



The Design Journal

An International Journal for All Aspects of Design

ISSN: 1460-6925 (Print) 1756-3062 (Online) Journal homepage: <https://www.tandfonline.com/loi/rfdj20>

Systemic Incubator for Local Ecoentrepreneurship to Favour a Sustainable Local Development: Guidelines Definition.

Chiara Battistoni & Silvia Barbero

To cite this article: Chiara Battistoni & Silvia Barbero (2019) Systemic Incubator for Local Ecoentrepreneurship to Favour a Sustainable Local Development: Guidelines Definition., The Design Journal, 22:sup1, 65-83, DOI: [10.1080/14606925.2019.1595851](https://doi.org/10.1080/14606925.2019.1595851)

To link to this article: <https://doi.org/10.1080/14606925.2019.1595851>



Published online: 31 May 2019.



Submit your article to this journal [↗](#)



View Crossmark data [↗](#)

Systemic Incubator for Local Eco-Entrepreneurship to favour a Sustainable Local Development. Guidelines Definition

Chiara Battistoni^{a*}, Silvia Barbero^a

^a Department of Architecture and Design, Politecnico di Torino, Torino (IT)

*Corresponding author e-mail: Chiara.battistoni@polito.it

Abstract: Systemic Design (SD) has demonstrated over the years the ability to create eco-opportunities for innovation in the manufacturing sector. Despite SD projects high value, the implementation of these complex projects is difficult, although this can boost local economies preventing waste creation to reach a sustainable local development. This research investigates the relationship between design, entrepreneurship and environmental sustainability, questioning how best support emerging businesses created by SD, and reflecting on the incubation services that are needed to develop eco-opportunities. To sustain this thesis is analysed a project for the textile industry developed by master students in SD under the framework of RETRACE European project for Piedmont Region (Italy), the area on which the SD research group is reflecting with policymakers. The result is the definition of guidelines to ease SD projects implementation and design a new Systemic Incubator for local eco-entrepreneurship, highlighting the strategic role of systemic design.

Keywords: systemic design, eco-entrepreneurship, local economic development, zero waste, business incubator, textile, Piedmont Region.

1. Introduction

This paper is part of a PhD research on the relationship between design, entrepreneurship and environmental sustainability to understand how best support emerging businesses created by Systemic Design (SD) to boost local circular economies. More in detail, the paper aims at the development of guidelines to design new Systemic Incubators for local eco-entrepreneurship that can facilitate the implementation of Systemic Design projects.

The research started from the literature review on the relationship between entrepreneurship and environmental sustainability to understand the state-of-the-art and the way in which nowadays the business incubators are facing this topic. The emerging data is that the present research is poorly focusing on these aspects, for that reason this paper want to give a significant contribution in the definition of a new kind of incubator able to facilitate the present and future trend in eco-entrepreneurships. The literature review provides a clear picture of the current business incubator's services, so the authors can reflect on the guidelines for this new kind of incubators, thanks to the experiences of real case studies, especially the one on textile sector in Piedmont Region. The analysis of SD projects for the textile industry, developed in the framework of RETRACE project

(www.interregeurope.eu/retrace) in Piedmont Region (Italy), permits to understand more precisely the needs of potential start-ups and the services of the new Systemic incubator. The results aside from defining the guidelines to ease Systemic incubators for local (eco) entrepreneurship highlight the strategic role of Systemic Design on opportunities creation. This work is complementary to another one specific on the definition of the ecosystem required by Systemic Design projects (Battistoni, 2018) and will be completed in Battistoni's PhD thesis. Future works will focus on their validation.

2. Context

We are living in a situation of fast changes and interconnected problems, most of which have effects at the global level (Capra, 2014). The environmental issues as climate change, pollution, waste management and limited natural resources should raise the attention of every sector for their global impact and be tackled with more holistic approaches. Scholars have recently pointed the linear economy as one of the enemies, as Gast (2017) citing Littig and Grießler (2005) stated, supporting researches and projects related to the Green, Bio and Circular economy. The manufacturing sector seems the most affected one and will face a revolution in the near future especially in its production models, as Garetti and Taisch in 2012 defined with trends and research challenges.

Systemic Design (SD) has demonstrated over the years the ability to create eco-opportunities for innovation (Bistagnino, 2011; 2016) as the result of the systemic thinking applied to design approach. SD applied to the manufacturing sector, rethinking the production models and looking mostly at the input and output of matter, energy and information involved, can tackle the environmental, social and economic sustainability. Despite their high value, the implementation of these projects is difficult due to several aspects such as their complexity and as they require a shift in the cultural paradigm from competition to collaboration (Battistoni, 2018). However, their realisation it's essential for their role in boosting local economies preventing waste creation and release in the environment (air, soil, water) as demonstrated in several projects as Enfasi (Barbero, 2012).

Many authors have just underlined the strategic role of design in innovation development (Bertola, 2003; Celaschi, 2007; Franzato, 2017). Nowadays, the implementation of innovative products and services is delegated mainly to the big enterprises that have an inner R&D centre and funds to invest. In the case of the SMEs is depending on the CEO personal will to innovate and collaborate in projects financed with regional or European funds, as they lack an R&D centre in most of them (Barbero, 2016).

In recent years a new phenomenon, coming from the American context, has emerged in the European framework, the Business Incubators (BI) which are able to launch several innovative start-ups every year. BIs as "organisations dedicated to the support of emerging ventures" (Bergek and Norrman, 2008, pg. 21), are promoted as accelerators of entrepreneurship and able to create economic development with a bottom-up approach. On the other side, the political context continues to tackle problems with the top-down approach.

In this context, the research questions are: Which services do BIs provide to create entrepreneurship? Are BIs including reflection on environmental aspects? Do BIs have specific services for eco-entrepreneurship? What is the contribution of design, especially Systemic Design, in new eco-firm creation? How best support the implementation of eco and systemic projects into firms?

3. Methodology

The research started with a literature review to understand the current BIs' services and the role of sustainability in the academic world about the entrepreneurial context. At the same time, we conducted an analysis of a SD project, in this case for the textile industry, developed in the framework of RETRACE European project for Piedmont Region (Italy). From the analysis were obtained the principal opportunities and outcomes created and the problems related to the project's implementation. These findings are crossed with the results coming from the literature review to start drafting the guidelines for the new incubator, defining the users and the typology of services needed for each of them.

4. Literature reviews

4.1 Sustainability in entrepreneurial context

To obtain an overlook of the concept of sustainability in the entrepreneurial context, in September 2018 was made a review on scientific contributions in the two main databases, Scopus and Web of Science, crossing two main keywords 'entrepreneur*' and 'BI*' with the one that have (1) the same background and goal of SD: Green economy, Circular economy, Blue economy (Pauli,2010); (2) have the same research goal: sustainable development, sustainability, environmental sustainability; (3) have the same cultural background of SD as "holism". As it possible to notice from the results, graphically represented in fig. 1, topics around environmental issues are not very diffused in the scientific production around BIs, neither the concept of 'Circular Economy' nowadays very diffused. The main finding is the identification of a subfield which emerged from the research, 'Ecopreneurship'.

