sectoral connection is also impacting the T&C sector as even if they have the knowledge, they need to improve at the same velocity as the sector is evolving in Europe, meaning that **they need the correct tools that can follow the rhythm of innovation of their clients.**

- **Active collaboration with universities** and the transformation of how to address this type of work through practical activities, could **enhance the interest from younger generations** to acquire this type of knowledge.

- The initiatives of clusters should promote the i**ntegration of the companies** of the same sector to add resilience to their practices.


Katty
Fashion

Introduction

Katty fashion is one of the **main actors inside the T&C ecosystem in North East Romania** and the main subject of this thesis, as explained above it was selected due to their **role as a good practitioner** inside the European Union and their **efforts towards circularity.**

In the following chapter with a **systemic approach, the company** is going to be studied from an **internal point of view**, based on history, the Ethos, structure and their productive process, and **externally** from their communication through platforms.

3.1.1. Profile of the CEO

Caterina Ailiesei

Reginnova

Katty Fashion

Is a textile engineer of the Technical University "Gheorghe Asachi" Iasi, Romania, class of 1995.
Development Association and KF Luxury short runs clothing
Founder and CEO Reginnova NE Innovation and Sustainable

"Entering the challenging world of fashion in 2003 I established Katty Fashion, a company: www.katty-fashion.com, that **makes design, development and production.**

Taking garment designs from concept to creation, development through to production, we produce collections for many well **respected European labels**. I love what I am doing, though sometimes this job is trying. **The satisfaction of seeing another new style ready gives me great joy and happiness".**

(Ailiesei, n.d.).

As the CEO of the company she has focused her **efforts on changing the paradigm of the sector,** from the **traditional functioning to a more digital/circular business model** that doesn't sacrifice the human part of it. That is how since 5 years ago, she has been **promoting innovation** and **sustainable development** as a **good practitioner** of circularity, not only at a regional level but also to the **whole Europe.**

Part of these efforts culminated in the **creation of Reginnova NE**, an association focused on **innovation by linking regional representatives** to create **strategies for a sustainable** and circular development for the **future of the NE region** and all the country.

3.1.2 History

The story of the company begins with her **working in a factory while studying at university**. After some time, she became coordinator of the line of production and later of the complete section. In 1995, Caterina graduated from university and returned to the company as the coordinator of the complete factory floor.

Later, the **UK companies** that worked with this factory decided to **train her in their department**, to understand the process and to be able to link everything properly. That is how she became their **production manager in North East Romania**, coordinating their product development and loan manufacturing. With this experience, Caterina was able to **see the gap between the brands and the factories**, as well as the **difference between the pragmatic companies of the East** and the level of **technology, methods and processes from western Europe**. As a result, **Katty Fashion was created as a bridge to harmonise the communication and optimize the working, the quality, technical and ethical flow.**

Katty Fashion S.R.L.

Address
Calea Chișinăului 57, Iași

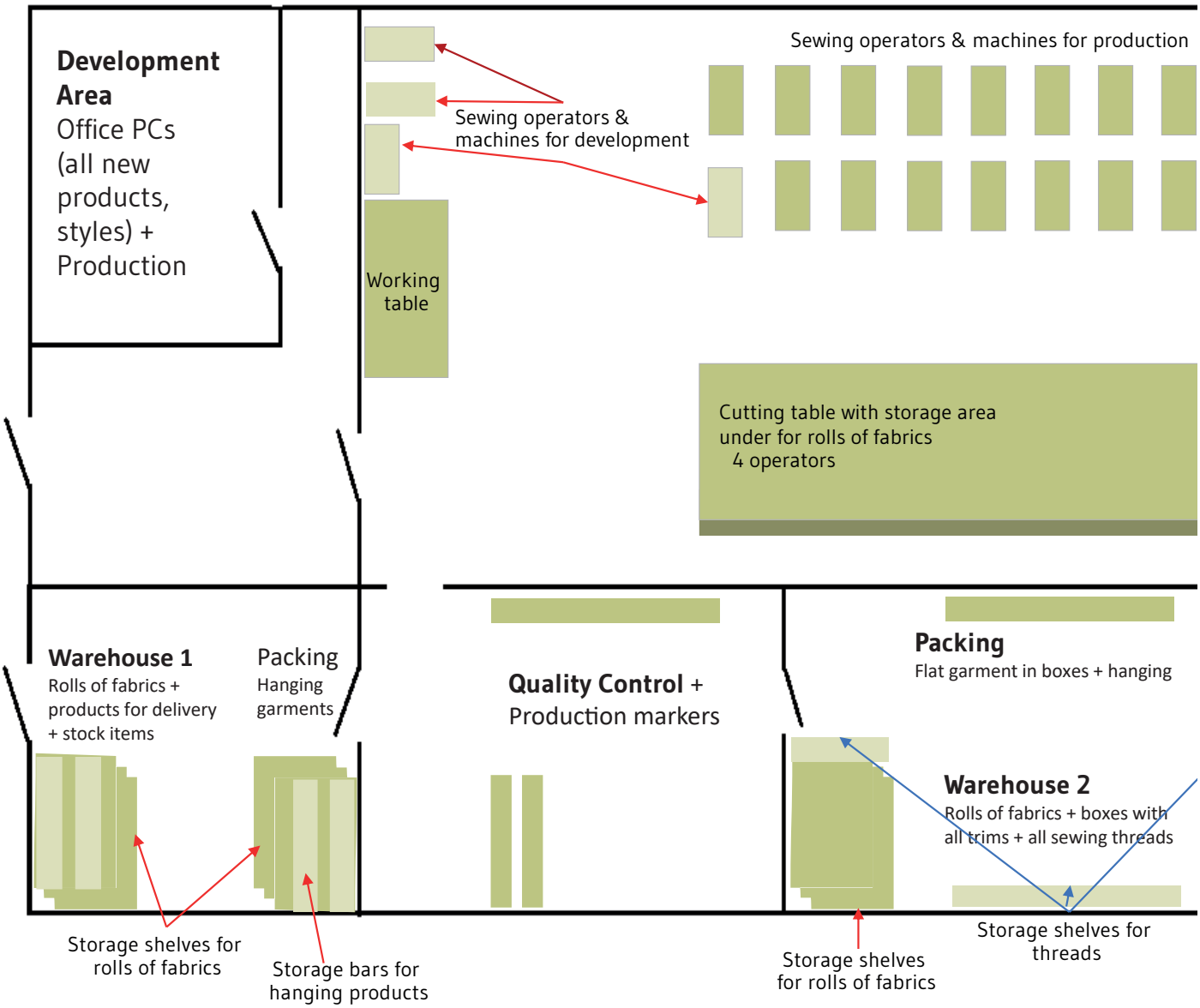
Caterina Ailiesei contributed with the information provided on this thesis by allowing the creation of a meeting to exchange information and explaining how their approach to the situation of the sector is.

3.1.3. The Structure

Team

The teamwork is characterized by **open communication** and **mutual respect.** Integrated by almost **50 employees.**

Working areas

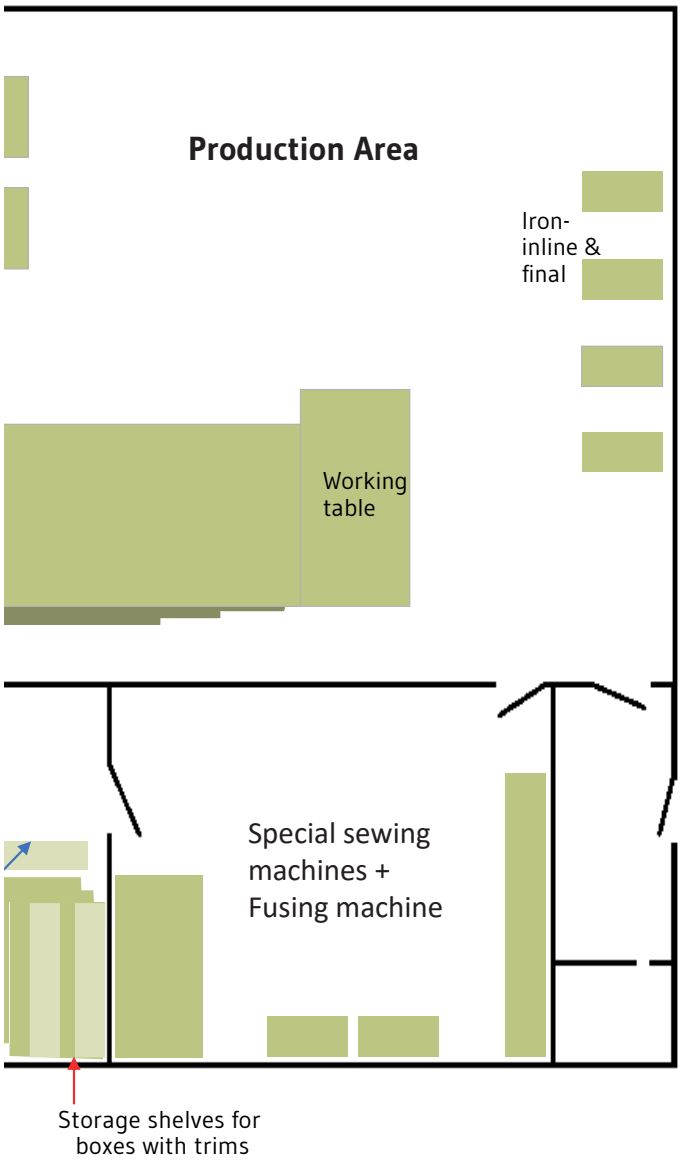


Vision

Offer excellent services of **product development of garments manufacturing**, without compromising teams, clients, environment and community wellbeing.

Mission

Make the **communication and working flow as harmonized and optimal for the entire ecosystem benefit**. Try and work with what is best for each of the actors, to support each other **to cover any gaps** in a harmonized and **ethical way.**



Shared by Katty Fashion

Goals

- Working to offer the best **working conditions.**
- Implementing **incremental services of zero pre-consumer waste** of all resources through virtual prototyping, **digital validatio**n of styles and seamless interlinks with ondemand smart circular garment manufacturing.
- Follow a real path of s**ustainable development** as this transformation faces the challenge of having internal and external actions.

Values

- **To be considerate** with yourself and the people around you.
- To use each of **our expertise** and good in us could contribute to an excellent service for clients to come back to and **create value for both**, without affecting each other or future generations.

3.1.3. The Structure

The company is dedicated to the production of **high-end fashion, delicate and luxury garments** and sells under **two modalities B2C and B2B,** depending on the clients needs. The products offered are categorized by **sportswear, homewear, chic-wear and highly fashionable women wear.**

The majority of the **procedures are carried out in-house**; however, if the volume of production becomes too large, other firms that adhere to Katty's quality standards assist in the production.

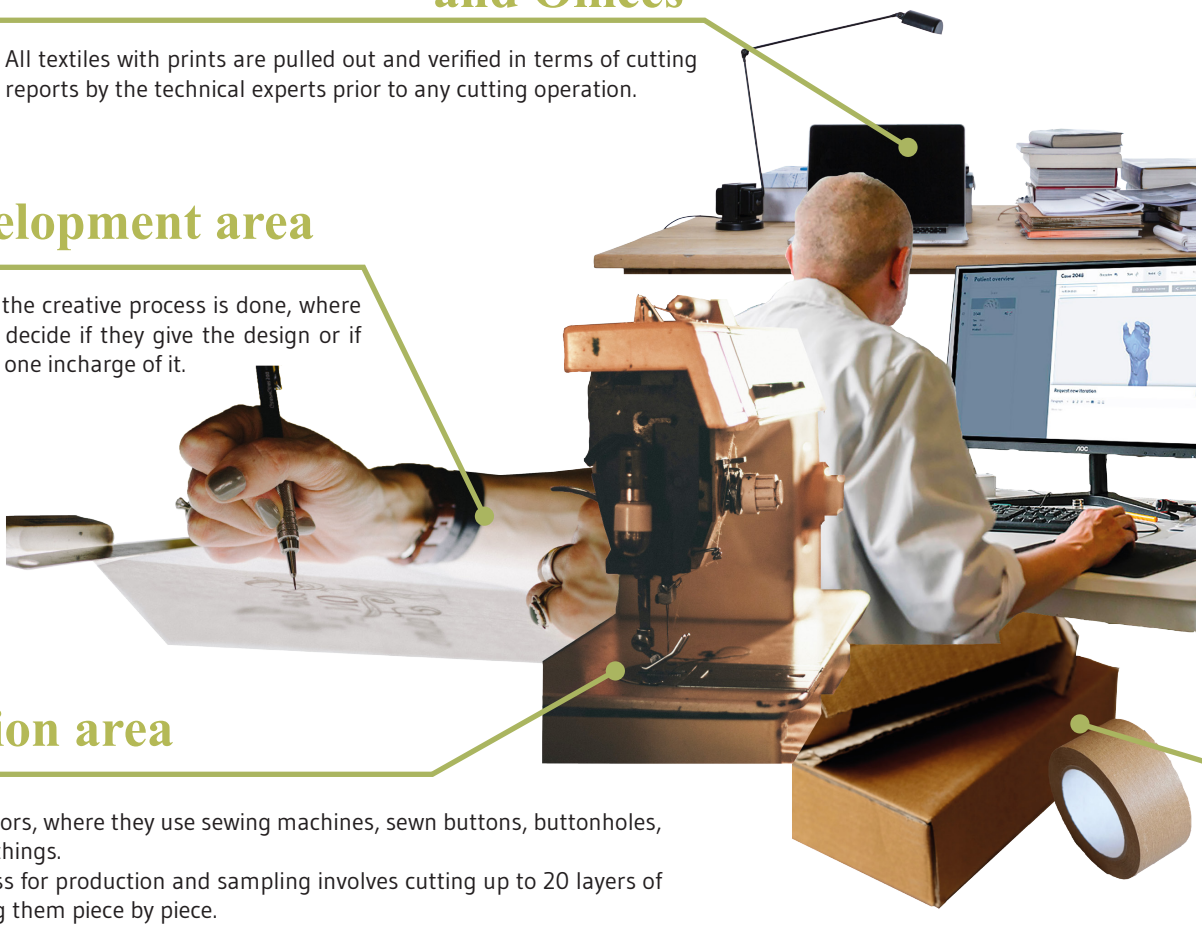
The **areas** inside the company are:

Receptions and Offices

All textiles with prints are pulled out and verified in terms of cutting reports by the technical experts prior to any cutting operation.

Development area

In this phase all of the creative process is done, where the customers can decide if they give the design or if the company is the one incharge of it.



Production area

- Sewing operators, where they use sewing machines, sewn buttons, buttonholes, among other things.
- Cutting process for production and sampling involves cutting up to 20 layers of fabrics, cutting them piece by piece.
- Iron process is where all cut panels needed to be ironed throughout the sewing process, like garments that are also final ironed before quality check.

Clothing worn in the home, typically of an informal, simple, or comfortable sort; the action or fact of wearing such clothing.
(Lexico (n.d.)entry 1)

Homewear

"Chic" wear

a distinctive mode of dress or manner associated with a fashionable lifestyle, ideology, or pursuit.
(Merriam-Webster. (n.d.)entry 2)

Highly fashionable women wear

Expensive, fashionable clothes produced by leading fashion houses.
(Lexico (n.d.)entry 1)

Sportswear

Clothing designed for casual or informal wear.
(Merriam-Webster. (n.d.)entry 2)

Warehouses

Depending on the customer, the fabrics and trimmings are then kept in warehouse 1 or warehouse 2 or under the cutting table.

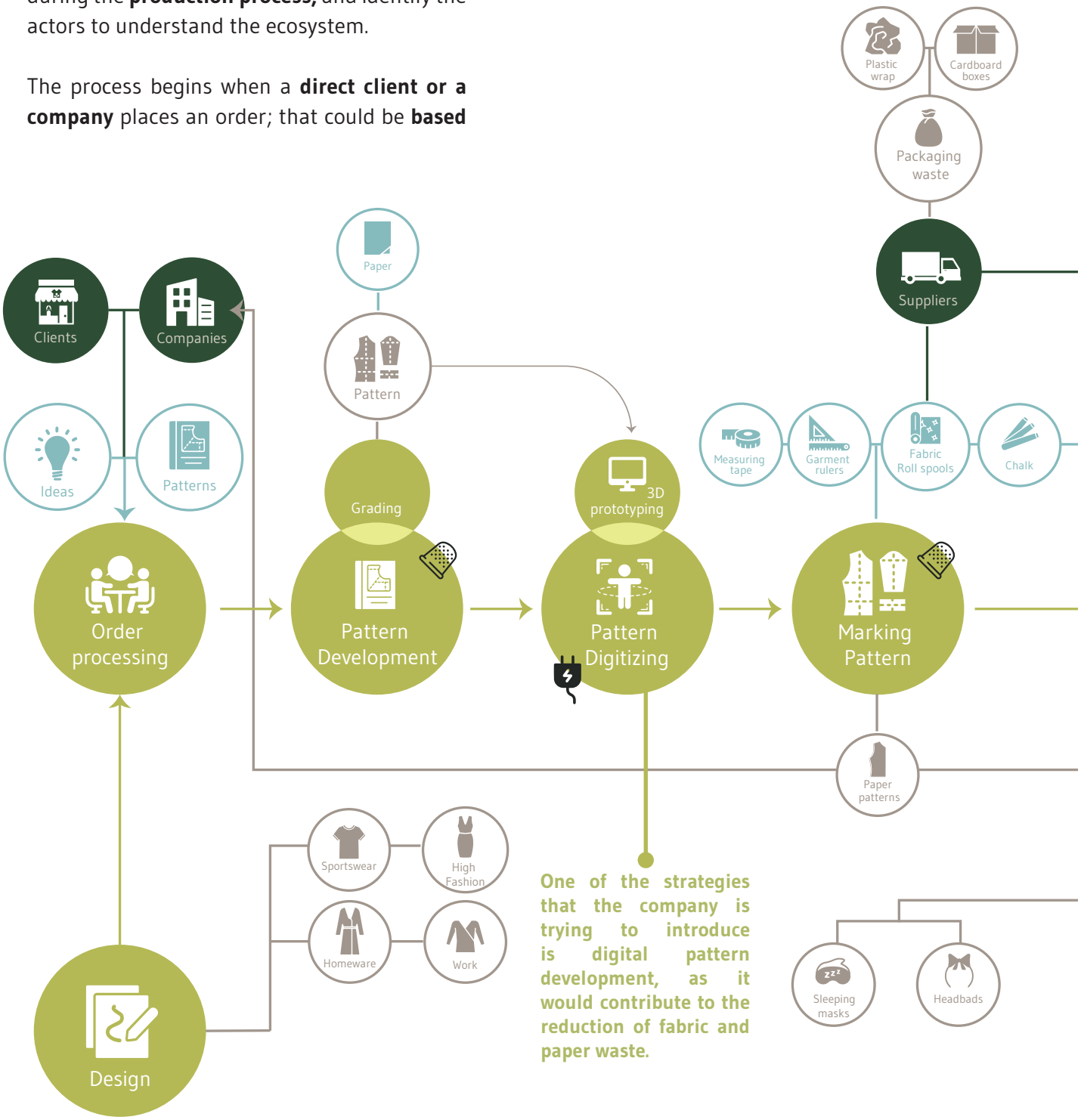
Quality Check and Packaging Area

Before being delivered, all garments are inspected. When a product has defaults from sewing, it is sent back to the sewing line to be remade, and then it is examined once more.

3.1.4. Productive process Analysis

Furthermore, to continue with the systemic analysis, it is necessary to evaluate the **inputs and the outputs** generated by the company during the **production process,** and identify the actors to understand the ecosystem.

The process begins when a **direct client or a company** places an order; that could be **based on an idea, a pattern or in a design**. If it is necessary the company **develops the pattern** to later translate it into a paper, to continue



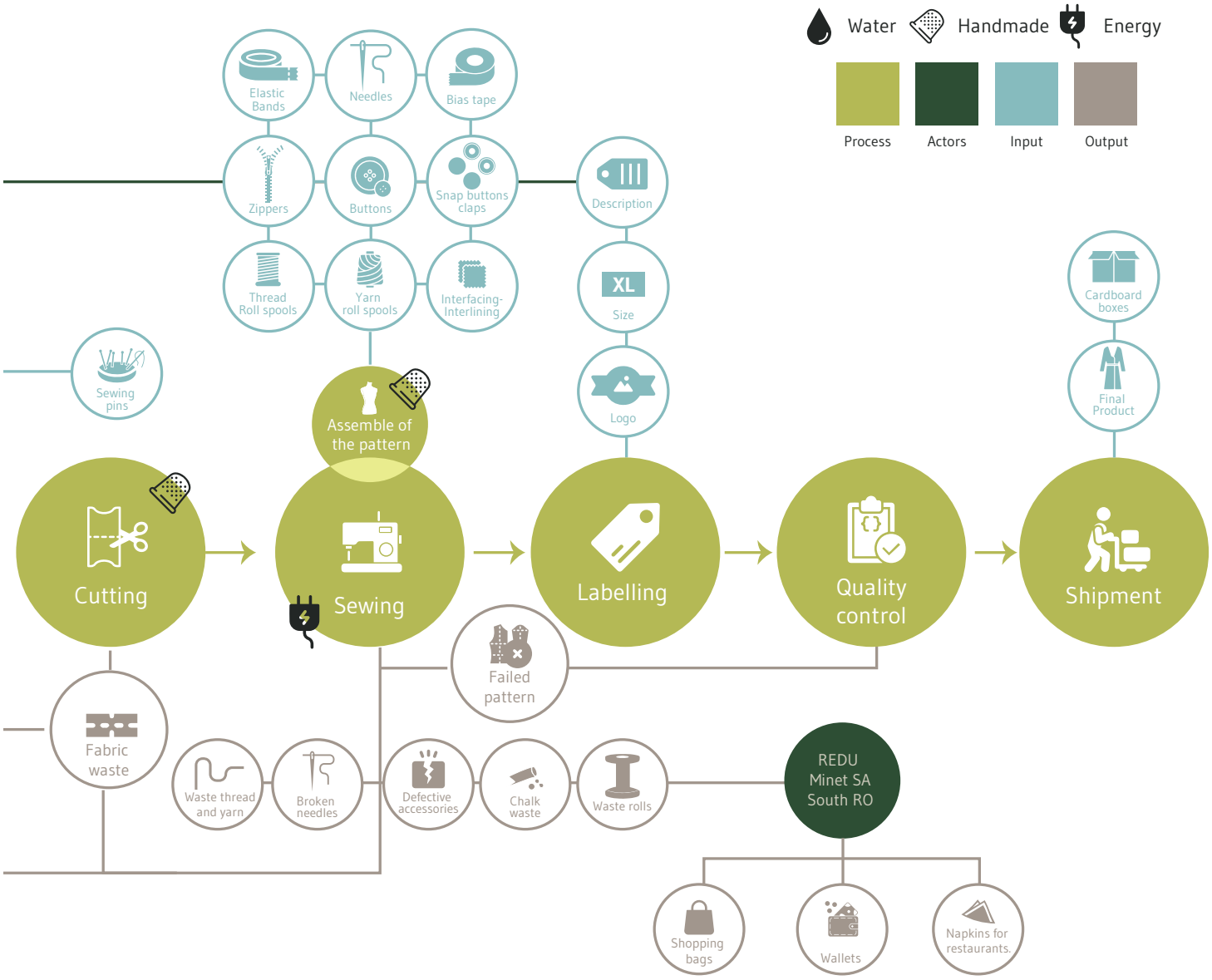
One of the strategies that the company is trying to introduce is digital pattern development, as it would contribute to the reduction of fabric and paper waste.

with **cutting the fabric**, proceeding to **sewing** it with the rest of accesories and linings. After the garment is done, the **label** is added to arrive at the **quality control** process to conclude with the **shipment** step.

The volume of production:

Niche brand: small orders from 1 to 100 garments depending on the different fabrics, prints and sometimes specific details.

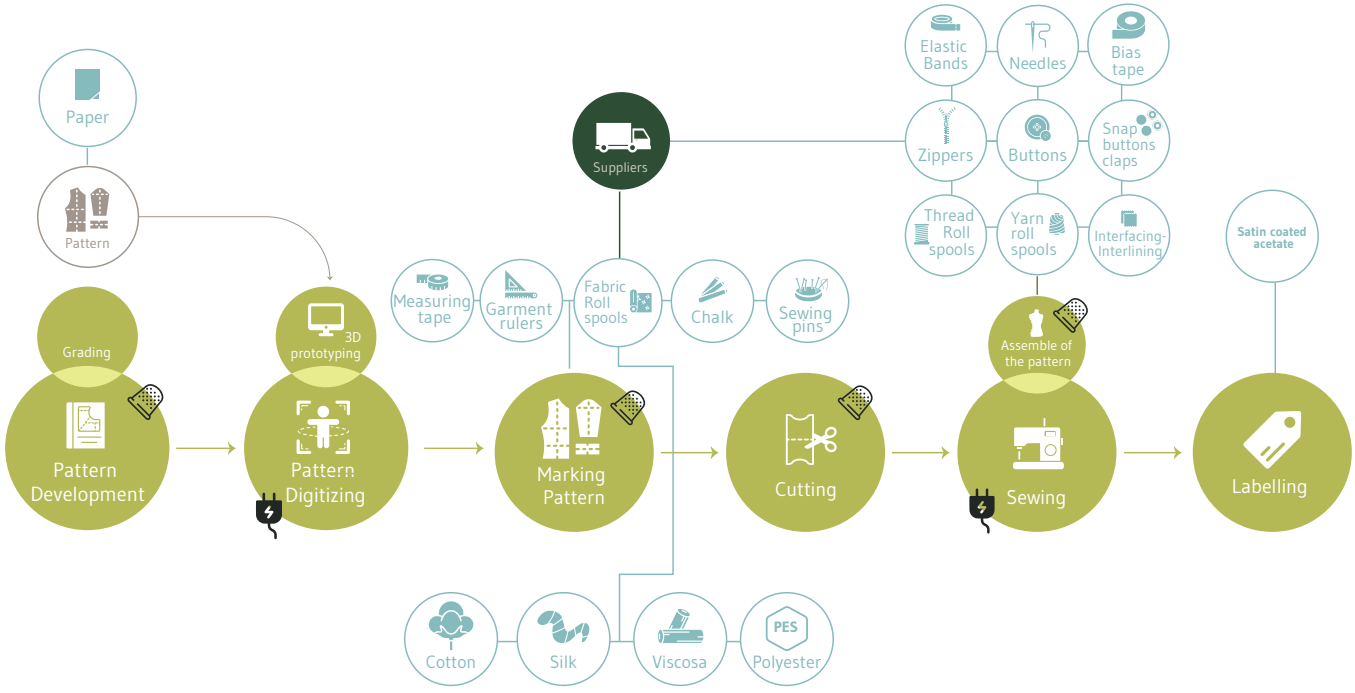
On average the production is 2000 garments in a month.



3.1.4.1. Input analysis

After the analysis of the process, it was helpful to evaluate each step to consider the **inputs and output** that enter and exit the process. And in this way, **identify the impact** that each of them has in the system and how the output would be later re-enter the system.

Starting with the input analysis, **development of the patterns** is the first step of the process where an input enters (paper), and inside **making of the pattern** is where a considerable amount of inputs enter (sewing pins, chalk, measuring tape, garment rulers and the most relevant and present inside the process the fabric roll spools), later after the **cutting of the pattern** is done, during the sewing process some other inputs enter (needles, elastic bands, zippers between other accessories for the creation of the garments).



The following table shows the different percentages of the material inside Katty Fashion production for the construction of the garments, considering the different combinations of the materials. By analyzing this type of information, it is possible to identify that the **most used materials** inside their production are: **cotton, silk, viscose and some of the linings in polyester** (sustainable produced). The percentage used for each material depends on the **clients requirements** that varies on the season and the trend, still the table makes evident how these three materials were the most relevant during three consecutive years, even with the situation that the pandemic caused to the sector.

