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Exploring Local Business Model Development for Regional Circular Textile Transition in France

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Abstract

From a cosmopolitan localism perspective, the circular economy could be described as a web of smaller circular economies where the core development is situated in local areas, like cities, or regions, with the active participation of territorial stakeholders. The objective of this research is to explore the development of local business model niches within the scope of circular textiles and fashion, including social enterprises. The research is based on the analysis of a specific territory, the Nouvelle Aquitaine Region in France, where participative observations at different scales (local, regional and interregional) have permitted an

in-depth comparison of four local social enterprise business models. The study defends the active role of social entrepreneurs in supporting circular transitions into regions and highlights the strong diversity of challenges they faced during the design of local business models, both at a technological, social and policy level.

KEYWORDS: circular economy, business model, action research, localism, conviviality, textile design

Iban Lizarralde is specialized in systemics and engineering design and works on the management of innovation through different approaches. Familiar with eco-innovation and creativity tools, he completes his research perimeter with new sustainable business models and conviviality approaches.

Benjamin Tyl is a researcher in eco-innovation. He develops and participates in research projects around open design, conviviality and eco-design. He is particularly interested in reuse center and design for repairing.

Through the RETRACE project, they now implement the principles of circular economy into territories, and look for developing approaches, methods and tools to enable companies/public institutions/NGOs/communities to tackle sustainability challenges at different scales.

Introduction

The Fashion industry is facing systemic changes with the development of the circular economy. Global-scale changes in the whole life-cycle of textile products are implemented by different organizations (companies, academics, non-governmental organizations and governments) through diverse projects and actions such as knowledge platform development, roadmaps, fashion forums, corporate social responsibility management, certification label creation, circular award event, grassroots initiatives, creation of citizen or activist movements and specific directives like the European Technology Platform for the Future of Textiles and Clothing directive[1], plus European research projects. The recent report of the Ellen MacArthur Foundation (2017) describes four main ambitions for a new textile circular economy: (1) phasing out substances of concern and microfibers release, (2) transforming the way clothes are designed, sold, and used to break free from their increasingly disposable nature, (3) radically improving recycling by transforming clothing design, collection, and reprocessing and (4) making effective use of resources and moving to renewable inputs. Moreover, recent academic works propose solutions and methods to develop a more circular and sustainable textile economy (Bocken et al. 2016; Kozlowski, Searcy, and Bardecki 2018).

Nevertheless, the territorial roots and local anchorage of circular economies are still under-considered and rarely documented in current studies. Projects do not identify either the territorial scale they use for closing the loop or the density of flows present in the value-chain generated by circular economies.

However, circular economy loops can be designed at different territorial scales (from a local to global scale, from a regional to a national and interregional scale). The quantity of products manufactured by a company, the development of "circular-oriented" services, or the number of loops to regenerate materials and products affect related territories, the structure of supply-networks (number, location and size of production sites), the speed of flows into the value-constellation (material, product and information) and the proximity with customers (Tukker 2015; Ghisellini, Cialani, and Ulgiati 2016).

Practices in textile industries must also focus on the impact of the dynamic behind the construction of circular economy networks. The

type of technologies, the scale of industries, the socio-economic context, as well as the territorial infrastructures, are crucial issues in order not only to avoid the environmental damages and the unequal wealth distribution amongst territories caused by the current globalized economy but also to be able to create territorial resilience and to respond to social needs (Johansson, Kisch, and Mirata 2005; Melles, de Vere, and Misic 2011).

As an answer, Ezio Manzini (2013) proposed a new vision of globalisation, through the concept of "Cosmopolitan localism". It is defined as a network of "interconnected localities, where many important decisions are made locally by the people directly concerned, and more importantly, where for each step of the process of production and consumption, much of the decision-making, know-how and economic value remains in the hands, minds and pockets of the local communities" (Manzini 2013:78). Manzini points out that small-scale organizations can together weave large distributed systems. In other words, a circular economy could be described as a web of smaller circular economies. This vision "does not create frontiers, and cherishes diversity locally" (Schneider and Sekulova 2014: 2), each community becoming a node connected to different networks. This proposal is related to several sources in literature such as bioregionalism (Georgescu-Roegen 1993), distributed economy (Johansson, Kisch, and Mirata 2005), degrowth (Demaria et al. 2013), diseconomies of scale and opposition to bigness (Kohr 1957) or conviviality (Illich and Lang 1973). All these approaches invite change-makers to design socio-technical transitions in small territories like cities or regions.

Designing such transitions in a cosmopolitan localism perspective involves the creation of specific conditions that fit with local contexts (for example regulation policies, infrastructures, user's behaviour …) and that interact with different scales to help the emergence and the development of local active and sustainable communities. A strong diversity of stakeholders from civil society, industries or public actors, is concerned or could be enrolled to participate in the maturation of grassroots projects, local initiatives and emergent business model development, in order to support the transformation of diverse industries in local areas.

Through the specific context of the French Region Nouvelle Aquitaine, this paper focuses on the transformation of the textile and fashion industry within the cosmopolitan localism narrative. More precisely, the objectives of this research are to explore the development of local business models within circular textile activity. This paper points out the diversity of challenges that entrepreneurs are facing at a technological, social and policy level.

Literature Review

Recent actions and studies have been undertaken to transform the fashion and apparel system toward sustainable practices (Niinimäki and

Hassi 2011; Armstrong et al. 2015; Boström and Micheletti 2016; Wang et al. 2014; Santos et al. 2016; Pal 2017). New models are being developed like remanufacturing, (Dissanayake and Sinha 2010, 2015; Sinha et al. 2014), zero waste patterning (Rissanen and McQuillan 2016), upcycling processes (Aus 2011), slow fashion design (Fletcher 2013; Cataldi, Dickson, and Grover 2010). Earley (2017) identified ten design strategies to help designers reach sustainable fashion practices: design for cyclability, sufficiency and ethical production, design to minimize waste and reduce chemical impacts, energy and water use, design that explores clean and better technologies, dematerialization, systems and service development.

