Systemic Design and Policy Making: the case of Retrace project

Systemic Design and Policy Making: the case of Retrace project

S. Barbero, Assistant professor, Politecnico di Torino, Department of Architecture and Design, siliva.barbero@polito.it
A. Pallaro, PhD candidate, Politecnico di Torino, Department of Architecture and Design, agnese.pallaro@polito.it

Abstract

The change of paradigm from linear to circular economic model is increasingly advocated. The benefits resulting from a Circular Economy (CE) are particularly appealing for Europe, considering the issues it is currently facing. Even though EU promotes activities to support the transition to CE, several economic, social and regulatory barriers hamper it. The full potential brought by CE can only be implemented once these barriers have been overcome. Given the current framework of the European context, the paper examines the case study of Retrace Interreg Europe project to argue that the methodology followed by the Systemic Design approach can support the transition towards Circular Economy, overcoming existing barriers. The focus of the discussion will be further narrowed on Piedmont Region (Italy) in order to better support the argument.

Introduction

As the limits of the traditional linear economic model become clearer, the path towards Circular Economy (CE) is increasingly identified as the way to ensure a sustainable development.
The opportunity offered by CE is particularly appealing for Europe which is affected by the scarcity of raw materials that make it resource-dependent and whose economy is still influenced by the effects of the economic crisis, with relevant consequences at the social level. Besides the doubts arising about the economic feasibility of the transition to a CE, a detailed report by Ellen MacArthur Foundation et al. (2015) examines the outcomes of the application of a CE model in comparison with the current one, highlighting the benefits that can result from this change. A development based on CE appears particularly appropriate for Europe because it would answer to the different challenges EU is facing at the moment, making use of a resource, waste, that abounds. EU economy is wasteful: in 2012, 60% of the waste materials produced by an average European was landfilled; the percentages of recycling remains low even for paper, steel and PET that lose 30-75% of their material value; obsolescence of goods is still high and manufactured products last on average only 9 years (Ellen MacArthur Foundation et al., 2015). The transition towards a CE would increase Europe's resource productivity by 3% annually, generating an annual benefit around €1.8 trillion by 2030 and several impacts on employment and welfare (Ellen MacArthur Foundation et al., 2015). In order to boost the establishment of a CE, Europe has promoted an action plan (European Commission, 2015[1]) containing several directives aiming to encourage the transition at all levels, from product design to last longer and be recyclable to regulatory framework to enable the change. The core of the document is constituted by the directives concerning waste management to reduce the percentage of waste ending up in landfills. In order to achieve this goal, EU focuses on actions to promote the use of secondary raw material, currently hampered by the uncertainty on its quality, the legislation on harmful chemicals, and the limits imposed to the cross-border circulation of secondary raw waste in Europe. These directives have been translated in challenging targets to be met by 2030: to recycle 65% of municipal waste; to recycle 75% of packaging waste; and to reduce the amount of landfilled waste to a maximum of 10% (European Commission, 2015[2]).
The potentialities offered by the transition to a CE model are increasingly recognized; however the implementation of this potential is hindered by different barriers at the economic level (market failures, unaccounted externalities), social level (lack of experience to identify opportunities) and regulatory level (regulations that hinder exchange of waste) (Ellen MacArthur Foundation, 2015).
The European Commission itself has identified several policies acting at EU level that may hamper the development of Circular Economy and has stressed the wide margin for improvement concerning policies in support of CE (European Commission, 2014[1]).

The success of the implementation of a CE at the EU level lays in Europe's capacity to overcome these barriers. Given the current framework of the European context, the paper examines the case study of Retrace Interreg Europe project to argue that the methodology of Systemic Design can support the transition towards Circular Economy, overcoming existing barriers. The focus of the discussion will be further narrowed on Piedmont Region (Italy) in order to better support the argument.

Systemic Design for Circular Economy

Retrace project involves five regions of EU countries -Piedmont Region (Italy), Bizkaia (Spain), Nouvelle-Aquitaine (France), the whole country of Slovenia and North-East Region (Romania)- and originated from the recognition that CE, despite being a priority in all regions, is improperly addressed in some of the policy instruments (all related to European Regional Development Funds/ERDF Operational Programmes) addressed by the project. The aim of Retrace is thus to promote the transition to a CE where it is not explicitly mentioned (Italian and Spanish policy instruments) or to create better tools to support the change where it is already foreseen (French, Slovenian and Romanian policy instruments).