Table of material quantities and percentage

Composition of the Used Fabrics	Total of quantities and years					
	2019		2020		2021	
	Qty	%	Qty	%	Qty	%
44% vis / 56% silk	837	3.56	51	0.33	100	0.56
100% silk	3425	14.59	2273	14.81	2308	12.96
48.5%silk / 51.5%visc	0	0	30	0.2	17	0.1
68%visc / 32% silk	0	0	0	0	15	0.08
62% cotton / 38% silk	103	0.44	0	0	0	0
33%silk / 45% viscose / 22%MF	10	0.043	0	0	0	0
33% silk / 45% viscose – 22%LU	42	0.17	6	0.04	0	0
97%silk – 3% ME	89	0.38	0	0	0	0
57% silk / 43% pes	67	0.29	0	0	0	0
50% silk / 50% viscose	0	0	211	1.38	0	0
78% viscose / 22% silk	0	0	0	0	612	3.44
30%silk / 70% cotton	0	0	0	0	66	0.37
84% viscose / 16% silk	0	0	0	0	18	0.1
50%cotton / 49% vis / 1% EA	88	0.37	0	0	0	0
100% cotton	6854	29.19	10042	65.42	8264	46.43
100% organic cotton	33	0.14	722	4.7	2062	11.58
40%cotton / 30%pes / 30% ME	63	0.27	32	0.21	0	0
55%cotton / 45% recycl. Pes	0	0	0	0	0	0
53% Virgin Wool / 47% Cotton	0	0	0	0	76	0.43
100%viscose	3000	12.77	464	3.02	513	2.88
95% Pes / 5% EA	84	0.36	0	0	574	3.22

Composition of the Used Fabrics	Total of quantities and years					
	2019		2020		2021	
	Qty	%	Qty	%	Qty	%
100% wool	1734	7.39	355	2.31	665	3.73
100%Pes	1442	6.14	129	0.84	428	2.4
97%pes / 3%EA	0	0	59	0.38	0	0
97% Recycl.pes / 3%EA	0	0	0	0	75	0.42
97% Viscose / 3% EA	1254	5.356	50	0.33	356	2
76% Acetate / 24% Viscose	1608	6.85	107	0.7	344	1.9
70% Linen / 30 % Viscose	16	0.068	0	0	30	0.17
99%Viscose / 1% EA	440	1.87	0	0	78	0.44
62% viscose / 38% Pes	0	0	15	0.1	0	0
54% viscose / 46% Acetate	0	0	17	0.1	0	0
55% Linen / 45% viscose	0	0	0	0	28	0.16
52% acetate / 48% viscose	0	0	0	0	15	0.08
85% viscose/ 11%PA / 4%EA	0	0	0	0	17	0.1
55% viscose / 45% acetate	80	0.34	0	0	0	0
58% viscose / 38% Virgin Wool / 4%EA	0	0	0	0	115	0.65
69% viscose – 25% PA – 6% EA	1575	6.71	721	4.7	901	5.1
98%Pes / 2% EA	498	2.12	0	0	0	0
71 %rayon / 18% pes – 11% PA	0	0	25	0.16	0	0
100% Cupro	134	0.57	41	0.27	0	0
100% Linen	3	0.013	0	0	129	0.7

With the analysis it was concluded that the most used materials were: 100% cotton, 100% silk and 100% viscose, and also they are present in a big percentage inside some combinations with other materials. However, there is also another material that is present in a high amount in some combinations, even if in the 100% presentation is not one of the most relevant, which is polyester, the most used synthetic material inside the production.

PES
Polyester

Combinations with:

Silk
Cotton
ME
EA
Viscose
Rayon
PA

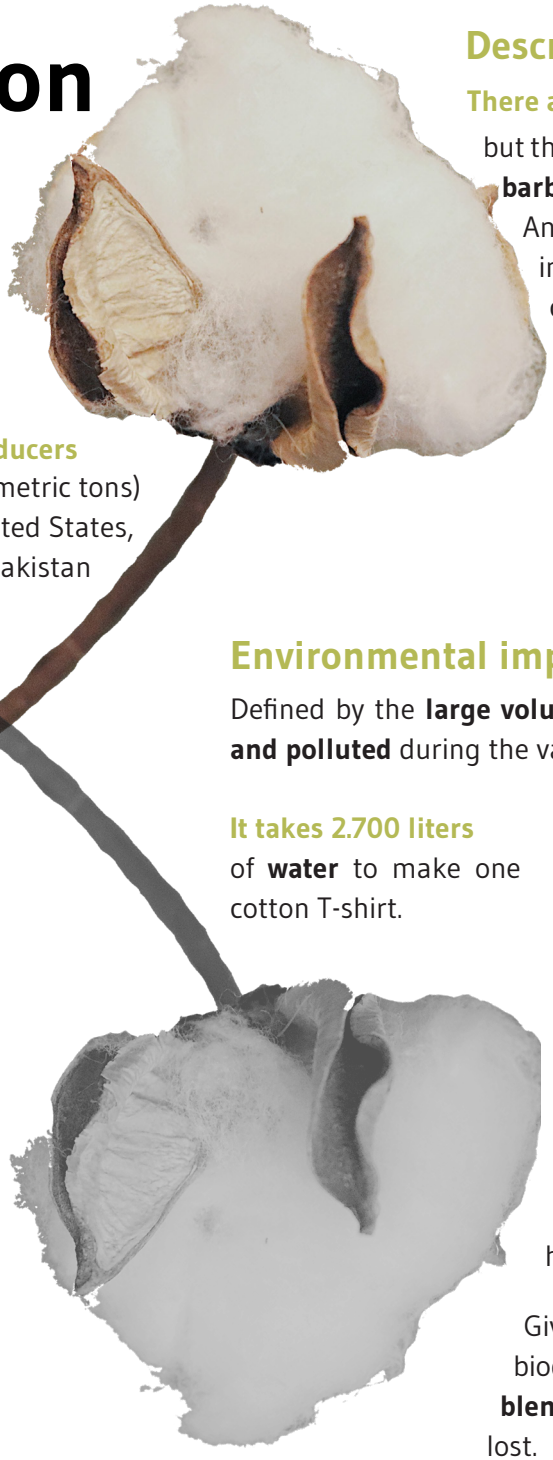
47% 100% Cotton

5% 100% Organic Cotton

6% 100% Viscosa

14% 100% Silk

Cotton



Description

There are 33 spices

but the four most commonly used are **hirsutum, barbadense, aboreum, and herbaceum.** And each of them has been transformed into many types in order to better their commercial qualities, such as quick growth or increased resistance to plagues.

Cotton fiber is **created from dried cell walls,** or "hairs," that have been treated to remove the dried seed and detritus. Cotton is purchased for its comfort, ease of care, and cost.

Top producers

China (6.423 metric tons)
India, United States,
Brazil and Pakistan

Environmental impact

Defined by the **large volume of water required and polluted** during the various procedures.

It takes 2.700 liters
of **water** to make one cotton T-shirt.

Harvests use 6%
of the world's pesticides

16% of the world's insecticides
resulting in **polluted water**, **high greenhouse gas emissions**, and **soil degradation**, which also **affects the farmers** who come into contact with these **chemicals**, making not only the material but also the processes around it hazardous to the environment.

Given that it is a natural fiber, it should be biodegradable, but because it is **frequently blended with synthetic fibers**, this quality is lost.

Alternatives

- **Organic cotton:** manufacturing of the same material **without** the use of any **chemicals**.
- **Hemp:** clothing **last longer** because it takes up less space, uses less water, and requires less room to produce.
- **Bamboo:** is a good choice because it can **grow on its own** and uses **less water.**
- **Tencel or Lyocell:** is a fabric manufactured from tree pulp.

Source
Love your clothes. (2017), Wicker, A. (2020)

Silk

Top producers

China, also countries like India, Uzbekistan, Brazil and Thailand

Description

2500 mulberry silkworms are required to make one pound of raw silk

Sericulture is the technique of making silk from the cocoons of silkworms. To harvest it, the pupae are destroyed before the adult moths emerge, and the **cocoons are boiled in boiling water** to soften the sericin, then unravelled as one continuous thread (called reeling).

Environmental impact

High energy consumption Silk farms are kept at a **constant humidity and temperature**, and the cocoons are dried with steam or hot air after harvesting. **Large amounts of trash** can be produced in the industry in the form of deadstock and offcuts.

Reeling the silk for one piece of handwoven silk **requires up to 66,6 liters of water**

Silk has been linked to child labor in India and Uzbekistan, and is one of the last remaining viable sources of income in Asia's rural communities, **particularly for women.**

The fabric can be circular and waste-free.

Many by-products are incorporated into the local ecology; mulberry fruits are consumed; and wood can be utilized as a source of energy.

Alternatives

- **Ahimsa or peace silk:** The ethical silk is extracted after the silkworm has finished metamorphosis and emerged from the cocoon as a moth, **so no silkworms are harmed**, and it is degummed and spun like ordinary fiber rather than reeled. It is, nevertheless, **more expensive and less polished** than regular silk.
- **Tencel:** is a fabric manufactured from tree pulp.

Source
Science Channel. (2019), Textiles School. (2018), Nizzoli, G. (2020), Banuri, T. (1998), Synzenbe. (2019), TENCEL. (2021), Statista. (2021), Carpenter, S. (2019).

Viscosa

Top producers

China, India, Indonesia and over all Europe.

Description

Because of the **amount of chemicals** used in its production, this fabric is categorized as a semi-synthetic material. It is made from **wood pulp**, primarily beech, pine, eucalyptus, or bamboo. It's a **low-cost, lightweight, and soft material.**

Environmental impact

Every year, thousands of hectares of rainforest are chopped down to grow trees specifically used to make rayon, leading in **significant deforestation**. Clothing made of rayon and viscose is sourced from endangered and old forests, accounting for 30% of total production.

When **chemicals are discharged into effluents**, they are **exceedingly harmful** to both the environment and people.

It has the potential to be **biodegradable.**

Alternatives

EcoVero is viscose, however it is produced in an environmentally friendly manner in Austria with **less toxic chemicals**, resulting in a **50% lower environmental** effect than regular viscose.
Lenzing: which also makes EcoVero, manufactures Lyocell or Tencel.

Source
MasterClass staff. (2021), Sustain your style. (n.d.), Water Footprint network. (2017), Hendriksz, V. (2021), K. (2020).

Polyester

Description

This fabric is created by polymerizing **petroleum-derived ethylene glycol** with purified terephthalic acid, which melts down to form polyethylene terephthalate (PET).

Environmental impact

Polyester may have a smaller environmental impact than other materials in terms of the amount of water and land utilized in its manufacture, but **the amount of energy** required to make it has a **substantial environmental impact.**

On the other hand, even if water quantity has nothing to do with the material's environmental impact, the **water pollution** caused by companies that **release harmful substances into the ocean** that harm ecosystems, as well as the **microplastics** that are **thrown into the water** while washing garments made of this fabric, makes it a big win for the environment.

Another of this material's effects is its durability, which can take decades or even **hundreds of years to decay.**

Top producers

China is the fastest-growing regional polyester market, exporting the most to the United States, India, and Vietnam.

Alternatives

- **rPET :** Recycling polyester is reported to **emit 79 percent fewer carbon emissions** than virgin polyester. Even when the material is reheated for recycling, **the quality of the material degrades**, reducing the material's recycling potential. Also, treating the material in terms of **dying is more challenging**, thus the influence on **water quality and energy consumed for treatment is still significant**.
- **ECONYL:** Nylon waste treated to by transform into a fabric.
- **Natural fibers**

Source
MasterClass staff. (2020), Common Objective. (2021), Raumer, A. (2021), ECONYL. (2022), Markets, R. A. (2019), TechnavinoBlog. (2019).

Labels

Another invisible but important material is the one used for the production of labels, which is also an input and is mandatory for all garments, as seen in the previous chapter where the regulations for the T&C sector were explained.

Usually the materials used for the labels are satin coated acetate, cotton, polyester and nylon, and in some cases the label is made with the same fabric of the garment. On the other hand the taffeta and damask are frequently used to weave labels into clothes. They are frequently in the form of a rectangle and measure 1 inch by 2 inches or 1/2 inch by 1 inch.

Taffeta

Is high end fabric usually used for the creation of gowns and it could be made of nylon, polyester or silk.

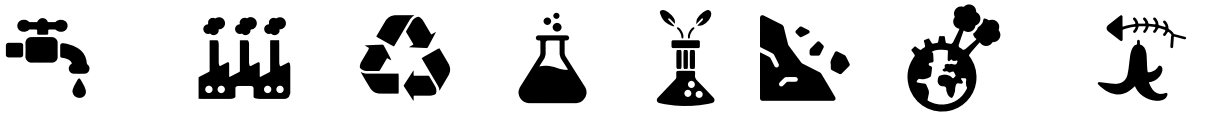
Damask

is a fabric named after Damascus as it the place where it was created and was traditionally woven of silk, cotton, or wool, although synthetic damask weaves are now available as well.Its particularity is that its weft serves as the background while the warp creates the drawings.

Source
Streditorial. (n.d.).

Evaluation of the materials

To support the analysis, each fabric's raw material will be evaluated based on their environmental impact:



Water Consumption | Energy Consumption | Renewable | Harmful Chemical | Use of GMO | Soil erosion | Rainforest destruction | Biodegradable

Type of impact	Material			
	Cotton	Silk	Viscosa	Polyester
Low Water Consumption				
High Water Consumption	X			
Low Energy Consumption		●		
High Energy Consumption			X	X
From Renewable Sources		●		
Non- renewable			X	X
Made of waste				
Harmful Chemical	X		X	X
Chemical Control		●		
Use of GMO	X			
No GMO		●		
Soil Erosion	X			
No Soil Erosion		●		
Rainforest destruction				
Non-Biodegradable			X	X
Biodegradable		●		

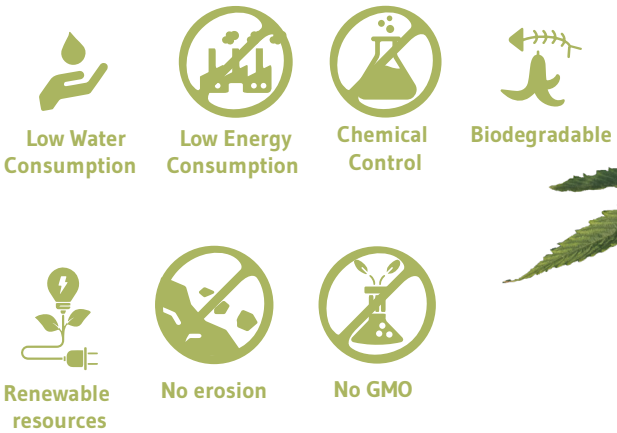
Source
Sustain Your Style. (n.d.).

In conclusion, **silk** is the only material with the most **positive outcomes for the environment**, meaning that there is the potential to replace the other materials with the alternatives found in the research. Still, to introduce a new material is a **gradual process**, so it is convenient to do the shift focusing on the most relevant one and later continue with the others.

As it was seen in the table of quantities and percentages, the most used material is cotton, with a presence of 47% inside the production and during the investigation, the best alternative of it was either organic cotton, Hemp or Lyocell.

With the pursuit of introducing more sustainable materials to their processes, Katty Fashion is currently **cooperating with the re introduction of the hemp as a key raw material** for Romanian Agriculture and a new path for the **T&C industry**. Even if they arent using it at the present moment, it is a relevant project for innovation in North East Romania and the company.

From **2016, Romania started to grow hemp** after changing the legal acceptance of it.



The purpose of this research is to **learn about the extraction process,** in order to **obtain the thinnest fiber** possible. Because the fiber developed till now is thick, it is commonly utilized for outerwear. This research is being carried out in collaboration with the **Association of Hemp Cultivators**, particularly the Caneparo cluster.

Some of the **partners** of this project are:

- Association of Hemp Cultivators.
- Caneparo cluster
- European Industrial hemp Association
- EIHA

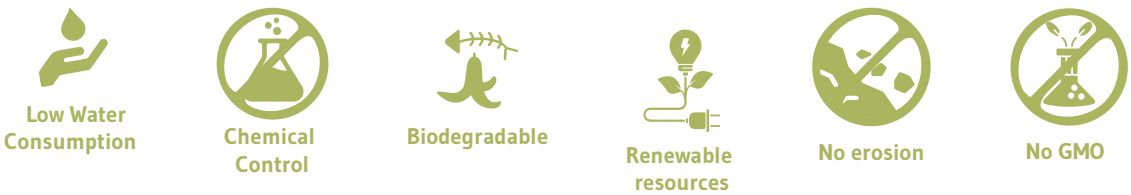
However, considering the presence of the raw material needed for its production and the potentiality to replace other materials, Lyocell is the ideal one.

Lyocell (Tencel)

This material is a rayon like viscose and modal. And all trees are made in a similar way, the process consists in **dissolving wood pulp** and drying it with a process known as **spinning**. To make a wet mixture, the wood chips are combined with a solvent prior to it getting dry, this mixture is then squeezed through small holes to create threads, which are then **chemically treated before being spun into yarn** and woven into fabric.

Environmental impact

Compared to other materials Lyocell requires **less energy and water**, and as it is a natural fiber is **biodegradable** as long as it is not combined with other synthetic materials. On the other hand, this material uses **less dye than cotton**, but still it is usually d**yed with dangerous conventional dyes**. Its natural color is white avoiding the need of bleaching. And in comparison with viscose and other rayon materials that usually are produced with endangered wood and harmful chemicals, Lyocell is produced most of the times with **sustainable sourced wood** and is processed with N-Methylmorpholine N-oxide solution that is more easily recovered, and its system assures that **no chemical is being thrown to the environment.**



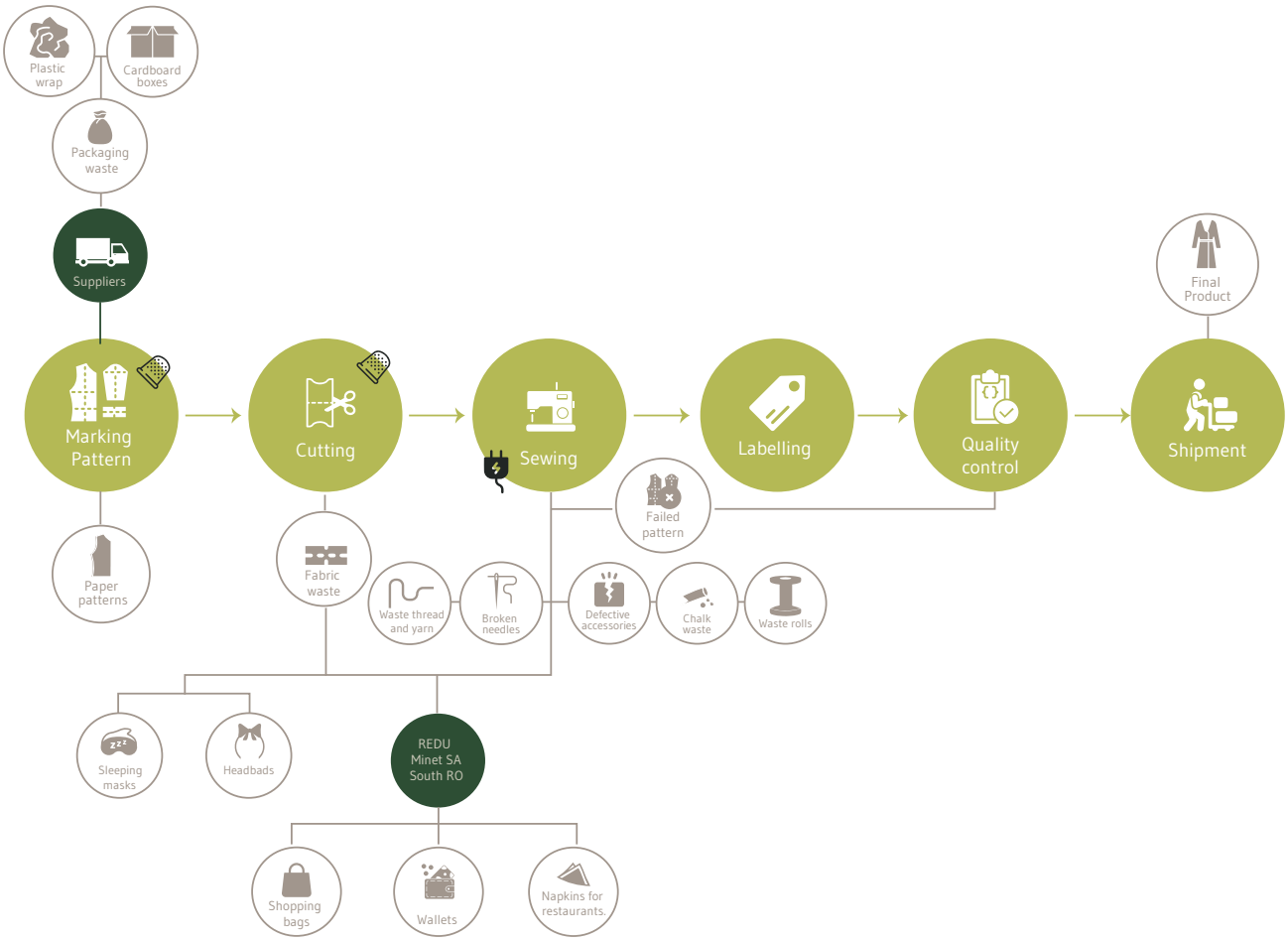
Source
Benton-Collins, K. (2021)

3.1.4.2. Output analysis

Focusing on the steps of the process, the first output is generated during the **making of the pattern**, such as plastic wraps, cardboard boxes and used paper patterns. That is why, the implementation of a technological tool would be helpful, as it is one of the steps of the process that creates the most waste.

As a future initiative, Katty Fashion plans to **introduce a 3D prototyping technology**, which would i**deally minimize the number of prototypes and waste**, as well as working in a **collaborative design mode**, as a future endeavor to reduce waste and make the manufacturing process more efficient.

Following the analysis, another significant output is the **fabric waste** that results from the **cutting process.** As the company is already on a path for circularity and sustainability, this waste is collected by **municipal companies** to be transformed externally in an adequate way and some other part of the **waste is transformed inside the company.**



External transformation of the waste:

- **SALUBRIS SA,** a municipality-owned corporation that **collects textiles, paper, and PETs**, among other things, **gathers 70-65% of the waste.** The other half is collected by **SC Waste Recycle SRL**, which collects fabric waste as well as recyclable paper and cardboard.

- The company **Redu** and **Minet S.A.** currently takes roughly **30-35% of the waste and transforms it into shopping bags, napkins, and wallets,** which is an amazing external endeavor to also take care of the waste. In addition, some Swedish clients have asked for their waste to be returned.

Internal transformation of the waste:

- If their clients permit it, the company develops things such as **sleeping masks and headbands** out of fabric waste.

Other parts of the waste are generated in the sewing process like, waste thread and yarn, broken needles, defective accessories, chalk waste and cardboard rolls from the fabric. Finally, during the quality control some defective garments could end up being waste material.

3.1.5. The issue with innovation

To reduce the waste production previously analyzed, as a future initiative, they planned to deploy a **3D prototyping technology**, which would ideally **minimize the number of prototypes and waste**, as well as working in a **collaborative design mode**, as a future endeavor to reduce waste and make the **manufacturing process more efficient.**

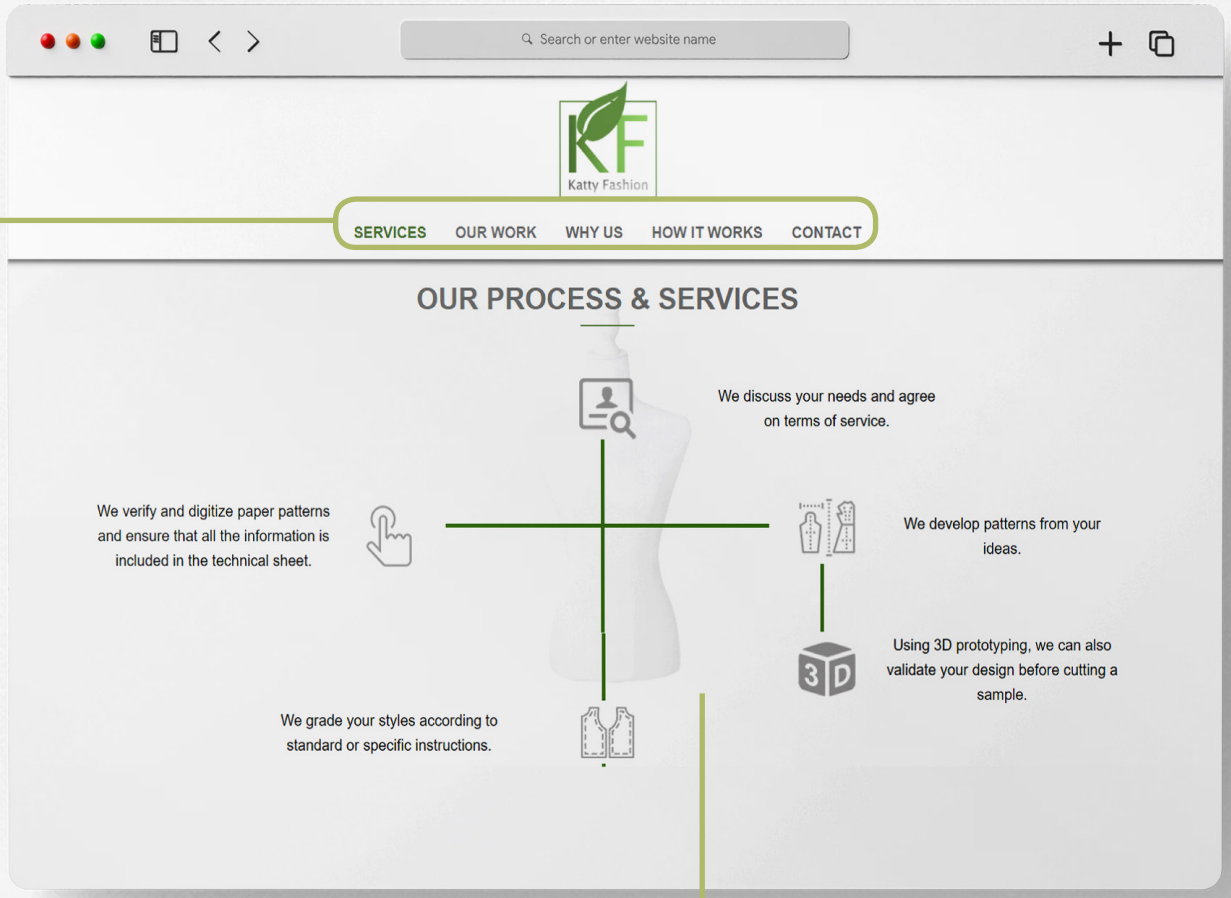
After the introduction, Caterina was once again confronted with a **missing connection between the knowledge of the enterprises in western and eastern Europe**, as the software was unable to transmit the experience gained and learned via practical work, as part of the identity of the territory.

Other initiatives that the company is implementing to reduce their impact and to contribute with the growth of the territory:

- A Demo Lab to create a smart specialization for testing and validating.
- Open Innovation Platform to evaluate all the new methodologies.
- The development of a new course model centered on forming relationships with universities to establish SME simulations within the old facility.

3.2.1.Communication through platforms

Subsequently, the external approach of the company is characterized by the **identification of the channels used to communicate** with their possible clients. Firstly, in their **Website** "www.Katty-fashion.com" sharing their services and some examples of what they have done. Secondly, their **Facebook page** "https://www.facebook.com/kattyfashionofficial/" serves as a news site to share their events and initiatives with their current clients.

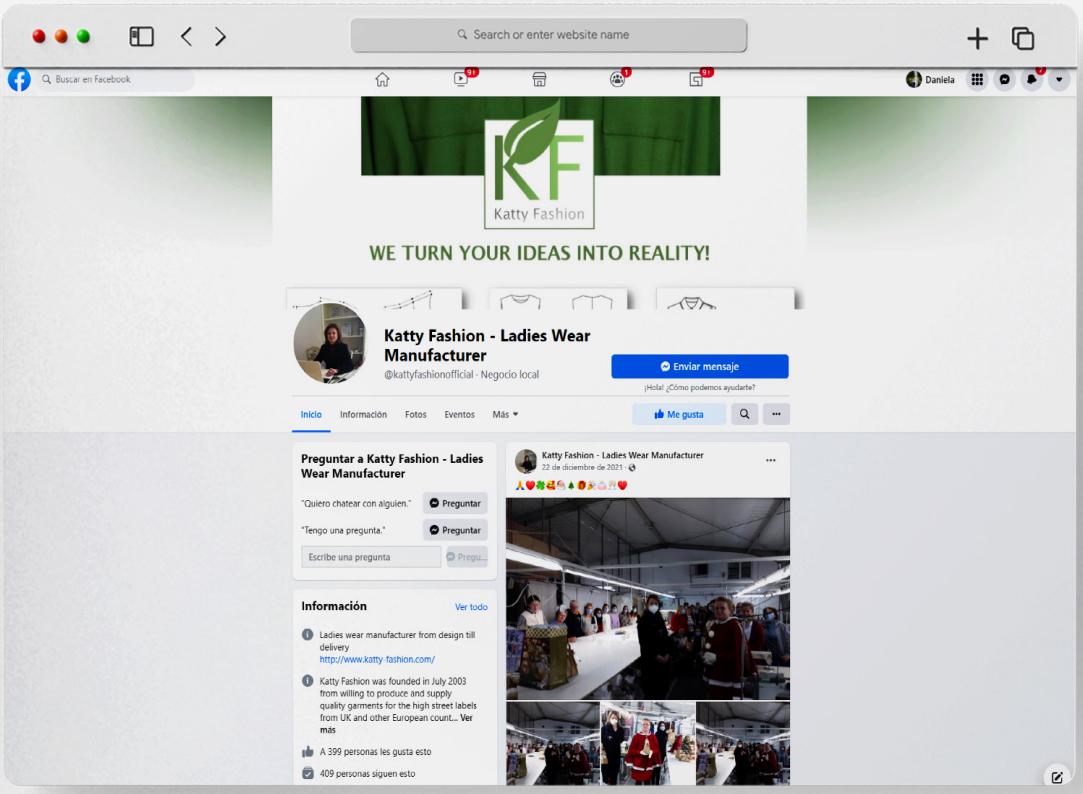


The header is structured by the **different types of approaches** a client could have. Focusing on what they **know how to do**, **the experience they have**, **what they are committed to with their work** and **section for the communication with new clients**. Even if these categories are divided in sections they are **still shown on the same homepage.**

They use the productive processes to explain the type of services they offer.