Quagliana (2013) offered a synthesis through the description of a sustainable business model archetype for the textile and fashion industry that defined three strategies respectively corresponding to technological, social and policy level of changes:

1. A new way of sourcing materials (selection of new products and materials - such as organic cotton, hemp, milk fiber, wood fiber, nettle, recycled leathers, recycled boat sails) and structuring the value chain within fair practices and adapted technological processes,
2. A responsible and pro-active consumer who is more attentive to the multiple use of a garment, to buying clothes with less impact on the environment, to the maintenance of clothes; a consumer who can be ready for new practices such as renting clothes, buying second-hand clothes or paying for quality and who cares about working conditions and worker fulfillment.
3. An active participation of government imposing or proposing new policies like the adoption of new certification labels, importation taxes and financial support for sustainable practices.

Such business model changes can occur in existing or emergent organizations, from different sizes and levels of maturation. They will affect the path of creation of projects, their dynamic and temporality (Real et al. 2015) as well as each dimension of their business models: the value proposal, the supply and value networks, the financial and governance models (Vurro, Russo, and Perrini 2009; Bolton and Hannon 2016). Different authors, such as Boons and Lüdeke-Freund (2013) or Bocken et al. (2013) focus their research in analysing sustainable business models and are looking for different ways to support stakeholders in the adoption of innovative practices at all stages of sustainable business model design processes. Recent works analyse more precisely the characteristics of sustainable business models related to a circular economy, which includes practices associated with the circulation of flows in networks (Roos 2014) and different strategies to make

products last longer such as reuse, repair and consumption reduction (Planing 2015; Gelbmann and Hammerl 2015; Antikainen and Valkokari 2016; Bocken et al. 2016; Lewandowski 2016).

The Triple-Layered Canvas (Joyce and Paquin 2016) integrates two layers of the classical business model canvas (Osterwalder 2004): the environmental canvas, which is inspired by the life cycle approach and the social canvas, which includes dimensions like the modes of governance, the role of employees and users as well as the project integration in local communities.

The sustainable business model approach is suggested by Lizarralde, Tyl, and Bonvoisin (2014) and Tyl, Lizarralde, and Allais (2015) that encourages designers to revisit the different components of a business model from a localism point of view. They present a business model that takes into account local needs and characteristics in the value proposal, favors local suppliers and local raw materials, prioritize local venture capital and supports local employment and local dynamism (Table 1).

A more radical and strongly sustainable view of the business model approach is highlighted in recent works introducing the importance of the integration of the *conviviality* concept in the design process, advocating for alternative practices to industrialised ones. Conviviality criteria highlights users' autonomy and creativity as well as the use of local, traditional, and simple techniques that are key dimensions present in the cosmopolitan localism narrative.

The "conviviality" approach (Illich and Lang 1973) criticizes industrial productivity and emphasizes the necessity of pursuing the satisfaction of human needs through the contributions of autonomous individuals in tools development. A technology is defined as *convivial* if it is decentralized, democratically controllable, and reversible, subordinated to the values and ends commonly negotiated and accessible in terms of knowledge and affordability (Muraca and Neuber 2017). Two design tools were developed to help designers to adopt conviviality in their practices: while the first one, from Lizarralde and Tyl (2017), encourages them to overcome the five main threats to conviviality (the biological degradation of the ecosystem, radical monopoly, over-programming, polarization, and obsolescence); the second tool entitled "*matrix of conviviality*" (Vetter 2017) invites designers to consider different trade-offs based on different dimensions in tension (access, adaptability, relatedness, bio-interaction, appropriateness) when designing products and services taking into account all life-cycle stages (material, production, use).

Method

The comparative study proposed in this paper is a reflexive analysis based on a set of participative observations that occurred during the development of the European RETRACE project. The project is based

Table 1. Comparison of sustainable business model innovation studies in a cosmopolitan localism perspective.

	Sustainable Fashion Business model archetype Quagliana (2013)	Triple-Layered Canvas Joyce and Paquin (2016)	Localism Business Model Lizarralde and Tyl (2017)	Matrix of conviviality Vetter (2017)
Path of creation	–	–	–	–
Territory	–	X *(Social)*	X	X
Materials / Resources	X *(technological)*	X *(Economic + Environment)*	X *(local)*	X *(All)*
Process/ production		X *(Triple)*	X *(local)*	
Networks People awareness and autonomy	X *(Social)*	X *(social)*	X *(local)*	X *(Access, Appropriateness, relatedness)*
Networks External stakeholders	X *(Economic + Social)*	X *(policy)*	–	–
Revenue model and financial investment	–	X *(Economic)*	X *(local)*	X *(Access)*
Governance model	–	X *(Social)*	X *(local)*	X *(Relatedness)*
Planet / Environmental impact	X	X *(Environment)*	X *(eco-design strategy)*	X *(Bio-Interaction)*

on a systemic design methodology (Barbero 2018). The Nouvelle Aquitaine region was one of the five territories of application. Retrospectively, four cases were chosen and a grid of analysis was built in order to better understand the diversity of local business models.

Participative observations at systemic level (local, regional, interregional)

From April 2016 to February 2018, researchers have actively participated in the first stage of the RETRACE project consisting of the co-construction of a regional action plan with local stakeholders. This plan contained new policies that emerged from a systemic design process that consists of three main activities: a holistic diagnosis of the region, interregional field visits that permit the analysis of 56 good practices in seven European regions, and four stakeholder meetings.

Thus, researchers were involved in different actions where participative observations were realized at different levels (local, regional, interregional) to explore the development of business model innovation in a cosmopolitan localism perspective.