In order to achieve this goal, Retrace applies the methodology of Systemic Design (SD) developed by the Department of Architecture and Design at Politecnico di Torino. Systemic Design is mentioned in several contexts with different meanings; in this case we refer to the methodology defined by professor Luigi Bistagnino, built around the key principle that the material and energy output (waste) of a system can become input (resources) for another one, imitating Nature (Bistagnino, 2011). These kinds of relationships generate a system of interconnected processes where waste is reduced and that tends to produce zero emissions. The system thus created is strictly connected to the local territory in which the process operates and it is built around the needs of the people related to it. As a result of the implementation of a Systemic Design approach, a new production model is created generating benefits for the society and the environment (Bistagnino, 2011).

The methodology of Systemic Design consists of five main steps.

1. *Quantity and quality analysis (Holistic Diagnosis).*

   In this phase, desk and field research combine together to investigate the current situation of the context in which the project will be created. It is the most important phase to ensure the solidity and effectiveness of the project that can only originate from a careful analysis of the backdrop. The majority of the effort is concentrated in this step to gather all the necessary information concerning the economic, social and environmental dimensions of the context in order to obtain a thorough framework. Once the data have been collected, the connections and influences between them are analyzed to properly assess the issues to be tackled. (Barbero, 2016)

2. *Benchmark*

   Parallel to the definition of the Holistic Diagnosis, a research on the best practices that address the same issues as the one of the project is performed. This activity aims to identify good practices from which it is possible to learn and transfer relevant elements.

3. *Identification of problems*

   From the framework outlined in the Holistic Diagnosis it is possible to identify the major problems to be addressed and the connections between them. Problems are regarded as leverages for the change from which the definition of the project can start.

4. *Creation of a solution*

   This step refers to the real design phase, when a solution to the identified problem is provided. The solution originates from the knowledge acquired through the Holistic Diagnosis and the

problems highlighted in step 3. The suggested solution undergoes a process of verification and validation before being implemented, to foresee the possible outcomes of its implementation.

5. Implementation

After the solution has been validated through preliminary studies and simulations, the project can be implemented. A continuous cycle of feedbacks from step 5 to step 1 enables to modify the project according to changes occurring in the framework. The methodology indeed follows an iterative path, where any further step is checked and reviewed according to the feedbacks received.

Systemic Design principles are close to the ones of Circular Economy, but further expand the concepts of reuse, recycle and recover proper of CE not only within a single production sector but mainly between different sectors in order to establish synergies among them, keeping the focus on the local dimension of the action and on the needs of the people related to it. This overcoming of borders between sectors must be supported by an analogue change in policy instruments that are currently mainly created ad hoc for each sector, leaving narrow margin for interaction among them. The two approaches of SD and CE are complementary and functional for the aims of Retrace project, to support the transition of regions and regional policies towards Circular Economy.

SD methodology and in particular the first step, Holistic Diagnosis, truly enables to identify the unexpressed potentialities of a territory looking at it from a different perspective that does not only consider the economic aspect of profitability, but takes also into account the material culture, the local history, the traditional know-how, the local resources and the features of the environment to understand what connections can be created between processes in order to ensure a sustainable development in the long-term. The establishment of these relations is the core of the approach: the connections generate new possibilities (for example: enhancement of outputs, savings on waste management, creation of new products from waste) for the actors involved, creating value at the local level.

In the case of Retrace, the application of SD methodology is not aimed at creating a concrete project but rather at defining new policies, Regional Action Plans (RAP), that support the birth of projects promoting the transition to CE.
Currently, the first two steps of the methodology, Holistic Diagnosis and Benchmark, are being carried on in parallel. In the following chapter the preliminary results of the project, which is in the first half of the second semester, will be discussed. The focus will be on Piedmont Region (Italy) as an example to explain the activities Retrace promotes in the five partner countries.