399 people
like this

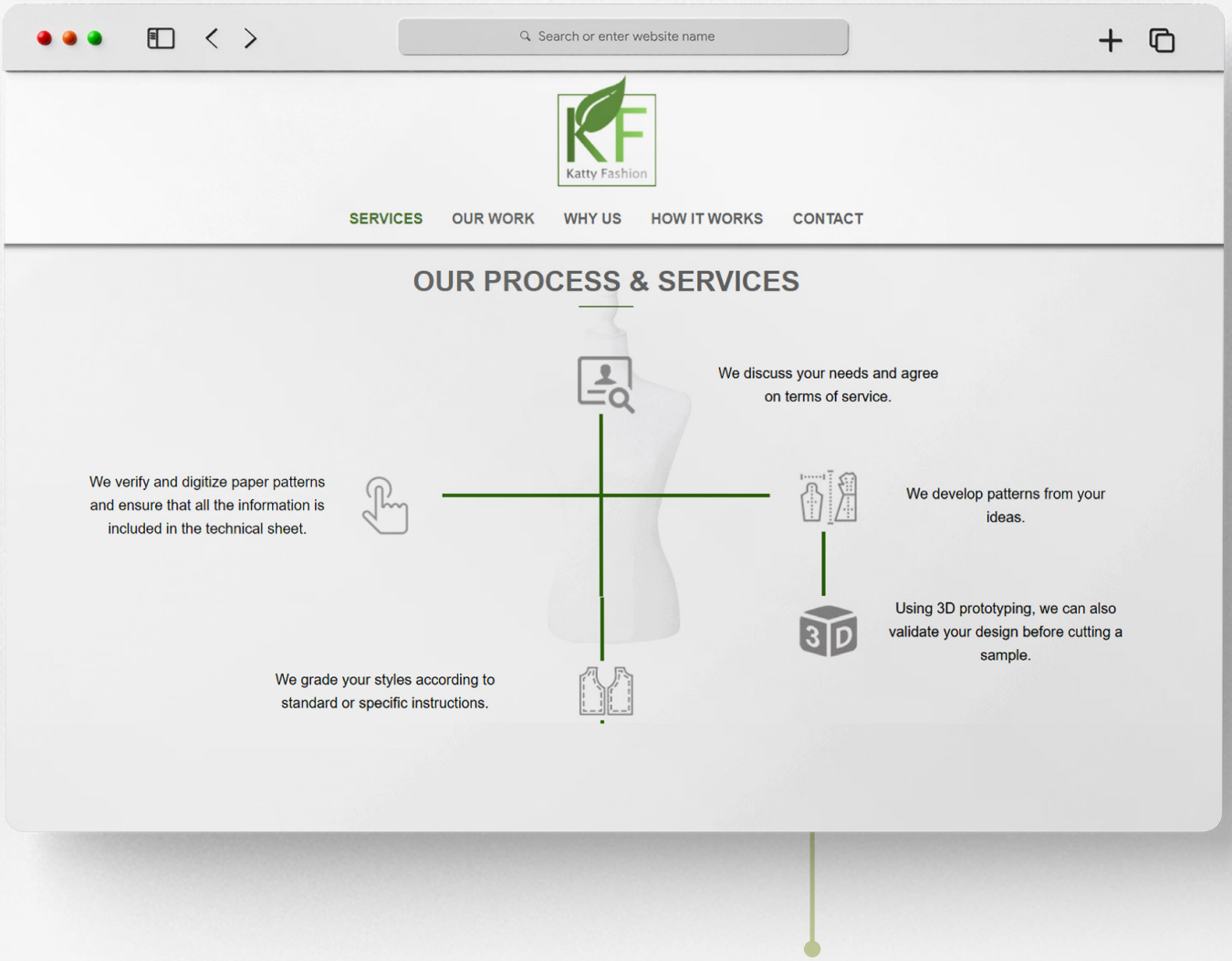
409 people
follow this



The facebook page is usually used to communicate internal activities and initiatives with the team to promote their business by creating a bond with the followers.

3.2.1.1. Website Analysis

Home Page
Services

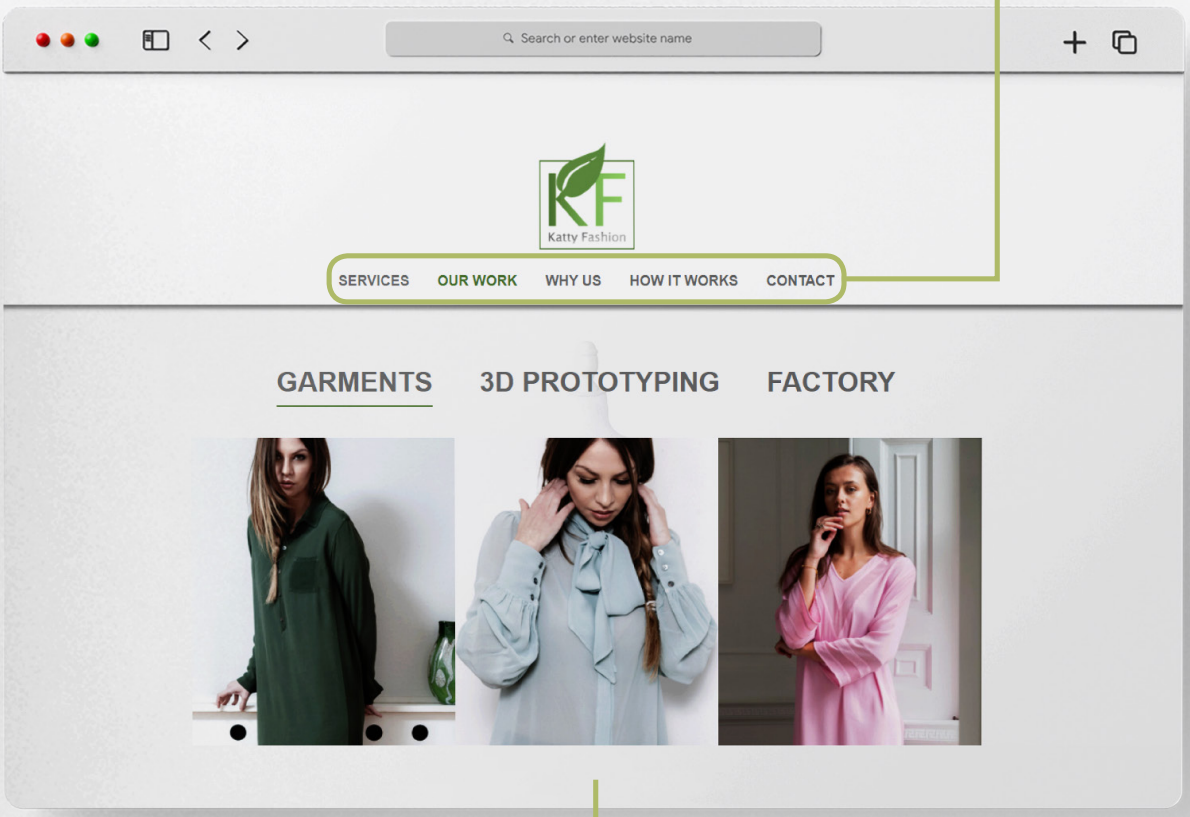


This page does **not present the company** from the first look and also it **does not attract the user** through the **onboarding**. Even if part of the information is present it is not clear that they are presenting a statement of what they do.

Instead of a home page the **services appear as the first information provided**, and they are explained with the process that the company follows to create a garment, making it **confusing for the client to understand** which are the **particular services** that they offer.

Menu

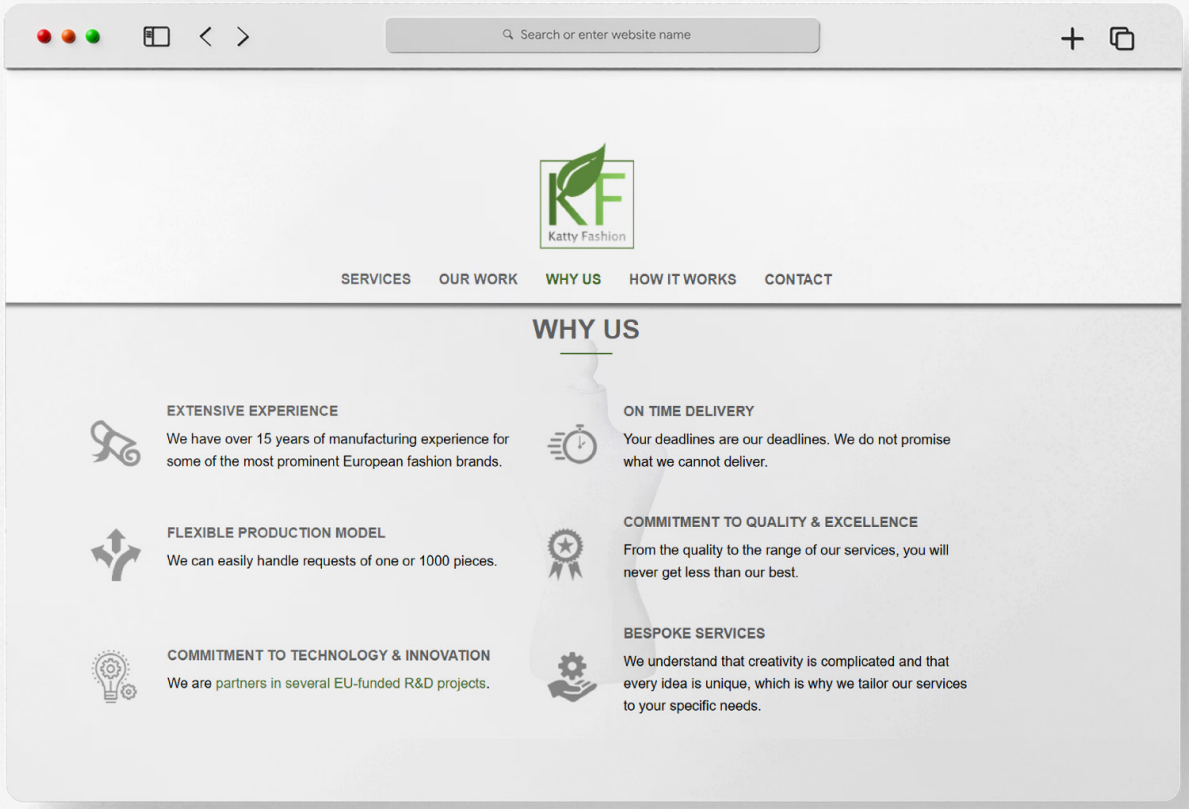
The categories presented work, but the flow of information is not clear because there is no separation between them. And having the menu displayed horizontally and the information vertically creates a visual disruption.



Our Work

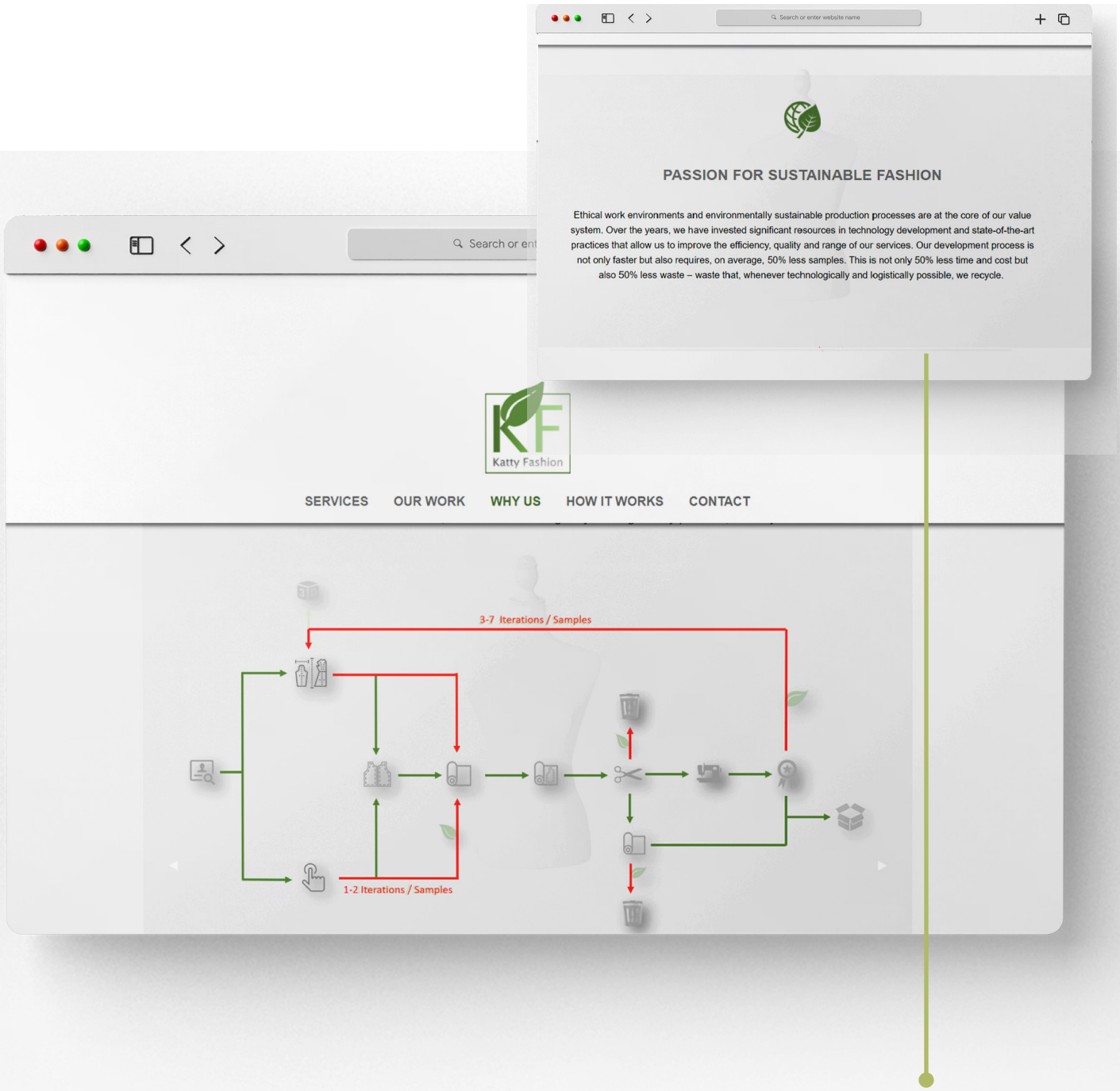
The images of the work done **don't have any description** not allowing the user to understand the **quality and the characteristics of the work.**

3.2.1.1. Website Analysis



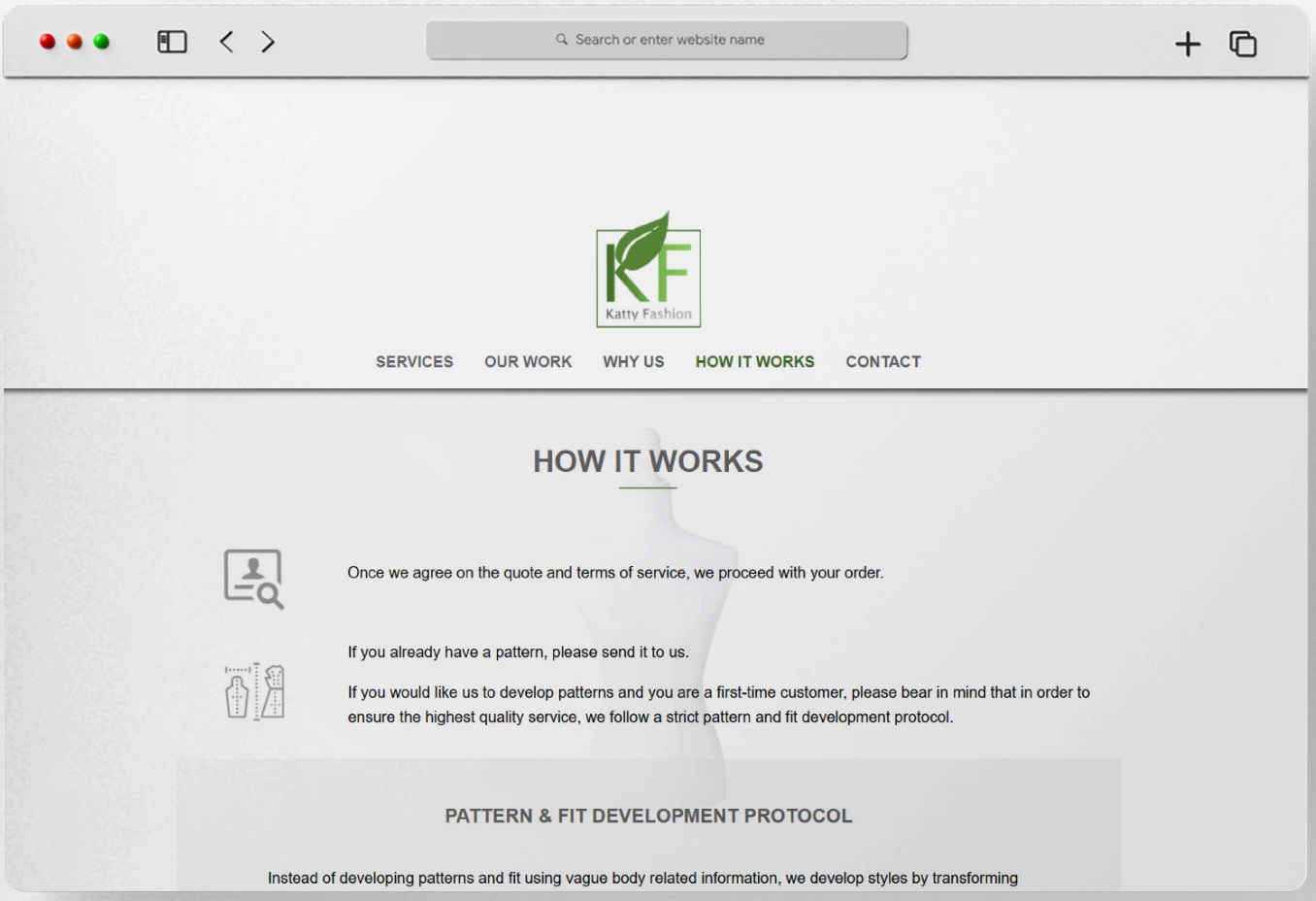
Why Us

As the **written information** provided is **valuable** for understanding the company's principles it would be ideal to **match the graphs** with the intention of the message to create an **impact on the user** without taking it for granted.



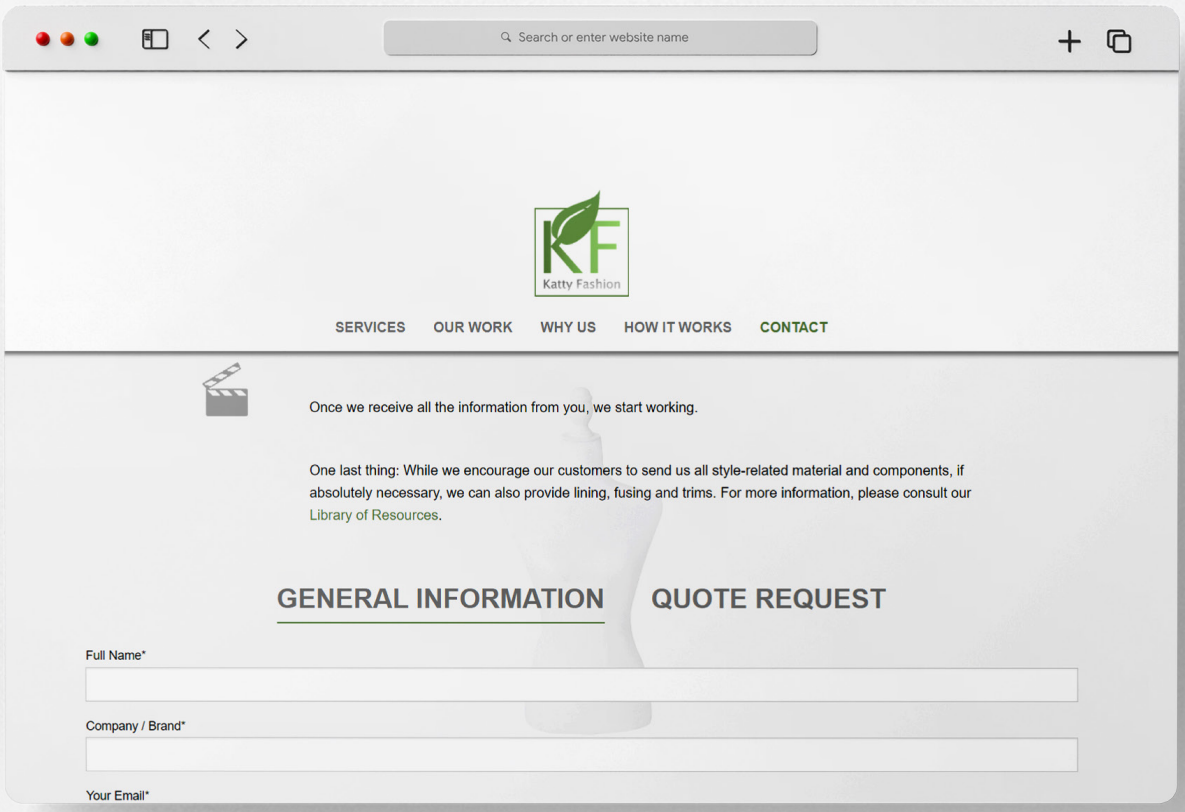
On the other hand **sustainability is one of the core values** of the company that is why it should be shown with **more emphasis** and not only in a paragraph.

3.2.1.1. Website Analysis



How it works

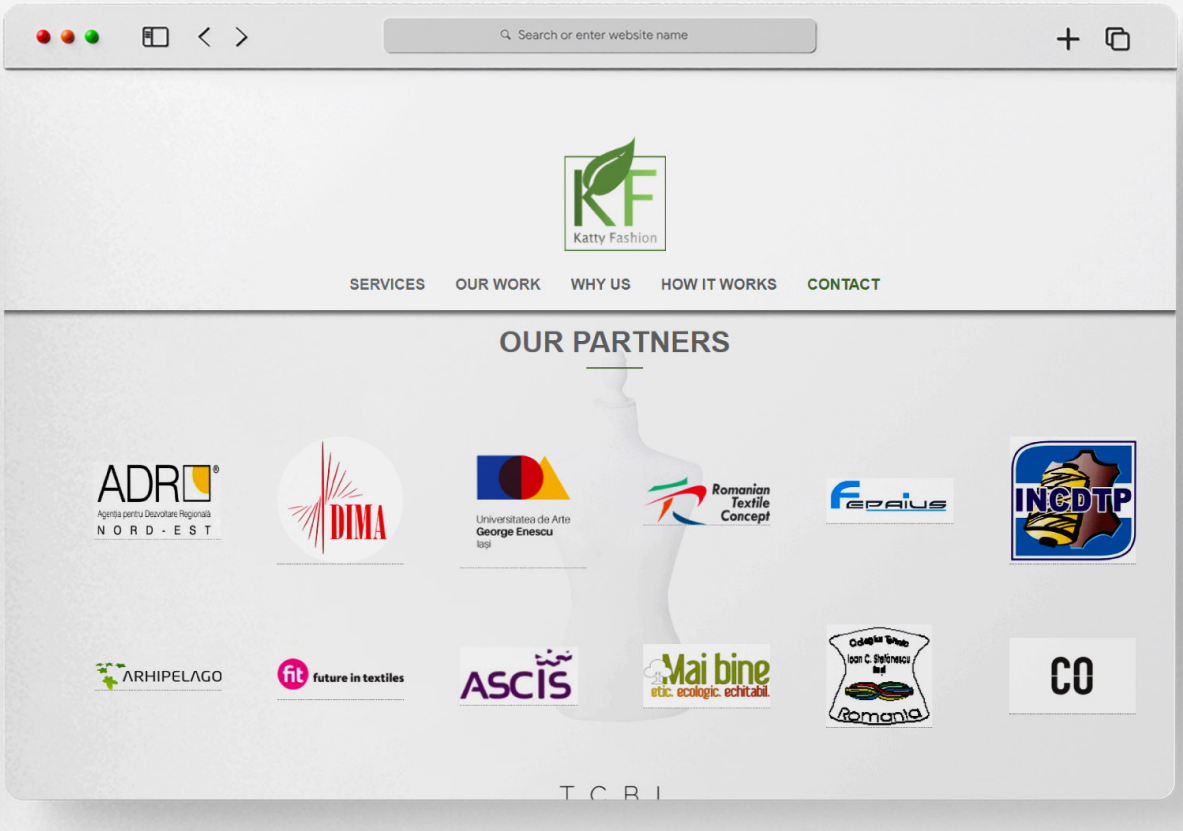
The message presented is very **similar to the types of services** provided, it would be better to **match both of the information** in one category.



Contact

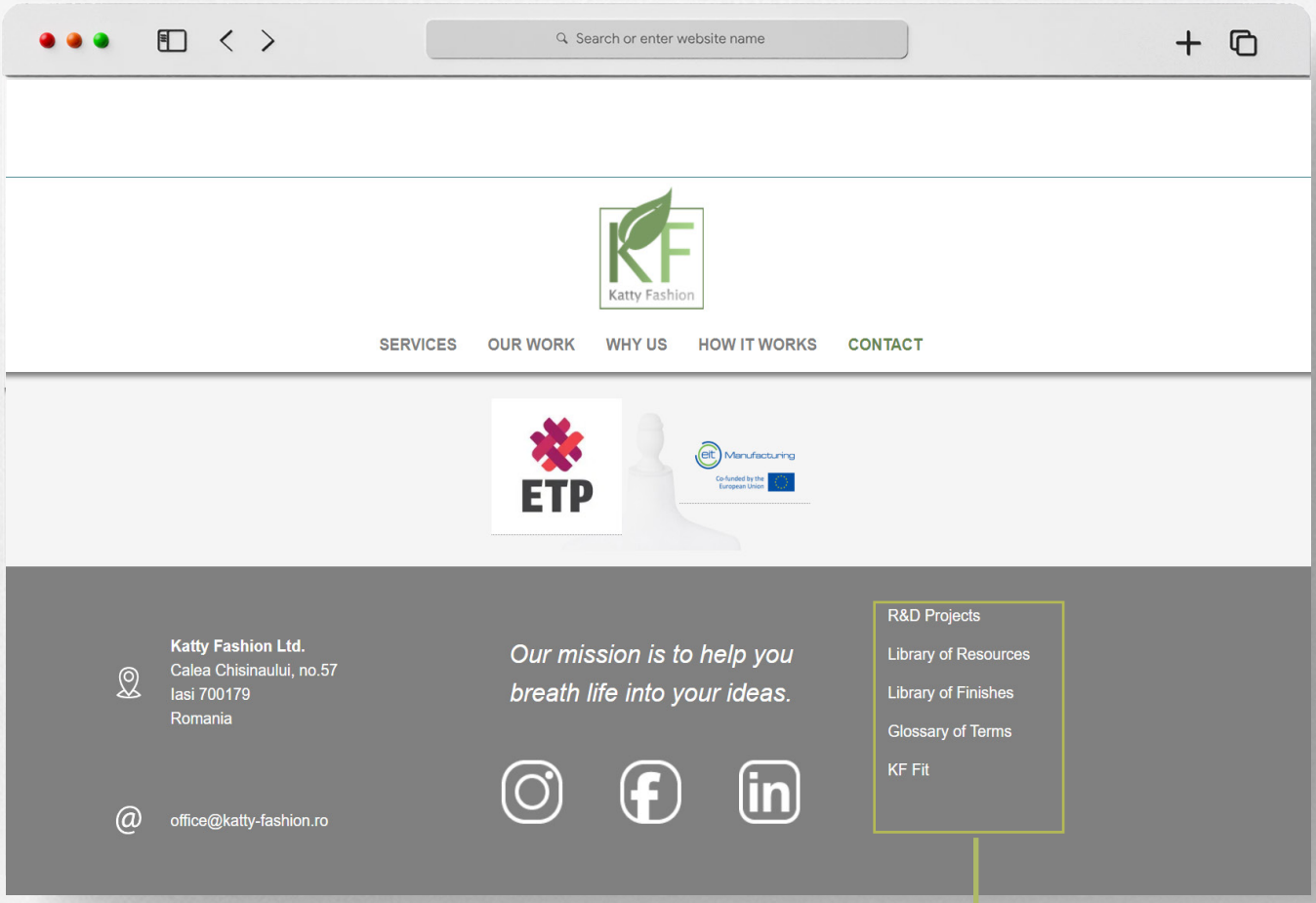
It Is correct that the contact is made **through two channels**, still the channel to request a budget is **very plain**, and this could make it **difficult** for a new client to ask for a service, it should be accompanied **with illustrations and CTA (call to action)** to promote the decision making that the contact is requiring.

3.2.1.1. Website Analysis



Our Partners

From a client perspective it is valuable that the company has worked with so many companies but if it is **relevant** for the company it would be efficient to share the **types of projects** that have been done with these partners.



Footer

This part should **not contain such relevant information as the project** that the company has developed, because it would be **key data** for a new client but here it is not perceived as important. **This part should only contain general contact information.**

3.3. The actors

After analyzing how the company communicates through its platforms, it is relevant to understand the different actors that Katty Fashion works with, to comprehend how the platforms could also impact and serve as a tool to connect them with the company and contribute by sharing their values, services and current projects.

The main actors inside the ecosystem of the company **are in Europe**, but the most relevant country is the **United Kingdom**, not only as **clients**, as it was the country that trained Caterina Ailiesei to be able to be the coordinator of product management, but also as **suppliers**; due to the **brexit,** they supply their material even if they are not produced in the country.

Suppliers

One of their a**chievements as a good practitioner** was having all of their suppliers come from inside Europe. All the accessories, linings and interlinings are from Romania.