1. At a local business model level, researchers have participated in different stages of maturation of the four local circular fashion projects described below. They also contributed to the analysis of business models for fifteen good practices in Nouvelle Aquitaine that were observed during the RETRACE project. Semi-structured interviews with project owners and a questionnaire based on fifteen questions enabled precise description of each good practice (context of emergence, development, partnership, difficulties, type of support …). Five good practices were dedicated to the textile and fashion industry.
2. At a regional level, researchers were responsible for the holistic analysis, i.e. the analysis of the metabolism of Nouvelle Aquitaine for the textile and fashion industry (see illustrations of this analysis on Figure 1.) They were also involved in the working group designing the regional roadmap for a textile circular economy.
3. At interregional level, researchers analyzed eight good practices for textile and fashion applications. These practices include the transformation of natural fibers or agricultural waste (Katty Fashion[2], Greenwolf[3], Pottias[4], Fruit Leather[5]), the development of sorting centers for used textiles (Le Relais[6], Koopera[7], CPU[8]), new models for upcycling (Redu[9], Kalopsia[10], Kameleonik[11]) and new recycling processes (Econyl[12]).

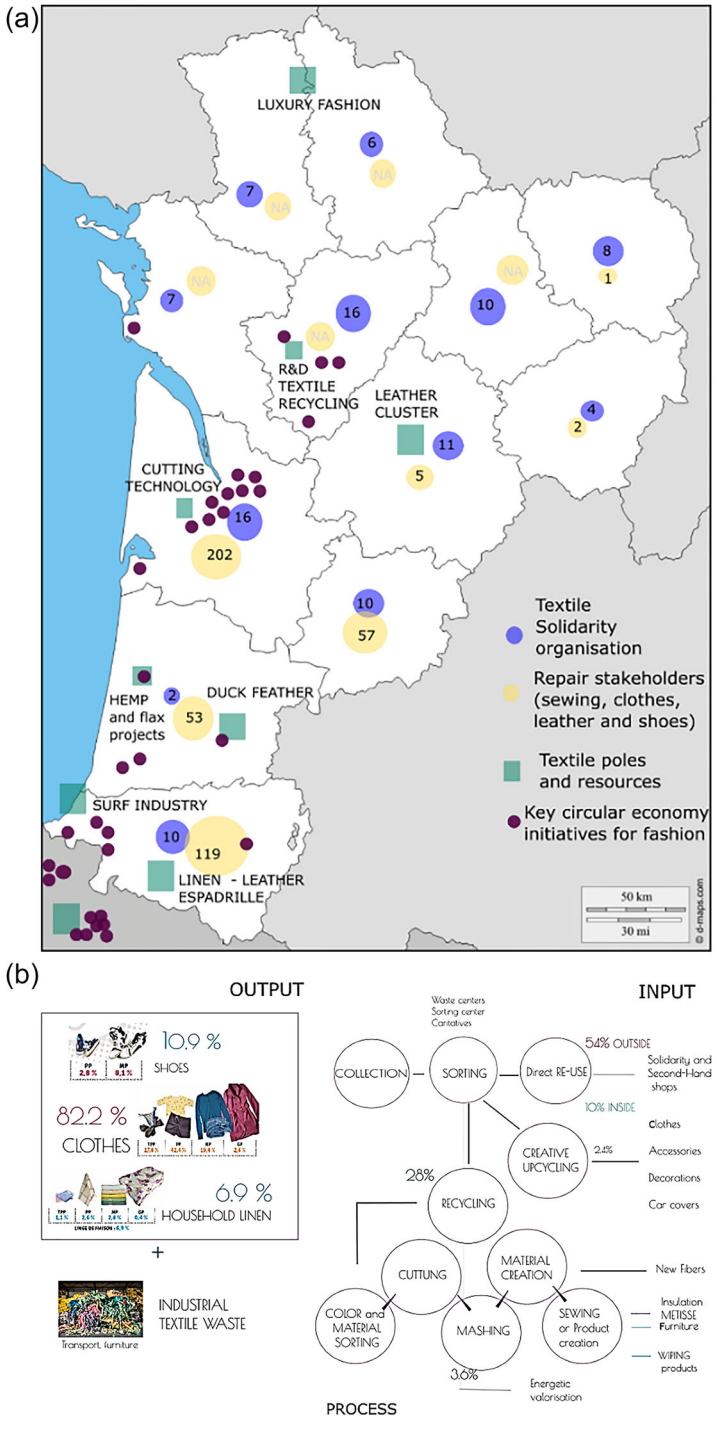

Figure 1
(a) Mapping of textile and fashion network (textile solidary, repairing, circular textile, clusters) in Nouvelle Aquitaine, (b) Input-Output process of used textiles.

Table 2. Involvement of researchers and research material for each selected project.

Projects	Self-assessment of immersion level	Description of the participative observations from project holder and researcher perspectives	Collected research materials
OH	*Medium* (20h)	• OH: Participation in RETRACE workshops and to a field visit. • Researcher: Volunteering in 4 events, courses informal discussions with the project owner	Event communication materials, RETRACE reports, Research diary
AUP	*Medium* (10h)	• AUP: Good practice analyzed in the RETRACE project, phase 1; active stakeholder to the RETRACE project • Researcher: One interview with project owner and product designer	RETRACE Forms of 15 points (see annexe1) RETRACE report, Research diary
R	*Strong* (40h)	• R: Active RETRACE stakeholder • Researcher: Animation of a series of 6 workshops and co-design of the upcycling design process. (10 meetings and 2 visits of companies)	Documentations (business plans, territorial analysis) RETRACE report Intermediary objects and photos of design workshops Research diary
NUSU	*Low* (2h)	• Researcher: Participation of one conference/discussion with the presence of the project owner.	Documentations through websites and notes from a responsible innovation intermediary agency.

Comparative analysis methodology

The case studies were selected according to three indicators: (1) the territorial perimeter of the main activities (in Nouvelle Aquitaine), (2) their ability to re-value local resources (natural fiber or used clothes or industrial wastes), (3) their participation in a social business model innovation process (early stage of maturation, involvement of local stakeholders). Four cases of local business models were chosen: a co-working community of sewers (OH); an industrial upcycling center and circular economy ecosystem (AUP); a creative reuse center for the South Basque Country (R) and a brand to promote the local use of a natural resource (NUSU).