Retrace

Outline of the project

Retrace – Systemic Approach for REgions TRAnsitioning towards a Circular Economy - is a project financed by the Interreg Europe programme in the first call of 2016 and addresses the issue of the transition to CE following the priorities set by the "Flagship Initiative for a Resource-efficient Europe" (European Commission, 2011) for a resource-efficient, low carbon economy to achieve sustainable growth as enshrined in Europe 2020 strategy and in the EC Communication "Towards a circular economy: A zero waste programme for Europe" (European Commission, 2014[2]).
The project involves eight private and public partners:

- 2 higher education centers; Politecnico di Torino (Lead Partner) (Italy) and Higher School of Advanced Industrial Technology – ESTIA (France)
- 3 managing authorities; Piedmont Region-Directorate for regional system competitiveness (Italy), Government Office for Development and European Cohesion Policy (Slovenia) and North-East Regional Development Agency (Romania)
- 1 foundation for the local economic development; Azaro Foundation (Spain)
- 1 public company of the Provincial Council of Bizkaia which aims to support local enterprises in new project, innovation and internationalization; BEAZ S.A.U. (Spain)
- 1 technological centre; Association for Environment and Safety in Aquitaine-APESA (France).

In addition to the partners involved, a Stakeholder Group has been created in each country. Even though they are not partners of the project, the role of stakeholders is crucial for the proper assessment of the local context and the definition of the Regional Action Plans, by which stakeholders are one of the mostly influenced recipients, in order to ensure that these measures reach their real objective.
Retrace officially started on 1 April, 2016 and will last until 31 March, 2020; the activities planned in the project are divided in two main phases lasting two years each (www.interregeurope.eu/retrace). The majority of the work is concentrated in phase 1 with the two parallel activities of Holistic Diagnosis and Benchmark that in the project takes the form of exchange of Good Practices (GPs) on Circular Economy through 7 Field Visits (one in each partner country, one in The Netherlands and one in Scotland, considered to be two particularly virtuous countries on the topic of CE). While field visits will enable the sharing of GPs, Holistic Diagnosis will identify policy gaps and barriers at the regional level. The comparison of these two elements will lead to the definition of Regional Action Plans, containing measures to promote the creation of policies in support of CE. Phase 2 will be dedicated to the implementation of RAPs and to the monitoring of the results.
The expected results of the project are:

- development of 5 regional (national in the case of Slovenia) Holistic Diagnosis
- identification and exchange of 30 Good Practices in 5 target policy areas
- holding of 7 field visits
- definition and agreements of 5 Action Plans (one per country)
- holding of 10 Regional Dissemination Events (one per country)
- holding of 2 Interregional Dissemination Events
- 3 publications collecting different results of the project.

So far, 5 Regional Dissemination Events were organized, 3 field visits have been held and each country has completed the first two steps of the Holistic Diagnosis (there are three steps in total). These activities provided preliminary results that enable to get a first glimpse of the local context of

each of the five partner countries. For the sake of the paper, the analysis of the preliminary outcomes related to Piedmont Region will be discussed more in detail.

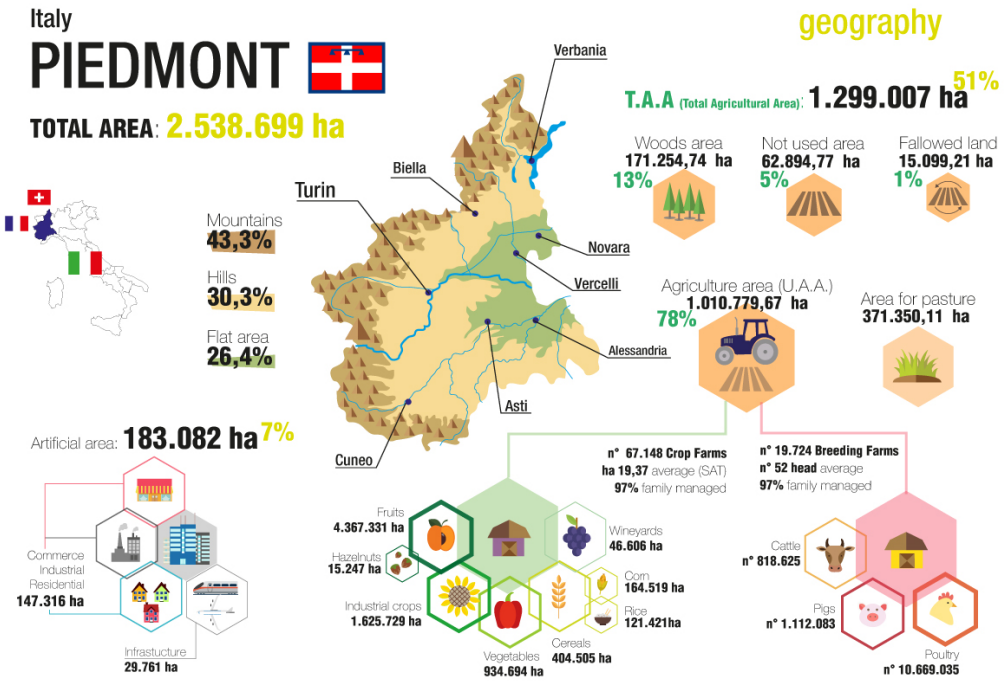
Piedmont Region (Italy)