How are they filtered?

- MOQ (Minimum Order Quantity)
- Term of delivery
- Price

Clients

The majority of the customers are from the United Kingdom, but also there are customers from Italy, France, Germany, Holland, and several Northern European nations, particularly for businesses with a strong sustainable **ETHOS**.

How are they filtered?

- The way they communicate
- The way they treat the team
- The prices

Having a sustainable **ETHOS** means that the values of the company are aligned with the way that they carry out their practices. In this particular example, the **ETHOS** is related to how they treat their employees, how they sell their clothes, the relationship they have with their clients, the prices that they offer and their commitment to introduce sustainable alternatives.

Associations

Part of the company's motivation comes from its collaborative work with associations and clusters that help with the **integration of innovation into their operations,** such as the following:

REGINNOVA NE is a non-profit organization dedicated to **innovation, technological transfer, human resources development, and community support** in the Romanian North-East Region, led by Caterina Ailiesei. Its mission is to create a structured environment for textile and clothing innovation and development.

The goals of this organization are:

- Establish creative and **dynamic value chains** in the North-East region with **cross-sectoral ties** at national and European level by valuing local innovation, sustainable natural resources, heritage, and experience.
- Accelerate the **shift from the unsustainable quick fashion** lohn-based model, which continues to dominate regional garment production, to more **profitable short-run**, private label, and mass-customization models.
- **Pique young people's interest** in working in local textile and garment businesses.
- **Deliver real answers** to local textile and garment sector social and environmental challenges.

The current projects are:

- **Welcome pack for new entrepreneurs**

Is a project based on an **Erasmus for Young Entrepreneurs is a cross-border exchange** program that allows young or prospective entrepreneurs to learn from experienced entrepreneurs in other Participating Countries who are running small firms.

- **TCBL | Textile & Clothing Business Labs***

is developing a multi-faceted business ecosystem comprising sector firms, **innovation labs**, service providers, and advisers to transform the Textiles and Clothing industry. The overarching goal is to **create alternate, cyclical, and long-term solutions** to overproduction and deteriorating value.

Reginnova NE (2019).

Some other associations that are currently working with Katty Fashion are:

European Technological Platform (ETP)

are industry-focused initiatives that provide interesting chances for international networking. Stakeholders collaborate to help define the future of European research. *(The Austrian Research Promotion Agency (FFG), n.d.).*

Future in textiles

is a creative Romanian fashion group, integrated by **textiles producers and designer associations**, that give a broader vision to create innovation inside the T&C sector, that also organizes events like Romanian Fashion Week. *(FIT21, n.d.)*

Universitatea Tehnică "Gheorghe Asachi", Iaşi DIMA and Universitatea de Arte "George Enescu", Iaşi

The collaboration with these universities is based on **research, validation and training by taking the role of a testing actor** that contributes with the transformation of the curriculum.
Their current strategies are:

- A **Demo Lab** to create a smart specialization for testing and validating.
- **Open Innovation Platform** to evaluate all the new methodologies.

The European Factories of the Future Research Association

is a non-profit, industry-led organization dedicated to the advancement of new and innovative manufacturing technology. Serves as the official representation of the business sector in the public-private collaboration "Factories of the Future" and, more recently, "the Made in Europe partnership".
EFFRA's main goal is supporting "pre-competitive research" on manufacturing technologies within the European Research Area by partnering with the European Commission. *(European Factories of the Future Research Association (EFFRA), n.d.)*

In addition, Katty Fashion is working with **other partners** focusing on collecting information and partners.

This partnership is targeting the introduction of **proper technologies** for the transformation to a seamless process, **virtual prototyping and collaborative designing.**

This initiative for the future of textiles inspired Caterina to enroll in an advanced manufacturing AT course, where she discovered that the appropriate infrastructure should integrate a **physical space with Internet of things** (IOT), which creates a layer between the physical factory and the digital level. Nevertheless, Caterina is dedicating all her efforts to promote a **balance between human abilities and technological tools.**

3.4. SWOT

After analyzing all of the information of the company, the SWOT was used as a **tool** to complement all of the **insights of the holistic diagnosis** that would facilitate the **integration of the qualities of the territory** and the **characteristics of the sector** to Katty **Fashion Fashion needs** based on their strengths.

Strengths

- **Understanding each of the roles** inside the productive process that take part in the **creation of a garment.**
- The company has only 50 employees and has strong values of **working as a community.**
- Involvement in many **circular initiatives** and interest **to continuing learning** about both circularity and sustainability.
- The **resilience** of the company helps them overcome the challenges inside the sector.
- The company is **aware of the gap** between the east and the western part of Europe and uses it as encouragement to become the **bridge between both.**
- **Flexible** processes linked to wide variety of garments offered, making the company **economically resilient.**

Weaknesses

- High dependency on the **clients requirements.**
- The **team is not completely conscious** of the importance of sustainability and circularity.
- Most of the **raw material** comes from other **countries in Europe**. And the fabric have a relevant envirnmental impact.
- Most of the people that take part in **practical work are getting old.** And there isn't interest from younger generations to do this work.
- **Absence of qualified workers** caused by the **deficit of courses** related to sustainability.
- **Environmental impact** of the **fibers** currently used.

Opportunities

- The company could **share all collected knowledge** about resilience and circularity to smaller companies in the territory.
- Katty fashion could become the **bridge between the west and eastern** part of Europe.
- They could **share their knowledge** about circularity and sustainability to their clients by **introducing** these aspects **inside their processes**.
- Improve the **ecological ETHOS** inside the team.
- **Use their role as a good practitioner** to share the knowledge to **introduce circularity** and sustainability inside the sector between the companies inside NE-Romania.

Threats

- The majority of their **clients are unaware of the long term benefits** that they could have with circularity.
- The **3D prototyping** softwares is **not completely aligned** with the methodologies of the practical work.
- **Non-existent technologies** to obtain a **thin fiber** from sustainable alternatives.
- **Lack of awareness** and encouragement in terms of the introduction of a circular economy.
- A **weak connection** between the private sector and academia.
- **Dependency** on the valorization and the efficient use of the resources.

The systemic approach

Introduction

While approaching a project there are two ways of addressing its structure, from a mechanistic perspective, based on each of the isolated parts that conform the project or from a holistic point of view, which considers its structure as whole, implementing systemic solutions to interconnect the actors, flows and operations of the context studied in this thesis (Battistoni, Giraldo Nohra & Barbero 2019).

As explained in the introduction of this study, the holistic diagnosis is based on six steps: 1. holistic diagnosis (HD), 2. the definition of problems and leverages for change, 3. the design of a system, 4. the study of the outcomes, 5. implementation and 6. the analysis of the results and feedback. Till this part the first step (HD) was being constructed based on literature review, historical review, news of the context, governmental and regional data and interviews (made with the CEO of Katty Fashion, Caterina Aliesei, and Gabriela Macoveiu a representative of the RDA), to later collect all the fundamental and raw data, which would lead to the creation of a broader view of the ecosystem in tables and gigamaps, to match and link all the data in a graphic way to visualize it and facilitate its interpretation.

Hence, this chapter will present the visual representation of the collected data in three gigamaps: 1. T&C sector, 2. the NE-RO and 3. Katty Fashion, for the creation of connections to disclose the challenges and opportunities of the existing ecosystem as leverage for change to later develop a new system.

4.1. Gigamaps

4.1.1. Textile and Clothing Sector

Wages in the fashion industry

Fashion brands are paying **less than the bare minimum** to have a dignified life.

Working hours

some companies make their employees work **more than the allowed quantity of hours.**

Health and safety conditions

unacceptable working conditions.

Child labour

in the fashion industry.

Social Impact

T&C Sector

Form of expression thorugh patterns, silhouettes and colors.

From the ancient Greece the thought of **reducing waste and cutting the fabrics** was really important.

Garments have become **not a basic need but social statement** that lead social division.

Fast Fashion

Creation of cheap and throw-away apparel that is

mass-produced in large quantities.

Fast-fashion manufacturers release **52 micro-collections** every year instead of the traditional two seasons.

Short-Life Fashion

design for material recovery.

Long-Life Fashion

Designing to Prolong Material Use.

Slow Fashion

Trends

The Stabilizers

The Settlers

The New Optimists

Employs

1,7 millons

generating a turnover of

EUR 166 billion

reported by the European Commission.

Transportation and distribution

Raw materials inside this industry are **imported.**

The processing

Transformation of materials into yarn, **dyeing** the fabric and creating the various textures and resistances.

Raw material production

Use of **fertilizer and pesticides** for the production of natural material.

Disposal

Must of them are **incinerated or dispose** with other types of waste.

Use

The most harmful practice is the washing process, where **microplastics and chemical substances are thrown to the water.**

Environmnetal Impact

'Made in the EU'

cannot be acknowledged as a legal designation of origin.

May not always reveal the complete story of your **clothing's origin.**

4.1.2. North East Romania

COVID Pandemic

Almost 20%
companies reduced the production.

15%
contracts were terminated.

- 40%
placed orders.

The demand retailers collapsed causing the delay of payments or the need of discounts from the producers.

Online shopping and working from home accelerated the digitisation of consumers' experiences and interactions.

"In 2020, about **30%** of companies have disappeared and the rest work at **30-50%** of capacity."

- Mihai Păsculescu

9,4%
Of the textile sector fell during 2019.

Geography

57% of the territory
is used for agriculture.

33%
is covered with forests.

Demography

The T&C sector

Strengths

- High-tech processes & applications (concept industry 4.0)
- Innovative materials.
- Digital fashion.
- Circular economy.

Weaknesses

- Big amount of waste resulting from the different manufacturing processes.
- Most of the raw material are imported and the accessories usually come from China or Turkey.
- The 90% of the products are exported.

Traditional activities

Pottery
Embroidery
Wood-work
Weaving
Home textiles
Musical instruments

Culture

Many of the ancient occupations are still alive and transmitted to younger generations throughout the Region.

4,3%
Roman Catholics

6,4%
Protestant Christians

81,9%
Orthodox Christians

Nort East Romania

Education

Iași is one of the most important education and research centres of the country, and accommodates over 60,000 students in 5 public universities.

8 Public Universities

4 Iași
1 Suceava
1 Bacău
1 Botoșani

Specializations on textiles

- Universitatea Tehnică "Gheorghe Asachi", Iași
- Universitatea de Arte "George Enescu", Iași
- University Of Bacau, Bacau

Economy

466.72 €
Monthly minimum wages

3,198,564
Population NE-RO

NE achieves its main economic results in Textiles, Food, Agriculture and Furniture industries.

6,33%
Construction

16,50%
Industry

37,70%
Services

39,45%
Agriculture

Wood exploitation and processing are one of the most relevant industries within the regional economic system.

Innovation

Companies with potential innovation

- Agro-food
- Textiles
- ICT
- Biotechnologies
- Environmental engineering
- Tourism.

The 2nd
with the most number of innovative companies

The 4th
regarding the number of patents requests

Clusters
contribute with the adoption of circular economy

Practices

- Feast of the Exaltation of the Holy Cross
- Decorating the eggs
- Christmas in Bucovina

Christianity is the largest faith, influencing most of their traditions.

4.1.3. Company Katty Fashion

Input

PES Polyester

14% 100% Silk

47% 100% Cotton

Hemp as a future project

6% 100% Viscosa

Productive process

Volume of prod.

Niche brand: small orders from 1 to 100.

Average in a month 2000 garments.

Clients

UK

Italy

France

Germany

Northern countries

specially most of the brands with sustainable ETHOS, Holland.

Suppliers

Italy

Holland

United Kingdom

Germany

All the accessories, linings and interlinings are from Romania.

Actors

Caterina Ailiesei

Katty Fashion

was created as a bridge to harmonise the communication and optimize the work flow.

Associations

Reginnova

fit

EFFRA

DIMA

Universitatea de Arte George Enescu Iași

Meșterul de idei

Working Areas

Offices and Receptions

Development Area

Warehouses

Production Area

Quality Check and Packaging Area

SALUBRIS SA
Redu
Minet S.A

Sleeping masks

Headbads

Shopping bags

Wallets

Napkins for restaurants.

Output

Team

Open communication and mutual respect.

50 Employees

Minimize the number of prototypes and waste

3D Prototyping

Software was unable to transmit the experience gained and learned via practical work.

Workware

Highly fashionable wear

Homeware

Sportswear

Women garments manufacturing

Line of products

4.2. The Challenges

After analyzing in a holistic way the T&C sector, immersed in the situations that Romania and particularly the North East region face, along with the experiences, projects and problematics of the company Katty Fashion, it is possible to match these aspects, to state the specific challenges which can be encountered with a systemic approach to articulate circular strategies.

Following this path, the reasoning about the challenges was done by levels. The first one is communication, related to the interconnections between the actors of the ecosystem; The second one is knowledge, making reference to the flows of information that contribute with resilience; Concluding with technologies, as the processes and tools that facilitate the implementation of the knowledge through connections.

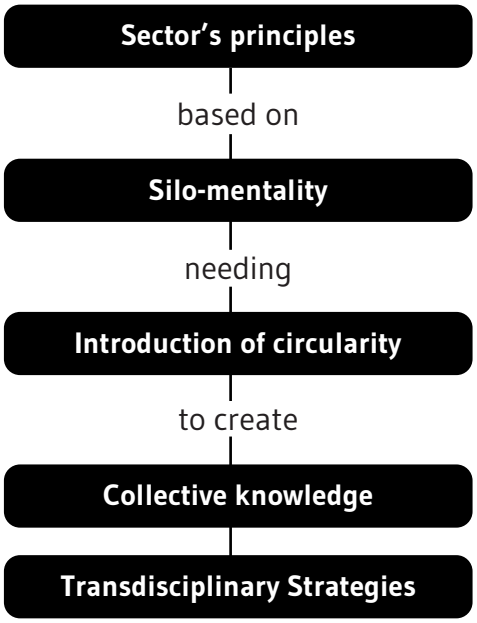
Internal and external communication

This level of the challenges came up from the analysis of the current channels of communication of the company and the disconnection between the actors of the T&C sector in the region, and also with other economic sectors.

Considering that **circularity** is a recent topic introduced in the NE-Region, it could be challenging for all of the actors to see the value of it, as it is a process that requires **lots of management and planning,** and inherently **depends on the ecosystem principals** that companies like Katty Fashion are part of. But based on the research, the most common perspective to deal with this aspect is **recycling**, which usually is the most basic way to approach it.
Consequently, it highlights the importance of **clear communication between the stakeholders** of the sector, as they could provide insights that could be **shared in a collaborative way,** as part of new strategies that could contribute to the **sustainable development of the sector, through more methods** than just recycling.

This was presented in the chapter of the holistic diagnosis of the territory where the dynamics of the T&C sector are studied from the situation of NE-RO region through the mapping made by Daniela Staicu,where she points out the way the interactions between the **stakeholders are based on a silo-mentality**, meaning that they have to **stop giving priority to an individual interest and creating a collective knowledge.**

Applying a broader perspective, this situation between different sectors is also causing a **lack of transdisciplinary strategies** to promote the growth of the territory. Through the analysis of the clusters that were created as a way to stimulate the cooperation between actors of the same sector, it was perceived that **none of them worked by matching the innovative solutions** of other sectors and the only one related to textile was focused on knitting, without including the other activities undergone in this sector. As a consequence, **the region is failing in creating a broader sense of community** and interconnectedness enabling their capacity to introduce innovation.



Challenges:

- The lack of channels to share the knowledge inside the T&C sector with different sectors in the territory.

- Lack of awareness of the actors part of the ecosystem, related to how to introduce circularity inside their processes

Knowledge

Being circularity a recent strategy known by a selected group, there aren't **sufficient channels to share all of the mechanisms** that imply introducing a sustainable transformation, for a responsable production and consumption. This includes the **knowledge based on the traditions** and the information shared through the complete **value chain** that are then transmitted to the final user.

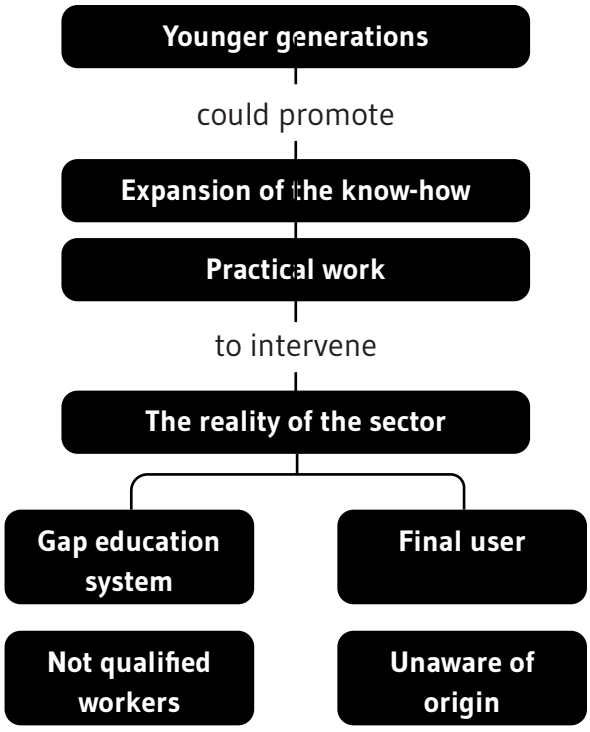
Reviewing this by layers, is evident that by studying the complete value chain, it is so complex that usually the **final user is unaware of many steps that the garment has to go through** to arrive to their hands, one of them is the lack of knowledge of the dynamics that are happening behind the simple **statement of a label with the message MADE IN.**

Following this perception of the situation and moving to the context of the **creation of the garment,** which is based on the techniques and how they are transferred to **promote the expansion of the know-how.** It was found that the ones attracted to this kind of knowledge, are the ones that are already experts on this field, showcasing that **younger generations are not keen on this type of practical work**, as it is part of a traditional labor.

Focusing on another layer that is affected by the reality faced by the context previously mentioned, is relevant to highlight that there are **younger generations** that are interested in **intervening the reality of the sector** related to the **environmental impact** and are coursing majors with hope of contributing with this transformation. However there is a **gap inside the education system**, that is determined by the **knowledge that is being discovered and the one that can be taught.** As a result, there are not **qualified workers** with a strong expertise to face the obstacles of the sector.

Challenges

- The final user is unaware of the process that goes behind the origin of their garment.
- Gap inside the education system, caused by the Insufficient courses related to sustainability issues faced by the T&C sector and as a consequence there aren't enough qualified workers with a strong expertise in this subject.
- Younger generations tend to give a poor recognition to the relevance of the practical based work.



Technologies

As it was acknowledged above, one of the significant impacts of the T&C Sector is related to the type of **raw material that enters the process,** its transformation and disposal. Even if Katty Fashion uses natural materials, it doesn't exclude the possibility of **impacting the environment** with other actions, such as the type pesticides used for their production, the quantity of water and energy required, pollution, massive deforestation and waste production. But moving into new materials could be really expensive and they are still part of **new technological discoveries,** putting at **risk the quality offered** by the company. Therefore, to solve this issue, there is a need to implement innovative technologies to diminish the damage caused.

One of the strategies to reduce the amount of fabric waste is the **introduction of 3D prototyping**, which simplifies the process of transferring the design of the pattern to the fabrics. Though Katty Fashion is trying to implement this kind of strategy, t**hese tools are non- adequate due to the gap between East pragmatic knowledge and western technologies,** as they are n**ot based on the real needs** and weren't created on the original conditions of production, due to the western part of Europe having more resources to develop technologies while the eastern part has a strong know-how on practical based- work. Making it **difficult to adapt the tools created on the west,** to the practices undergone on the east. As a result, it makes it difficult for Eastern companies to follow the **innovative development** proposed by the Western part of Europe.

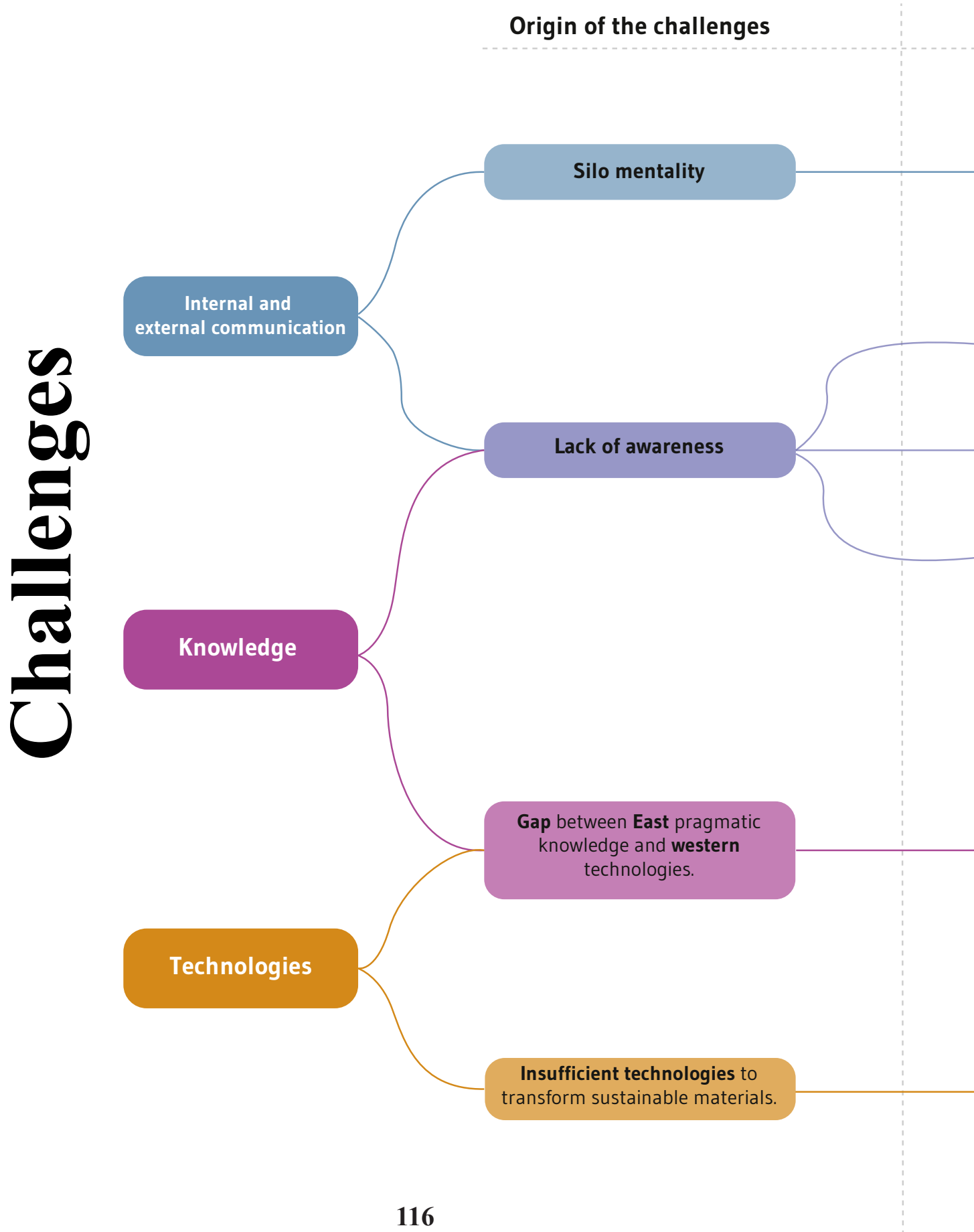
In addition, on the search for more **sustainable solutions**, Katty Fashion has started a project with the **hemp farmers** of the region to transform this **material into yarns**, but during this process another challenge was discovered, ones again, **the technologies were not up to the level of innovation** to create such a t**hin fiber to offer high quality garments**, constraining Katty Fashion to continue using the same type of fabrics.

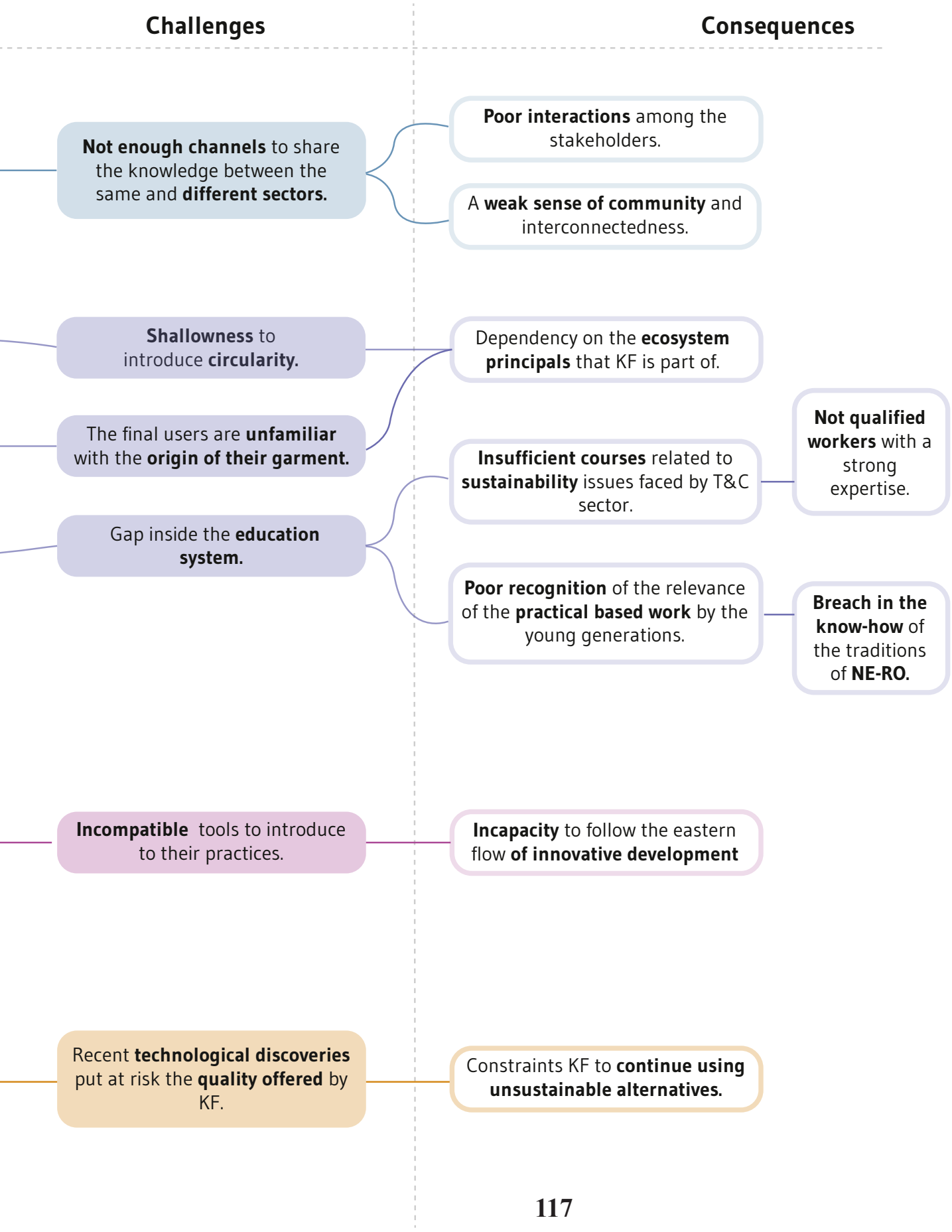
Challenges

- Due to the gap between east and western Europe the tools to introduce to their practices are not adequate to the needs of Katty Fashion, limiting them to continue using traditional processes.

- Insufficient technologies to transform sustainable materials into a thin fiber to create a high quality garment as a client's requirement, constraints the company to continue using unsustainable alternatives.

Challenges


Origin of the challenges
Silo mentality
Internal and external communication
Lack of awareness
Knowledge
Gap between East pragmatic knowledge and western technologies.
Technologies
Insufficient technologies to transform sustainable materials.


Challenges
Consequences
Not enough channels to share the knowledge between the same and different sectors.
Poor interactions among the stakeholders.
A weak sense of community and interconnectedness.
Shallowness to introduce circularity.
Dependency on the ecosystem principals that KF is part of.
The final users are unfamiliar with the origin of their garment.
Gap inside the education system.
Insufficient courses related to sustainability issues faced by T&C sector.
Not qualified workers with a strong expertise.
Poor recognition of the relevance of the practical based work by the young generations.
Breach in the know-how of the traditions of NE-RO.
Incompatible tools to introduce to their practices.
Incapacity to follow the eastern flow of innovative development
Recent technological discoveries put at risk the quality offered by KF.
Constraints KF to continue using unsustainable alternatives.

4.3. Case Studies

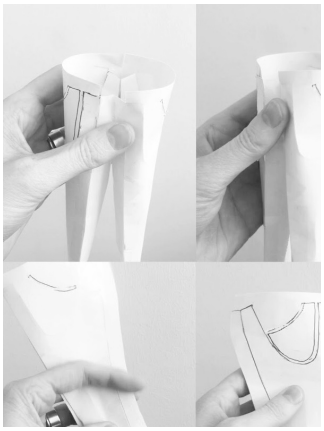
Subsequently, it is crucial to assess how these difficulties are being addressed and which ones could be developed based on the characteristics of the territory and what has been done to approach the actors that belong to the evaluated context, in order to facilitate their future implementation. A tool for addressing this type of task is the state of art by presenting several case studies that have been introduced in the current context with comparable goals to those outlined inside the problems listed previously.