For each case, research materials were collected through a folder dedicated to RETRACE activities and a fuzzy research diary was elaborated throughout the project. Materials varied according to each case - from documentation (meeting reports, events communications, website content), intermediate objects of design (sketches from meetings, visual designs) to official RETRACE documents (forms, video, action plans, and holistic analysis report). This variability can be explained by the involvement of the main researcher in each project. The immersion level

of the researcher in each project was estimated through a relative self-assessment (from low to high level of immersion) and described in term of activities or times in Table 2.

To compare each case, a grid of analysis was built by comparing the 15-question form used in the RETRACE project (*see Appendix* for AUP) with the literature review presented above. (see Table 1) The grid is composed of the following components:

- "*Path of creation*" consists in retracing the main evolutions of both the concept and the stakeholder network in the early stages of the sustainable project development.
- "*Territorial scale*" aims at defining where the resources are collected, where they are produced and consumed.
- "*Materials/Resources*" defines the type of resources and the different ways used to collect them.
- "*Processes*" is a large criterion for outlining the layout of activities, the design guidelines and the type of technologies used in the core of the project (convivial or not).
- "*Revenue model and financial investment*" refers to how projects capture their financial value.
- "*Governance model*" is about the juridical form and the mode of management (horizontal/vertical) chosen by project holders.
- "*People autonomy and cultural dimension*" questions how a project is anchored in the territory and how it can empower users, citizens, employees giving them the opportunity to self-learn, use/reuse and repair.
- "*Planet*" discusses the effective environmental impacts of the project on a multi-criteria line like human toxicity, smog, global warming, eutrophication and highlights the avoided negative externalities related to the notion of destroyed, missed or wasted value.

After comparing each case through the grid of analysis, new challenges for business model development were listed and visually mapped through reflexive and introspective discussions with the researchers (authors of the paper).

Results

The following paragraphs present an in-depth description of each case and a table comparing them through each dimension of the grid of analysis.

A co-working communities of sewers (OH)

OH is a sewer collective created in 2012 situated in the French part of the Basque Country. The idea of the project owner was to help sewers

in gaining autonomy, mutualizing tools and networks while creating economically viable activities in the territory. A group of six sewers worked together to refine the concept and visit other similar initiatives. A directory of all sewers presented in the territory was elaborated upon and shared freely. The concept took form when they accessed a collective house in Cambo thanks to the city council. The activities can be summarized in four areas: (1) a co-working space for professionals which is composed of dedicated rooms (fabric storage donated by individuals or companies, a patterning room, a workshop with leather machines, and a classic sewing machine room). The machines were bought at small shops, donated or directly brought by sewers. (2) A shared service provision is collectively proposed to clients who want retouches, repairs or confection of clothes. (3) OH offers courses in sewing, tapestry, tricot, hook, leather confection taught by internal or external sewers at accessible prices for members. External courses are also animated by OH in regular and bi-lingual associative schools (Ikastola), in local events and retirement homes. (4) A commercial activity based in a shop selling local creations, second-hand clothes, fabrics and alternative haberdashery. Moreover, they organize a second-hand market each month, participate in local markets, events and alternative projects like the local currency. They also created *HE OH Pesta (*"Hihaurk Egin Orratzetik Hari"), an annual fashion show dedicated to local creators. In March 2017, OH had 43 members, employed one part-time social employee, two sewers were benefitting from the co-working space and around ten fashion designers were selling products in the shop. The financial model is based on a multiple source revenue: training revenue, membership fee for individuals and a win-win model for professionals who have access to working place, networks and shop in exchange for a small fee and an active participation in OH.

An industrial upcycling center and circular economy ecosystem (AUP)

The idea of the AUP project emerged in 2012 aiming to create an activity within the circular economy and based on technological innovation. South Aquitaine regional authorities were solicited to identify specific local needs and waste streams. Based on the upcycling concept, 8 people (designers, professional integration and sustainable development experts) were mobilized to define the foundations of the project at a semi-industrial scale. After a six month internal opportunity study, work with an external consulting structure and the attainment of approval for a social inclusion project issued by the Committee CDIAE (Departmental Council of Integration through Economic Activity), the social workshop *"du déchet au design*" ("From Waste to Design") was launched in 2014 at Cap Breton, in the Landes department. The main activity of the enterprise consists in manufacturing eco-designed furniture from waste collected in the territory. The physical workshop combines recycling and

eco-friendly design, eco-designed industrial processes for operating a transformation into new items/products with higher added value. The price strategy follows the philosophy that high-quality and rare products, made locally, have to be re-valued through adapted but high purchasing prices. A partnership with the Camif enterprise (a sales platform for eco-designed furniture) was chosen to optimize the product distribution.

In 2016, the team stabilized the upcycling processes. After wooden furniture, they integrated textile scraps from companies into their products by investing in adapted tools (scissors and semi-industrial crusher) and human resources (two full time social jobs). Textiles scraps are sorted, cut, ground and directly used for cushion padding.

The project enabled the recruitment of more than 19 employees (12 social work jobs, 1 administrative job and 6 permanent jobs) and the collection of 145 tons of waste in 2015. Half of the collected waste was treated in a more environmentally responsible recycling process and the other half was directly upcycled or reused. Customers who buy upcycled products from AUP comprise 45% individuals and 55% companies (data from 2015). AUP's success relied on relevance in competence management and an important ecosystem of stakeholders. The organization currently works with about fifty companies: thirty from the collecting activity and thirty from the upcycling activity (including ten from both activities).

Since the second half of 2016, new perspectives have been developed such as (1) the implementation of a modular spin-off of the API'UP model to be deployed in the French territory, or (2) the emergence of a new project which manages a unit composed of a material library, a numerical technological platform and an exhibition and storage place for designers, craftsmen and small companies to create limited series productions.