The Holistic Diagnosis is divided into three steps: step 1 relates to the assessment of the current situation of regions at the widest possible level; step 2 relates to a deeper analysis of the policy instruments addressed by the project; step 3 relates to the identification of the main production sectors of a region, highlighting specific criticalities concerning the input used and output produced and looking for possible interconnections between them.

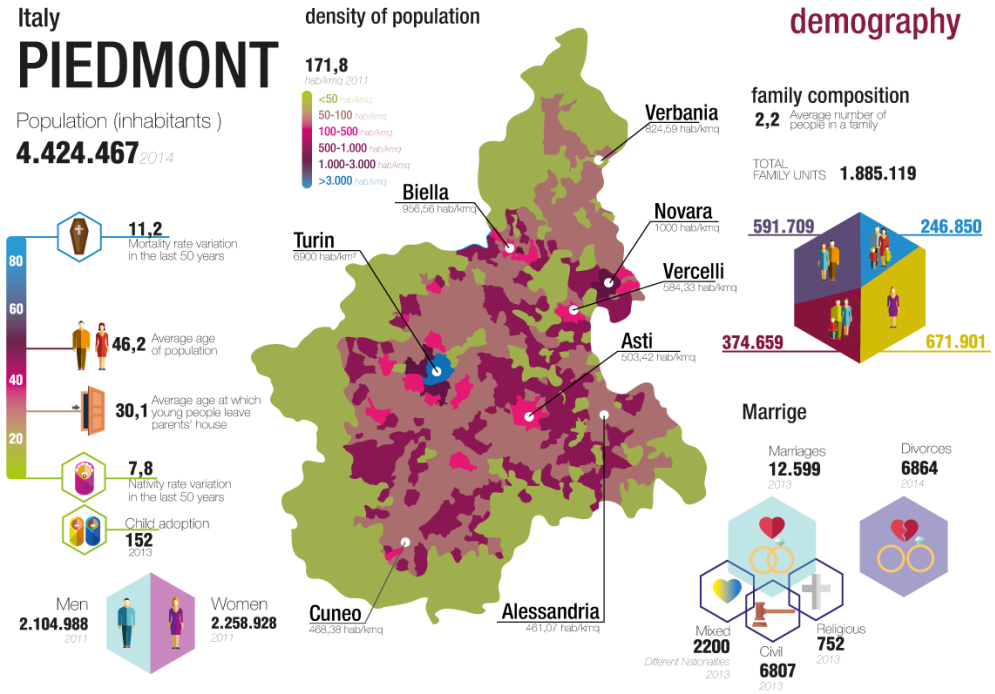
Step 1 required a thorough collection of data concerning five dimensions of the local territories:

- Geography; this section analyzes mainly the composition of the use of the soil, distinguishing between agricultural and artificial areas
- Demography; this section collects information on the dynamics of the population such as growth trends, economic and religious situation, rate of immigration, etc.
- Culture; this section gathers data concerning several aspects of a people's culture, from history to arts, food, habits, languages etc.
- Urban centers; this section analyses more in detail the main urban centers of a region, to understand what are their peculiar features
- Economic sectors; this section shows information related to the main economic sectors of a region and to their characteristics, such as the structure of the companies.

