5TH EDITION 2023

#PhDays2023

EU-SPRI EARLY CAREER CONFERENCE

"ADDRESSING OLD AND NEW SOCIAL CHALLENGES: KNOWLEDGE, POLICIES, INCLUSION"

VALENCIA, SPAIN
8, 9, 10 February 2023

CONFERENCE PROCEEDINGS

EU SPRI European Forum for Studies of Policies for Research and Innovation
UNIVERSITAT POLITÈCNICA DE VALÈNCIA
CSIC Consejo Superior de Investigaciones Científicas
ingenio CSIC-UPV Instituto de gestión de la innovación y del conocimiento

PhDays 2023:"ADDRESSING OLD AND NEW SOCIAL CHALLENGES: KNOWLEDGE, POLICIES, INCLUSION"

EU-SPRI EARLY CAREER CONFERENCE (ECC)

ORGANISING COMMITTEE

Presidents

Dima Yankova, PhD Candidate at INGENIO (CSIC-UPV), Universitat Politècnica de València

Ana Escario Chust, PhD Candidate at INGENIO (CSIC-UPV), Universitat Politècnica de València

Committee

Gretel Gutiérrez Calderón, PhD Candidate at INGENIO (CSIC-UPV**),** Universitat Politècnica de València

Jordi Molas, director of INGENIO (CSIC-UPV), Universitat Politècnica de València

Davide Consoli, researcher at INGENIO (CSIC-UPV), Universitat Politècnica de València

Pablo D'Este, researcher at INGENIO (CSIC-UPV), Universitat Politècnica de València

Ester Planells Aleixandre, technical support, INGENIO (CSIC-UPV), Universitat Politècnica de València

Mª Jesús Dura Mañez, management support, INGENIO (CSIC-UPV), Universitat Politècnica de València

Marisa Rodríguez Mondragón, accountability, INGENIO (CSIC-UPV), Universitat Politècnica de València

I**sabel Piqueras Pardo**, manager at INGENIO (CSIC-UPV), Universitat Politècnica de València

SUPPORT

Magdalena Álvarez Arancedo*, Daniel Cuesta Delgado*, Francesco de Cunzo*, Karen Corbett Lagos*, Carlos, Delgado Caro*, Ruth M. Domenech*, Maria Paula Franco Lozano*, Ana María Gómez Aguayo*, Marta Maicas Pérez*, Enrique Meseguer Castillo*, Irene Monsonís Payá*, Esmeralda Montesa*, Ghinwa Moujaes*, Sara Sánchez López*

*****INGENIO (CSIC-UPV), Universitat Politècnica de València*

SCIENTIFIC COMMITTEE

Adela García Aracil, INGENIO (CSIC-Universitat Politècnica de València)
Adrián A. Diaz-Faes, INGENIO (CSIC-Universitat Politècnica de València)
Alejandra Boni Aristizabal, INGENIO (CSIC-Universitat Politècnica de València)
Álvaro Fernández-Baldor Martinez, INGENIO (CSIC-Universitat Politècnica de València)
David Barberá Tomás, INGENIO (CSIC-Universitat Politècnica de València)
Davide Consoli, INGENIO (CSIC-Universitat Politècnica de València)
Guillermo Palau Salvador, INGENIO (CSIC-Universitat Politècnica de València)
Joaquín Azagra Caro, INGENIO (CSIC-Universitat Politècnica de València)
Jordi Molas, INGENIO (CSIC-Universitat Politècnica de València)
José Félix Lozano Aguilar, INGENIO (CSIC-Universitat Politècnica de València)
Marta Rivera, INGENIO (CSIC-Universitat Politècnica de València)
Mónica García Melón, INGENIO (CSIC-Universitat Politècnica de València)
Oksana Udovyk, INGENIO (CSIC-Universitat Politècnica de València)
Oscar Llopis Córcoles, Universitat de València
Pablo D'Este, INGENIO (CSIC-Universitat Politècnica de València)
Pablo Fernández Méndez, INGENIO (CSIC-Universitat Politècnica de València)
Paula Otero, INGENIO (CSIC-Universitat Politècnica de València)
Pedro Marques, INGENIO (CSIC-Universitat Politècnica de València)
Richard Woolley, INGENIO (CSIC-Universitat Politècnica de València)
Sergio Segura Calero, INGENIO (CSIC-Universitat Politècnica de València)
Teresa Domenech Aparisi, INGENIO (CSIC-Universitat Politècnica de València)

KEYNOTE SPEAKERS

Elisa Giuliani (Professor of Management at the University of Pisa. Founder and director of the Responsible Management Research Center)
Lars Coenen (Professor of Innovation and Sustainability Transitions at the Western Norway University of Applied Science)

WORKSHOPPERS

Elisa Giuliani and **Francesco Rentocchini**: "The publishing process: everything you wanted to know but never dared ask"
Elisabetta Marinelli: "When is research policy relevant? Understanding and (hopefully) bridging the distance between academia and policy"

EDITOR'S NOTE: The papers included in this work faithfully reflect the content of the works sent by the authors.

This fidelity refers to both the authors' works and the supplementary material.

The authors are solely responsible for the content of the papers.

EDIT: INGENIO (CSIC-UPV), Universitat Politècnica de València

ISBN: 978-84-09-48992-3

INDEX:

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Open Science Policies seen from the perspective of researchers' communities: Brazil and Peru

Alejandra Manco Vega
Université Claude Bernard - Lyon 1, ELICO, France (alejandra.manco-vega@univ-lyon1.fr).

Short Bio

Ph.D. candidate in information and communication sciences at Lyon 1 University, part of the research team ELICO (EA 4147). Master in digital media at Uppsala University. Ph.D. thesis on open science policies' effects on basic sciences researcher's career. Professional experience as an editor and consultant in information and knowledge management in international organizations.

Abstract **– This paper explores the different open science policy effects on the knowledge generation process of researchers in basic sciences: biology, chemistry, and physics, using a qualitative approach with twelve semi-directed interviews.**
The main perceived effect of open science is access to research inputs, with open access, open research data -especially data reuse and paradata- and code reuse as primary sources. Another issue is the increase of collaboration with other colleagues in terms of the ability to collaborate at a faster speed and also the encouraging the exchange of ideas, i.e., it is a cultural change brought about by the information sharing.
Time spent on tasks like cleaning up data and programs and the rise of predatory publications are two unfavourable aspects that have been noted. Finally, the issue of science communication as part of the conceptualization of open science is also mentioned by different researchers although this is a topic that remains to be explored.

Keywords **– Open science, Open science policies , Peru, Brazil, Researcher's communities, Knowledge production**

Introduction

Open science is thought to have several advantages—the same aspect of being open aids in speeding up research (Woelfle et al., 2011). According to McKiernan et al. (2016), studies have shown the significant benefits of open citations and that various foundations are pushing open science, and more organizations are acknowledging open practices in academic evaluation. Moreover, it has the potential to eventually provide coherence to a shared global knowledge system (Mendez, 2021).

Open science is gaining traction worldwide, with open science policies being enacted at institutional, national, regional, and international levels. However, open science has both a bottom-up and a top-down policy approach. While the practical implementation is a bottom-up affair, national policies and strategies and all kinds of policies overall are top-down issues (Méndez, 2021). In addition, it is argued that institutional open science policies can only be successful if they are developed in close collaboration with researchers rather than from the top down (Ali-Khan et al., 2017).

During the last ten years, many institutions have begun to design, adopt, and implement open science policies (Schmidt et al., 2018) (Kretser et al., 2019). Nevertheless, there is a research gap in tackling how these policies impact researchers' knowledge production. Therefore, this research investigates the researcher's opinions, perceptions, and experiences with open science policies concerning knowledge production processes from researchers from Brazil and Peru. It aims to highlight differences and similarities in the science disciplines across these countries. Furthermore, it aims to provide an overview of how

communities of researchers from the hard sciences - physics, chemistry, and biology - visualize open science policies, meaning their opinion and discourse on this subject and whether their knowledge production processes have changed and to what extent they had an impact on their research products.

METHOD

This proposal is built on a qualitative approach using semi-directed interviews as a research method. We conducted 12 interviews, each of which lasted around one hour. Therefore, data collection for the interviews corpus was made in different stages:
1. Using the QS World University Rankings 2022 as a guide, the best universities in the country were identified. 2. After this process of identifying the institution, scientists in the three areas mentioned above were contacted via social networks such as Twitter or Linkedin and interviewed if they agreed. At the time of the interview, consent was sought from the interviewees to make a sound recording. Interview transcripts were analysed using Nvivo 12 software. 4. The coding process was conducted using an inductive category development approach.
In the end, a total of 12 researchers accepted the interviews. Table 1 details their characteristics:

Table 1. Characteristics of the interview panel

Code	Age	Gender	Title	Discipline
C2	40-45	F	Research scientist	Chemistry
P3	45-50	M	Associate professor	Physics
C3	20-25	F	PhD Student	Chemistry
B3	30-35	M	Research scientist	Biology
C5	45-50	M	Research scientist	Chemistry
P5	50-55	M	Associate professor	Chemistry
C7	25-30	M	PhD Student	Chemistry
P4	40-45	M	Full professor	Physics
B4	40-45	M	Full professor	Biology
P6	55-60	M	Full professor	Physics
C8	20-25	F	PhD Student	Chemistry
BQ1	35-40	F	Post-Doc	Biochemistry

RESULTS

1. Open science definition
The concept of open science is interpreted as open access to information. It is a prevalent conception among researchers. This means being able to read or access the different research articles. The payment of article processing charges (APCs) is fully normalized. It is understood that paying for quality material in these academic areas is necessary. In physics, the issue of working with preprints is fully standardized.

Another point mentioned quite often by the interviewees is that of science communication. Scientists associate open science with science communication and citizen science. They are especially bringing scientific knowledge out of academia so that people can form a position on science. Also another interesting point is that this concept is linked to education. Open science would help to close the gaps in science education.

2. Open science effect in knowledge production

There are some points related to the knowledge production cycle where there is no perceived effect of open science policies. For example, the format of scientific communication has remained the same; for the moment, the scientific article is still the preferred format for peer-to-peer communication, according to the different researchers in the three areas interviewed. Likewise, open science has no perceived relationship or influence on research results.

The main perceived effect of open science is access to research inputs, with open access, open research data -especially data reuse and paradata- and code reuse as main sources. As a result, the theoretical framework of the research can be updated with these elements. In the same way, open science is perceived as fundamental for defining objectives.

Linked to this issue is also a perceived double effect on the research questions. On the one hand, one can quickly check whether this question has already been answered before. But on the other hand, it is also perceived as contributing to improving the questions.

Another point of effect focuses on how to share knowledge with colleagues and disseminate information with people. Especially getting in touch with other colleagues and encouraging the exchange of ideas, i.e., it is a cultural change brought about by the open culture of information sharing.

Another effect is in terms of collaboration, especially in terms of the ability to collaborate at a faster speed. Another issue mentioned is the contact with colleagues, which is optional for an explicit collaboration, i.e., a co-authorship, and the exchange of ideas after an open-access publication. In the same way, there is also the issue of feedback on the work from colleagues, which increases the visibility of the work in some instances.

There is also a perceived effect on science communication, which can be subdivided into several parallel themes.
The first refers to encouraging young people or children to be interested in science through activities related to science communication. This activity helps the generational turnover of professionals and researchers in these academic areas.
It is mentioned that effective science communication requires an ad hoc investment of time and that there is a learning curve:

Finally, there are also perceived adverse effects. This cultural change also generates new sources of stress and time investment in new tasks; scientists need to take more care in all the information that will be made public. In this sense, this new action also means sharing data and code; generally, it is preferred that this is clean.
However, there is also a perception of less scientific rigor in open science, leading to predatory journals' emergence.
In addition, there is also a fear of scooping research ideas, data and even contributions. Especially from other colleagues working with bigger and better equipped (and funded) laboratories or faster computer infrastructures.

Conclusion

Even though both countries are close and there is some degree of collaboration and contacts, the research cultures of both countries are different. There are diverse perceptions of what open science is among the scientists interviewed. Most of these focus on the following points: open access to information, open research data, and open source. However, the issue of science communication as part of the conceptualization of open science needs to be addressed. The emphasis on science communication is related to society, which is typical for science developed in mode 2 (Gibbons et al., 2010) (Bucchi & Trench, 2016).
There are several elements of the effects of open science policies on knowledge production processes. First, there is already a cultural shift in open science practices, obviously with disciplinary, age, and experience differences. The effect found in this work is in the speed of collaboration, i.e., in the availability of access to information and data that helps to bridge existing inequalities by giving all members a common starting point. However, the issue of division of labor and their roles within a team in collaborations appears to be the same. Informal feedback from colleagues provides greater visibility and helps to improve the final research product, but this only sometimes materializes in a formal collaboration such as co-authorship.
Another issue mentioned is that of perceived adverse effects. For instance, the investment of time in activities, like spending time on cleaning data and codes, and the emergence of predatory publishing. Finally, the issue of the relationship between open science and the different meanings of science communication is a topic that remains to be explored.

