

## Sustainability Transition:

### Measuring Sustainable Performance of Industrial Ecosystems

#### (SusTran)

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#### Background

Considering the threshold limit for global warming recently set at 1.5°C (IPCC, 2018), the governments agenda on climate actions has become sensibly pressing. In particular, the “2050 low-carbon economy” strategy roadmap, suggesting a cut of gas emissions to 80% below 1990 levels, with milestones by 2030 (-40%) and by 2040 (-60%), requires *“rapid, far reaching and unprecedented changes in all aspects of society”* (IPCC, 2018). Energy-intensive industries, manufacturing firms, agriculture and transportation sectors are listed among the main contributors to gas emissions and they should be strongly committed toward more sustainable processes, with a cut of more than 80% by 2050, the application of cleaner and more energy-efficient technologies, supply chains and distribution systems . This transformation toward less impacting structures has been identified by researchers as Sustainability Transition (ST) (Rotmans et al., 2001; Davies, 2013).

Markard et al. (2012; p. 956) refers to ST as *“long-term, multi-dimensional, and fundamental transformation processes through which established socio-technical systems shift to more sustainable modes of production and consumption”*. ST represents fundamental shifts of entire industrial sectors towards a new sustainable trajectory (Skellern et al., 2017), elaborating technological, material, organisational, institutional, political, economic and socio-cultural dimensions (Geels and Schot, 2007; Markard et al. 2012; Pisano et al., 2014). Specifically, the industrial sector is responsible for a third of total global greenhouse gas emissions (Fischedick et al., 2014). For this reason, this project, refers to a specific type of ST, namely industrial ST, as the *“conceptualisation, design and manufacture of goods and services that meet the needs of the present*

*generation while not diminishing economic, social and environmental opportunity in the long term”* (Paramanathan et al., 2004 p. 528).

These definitions of ST suggest that the governance of sustainability transition requires the interplay among different dimensions of action. Although the lens of multi-level and multi-actor governance allows to highlight the complex decision-making structure characterizing environmental challenges, ST are by definition geographical processes which happen in particular places (Coenen and Truffer, 2012). The introduction of a geography of ST (Coenen et al., 2012; Hansen and Coenen, 2015) has been recognized as extremely valuable in this research field as it allows to understand peculiarities of the various contexts where ST takes place.

### **Aim of the project**

This project builds on the results of two previous projects led by Matteo Mura and Mariolina Longo: *Re-Industrialise*, a two-year project funded by the EU Commission through Climate KIC <https://re-industrialise.climate-kic.org/> ; and *SuMM Lab*, a still ongoing research project launched in 2016 with funding from six large Italian companies <https://events.unibo.it/summ-lab>.

Based on the findings of the two aforementioned research strands, *SusTran* aims at deepening our knowledge of industrial sustainability transition. In particular, the aim of the project is fourfold as it seeks:

- (1) To identify the most informative geographical boundaries (i.e., levels of analysis) for analyzing ST dynamics (e.g. State, Region, Province, City);
- (2) To quantitatively explore the dynamics of ST over time;
- (3) To identify the drivers of ST at different levels of analysis;
- (4) To compare ST dynamics across EU, and emerging economies.

### **Contributions and scientific relevance**

This project outlines several contributions to existing research. Firstly, it applies the theoretical lenses of the economic geography to study sustainability transition of industrial ecosystems. The lack of a precise definition of territorial scale in the ST transition literature, allows us to capture the distribution of different transition

dynamics across space (Bridge et al., 2013) and to geographically delineate the possible levels of analyses of transition processes. To our knowledge, when space is taken into consideration, it generally enters the analysis in a rather rough way. Most of the research focuses on transformation processes in specific countries (Hodson and Marvin, 2012, Spath and Rohrer, 2012, Geels et al., 2016) or on the comparison among a limited number of countries (Maassen, 2012), implicitly assuming that ST primarily occurs at the national level (Smith et al., 2010). However, space can be geographically analyzed at different degrees of aggregation (i.e. local, national, global) and, depending on the level analyzed, results about ST dynamics may vary.

Additionally, national contexts and cities have been so far considered as the only units of analysis for studying ST. This project adds a greater emphasis on the territorial nature of ST, thus providing a richer understanding of the heterogeneity and spatial unevenness of ST pathways (Bridge et al., 2013; Skellern et al., 2017). By focusing on novel levels of analysis (i.e. clusters of regions, regions and provinces) the project will empirically validate the strength of the meso-level scale (rather than the national or the city scale) in capturing differences in transition pathways across geographical entities.