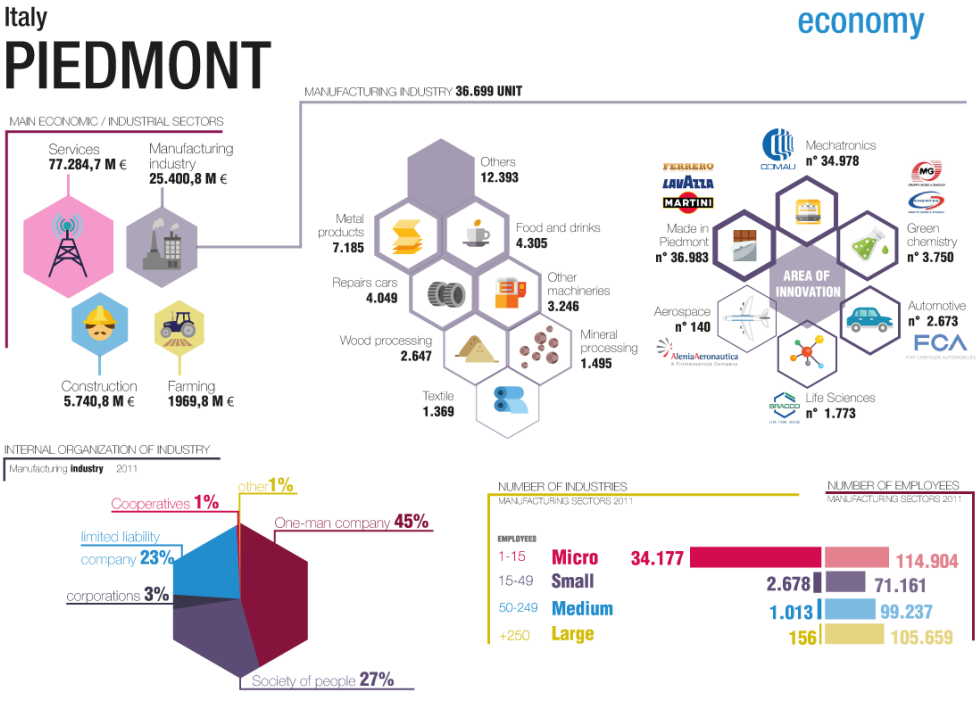
All these data were collected from reliable regional or national databases and gathered in several excel files. This format helped to store information in an organized way; however it did not enable the information to become meaningful for the reader. In order to increase the usability of these data, a long process of visualization was put in place. As a result, different giga-maps for each section of the Holistic Diagnosis were created. The role of gigamapping in Systems Oriented Design has been already established (Sevaldson, 2015).



Step 1 of Holistic Diagnosis in Piedmont Region: Geography.



Step 1 of Holistic Diagnosis in Piedmont Region: Demography.



Step 1 of Holistic Diagnosis in Piedmont Region: Economy.

From this first step of analysis, different peculiar features of Piedmont Region emerged.
The regional territory is mainly covered by mountains (43.3%) whereas hills and flat areas occupy respectively 30.3% and 26,4% of the land (Sistema Piemonte). Agriculture and the industries related to it fulfill a fundamental role in the history and economy of the region: the agricultural area, including both breeding and agriculture, accounts for 78% of the Total Agricultural Area (Sistema Piemonte), and agriculture is one of the main economic sectors of the region. The food and beverage subsector of manufacturing is one of the most relevant ones, in terms of number of plants. Moreover, the so called "made in Piedmont" sector is dominated by three multinational companies related to food and beverage (Lavazza, Martini and Ferrero) (CUBE Piemonte). Lastly, the gastronomic excellences that abound in Piedmont are famous all over the world.
Other relevant economic sectors are related to -in order of relevance- services, manufacturing and building industries (Spolti et al., 2013). Other important areas of innovation involve the fields of mechatronics, green chemistry, automotive (mostly thanks to the activities of FIAT), life sciences and aerospace (Regione Piemonte, 2016).
Despite the existence in the territory of large multinational companies, the production sector is dominated by micro industries made of 1-15 employees: more than 34.000 companies employing about 114.900 people; almost the same numbers achieved by the 156 large companies that employ around 105.660 people (Censimento Industria Servizi).
The population, equally divided between men and women, is aging and it is concentrated in the main urban centers of Torino and Novara (ISTAT, 2011). The analysis of the working situation highlights the permanence of the negative effects of the economic crisis on the Region: indeed, the rate of unemployment increased from 5,3% in 2004 to 10,2% in 2015 (ISTAT).
From the cultural point of view, Piedmont Region reflects in the languages, traditions, religions, cultures and art the influences of the people that crossed it. A relevant heritage of the past is the existence of different craft districts related to the processing of metals and electric materials, textiles, house wares, gold, taps and drinks (Osservatorio Nazionale Distretti Italiani). For what concerns urban centers, the majority of the economic and social activities are concentrated around Turin, which is the main city of the area.
The framework outlined so far shows Piedmont Region as an area rich in cultural and productive resources, whose production scenario is related mainly to a few key sectors and dominated by micro industries.