Bibliography

Ali-Khan, S. E., Harris, L. W., & Gold, E. R. (2017). Point of view: Motivating participation in open science by examining researcher incentives. ELife, 6, 1–27. https://doi.org/10.7554/eLife.29319

Bucchi, M., & Trench, B. (2016). Science Communication and Science in Society: A Conceptual Review in Ten Keywords. TECNOSCIENZA Italian Journal of Science & Technology Studies, 7(2), 151–168. www.tecnoscienza.net

Gibbons, M., Limoges, C., Nowotny, H., Schwartzman, S., Scott, P., & Trow, M. (2010). The new production of knowledge: The dynamics of science and research in contemporary societies. SAGE Publications Ltd, https://dx.doi.org/10.4135/9781446221853

Hessels, L. K., & Van Lente, H. (2008). Re-thinking new knowledge production: A literature review and a research agenda. Research policy, 37(4), 740-760.

Kretser, A., Murphy, D., Bertuzzi, S., Abraham, T., Allison, D. B., Boor, K. J., Dwyer, J., Grantham, A., Harris, L. J., Hollander, R., Jacobs-Young, C., Rovito, S., Vafiadis, D., Woteki, C., Wyndham, J., & Yada, R. (2019). Scientific Integrity Principles and Best Practices: Recommendations from a Scientific Integrity Consortium. Science and Engineering Ethics, 25(2), 327–355. https://doi.org/10.1007/s11948-019-00094-3

McKiernan, E. C., Bourne, P. E., Brown, C. T., Buck, S., Kenall, A., Lin, J., ... & Yarkoni, T. (2016). How open science helps researchers succeed. Elife, 5. https://doi.org/10.7554/eLife.16800

Méndez, E. (2021). Open science by default. The «new normal» for research. Arbor, 197(799). https://doi.org/10.3989/arbor.2021.799002

Schmidt, B., Bertino, A., Beucke, D., Brinken, H., Jahn, N., Matthias, L., Mimkes, J., Müller, K., Orth, A., & Bargheer, M. (2018). Open science support as a portfolio of services and projects: From awareness to engagement. Publications,6(2). https://doi.org/10.3390/publications6020027

Woelfle, M., Olliaro, P., & Todd, M. H. (2011). Open science is a research accelerator. Nature chemistry, 3(10), 745-748. https://doi.org/10.1038/nchem.1149

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Optimisation of local energy communities to exploit their potential and increase their impact on local development

Manso-Burgos, Álvaro
Institute for Energy Engineering, Universitat Politècnica de València, Camí de Vera S/N, 46022 València, Spain (almanbur@etsii.upv.es).

Short Bio

Álvaro Manso Burgos is researching how to exploit a Local Energy Community in favour of local development and a fair energy transition. He has developed a mathematical model to simulate the electricity fluxes in an energy community to study, among other things, the impact of sharing strategies, storage systems, price of components and demand flexibility. Currently, he has published in three peer-reviewed journals and two international conferences.

Abstract **– The general objective of the PhD program will be to study the best Local Energy Community configurations that unleash their potential to accelerate a just energy transition and local development. The specific objectives of this PhD program involve designing a methodology to share energy, costs and benefits fairly among the users. Also, evaluate the impact of storage technologies, electrifying thermal loads, and electricity market changes. We will also consider future pricing and cost scenarios to assess their impact on energy communities. Furthermore, we have posed the upscaling of the Local Energy Communities into District Energy Communities as part of a Positive Energy District. Hence, we develop a mathematical model to simulate the operation of a local energy community sharing self-generated energy. This model can integrate generators, load profiles, storage systems, electric vehicles and controllable appliances. We used Julia programming language and the optimisation package JuMP-Gurobi. This PhD program provides a tool for energy communities initiatives to optimise their design and operation, insights into the impact of regulatory and tariff changes and assessments on how to decarbonise a district or tackle fuel poverty with energy communities.**

Keywords **– local energy community, collective self-consumption, fair energy transition, citizenship involvement, mathematical modelling**

Introduction

The general objective of the PhD program will be to study the best Local Energy Community (LEC) configurations that unleash their potential to accelerate a just energy transition and local development. LECs are locally rooted legal entities that effectively control their members and whose goals must be to provide environmental, economic and social benefits rather than financial profits.

LECs offer several benefits to the Energy Transition's success involving all the pillars of sustainability (Brummer 2018; Ceglia et al. 2020). On the economic side, LECs allow members to reduce their energy expenses and can be used to fight against energy poverty. Besides, LECs represent a new funding source for renewable energy projects to increase the system's share of clean energy technologies. On the technical side, LECs bring power generation closer to the consumption points reducing power losses in the electricity system. They also leverage the potential flexibility of the end-users of energy and increase the grid's resilience without overinvesting in grid expansions. On the social side, LECs promote participation and democratic control of the electricity system for social sectors that currently do not have the space or funding needed for an individual installation. At the same time, LECs increase awareness of sustainable

issues and build community cohesiveness (Coenen y Hoppe 2022).

The thesis aims to answer the following research questions:

- How can LECs be exploited to decarbonise urban environments involving citizenship?
- Which is the fairest way to share collective renewable generation?
- Can we develop new regulations to promote a fair energy transition through LECs?

To articulate this job, we establish the following specific objectives:

- Find the fairest ways to share energy, costs and benefits among the members of a CEL.
- Evaluate the impact of energy storage systems in a CEL. The storage systems to be evaluated are stationary batteries and electric vehicle integration.
- Integrate flexible loads (demand response and controllable appliance) and thermal loads (domestic hot water and climatisation) into the CEL.
- Assess LEC's performance under new regulations and changes in the electricity tariff.

The starting hypothesis is that LECs increase the urban energy transition by generating renewable energy, improving the system efficiency and developing local awareness. Current LEC simulation models do not uncover the full potential of LECs. Exploiting storage arbitrage, users' demand flexibility and optimising energy sharing will improve LECs' potential. Also, we aim to design new regulations that enhance and facilitate LEC deployment and thriving.

This PhD program will give LEC promoters and policymakers insights into exploiting the full potential of energy communities to achieve a fair and effective urban energy transition.

Methodology

The research begins with a comprehensive literature review. The aim is to understand the topic's current status and identify knowledge gaps. We review other LEC simulations, barriers faced and relevant regulations.

From here, we develop a mathematical model to define the CEL. This model must consider all the elements that make up the system: from generation equipment to storage systems and the users' consumption of the photovoltaic plant. We base the LEC on solar photovoltaic generation in an urban environment. We expand the model afterwards with other technologies such as hybrid generation, storage systems and electric covering of thermal loads. The model helps us test different LEC configurations involving changing the sharing strategy to improve profitability or fairness: the ideal scenario is to find a way to balance both outcomes (Baranauskas et al. 2022; Casalicchio et al. 2022). We also consider exploiting the users' flexibility with demand response programmes. Finally, different regulations can lead to a broad scope of results in the LEC (Inês et al. 2020).

We use case studies with real hourly consumption data from electricity users to apply the model. We compare the results of the LEC under different scenarios and environments. The results are analysed to conclude the implications of using some configurations or others when developing an energy community.

We programmed the mathematical model and the optimisation problem using Julia programming language. In addition, we use the optimisation package JuMP-Gurobi to achieve fast and optimum results, allowing us to study many scenarios. This way, we obtain the best energy allocation according to the established constraints. Finally, MATLAB and Microsoft Excel are used to analyse the results, depending on the needs.

To evaluate the results, we select the specific indicators according to the research needs to respond to the questions. Some examples of possible indicators are the Net Present Value, Levelized Cost Of Energy, Internal Rate of Return, Payback Period, Greenhouse Gases Avoided, Number of People Benefited, Percentage of Renewable Resource Utilization or Degree of Self-consumption.

Results and discussion

Our first work concerned Spain's new electricity tariff enforced in 2021 that changed the volumetric charges of electricity depending on the hour of the day for small residential and commercial consumers (less than 10 kW) during weekdays. The goal is to reduce consumption in peak, incentivising consumption in hours with historical valley consumption. We compared the impact of this regulatory change to the impact of allowing the use of dynamic allocation coefficients, a common demand from the sector. Results indicate (*Figure 1*) that both measures are beneficial, but the new electricity tariffs resulted in more significant profitability increases. However, LECs still present an optimal economic power installation below the environmental optimal. Installations are only optimal with a small ratio of surpluses, which fails to capture all the potential benefits of decentralised generation. Thus, future regulatory frameworks should aim to promote and incentivise LECs as they benefit local resilience and the environment while reducing energy bills (Álvaro Manso-Burgos et al. 2021).

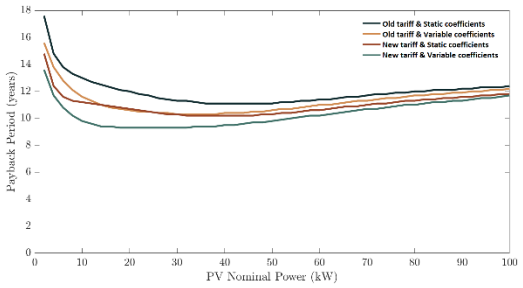


***Figure 1**. Payback period according to the installed nominal PV power applying static and variable coefficients under the old and new regulations.*

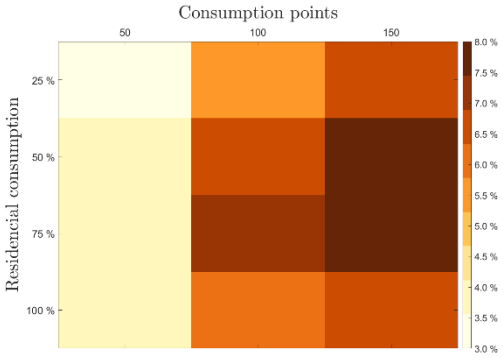


***Figure 2.** IRR heat map comparing the number of consumption points and share of residential consumption. These scenarios do not use batteries but use dynamic coefficients.*

Local energy communities require tools to select their most fitting community members, power-sharing strategy (Di Lorenzo et al. 2021; Herenčić et al. 2022; Kulmala et al. 2021) and technologies for their goals. In our second research, we characterise local energy communities' demand by comparing residential and commercial loads and varying the number of consumption points. Also, we evaluate the presence of a battery energy storage system with different capacities and ownership options. Results (*Figure 2*) indicate that an optimised LEC can fulfil economic, environmental or self-consumption goals. We also identify that combining residential and commercial profiles improves LEC's performance. Hence, policymakers should promote local energy communities that combine different load profiles to maximise their potential (Á. Manso-Burgos et al. 2022).

The role of electric vehicles (EVs) in the energy transition is in constant debate. In our following study, we assessed their impact on integrating them into LECs (Eckhoff et al. 2021; Lu et al. 2020) using the surplus energy from the prosumers to charge EVs instead of selling them to the grid. As shown in *Figure 3*, the households on their own showed better performance than those integrating EVs; however, this integration benefits EVs. Hence, one way to increase EV penetration into the system is their combination with LECs, but they need help in the form of grants and subsidies to host them.

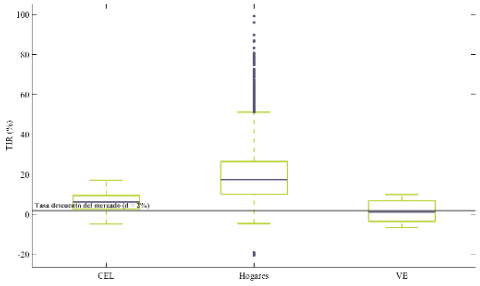


***Figure 3.** Cost-effectiveness of CEL compared to EVs and households separately considering their respective investments.*

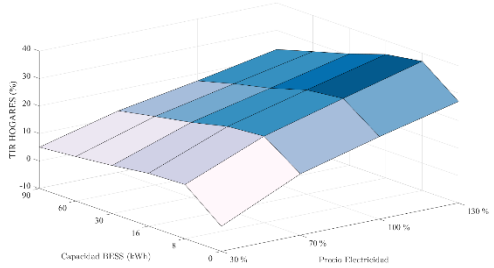


***Figure 4.** Cost-effectiveness under different electricity prices and storage capacity for households.*

We evaluated the impact of different critical variables regarding their technical design, namely the PV power and batteries capacity, or that affect the economic performance, namely electricity, fuel, PV modules and batteries prices. Results implied that solar installations do not need further subsidies to be profitable. At the same time, batteries improve profitability because the prosumers avoid buying high-priced electricity (Faia et al. 2021). Hence, we conclude that policymakers need to promote LECs that involve elements beyond electricity generation, such as batteries that increase prosumers' flexibility (Burgio et al. 2022; Felice et al. 2021) or integrate EVs that reduce mobility carbon footprint.

Conclusions and future work

This PhD program has concluded that an optimised local energy community can fulfil economic, environmental or self-consumption goals. Thanks to the new regulations and price reduction of the elements, PV generation does not need further subsidies to be profitable. In addition, the inclusion of

batteries improves its economic performance. Hence, subsidies should intend to exploit the full potential of collective prosumership, including elements of flexibility and mobility, among other options.

Despite being cost-effective, LECs are still not emerging at the pace that society and the climate emergency requires. So, we conclude that the main barriers to developing a new LEC are not regulatory, technical or economic but social (Bauwens et al. 2022; Gjorgievski, Cundeva, y Georghiou 2021; Gruber, Bachhiesl, y Wogrin 2021; Slingerland et al. 2021; Soeiro y Dias 2020).