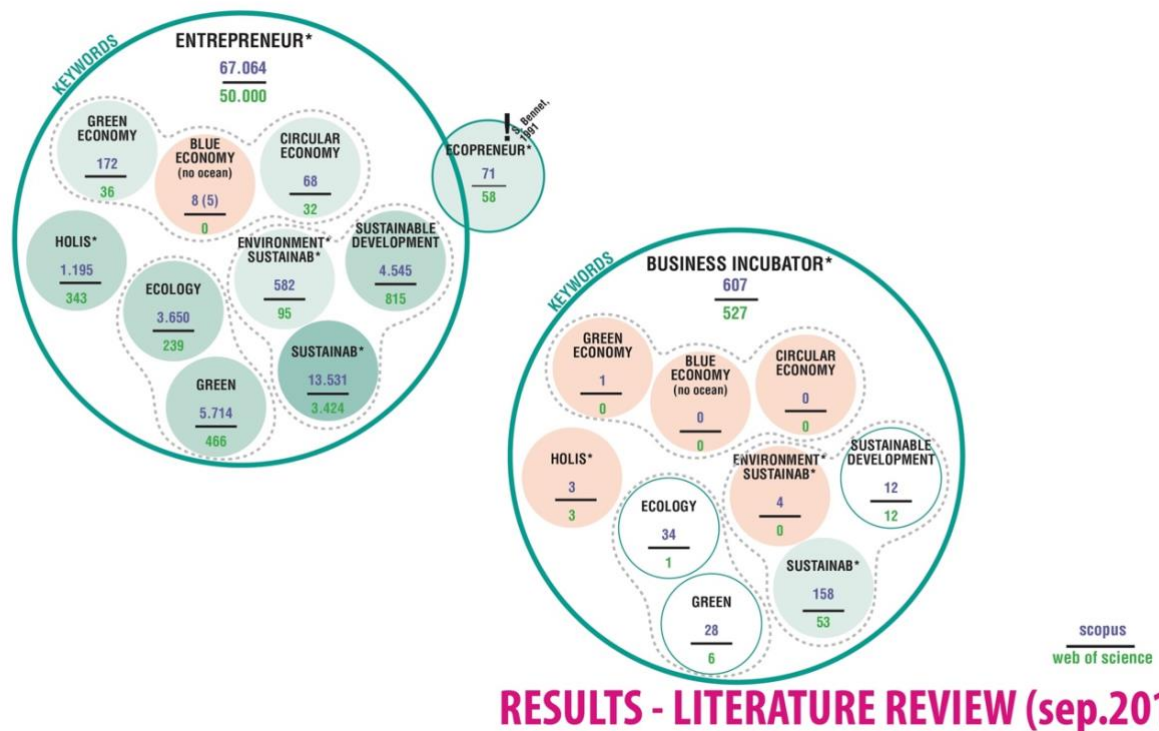


Figure 1 Results of the literature review in September 2018. In red, the topics without relevant results. In shadows of green the ones with relevant results.

4.2 Ecopreneurship

The intersection between entrepreneurship and environmentally and socially responsible behaviour is identified in 'ecopreneurship' referring to the movement defined by S. Bennett in 1991 (Holt, 2011). Santini in 2017 identified limits, trends and characteristics of this movement as:

- ability to shape the face of companies according to the belief set and motivations;
- inner tension experienced between making profits or going green;
- the role as a change agent;
- ability to establish relationships with multiple stakeholders;
- openness towards ecological and social responsibilities;
- co-creation, characterised by a high degree of creativity, collaboration and by a societal orientation, as a key issue (co-creation as opposite to customisation).

Gast et al. (2017) presenting the first systematic review of the literature on ecological sustainable entrepreneurship find a fragmented and inconsistent research field reflected in the variety of terms used such as "sustainable entrepreneurship", "ecopreneurship", "environmental entrepreneurship/enviropreneurship", and "green entrepreneurship" (Gast et al.,2017).

They stated the distinction between environmentally oriented (E.O.) and sustainability-oriented (S.O) entrepreneur as (Gast et al.,2017):.

- "E.O. entrepreneurs follow their motivation to earn financial benefits by helping to decrease environmental problems and ecological degradation";
- "S.O. entrepreneurs typically seek to solve societal and environmental problems through their entrepreneurial activities. As such, they are likely to focus on environmental, social, and economic issues simultaneously".

Finally, they defined ecological sustainable entrepreneurship as "the process of identifying, evaluating and seizing entrepreneurial opportunities that minimise a venture's impact on the natural environment and therefore create benefits for society as a whole and local communities" (Gast et al., 2017). Their literature review pointed out other relevant information about the topic as:

- "Sustainability-related entrepreneurship has become an essential area in entrepreneurship research";
- "four major motives for ecological sustainability: regulation, public concern, expected competitive advantage, and top management commitment";
- Advice: "entrepreneurs need to take an active role in seeking to balance economic goals with sustainability and environmental goals".

4.3 Business Incubators: goal, typologies and services

This other literature review had the focus to frame the phenomenon of BIs, understanding the typology of existing incubators, their goal and services.

In 2008, Bergek and Norrman individuated the BI goals as (1) economic development enhancement, (2) unemployment reduction, (3) entrepreneurs training, (4) firms stimulation in the commercialisation of research.

Arguing the role of Bi as a tool for entrepreneurship, Aernoudt (2002) framed the incubator concept as an umbrella for the presence of different approached associated with it. Moreover, he defined different types of incubators with different main objectives: (1) basic research incubators focused on blue-sky research and spin-offs creation; (2) social incubators on integration of social categories and employment creation; (3) technology incubators on entrepreneurship creation and stimulating

innovation; (4) economic development incubators focused on regional development and business creation; (5) mixed incubators with the goal to create start-ups and employment (Aernoudt,2002)

On BIs typologies, Barbero J. L. (2012) provided a classification by authors. One cited is the work by Von Zedtwitz and Grimaldi who shaped five incubator archetypes identifying moreover their competitive focus: (1) regional business incubators focus on local areas in which they operate, (2) university incubators on academic start-ups, (3) independent incubators on industry, (4) company-internal incubators on mostly-company internal employees, (5) virtual incubators on internet and ICT industry (Von Zedtwitz and Grimaldi, 2006).

Many scholars have focused their researches about BIs services. According to the benchmarking on BIs performed by the European Commission, three categories of business support services are identified (CSES, 2002):

1. "training;
2. advice on business issues;
3. financial support (either from an incubator's own sources or from external providers, i.e. financial institutions), and technology support".

In this European report, they added: "The provision of incubator units and networking (internally between tenants and externally with other organisations, e.g. universities, large companies) constitute the other basic features of the 'package'" (CSES, 2002).

The BI services identified by Von Zedtwitz and Grimaldi in 2006 are:

1. "Access to physical resources such as office space and IT infrastructure;
2. Office support services such as secretarial and mail services, security systems, and IT troubleshooting;
3. Access to capital, including seed money, venture capital, etc;
4. Process support such as mentoring, coaching, consulting, but also legal advice and bookkeeping;
5. Networking services, both incubator internal as well as external with customers, collaborators, and potential investors".