A creative reuse center for the South Basque Country (R)

R is an association of social economies based in Hendaye created in May 2015, by a group of eight people. There are fifteen active volunteers working in the association on different fields of interest. R is defined as a creative reuse center i.e. a structure of the social economy that offers a second life to waste through implementing four functions: collection, the valuation of objects, the resale in a re-use shop and environmental awareness. To start their activity, R has realized an important characterization of the territory to analyze the potential of waste in local waste centers and in companies thanks to the MCOPR© tool (Methodology of characterization of potentially reusable objects) developed by the Ressourcerie Network[13]. Thirteen sessions in six waste centers corresponding to 30 h facilitated the study of the type of waste potentially reusable in the South French part of the Basque Country. It showed a potential of 1717 tons of which 884 tons would be reusable;

6% of local waste presented by waste centers corresponded to Clothing, Linen and Footwear (CLF) products. The collecting will be realized in partnership with local CLF partners who already have 21 collecting points in the territory. Avoiding the exportation of reused textiles is at stake with these stakeholders. Since the end of 2016, R has developed monthly open workshops where members can learn and share practices on how to repair jeans, sew a tote bag, hook sponges (Tawashi) or practice trapilho (create recycled yarn) . Since March 2017, the association has also implemented a participative upcycling design process to realize a first clothing and accessory collection. It consists of five steps: (1) Developing a partnership with companies or waste centers, (2) Collecting and characterizing of materials (type, quantity, quality), (3) Designing and prototyping pieces thanks to a trend map, drawing and quasi zero waste patterning tools, (4) Preparing and cutting fabrics with cutters and scissors, (5) Confecting garments and accessories with three classic domestic sewing machines. Complementary machines can be provided by external practitioners and local companies. One systems designer, two product designers, one sewer, three other members of R and employees of waste-owner companies are involved in the process.

R is now experiencing different ways to endeavor their implementation in the territory. Since 2016, they have rented a place in partnership with the city council where they organize participative workshops and structure the association. They organize a free-zone with city neighbors; they are part of a creative project for revitalizing the train station area; they manage a self-help bicycle workshop and are looking for a larger area for the future Ressourcerie. The revenue model is principally based on selling reused and upcycled products, training on environmental awareness in local structures, small membership fees, and occasionally from regional and European funds.

Nunti sunya, a Brand to promote the local use of hemp as a natural resource (NUSU)

In 2013, *Les Chanvres de l'Atlantique* were initiated as a project aim to cultivate and process hemp in all its forms. Hemp culture has an important history. It is one of the fastest growing plants and was one of the first plants to be spun into usable fiber 10,000 years ago. It can be refined into a variety of commercial items including paper, textiles, clothing, biodegradable plastics, paint, insulation, biofuel, food, and animal feed. For centuries, its culture was limited due to the development of plastic fibers and to the use of some of the species as a drug (cannabis). The legality of industrial hemp varies widely between countries according to their biochemical compositions and uses. The brand NUSU was created in 2016 with 50 hectares of hemp planted in May 2016 and harvested in August, thanks to the acquisition of a seed scarifier. The brand relies on a local network of about 20 organic farmers, with a target of 200 hectares of crops. For the moment, the company's

activities are the cleaning and sorting of the seeds. They recently invested in processes for hemp oil production with the ambition to develop several processes for relocating the multiple uses of hemp in the territory. Nunti Sunya has a strong commitment in the regional network and benefits from the support of the surf and outdoor cluster Eurosima[14], the incubator Domolandes and the regional council. While investigating production processes, the company has created a community around the value of well-being and responsible consumption hidden behind the use of hemp in everyday life activities: feeding, clothing, insulating. They sold hemp products like T-shirts and oil produced in Europe, they raise awareness through educational workshops and active participation in alternative networks like Antifashion[15] and participate in lobbying for policy changes (Table 3).

Discussion

These cases represent a small part of the textile and fashion circular initiatives present in the Nouvelle Aquitaine region. They are not exhaustive but permit discussion of the diversity of circular textile niches development into regions regarding their business models (type of resources, modes of production, governance and financial models, environmental impacts or social empowerment), their current necessities and interactions within the regional metabolism. The following paragraphs discuss different tensions observed in the different cases and highlight key challenges faced by social entrepreneurs in the design of local business models at both technological, social and policy levels. They are summarized and illustrated in Figure 2.

Convivial technologies

In line with the cosmopolitan localism narrative, this research shows that an important choice for entrepreneurs is the selection of the technology that will be used for the key activities of their project. The selected technology will influence the scale and the scope of the project, such as the required investment and therefore capital dependency, the autonomy level. Indeed, beyond "green" technologies, the cosmopolitan localism narrative calls for convivial technologies in order to experiment with new practices through local materials and know-how valorization, and closed loop systems work at a local level.

As previously stated, convivial "tools", from Illich's perspective, can be a means of production or offer of services, which can empower users and give them the opportunity to self-learn. Moreover, they keep the balance between self- and ready-made work, and between human activities and the biosphere.

In particular, the works of Lizarralde and Tyl (2017) and Vetter (2017) about the development of frameworks for convivial technologies identified two trade-offs that have arisen in this study: a) the scale of

Table 3. Comparative table of four local business model projects in the Nouvelle Aquitaine region.