The case studies were categorized in order to determine the type of strategy each used to achieve their goal.The categories given are: description to explain the project's structure in a direct way, type of approach utilized to include a systemic addressing of the project's problems, objective, insight gained from the project's analysis, and how it may be applied to the identified challenges.

Case Study	Description	Type of strate
Retrace Project *Horizon 2020 EU's Marie Skłodowska-Curie Innovative Training Networks* 	This project has underlined the importance of policy making to introduce circularity inside a territory, and in addition has presneted different cases of good practitioners of circularity and sustainability inside of Europe in order to facilitate the process for other companies.	Circularity
MA RA MI *Andra Clitan (1)* 	Romanian fashion brand created by Andra Clitan with a strong focus on culture and tradition that emerge with the intention of bringing to the present the culture of the Maramures and transforming it into high fashion.	Tradition
Zero Waste System Thinking : Multimorphic Textile Form *(Holly McQuillan) (2)* 	Research project focused on putting together design practices, sustainable fashion and zero waste to develop systems and methods for zero waste textile patterns.	Circularity

1)

2)



egy	Objective	Insight	Application for the thesis
	Present yje evaluation of some good practitioners of circularity inside Europe, to establish the key points that are still weak for the introduction of sustainability and circularity inside Europe.	The role of the textile sector and its responsability inside culture of creating models that allow, show and share more sustainable practices.	How the project could introduce sustainability models inside the dynamics of the sector inside NE-RO.
	Use an important part of the romanian tradition to create unique and valuable products.	Put togheter recent trends and tradition to bring to the present past dynamics that are still valuable for the territory.	How to make interesting the textile tradition of the territory for younger generations.
	Share a systemic approach of sustainable fashion and strategies for it application.	The importance of migration to digital practices mixed with the practical ones to reduce the waste inside fashion processes.	Ways of transforming the digital approach of the companies to the use of different tools and strategies.

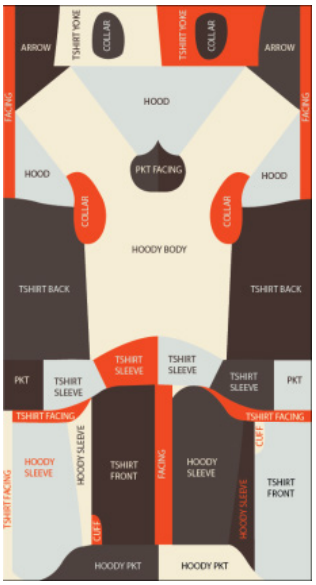
Case Studies

Case Study	Description	Type of stra
Make Use *(Holly McQuillan) (3)*	Open source system and workshop designed for users to learn how to modify their garments as they want, contributing with the reduction of clothes exaggerated production.	Education and Circularity
Twinset *(Holly McQuillan) (4)*	Three zero waste design patterns that show how to fit three different garments into one placement of the fabric.	Management and Circularity
Circular Design Guide *Ellen Macarthur Foundation and IDEO (5)*	A tool full of methods that facilitate the introduction of circularity inside design projects. The methods are categorized by: UNDERSTAND, DEFINE, MAKE, RELEASE AND ADVANCE, and they include topics like understanding the circular flows, how to define the challenges and opportunities, how to brainstorm, how to create the journey map of a product and how to select the materials.	Management and Circularity

3)

tegy	Objective	Insight	Application for the thesis
	Provide a tool for people to learn how to transform their clothes reducing the need to buy new clothes, that could increase the production and pollution caused by the sector.	The role of education and communication inside the transformation of the responsability that the T&C sector has in terms of sustainability.	Methodolies to implement inside the education plan for bringing new generations to the practical based work.
	Create methdologies and strategies to reduce the waste during the making of garments.	Strategies to reduce the waste during the pattern making of the garment.	Creation of strategies that are align with the needs of the flows of work but also with sustainability and efficiency.
	Facilitate the application of circularity through theory based knowledge brought into simple concepts.	How circularity could be communicated in a simple way.	Strategies to communicate in a better way how to introduce circularity and expand the knowledge learnt by Katty Fashion.

4)



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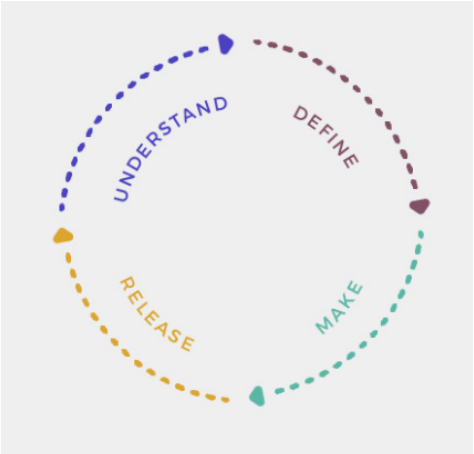


Case Studies

Case Study	Description	Type of strate
Sew-Cialising in west London *The Waste and Resources Action Programme* **(6)**	Workshops developed with the goal of teaching and sharing how clothes can easily be transformed, repaired or customized avoiding throwing them in the trash.	Education, Circularity and Community
Love Clothes *The Waste and Resources Action Programme* **(7)**	Campaign created in the UK to share awareness of the impact of the fashion industry and motivate the introduction of circularity inside peoples habits.	Circularity, Education and Communication
Closing the Loop *Price WaterHouse Cooper*	A tool to explain what a circular economy is and how it can be introduced in a company by presenting 70 corporate case studies and various tools as a response to an issue inside 7 different industries: textile, food, electronic, transportation, energy and public utility, construction and Cities of the future.	Circularity and Community
Chicfashic *Reflow Project (8)*	Start-up created with the intention of motivating the circularity inside the fashion sector, by facilitating the swaping, selling or renting of the clothes through a platform that connects people and encourages them to learn and share the benefits of second hand fashion.	Circularity and Community

6)

egy	Objective	Insight	Application for the thesis
	Transform the consumism inside London through putting together the community and share the knowledge that could support this transformation.	Initiatives that include the community to impact the consumption mentality	Methdologies that could allow people external to sector to know how trans-form their practices and understand the trasnfor-mation of the sector.
	Sensitize people about their realtion with cloths to motive sustainable fashion practices.	Educating through sesibilzation	Transfom the communica-tion of the company with the different actor about circularity.
	Present the evaluation of some good practitioners of circularity inside Europe, to establish the ke points that are still weak for the introduction of sustainability and circularity inside Europe.	The role of the textile sector and its responsability inside culture of creating models that allow, show and share more sustainable practices.	How the project could introduce sustainability models inside the dynamics of the sector inside NE-RO.
	Create a channel that allows people to introuce sustainability inside their practices in an easy way.	Sustainable trends and strategies inside the sector.	Methodlogies that bring together the education system, the community and the T&C sector.

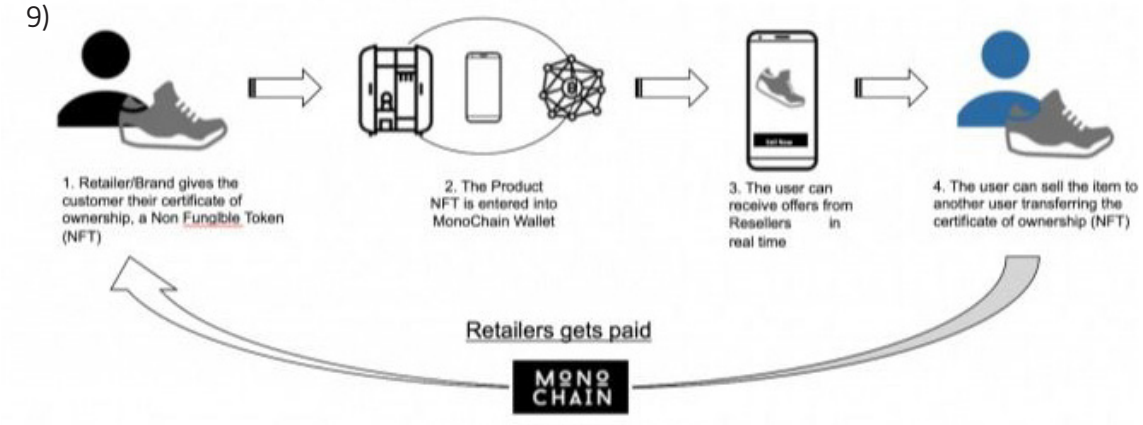
7)

8)

Case Studies

Case Study	Description	Type of st
Mono Chain *Ellen Macarthur Foundation* **(9)**	Blockchain application to connect primary and secondary markets to manage the textile waste problem by facilitating opportunities to reuse by reselling the products with the goal of extending the product life cycles and changing the consumers behavior.	Management and Circularity
Chisty Dawn (10)	This brand is ethically and sustainably comitted to their production, that is why their creators introduced a collection/canpaign called Farm to closet that consist on selling not a product but a peace of land, where the natural material for the creation of their chlothes is being produced. In this way consumers could buy the real material, and the commitment with the garmen that they are buying. Also these would contribute with the maintenance of the land and its hervesters.	Education, Circulariry and Community
Deadstock Collection *(Christy Dawn)* *(11)*	This collection is made with recovered fabric as a result all of the pieces are limited collection.	Circularity

9)



rategy	Objective	Insight	Application for the thesis
	Create a channel that facilitates all the actors inside the sector to take responsability of the products including the buyer.	Methodologies to include the final clients inside the circularity perspective.	Mechanisms that Katty Fashion could propose as an added value to their clients and their clients to idenitify circularity as a benefit inside the value chain.
	Create a connection between the consumers and the complete life of the product they are buying, while creating commitment and spreading awareness of the prodcees of production and harvesting.	Link the consumers with the process.	Their clients could be link to the process of the territory.
	Creating unique garments by reducing the impact made by the fashion industry.	Strategies for circularity inside the industry	The company could use recovered fabrics collected inside the cluster or any other organization and it could be used during the labs in collaboration with universities to create unique pieces.

10)

11)

4.4. Opportunities

With the insights gained in the analysis of the state of the art, it was possible to structure achievable responses that could intervene in the current situation of NE-RO found through the holistic diagnosis and other tools of investigation.

Having in mind the challenges explained in the previous chapter, these are the potentialities proposed in this thesis.

Internal and external communication

Challenge I

The lack of channels to share the knowledge inside the T&C sector and with different sectors in the territory.

Opportunity I

- **Implementation of an interdisciplinary cluster of co-creation.**

Considering that the territory wants to promote **active collaboration** within the actors inside the same sector through the existing clusters. Integrating the methodology proposed on the project **"closing the loop"**, (presented as a case study), that suggests the cooperation between sectors by introducing the **output of one, as an input of another** to give answer to the challenges they are facing, could boost the intentions of the cluster by creating new connections. That is why, **the aim of this opportunity is bringing together the sectors to cooperate.**

Starting from the obstacles that Katty Fashion is facing as a garment producer, such us the the **incompatibility between the technologies and their practices**, showcases the need of technologies created under the real conditions of production of the company, making evident that **working in a cooperative way** with the I**CT sector** could contribute to the innovation inside the **T&C sector,** as it has an important role related to the know-how of textiles as well as the **development of new technologies that belong to the territory.**

Another obstacle is the **incapability of changing the fabrics to the ones made with sustainable materials,** as they put at risk the quality offered by katty fashion in their garments. Because as it was previously mentioned, the technologies are **not that advanced** to produce the **same conditions** on yarn to give the fabric the same characteristics from the ones imposed by fashion trends and consumerism. That is why, to use the resources offered by the territory along with the technologies developed in it, it is indispensable the participation of the **agricultural sector in collaboration with the ICT and T&C sector.**

Challenge II

Lack of awareness of the actors part of the ecosystem, related to how to introduce circularity inside their processes.

Opportunity I

Introduce a channel of cooperation to help rise the companies of the T&C sector.

Following one of the strategies proposed by the systemic design which is **cooperation,** this activity promotes the i**nterconnection between companies** of the same sector, to stimulate an **horizontal communication** for the exchange of observations and ways to comprehend and resolve the issues faced by the actors, inside an **agenda of cooperation** that will bring **resilience** to the companies, as well as to the economy of the territory.

Opportunity II

Participation of locals interested in learning about tools to introduce circularity in their day to day life.

Consequently, with the goal of the previous activities to bring **circular strategies** to the actors in all of the levels, c**onsumers also play an important role.** That is why, there is an opportunity to share the **insights gained from the agenda of cooperation** with the goal of extending the efforts of the company to be more sustainable while **educating consumers** on how the sector is evolving **towards sustainable development.**

Opportunity III

Interconnectedness through KF platforms

On the same level of communication, Katty fashion has the **responsibility** to share their **unique knowledge as a good practitioner**, as they have applied circular practices inside their processes. Therefore Katty Fashion should become a **mentor** to give guidance to actors of the sector on how to continue that line of sustainable development, mentioned above.

But this communication does not exclude the role of clients and suppliers, on how they are approaching the practices related to the sector. For this reason, the **redesign of the website as a circular tool** is an effective strategy to invite new actors to learn about this type of knowledge.

Knowledge

Challenge III

The final user is unaware of the process that goes behind the origin of their garment.

Opportunity I

Responsability extension through the ownership given by the label.

As the **final user** is usually **unconcerned** of the majority of the steps of the **value chain** and Katty Fashion works as a Third party producer, the flow of information related to the origin and processes of the garment is disrupted, as the **intermediary company** is the one that has the **direct channel** of communication with the final user, which end up having **a non existent sense of ownership.**

Taking into account the case study **"MonoChain",** that aims to introduce an **ownership strategy** to involve the final user much more than just being a consumer. Hence, to achieve a similar objective, **labels** could be used as a s**tatement to extend the responsibility of owning a sustainable garment**, which has an origin and a life of use. Consequently, users will create a **sense of belonging with their clothes**, which could **reduce the possibility of throwing away** garments without thinking of other solutions.

Challenge IV

Gap inside the education system, caused by the Insufficient courses related to sustainability issues faced by the T&C sector and younger generations tend to give a poor recognition to the relevance of the practical based work.

Opportunity I

Creation of labs and workshops to involve younger generations.

Based on current trends of consumption that motivate more **circular practices,** some of the case studies highlight the importance of s**ocial awareness and cooperation**, for the transformation of the **habits of consumption.** It was perceived that people need to take part in an active way in the activities that share easy and accessible strategies that **diminish the impact** made by the **unconcerned ownership of clothes.**

Through these activities the basis of the T&C **traditions take an important role** as an easy tool and interesting way of **developing abilities** related to the **transformation and processing of clothes.** That is how current strategies could be brought to different areas of knowledge, that mark the roots of common habits. One of these areas is **education**, as it prepares professionals to become **future workers** that would be able to understand the **value of knowledge inside the traditions of the territory.**

Therefore, activities like **labs and workshops that connect universities with companies** are necessary to achieve the aspects mentioned before. While positioning these interactions on **real life situations** gained by the experience of the companies, **the gap between the reality and what is being thought** is going to be reduced. And this could be approached in a circular way by **reintroducing the output** created by the companies during their processes, as the input for the development of these labs.

Technologies

Challenge V

The materials currently used have a relevant environmental impact, but moving into new materials could be really expensive and they are still part of new technological discoveries putting at risk the quality offered by the company.

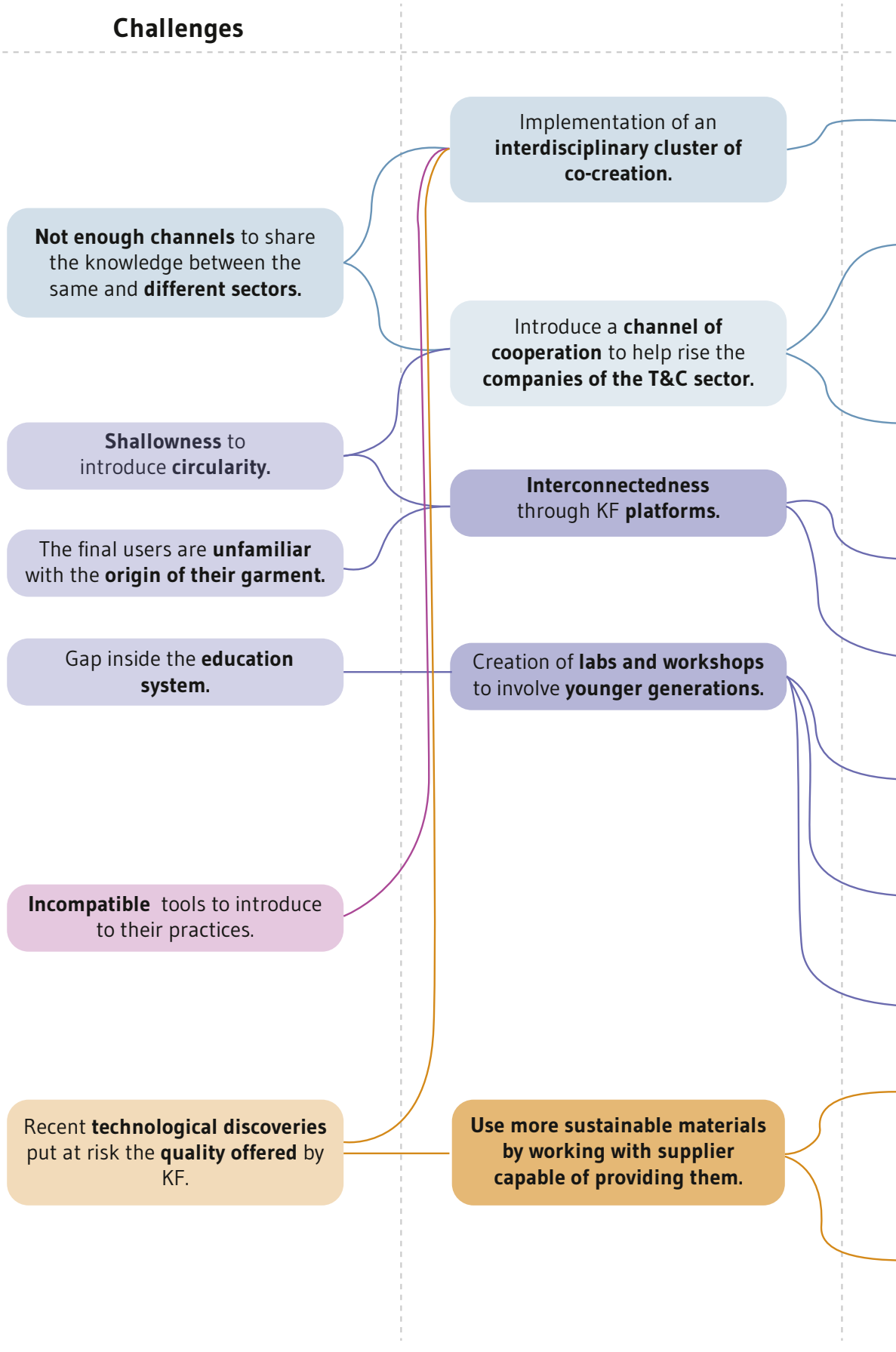
Opportunity I

Use more sustainable materials by working with suppliers capable of providing them.

By considering the inputs as a key aspect for a sustainable addressing of a problem, **fabrics become a crucial element for a significant transformation.** One way to address this issue is by using **natural materials** and if they are already part of the process, a deeper analysis should be made to **understand if the processes** that these materials undergo are **hazardous or not.** But, as seen on this research, the company only uses one **synthetic fabric** and the other ones, even if they **are natural, impact in some way. Thus, a material that can provide better characteristics is necessary.**

With the help of the holistic diagnosis, it was found that there is a possibility to introduce a material that is created with a **raw material abundantly present in the territor**y, such as **beech wood** for the production of **Lyocell,** a rayon material based on the cellulose of wood. Likewise, the impact of the use of such a harmful material like **polyester** could be diminished by **swapping to the recycled one.**

Opportunities



Opportunities

Integration of ICT and agriculture sectors to create broader strategies.

Use the participation of the **agricultural sector** to explore the **insights** gained via **international partneships.**

Take advantage of the **growth of the ICT** sector to match the needs of the T&C and the **possible interventions.**

Create an **agenda** to stimulate a **cooperative feedback** between the companies.

Participation of locals interested in learning about tools to **introduce circularity in their day to day life.**

Redesign of the **website as a circular tool** to share KF knowledge.

Responsability extension through the **ownership** given by the label.

Reinforcement of the traditions through practical work.

Utilize the **outputs** as the base material **for the courses.**

Place the practices inside **current challenges of the T&C sector.**

Work with suppliers that produced **recycled polyester.**

Use the **abundant wood of** the territory as the **raw material** for the creation of a **sustainable fabric like Lyocell.**

4.5. Multicriteria Analysis

Taking into account **the systemic design principles** (Outputs-Inputs, relationships, autopoiesis, act locally and human centered design) it's possible to evaluate the opportunities and select them based on a score and depending on **how they support these five principles**. Having in mind the identity of this project, some of the principles were considered from a specific perspective.

- Flows and resources (Outputs-Inputs)
- Relationships
- Resilience (Autopoiesis)
- Act locally
- Human centered design

The **evaluation** was made from 1 to 5, 5 being the highest score and 1 the lowest. After scoring them, the opportunities selected to be developed in a proposal are the ones that got **more than 20 points.** But from a systemic perspective, integrating the other ones could **support the development of the main ones.**

1. Implementation of an interdisciplinary cluster of co-creation.

a. Integration of ICT and agriculture sectors to create broader strategies.

- Flows and resources (Outputs-Inputs): Continuous **flow of insights** and **shared resources** from the various sectors.
- Relationships: Consolidation of s**tronger relationships in NE-RO** to create innovation.
- Resilience (Autopoiesis) :The functioning of the cluster depends on the **commitment of the actors** that will be strengthened as results become evident.
- Act locally: Motivates the creation of **local strategies** proposed by **local actors.**
- Human centered design: Strategies that truly **match the needs of the T & C sector in NE-RO.**

2. Introduce a channel of cooperation to help rise the companies of the T&C sector.

a. Create an agenda to stimulate cooperative feedback between the companies.

- Flows and resources (Outputs-Inputs): Continuous **flow of insights** and shared resources from the different companies.
- Relationships: **Constitution of a team** that shares a flow of information that contributes to the development of NE-RO.

- Resilience (Autopoiesis): As all the actors can **benefit from this share of information,** they will contribute to the resilience of a community.

- Act locally: **Local connections** that reinforce a **sense of community.**

- Human centered design: This **interconnectedness** facilitates the **improvement** of the services provided.

b. Participation of locals interested in learning about tools to introduce circularity in their day to day life.

-
- Flows and resources (Outputs-Inputs): By **Upcycling used garments** there is a possibility of a drop in purchase of new garments.

- Relationships: New connections between t**he locals and KF.**

- Resilience (Autopoiesis): Without the locals' interest and an **additional effort** from KF, this proposal couldn't work.

- Act locally: The presence KF as a **spokesman,** contributes with the **introduction of sustainable practices** in NE-RO.

- Human centered design: It is focused on the **transition of the consumption trends.**

3. Interconnectedness through KF platforms.

a. Redesign of the website as a circular tool to share KF knowledge.

- Flows and resources (Outputs-Inputs): The flow of information provided by t**he company improves and has a bigger influence.**

- Relationships: By having **assertive communication** the relationships with new actors could improve.

- Resilience (Autopoiesis):Having a clear communication will make KF a more stable company with **continuous feedback to improve their practices.**

- Act locally: Is focused on a **broader communication channel.**

- Human centered design: Facilitates the **diffusion of their objectives and services of KF**

b. Responsability extension through the ownership given by the label.

- Flows and resources (Outputs-Inputs) :The information improves as it communicates the origin of the garment but **it only works in one direction.**

- Relationships: Creation of a **relation** between the **producer and the final user.**

- Resilience (Autopoiesis): Does Not apply.

- Act locally: Is based on r**epresenting the territory of the other European countries.**

- Human centered design: It gives **value** to the **handmade work done by NE-RO** locals.

4. Creation of labs and workshops to involve younger generations.

a. Utilize the outputs as the base material for the courses.

- Flows and resources (Outputs-Inputs): Using in an effective way the **output** by **reintroducing them to create new products.**

- Relationships: Even if this opportunity is based in creating a new relationship, **this activity is focused on the introduction of the outputs.**

- Resilience: (Autopoiesis) **Without the outputs** of the company, this proposal **wouldn't work.**

- Act locally: Is based on the **effective local use of the waste generated by KT.**

- Human centered design: by using recycled materials, KF gives the space to **younger generations to learn the importance of practical based work.**

b. Reinforcement of the traditions through practical work.

- Flows and resources (Outputs-Input): The flow is related to the **knowledge shared** with the scope of reactivating the flow of inputs and outputs.

- Relationships: Creates a **new meaning** in the actual relationship of younger generations with **practical work** done by older generations.

- Resilience (Autopoiesis): It contributes with the **resilience of the traditions** of the territory.

- Act locally: The main goal is to **strengthen the local traditions.**

- Human centered design: **Give value to local people** and the know-how of their **traditions.**

c. Place the practices inside current challenges of the T&C sector.

- Flows and resources (Outputs-Inputs): It is only focused in the introduction of practices **based on real situations.**

- Relationships: Even if this opportunity is based in creating a new relationship, this activity is **focused on the flow of information.**

- Resilience (Autopoiesis): Younger generation will be prepared to face **actual challenges,** by entering work life as **qualified employees.**

- Act locally: Teaching younger generations of NE- RO how to f**ace current challenges using circularity.**

- Human centered design: Teaching younger generations how to **overcome** the **challenges** that they will face in their work life.

5. Use more sustainable materials by working with suppliers capable of providing them.

a. Work with suppliers that produced recycled polyester.

- Flows and resources (Outputs-Inputs): **Introduction** of a more **sustainable alternative** for polyester.
- Relationships: Consolidation of new **relationships with circular suppliers.**
- Resilience (Autopoiesis): They are **adapting** to more circular alternatives but there is still a step back from using a **sustainable material.**
- Act locally: **Depend on external resources and technologies.**
- Human centered design: The environmental **impact of the garments** is reduce but not completely resolved.

b. Use the abundant wood of the territory as the raw material for the creation of a sustainable fabric like Lyocell.

-
- Flows and resources (Outputs-Inputs): Use the resources of NE- RO to **produce** a **sustainable alternative.**
- Relationships: This activity is possible thanks to the **relationships with other sectors.**
- Resilience (Autopoiesis): It contributes with the **capability** of the territory of **creating** their **own technologies and materials.**
- Act locally: Initially the work will be **based** on the work made inside **Austria with Lyocell.**
- Human centered design: Creation of **employment** and the **decrease** of the **environmental impact** of the garments.

Opportunities	Action	Flows and resources	Relationships
Implementation of an **interdisciplinary cluster of co-creation.**	**Integration** of ITC and agriculture sectors to create broader strategies.		
Introduce a **channel of cooperation** to help raise the **companies of the T&C sector.**	**Participation of locals** interested in learning about tools to **introduce circularity in their day to day life.**		
	Create an **agenda** to stimulate a **cooperative feedback** between the companies.		
Interconnectedness through KF **platforms.**	Redesign of the **website as a circular tool** to share KF knowledge.		
	Responsability extension through the **ownership** given by the label.		

Multicriteria Analysis

Resilience	Act Locally	Human centered Design	Score
			23
			17
			24
			20
			15

Opportunities	Action	Flows and resources	Relationships
Creation of **labs and workshops** to involve **younger generations.**	Utilize the **outputs** as the base material **for the courses.**		
	Reinforcement of the traditions through practical work.		
	Place the practices inside **current challenges of the T&C sector.**		
Use more sustainable materials by working with supplier capable of providing them.	**Work** with suppliers that produced **recycled polyester.**		
	Use the **abundant wood of** the territory as the **raw material** for the creation of a **sustainable fabric like Lyocell.**		

Multicriteria Analysis

Resilience	Act Locally	Human centered Design	Score
			15
			21
			20
			16
			23

Systemic Project

proposals

Introduction

Arriving at the final stage of the project and having almost completed all the systemic design steps mentioned in the previous chapter, the opportunities required an argumentation and planning of the activities that integrate them, to make each of the systemic proposals achievable and feasible. Then, it is possible to make a **new system**, bringing new actors to collaborate together in new activities, to later assess the project by **studying the outcomes** from a qualitative and quantitative evaluation, its **timeframe** and identifying the **project scales.**
Politecnico di Torino [Systemic Design Lab]. (2021, May 4). Systemic Design - Unit 4: Systemic Project [Video]. YouTube.