Moreover, they underlined that "four of five services are a minimal condition for an incubator as otherwise the service profile would be indistinguishable from real-estate agents, pure-play venture capitalists, technology transfer offices, or business angels" (Von Zedtwitz and Grimaldi, 2006). They also stated that:

"a differentiated analysis of these services within the context of different incubation objectives has been largely missing...incubator objectives are often developed in order to satisfy political or public demands...but incubator services depend on the background and proficiency of the incubator management team, we hypothesize that incubator service profiles are not perfectly matched with the incubation objectives" (Von Zedtwitz and Grimaldi, 2006, p. 461).

Bergek and Norrman (2008) identified "four components (that) have received particular attention in previous research":

6. "shared office space, which is rented under more or less favourable conditions to incubates;
7. a pool of shared support services to reduce overhead costs;
8. professional business support or advice ("coaching");
9. network provision, internal and/or external". (Bergek and Norrman, 2008, p. 21).

To conclude, the cited authors seem to agree on BIs services, however is possible to state that nobody cited topics around the environmental sustainability, but it was cited the regional development and the social sustainability. Although BIs are important and have positive aspects for new ventures development, they seem to have reductive services to face the current complexity of the world.

Starting from the BIs services begin the reasoning about the type of support needed by enterprises born from the SD approach to implement new business realities. This can answer to another goal settled, instead of focusing only on the economic sustainability and technological aspect: facilitate the start-up of new companies that can tackle the waste production to meet the needs of sustainability required by a complex and changing world.

5. CASE STUDY: textile industry in Piedmont Region

5.1 Systemic Design and RETRACE project in Piedmont Region

In Piedmont Region (Italy), thanks to the Interregeurope project RETRACE - A Systemic Approach for Regions Transitioning towards a Circular Economy -, the regional stakeholders are reasoning on the regional policies that are needed to reach a circular economy through the SD methodology (Barbero, 2017). The Directorate for regional system competitiveness (DRSC) has identified, thanks to the Holistic Diagnosis of the region (Battistoni, 2017), carried out within the Systemic Design research group, the principal manufacturing and production sectors where political actions are needed to create a Circular Economy in action. At the end of the first two years of the project (2016-2018) the DRSC had to develop the “regional action plan”, which is showing its results in the period 2018-2020. It is composed mainly of two calls for tenders in the framework of the POR-FESR 2014-2020 (European Regional Development Fund) to promote research projects in the Circular Economy context and a review of the regional strategy. It's important to underline that they are delivered through a top-down approach and that in this approach it's possible to find several obstacles as the difficulty for the regional SMEs to apply for these funds lacking for example an R&D centre in most of them (Barbero, 2016).

Another action supported by the DRSC in the framework of RETRACE project was the study of the current problems and opportunities in the sectors identified at regional scale, following the SD approach. In the first semester of 2018, the Systemic Design research group has conducted an analysis over around 20 manufacturing SMEs located in Piedmont Region that has shown their willingness to cooperate, after a call done in collaboration with the regional innovation pole. It was identified the SMEs segment regarding the fact that it is the one that drives the regional and national economy (Pedone, 2016). They were selected on the main sectors identified by the Holistic Diagnosis for the project as milk, meat, rice, fruit and wine (production and transformation); Textile; Production of building materials and Demolition of building; Organic Waste management. Thanks to the involvement of the students of the master course 'Open systems' in Politecnico di Torino, each productive chain was analysed through a field visit in the specific enterprise. Further, a specific complex project was designed for each enterprise, underlining its potentialities to change the production model and to reach a Circular Economy, following the SD methodology used in the master course (Battistoni, 2016) and the SD guidelines (Bistagnino, 2011): each output becomes input for the same or another process; creation of relationships and an autopoietic system; acting locally and with a human-centered vision.

5.2 Specific case study: Wool transformation in Piedmont Region

To understand the potential opportunities created by a SD project and to identify principal problems for their implementation, the project done for the textile industry is taken as example. Firstly, thanks to the field visit conducted by students in a company situated in Biella (TO), a Holistic Diagnosis was performed to understand the local context and all the inputs and outputs involved in the production that nowadays are raw resources bought, products sold and waste released in the environment. Subsequently, with a desk research, were found the principal problems at environmental, social and economic level.

Imported wool

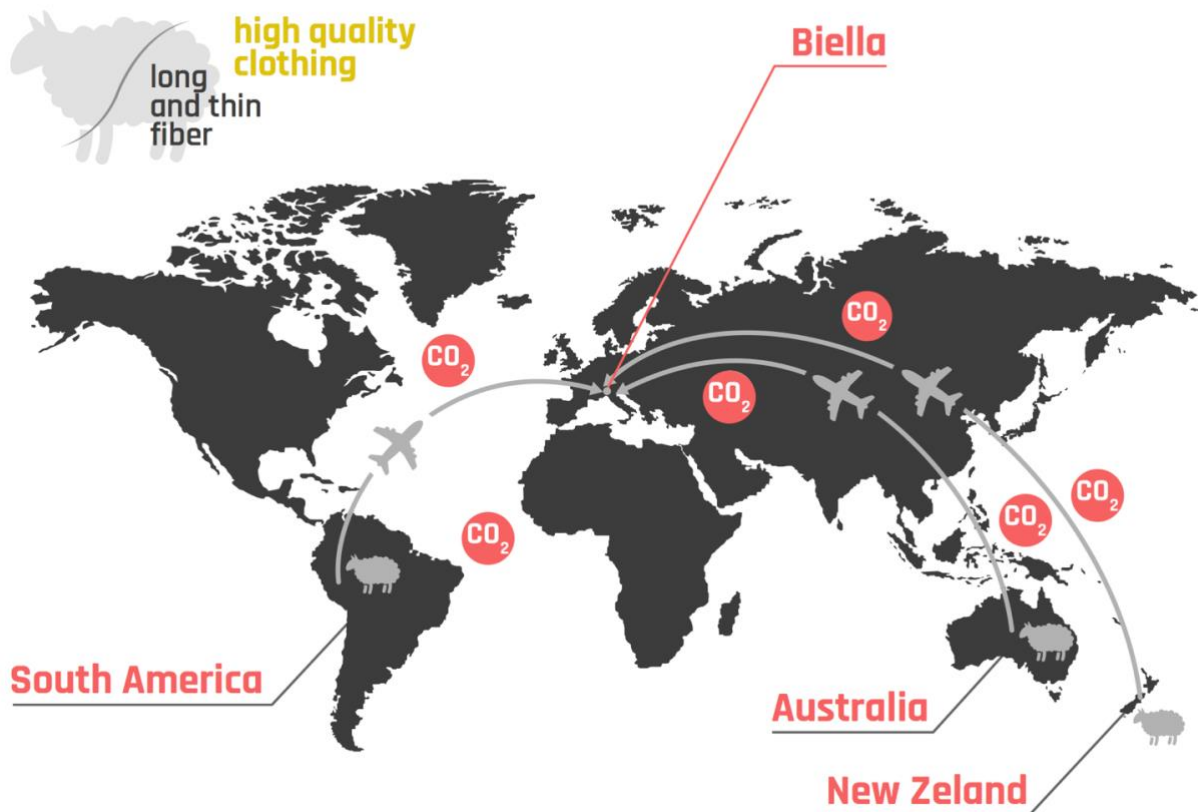


Fig. 2 current situation for the textile sector in Biella (Italy). Visual representation by students.