The second step of the Holistic Diagnosis was dedicated to a deeper analysis of the Policy Instrument addressed by Retrace in order to investigate if it considers the topic of Circular Economy in the measures it foresees and if it is possible to identify relations between it and the findings emerged from step 1.
The three main priority axes of the policy instrument analyzed consider different aspects related to environmental sustainability and resource efficiency without, however, explicitly mentioning Circular Economy. Despite this, the current situation of the region offers good assets -such as solid economic sectors with leading enterprises and the capacities related to research, innovation and technological development- that can be considered as basis for the development of circular economy. Some key elements to work on in order to ensure the development of CE in the region are: knowledge transfer related to the opportunities offered by CE; increase of awareness through the engagement of key stakeholders (such as innovations clusters and research centers); and redesign of policy actions to support the transition to CE.

The Holistic Diagnosis will be completed only after the fulfillment of the third step that, by identifying the main economic/industrial sectors of the region and analyzing the policies concerning them and their relation to CE, will enable to build the link between the first two steps of HD.

Parallel to the definition of Holistic Diagnosis, 15 Good Practices on Circular Economy were identified in Piedmont Region. They relate to several different sectors: plastics, special waste, energy, water management, agrifood, sustainable mobility, fuel production, knowledge transfer and reuse/recycle of everyday objects (a video explain the best 8: https://goo.gl/yJUuXv). The identification of the GPs has been performed in close cooperation with Retrace stakeholders that suggested, described and evaluated them. Two main findings resulted from this activity and from the discussions with stakeholders. The first element is the remark that, even though CE is not explicitly mentioned in the policy instrument addressed by Retrace, there are many different case studies of activities in Piedmont Region that apply the principles of Circular Economy in different sectors. The second consideration is the recognition of the difficulty encountered by more innovative projects on CE in the implementation phase. This is mainly due to the gap existing between the rules imposed by the regulation on waste and the technological innovations related to waste treatment and to the difficulty in transferring to the market the latest innovations developed in this field. This is particularly relevant for brand new innovations proposed by start-ups that need high investments in the test phase, which are hard to obtain.

The preliminary results achieved so far can be properly interpreted only once all the activities of the analysis phase will be completed (step 3 of HD and holding of all the 7 Field Visits). The process of interpretation will actively involve local partners and stakeholders, considered particularly crucial in this phase of the project, to define Regional Action Plans.

Future developments

The further steps of Retrace project will be:

- Fulfillment of step 3 of Holistic Diagnosis in each partner region
- Holding of all the 7 Field Visits with the exchange of the remaining 32 GPs (in addition to the 18 already exchanged) and the identification of the best 30 GPs to be collected in a publication
- Identification of Policy Gaps in each partner region
- Creation of a matrix to match Policy Gaps and Good Practices in order to find suggestions for the solution to the identified problems
- Elaboration of 5 Regional Action Plans, one in each partner region
- Implementation of the project and monitoring.

Parallel to these core activities, 5 Regional and 2 Interregional Dissemination Events will be held to share with key stakeholders (such as policy makers) and the wider public the results of the project.

In the case of Piedmont Region, Retrace will produce two different types of impacts in the short and long time: a lighter impact on policy instrument in the short term is expected as the measures foreseen by it have already been defined and concern the timeframe of 2016-2020, so that a structural change is not feasible; however, Retrace will have a stronger impact on the following programming period that can benefit from the outputs and results obtained by the project. For the current timeframe, Retrace is expected to support the improvement of the Regional Operational Programme through different actions: the promotion of calls oriented to support CE; the introduction of new evaluation criteria to encourage the implementation of resource efficiency and CE concepts; and the improvement of the dialogue between local actors to increase the awareness and commitment of key regional stakeholders.