5.1. Proposals

5.1.1. Interconnectedness through KF platforms

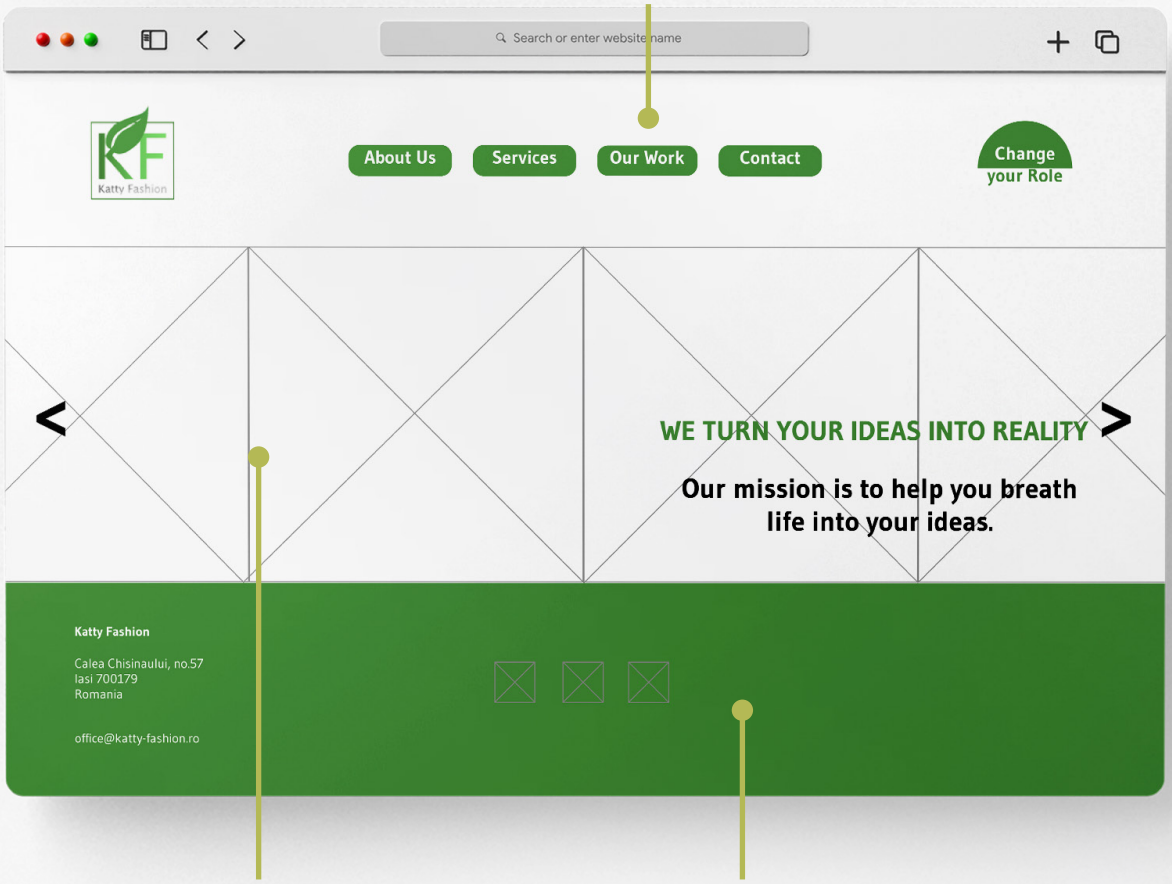
As it was illustrated above, **the channels** that the company uses to be present in the market and to attract new actors to their business, are usually their **website and facebook page, along with the participation on activities and projects.**

This communication highlights the i**mportance for the company to be clear about their values,** the type of services they offer, and what makes them special. But, as the analysis presented on the chapter of Katty Fashion shows, the company could improve their communication by **modifying the website pag**e.

The **proposals** of the changes are presented as a wireframe for each page in the images below.

Homepage

The header is integrated by five main categories to divide the information in a clearer way.



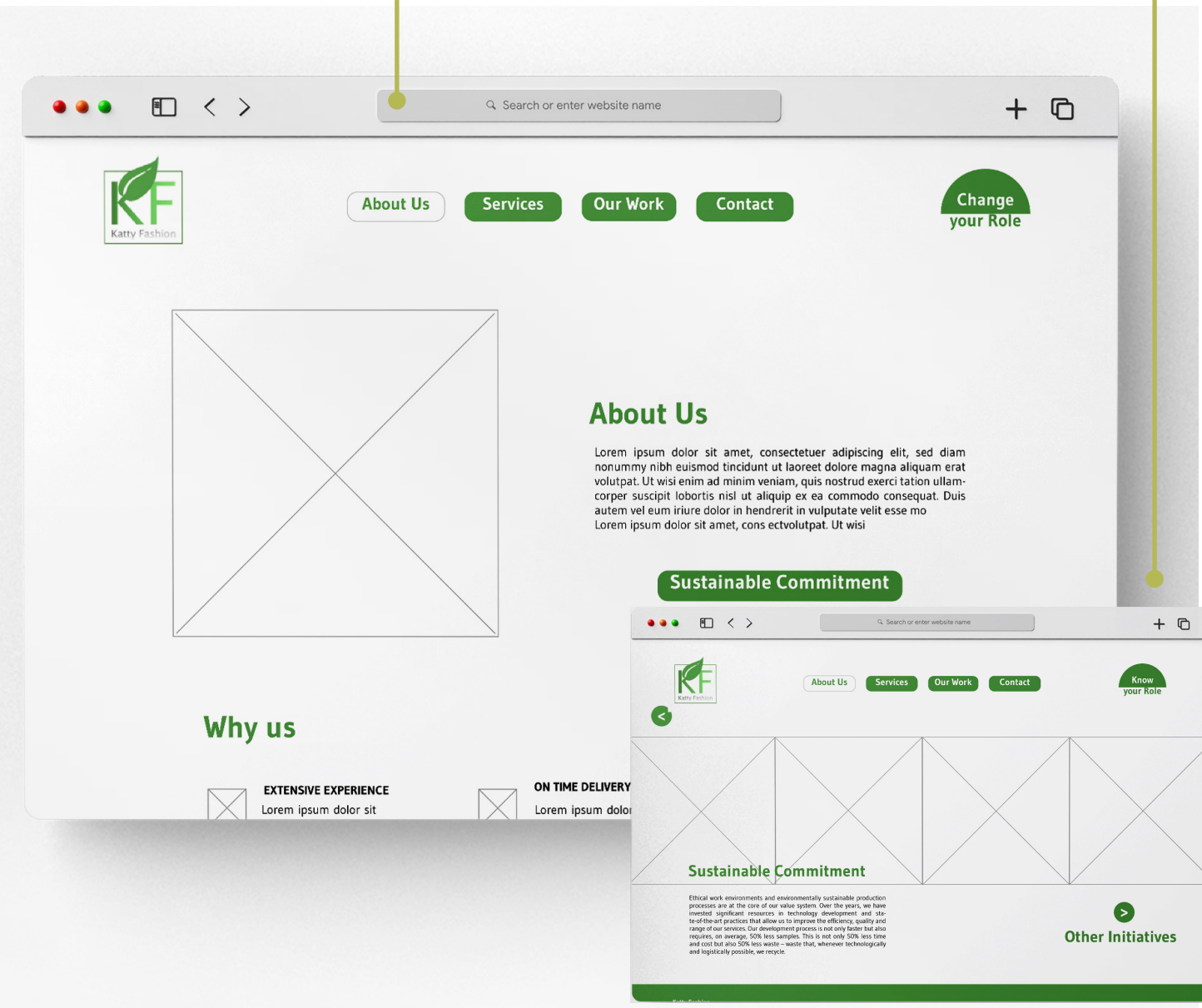
For the company it is important to create a **good first impression** by d**isplaying some images** of the work they have done with a **catchy phrase** and a slogan.

The footer should have basic information about how to **contact the company and where they are located.**

About us

This category is used to present the company with more **specific content** that could contribute to attracting new clients. With a brief description of what the company is, and some key aspects of the functioning of it.

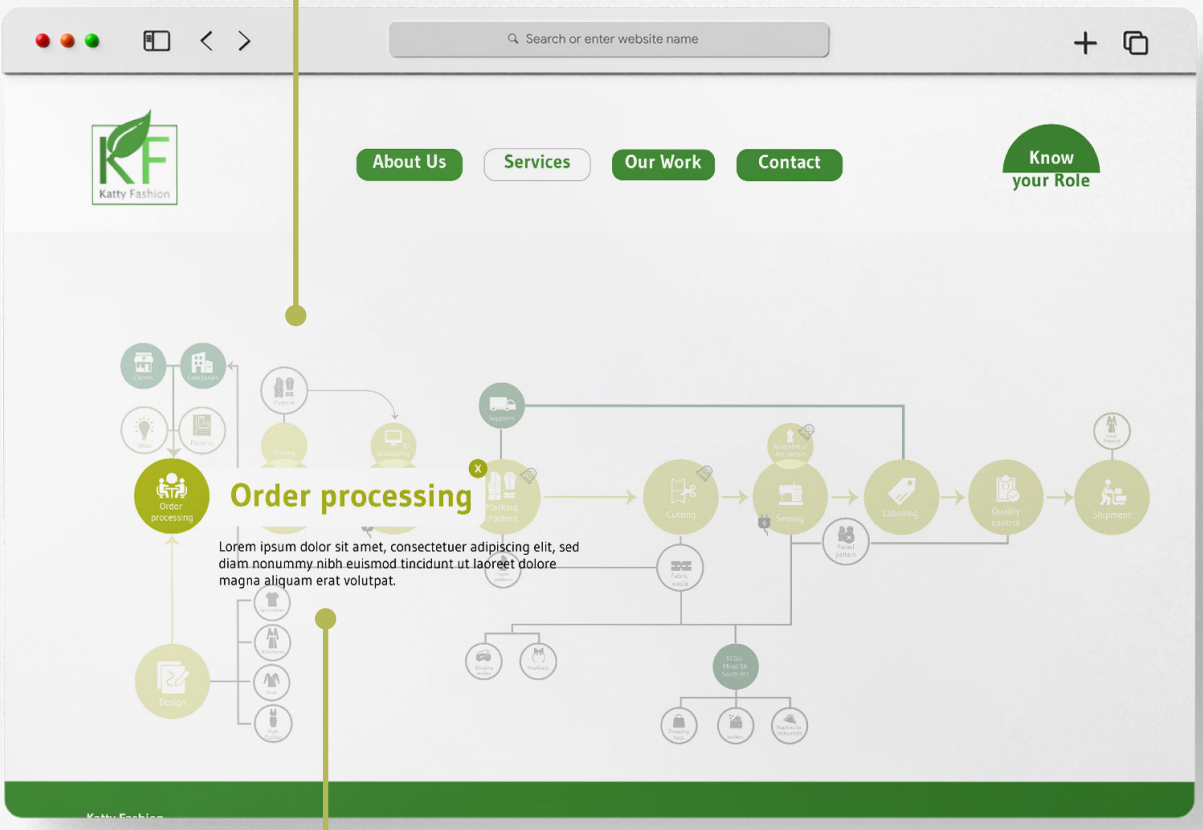
With the additional page of **"Sustainable commitment"** the company can create a statement by sharing in clear aspects of their functioning that are related to **more sustainable practices and their current initiatives.**



Services

The **productive process** serves as a **tool to share information** on how the client can take a role since the beginning of the process, by deciding either if they want to provide the design, want to cocreate or want the company to make it.

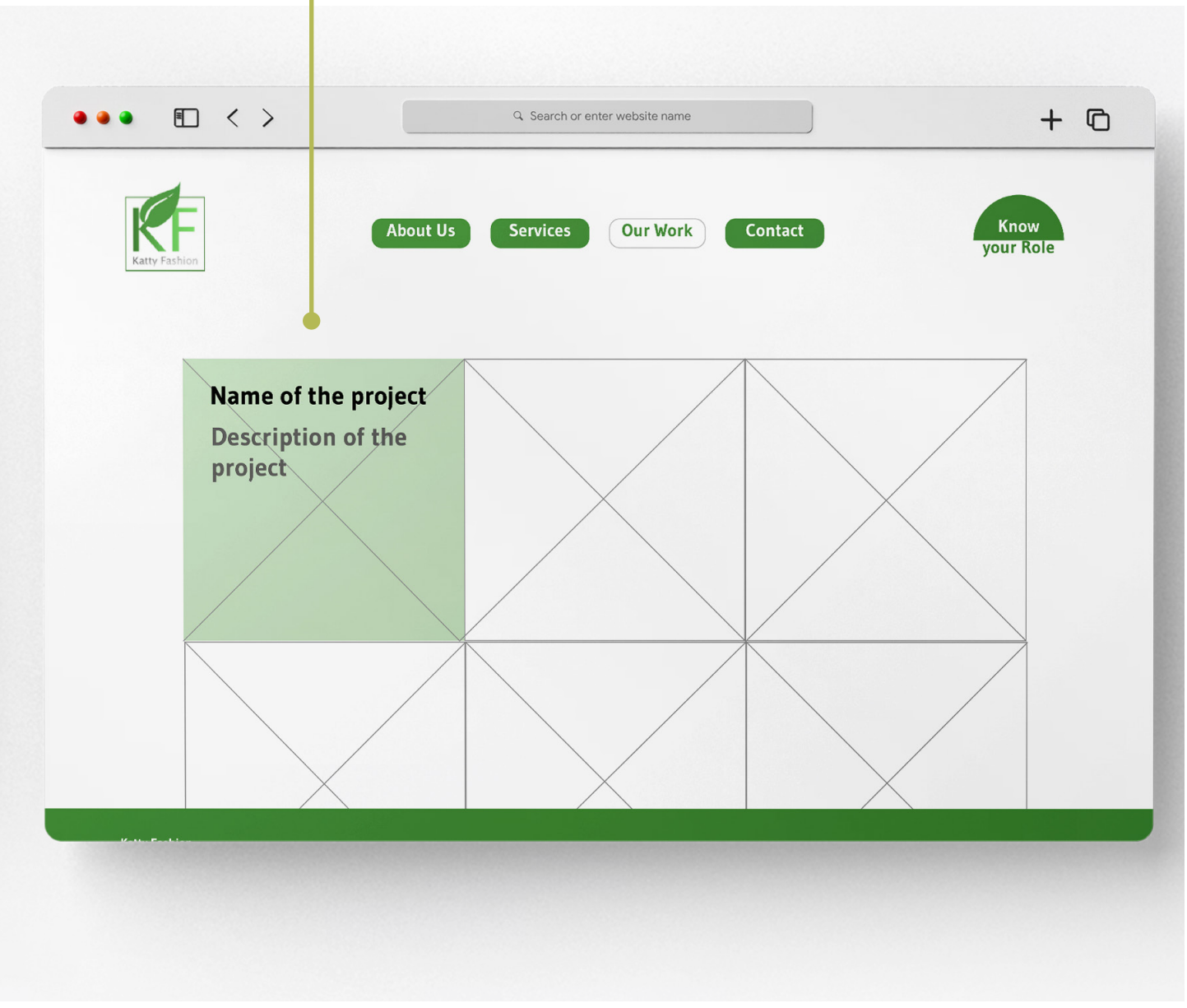
Also, this category helps to share the **type of suppliers** they work with, the type of **material** they use and the type of **final products** they create, along with **specific aspects of the productive process that support the values of the company,** such as the treatment of the waste and the internal innovations that they are developing.



This information can be **visualized by clicking** on the different parts of the process.

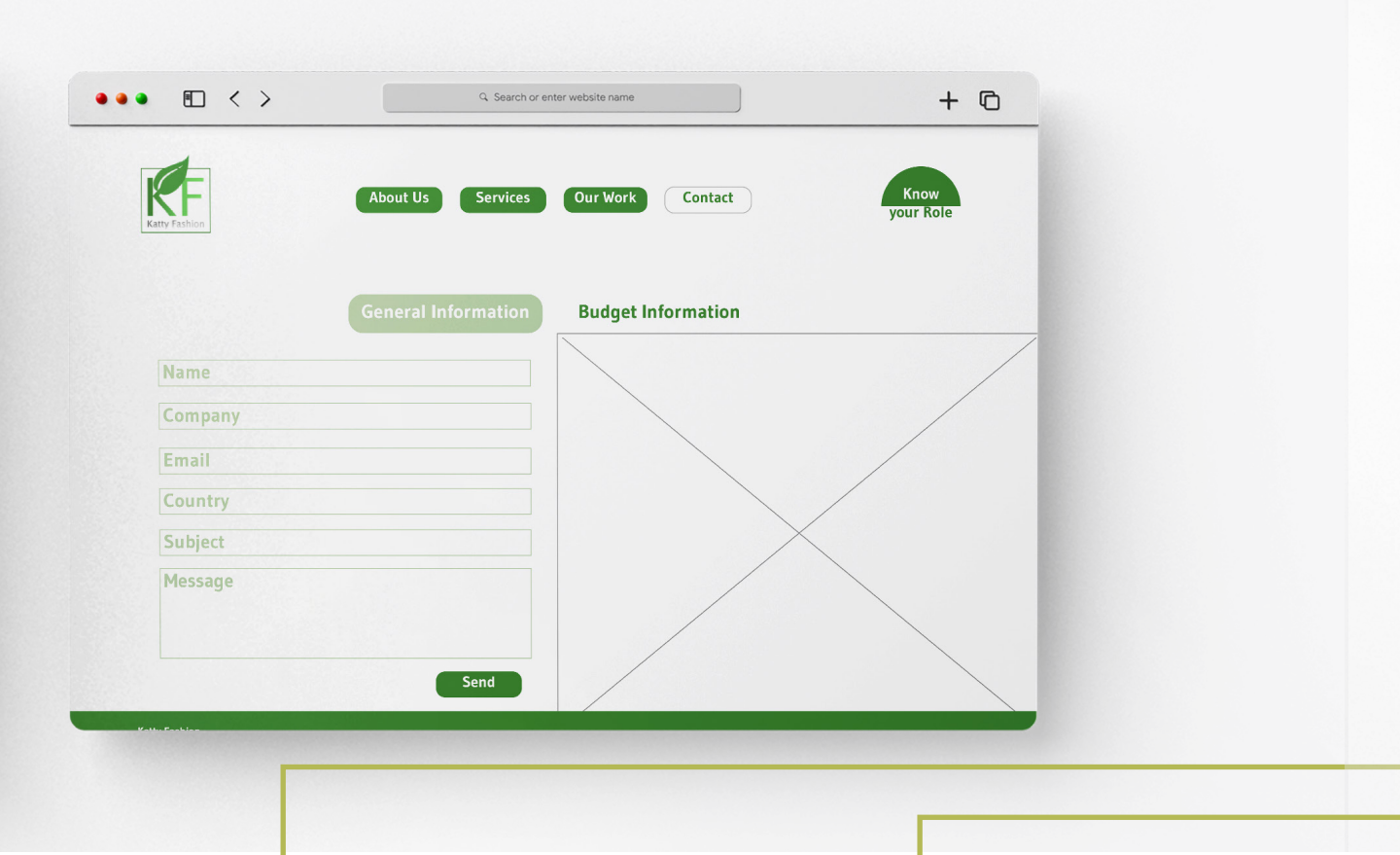
Our Work

Inside this category the company shares the projects that they have developed through images and a brief description of it, to let the client know their **experience and the quality of work they have produced.**



Contact

This page **does not have relevant changes** compared to the original website.



User

In this section the main goal is to **communicate to the user the ways on how they can reduce their impact** by understanding the origin of the garment and the materials that were used to produce it.

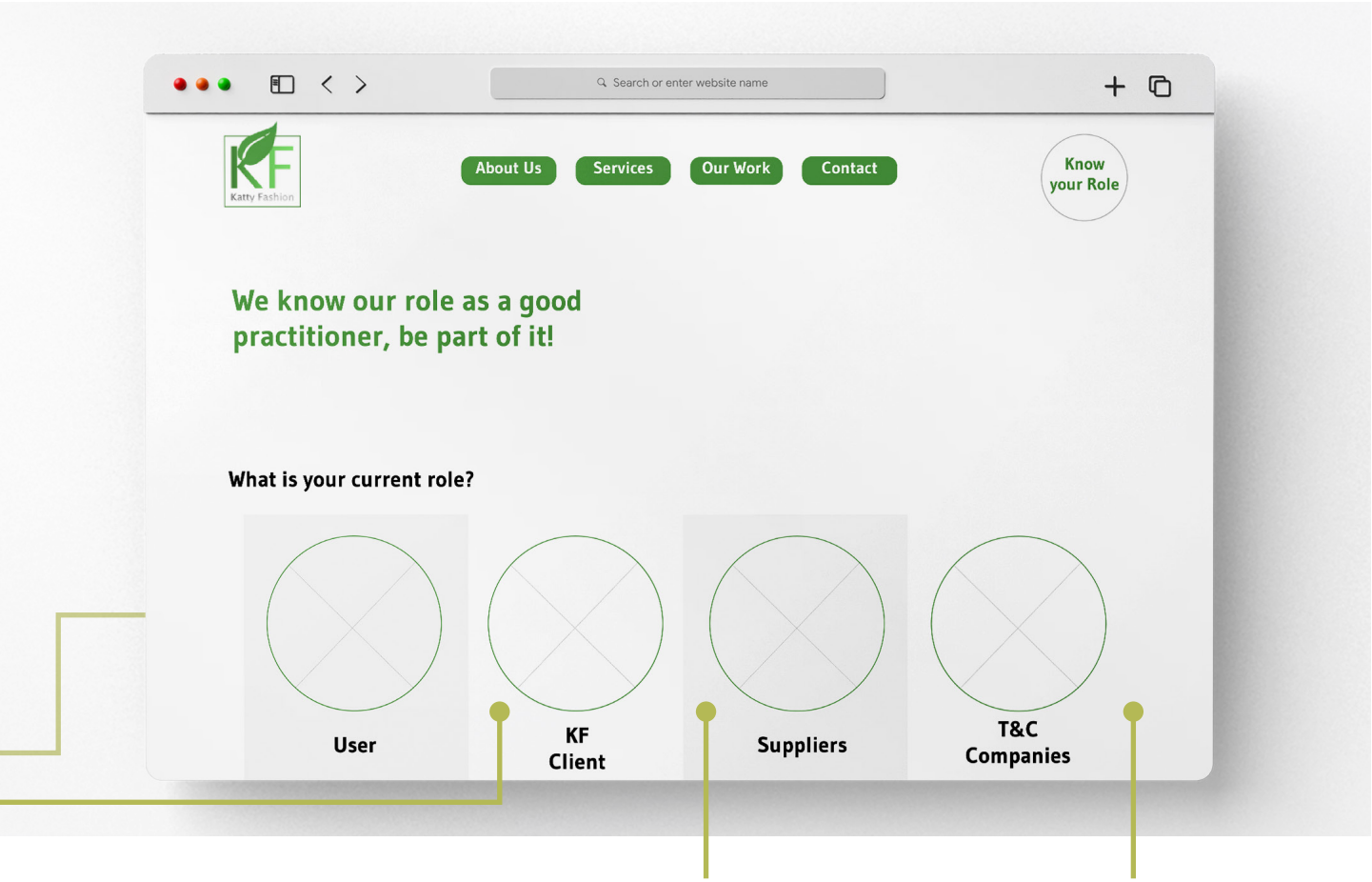
Supporting the initiative of the **label as a statement that constitutes a relation of responsibility** by truly understanding what it means to own a garment generating a sense of belonging, that later could contribute with the making of better decisions as better consumers.

Client

Usually the client takes the role of intermediary between the company and the final user, but in this part it **would be key for this actor to learn how to take the responsibility of transferring the values of Katty Fashion through each step of the process to arrive at the final user.** Here Katty Fashion could share the strategies they use to filter their clients to understand their boundaries.

Know your role

This category of the website has the aim to be the platform for all of the actors to know in which **ways they can or they are having an active participation in the work that Katty Fashion is doing as a good practitioner**.By using the website as a circular tool to create stronger interconnections in this ecosystem.



Suppliers

This category is linked to the profile of the suppliers and the description of the material that the company is using, also with the filters that Katty Fashion applies to choose them.

At this point, this category also helps with **sharing the insights of the initiatives that the company wants to implement to reduce the impact**, by using resources and technological development of the territory, introduced in the projects that are being developed on the co-creation clusters.

T&C companies

In the last part, the horizontal communication between companies of the T&C sector, helps to promote the collaboration and the sharing of insights that are built based on **the challenges each of them are facing.** The a**genda of co-creation would serve as a bank of ideas** to overcome the obstacles of the realities of the sector, that is how this section invites other companies to become part of this initiative **guided by Reginnova, the association led by Caterina Ailiesei.**

Key aspects of the proposal

Actors

Katty Fashion Good practititoner

NE-RO T&C Association for good practices

Final User

RDA (Intermediary)

Clients

REDU Minet SA South Ro

Suppliers

Processes

Communication through platforms

Garment Production

Creation of labels

Production of accessories

Collecting waste

Inputs

Fabrics

Orders

Insights

Outputs

High quality Garment

Labels

Outcomes

Awareness of the origin of the garment

Creation of new connections

Website as a tool for circularity

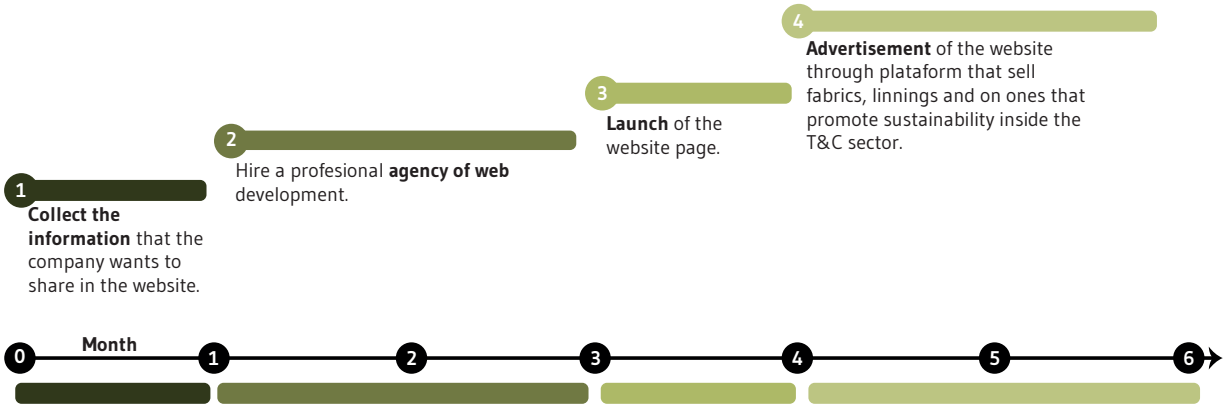
Label as a statement

a.Times of realization

The following activities are the steps that the company has to undergo to t**ransform their website into a tool that truly serves as a platform to expand their business.**

The time frames presented below are divided into months needed for the completion of this proposal. Beginning in the first month, with the **collection of the relevant information** that Katty fashion plans to share. Following with the redesign of the website, by hiring a professional agency of web development that will take 2 months to **restructure this information,** to later launch the new website. Moving forward to the promotion of the website in other platforms related to the sector. These promotions could take several months to see the effects, but **overall the implementation of it would ideally take 6 months approximately.**

Implementation of the website



5.1.2. Introduce a channel of cooperation to help raise the companies of the T&C sector.

Previously, it was addressed that the cluster that belongs to the T&C sector is partially dedicated to knitting, leaving aside other aspects of the sector that could contribute to its growth and development. Having this in mind, the **creation of another channel to promote the exchange of information between the companies** that are excluded from the cluster, could be useful to promote cooperation between them.

An **agenda of cooperation that integrates the role of the RDA as an intermediary allows Katty Fashion to share the knowledge** collected on their journey as a good practitioner through Reginnova.

This agenda will consist of **monthly meetings** with representatives of all of the companies that are part of the mapping made by the RDA, to create a bank of insights and strategies that would **contribute with the resilience** of the sector by dealing with topics that it is facing, such as, the covid pandemic, i**ntroduction of new technologies, environmental impact, experimental materials and work environment, between others.** A relevant factor would be the participation, **not only of the CEOs** of the companies, but also the workers that deal by first hand with the situations mentioned above. This bank of ideas will serve as an input for the co-creation cluster to guide part of their future projects.

Key aspects of the proposal

Actors

- Katty Fashion Good practititoner
- Other T&C companies of NE- RO
- NE-RO T&C Association for good practices
- RDA (Intermediary)
- Future In Textiles
- Textile & Clothing Business Labs

Inputs

- Guidence to implement circularity
- Insights of the sector
- Challenges of the sector

Processes

- Agenda of cooperation
- Introduction of circular practices

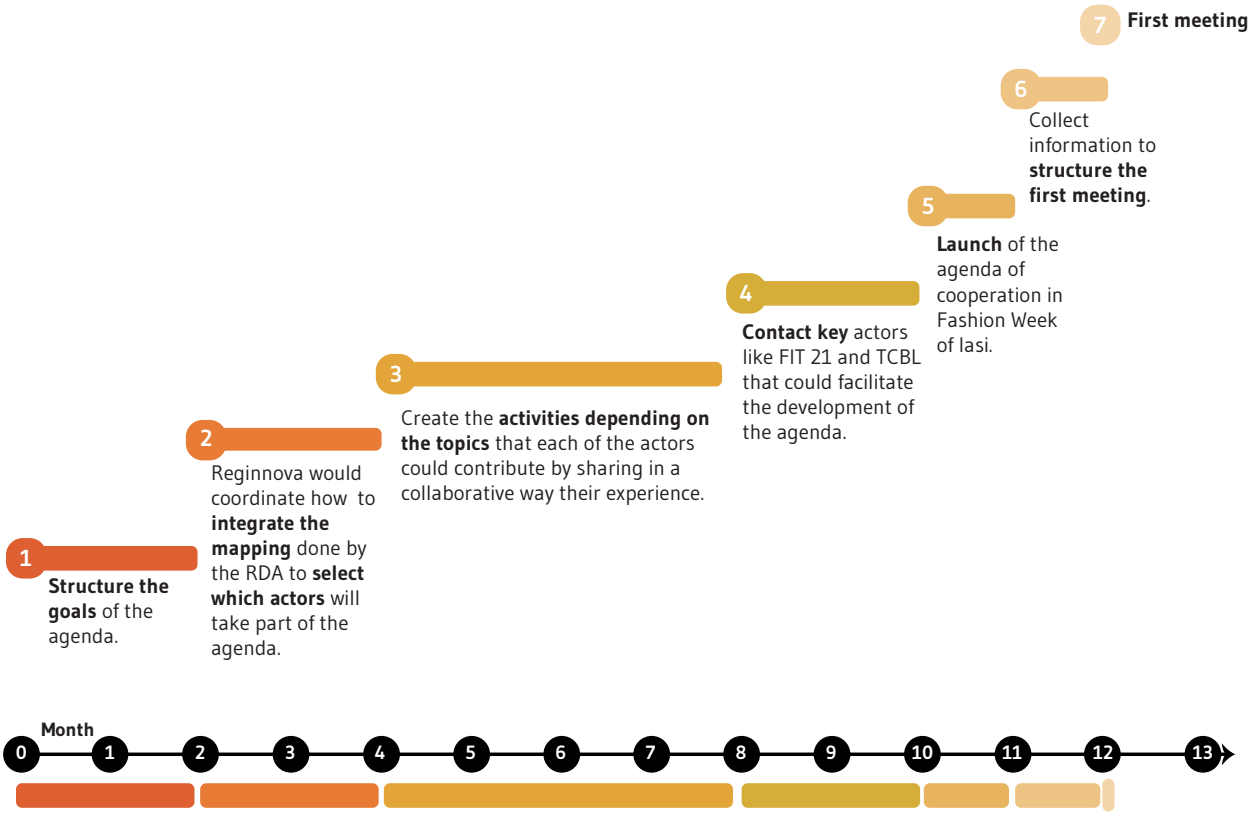
Outcomes

- Resilience
- More Circular Practices

a. Times of realization

As mentioned above, the time frames are divided into months. The agenda of cooperation will ideally take 1 **year to arrive to perform the first meeting.** For the project to get to this point, it is important for **Reginnova to structure the objectives** that would lead to the selection of the companies that will integrate the agenda. After having this clear, Reginnova would be able to **create the activities, contact the key actors and launch the agenda,** using the Fashion Week of Iași as the perfect platform to connect the companies of the sector.