In Piedmont Region, the Biella district is globally well-known for its know-how in the wool transformation. Nowadays, they are treating the wool coming especially from Australia, South America and New Zealand to export it everywhere in the world, because the fibres from local sheep breeding are short and heavy (fig.2). This is causing principally a high environmental impact due to the transport system and leaving on Biella area many waste to manage. For around 350 t/year wool processed (data from the industry analysed), the process is using and producing as:

- around 900.000 kWh of energy - in the best case provided by solar panels;
- 60.000.000 l of water - coming mainly from the well that can reduce the quantity of water presents in the aquifers;
- around 34 t of short fibers and broken threads from the spinning – that are currently sold to retailers that are bringing their values out of the region;

- around 32 t/year of sludge from the treatment of water full of chemicals from the dyeing and cleaning.

Following the SD guidelines, many new opportunities were created to transform the problems into resources. The last step of this study was the reflection on the outcomes that these new production models can create at regional level at the environmental, economic and social scale (tab. 1).

Table 1. examples of opportunities created by the Systemic Design Approach applied to wool transformation, with related outcomes created. Each one are grouped in level of impact (environmental, economic, social and cultural).

OPPORTUNITY EXAMPLE	OUTCOME	LEVEL
Replacing synthetic colourants with organic ones	reduction of toxic substances in water, decreasing of temperature in dyeing process, decreasing in quantity of water used to dye, easier water purification	Environment
Use of local wool	decreasing transports	
New products and new production processes	increasing in the revenues increasing of job places	
Waste as resource (threads)	reduction of costs for waste disposals	
New fabrics from mixing local wool with imported one; fabrics from regenerated yarns	born of new products and value chains	
New raw materials in various combination for clothing and furnishing	born of new market sectors	Economy
Working with local farmers for organic colourants	increasing of partnerships	
Sharing of machinery between industries	sharing economy	
Necessity of organic colourants; Regeneration plant	opportunities for research on bio-materials and new technology	
Support to local wool farmers	support of local traditions	
Fab lab for textile prototyping; school for tailoring (fig. 7)	improving local competence / support to local know-how	
Communication and local shop	increasing awareness from the final buyers about the entire production chain, closer relationship between producers and final buyers	
Products quality increasing	increasing in well-being	Society and culture
Less noise, high temperature and dust in the working environment	increasing in the working conditions	
Creation of new fibers and fabrics (fig. 4-5)	creation of new job skills	
Creation of Fab lab and a school for tailoring (fig. 7)	enhancement of jobs opportunities for specialized workers and researchers	

Creation of Fab lab (fig.7)	Increase awareness on waste
Use and communication of local wool	re-establishment of the relationship between people and environment.

Water management

Replacing synthetic colorants with organic ones

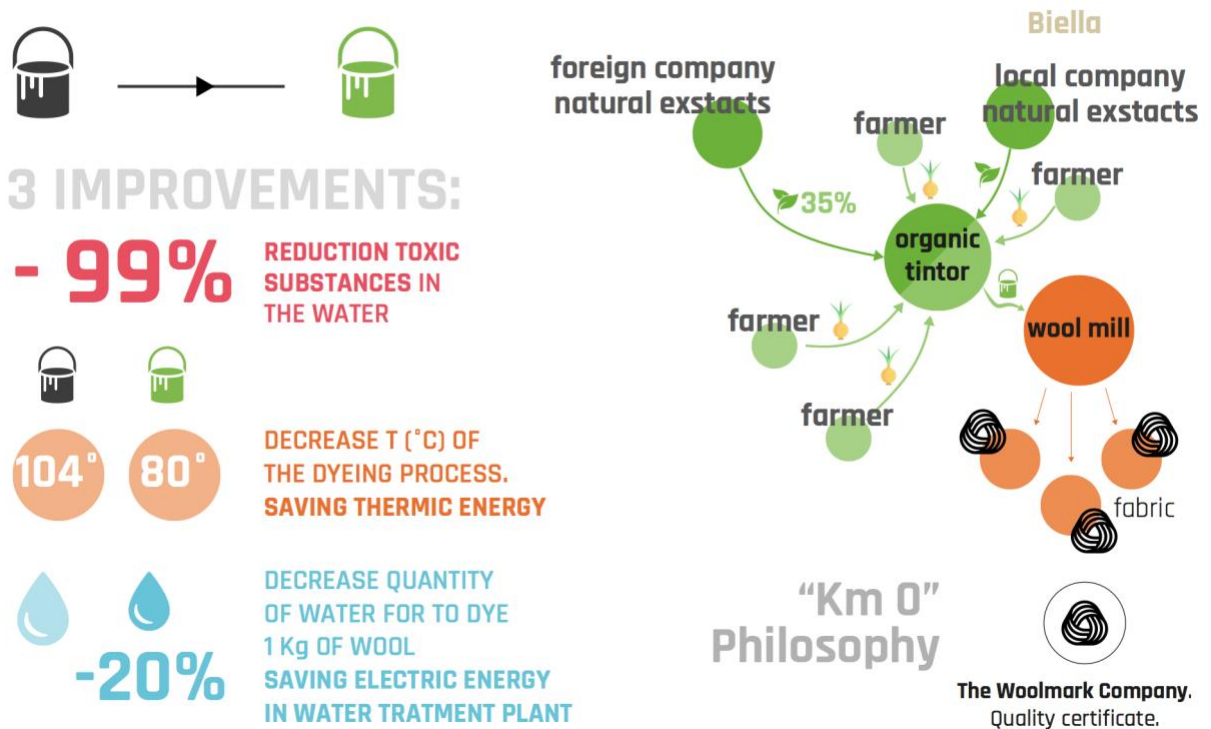


Figure 3 Focus on the opportunities for the textile industry - water management system improvement. Visual representation by students