	OH	AUP	R	NUSU
Paths of creation	2012 – Cooperation between independent sewers in a house Main supports: volunteers, local NGOs, local funds, city	2014 – From furniture to multi-material industrial upcycling center Main supports: European/national funds, regional agencies, eco-organisms	2015 – From reuse to self-learning and upcycling center Main supports: volunteers, local NGOs European fund, regional agencies, cities	2016 – Local Hemp production with a multi-application perspectives Main supports: incubator Domolandes, surfer and hemp communities, regions
Territory scales	City of Cambo + Basque country	Regional collection + production in Cap Breton - National selling via platform	All in South Basque Country 69 723 habitants	Production in LANDES International commerce via online website
Materials / Resources (type and collection)	Used clothes Donation	Used textile (industrial left-overs) Service provision with companies/eco-organisms/ waste centers	Used clothes and industrial textile waste Donations of different materials Individuals/Waste centers/companies	Hemp Local culture of hemp fields. Conventional seeds
Processes and technologies	Individual creations Collective shops Reused cutting and sewing machines	Design > Collection > Standardization > production > selling Scissors and a semi-industrial crusher	First collection process and weekly design/ production workshops Donation of machines or purchase of low cost machines: 3 sewing machines Mutualisation of maker spaces	Cultivation, cleaning, sorting Production for textile products in Romania Hemp scarifier
Revenue model financial investment & needs	Monthly second-hand shops Creators shops /Market selling Designer' rent Training Membership fees 2 social jobs	Service provider: collection, reuse and training High price products Franchise models More than 15 social jobs Regional funds	Free space and market Membership fees Selling products Free or low prices for reusing and fair/ ethical/medium prices for upcycled products.	Selling hemp products Pricing strategy according to industry (food or clothing)

(*Continued*)

Table 3. (*Continued*).

	OH	AUP	R	NUSU
	Access to a low rent by city hall		2 Social jobs Regional/ European funds	
Juridical forms/ governance model	Association Independent brands for local sewing. n.a	Association Perspective of creation of a new commercial structure with external shareholders. Strong leadership/social entrepreneurship	Association Future cooperative "SCIC" Open/direct democratic value	Company SAS "Chanvre de l'Atlantique" Brand: Nunti Sunya
People awareness/ autonomy/ Cultural dimension	Integration in local events and territorial animation Schools / Accessible courses / Sharing tools & experiences	Value creation / training path/ reinsertion for social employee. Training addressed to professional and customers. Intervention in N.A networks No citizen access	Local networks Autonomy by sharing freely knowledge and products Accessible learning	Ambassador of hemp virtues and part of hemp community Invested in Anti-Fashion movement
Planet	+ Improvement of LCA in use and end of life stages. + Working with fabric scraps + Short-loop transports - No defined eco-design practices.	148 tons of wastes collected in 2015. (50% upcycled + 50% recycled in eco-organisms/waster centers) Eco-design value sharing through functional design and life-cycle thinking	Potential reuse of 7% of local waste presented in waste centers for textile products. Integrated guidelines of eco-design	+ No herbicides, fungicides and insecticides are needed to grow industrial hemp. It Favors insect pollinators + 11 times less water than cotton T-shirt - Transport/weaving for T-Shirt and Packaging

the project and its capacity to be embedded in a regional circular economy dynamic, b) the accessibility and adaptability of technologies, to empower users as well as to be shared amongst users.

Exploring the appropriate scale of production

The conviviality level of a technology is particularly linked to the critical scale of means of production. The four cases analyzed have chosen small-scale technologies with different levels of automatization. OH and R are based on manual production units supported by small machines, so they keep their activities within a limited area (at the Basque country territory level). AUP and NUSU choose semi-industrial technologies, shaped to work with regional stakeholders.

Therefore, the four cases are sized to be part of a decentralized economy to better fit to local needs and local flows of materials, in line with a regional level of circular economy. Despite some opportunities to develop larger scale of production, entrepreneurs have limited the production level to a more local scope (from city to regional scope), reducing or avoiding the importation of materials from other regions (even if they are considered to be green materials).

Designing for accessibility and adaptability

Secondly, convivial technologies also refer to accessibility and adaptability, meaning the ability for people to have open access to technologies but also not to be dependent, or "linked" with a technology. Accessibility of technologies describes the access to both material and immaterial necessities (Vetter 2017). In line with the Open Source movement, it means that tools and knowledge can easily be shared and freely disseminated for practitioners and users. This issue is crucial to avoid concentration of technologies for a small part of the population. This is the case for example of OH, which gives access to co-working spaces for sewing, patterning and other activities. Accessibility can also refer to immaterial resources, such as knowledge, and documentation. OH and R organize training sessions for different stakeholders and provides the possibility for users to access tools for self-learning. This enhances the empowerment of local stakeholders.

Adaptability concerns the choice for the user "to decide whether one wants to be independent or linked" to the technology (Vetter 2017). Practically, it means that convivial technology is closely related to the level of autonomy of the entrepreneur. In the four cases, the entrepreneurs have paid attention to the linkage they build by the choice of the different technologies. In the NUSU case, the entrepreneur depends on hemp farmers for the development of the activity. Both actors depend on specific machines to harvest and transform this fiber. Therefore, the risk for the structures is to be too dependent on the technology they chose. In such a case, these specific means of production can threaten

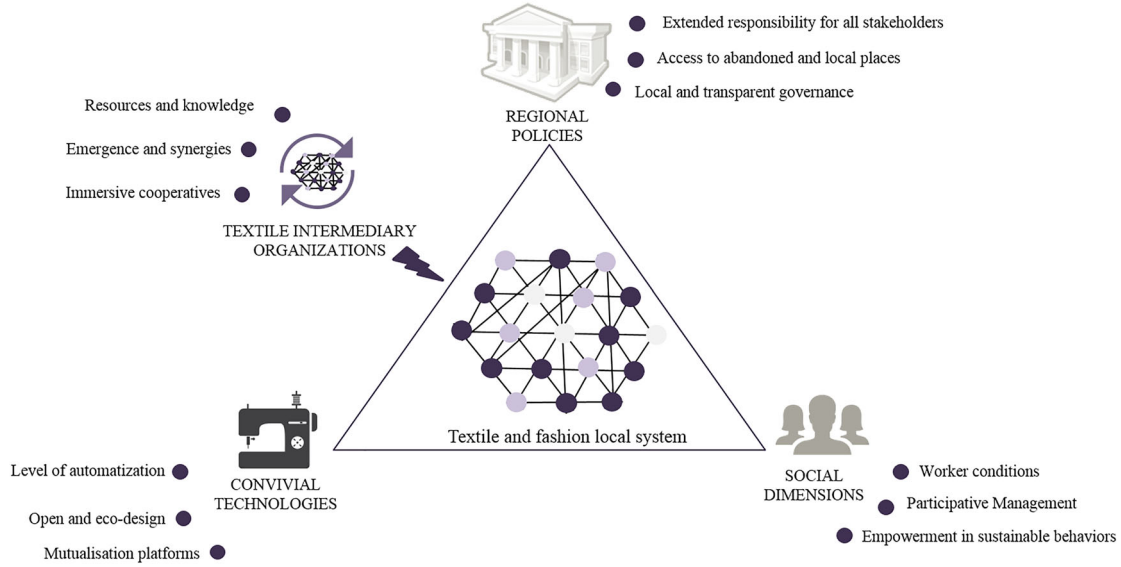

Figure 2
Visual mapping of the diversity of local business model challenges from Nouvelle Aquitaine region case-study.