Also, several studies have explored ST by means of case studies or other qualitative methodologies that focused on single firms or industries (Dewald and Truffer, 2012; Truffer, 2019). This project, instead, aims to build a large-scale longitudinal dataset across EU and emerging economies that allows to quantitatively explore ST, thus providing generalizability to the findings.

Finally, very few studies have so far explored ST in developing countries (Pan et al, 2019; Zakarya et al., 2015; Xu et al., 2016), by comparing transition dynamics among EU and emerging countries we aim to provide interesting insights that could inform policy makers in both incumbent and emerging economies.

## **Training plan of the research fellow**

### Year 1

The first year will mainly focus on defining the research questions and hypotheses and on the development of the longitudinal dataset. In particular, the activities of the research fellow will include the following:

- Development and definition of a research agenda that meets the needs of the *SusTran* project;

- In-depth literature review on industrial sustainability transition, with particular regard to the regional context and to emerging economies;
- Development of a longitudinal dataset across EU and emerging economies;
- Development of research hypotheses;
- Data analyses and development of preliminary results.

## Year 2

The second year will focus on the dissemination of the results of the project. In particular, the activities of the research fellow will include the following:

- Development of articles for academic conferences (e.g. *Sustainability Ethics & Entrepreneurship Conference; AOM Annual Meeting; Euroma Conference; EU Commission Meetings of the Working Groups on industrial sustainability transition and on coal mine regions in transition*).
- Development of articles for academic journals (e.g. *Research Policy, Journal of Economic Geography, Journal of Business Ethics, Ecological Economics*).
- Development of tools for mapping and visualizing ST of industrial ecosystems across countries and regions in EU and emerging economies (e.g. by means of Tableau software). These tools will allow translating scientific results into insights that can be disseminated to companies and policy makers.
- The aforementioned activities will support the development of a UNIBO Research Centre on Industrial Sustainability Transition thus supporting the “third mission” of the Department of Management.

## **Assessment of the results achieved by the research fellow and scientific outputs**

The research fellow will be required to diligently carry out the required activities, with participation in periodic coordination meetings with the academic supervisors, during which they will set intermediate targets, and verify the progress achieved on the requested deliverables.

At the end of the two-year grant, the research fellow will have to achieve the following scientific outputs:

- Presentations of the results achieved in the project in, at least, four international conferences for academics and practitioners;

- Have at least four papers, based on the findings from SusTran, in R&R in Gold or Gold Star journals (AiIG Ranking 2018).

### **Six publications of the academic supervisor 2014-2018**

- (1) Mura M., Longo M., Micheli P., Bolzani D. (2018) "The evolution of sustainability measurement research", *The International Journal of Management Reviews*. Vol. 20 No. 3, pp. 661-695
- (2) Bourne M., Mura M. (2018) "Performance and risk management" *Production, Planning & Control*, Vol. 29 No. 15, pp: 1221-1224
- (3) Micheli P., Mura M. (2017) "Executing strategy through comprehensive performance measurement systems", *International Journal of Operations and Production Management*, Vol. 37 No. 4, 2017, pp. 423-443
- (4) Pavlov A., Mura M., Franco-Santos M., Bourne M. (2017) "Modelling the impact of performance management practices on firm performance: interaction with human resource management practices", *Production Planning & Control*, Vol. 28 No. 5, pp. 431-443
- (5) Mura M., Lettieri E., Radaelli G., Spiller N. (2016) "Behavioural operations in healthcare. A knowledge sharing perspective" *International Journal of Operations and Production Management* , Vol 36 No.10, pp. 1222 - 1246
- (6) Radaelli G., Lettieri E., Mura M., Spiller N. (2014) "Knowledge Sharing and Innovative Work Behaviour in Healthcare: A Micro-Level Investigation of Direct and Indirect Effects", *Creativity and Innovation Management*, Vol. 23 No. 4, pp. 400-414.

### **Publications 2019**

- (1) Carlucci D., Schiuma G., Mura M. (In Press) "Fostering employees' innovative work behaviour in healthcare organizations", *International Journal of Innovation Management*. DOI: 10.1142/S1363919620500140.
- (2) Micheli P., Wilner S.J.S., Bhatti S.H., Mura M., Beverland M.B. (2019) "Doing Design Thinking: Conceptual Review, Synthesis, and Research Agenda", *Journal of Product Innovation Management*, Vol. 36 No. 2, pp. 124-148.

- (3) Mura, M., Longo, M., Domingues, A.R., Zanni, S. (2019) "An exploration of content and drivers of online sustainability disclosure: A study of Italian organisations", *Sustainability*, Vol. 11 No. 12, pp. 3422

### Co-funding

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