Our future work will explore this topic, assessing the impact of LECs on different user profiles (Pena-Bello et al. 2021) and evaluating how LECs can be used to tackle fuel poverty (Hanke, Guyet, y Feenstra 2021). Furthermore, we will upscale the scope of collective prosumership to the district level (Bukovszki et al. 2020; Petrovics, Huitema, y Jordan 2022; Sareen et al. 2022) to identify the best expenditure strategy using mature technologies to decarbonise urban areas.

Baranauskas, Marius, Antti Keski-Koukkari, Poria Hasanpor Divshali, Amir Safdarian, y Anna Kulmala. 2022. «Value Creation and Sharing Methods in Household Energy Communities». En *2022 IEEE International Conference on Power Electronics, Smart Grid, and Renewable Energy (PESGRE)*, 1-8. Trivandrum, India: IEEE. https://doi.org/10.1109/PESGRE52268.2022.9715888.

Bauwens, Thomas, Daan Schraven, Emily Drewing, Jörg Radtke, Lars Holstenkamp, Boris Gotchev, y Özgür Yildiz. 2022. «Conceptualizing Community in Energy Systems: A Systematic Review of 183 Definitions». *Renewable and Sustainable Energy Reviews* 156 (marzo): 111999. https://doi.org/10.1016/j.rser.2021.111999.

Brummer, Vasco. 2018. «Community Energy – Benefits and Barriers: A Comparative Literature Review of Community Energy in the UK, Germany and the USA, the Benefits It Provides for Society and the Barriers It Faces». *Renewable and Sustainable Energy Reviews* 94 (octubre): 187-96. https://doi.org/10.1016/j.rser.2018.06.013.

Bukovszki, Viktor, Ábel Magyari, Marina Kristina Braun, Kitti Párdi, y András Reith. 2020. «Energy Modelling as a Trigger for Energy Communities: A Joint Socio-Technical Perspective». *Energies* 13 (9): 2274. https://doi.org/10.3390/en13092274.

Burgio, Alessandro, Domenico Cimmino, Micha Jasinski, Zbigniew Leonowicz, y Pierluigi Siano. 2022. «A Heuristic Method to Calculate the Capacity of Residential PV-BESS in Providing Upward Flexibility Services in Energy Communities». *IEEE Access* 10: 2908-28. https://doi.org/10.1109/ACCESS.2021.3139189.

Casalicchio, Valeria, Giampaolo Manzolini, Matteo Giacomo Prina, y David Moser. 2022. «From Investment Optimization to Fair Benefit Distribution in Renewable Energy Community Modelling». *Applied Energy* 310 (marzo): 118447. https://doi.org/10.1016/j.apenergy.2021.118447.

Ceglia, F., P. Esposito, E. Marrasso, y M. Sasso. 2020. «From Smart Energy Community to Smart Energy Municipalities: Literature Review, Agendas and Pathways». *Journal of Cleaner Production* 254 (mayo): 120118. https://doi.org/10.1016/j.jclepro.2020.120118.

Coenen, Frans H. J. M., y Thomas Hoppe. 2022. «Renewable Energy Communities as a New Actor in Home Energy Savings». *Urban Planning* 7 (2): 108-22. https://doi.org/10.17645/up.v7i2.5088.

Di Lorenzo, Gianfranco, Sara Rotondo, Rodolfo Araneo, Giovanni Petrone, y Luigi Martirano. 2021. «Innovative Power-Sharing Model for Buildings and Energy Communities». *Renewable Energy* 172 (julio): 1087-1102. https://doi.org/10.1016/j.renene.2021.03.063.

Eckhoff, S., H. Wagner, O. Werth, J. Gerlach, M. H. Breitner, y B. Engel. 2021. «Electric Mobility Integration in Energy Communities: Trending Topics and Future Research Directions». En *5th E-Mobility Power System Integration Symposium (EMOB 2021)*, 196-204. Hybrid Conference, Germany: Institution of Engineering and Technology. https://doi.org/10.1049/icp.2021.2524.

Faia, Ricardo, Joao Soares, Tiago Pinto, Fernando Lezama, Zita Vale, y Juan Manuel Corchado. 2021. «Optimal Model for Local Energy Community Scheduling Considering Peer to Peer Electricity Transactions». *IEEE Access* 9: 12420-30. https://doi.org/10.1109/ACCESS.2021.3051004.

Felice, Alex, Lucija Rakocevic, Leen Peeters, Maarten Messagie, Thierry Coosemans, y Luis Ramirez Camargo. 2021. «An Assessment of Operational Economic Benefits of Renewable Energy Communities in Belgium». *Journal of Physics: Conference Series* 2042 (1): 012033. https://doi.org/10.1088/1742-6596/2042/1/012033.

Gjorgievski, Vladimir Z., Snezana Cundeva, y George E. Georghiou. 2021. «Social Arrangements, Technical Designs and Impacts of Energy Communities: A Review». *Renewable Energy* 169 (mayo): 1138-56. https://doi.org/10.1016/j.renene.2021.01.078.

Gruber, Lia, Udo Bachhiesl, y Sonja Wogrin. 2021. «The Current State of Research on Energy Communities». *E & i Elektrotechnik Und Informationstechnik* 138 (8): 515-24. https://doi.org/10.1007/s00502-021-00943-9.

Hanke, Florian, Rachel Guyet, y Marielle Feenstra. 2021. «Do Renewable Energy Communities Deliver Energy Justice? Exploring Insights from 71 European Cases». *Energy Research & Social Science* 80 (octubre): 102244. https://doi.org/10.1016/j.erss.2021.102244.

Herenčić, Lin, Mislav Kirac, Hrvoje Keko, Igor Kuzle, y Ivan Rajšl. 2022. «Automated Energy Sharing in MV and LV Distribution Grids within an Energy Community: A Case for Croatian City of Križevci with a Hybrid Renewable System». *Renewable Energy* 191 (mayo): 176-94. https://doi.org/10.1016/j.renene.2022.04.044.

Inês, Campos, Pontes Luz Guilherme, Marín-González Esther, Gährs Swantje, Hall Stephen, y Holstenkamp Lars. 2020. «Regulatory Challenges and Opportunities for Collective Renewable Energy Prosumers in the EU». *Energy Policy* 138 (marzo): 111212. https://doi.org/10.1016/j.enpol.2019.111212.

Kulmala, Anna, Marius Baranauskas, Amir Safdarian, Jussi Valta, Pertti Jarventausta, y Tomas Bjorkqvist. 2021. «Comparing Value Sharing Methods for Different Types of Energy Communities». En *2021 IEEE PES Innovative Smart Grid Technologies Europe (ISGT Europe)*, 1-6. Espoo, Finland: IEEE. https://doi.org/10.1109/ISGTEurope52324.2021.9640205.

Lu, Xinhui, Zhaoxi Liu, Li Ma, Lingfeng Wang, Kaile Zhou, y Nanping Feng. 2020. «A Robust Optimization Approach for Optimal Load Dispatch of Community Energy Hub». *Applied Energy* 259 (febrero): 114195. https://doi.org/10.1016/j.apenergy.2019.114195.

Manso-Burgos, Á., D. Ribó-Pérez, T. Gómez-Navarro, y M. Alcázar-Ortega. 2022. «Local Energy Communities Modelling and Optimisation Considering Storage, Demand Configuration and Sharing Strategies: A Case Study in Valencia (Spain)». *Energy Reports* 8 (noviembre): 10395-408. https://doi.org/10.1016/j.egyr.2022.08.181.

Manso-Burgos, Álvaro, David Ribó-Pérez, Manuel Alcázar-Ortega, y Tomás Gómez-Navarro. 2021. «Local Energy Communities in Spain: Economic Implications of the New Tariff and Variable Coefficients». *Sustainability* 13 (19): 10555. https://doi.org/10.3390/su131910555.

Pena-Bello, Alejandro, David Parra, Mario Herberz, Verena Tiefenbeck, Martin K. Patel, y Ulf J. J. Hahnel. 2021. «Integration of Prosumer Peer-to-Peer Trading Decisions into Energy Community Modelling». *Nature Energy* 7 (1): 74-82. https://doi.org/10.1038/s41560-021-00950-2.

Petrovics, Daniel, Dave Huitema, y Andrew Jordan. 2022. «Polycentric Energy Governance: Under What Conditions Do Energy Communities Scale?» *Environmental Policy and Governance* 32 (5): 438-49. https://doi.org/10.1002/eet.1989.

Sareen, Siddharth, Vicky Albert-Seifried, Laura Aelenei, Francesco Reda, Ghazal Etminan, Maria-Beatrice Andreucci, Michal Kuzmic, et al. 2022. «Ten Questions Concerning Positive Energy Districts». *Building and Environment* 216 (mayo): 109017. https://doi.org/10.1016/j.buildenv.2022.109017.

Slingerland, Stephan, Jordan Young, Ruth Mourik, y Lena Lutz. 2021. «Energy Communities for Just Energy Transitions on a Local Scale: Initial Lessons from the Lightness Project». En *The 9th Annual Edition of Sustainable Places (SP 2021)*, 29. MDPI. https://doi.org/10.3390/environsciproc2021011029.

Soeiro, Susana, y Marta Ferreira Dias. 2020. «Renewable Energy Community and the European Energy Market: Main Motivations». *Heliyon* 6 (7). https://doi.org/10.1016/j.heliyon.2020.e04511.

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Participatory energy transitions in southern Europe. The experience from València, Spain

Ana Escario-Chust[1], Guillermo Palau-Salvador[1], Sergio Segura-Calero[1]
[1]*INGENIO (CSIC-UPV), Universitat Politècnica de València (aneschu@alumni.upv.es).*

Short Bio

PhD candidate at INGENIO (CSIC-UPV) in the Local Development and International Cooperation Program. Her research focuses on climate neutral cities, sustainability governance, participatory spaces for urban transitions to sustainability and urban transformative capacities among others. At the city level she has been involved in the creation and development of the urban transition participatory spaces in Energy and Agri Food.

Abstract **– Multi-stakeholder engagement spaces are important instruments for transition governance. Due to their nature they require consciousness of the place they are based in. The research conducted in this paper connects to the ongoing literature of Transition Management on how to govern the energy transition (ET) at a local level, and contributes to filling the gap on multi-stakeholder engagement groups for the energy transition in a Southern European context. Empirical evidence comes from the city of València, Spain, where innovative formulas are being developed. One of them, the Mesa de Transición Energética (MTE), emerges as a multi-stakeholder, participatory and inclusive mechanism to define the roadmap towards sustainability. This new experience in the city led to the need to uncover the challenges, barriers, benefits and opportunities it had to face. It also shed clarity on how such multi-stakeholder engagement spaces can facilitate the energy transition path. The multi-stakeholder engagement space for the energy transition in València can be seen as an important driver of change in València and as a model for other cities in Spain. In turn, this piece of work contributes to both increasing the representation of the literature about these initiatives and providing grounding for the future spread of multi-stakeholder governance arrangements towards energy transition in Southern European cities.**

Keywords **– Energy transition, urban sustainability, multi-stakeholder, roadmap, Southern Europe, València**

INTRODUCTION

It is widely acknowledged in academic literature that different geographical contexts can require different transition pathways (Frolova Ignatieva et al., 2019; Krupnik et al., 2022). This highlights the need of contextualization and place-based approaches. This also means that Southern European countries can have different experiences with sustainability transition processes compared to north and west European contexts, due to "cultural, historical, political and socio-economic factors" (Krupnik et al., 2022, p. 8). This get highly complex when talking about participatory sustainability transitions. However, while the information regarding these sustainability transition processes in northern Europe is growing exponentially, for example through experiences and case-studies, the southern European context is less represented in this area (Frolova Ignatieva et al., 2019; Krupnik et al., 2022).

In essence, through a case-study in València, this research proposes to understand: how urban energy transitions can be governed in southern urban contexts? How can multi-stakeholder engagement spaces facilitate this governance?

CASE STUDY

In València, a southern European city from Spain, innovative formulas are being developed to

address sustainability transitions. Aware of the importance of an energy transition (ET) that has to be inclusive, fair and co-created a participative multi-stakeholder engagement group has been created. The group, also known as *Mesa de la Transición Energética* (Energy Transition Roundtable) or MTE, is in charge to define the energy transition roadmap for 2030.

This initiative was facilitated after the incorporation of the city into the European project TOMORROW (TOwards Multi-stakehOldeRs transition ROadmaps With citizens at the centre). The MTE started in September 2020 under the coordination of a motor group made up of: the València City Council, the València Climate and Energy Foundation and the Polytechnic University of València. The group is composed of 24 stakeholders belonging to: academia, private sector, public sector, mass media and civil society. During 2 years, the MTE has become a space for collaboration of energy stakeholders and co-creation of new solutions that can address the ET of the city in a balanced, participatory and inclusive manner.

THEORETICAL FRAMEWORK

Transition management

Level	Key activities
Strategic	Problem structuring, vision development, strategic discussions, long-term goal formulation, collective goal and norm setting, long-term anticipation
Tactical	Achieving goals in a specific context, steering activities, negotiation, collaboration, agenda-setting, coalition forming
Operational	Short-term, everyday decisions, specific projects and experiments
Reflexive	Learning, monitoring, assessment, evaluation

Table 1. Governance activities in Transition Management (Loorbach, 2007)

Multi-stakeholder engagement spaces

In TM conventional approaches to governance are considered inadequate, situating at its core the experimentation with innovative solutions (Wittmayer et al., 2011). Together with this, McCormick (2013) also considers that collaborative action can enhance effectiveness of urban sustainability projects, particularly when there are ambitious goals. Also, sustainability transitions can be enhanced by stakeholder engagement since it can cause transformative social learning, promoting societal change and leading to collective action towards a common goal such as sustainability (Frantzeskaki et al., 2016, p. 11).