Structure of the agenda of cooperation



5.1.3. Creation of labs and workshops to involve younger generations.

By establishing a connection with universities, it is easier for the companies to take an **active participation on how to prepare their future workers,** together with promoting the transmission of traditions and the i**ntegration of innovative methods** that are being developed on the courses.

The two new actors introduced in this proposal are, **Universitatea Tehnică "Gheorghe Asachi",** Iași (Università Tecnica "Gheorghe Asachi" di Iași) with specializations on Industrial Engineering (Industrial design, Textile technology and design, Knitting and garment technology, Technology and design of leather garments and substitutes), Chemical Engineering (Textile chemical technology, Chemical technology of leather products and substitutes); and **Universitatea de Arte "George Enescu",** Iaşi (Università di arte "George Enescu" – Iasi) with the Faculty of Visual Arts and DesignTextile Arts - (Textile Design, Design, Fashion). The aim of the participation of these two universities is to **create a space in the companies,** where the **students** can learn from the real experts, the importance of the level of innovation that a company could achieve by investing in this type of labor, meaning that the **practical work is fundamental for the development of the territory.**

Some of the activities that could be done to attract younger generations, based on the case studies presented previous are:
Upcycling used clothes and waste material of the company to design new garments, stimulating the creativity of the students and constructing unique pieces that **represent the tradition of the territory in a contemporary** perspective, encouraging innovation in their traditions.

Through challenges based on real situations that the company has faced, the **students** will have to come upon **how to interact with clients and suppliers, giving another point of view** on how to act in this type of situation, helping them to be better professionals.

Create a **bank to collect old clothes** from citizens of Iași, to transform them into new garments that would contribute to creating awareness by sharing the results of these projects.

Key aspect of the proposal

Actors

Katty Fashion Good practititoner

Goverment (Regulator)

REDU Minet SA South RO

Education System

Universitatea Tehnică "Gheorghe Asachi"

Universitatea de Arte "George Enescu"

Inputs

NE-RO T&C Association for good practices

Circular Knowledge

Policies for Education

Outputs

Fabric Waste

Challenges of the sector

Sustainable Garment

Processes

Garment Production

Collecting waste

Workshops and labs

Outcomes

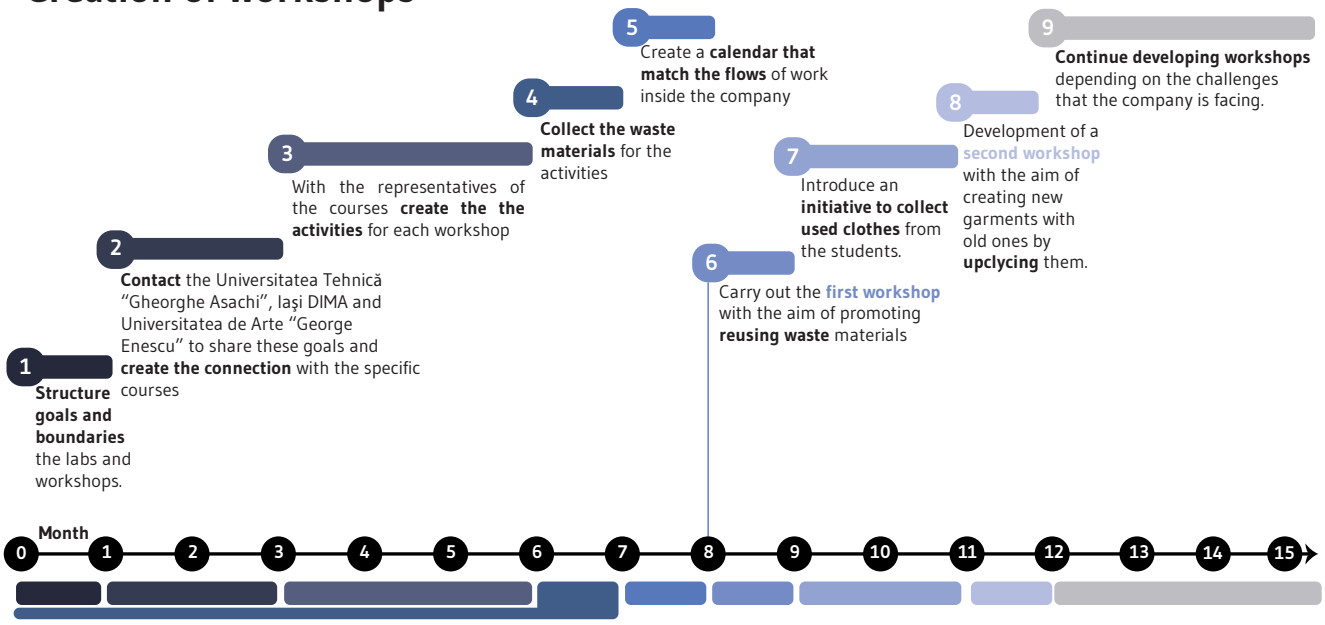
Qualified Workers

Reinforcement of the tradition

a.Times of realization

To plan the workshops and labs, they required almost 1 year and a half, as it is necessary to have a clear curriculum and boundaries to contact the universities to make an official collaboration. After this, they can create the activities and match the calendars of both Katty Fashion and the universities to carry out the first workshop, with the aim of reusing the waste material of the company, to promote a second workshop focused on the creation of garments through upcycling them.

Creation of workshops



5.1.4. Implementation of a transdisciplinary cluster of co-creation.

As illustrated in the other proposals, the **T&C sector has always worked as an isolated actor,** but still, it is evident that it requires the i**ntegration of other actors from other sectors that could facilitate the introduction of innovative development inside their processes and even, inside the region.**

Just like the agenda of cooperation, the cluster of co-creation wants to **invite new actors to collaborate in an open space,** where they can match their strengths generating innovative insights to support the creation of new projects, to approach in a circular way the needs of the territory.

Focusing on the intentions of introducing new inputs to Katty Fashion, as a strategy to become more circular, the following project is an example of the projects that could be developed inside the cluster.

As it was mentioned in a previous chapter, **Lyocell Is a potential material to reduce the environmental impacts of the fabric utilized by the company.** Meaning that there is a need for a **new actor** that can **provide the beech wood (base wood for this material)** and another one that has the technologies to transform it into yarns and textile. After doing an analysis of the presence of **this type of wood in the NE-RO, it was found that this type of wood is present on the territory.**

The **beech tree is one of Europe's most well-known trees,** due to being frequently used. Originally from southern Sweden, it is currently native to the Sicilian highlands, the United Kingdom, and southeastern Russia, and it may be found in all European woodlands, as well as in France. Beech (genus Angiosperms, family Fagaceae) is a tree species that belongs to the genus Angiosperms, it is a large and leafy plant that can grow to be between 15 and 35 meters tall.

In July 2017, several secular beech woods in Romania were included on the UNESCO World Heritage List. Inside NE-RO these woods are mostly located inside Slatioara secular forest **(Suceava county)**, and there are some forest inside the country in Izvoarele Nerei, Cheile Nerei-Beusnita, Domogled-Valea Cernei (in Caras Severin county), the Cozia Massif, Lotrisor (Valcea county), the Sinca secular forest (Brașov county) and Grosii Tiblesului and Strambu Baiut (Maramureș county).

Additionally there is an **existent cluster (PRO-WOOD)** that deals with collecting the waste wood of the production of furniture, with the aim of finding an **alternative of re-introducing this outcome into a new value chain.**

But the **companies capable** of transforming this type of material and **technologies are unknown on the territory,** showing that the cluster of co-creation will be the scenery to **communicate and promote the participation of the ICT sector,** by having cross-sectoral relations, that in a future could give answer to this type of problem.

Another **issue** that can be **addressed by the ICT sector** is related to the gap mentioned above that highlights the **importance of tools that respond to the needs of the sector in this region.** Currently, **3D prototyping** is a circular

strategy that Katty Fashion is committed to introduce but till this point the **software is not compatible with their practices.** That is how the **ICT sector could intervene to develop local technologies based on a collaborative participation including the ones that are going to use this type of technology.**

Lastly, another initiative that could take part of the cluster of co-creation is the i**ntroduction of recycled polyester by coworking with the company Green Fiber,** a romanian company created in Buzău in the south-east region of the country with plants in Iași, Urziceni and Ialomița.It has become one of the most relevant producers of recycled polyester in Europe, as it is presented on their website it is an "integrated group of companies which today offers a multitude of closed loop solutions for collection, logistic, recycling and remanufacturing based 100% on waste, becoming t**he first industrial recycling park in Romania ".**

Even if until now it has not been used for the production of textiles dedicated to garments, important c**onnections with Katty Fashion and companies like this one could stimulate its production and the integration of this material to the practices inside the T&C sector,** meaning that they are available to process the polyester into a yarn, but still it is necessary to create the relation that could **motivate the creation of thinner fiber to produce the same quality needed for high quality garments.**

Just by taking these three previous examples, it **is evident that cross-sectoral relations would boost the innovation inside the T&C sector,** that currently is lacking support for this type of potentiality, even if they are a leader region in these practices, as they still lack the sufficient autonomy to follow the rhythm of development of other European countries.

Some other actors from all over Romania that can take part in these projects are:

ICT:

- Regional Cluster for Information and Communication Technology - West Region Romania
- ClujIT: Central and Eastern Europe
- Oltenia Oltenia Cluster Cluster:
- ICT Regional Cluster:

Agriculture:

- AGROFOOD Sfantu Gheorghe / AGROFOOD Regional Cluster from Covasna County.
- Agro Transilvania Cluster
- IND-AGRO Competitiveness Pole

Wood:

- REGIOFA INNOVATION CLUSTER
- PRO WOOD Regional Wood Cluster

Textile :

- Transylvania Textile & Fashion Cluster
- Romanian Textile Concept Cluster Bucharest
- Cluster Traditions Manufacture Future TMV Sud Est

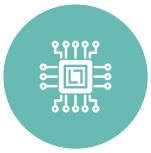
Key aspects of the proposal

Actors

Katty Fashion
Good practititoner


Goverment
(Regulator)

NE-RO T&C
Association


ICT Sector


Agricultural
Sector


RDA
(Intermediary)


Green Fiber

European
Industrial Hemp
association


PROWOOD
Regional
Wood Cluster

Inputs


Policies for ICT


Policies for
agriculture


Policies for
T&C


Beech Trees


Hemp


Fundings

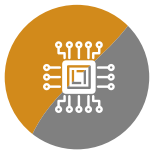
Outputs


Polyester


Sustainable
Garments


High quality
Garments


3D
Prototyping
Tech


Technologies for
transformation of
the materials


Tencel Fabric

Recycled
Polyester


Hemp

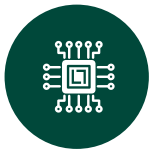

Insights of
co/creation
cluster

Processes


Transformation
Beech Trees


Transformation
of hemp

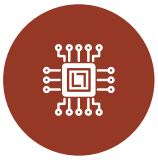

Waste from
furniture
processes


Technological
know-how


Harvest of
beech trees


Harvest of
hemp

Outcomes

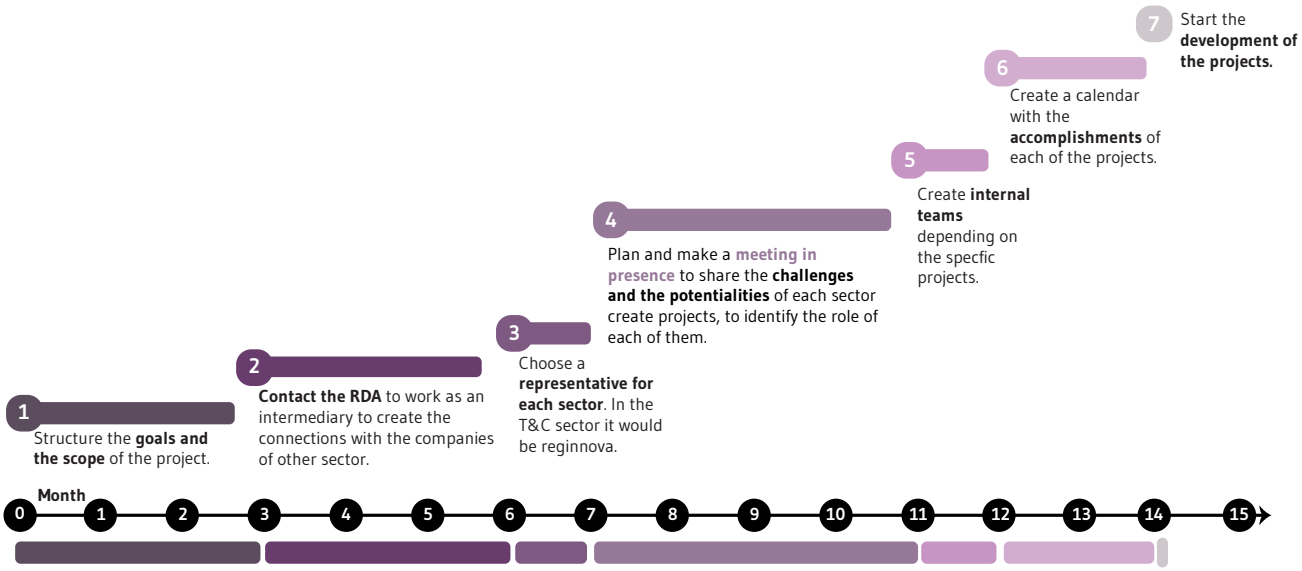

Regional Tech


Creation
of new
connections

a.Times of realization

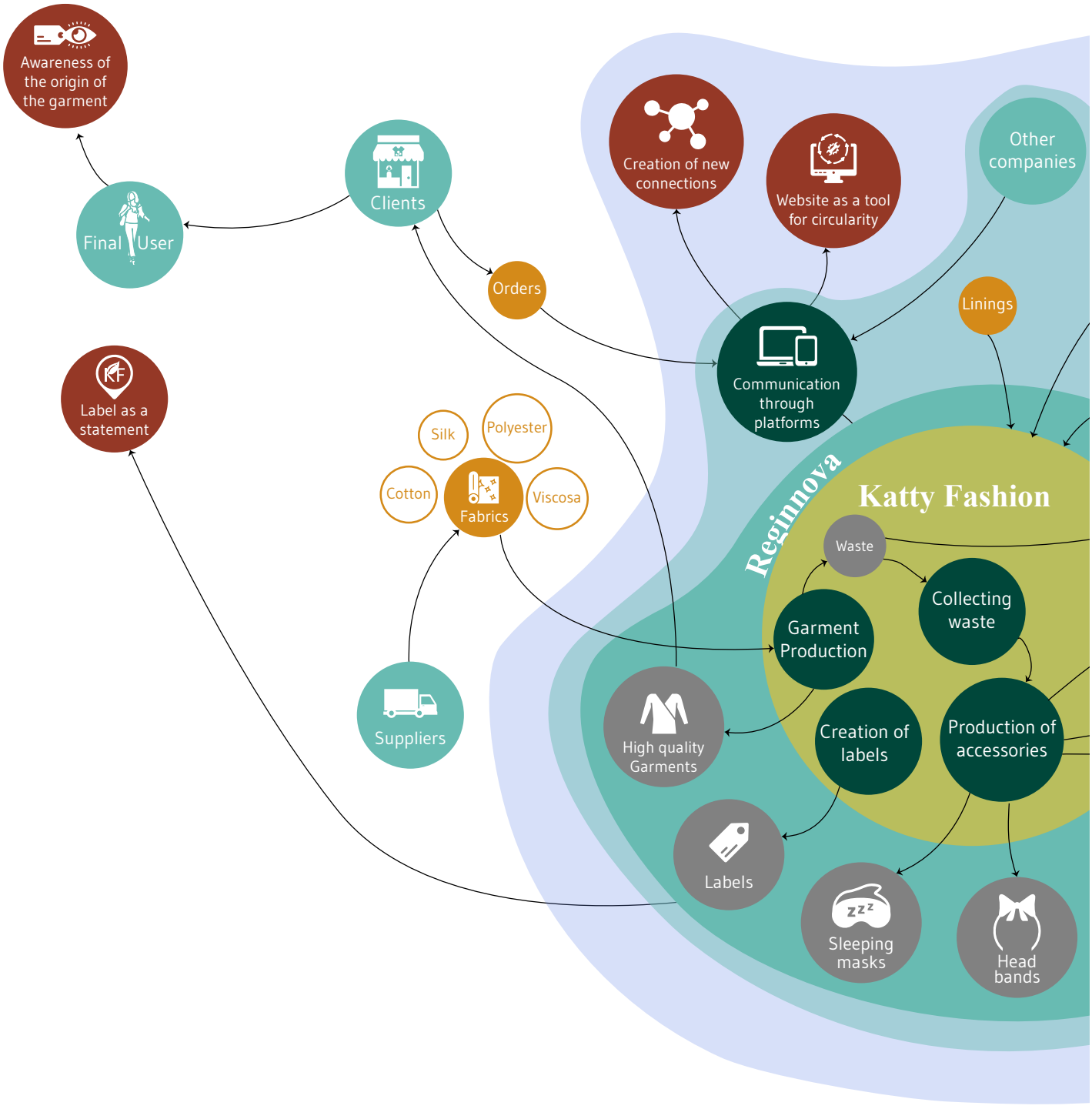
For the last and more complex proposal, the time frame to create the **connections** for the participation of the sectors selected for the cluster is of almost a year and a half. However, the time period to achieve significant results of this project could take years. These two periods of time **are divided between the logistics needed to find the intermediaries and the representatives that can structure a clear plan to cross-match their challenges and potentialities.** After having this structure, each of the sectors can be divided into **teams depending on the topics resulting from the cross-match to set their calendars for the achievement of their goals.** Eventually, the second period will be used to develop the projects framed before.

Creation of a cluster



5.2. System

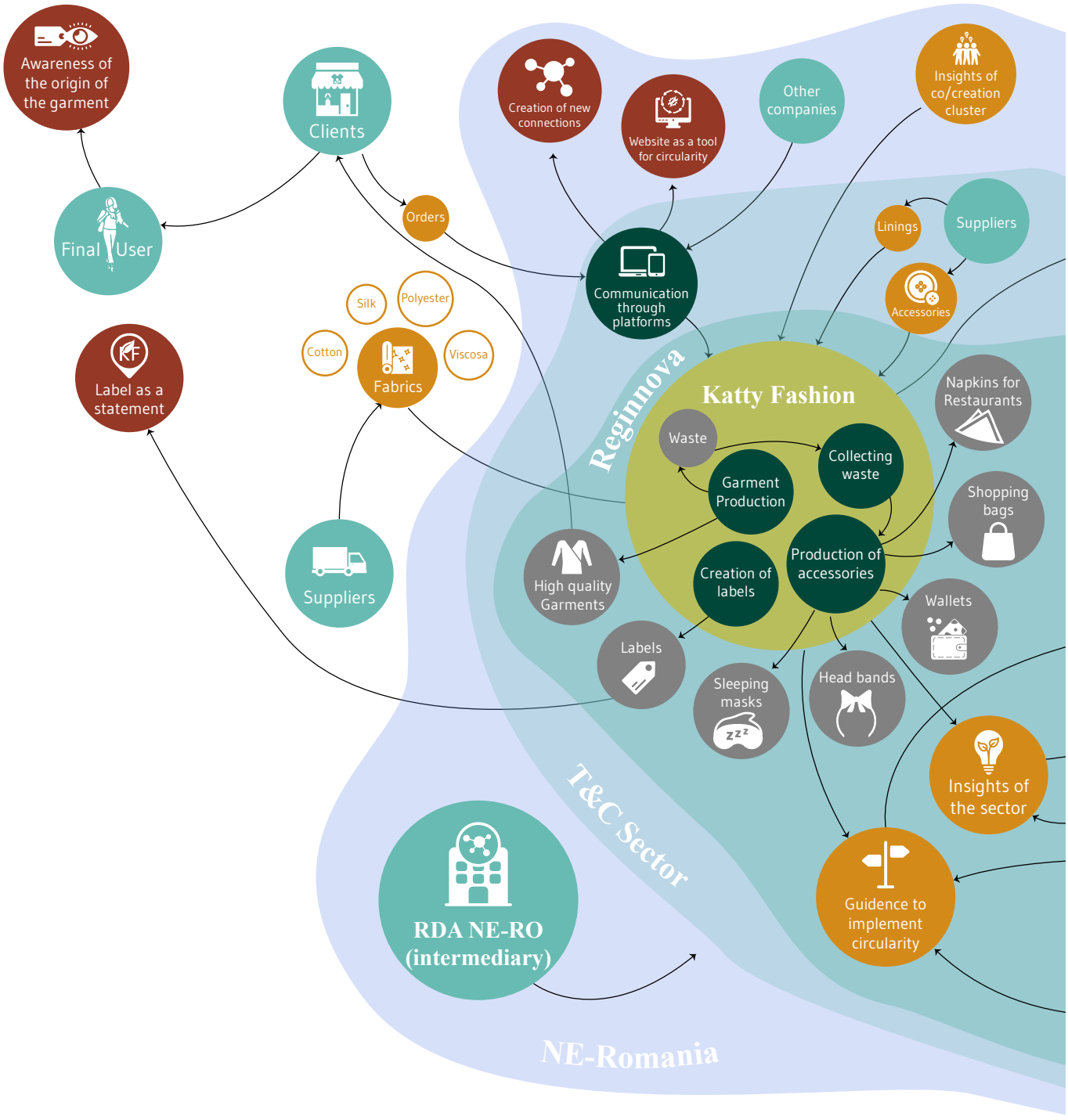
5.2.1. Interconnectedness through KF platforms



Reginnova is one of the **main actors** of this level of the system, as it has the potential of putting together all of the actors of the T&C sector. The base of this proposal is **connecting the actors through platforms**, in this case those actors are the final user and the producer's company of their garments, with the intention of sharing the origin of the garment as a **channel to raise awareness and create a sense of ownership** through the creation of the label to serve as a statement.

By connecting the **final user with Katty Fashion** the website could also become a platform to connect these two actors to contribute with t**he need and responsibility of Katty Fashion of sharing their values and spreading circular practices** as one of their very own. That is how the redesign of the website represents one of the main actions that support the implementation of this proposal, due to the fact that is the only channel that Katty Fashion has to **communicate openly and all together what makes them unique, the type of project they have developed and the community they have created behind the production.**

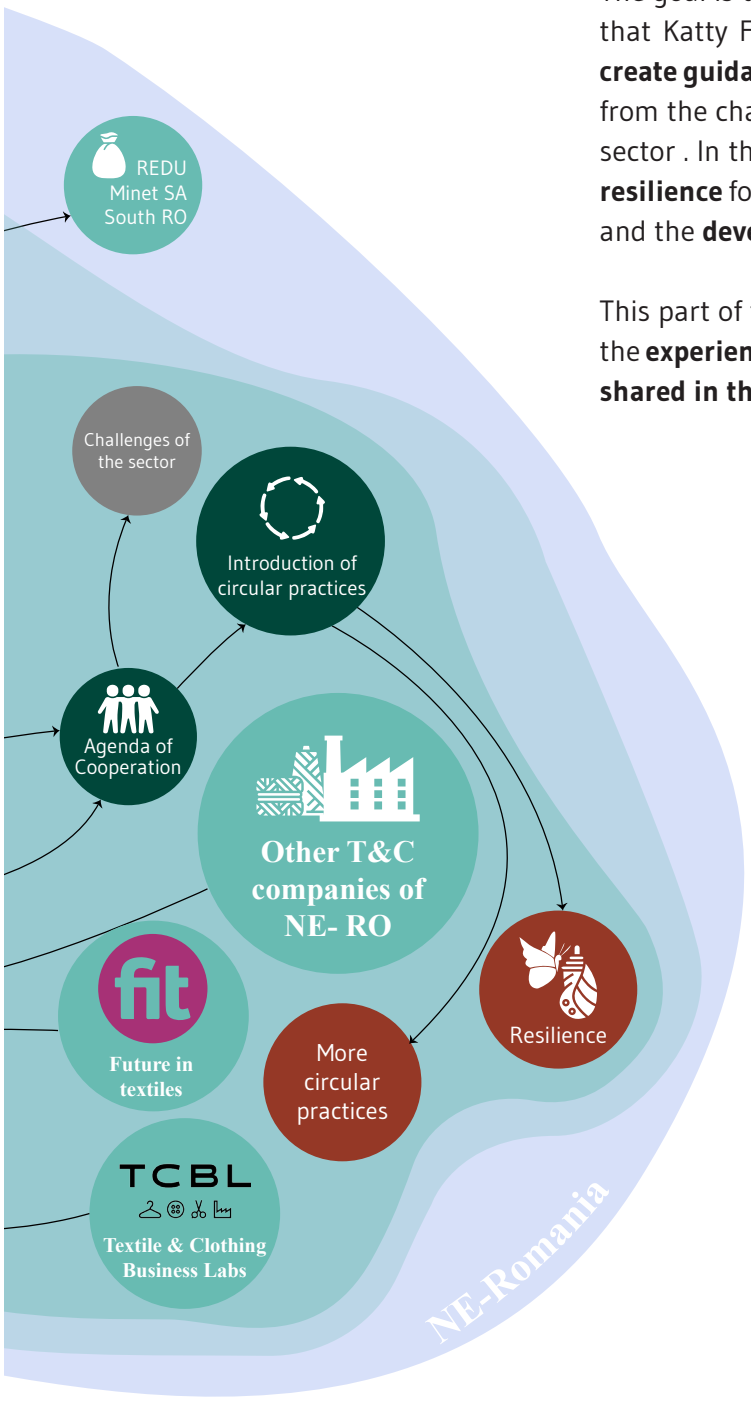
5.2.2. Introduce a channel of cooperation to help raise the companies of the T&C sector.