people's capacity to do basic activities by themselves. This is one of the reasons why NUSU attempts to deal with the complete cycle of the hemp and controls, together with the farmers, the seeds, the agriculture typology and the machines that are used for harvesting and transforming the fibers.

Social dimensions

Social dimensions of activities refer to how an organization creates or destroys value for its stakeholders (N. Bocken et al. 2013; Joyce and Paquin 2016). The different cases underline three major social challenges: managing fair practices for workers, facilitating transparent processes of governance and empowering users in sustainable behaviours.

Managing fair practices for workers

As introduced in the four cases, local initiatives have succeeded in creating "social jobs". The latter are destined for young people, long-term unemployed, or people with social, cognitive or physical disabilities. AUP, for example are facilitating the insertion of people within a working period that includes training sessions. OH has also employed people through specific widely used social contracts with associations.

These kinds of jobs aim to facilitate the (re)integration of people and are financed in part by regional or national government funds. However, these social contracts only concern one part of the population

(excluding sometime qualified people) and have a limited lifetime of two years in general. Indeed, opting for social contracts in a long-term perspective can limit the autonomy of the organization by creating both a dependency loop on public funds and an important turnover. One major risk for the analysed cases is to build their revenue model mainly based on these contracts, employing social jobs in order to have public funds and forgetting the social dimension of such practices. Structures rely on employees with precarious situations who always need to find funds to guarantee their jobs (for example OH).

Moreover, social initiatives also relied on an important group of volunteers. OH for example is a collective with only one employee for more than 100 members. The structure has to find a balance between employee/volunteer task partition and to manage the involvement of workers to avoid burnouts or potential social conflicts. It involves an endeavour of rapid task rotations by setting up an efficient knowledge capitalization system or finding means to encourage long-term empowerment.

Facilitating transparent processes, participative and common value-based mode of governance

The governance defines which stakeholders are engaged with the organization and how the organization integrates them in the decision-making process (Joyce and Paquin 2016). Whatever their judicial status (association, company, collective), the initiatives identified in this paper have integrated public institutions (except OH) and/or territorial stakeholders in their governing board. This permits a direct connection with territorial decisions and can be used as an entry point to facilitate the social integration and the financing of projects. Nevertheless, the authors also observed that stakeholders were not all represented in the governance such as employees, activists, citizens, other NGOs (non-governmental organizations). Discussions with project owners have highlighted the need to enlarge the representation of all stakeholders and to propose a participative and transparent management able to redefine collectively the "commons" of the project and decentralize decisions: several tools (OECD 2010) exist to facilitate the involvement of people in the definition and assessment of projects and decisions. Some examples used in the observed projects are self-assessment grids, votes by consent or non-verbal modes of communication.

Empowering co-producer/user/consumer in sustainable behaviours in the textile industry and local initiatives

A shared difficulty over the four observed projects is their lack of support for the project towards more sustainable behaviour. Even if they are proposing many educational workshops and selling products which are created using eco-information, eco-choice or eco-spur sustainable

behaviour strategies (Tang and Bhamra 2008) the numbers of consumers involved in grass root projects seems still limited or reduced to already sensitized people. New strategies need to be tested to enlarge these communities. One inspiration could be to develop a "prosumer" strategy (Toffler and Alvin 1980) i.e. to support and involve people in local initiatives, through design workshops, in order to change their consumption. Various consumer interventions were identified by Sinclair et al. (2018) to envision redistributed manufacturing futures during all the life-cycle of products: crowd voting, co-design workshops, social platform of products, makerspaces, on-demand manufacturing platforms, social media campaigns, uberisation of delivery, self-(dis)assembly, do-it-yourself practices, repair, upcycling… At each step, knowledge, ethics, perseverance and curiosity of consumers will shape the effective adhesion to sustainable practices.

Even if some of these practices have been identified within the practices of OH and R, a higher "prosumer" strategy could engage other types of users in more sustainable behaviours.

Interactions within the regional metabolism

The study illustrates that the development of local initiatives is particularly determined by the regional metabolism. Their business models are constrained by existing local policy frameworks and these initiatives are involved beyond their "project perimeters", through different regional clusters, stakeholder networks, and textile expert intermediaries.

Local initiatives embedded in policy frameworks

The analysis of different stakeholders in the Nouvelle Aquitaine region underlines that local and regional policies can restrain the incubation of projects. In particular, local initiatives in textile faced several difficulties in relation to policy. The first one is the access to buildings to develop their activities. For example, R and OH have found a building (lent by the municipality) but not adapted to their activities: OH is located in the center of the city but in temporary places, and R is located in the urban sprawl, far away from the public.

Secondly, contrary to stronger industrial companies, new social and small-scale projects have difficulties in financing their means of production, their research and development investments and consequently the scaling-up of their project. OH and R cannot support all investment for the development of semi-industrial processes because only a few regional calls for projects are offered to support such initiatives. Moreover, project holders have difficulty in managing the development of proposals for project calls because of short-time demands and a lack of clarity and transparency from financial and public institutions systems. Indeed, social entrepreneurs are looking for clearer communication concerning

the mode of fund attribution, processes and modalities of interaction between supporting structures and local projects.