For this, an innovative instrument of governance of, the above considered, participatory transitions are multi-stakeholder engagement spaces. These spaces are "institutional spaces in which multiple actors convene to allow exchange of ideas, dialogue on issues and solutions and interactions concerning targeted problems and their proposed solutions" (Frantzeskaki and Rok, p.48). According to literature, these groups must be open and evolving process of innovation and it is important that conditions that propitiate actor engagement are not only built and ensured but also protected. This groups aim is to develop a transition agenda and can be managed by a transition team (Hölscher et al., 2019) that fosters, prepares, facilitates, coordinates, documents and analyzes the entire process.

Transition Management in urban, southern European contexts

TM was developed as a way to assist countries setting up policies to make sustainability transitions in various socio-technical systems. It started in the Netherlands and spread to the UK and Belgium (Loorbach & Rotmans, 2010). Nowadays, in TM research literature western Europe cases stand out (Frantzeskaki et al., 2018), being southern Europe underrepresented, with only a ten per cent of the cases reviewed. No cases were found in Spain.

Following the place-based approach, the implementation of the approach in any specific context can lead to different results and, consequently, different lessons. Since TM itself is considered the outcome of a combination of theory and practice (Loorbach, 2010), learning from the application of this model in other contexts could contribute to advance the generic model of TM by including the newfound insights (Loorbach, 2010), getting closer to more context suitable transitions.

METHODOLOGY

Primary data was collected through three sources: participant observation, informal conversations with actors and semi-structured interviews. In total 45 interviews were conducted online: 21 at the beginning of the MTE in March 2019 and 24 at the end in April-June 2021. The

interviewees were every actor of the MTE, including the motor group.

To this, secondary data was added from: websites, project documents, minutes, reports, publications, strategic plans and workshop canvases. Primary and secondary data was analyzed and coded using NVivo.

Results and Discussion

The MTE was implemented as a way of coordinating and leading a participatory definition of the ET roadmap (*strategic level*). The interviews reflect a city with a weak ET without clear leadership, rigid administrations that resist to change and a lack of adequate baselines nor path dependencies evaluation. The fragile network of actors and a citizenship with a lack of knowledge and a tense relation on the energy sector make the social organization unstable and with heterogenous ET visions. This tension comes due to historical distrust after years of oligopoly of the private sector supported by the government structures and to the adverse legal framework, that considers energy as a consumer product instead of a basic necessity (Pellicer-Sifres et al., 2018). Considering all this, the stakeholders agree that the creation of the MTE in València has become an achievement in itself.

Its aim was to create a citizen alliance, and to collaborate with other urban strategies for climate neutrality (*tactical level*). The process resulted in a highly dependent group to the institution. An independent process is perceived as less neutral and less supported by the political and economic commitment, as well as familiarity and knowledge, that scaling up the process would need. However, the strong role of the administration could have led some of the stakeholders to a feeling of being conducted with a co-optation shadow.

The practical work started through the definition of demonstrative -or pilot- projects (*operational level*). Here, a stronger presence of technological projects to the detriment of social projects was found due to: an underrepresentation of social actors, masking other transition views and the existence of few dissonant voices. The two years duration made some stakeholders to start getting impatient about the lack of "action" of the group and demanded process more practical with more impact in the city.

The ambitious goal of the MTE requires a process of collective reflection on the energy system and on the group development (*reflexive level*). This has been a transversal element during time, where specific sessions were carried out to redefine the goal and the priorities as well as the future of the MTE.

Conclusions

Multi-stakeholder transition roadmaps have special relevance in contexts without a consolidated participatory tradition or where institutional trust, or between the system's own actors, has been socially reviled. TM methodology has proven to be an adequate basis that allows the formulation of a participatory urban ET strategy in southern Europe. This methodology can work as an important support to find methods and legitimation for transition strategies. Promoting a bigger scale discussion of the potential impacts of these experiences in southern European contexts could lead to more adequate processes, increasing its potential impact.

References

Frantzeskaki, N., Dumitru, A., Anguelovski, I., Avelino, F., Bach, M., Best, B., Binder, C., Barnes, J., Carrus, G., Egermann, M., Haxeltine, A., Moore, M. L., Mira, R. G., Loorbach, D., Uzzell, D., Omman, I., Olsson, P., Silvestri, G., Stedman, R., … Rauschmayer, F. (2016). Elucidating the changing roles of civil society in urban sustainability transitions. *Current Opinion in Environmental Sustainability*, *22*, 41–50. https://doi.org/10.1016/J.COSUST.2017.04.008

Frantzeskaki, N., H€ Olscher, K., Wittmayer, J. M., Avelino, F., & Bach, M. (2018). *Transition Management in and for Cities: Introducing a New Governance Approach to Address Urban Challenges*. 1–40. https://doi.org/10.1007/978-3-319-69273-9_1

Frolova Ignatieva, M., Frantál, B., Ferrario, V., Centeri, C., Herrero-Luque, D., Gronas, V., Martinát, S., Puttilli, M., da Silva-Almeida, L., & D'Angelo, F. (2019). *Diverse energy transition patterns in Central and Southern Europe: A comparative study of institutional landscapes in the Czech Republic, Hungary, Italy and Spain*. https://digibug.ugr.es/handle/10481/70888

Hölscher, K., Wittmayer, J. M., Avelino, F., & Giezen, M. (2019). Opening up the transition arena: An analysis of (dis)empowerment of civil society actors in transition management in cities. *Technological Forecasting and Social Change*, *145*, 176–185. https://doi.org/10.1016/J.TECHFORE.2017.05.004

Krupnik, S., Wagner, A., Koretskaya, O., Rudek, T. J., Wade, R., Mišík, M., Akerboom, S., Foulds, C., Smith Stegen, K., Adem, Batel,

S., Rabitz, F., Certomà, C., Chodkowska-Miszczuk, J., Denac, M., Dokupilová, D., Leiren, M. D., Ignatieva, M. F., Gabaldón-Estevan, D., … von Wirth, T. (2022). Beyond technology: A research agenda for social sciences and humanities research on renewable energy in Europe. *Energy Research & Social Science*, *89*, 102536. https://doi.org/10.1016/J.ERSS.2022.102536

Loorbach, D. (2007). *Transition management. New mode of governance for sustainable development*. International Books. https://www.jstor.org/stable/jcorpciti.58.48

Loorbach, D. (2010). Transition Management for Sustainable Development: A Prescriptive, Complexity-Based Governance Framework. *Governance*, *23*(1), 161–183. https://doi.org/10.1111/J.1468-0491.2009.01471.X

Loorbach, D., & Rotmans, J. (2010). The practice of transition management: Examples and lessons from four distinct cases. *Futures*, *42*(3), 237–246. https://doi.org/10.1016/J.FUTURES.2009.11.009

McCormick, K., Anderberg, S., Coenen, L., & Neij, L. (2013). Advancing sustainable urban transformation. *Journal of Cleaner Production*, *50*, 1–11. https://doi.org/10.1016/J.JCLEPRO.2013.01.003

Pellicer-Sifres, V., Belda-Miquel, S., Cuesta-Fernandez, I., & Boni, A. (2018). Learning, transformative action, and grassroots innovation: Insights from the Spanish energy cooperative Som Energia. *Energy Research & Social Science*, *42*, 100–111. https://doi.org/10.1016/J.ERSS.2018.03.001

Wittmayer, J., van Steenbergen, F., Quist, J. N., Loorbach, D., & Hoogland, C. (2011). The community Arena: Application of transition governance in local communities. In G. Balint, B. Antala, C. Carty, J.-M. A. Mabieme, I. B. Amar, & A. Kaplanova (Eds.), *2nd International Conference on Sustainable Transitions Diversity* (Vol. 7, Issue 1, pp. 343–354). s.n. https://doi.org/10.2/JQUERY.MIN.JS

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Managerialism in academia: External factor changing researchers' motivations to engage with industry

Ana María Gómez-Aguayo*, Pedro Marques
INGENIO (CSIC-Universitat Politècnica de València), Camino de Vera s/n, E-46022 Valencia, Spain (angoag@upvnet.upv.es)

Short Bio

I am a PhD candidate at INGENIO. I am in my fourth year of the PhD program in Economics at UPV. My research topic is The scientific co-production of knowledge with universities on the relationship between growth cycles and the quality of business science.

Abstract **– The academic debate about university-industry engagement often centres on the strategic aspects of these interactions, in particular, those related to the benefits associated with knowledge exchange and learning. In a broader sense, it is assumed that these interactions are fundamental to innovation and economic growth. However, not enough attention has been paid to the external reasons why individual academics chose to engage with business partners to maintain a long-term relationships. In particular, this paper argues that the incentives that academics face in the context of managerialism in academia, with its emphasis on quantitative targets and business practices, may be leading to higher levels of 'instrumental engagement'. This happens when individuals participate in these types of interactions only to meet funding or publication targets, but with limited interest in actual knowledge exchange and learning. We explore this issue through semi-structured interviews with the most productive Spanish academics in terms of co-publications with industry partners. We deepen our understanding of managerialism as an external factor that is leading researchers to instrumentalize their relationships with the private sector. Our findings reveal that other forms of engagement are often replacing research tasks assumed by universities beyond mere funding.!**

Keywords **– Research motivations; University-industry interaction; managerialism in academia**

INTRODUCTION

University-industry relationships have been at the forefront of academic and policy debates for at least two decades (Laredo, 2007). The role of university in economic development is an issue mired in controversy. A "Third Mission" has been adopted by universities and the broad concept has become firmly established by the literature on entrepreneur university (Campbell and Guttel, 2005; Rothaermel et al., 2007) and by the evolution of theoretical frameworks as the models of innovation, from linear models, triple-helix and national (or regional) to innovation systems. Within this framework, the university assumes a "Third Mission", subsuming all activities with the external environment in besides teaching and research (Abreu et al., 2016; Glaser et al., 2014). Major literature has overemphasized the importance of university and industry collaboration, arguing that crucial for new knowledge-based societies (Etzkowitz and Leydesdorff, 2000). In consequence, governments over the past two decades have allocated resources in mass to support collaboration between university and industry in order to exploit the scientific knowledge base for innovation and economic competitiveness (Lambert, 2003). These initiatives have a direct effect on academic researchers' motivation to engage with industry. The possibility to generate additional funds from private industries and the government may affect

academics' willingness to engage with industry (Benner and Sandström, 2000; Slaughter and Leslie, 1997) and those incentives can be particularly attractive to researchers whose resources are extremely limited in the university (Laudel, 2006).

Several authors have deepened in their studies to determine the motivations of academics to interact with industry (Azagra-Caro et al., 2017; Bozeman and Gaughan, 2011). From the university perspective there are several studies regarding micro-level determinants of academic engagement such as individual age, gender, psychological characteristics, rank of researchers, academic status, scientific output, type of knowledge (Bekkers and Bodas Freitas, 2008; D'Este and Perkmann, 2011; Giuliani et al., 2010; Haeussler and Colyvas, 2011). In contrast to this wide range of studies related to motivations of researchers to engage, studies about organizational context facilitating or hindering academic engagement have been lack studied (Bercovitz and Feldman, 2008; Boardman and Ponomariov, 2009; Huyghe and Knockaert, 2015).

Therefore, this study explores the effects of organizational factors on academic engagement motives through individual factors. The university is the pillar where a researcher forges his or her career and therefore it is necessary to understand in-depth the factors that researchers perceive closest from the academic context being very specific on managerialist characteristics (supervision system, performativity culture, and labour conditions) and how they are connected with the motives to engage with industry. A novel contribution of this study is that we aim to capture those first reasons why a researcher collaborates and those changes in their motivations, which, due to these external factors, become push-motives of engagement. The study of motivations in technology transfer literature use a static or cross-sectional analysis, limiting the analysis to a specific moment in time (Barberá-Tomás et al., 2022; Bozeman and Gaughan, 2011). Individual motivations literature establishedthose motives can change in intensity and in type of motivation over time (Grant and Shin, 2012; Murnieks et al., 2020a).

Universities have undergone fundamental transformations over the past two decades (Hagen, 2002; Blackmore, 2002). To sustain their research performance despite the constraint of public funding, and to adapt to a more competitive environment in a fluctuating economy (Billot, 2010; Henkel, 2007; Slaughter and Leslie, 1997) universities intend to climb in the international competitive rankings by building up good records regarding students, licensing, patents, publications, research projects, and international collaboration, placing a more significant burden on academics (Borum and Hansen, 2000; Muller, 2021; Thursby et al., 2007). To achieve this goal, universities have adopted managerial technics to maintain the performance of academics, reshaping the research system and work experiences of academic scientists. Some characteristics of managerialism in academia include strong supervisory structures, extreme control of academic work and incentive mechanisms for intensive knowledge production, combined with a limited job offer, uncertain stabilization, and precarious academic career for researchers.