Conclusions

Circular Economy is a topical subject in the discussion concerning sustainable development. The change from a linear to a circular economic model offers opportunities that are particularly appealing for Europe, considering the internal issues it is currently facing. However, several economic, social and regulatory barriers hamper this transition. The necessity to overcome these barriers has been discussed in the paper and the case study of Retrace Interreg Europe project was introduced to demonstrate the benefits that the application of Systemic Design methodology can provide in supporting the advocated transition. In particular, it enables an expansion of the concepts of reuse, recycle and recover proper of Circular Economy to different economic and production sectors in order to establish synergies between them to support the sustainable development in the long term. Furthermore, Systemic Design pushes over the concept of circular towards a network in which the cross-sectorial flows of materials and energy can really imitate the Nature. The directives on waste management have been mentioned as some of the most relevant regulatory barriers; even though Retrace does not directly address this directive, it aims to stimulate a further review of regulation on waste management to increasingly promote their proper enhancement.

References

Ellen MacArthur Foundation, the McKinsey Centre for Business and Environment and the Stiftungsfonds für Umweltökonomie und Nachhaltigkeit (2015). *Growth within: a circular economy vision for a competitive Europe. R*eport by (SUN), June 2015.

European Commission (2015)[1]. *Closing the loop – An EU action plan for the Circular Economy*. [Report] Retrieved December 10, 2016, from http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52015DC0614

European Commission (2015)[2]. *Clear targets and tool for better waste management, Circular Economy factsheet – Closing the loop* [Article] Retrieved 13 December, 2016, from http://ec.europa.eu/priorities/publications/clear-targets-and-tools-better-waste-management_en

Ellen MacArthur Foundation (2015). *Delivering the Circular Economy. A Toolkit for Policymakers*. [Report] Retrieved December 13, 2016, from https://www.ellenmacarthurfoundation.org/assets/downloads/publications/EllenMacArthurFoundation_PolicymakerToolkit.pdf

European Commission (2014[1]). *Scoping study to identify potential circular economy actions, priority sectors, material flows and value chains*. [Report] Retrieved on December 13, 2016, from http://www.ieep.eu/assets/1410/Circular_economy_scoping_study_-_Final_report.pdf

European Commission (2011). A resource-efficient Europe - Flagship Initiative under the Europe 2020 Strategy. [Report] Retrieved 13 December, 2016, from http://ec.europa.eu/resource-efficient-europe/pdf/resource-efficient_europe_en.pdf

Bistagnino, L. (2011). *Systemic Design: Designing the productive and environmental sustainability*. Bra, Italy: Slow Food

Barbero, S. (2016). Opportunities and challenges in teaching Systemic Design. In proceedings of: 6th IFDP – Systems & Design: Beyond Processes and Thinking, ISBN: 978-84-9048-440-1. Valencia, Spain: Editorial Universitat Politècnica de València, 2016.

European Commission (2014[2]). *Towards a circular economy: A zero waste programme for Europe.* [Report] Retrieved 13 December, 2016. From http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52014DC0398

Sevaldson, B. (2015). Giga-maps: their role as bridging artefacts. In proceedings of: RSD4 – Relating Systems Thinking and Design 4. Banff, Canada.

Sistema Piemonte, *Monitoraggio del consume di suolo in Piemonte*. Retrieved from: http://www.regione.piemonte.it/territorio/pianifica/sostenibilita.htm

CUBE Piemonte, Tour delle eccellenze Piemontesi. Retrieved from: http://www.cubepiemonte.com/it/it/itinerari-italia/tour-delle-eccellenze-piemontesi-0

Spolti, G., Ricerche, S., Ferrero, V. (2013). *Rapporto sull'industria in Piemonte. Edizione 2012*. Retrieved from http://www.digibess.it/fedora/repository/openbess:TO082-01854-0003

Regione Piemonte (2016). *Strategia per la specializzazione intelligente del Piemonte*. Retrieved from: http://www.regione.piemonte.it/partenariato1420/dwd/S3piemonte.pdf

Censimento Industria Servizi, Retrieved from: http://dati-censimentoindustriaeservizi.istat.it/Index.aspx

ISTAT (2011). L'Italia del censimento. Struttura demografica e processo di rilevazione. Piemonte. Retrieved from: https://www.istat.it/it/files/2013/01/Piemonte.pdf

ISTAT. *Tasso di disoccupazione*. Retrieved from: http://dati.istat.it/Index.aspx?DataSetCode=DCCV_TAXDISOCCU

Osservatorio Nazionale Distretti Italiani. Piemonte. http://www.osservatoriodistretti.org/category/regione/piemonte