Enacting circular transitions by moving beyond scales, between local and regional territories

The comparison has also highlighted the presence of complex interactions in such projects with entrepreneurs that are often involved in multi-scale networks. The territorial perimeter for such projects is multiple and constantly moving according to their development concerning not only institutional territories (city, department, region …) but also production or distribution areas, supply or value networks and social communities. The study illustrates that the maturation of such business models could be in different localities or "pluri-local" (Buclet4242 2010; Tyl, Lizarralde, and Allais 2015) and highly depends on the ability of actors to mediate between different levels and enact transitions (Grin, Rotmans, and Schot 2010). For instance, AUP plans to develop different local networks of suppliers and workers in different regions, while actively participating in the development of national and regional studies and strategies on semi-industrial manufacturing. In the same line, even if R's area is above all located in the south of the French Basque Country, they are also involved in the regional network of repair workshops to develop their projects and their skills.

Catalysing circular economy in regions thanks to specific circular textile intermediaries

These observations point out the need for stimulation to guide the development of local business models as well as for catalyzing the interactions between top-down and bottom-up processes present in the regional metabolism. Supporting structures also called "intermediaries" in the literature (Howells 2006; Tremblay et al. 2012; Klewitz, Zeyen, and Hansen 2012; Agogué 2012) are disseminated within territories, from public bodies and their respective supporting structures dedicated to innovation (clusters, development agencies, etc.) to incubators, experts in circular economy, eco-design and environment or researchers through research-intervention approaches, design or engineering consultants, change-makers and non-governmental organizations (NGOs). In the RETRACE project, intermediaries have appeared as key stakeholders for supporting the development of local business models and circular economy projects into regions. However, the four cases were supported by different entities according to their own needs and level of maturity. The competence in circular design for textiles and fashion has been built by social entrepreneurs by means of personal skill backgrounds (sewers of OH for instance), try-and-trials approaches and various interactions with different intermediaries: agencies dedicated to circular economy and innovation (AUP, R, NUSU), eco-organisms and charities (R, AUP),

textile designers and makers (R, OH) or local and thematic activist communities (hemp and surf communities for NUSU). It appeared that no intermediary was dedicated to supporting social entrepreneurs toward circular textile and fashion even when the necessity for the development of specific textile intermediary organizations was pointed out by the researchers. Such intermediaries could potentially act as:

1. Knowledge providers on territorial metabolism (textile waste flow, new fibers opportunities), design tools and textile practices,
2. Catalyzers of new projects (facilitating the emergence of projects and synergies between organizations and people as well as avoiding delocalization and participating in rediscovering know-how on local fiber production and transformation techniques for both used textiles and new fabric development,

Frontrunners in the development of new textile and fashion practices for circularity and conviviality into regions are acting at both entrepreneurship (high level of immersion in local business model development) and policy (participation in the elaboration of new policies or the assessment of projects) levels.

Conclusion and Perspectives

This paper is an exploratory study based on ongoing action-research situated in the Nouvelle Aquitaine region of France. Through a comparative analysis, the paper outlines the effective diversity of circular fashion niches regarding their business models (type of resources, modes of production, governance and financial models, environmental impacts or social empowerment), their current needs and their interactions with the territorial metabolism.

Results of the analysis identify that the development of local business models involves a constant effort from social entrepreneurs to develop more convivial technologies and ensure the empowerment of users toward fair, cooperative and sustainable behaviours. They need to integrate innovative practices to find the "right" scale for production processes, and the relevant mode of governance.

The analysis of four case studies highlights that local entrepreneurs of such textile-oriented projects that need to develop a systemic approach to their activity, that is to say they have to develop links and relationships at different territorial scales in order to have both a top down approach (from regional to local policies or material flows) and a bottom up approach (starting from local users and customers). One solution for these projects is to be supported by intermediaries, who can help to find right scale solutions, to bridge the gap between their ambitions and their effective means, as well as to disseminate information at the different territorial levels.

The results of this study do not pretend to be generalized as the samples are too small (one region, four cases), but to give key insights for such emergent topics for future actions and research.

Indeed, this work outlines some perspectives for systemic design researchers and practitioners in the fashion and textile sector by transferring existing entrepreneurial and regional practices, and by providing methodological tools for analysing the diversity of local business models.

Future works will be realized that overlap the role of systemic designers and textile intermediary organisations according to the context of different regions. In parallel, efforts will be pursued in the local context of Nouvelle Aquitaine to support entrepreneurs in the maturation of their circular-oriented projects.

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Notes

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Appendix

Method to Identify Good Practices (Retrace Project)

1. Identify the Good Practice
   Describe the territorial influence of the policy, the number of activities/companies interested, the timescale of the good practice, the involved bodies/organizations
2. What is the background of the Good Practice?
   Describe the problem addressed and the context of the GP
3. What is the objective of the proposed Good Practice?
   Describe the objective, the target group and the needs the GP aims to satisfy
4. What is the content of the Good Practice?
   Describe the concrete activities implemented
5. What is the implementation process?
   Describe the process followed for practical implementation
6. Which is the aspect of the good practice related to CE and SD?
   Describe the specific practice of reuse/recycle linked to output-input concept
7. To which sectors does this Good Practice refer?
   Propose good practices from different sectors!
   Describe beneficiaries, the success factor and the lesson learnt
8. What are the main results achieved by the Good Practice?
   Describe beneficiaries, the success factor and the lesson learnt
9. How is it possible to improve this Good Practice?
   Describe the main difficulties encountered and further development or improvements foreseen
10. How is it possible to exploit the Good Practice?
    Describe the media used and the degree of transferability
11. Which innovation does the policy related to the Good Practice offer?
    Technical, environmental, social, economic innovation
12. Which aspect does this policy improve compared to other existing policies?
    Describe the most successful improvements introduced / realized
13. Which aspects did this policy supported the most?
    Cooperation, specific technical innovation, process innovation, measurement of environmental impacts, creation of jobs …
14. Through which supports?
    Non-repayable financing, subsidized financing, support in terms of competences, etc.