The higher education literature has largely debated about the model of the university more accurate to generate knowledge within the university, but not with other actors of innovation. While in the university-industry literature, the concept of managerialism has never been linked to studying the interplay between companies and universities. Tartari and Breschi (2012) posited that the current evaluation system influences academics' willingness to collaborate with the industry. We go further in this line by exploring managerialism in academia, as an external factor that may change researchers' motivations to collaborate.

This study presents a qualitative inductive study comprising 10 collaborative research stars i.e. scientific personnel recognized for their high production in collaboration with industry (Deem, 1998; Henkel, 1997) in the context of Spain from 2000 to 2016. It offers an in-depth understanding of the primary intention to collaborate and the changes on the motivations of collaborative researchers associated with the managerialist strategies implemented by universities. The findings shed light on how managerialism is playing an important role in how academics are engaging with industry and how this context may shape academia towards more instrumental purposes to engage with industry (Elfving et al., 2017; Grant and Shin, 2012; Kromydas, 2017; Lam, 2011).

METHODS

We used qualitative analysis to explore the benefits and current motivations of researchers to engage with the industry. Semi-structured interviews were conducted with the most prolific correspondent authors of articles published in collaboration with at least one industry author in the period of 2000-2016. The participants were considered collaborative research stars i.e. scientific personnel recognized for their high

production and competitive activity (Deem, 1998; Henkel, 1997).

We selected the participants by using bibliometric data from Web of Science. The full sample consisted of 7026 scientific co-publications corresponding to 3,300 correspondent authors. We selected authors of correspondence with an average rate of 15 co-publications with industry partners.

From the transcripts, we identified key ideas that are relevant to the study. We coded the transcripts twice to make an inductive analysis of the relevant ideas. We explored the current data and put them together in three big categories (venture initiation motives to collaborate, managerialism in academia, and the latest motivations to collaborate). After this dynamic process of deriving and developing concepts from data, we went back to the literature. We obtained a list of codes based on the literature where some authors suggest, first, a categorization of the motivations to engage with industry literature, and second, the descriptive characteristics of managerialism in academia. Subsequently, the codes were compared with the codes against actual data to develop a unique code. After that we went deeper into the analysis by comparing the relation of different components to each other, to end with an accurate interpretation of the data collected.

RESULTS

In academic careers, researchers go through different moments in their academic status, and in their working conditions. Time, organizational changes in the university, and the crises that universities have faced in the last twenty years are factors that change the motivation of academics to collaborate. Understanding the evolution of these motivations is complex, however, in this study we wanted to understand what motivations are maintained over time and which others are born and evolve towards another type of motivation.

Researchers mentioned that the excessive control and supervision exercised by the university in order to have a high performance of researchers comes at a cost to the research they do. The opportunity cost of collaborating with a company versus doing non-collaborative research may decrease in unfavourable context. We highlighted new push motivations hitherto unknown in the literature, such as (1) time to dedicate to research; (2) practical relevance of your research; (3) monitorization focus on scientific research; (4) publishing scientific papers.

The competitive environment and the excess of inbreeding in Spanish universities are probably a result of the academic evaluation system and the bureaucratic barriers to access permanent positions in research, but it is a characteristic that has permeated the organizational culture of the university. The competitive environment (perceived negatively or rated as negative by the interpretation of several of the interview extracts) as a discouraging factor to stay at the university may push some researchers to look for collaboration with other partners in the same field outside of academia. In addition, managerialism in academia is pushing researchers' orientation toward self-demanding performance and the motivation for publishing academic papers became a new motivation itself. For example, the pressure to publish, which may exist for early career researchers, also rebounds on tenured academics and pushes them to use their research results to publish scientific articles, often prematurely.

Regarding the job conditions of researchers, we observed that some motivations are still the same, e.g. solving industry problems; others get reinforced e.g. access to funding and in-kind resources; some others are new such as fixing careers of early-stage researchers and facing economic hardship.

REFERENCES

Abreu, M., Demirel, P., Grinevich, V., & Karataş-Özkan, M. (2016). Entrepreneurial practices in research-intensive and teaching-led universities. Small Business Economics, 47(3), 695–717. https://doi.org/10.1007/s11187-016-9754-5

Azagra-Caro, J. M., Barberá-Tomás, D., Edwards-Schachter, M., & Tur, E. M. (2017). Dynamic interactions between university-industry knowledge transfer channels: A case study of the most highly cited academic patent. Research Policy, 46(2), 463–474. https://doi.org/10.1016/j.respol.2016.11.011

Barberá-Tomás, D., Azagra-Caro, J. M., & D'Este, P. (2022). Dynamic perspectives on technology transfer: Introduction to the special section. The Journal of Technology Transfer, 47(5), 1299–1307. https://doi.org/10.1007/s10961-021-09898-7

Bekkers, R., & Bodas Freitas, I. M. (2008). Analysing knowledge transfer channels between universities and industry: To what degree do sectors also matter? Research Policy, 37(10), 1837–1853. https://doi.org/10.1016/j.respol.2008.07.007

Benner, M., & Sandström, U. (2000). Institutionalizing the triple helix: Research funding and norms in the academic system. Research Policy, 29(2), 291–301. https://doi.org/10.1016/S0048-7333(99)00067-0

Bercovitz, J., & Feldman, M. (2008). Academic Entrepreneurs: Organizational Change at the Individual Level. Organization Science, 19(1), 69–89. https://doi.org/10.1287/orsc.1070.0295

Billot, J. (2010). The imagined and the real: Identifying the tensions for academic identity. Higher Education Research & Development, 29(6), 709–721. https://doi.org/10.1080/07294360.2010.487201

Boardman, P., & Ponomariov, B. L. (2009). University researchers working with private companies. Technovation, 29(2), 142–153. https://doi.org/10.1016/j.technovation.2008.03.008

Borum, F., & Hansen, H. F. (2000). The Local Construction and Enactment of Standards for Research Evaluation: The Case of the Copenhagen Business School. Evaluation, 6(3), 281–299. https://doi.org/10.1177/13563890022209299

Bozeman, B., & Gaughan, M. (2011). How do men and women differ in research collaborations? An analysis of the collaborative motives and strategies of academic researchers. Research Policy, 40(10), 1393–1402. https://doi.org/10.1016/j.respol.2011.07.002

Campbell, D. F. J., & Guttel, W. H. (2005). Knowledge production of firms: Research networks and the 'scientification' of business R&D. International Journal of Technology Management, 31(1/2), 152. https://doi.org/10.1504/IJTM.2005.006629

Deem, R. (1998). New Managerialism and Higher Education: The Management of Performances and Cultures. In Universities in the United Kingdom.'International Studies in Sociology of Education 8 (1.

D'Este, P., & Patel, P. (2007). University–industry linkages in the UK: What are the factors underlying the variety of interactions with industry? Research Policy, 36(9), 1295–1313. https://doi.org/10.1016/j.respol.2007.05.002

D'Este, P., & Perkmann, M. (2011). Why do academics engage with industry? The entrepreneurial university and individual motivations. The Journal of Technology Transfer, 36(3), 316–339. https://doi.org/10.1007/s10961-010-9153-z

Elfving, J., Brännback, M., & Carsrud, A. (2017). Motivations Matter in Entrepreneurial Behavior: Depends on the Context. In M. Brännback & A. L. Carsrud (Eds.), Revisiting the Entrepreneurial Mind: Inside the Black Box: An Expanded Edition (pp. 211–217). Springer International Publishing. https://doi.org/10.1007/978-3-319-45544-0_14

Etzkowitz, H., & Leydesdorff, L. (2000). The dynamics of innovation: From National Systems and "Mode 2" to a Triple Helix of university–industry–government relations. Research Policy, 29(2), 109–123. https://doi.org/10.1016/S0048-7333(99)00055-4

Giuliani, E., Morrison, A., Pietrobelli, C., & Rabellotti, R. (2010). Who are the researchers that are collaborating with industry? An analysis of the wine sectors in Chile, South Africa and Italy. Research Policy, 39(6), 748–761. https://doi.org/10.1016/j.respol.2010.03.007

Glaser, A., O'Shea, N., & de Gery, C. (2014). Measuring Third Mission Activities of Higher Education Institutes. Constructing an Evaluation Framework. (SSRN Scholarly Paper No. 2649950). https://doi.org/10.2139/ssrn.2649950

Grant, A. M., & Shin, J. (2012). Work Motivation: Directing, Energizing, and Maintaining Effort (and Research). In R. M. Ryan (Ed.), The Oxford Handbook of Human Motivation (1st ed., pp. 505–519). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780195399820.013.0028

Haeussler, C., & Colyvas, J. A. (2011). Breaking the Ivory Tower: Academic Entrepreneurship in the Life Sciences in UK and Germany. Research Policy, 40(1), 41–54. https://doi.org/10.1016/j.respol.2010.09.012

Henkel, M. (1997). Teaching Quality Assessments: Public Accountability and Academic Autonomy in Higher Education. Evaluation, 3(1), 9–23. https://doi.org/10.1177/135638909700300102

Henkel, M. (2007). Can academic autonomy survive in the knowledge society? A perspective from Britain. Higher Education Research & Development, 26(1), 87–99. https://doi.org/10.1080/07294360601166836

Huyghe, A., & Knockaert, M. (2015). The influence of organizational culture and climate on entrepreneurial intentions among research scientists. The Journal of Technology Transfer, 40(1), 138–160. https://doi.org/10.1007/s10961-014-9333-3

Kromydas, T. (2017). Rethinking higher education and its relationship with social inequalities: Past knowledge, present state and future potential. Palgrave Communications, 3(1), 1. https://doi.org/10.1057/s41599-017-0001-8

Lam, A. (2011). What motivates academic scientists to engage in research commercialization: 'Gold', 'ribbon' or 'puzzle'? Research Policy, 40(10), 1354–1368. https://doi.org/10.1016/j.respol.2011.09.002

Lambert, R. (2003). Lambert Review of Business-University Collaboration: Final Report (SSRN Scholarly Paper No. 1509981). https://papers.ssrn.com/abstract=1509981

Laredo, P. (2007). Revisiting the Third Mission of Universities: Toward a Renewed Categorization of University Activities? Higher Education Policy, 20(4), 441–456. https://doi.org/10.1057/palgrave.hep.8300169

Laudel, G. (2006). The art of getting funded: How scientists adapt to their funding conditions. Science and Public Policy, 33(7), 489–504. https://doi.org/10.3152/147154306781778777

Muller, S. M. (2021). From Accountability to Managerialism and Incentives. In The Incentivised University. Debating Higher Education: Philosophical Perspectives: Vol. vol 9. (pp. 95–112). Springer, Cham. https://doi.org/10.1007/978-3-030-84447-9_7

Murnieks, C. Y., Klotz, A. C., & Shepherd, D. A. (2020). Entrepreneurial motivation: A review of the literature and an agenda for future research. Journal of Organizational Behavior, 41(2), 115–143. https://doi.org/10.1002/job.2374

Rothaermel, F. T., Agung, S. D., & Jiang, L. (2007). University entrepreneurship: A taxonomy of the literature. Industrial and Corporate Change, 16(4), 691–791. https://doi.org/10.1093/icc/dtm023

Slaughter, S., & Leslie, L. L. (1997). Academic capitalism: Politics, policies, and the entrepreneurial university.

Tartari, V., & Breschi, S. (2012). Set them free: Scientists' evaluations of the benefits and costs of university–industry research collaboration. Industrial and Corporate Change, 21(5), 1117–1147. https://doi.org/10.1093/icc/dts004

Thursby, M., Thursby, J., & Gupta-Mukherjee, S. (2007). Are there real effects of licensing on academic research? A life cycle view. Journal of Economic Behavior & Organization, 63(4), 577–598. https://doi.org/10.1016/j.jebo.2006.05.016

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Learning in/from left-behindness: A transformational failures perspective

Andrea Fulgenzi
Gran Sasso Science Institute, L'Aquila, Italy (andrea.fulgenzi@gssi.it)

Short Bio

Andrea Fulgenzi is a PhD student in Regional Science and Economic Geography at GSSI, L'Aquila, Italy. Thanks to a transdisciplinary background integrating globalization studies (University of Rome Tor Vergata, Italy), environmental engineering and urban environmental policy (Wageningen University and Research, The Netherlands), his research activities lie on the interface between sustainability transition management and urban/regional planning, with a specific interest on co-creation mechanisms.

Keywords
Left-behindness; Regional economic resilience; Policy learning; Sustainability transition management; Science-policy interaction.

Extended abstract

The theme of left-behindness is situated amidst lively ontological and critical debates involving researchers, policymakers, and practitioners, reflecting the complex, multi-dimensional, and spatially-diverse nature of the issue. Beyond debates on the legitimacy and effectiveness of place-based vis-à-vis place-blind policy approaches, and the potential for their integration as *place-sensitive* policies (Iammarino et al., 2019), the literature has recently attempted alternative conceptualisations of local and regional development in and for left-behind places (Compagnucci & Morettini, 2021; Iammarino et al., 2019; MacKinnon et al., 2022; Martin, 2021). The resulting debate has received peculiar resonance in Italy, where researchers, policymakers, and practitioners have criticised mainstream strategies to revitalise and re-inhabit so-called 'inner areas' in mountain regions along the Alps and Apennines under the radical heading of 'metro-mountain polycentrism' (Barbera & De Rossi, 2021).