New fabrics

Give comfort to the rough wool

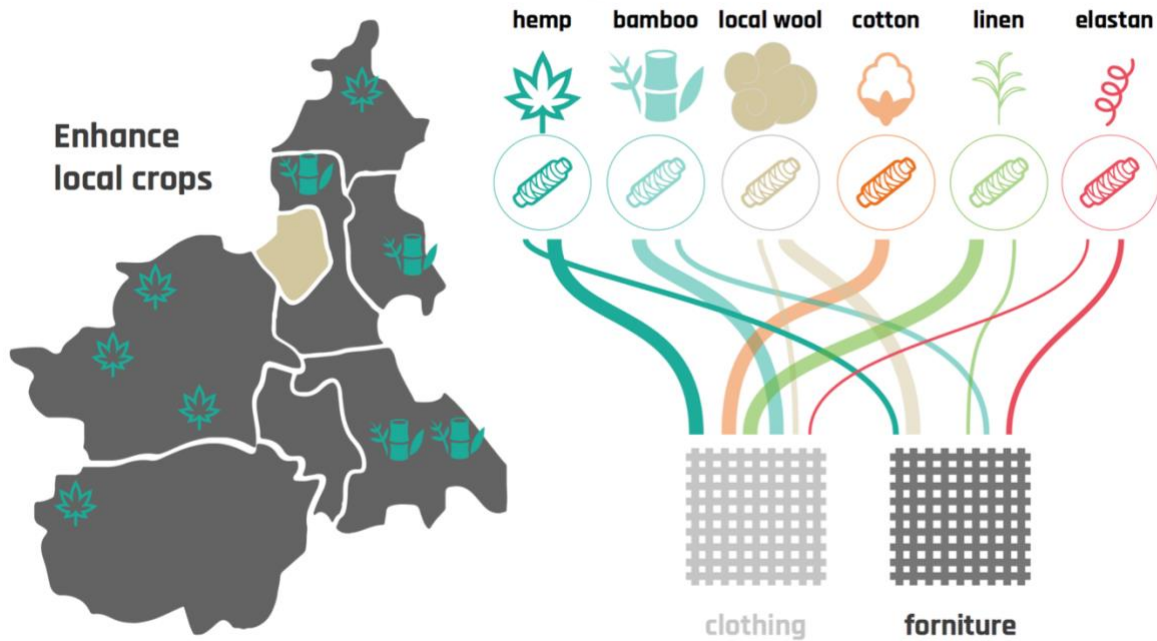


Figure 4 Focus on the opportunities for the textile industry - creation of new fabrics integrating the local wool. Visual representation by students

New markets

RAW MATERIALS



Various combinations DIVERSIFICATION OF PRODUCTS:



Figure 5 Focus on the opportunities for the textile industry - creation of new raw materials. Visual representation by students.

Enhance the by-products

NEW ACTIVITY
REGENERATION PLANT



NEW ACTORS
CARDED SPINNING



NEW MATERIAL
WOOL MILLS



NEW SECTORS
AGROTECH BUILDINGS

28.000 kg
per wool mill
a year

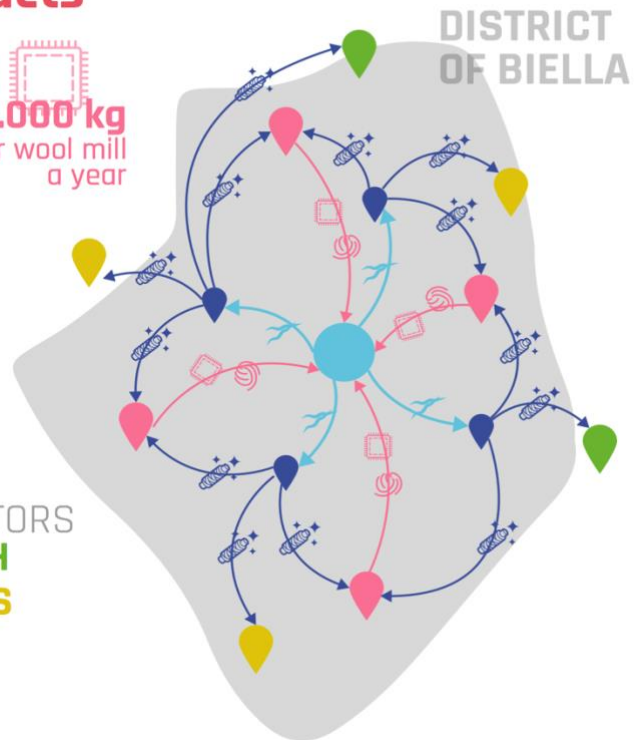
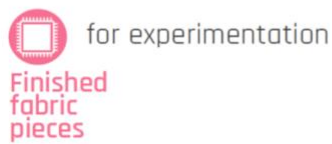


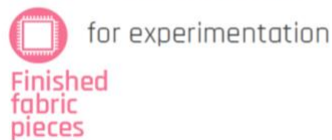
Figure 6 Focus on the opportunities for the textile industry- the regeneration plant. Visual representation by students.

Improve local competences

NEW ACTIVITIES
TAILORING ITS
2 years school



FAB LAB
for textile prototipation



6.500 kg
a year

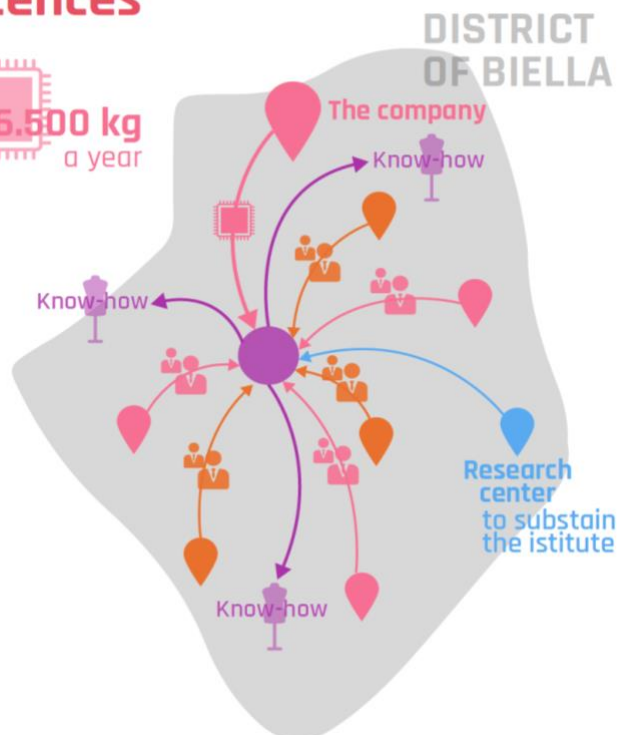


Figure 7 Focus on the opportunities for the textile industry- the tailoring professional school (ITS). Visual representation by students.

One of the principal outcome is the potential increase of partnership and the creation of cross-collaborations (fig. 9) between different sectors thanks to the creation of new products and productive chains.

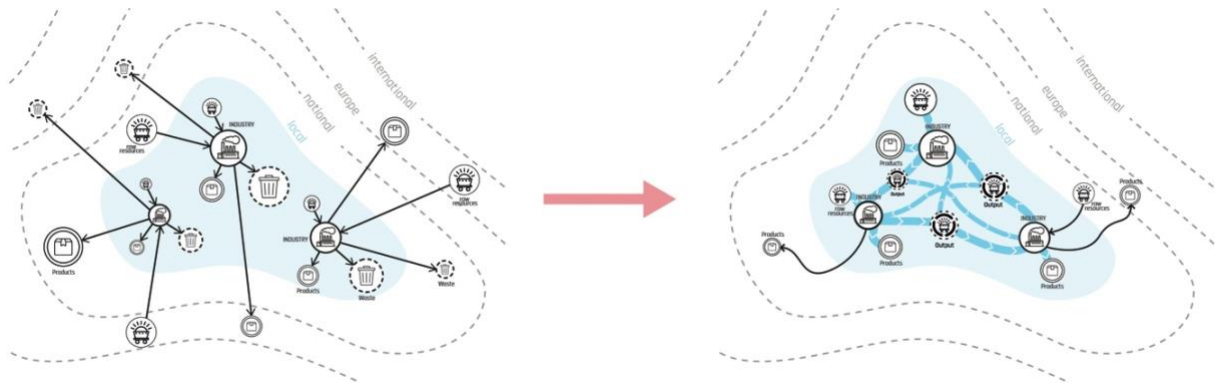


Figure 8 The shift from competition to cross-collaboration. Visual representation by students.