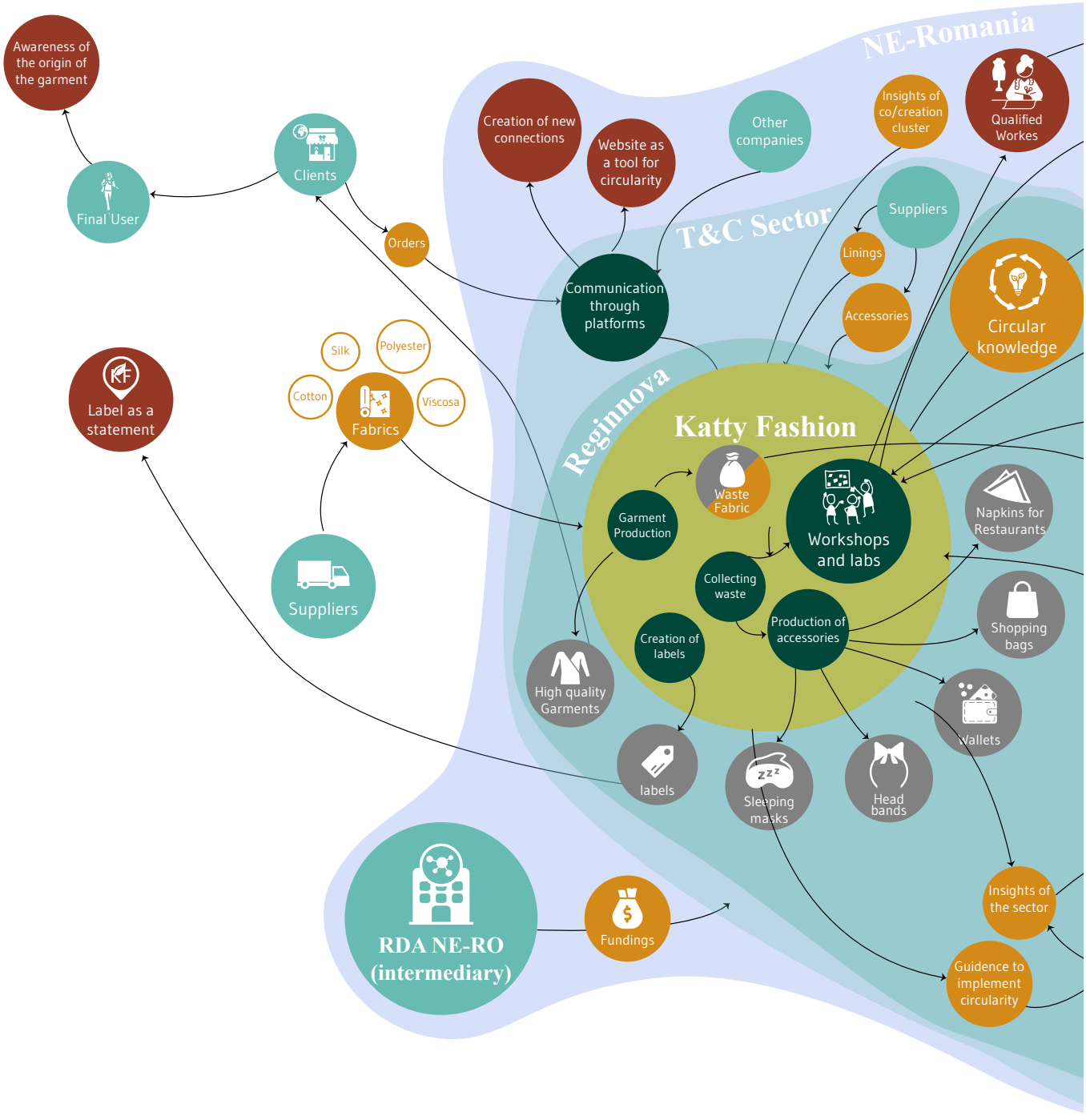
In this level of the system, the focus is **cooperation.** As explained in the proposal, the main actors are: **Reginnova**, as the association incharge of the management of this project; the **RDA**, as the **intermediary** between the **companies of the T&C sector mapped,** helping contact them to structure the processes inside the agenda of cooperation.

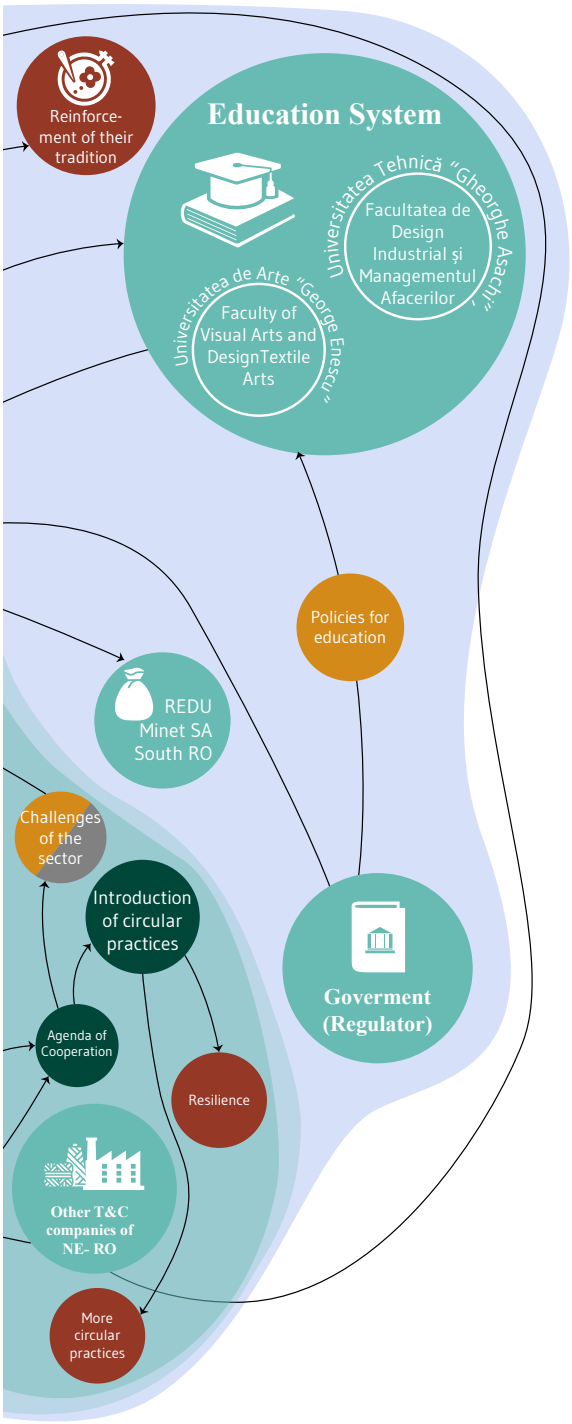
The goal is to **introduce circular practices** using the knowledge that Katty Fashion has as a good practitioner, as an input to **create guidance** for the project and the various insights resulting from the challenges that these actors are facing inside the T&C sector . In this way, the outcomes of this new process are, more **resilience** for these companies to face the problems of the sector and the **development of more circular practices**.

This part of the system is connected to the previous level, as all the **experience gained** in the project will nourish **the information shared in their website and will also invite new actors.**



5.2.3. Creation of labs and workshops to involve younger generations.

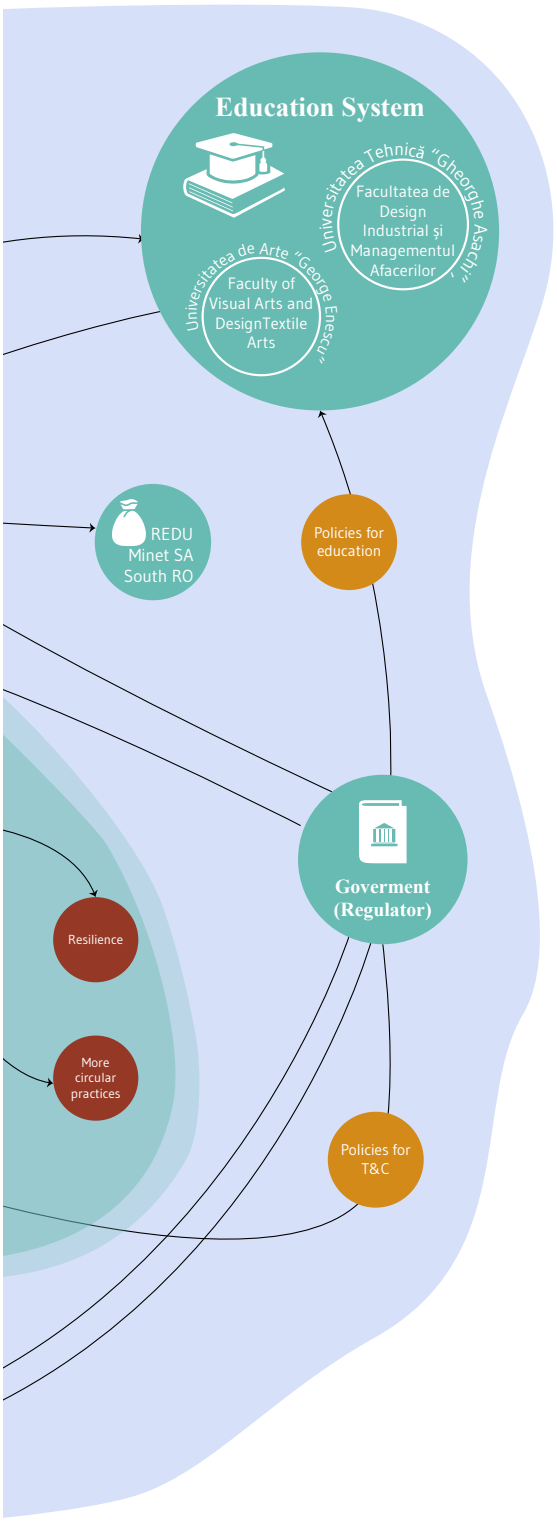




This level is **based on education** to attract **younger generations** to be **interested in practical work.** The creation of labs and workshops is the main activity that supports the development of this proposal, becoming the channel to **integrate universities with the activities of the company.** Part of the **inputs** used on the workshops and labs would be the **waste fabric that comes from the production of the company and couldn't be reintroduced as other products.** Is important to highlight that the process of **collecting the fabric** is also going to be **promoted as a circular and sustainable practice inside the universities,** to stimulate **awareness** even in these spaces.

On the other hand, the type of activities done inside the workshops are going to be based on **real life situations,** that come from the information collected from the **cooperation agenda**, the platforms of the company and the **co-creation cluster.** Putting all together, the main goal of these activities is to contribute to the education of younger generations that in the future would become **qualified workers for the sector**.

5.2.4. Implementation of a transdisciplinary cluster of co-creation.



After analyzing what Katty fashion is doing with their waste, it was evident that they **already had initiatives to transform their outputs** into new products. For this reason, the first approach for this proposal was looking at how to intervene with the inputs to generate a **sustainable shift since the beginning.**

That is why the last part of the system deals with the creation of **more connections** between new actors outside of the T&C sector. The new actors are: **The ICT sector, the Agricultural sector, European Industrial Hemp association, the Regional Wood Cluster (Prowood) and the company Green Fiber.**

Starting with the new flow with the **ICT Sector,** they are a valuable new connection that will be capable of c**reating the technologies** to facilitate the production process of some T&C companies by also reducing the waste. The importance for this process is understanding the compatibility of the technologies with the real needs of the territory. This is also relevant in the creation of new technologies **to produce sustainable materials,** taking into consideration the use of raw materials of the territory to produce these new alternatives.

Here is where the **agricultural sector** becomes important, as having the connection within these two sectors will promote the **match-crossing** of their **resources and abilities,** introducing to the system three **new inputs, hemp, beech tree and waste polyester.** To transform these materials to create a new sustainable input that will be introduced into the ecosystem, the connections with **new actors (Prowood cluster, the company Green Fiber and European Industrial Hemp association**) will be fundamental, generating a relevant new outcome, high quality sustainable garments done locally.

5.3. Outcomes

5.3.1 Evaluation

The evaluation presented below determines the **magnitude of the approach of the proposal** and the effects that it has in terms of how it diminishes or contributes with the environmental impacts included in its development, the socio-cultural sphere that it promotes, the economic stimulation that it brings to the actors and the complexity of the logistics that the proposals encourages and requires. The score is given by a number between 1 to 3, where 1 means negative approach, 2 a neutral approach and 3 a positive approach, both of them related to the benefits that the implementation of the projects bring to Katty Fashion, the NE-RO region and the T&C sector.

Each of the following **evaluations will have an indicator of success** that later could be used by the company to **measure the influence it has on their practices.**

Environmental

- Interconnectedness through KF platforms.

This proposal is focused on **encouraging communication between actors,** and in this way it could push for **sustainable awareness** as a circular tool, nevertheless, there are no indications on how it could contribute to diminishing the impact.
Indicator: Does Not apply.

- Introduction of a channel of cooperation to help raise the companies of the T&C sector.

The **cooperation between companies** of the same sector and the sharing of strategies between them contributes to a **shift of perception on how to approach the environmental challenges** that this sector generates. In addition, Katty Fashion´s role, of being a good practitioner, commits to support this shift of perception.

Indicators of success:

* Number of meetings focused on challenges dealing with the environmental impact of the T&C sector.
* Number of sustainable strategies that the companies start introducing in their practices.

- Creation of labs and workshops to involve younger generations.

Reducing the environmental impact of the sector is not the main goal of this proposal, but is still a tool to **create innovative solutions,** meaning that this new approach could tackle the impacts generated by the business as usual of the companies of the sector. **As the new generations are leading this type of transformation.**

Indicators of success:

* Number of students interested in being part of the labs and workshops.
* Quantity of old clothes collected for the workshops.
* Quantity of fabric waste, reduced with the creation of new products.

- Implementation of a transdisciplinary cluster of co-creation.

The base of this proposal is circularity by bringing together sectors that don't usually cooperate, meaning that the projects that result from this collaboration are r**ooted in sustainability, the use of local resources and knowledge.**

Indicators of success:

* Quantity of projects undergone for the development of sustainable materials.
* Reduction of the use of unsustainable materials in fabrics, in the T&C sector in NE-RO.
* Quantity of waste reduction from sectors like the agricultural one, by being reintroduced to other industries.

Sociocultural

- Interconnectedness through KF platforms.

The platform brings together the existing actors and new ones, through the **page of know your role as it promotes the commitment and understanding of knowing the part they play in the value chain.**

Indicators of success:

* Number of new actors interested in being part of the initiatives of Reginnova

promoted in KF website.

- Introduction of a channel of cooperation to help raise the companies of the T&C sector.

Being Katty Fashion a privileged company in terms of knowledge and relations with relevant actors, sharing their information inside this **agenda will contribute to the growth of smaller companies** that don't have access to this type of knowledge. Additionally, this change in the way the companies are **using sustainability in their practices, will spread awareness on this topic.**

Indicators of success:

* Number of companies that are part of the agenda of cooperation.
* Number of attendance at each meeting.

- Creation of labs and workshops to involve younger generations.

Collaborating with younger generations will **facilitate the education of future professionals** by placing these workshops and labs, on real life situations that are being solved by current professionals, to encourage from the **beginning the raise of environmental awareness.**

Indicators of success:

* Number of students that take part on the workshops
* Number of curriculums that include these workshops and labs.
* Number of the young employees interested in applying to do practical based work.

- Implementation of a transdisciplinary cluster of co-creation.

By putting together the efforts of several sectors and the challenges they are facing, the cluster of co-creation **creates a bigger impact including different types of social groups for the growth of the territory.**

Indicators of success:

* Number of interconnections between different actors to collaborate on the accomplishment of a project.

Economic

- Interconnectedness through KF platforms.

Having new visitors on the website **may not guarantee selling more garments.** But having a clear communication, could strengthen the **existent relationships and in the future could impact the finances of the company.**

Indicators of success:

* Number of clients that arrive at the website.

- Introduction of a channel of cooperation to help raise the companies of the T&C sector.

By **improving their practices** in a collaborative way, based on the insights gotten from the agenda **will reduce the cost of some activities in the value chain.**

Indicators of success:

* Reduction of costs compared with the previous year before the implementation of the agenda.

- Creation of labs and workshops to involve younger generations.

The achievement of this proposal is a future investment for the company, as **new employees** will want to work with them to extend the life of the company. Meaning that is a s**hort term achievement.**

Indicators of success:

* Does not apply

- Implementation of a transdisciplinary cluster of co-creation.

By developing local solutions to the challenges of NE-RO, this will not only contribute to the economic growth of the territory but also, will facilitate the introduction of **new local technologies, reducing the future costs that bringing international technologies could have.**

Indicators of success:

* Number of local technologies introduced.

Logistic

- Interconnectedness through KF platforms.

Redesigning the website does not imply a big effort of the company, as they **just need one other actor for it to be developed.**

Indicators of success:

* Time takes to develop the new website.

- Introduction of a channel of cooperation to help raise the companies of the T&C sector.

It has a **medium level of complexity, as it depends on the collaboration and organization** with other companies to achieve the goals.

Indicators of success:

* Time it takes to contact the various actors and their availability.

- Creation of labs and workshops to involve younger generations.

The complexity of this activity depends on the **capacity of the university to modify the curriculum** taking into account the education **policies** and the interest of the students.

Indicators of success:

* Time it takes to formalize the new curriculum.
* time it takes to develop the workshops proposed.

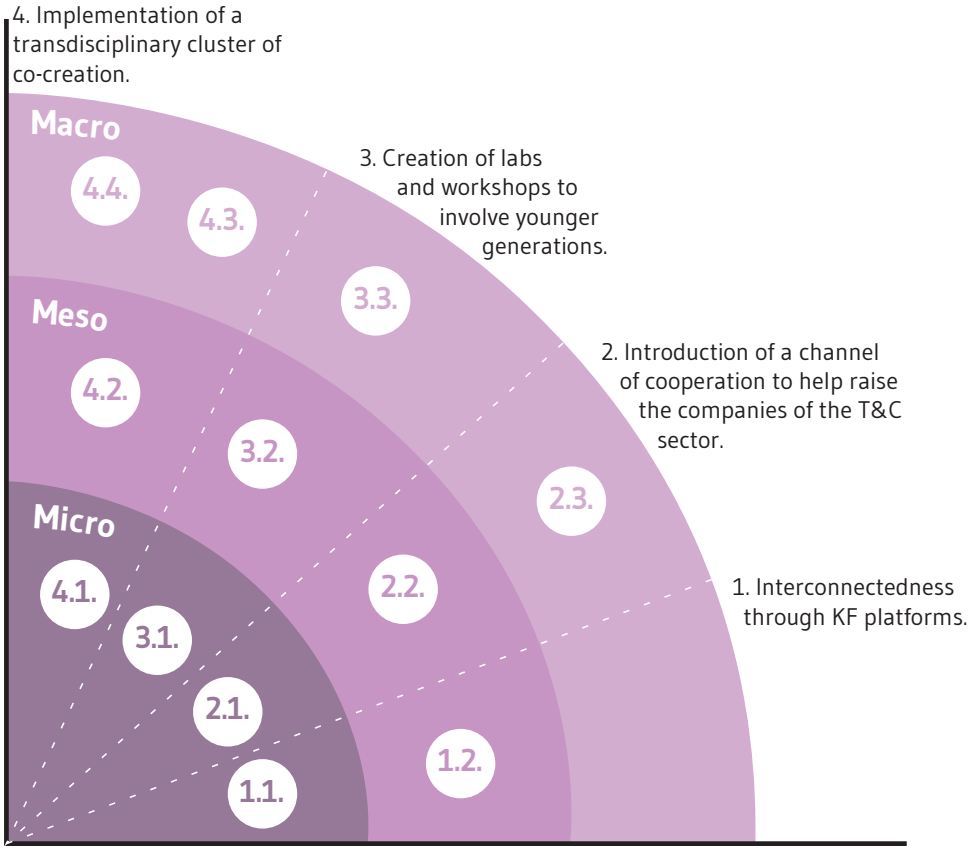
- Implementation of a transdisciplinary cluster of co-creation.

This proposal has a high level of complexity as it depends on the **availability of various actors and how they can match their goals and calendars.**

Indicators of success:

* The time it takes to contact the various actors
* The time it takes to structure the projects depending on the goals of each sector.
* The time it takes to develop the projects proposed.

5.3.2 Scales



The following statements describe the type of scale of each of the activities that take part on the proposals, depending on if it is only an internal project inside the **company (micro)**, if is a **group on initiatives** that influences more actors than just the company **(meso)** and the changes in the current **policies** necessary to achieve the goals **(macro).**

1. Interconnectedness through KF platforms.

1.1 Katty fashion website as a **project developed internally. (micro).**
1.2 "Know your role" section in KF website attracts new stakeholders and actors (not only locals but also internationals), with the **promotion of their initiatives (meso).**

2. Introduction of a channel of cooperation to help raise the companies of the T&C sector.

2.1 This scale takes into account the **role of Reginnova** to **structure the agenda** of cooperation. (micro)
2.2 **Interconnections** of the T&C companies at

regional level. (meso)
2.3. **Develop new policies** to encourage companies of the T&C sector in NE-Ro to follow a sustainable path. (macro)

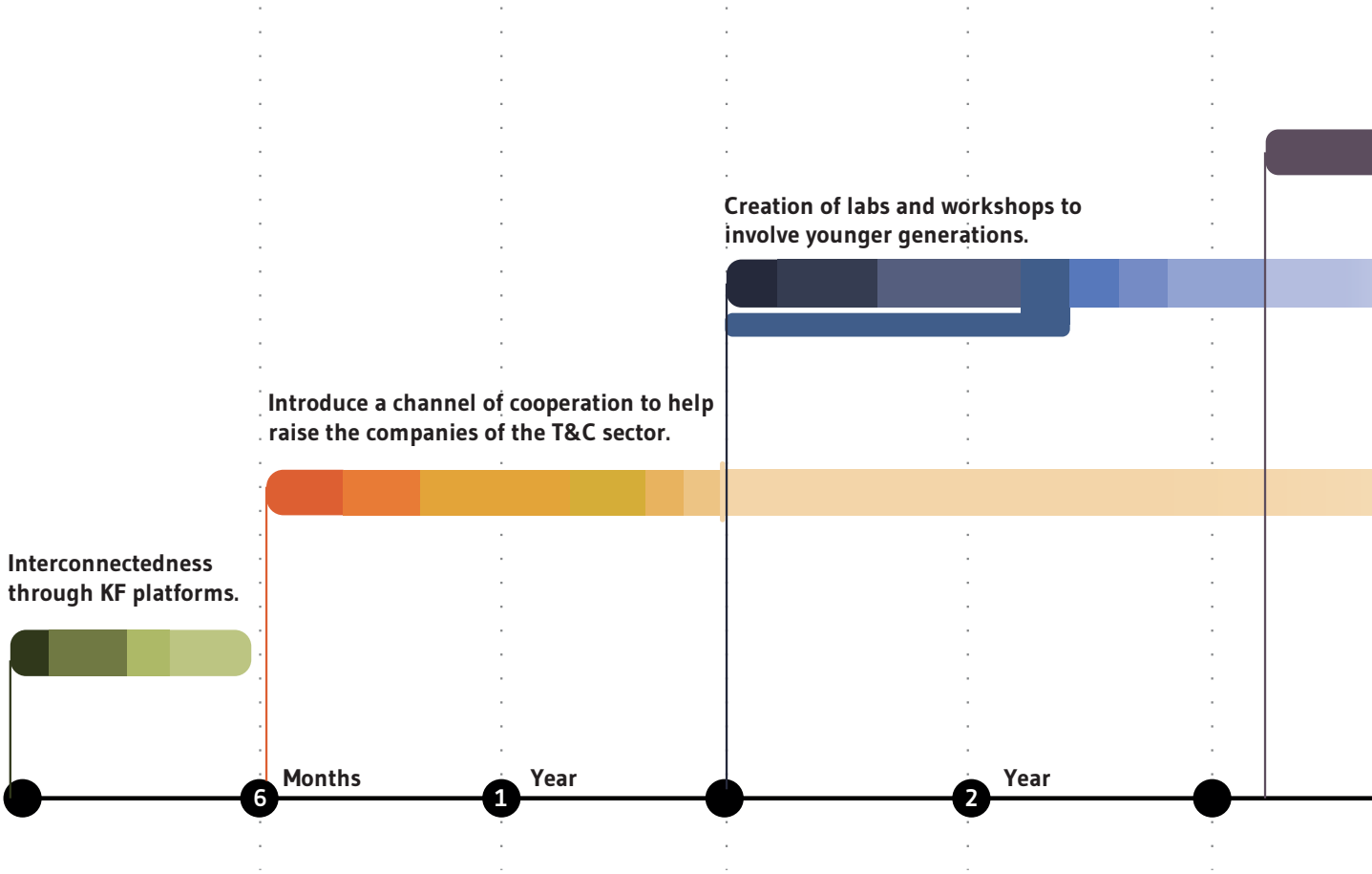
3. Creation of labs and workshops to involve younger generations.

3.1.. This scale is characterized by Katty Fashion **opening a space** for the development of these **workshops** in their old location. (micro)
3.2. . The labs and workshops connect students with the reality of the T&C sector, meaning that it **brings new actors to the practices of the company. (meso)**
3.3 Implementation of policies for the **transformation** of the **curriculum for the activities** that are going to be done by the company. (macro)

4. Implementation of a transdisciplinary cluster of co-creation.

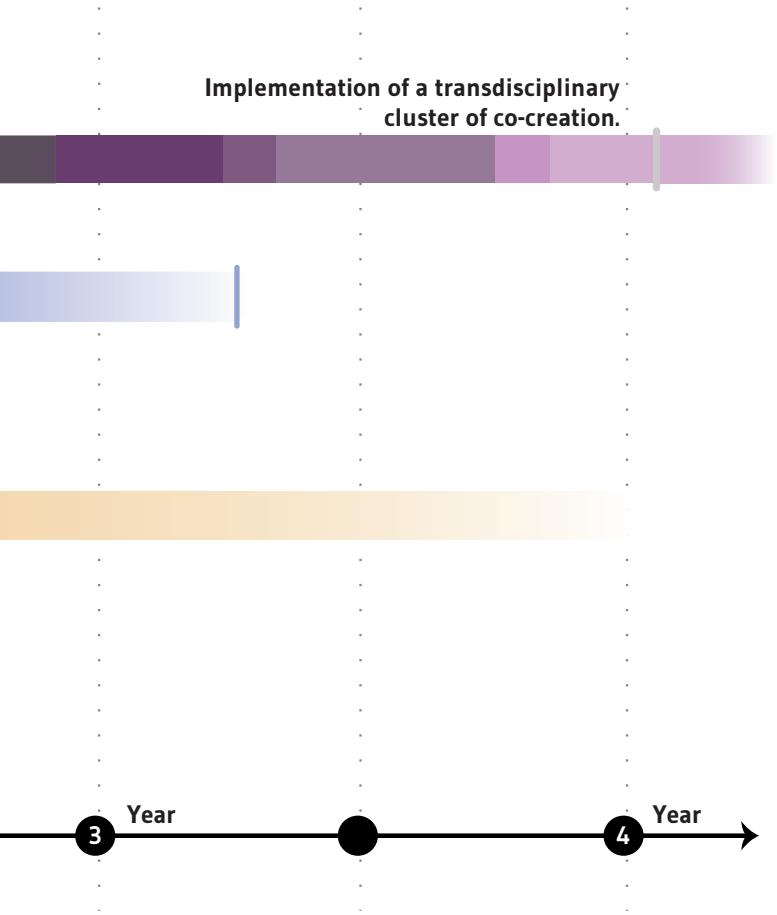
4.1.Individual efforts of each of the companies to **comprehend their role** (strengths and weaknesses) contribute to the **construction of the cluster(micro).**
4.2 **Meetings** created to share the information between the **representatives of the sectors,** to structure the activities inside the cluster. (meso)
4.3. **Change of policies** that determine the functioning of all of the mechanisms inside each of the sectors that allow the **development of the projects of the cluster. (macro)**
4.4. Development of **new technologies** that **stimulate the economy of the country (macro).**

5.3.3 Time Frame



The implementation of the 4 proposals could take 4 year and a few months. Starting with the **redesign of the website,** as it requires a low level of **complexity on logistics.** After a few months of the launch of the new website, the **agenda of cooperation could start,** as the website will attract participants. The first meeting of this agenda will happen after the first year and a half since the start of the **systemic transformation.** Continuing through time, as a tool for the companies of the T&C sector, **to gain insights that could improve their practices.**

Having structured the agenda of cooperation and a**chieving the first meeting** that contributes to understanding the **position of Katty Fashion**, they are able to focus their efforts in the consolidation of the 3 proposals, **connecting with universities** with the aim of doing workshops and labs. This project will last 1 academic year and with its termination, the indicator of success can be **measured to evaluate if they accomplished their goals and understand how these activities can improve.**



While the workshops and labs are being done, the **structuring of the cluster of co-creation** would start. It is important to highlight that this proposal is the **last to be implemented,** as it can be constructed based on the insights obtained from the other projects and its **higher level of complexity. However, this proposal will continue being developed over time.**

6. Conclusions

Following the line of reasoning to construct this thesis, by using a systemic approach based on **flows, inputs and outputs,** it was perceived that they were only one of the many levels indispensable to have an exhaustive overview of the entire situation of the ecosystem, to identify legitimate challenges that would achieve representative changes. One of these levels is the flow of interconnections through communication, that define **how transdisciplinary this approach could be, by focusing on changing the principles of the web to create a stronger structure,** rather than just focusing on the results, as they will be accomplished as a consequence.

Part of the structure of this ecosystem is **characterized by the silo-mentality,** which is contrary to the systemic principle of creating relationships. Leading the approach of the study, firstly on how to **strengthen this relations,** by promoting the **sharing of communication** and dialogues, to later impact all of the actors with even small actions, that at the end will allow the creation of a **broader web of interactions that will not only benefit the T&C sector**, but also other sectors, as all of them will understand the baseline of these connections.

Having this in mind, the base of the study was analyzing the **dynamics of a good practitioner of circularity in some of its dimensions.** Carrying this title inquires a **responsibility of creating an eco of awareness** and transformation through the complete value chain, as it doesn't mean anything if only one of the actors is a good practitioner, but the rest continue with detrimental practices, meaning that **to truly carry this role is essential to support the autopoetic principle, that suggests that all the system should encourage the improvement of all the practices to be resilient through time.**

Apart from this, to continue rethinking the way in which Katty Fashion does their business, it is practical to give the r**elevance that their website could have to be a platform that facilitates a direct interaction to share their values and work**, by attracting new actors that want to take their role as **promoters of potential change.** This previous statement reinforced the changes that the covid pandemic brought to physical interactions, showcasing how virtuality became one of the **most important channels to create connections as strong as the physical ones.**

In the same fashion, part of this resilience is linked with the **evolution of old traditions,** supporting the know-how of the territory, by integrating the perspective of younger generations that will achieve **unique innovation,** giving answers to the current challenges. **Granting younger generations this space will allow them to be aware** of how important is their role to bring innovative development to the territory.

All things considered, this research was structured through the experience of Katty Fashion but it would be interesting to integrate the **perspective of some other actors** on the sector to match all of the viewpoints to create a **broader panorama on how to approach all of the aspects previously mentioned.**

7. References

7.1. Research references

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