Wider regional development questions emerge from the topic of left-behindness, usually concerned with the possibility of improving mainstream development policy approaches. For example, Martin et al (2021) have called for a "transformative shift in policy model and resource commitment" (p. 109), signalling a contemporary necessity of somewhat a 'turn' from innovation to transition policies for local and regional development. This need also stems from so-called 'grand societal challenges' (Schot & Steinmueller, 2018) that exacerbate ineffective regional development and innovation policies (Alkemade et al., 2011; Asheim et al., 2020). However, 'innovative' policy approaches are often regarded as naïve or incompatible with mainstream perspectives (Weber & Rohracher, 2012). Moreover, a cognitive "pro-success bias" (Vinck, 2017, p. 224) results in avoiding risk-taking behaviour and, in turn, in hampering the capacity to conduct (and learn from) experiments and innovation (Vinck, 2017).

Recent Economic Geography literature, especially in its evolutionary branches, have shown a transdisciplinary tendency of bridging contributions from other strands of literatures and disciplines – building for instance on the affinity between transition studies, sociological approaches, and global production networks (MacKinnon et al., 2019). Other potential directions seems to emerge from recent literature on policy learning (e.g., Moyson et al., 2017; Van Assche et al., 2022; Voß et al., 2009), while regional economic resilience presents extensive debates on the role of agency as critical dimension in left-behindness and regional development (e.g., Bristow & Healy, 2014; Grillitsch & Sotarauta, 2020;

Pezzi & Urso, 2017; Suitner et al., 2022). The *capacity* of managing such transition is in fact a critical component of these arguments, shedding the light on the processes and decisions behind more "future-oriented" (Levinthal & March, 1993, p. 95) regional development policies.

Despite this recognition, agency and capacity are still thorny topics raising significant challenges when the literature on regional economic resilience is applied to left-behind places with a non-urban or rural nature. Martin and Sunley (2020), for example, explicitly discourage the incorporation of 'slow-burn' processes (Pezzi & Urso, 2017) into the notion of regional economic resilience. Refraining from increasing ambiguity and *fuzziness* when distinguishing between the impact of shocks vis-à-vis slow-burn phenomena, left-behind places can in fact be considered as manifestations of an "*adaptive inertia*, or failure to upgrade and modernise" (Martin & Sunley, 2020, p. 19). Other critical perspectives emerge around the role of agency and capacity in mainstream local and regional development policies. First, the predominant focus on industrial dynamics and high-tech, firm-centred innovation has overlooked the multiscalar complementarities with alternative practices to community development (Brandão & Bagattolli, 2017; Meadowcroft, 2009; Pfotenhauer & Juhl, 2017; Uyarra et al., 2019), or territorial planning (Medeiros, 2022; Syssner & Jonsson, 2020). Second, as strictly dependant on contextual specificities and social embeddedness (Grillitsch et al., 2022; Hansen & Coenen, 2015; Nilsen et al., 2022; Tödtling & Trippl, 2018; Truffer et al., 2015, 2015; Weber & Rohracher, 2012), agency and capacity are representative of the overarching discourse on the geography of uneven development (Smith, 2008). Third, scarce appreciation of context diversity besides economic performance, in terms of actor compositions, power relations, and institutional responses, results in challenges of learning from successes and failures (Bristow & Healy, 2014; Fogelberg & Sandén, 2008; Nilsen et al., 2022; Tödtling & Trippl, 2018; Vinck, 2017; Weber & Rohracher, 2012).

The perspective of transformational failures, originating from Weber and Rohracher's (2012) work, enters this debates as one potential analytical framework for addressing criticisms on the firm-centred, innovation-biased approach to local and regional development in left-behind places. The two authors identified, alongside market and system-structural failures, a third type of failure mechanisms specifically hampering the adaptive-transformative capacity of regional development actors for new development paths. Depopulation and ageing, lack of horizontal and multi-level actor coordination for public and private investments and policy intervention, as well as lack (or inconsistency) of a shared and negotiated vision on the direction of local development, are indeed relevant and foundational issues for left-behind places. This evolutionary lexicon shows that left-behind places in fact reproduce the very same mechanisms of *adaptive inertia* that result in negative hysteretic responses to regional economic growth paths (cf. Martin & Sunley, 2020).

Similar questions arise in the context of Italian inner areas – especially concerning innovation (how to stimulate the growth or emergence of new economic activities, while preserving community cohesion?), repopulation (how to increase place attractiveness and stimulate relocation by new residents?), and heritage valorisation (how to reconcile post-disaster reconstruction, in central Italy, with tourism valorisation of material and immaterial heritage?). The underlying hypothesis guiding the PhD research, presented in this extended abstract, is that local institutions engaging in policy learning processes can increase their capacity to implement agendas for local and regional development transitions. Aligning with the so-called 'agency perspective' in regional economic resilience (Bristow & Healy, 2014), policy learning processes are believed to perform a mediating role for increasing transformative capacity at different spatiotemporal scales. The research hence emphasises policy learning processes as one contextual (pre)condition for the "emergence and patterning" (Nilsen et al., 2022, p. 3) of transformative agency among local and regional development actors (i.e., firm *and* nonfirm actors), to intervene on market, structural-system, and transformative failures. Transformative agency is here interpreted as capacity to design, implement, and evaluate innovative policy instruments to address left-behindness, 'adaptive inertia', and 'grand societal challenges'.

By providing grounded knowledge on how local and regional institutions can design, assess, and learn from innovative policy instruments for stimulating transitions in left-behind places, the proposed research adopts a significant practice-oriented objective. Research outputs are intended to provide policy-relevant and high-level academic knowledge also in the light of the 'Municipal PhD programme' in which the research is situated. These research programmes consist in a set of 40 PhD tracks offered by 30 Italian universities, carried out between 2021-2025 in a collaborative format with 40 Italian municipalities in inner areas (cf. Agenzia per la coesione territoriale, n.d.). The novelty of this PhD programme lies in the collaborative nature and co-ownership of the research project, as for the first time PhD students are required to work in close contact with one or more local public institutions. Besides representing a potentially innovative knowledge co-production process for addressing structural barriers to transitions in left-behind places, some inner areas participating to Municipal PhD projects overlap with pilot investment projects of the National Strategy for Inner Areas

(SNAI). One of these is the Valle Subequana area in the Abruzzo region, Italy, which has recently stipulated their Area Strategy – a multi-stakeholder, long-term policy intended to provide a shared vision and organisation for supporting transformative change (cf. Agenzia per la Coesione Territoriale, 2021). This area offers promising research activities as it also presents the abovementioned intersection between shocks and slow-burn phenomena, with most of the municipalities located in the crater of the 2009 earthquake — itself object of inquiry for the extent and timeline of reconstruction efforts (cf. Contreras et al., 2018; Imperiale & Vanclay, 2021).

The PhD research is therefore expected to contribute to literatures on policy learning, on local and regional development transitions, and on the 'resilience' of left-behind places against slow-burn phenomena and adaptive inertia. The research adopts a comparative, multiple case study design to the study of policy learning processes in left-behind places. Mixed methods are employed, including spatial analyses and mapping, descriptive statistical analyses, narrative and discourse analyses, archival research, and interviews with representatives of local and regional institutions and of territorial governance associations. The objective of these methods is to conduct a deductive, constructivist comparison between empirical evidence of transition experiments and theories on transformative capacity and left-behindness. First, critical challenges and barriers (material and immaterial) to development are analysed in the study area, to explore regional spatial divergences and local inequalities (Martin et al., 2021), as well as their historical development. These contextual (pre)conditions for success or failure in transformative change are then be compared with the transformational failures perspective, to pursue three research objectives: to analyse how supralocal policies (e.g., SNAI, Municipal PhD programmes, and Area Strategies) are absorbed by local institutions; to assess the level of policy harmonisation across municipalities in the same study area and to unveil the skewness of power relations (Nilsen et al., 2022) across actors; and to assess different actors' perception, positioning, and (expected) alignment towards the vision, objectives, and strategies set forth in the Area Strategy.

Bibliography

Agenzia per la coesione territoriale. (n.d.). Bandi per dottorati. *Agenzia per la coesione territoriale*. Retrieved 1 October 2022, from https://www.agenziacoesione.gov.it/opportunita-e-bandi/bandi-per-dottorati/

Agenzia per la Coesione Territoriale. (2021, June). *Accordo di Programma Quadro Valle Subequana*. https://www.agenziacoesione.gov.it/strategia-nazionale-aree-interne/regione-abruzzo-aree-interne/subequana/

Alkemade, F., Hekkert, M. P., & Negro, S. O. (2011). Transition policy and innovation policy: Friends or foes? *Environmental Innovation and Societal Transitions*, *1*(1), 125–129. https://doi.org/10.1016/j.eist.2011.04.009

Asheim, B. T., Isaksen, A., & Trippl, M. (2020). The role of the Regional Innovation System approach in contemporary regional policy: Is it still relevant in a globalised world? In M. González-López & B. Asheim, *Regions and Innovation Policies in Europe* (pp. 12–29). Edward Elgar Publishing. https://doi.org/10.4337/9781789904161.00006

Barbera, F., & De Rossi, A. (Eds.). (2021). *Metromontagna: Un progetto per riabitare l'Italia*. Donzelli editore.

Brandão, T., & Bagattolli, C. (2017). 'Best practices' as mimesis? Innovation policies in peripheral countries. In B. Godin & D. Vinck (Eds.), *Critical Studies of Innovation: Alternative Approaches to the Pro-Innovation Bias* (pp. 48–67). Edward Elgar Publishing. https://doi.org/10.4337/9781785367229

Bristow, G., & Healy, A. (2014). Regional Resilience: An Agency Perspective. *Regional Studies*, *48*(5), 923–935. https://doi.org/10.1080/00343404.2013.854879

Compagnucci, F., & Morettini, G. (2021). Abandoning the Apennines? The anthropo-systemic value of the Italian inner areas within the 2016-17 seismic crater. *GSSI Discussion Paper Series in Regional Science & Economic Geography*, *2021–12*, 33.

Contreras, D., Forino, G., & Blaschke, T. (2018). Measuring the progress of a recovery process after an earthquake: The case of L'aquila, Italy. *International Journal of Disaster Risk Reduction*, *28*, 450–464. https://doi.org/10.1016/j.ijdrr.2017.09.048

Fogelberg, H., & Sandén, B. A. (2008). Understanding reflexive systems of innovation: An analysis of Swedish nanotechnology discourse and organization. *Technology Analysis & Strategic Management*, *20*(1), 65–81. https://doi.org/10.1080/09537320701726593

Grillitsch, M., & Sotarauta, M. (2020). Trinity of change agency, regional development paths and opportunity spaces. *Progress in Human Geography*, *44*(4), 704–723. https://doi.org/10.1177/0309132519853870

Grillitsch, M., Sotarauta, M., Asheim, B., Fitjar, R. D., Haus-Reve, S., Kolehmainen, J., Kurikka, H., Lundquist, K.-J., Martynovich, M., Monteilhet, S., Nielsen, H., Nilsson, M., Rekers, J., Sopanen, S., & Stihl, L. (2022). Agency and economic change in regions: Identifying routes to new path development using qualitative comparative analysis. *Regional Studies*, 1–16. https://doi.org/10.1080/00343404.2022.2053095

Hansen, T., & Coenen, L. (2015). The geography of sustainability transitions: Review, synthesis and reflections on an emergent research field. *Environmental Innovation and Societal Transitions*, *17*, 92–109. https://doi.org/10.1016/j.eist.2014.11.001

Iammarino, S., Rodriguez-Pose, A., & Storper, M. (2019). Regional inequality in Europe: Evidence, theory and policy implications. *Journal of Economic Geography*, *19*(2), 273–298. https://doi.org/10.1093/jeg/lby021

Imperiale, A. J., & Vanclay, F. (2021). The mechanism of disaster capitalism and the failure to build community resilience: Learning from the 2009 earthquake in L'Aquila, Italy. *Disasters*, *45*(3), 555–576. https://doi.org/10.1111/disa.12431

Levinthal, D. A., & March, J. G. (1993). The myopia of learning. *Strategic Management Journal*, *14*(S2), 95–112. https://doi.org/10.1002/smj.4250141009

MacKinnon, D., Dawley, S., Pike, A., & Cumbers, A. (2019). Rethinking Path Creation: A Geographical Political Economy Approach. *Economic Geography*, *95*(2), 113–135. https://doi.org/10.1080/00130095.2018.1498294

MacKinnon, D., Kempton, L., O'Brien, P., Ormerod, E., Pike, A., & Tomaney, J. (2022). Reframing urban and regional 'development' for 'left behind' places. *Cambridge Journal of Regions,*

Economy and Society, *15*(1), 39–56. https://doi.org/10.1093/cjres/rsab034

Martin, R. (2021). Rebuilding the economy from the Covid crisis: Time to rethink regional studies? *Regional Studies, Regional Science*, *8*(1), 143–161. https://doi.org/10.1080/21681376.2021.1919191

Martin, R., Gardiner, B., Pike, A., Sunley, P., & Tyler, P. (2021). *Levelling up left behind places: The scale and nature of the economic and policy challenge* (L. Kempton, Ed.). Taylor & Francis.

Martin, R., & Sunley, P. (2020). Regional economic resilience: Evolution and evaluation. In G. Bristow & A. Healy (Eds.), *Handbook on regional economic resilience* (pp. 10–35). Edward Elgar Publishing.