5.3 Principal problems in SD projects implementation

This tailored project on a specific enterprise, as the others developed thanks to RETRACE project, have shown interests in many entrepreneurs, however some criticalities emerged for their execution which have limited their potential realisation. Some of these problems can be allocated to the industry, some to the project itself and some to external factors (tab. 2).

Table 2. principal problems related to internal and external factors.

	PROBLEM
related to the industry (internal):	lack of commitment by the industry along all the project duration
	lack of data on specific quantity of the different waste (considered in large category)
	difficulties to understand the importance of the project over the economic benefit
	economic problems for required investments
	reduced openness to collaboration with other industries
	difficulties in understanding and managing the complexity of the projects
	lack of human resources to invest in a new project
	lack of future visions for the company
	lack of future vision on the environmental situation
	focus on its own production and lack of awareness of what is happening outside (even in 1 km radius)
resistant to change	
related to the project itself	Complex
	requires a shift from competition to cooperation
	requires the collaboration of different partners and stakeholders
	it is a preliminary one and it lacks the complete feasibility study

	not give the exact indication on 'where and how to start'
	requires the involvement of other experts
related to external factors	difficulties in receiving economic support
	no mechanism that rewards the most virtuous
	legislation barriers (e.g. on special waste)
	industries feel that they are "left alone" from the political context
	lack of enough research studies on particular outputs

6. Results

6.1 The role of designers (in opportunity creation)

Usually projects that concerns change in production processes and models are delegated to team mainly composed by engineers. In this kind of projects were involved, in addition to the people from the companies analysed, a team composed by 80 students in Systemic Design, 1 professor in design and the assistant (authors), 1 economist from a famous accounting organization and 1 teacher in environmental engineer with a background in biology. The designers demonstrated some abilities, in addition to the one just underlined by the literature, that can be listed as:

- capacity in the management of the complexity thanks also to visual tools;
- deal with the future (Peruccio, 2014) and future challenges;
- role of mediators (Celaschi, 2008) between the requirements from the enterprises and the professors;
- openness and curiosity to the other disciplines (economy, biology,...);
- capacity of visualization and communication which made easy to explain the projects (to the company and to other professors);
- knowledge on production processes thanks to the university curriculum;
- high interest and curiosity to develop new products;
- creativity in problems solving and opportunity creation;
- recognize the know-how and to design according with it (De Giorgi, 2008).

6.2 Systemic incubator for local (eco)entrepreneurship - ECO-SDinc: guidelines definition

Thinking about the development of the manufacturing sector in Piedmont Region, it seems clear that top-down approaches put in practice by the Region to stimulate a transition to a circular economy have many limitations. Especially if these strategies are not developed also within initiatives that come from a bottom-up approach to foster the implementation of opportunities that can be born from these different approaches. In this context, which also lacks specific services to support the development of new ventures that can tackle the waste production and foster sustainable local development, it seems necessary the creation of a new entity - SYSTEMIC INCUBATOR FOR (ECO)ENTREPRENEURSHIP (ECO-SDinc)- that continues to be as the BIs "entities that promote local development as a bottom-up territorial approach" (CSES, 2002), but is able to foster the born and the reproduction of productive processes and act as an open system. Referring to the Von Zedtwitz and Grimaldi (2006)'s definition is possible to consider ECO-SDinc, for its goal, as combination between a regional and a university incubator, with a strong focus on industry as the independent incubators and company-internal incubators.

The primary services for ECO-SDinc along the traditional BI services (space, assistance on the business model definition, financial support, legal consultancy) are the one identified and listed in tab 3. Stated the goal as (1) project implementation, (2) Regional sustainable economic development, (3) act as an open system, (4) training for incubator’s regional ecosystem, were identified specific actors/users and specific services needed to reach these goals. To perform these services, different centres are included in this new incubator, with specific roles: (1) ecopreneurs training center for a new kind of entrepreneurs; (2) eco-sd training center for training on ecology and systemic thinking; (2) regional research centers for multidisciplinary researches on local problems and opportunities; (4) Systemic design university which train new systemic designers and support the regional research centers. A visual representation of the new entity is fig. 9. ECO-SDinc can incubate different typology of new ventures as spin-offs, start-ups and clusters, creating an open system between them. Moreover, it spreads its knowledge through the region with training services. It is inserted in the core of the local manufacturing sector.

The delivery of different services need that the people working in ECO-SDinc should come from different disciplines but share the same goal: regional sustainable development. Especially, next to the designers which has a vision from above and act as mediators and directors managing the complexity, there should be as mentors and consultants people that:

- recognise both the economic value and the environmental and social one of the projects (as it is happening for the social entrepreneurship phenomenon (Deloitte, 2018);
- facilitate the creation of an “open systems”: advise on the possible networks that are possible to create between the business realities and the local stakeholders, local natural resources, local know-how;
- support the local know-how and creativity.

Table 3. Main services for ECO-SDinc divided per goals and actors

GOAL	ACTORS/BENEFICIARIES	SERVICES
Project implementation	Local enterprises	Support the transition from a linear to a systemic production model (consultancy)
		Support the creation of clusters
		Perform the input-output analysis to find problems and opportunities
	Systemic Designers with a complex project	Support the creation of spin-offs (to regenerate the existing enterprises) or start-ups with a completely different business model
		Training to become a (eco)entrepreneur
		Connection with local ecosystem
Systemic Designers with a single new idea born from Systemic Design project	Creation of multidisciplinary team	
	Research support for experiments and tests	
	Training to become a (eco)entrepreneur	
Regional sustainable	Region and municipalities	Creation of multidisciplinary team
		Perform the Holistic diagnosis to explore gaps and potentialities (It can guide the

economic development		polymakers to understand what sector needs support)
ECO-SDinc = Open-system	ECO-SDinc tenants	Facilitate the creation of relations of information, human resources, but also energy, matter, money
Training for ECO-SDinc's regional ecosystem	Everybody interested in being incubated the ECO-SDinc	Facilitate the networking to create multidisciplinary teams (to obtain solutions that can tackle the environmental, social and environmental sustainability)
	Local community (inside and outside ECO-SDinc):	Training on Systemic thinking and complexity (Capra, 1982, 1996, 2014), Circular economy (EllenMacArthur foundation, 2013), Blue economy (Pauli, 2010), Cradle to Cradle (Braungart, 2009) and Design Thinking (Brown, 2009);