Meadowcroft, J. (2009). What about the politics? Sustainable development, transition management, and long term energy transitions. *Policy Sciences*, *42*(4), 323–340. https://doi.org/10.1007/s11077-009-9097-z

Medeiros, E. (2022). *Strategic-Based Regional Development: Towards a theory of everything for regional development?* https://doi.org/10.5281/ZENODO.6805455

Moyson, S., Scholten, P., & Weible, C. M. (2017). Policy learning and policy change: Theorizing their relations from different perspectives. *Policy and Society*, *36*(2), 161–177. https://doi.org/10.1080/14494035.2017.1331879

Nilsen, T., Grillitsch, M., & Hauge, A. (2022). Varieties of periphery and local agency in regional development. *Regional Studies*, 1–14. https://doi.org/10.1080/00343404.2022.2106364

Pezzi, M. G., & Urso, G. (2017). *Coping with peripherality: Local resilience between policies and practices. Editorial note.* 23.

Pfotenhauer, S. M., & Juhl, J. (2017). Innovation and the political state: Beyond the myth of technologies and markets. In B. Godin & D. Vinck (Eds.), *Critical Studies of Innovation: Alternative Approaches to the Pro-Innovation Bias* (pp. 68–93). Edward Elgar Publishing. https://doi.org/10.4337/9781785367229

Schot, J., & Steinmueller, W. E. (2018). Three frames for innovation policy: R&D, systems of innovation and transformative change. *Research Policy*, *47*(9), 1554–1567. https://doi.org/10.1016/j.respol.2018.08.011

Smith, N. (2008). *Uneven development: Nature, capital, and the production of space* (3rd ed). University of Georgia Press.

Suitner, J., Haider, W., & Philipp, S. (2022). Social innovation for regional energy transition? An agency perspective on transformative change in non-core regions. *Regional Studies*, 1–13. https://doi.org/10.1080/00343404.2022.2053096

Syssner, J., & Jonsson, R. (2020). *Understanding Long-Term Policy Failures in Shrinking Municipalities: Examples from Water Management System in Sweden*. 18.

Tödtling, F., & Trippl, M. (2018). Regional innovation policies for new path development – beyond neo-liberal and traditional systemic views. *European Planning Studies*, *26*(9), 1779–1795. https://doi.org/10.1080/09654313.2018.1457140

Truffer, B., Murphy, J. T., & Raven, R. (2015). The geography of sustainability transitions: Contours of an emerging theme. *Environmental Innovation and Societal Transitions*, *17*, 63–72. https://doi.org/10.1016/j.eist.2015.07.004

Uyarra, E., Ribeiro, B., & Dale-Clough, L. (2019). Exploring the normative turn in regional innovation policy: Responsibility and the quest for public value. *European Planning Studies*, *27*(12), 2359–2375. https://doi.org/10.1080/09654313.2019.1609425

Van Assche, K., Beunen, R., Verweij, S., Evans, J., & Gruezmacher, M. (2022). Policy Learning and Adaptation in governance; a Co-evolutionary Perspective. *Administration & Society*, *54*(7), 1226–1254. https://doi.org/10.1177/00953997211059165

Vinck, D. (2017). Learning thanks to innovation failure. In B. Godin & D. Vinck (Eds.), *Critical Studies of Innovation: Alternative Approaches to the Pro-Innovation Bias*. Edward Elgar Publishing. https://doi.org/10.4337/9781785367229

Voß, J. P., Smith, A., & Grin, J. (2009). Designing long-term policy: Rethinking transition management. *Policy Sciences*. https://doi.org/10.1007/s11077-009-9103-5

Weber, K. M., & Rohracher, H. (2012). Legitimizing research, technology and innovation policies for transformative change. *Research Policy*, *41*(6), 1037–1047. https://doi.org/10.1016/j.respol.2011.10.015

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

LAGs and Community-based Cooperatives as enablers of civic participation in marginal rural areas

Annalisa Spalazzi
Gran Sasso Science Institute (GSSI), L'Aquila - Italy (annalisa.spalazzi@gssi.it)

Short Bio

I started my Ph.D. in Regional Science & Economic Geography in 2021, after four years as an Ecosystem manager in Southern and Central-Eastern Europe for an innovation and regional development programme. I am active in rural development and regenerative tourism with local associations in the Italian Apennines. My main interests are in community activation, participatory governance & policy co-design, social innovation, and just transition in rural and peripheral areas in South-East Europe.

Abstract
Community-based enterprises, in the form of cooperatives, could have a substantial role in civic participation and entrepreneurial development in marginalised rural areas. Local Action Groups (LAGs) borne from the Community-led Local Development (CLLD) approach, act as enablers of aggregation and innovation initiatives. The research explores the relationship between those actors and how they could regenerate communities in marginalised rural areas.

WHAT?
SITUATING THE RESEARCH

Various studies and policies are trying to give a categorising definition to marginal areas. Usually are deep rural and mountain regions. Thus, Inner Peripheries are the geographical result of multiple combinations of processes (difficult access to services, low economic potential, lack of relational proximity) that limit defined areas' development potential (ESPON, 2017).

The "rural issue" is not a recent one. It has been a matter of European policy actions for decades. The LEADER approach was introduced at the end of the 80s in response to the failure of top-down policies to address problems faced by European rural areas.[1] The ambition was to empower people and local organisations to act as development actors rather than beneficiaries. From this vision, the programme asked to build area-based partnerships between the public, private and civil sectors: the Local Action Group (LAG). Their role was designed to enable participatory approaches and engage citizens in community development.

The 2014-2020 EU programming period was further extended as Community-Led Local Development (CLLD) in rural, fisheries and urban areas. LAGs are usually perceived as a funding instrument. Instead, they should be facilitators and enablers of collaborative innovation in rural development. However, the quest for participated innovation remains one of the most exciting, groundbreaking and yet challenging parts of the LEADER approach. (Courades & Brosei, 2018)

In Italy, as of 2022, 235 LAGs are covering most of the rural regions. What makes Italy a relevant case study is the overlap of the rural development policies with the National Strategies for Inner Areas (SNAI), launched in 2014. (Barca, 2012) SNAI is aligned with the definition of Inner Peripheries and aims to find solutions for service provision (health, mobility, and education) and local development.

Nevertheless, despite the evolution of rural and place-based policies since the 1980s and the deployment of community-led initiatives, the entrepreneurial factor in rural areas is weaker compared

[1] About LEADER/CLLD: https://enrd.ec.europa.eu/leader-clld/leader-toolkit/leaderclld-explained_en

to urban areas, reducing the supply of services and job opportunities.
On the other side, it is argued that the last decades' abandonment created a space of 'relative emptiness' (De Rossi, 2019), which enabled diverse economies to arise. (Gibson-Graham, 2008) In these marginalised contexts, the effect of multiple crises (socio-economic, political, and ecological) could be mitigated by alternative socio-economic models based on collaboration and participation and led by a sense of community.
Hence why Inner Peripheries are favourable environments for activating Community-based Enterprises; mostly they take the form of cooperatives. There are more than 210 experiences in Italy. (EURICSE, 2022) Community-based Cooperatives (CBCs) are emerging as innovative social actors, responsive to local needs, and based on a multisectoral approach. (Mori & Sforzi, 2019) For their nature, such initiatives need a strong community component and participation in decision-making by the community. Nevertheless, those marginal places are usually inhabited by older people and suffer from shrinking population effects – particularly by youth and educated individuals. Therefore, it is more difficult to implement innovative engagement activities.
Their acknowledgement as crucial actors in addressing regional disparities is growing in the academic and public debate. Despite growing, the scientific literature in this field still needs to be improved. A better understanding of the role played by Community-based Cooperatives to enable citizens' participation in the collective management of local resources is crucial for those areas' future development.
CBCs still need to be recognised by legislation at the national level, limiting their scope of action. Despite this regulatory gap, an increasing number of LAGs' Local Action Plans are fostering the dissemination of these community-based business models. Primarily they are motivated by the willingness to experiment with innovative entrepreneurship, revitalise the local economy and offer essential services to the population in marginalised areas. This is also giving a new role to LAGs in performing the role of intermediary institutions in rural areas.
Ultimately, marginal rural areas, defined as inner peripheries or left-behind, are the subject of several local development policies and the perfect ground for innovative entrepreneurship through community-development and citizen participation. Therefore, is there a relationship between those policy-driven and community-led initiatives? On the opposite, which are the gaps?

SO WHAT?
METHODOLOGY AND DATA

Set off from those considerations, the starting hypothesis of the research is:
Community-based Cooperatives are economic and social actors that serve as instruments for the development of marginal areas and can benefit in various ways from their relations with LAGs, contributing in turn to the implementation of Local Development Plans of the area. Simultaneously, they have a role in enhancing participation and engagement by the local community.

The research follows a qualitative exploratory design based on Grounded Theory's methodological approach. (Glaser and Strauss, 1967) It does not impose a consolidated theory but aims to generate a theory starting from fieldwork. (Kennedy & Lingard, 2006)

The research has been structured in two phases:
1) Firstly, it aimed to deepen the existing policies, local strategies and LAGs initiatives through desk research.
2) The second phase focused on semi-structured interviews with selected LAGs already offering support and incentives to CBCs initiatives.

The preliminary research question was designed as follows:

How do Community-based Cooperatives contribute to implementing LAGs' Local Development Plans? Which – if any – are the existing relationship between Community-based Cooperatives and LAGs?

The mapping included 35 initiatives by LAGs and 10 semi-structured interviews with LAGs at the forefront in supporting CBC initiatives deployment. An in-depth analysis of the Tuscany case was performed as the most innovative and systemic approach to rural development through community regeneration activities.

NOW WHAT?
EXPECTED IMPLICATIONS

While it is acknowledged that there is an essential role in community engagement, citizen participation and co-creation of activities, the modalities for implementing such practices need to be better defined, and there is usually a lack of competencies that makes participation overlooked. Whist such accompanying on what a community is and how to activate participation is at the basics of development models such as CBCs.

The results of the interviews and the analysis of the LAGs' calls for projects have shown that there is indeed a developing relationship between participatory models in performing entrepreneurial activities such as CBC and local development support instruments such as LAGs. However, the experiences remain fragmented and have developed mainly over the last three years.
Among the common elements, it emerged that the LAGs perceive CBCs as a tool for implementing the LEADER/CLLD approach in their area of action and as a form of entrepreneurship to be experimented with and supported in their territory.
It also emerged that in addition to funding, there is a need for work beyond animation and advocacy and capable of implementing raccompaniment to respond to the lack of entrepreneurial skills in those areas.
Most LAGs have regulatory limits, which impact their scope of action. Although some of the LAGs have succeeded in finding alternative paths to the Regional Development Plans and sought innovative support beyond tender funding, these actions remain isolated and unsystemic.
On the other hand, CBCs, being de facto businesses that have to keep themselves going, need help to work on the community aspect because there are few resources, and they have to cope with the difficulties of doing business in a marginal area.

The relationship between LAGs and the region has also proven to be a primary enabling/blocking factor. An example of this is the case of Tuscany, where joint action by LAGs at the regional level has led to the launch of a systemic and integrated process of training, accompaniment and development of community projects.

It is argued that where participation is appropriately managed, in particular by institutional actors such as LAGs, and there is a broader integration of the community in the development of activities through local actors such as CBCs, it is possible to achieve more substantial results.

Ultimately, based on the results, the research provides policy recommendations to support local development and (impactful) integration of community-based economies driven by participative and co-creation modalities and policy-led initiatives in Inner Peripheries.

REFERENCES

BARCA, F., 2015. UN PROGETTO PER LE AREE INTERNE DELL'ITALIA. IN AREE INTERNE E PROGETTI D'AREA. ROSENBERG & SELLIER, PP.29-35, TURIN.

COURADES, J.M. AND BROSEI, P., 2018. CLLD/LEADER: APPLYING THE PARTNERSHIP PRINCIPLE TO LOCAL DEVELOPMENT. EUROPEAN STRUCTURAL AND INVESTMENT FUNDS JOURNAL, 6(3), PP.210-222.

DE ROSSI, A., 2019. RIABITARE L'ITALIA: LE AREE INTERNE TRA ABBANDONI E RICONQUISTE. DONZELLI EDITORE.

ESPON, 2017. INNER PERIPHERIES: NATIONAL TERRITORIES FACING CHALLENGES OF ACCESS TO BASIC SERVICES OF GENERAL INTEREST | ESPON. AVAILABLE AT: HTTPS://WWW.ESPON.EU/INNER-PERIPHERIES.

ESPON, EGTC, 2018. FIGHTING RURAL DEPOPULATION IN SOUTHERN EUROPE–TRANSNATIONAL OBSERVATION. LUXEMBOURG. AVAILABLE AT: WWW. ESPON. EU/SITES/DEFAULT/FILES/ATTACHMENTS/AF-ESPON_SPAIN_02052018-EN.PDF

EURICSE, 2022. COMUNITÁ INTRAPRENDENTI ALLA RICERCA DI PRATICHE DI TRASFORMAZIONE SOCIALE. MAPPATURA DELLE COMUNITÁ INTRAPRENDENTI IN ITALIA. EURICSE RESEARCH PAPERS.

GIBSON-GRAHAM, J.K., 2008. DIVERSE ECONOMIES: PERFORMATIVE PRACTICES FOR OTHER WORLDS'. PROGRESS IN HUMAN GEOGRAPHY, 32(5), PP.613-632.