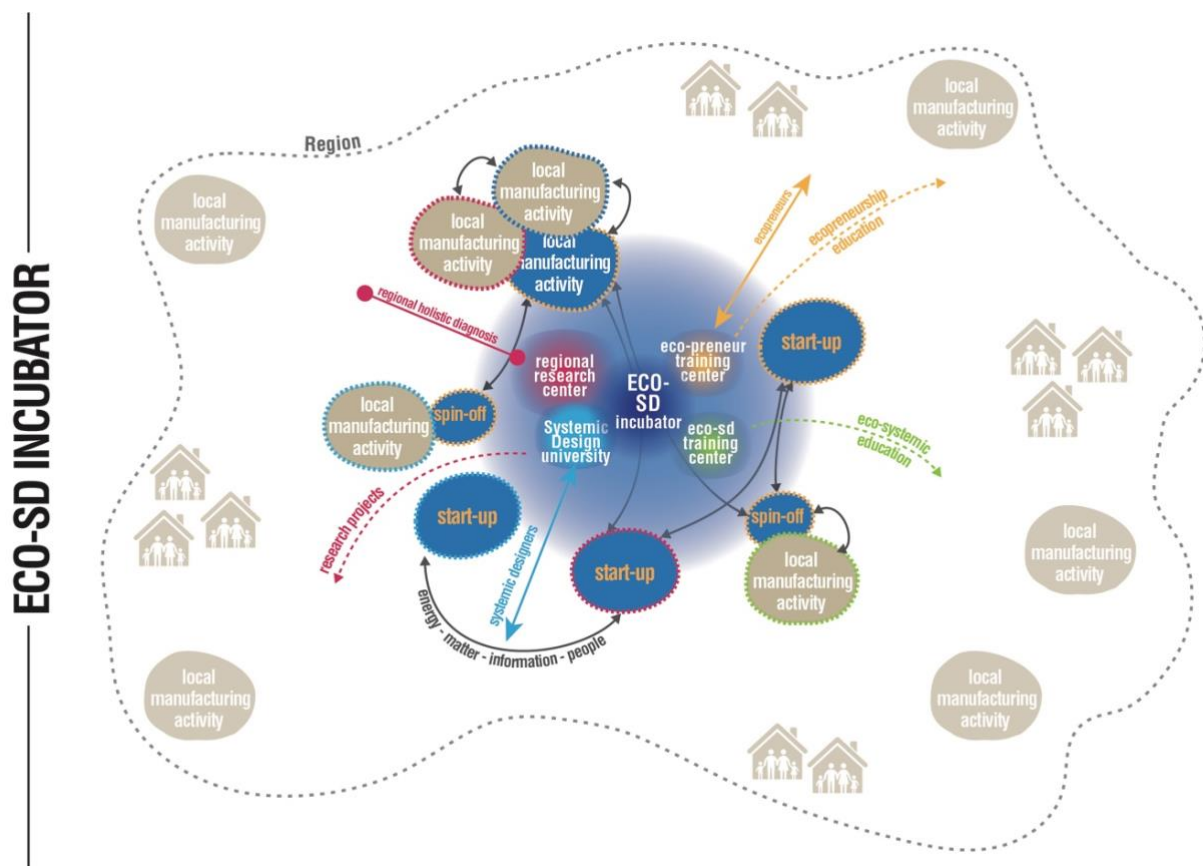


Figure 9 Visual representation of ECO-SDinc. Credits for the 'family icon': David from the Noun Project

6.3. Indications for policy makers for the development of ECO-SDinc

The development of a new kind of entrepreneurship required at the same time actions at the policy level, as:

- Work on concept of waste that is limiting lots of projects (there is a current debate on it in European Union (Bourguignon, 2016);
- co-design of future policies with the 'operative actors' to be more active and problem solver;
- provide economic support for (especially in the primary sectors where the process of updating is slow):
 - change or updating of machinery/vehicles (less energivorous);
 - use of new technologies that reduce the environmental impact;
 - transition to biocarburants;
- provide tax concessions and tax breaks for virtuous companies to enhance the best one and process of imitation;
- facilitate cross-collaboration between sectors (primary and secondary that nowadays are treated by different economic treatments);
- enhance the creation of a sharing economy with less legislative barriers.

6.4 Suggestions for the location of ECO-SDinc

After the identification of the main services and beneficiaries, it is possible to give suggestions on the location for ECO-DSinc, according to these identification points. Being most of the services related to existing enterprises or to the development of new ones, the perfect location should be:

- into or next to manufacturing district;
- into or next to area that should re-start their economic development (in this case the indications arriving from the Holistic Diagnosis gain a central role).

In these areas, the outcomes from ECO-DSinc can be multiplied thanks also to the concentration of quantity of same outputs or inputs.

7. Conclusions

This research can contribute to the debate around the relationship between design and entrepreneurship, enlarging the strategic role of design in innovation development (Bertola, 2003; Celaschi, 2007; Franzato, 2011) to the one of systemic design in innovation for sustainable development.

SD projects demonstrate to be important in opportunity creation and for their impact on the environment, economy and community. This study represents a first draft for the design of an entity that can develop and foster these projects. One of the limits of the research can be seen in the presence of only SMEs, which can also be seen of a point of strength, as their innovative potential and their importance in regional revitalisation as stated by Fischer and Nijkamp in 1988, and in the lack of relationship with similar cases. Nonetheless, the literature review has demonstrated this gap in the scientific literature and, if the context of reference is Piedmont region, referring to SMEs is the most common situation because they are the 97% of the total companies (Battistoni, 2017). The EU also reported that the average ration between BI and SMEs in Europe is 1:19, but if we focus on the Italian situation, it is reducing to 1:67 (CSES, 2002). Although more than 16 years have passed from this study, Italy has maybe reduced the gap from the European context, but of course is far from the American one. The situation on BIs worldwide remains focused on the technology incubators which are lacking the attention on environmental aspects which are becoming central in these years thanks also to the Sustainable Development Goals settled by the United Nations in 2015 with the Agenda for 2030.

For this reason, the focus of the economy should change, learning from the design framework, if we also want to train people for future problems with ability on complex problem solving, critical thinking and creativity as stated by the World Economic Forum in 2016 (World Economic Forum, 2016). More studies on realities as ECO-SDinc should be born to increase this field of research. Starting to explore this new context means taking a lot of risks for the rapid change happening lately, but also for the high presence of uncertainty related to the outcomes, that, of course, are more than the ones individuated by our study. However, the world needs a revolution in the manufacturing sectors to tackle the waste production and meet the needs of sustainability required by a complex and changing world.

References

- Aernoudt, R. (2004). Incubators: tool for entrepreneurship?. *Small business economics*, 23(2), 127-135.
- Barbero, J. L., Casillas, J. C., Ramos, A., & Guitar, S. (2012). Revisiting incubation performance: How incubator typology affects results. *Technological Forecasting and Social Change*, 79(5), 888-902.
- Barbero, S. (2017). *Systemic Design Method Guide for Policymaking: a Circular Europe on the way*. Torino, Italy: Allemandi.
- Barbero, S. (2016). Subject of change: micro and small enterprises. In Bistagnino, L. (2016). *microMACRO*. Milano, Italy: ed. Ambiente.
- Barbero S. & Battistoni C. (2016). From the sustainable biscuit production to territorial development through systemic incubator. In *8th International Scientific Conference Management of Technology - Step to Sustainable Production (MOTSP 2016)*, Porec (HR), 01–03 June, 2016.
- Barbero S., Tamborrini P. (2012) Systemic Design in AgroFood Sector: EN.FA.SI project. *Proceedings of International Conference on Designing Food and Designing For Food, London 28-29/06/2012*. pp. 285-296
- Battistoni C. & Barbero S. (2017). Systemic Design, from the content to the structure of education: new educational model. *The Design Journal*, 20:sup1, S1336-S1354: *Design for next. Proceedings of the 12th European Academy of Design Conference - Sapienza University of Rome (IT), 12-14 April 2017*.
- Battistoni, C. & Giraldo, N. C. (2017). The Retrace Holistic Diagnosis. In Barbero S. (2017). *Systemic Design Method Guide for Policymaking: a Circular Europe on the way*. Torino, Italy: Allemandi.
- Battistoni C. & Barbero S. (2018). Systemic design for territorial development: ecosystem to support autopoietic local economies. (abstract) In *Conference abstracts RSD7, Relating systems thinking and design 7, 24-26 October 2018, Torino, Italy*.
- Bennett, S.J. (1991). *Ecopreneuring: The Complete Guide to Small Business Opportunities from the Environmental Revolution*. New York: John Wiley. Cited in Holt (2011).
- Bergek, A., & Norrman, C. (2008). Incubator best practice: A framework. *Technovation*, 28(1-2), 20-28.
- Bertola, P., & Teixeira, J. C. (2003). Design as a knowledge agent: How design as a knowledge process is embedded into organizations to foster innovation. *Design Studies*, 24(2), 181-194.
- Bistagnino, L., Celaschi, F., & Germak, C. (2008). *Man at the center of the project*. Torino, Italy: Allemandi.
- Bistagnino, L. (2016). *microMACRO. The whole of micro systemic relations generates the new-economic-productive model*. Milano, Italy: edizioni Ambiente. 2° edition
- Bistagnino, L. (2011). *Systemic Design, designing the productive and environmental sustainability*. Bra, Italy: Slow Food. 2° edition.

- Bourguignon, D. (2016). Circular economy package: Four legislative proposals on waste. *Briefing, EU Legislation in Progress, European Parliamentary Research Service*.
- Braungart, M. & Mc Donough, W. (2009). *Cradle to Cradle. Re-making the way we make things*. London, UK: Vintage books.
- Brown, T. (2009). *Change by design – how design thinking transforms organizations and inspires innovation*. New York, HarperCollins.
- Capra, F. (1982). *The turning point*. New York: Bantam Books
- Capra, F. (1996). *The web of life: A New Scientific Understanding of Living Systems*. Doubleday, New York: Anchor Books.
- Capra, F. & Luisi P. (2014). *The Systems View of Life: A Unifying Vision*. Cambridge, UK: Cambridge University Press.
- Celaschi, F. (2008). Design as a mediation between areas of knowledge. In Bistagnino, L., Celaschi, F., Germak, C., (2008). *Man at the center of the project*. Torino, Italy: Allemandi.
- Celaschi, F., & Deserti, A. (2007). *Design e innovazione: strumenti e pratiche per la ricerca applicata [Design and innovation: instruments and practices for the applied research]*. Milano, Italy: Carocci editore.
- CSES (2002). *Benchmarking of business incubators*. Enterprise Directorate General, European Commission, Brussels.
- Deloitte (2018). *2018 Global Human Capital Trends. The Rise of the Social Enterprise*. Retrieved from: <https://hctrendsapp.deloitte.com/reports/2018/>. [Accessed 10th September 2018]
- De Giorgi, C., Germak, C. (2008). *Manufatto: artigianato, comunità, design [Artefact: handicrafts, community, design]*. Milano, Italy: ed. Silvana.
- Ellen Macarthur Foundation (2013). *Towards the circular economy*. Vol 1. Retrieved from <https://www.ellenmacarthurfoundation.org/assets/downloads/publications/Ellen-MacArthur-Foundation-Towards-the-Circular-Economy-vol.1.pdf>
- Fischer, M. M. & Nijkamp, P. (1988) The role of small firms for regional revitalization, *The Annals of Regional Science*, 22(1), pp. 28–42. doi:10.1007/BF01952841
- Franzato, C., & Celaschi, F. (2017). A design-driven innovation process for the exploration of organisational scenarios: action research conducted in a manufacturing company. *Journal of Design Research*, 15(3-4), 309-328.
- Garetti, M. & Taisch, M. (2012) Sustainable manufacturing: trends and research challenges, *Production Planning & Control*, 23:2-3, 83-104, doi:10.1080/09537287.2011.591619
- Gast J., Gundolf K., Beate Cesinger K. (2017). Doing business in a green way: A systematic review of the ecological sustainability entrepreneurship literature and future research directions. *Journal of Cleaner Production*, Volume 147, 2017, 44-56. <https://doi.org/10.1016/j.jclepro.2017.01.065>.
- Holt, D. (2011), Where are they now? Tracking the longitudinal evolution of environmental businesses from the 1990s. *Bus. Strat. Env.*, 20: 238–250. doi:10.1002/bse.697
- Littig, B., Grießler, E., 2005. Social sustainability: a catchword between political pragmatism and social theory. *Int. J. Sustain. Dev.* 8, 65-79. Cited in Gast (2017)
- Pauli, G. (2010). *The Blue economy, report to the club of Rome*. Taos, New Mexico: Paradigm Publications.
- Pedone, G. (2016). The economy is generated by the network of different activities in the jurisdiction. In Bistagnino, L. (2016). *microMACRO*. Milano: ed. Ambiente.
- Peruccio, P. P. (2014). The contribution of future studies and computer modelling behind the debate on sustainable design: the role of the report on The Limits to Growth. In *Diversity: Design/Humanities. Proceedings of the Fourth International Forum for Design as a Process*. Belo Horizonte, Brazil: EduEMG. pp. 206-213

- Santini, C. (2017). Ecopreneurship and Ecopreneurs: Limits, Trends and Characteristics. *Sustainability*, 9, 492.
- United Nations (2015). Transforming our world: the 2030 Agenda for Sustainable Development. In: *Resolution adopted by the General Assembly on 25 September 2015*. Retrieved from: http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E
- Von Zedtwitz, M., & Grimaldi, R. (2006). Are service profiles incubator-specific? Results from an empirical investigation in Italy. *The Journal of Technology Transfer*, 31(4), 459-468.
- World Economic Forum (2016). *The Future of Jobs, Employment, Skills and Workforce Strategy for the Fourth Industrial Revolution*. Retrieved from: <https://www.weforum.org/agenda/2016/01/the-10-skills-you-need-to-thrive-in-the-fourth-industrial-revolution/>

About the Authors:

Chiara Battistoni is a designer currently pursuing a PhD in Management Production and Design. She is working with the Systemic Design research group and being the teacher assistant of the course 'Systemic Design' in Politecnico di Torino (Italy) since 2015.

Silvia Barbero PhD, is an Associate Professor at Politecnico di Torino (Department of Architecture and Design). She is lecturer of 'Product Environmental Requirements' at the Design and Visual Communication degree and of 'Systemic Design' at the Systemic Design Master degree at Politecnico di Torino.

Acknowledgements: Many thanks to Tiziana dell'Olmo from Piedmont Region for the perspective from policymakers; to the students of the Master Degree in Systemic Design at Politecnico di Torino, especially the ones that attended the course 'Open Systems' in a.y. 2017/2018; to professor Luigi Bistagnino who launched this Master Degree in 2003-2004.