GLASER, B. AND STRAUSS, A., 1967. GROUNDED THEORY: THE DISCOVERY OF GROUNDED THEORY. SOCIOLOGY THE JOURNAL OF THE BRITISH SOCIOLOGICAL ASSOCIATION, 12(1), PP.27-49.

KENNEDY T. J. & LINGARD, L. A., 2006. MAKING SENSE OF GROUNDED THEORY IN MEDICAL EDUCATION, IN MEDICAL EDUCATION, 40(2).

MORI, P.A. AND SFORZI, J. EDS., 2019. IMPRESE DI COMUNITÀ: INNOVAZIONE ISTITUZIONALE, PARTECIPAZIONE E SVILUPPO LOCALE. SOCIETÀ EDITRICE IL MULINO, SPA.

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

How green technologies rely on a range of fields in science: A research into knowledge base via patent citations.

An Yu Chen
University of Manchester, Alliance Manchester Business School, Institute of Manchester, Manchester, UK
(anyu.chen@postgrad.manchester.ac.uk).

Short Bio

I've been investigating the techno-science linkages and the impact of interdisciplinary research. I am particularly keen to explore publication-to-patent citations to prove the existing relationships between technology and science. My whole research interests are in green energy and innovation, science and technology linkage, bibliographic metadata, social network analysis, Science, Technology and Innovation Policy (STI policy).

Abstract **–In my research, I set out to explore knowledge flows in the area of green technologies. Whilst the emerging and nascent knowledge that is critical for green technologies is constantly evolving, green technologies can represent how innovation builds on previous knowledge and prior art (Dechezlepr^etre et al., 2011; Noailly and Shestalova, 2017; Hötte et al., 2021). For instance, Hötte et al. (2021) maintain that technological development is related to the capacity of putting knowledge in use, in that different technologies build on distinct scientific fields and have a diverse knowledge foundation (Arthur, 1994; Hötte et al., 2021). As such, we may suspect that new technologies rely on multiple fields, which interact or create new combinations in science and technology. In this study, thus, I rely on non-patent literature (NPL) citation data on patents as prior art and explore how science has laid foundations for technology by analysing knowledge flows in the domain of green technologies. I pay particular attention to the scientific field to understand the role of interdisciplinary knowledge in this development.**

Keywords **– science-technology linkages, non-patent literature, patent citations, social network analysis**

INTRODUCTION

In the literature, it has been indicated that the gap between technology and basic science has become smaller (Narin et al., 1997; Meyer, 2000; Ahmadpoor and Jones, 2017). However, there are non-linear knowledge flows between science and technology (Meyer, 2000) and this phenomenon poses a challenge for policy makers to form a seamless cooperation between these two realms to foster the innovation.

There have been enormous transformations in our perception of epistemological properties of knowledge, which have given rise to different interpretations of what constitute the specific knowledge domain (Stein, 2007; MacMynowski 2007; Miller et al., 2008). Whilst there is plenty of research that brilliantly demonstrates the increasingly growing flow of knowledge from science to technology (van Vianen et al., 1990; Tijssen, 2001; Glänzel and Meyer, 2003), they generally look no further than "conventional" fields of technology such as Chemistry and Electronics.

In the meantime, governments around the world share concerns arising from the threat of climate change, which make green technology become the central focus in science and technology policy research (e.g., Jacobsson and Johnson, 2000; Stern, 2007; Popp et al., 2011; Kalthaus, 2017). In response to such fairly urgent environmental conditions, there is a need for

further understanding of emerging knowledge flows in order to better develop and diffuse environmental technology (Wilson and Grubler, 2011).

A scientific activity that has been highlighted by policy makers and researchers is interdisciplinary research (IDR), which relies on cross-field efforts to break the limitation of current knowledge application (e.g., Cantwell et al., 2014; Laudel and Gläser, 2014). The emergence of interdisciplinary research can also be seen as an attractive alternative in response to the wider change of society such as globalisation and environmental crisis. Interdisciplinary research typically points to a form of research that shapes scientific collaboration as the integration of multiple domains of knowledge that goes beyond a single normative focus (Klein, 1990; Porter et al., 2006; Wagner et al., 2011). Since it has been introduced to the policy space in the 1970s, it has become a major research funding target (Porter et al., 2006).

The question of how interdisciplinary knowledge flows act upon science and technology has provided opportunities for policy design. However, the past literature seems to suggest that the degree of interdisciplinarity can only spot highly cited papers or core competences and technologies (see e.g., Uzzi et al., 2013; Su and Moaniba, 2017). Obviously, the impact of interdisciplinarity can neither be confirmed nor disconfirmed because nascent knowledge flows from science simply cannot be fully attributed to the invention of technology (Dasgupta and David, 1994).

Thus, this research has been formulated by the above intentions, and the major interrogation can be broken down into four major overarching questions:

- What are the cognitive characteristics of the knowledge base? (e.g., how many different fields do green technologies rely upon?)
- Why do some areas reveal higher degrees of interdisciplinarity than others? How do they differ compared to areas with a lesser degree of interdisciplinarity?
- Does a higher degree of interdisciplinarity, lead to higher technological impact such as higher patent value?
- To what extent does technology rely on science in environmental technology?

METHODOLOGY

a) Data collection

To estimate the degree of reliance on science in green technologies, I make use of non-patent literature (NPL) citations in patents. I use Lens.org as a source of patent data, because it provides a wide array of scholarly work and patent citation information. Most importantly, it directly allows me to identify relevant scholarly works mentioned in NPL citations. It also has one of the most comprehensive databases making it particularly suitable to study emerging technologies.

b) Patent Classification

To identify green patents, this research relies on the Cooperative Patent Classification (CPC), which has categorised them into a Y section. The main rationale for categorising green technologies into one section, despite the diverse range of underlying technologies, is the emerging research interest in their knowledge flows and formation (e.g., Hötte et al., 2021). This research is focused on CPC Y section, which contains renewable energy generation and energy generation from fuels of non-fossil origin.

c) Citation information

Following prior research, I will use citations in patent data to track knowledge flows (Jaffe and Trajtenberg, 2002; Costantini et al., 2015; Jaffe and Rassenfosse, 2017). To answer how technology relies on science (Marx and Fuegi, 2020), NPL citations to specific papers can be considered as prior art and knowledge base from science (Glänzel & Meyer, 2003; Bhattacharya et al., 2003). Such interaction between citations from technology to science enable us to know the characteristics of knowledge base, which encompass a wide array of meaning for the formation of emerging areas.

Thus, identifying NPL citations can also allow me to explore the formation of the knowledge base. By identifying the scientific papers, I am able to identify their relevant scientific fields based on subject classifications, such as those provided by Scopus. If multiple scientific fields are detected in the NPL citations or if these scientific papers themselves rely on knowledge from multiple fields, it would fit into the interdisciplinary perspective. This can be traced back to a line of research, which used Web of Science Subject Categories (SCs) or Scopus (Elsevier) Subject Categories to classify the publication and estimate how a domain knowledge is distributed and interacted across fields (e.g., Morillo et al., 2003; Rafols and Meyer, 2010; Anzai et al., 2012; Leydesdorff et al., 2019).

d) Analysis

To capture the relationships between different technological fields according to CPC classification, this research will calculate the distance between different patent families as well as the subject areas of scientific knowledge in NPL. I draw on NPL to find out the linkages between citations from patents to scientific literature in order to explore the interaction between science and technology. Patent citation network will be constructed, particularly at patent family level. After grouping patents into their families, I will take a bottom-up approach to establish citation clustering of knowledge communities. Specifically, this research concentrates on the extent of knowledge exchange in the social network, the degree of interaction between clusters of knowledge will be estimated by examining the degree of the diffusion (out degree centrality) and network cohesive of the citation network.

Whilst interdisciplinarity is increasingly important, the instruments to measure it do not seem to be well developed. This research relies on betweenness centrality in social network analysis to assume the interdisciplinary trend because it represents the ability to connect diverse information in a social network (Freeman, 1979; Leydesdorff, 2007; Seyedghorban et al., 2015). I will also refer to Stirling diversity index (Stirling 2007).

Expected Results

I firstly expect a heavy reliance on science in the field of green technology, as well as a fairly high degree of interdisciplinarity. This is because knowledge in emerging and nascent areas such as environmental technologies should be rather heterogeneous, which results in dynamic knowledge flows between fields.

On the basis of these arguments that I made, the linkages of science and technology probably should be non-linear and interact closely. Besides, there are various concepts that transmitted academic research to technological application. This can lead to similar names or terms but not exact as the origin terminology in scientific definition. If the result appears biased when applying social network analysis to group and cluster citations, there should be a language assessment via text mining techniques.

The potential findings can answer the questions that cut right to the heart of science and technology policy, differentiating how interdisciplinary knowledge flows get articulated into making technological impact and how science and technology intertwine each other.

References

Ahmadpoor, M., & Jones, B. F. (2017). The dual frontier: Patented inventions and prior scientific advance. Science, 357(6351), 583-587.

Anzai, T., Kusama, R., Kodama, H., & Sengoku, S. (2012). Holistic observation and monitoring of the impact of interdisciplinary academic research projects: An empirical assessment in Japan. Technovation, 32(6), 345-357.

Arthur, W. B. (1994). Increasing returns and path dependence in the economy. University of michigan Press.

Bhattacharya, S., Kretschmer, H., & Meyer, M. (2003). Characterizing intellectual spaces between science and technology. Scientometrics, 58(2), 369-390.

Cantwell, J., Piepenbrink, A., & Shukla, P. (2014). Assessing the impact of JIBS as an interdisciplinary journal: A network approach. Journal of International Business Studies, 45(7), 787-799.

Costantini, G., Epskamp, S., Borsboom, D., Perugini, M., Mõttus, R., Waldorp, L. J., & Cramer, A. O. (2015). State of the aRt personality research: A tutorial on network analysis of personality data in R. Journal of Research in Personality, 54, 13-29.

De Rassenfosse, G., & Jaffe, A. B. (2018). Are patent fees effective at weeding out low-quality patents?. Journal of Economics & Management Strategy, 27(1), 134-148.

Dechezleprêtre, A., Glachant, M., Haščič, I., Johnstone, N., & Ménière, Y. (2011). Invention and transfer of climate change–mitigation technologies: a global analysis. Review of environmental economics and policy.

Freeman, L. C., Roeder, D., & Mulholland, R. R. (1979). Centrality in social networks: II. Experimental results. Social networks, 2(2), 119-141.

Glänzel, W., & Meyer, M. (2003). Patents cited in the scientific literature: An exploratory study of'reverse'citation relations. Scientometrics, 58(2), 415-428.

Hötte, K., Pichler, A., & Lafond, F. (2021). The rise of science in low-carbon energy technologies.

Renewable and Sustainable Energy Reviews, 139, 110654.

Jacobsson, S., & Johnson, A. (2000). The diffusion of renewable energy technology: an analytical framework and key issues for research. Energy policy, 28(9), 625-640.

Jaffe, A. B., & Trajtenberg, M. (2002). Patents, citations, and innovations: A window on the knowledge economy. MIT press.

Kalthaus, M. (2017). Identifying technological sub-trajectories in photovoltaic patents (No. 2017-010). Jena Economic Research Papers.

Klein, J. T. (1990). Interdisciplinarity: History, theory, and practice. Wayne state university press.

Laudel, G., & Gläser, J. (2014). Beyond breakthrough research: Epistemic properties of research and their consequences for research funding. Research Policy, 43(7), 1204-1216.

Leydesdorff, L. (2007). Betweenness centrality as an indicator of the interdisciplinarity of scientific journals. Journal of the American Society for Information Science and Technology, 58(9), 1303-1319.

Leydesdorff, L., Wagner, C. S., & Bornmann, L. (2019). Interdisciplinarity as diversity in citation patterns among journals: Rao-Stirling diversity, relative variety, and the Gini coefficient. Journal of Informetrics, 13(1), 255-269.

MacMynowski, D. P. (2007). Pausing at the brink of interdisciplinarity: power and knowledge at the meeting of social and biophysical science. Ecology and Society, 12(1).

Marx, M., & Fuegi, A. (2020). Reliance on science: Worldwide front-page patent citations to scientific articles. Strategic Management Journal, 41(9), 1572-1594.

Meyer, M. (2000). Does science push technology? Patents citing scientific literature. Research policy, 29(3), 409-434.

Miller, T. R., Baird, T. D., Littlefield, C. M., Kofinas, G., Chapin III, F. S., & Redman, C. L. (2008). Epistemological pluralism: reorganizing interdisciplinary research. Ecology and Society, 13(2).

Morillo, F., Bordons, M., & Gómez, I. (2003). Interdisciplinarity in science: A tentative typology of disciplines and research areas. Journal of the American Society for Information Science and technology, 54(13), 1237-1249.

Narin, F., Hamilton, K. S., & Olivastro, D. (1997). The increasing linkage between US technology and public science. Research policy, 26(3), 317-330.

Noailly, J., & Shestalova, V. (2017). Knowledge spillovers from renewable energy technologies: Lessons from patent citations. Environmental Innovation and Societal Transitions, 22, 1-14.

Partha, D., & David, P. A. (1994). Toward a new economics of science. Research policy, 23(5), 487-521.

Popp, D., Hascic, I., & Medhi, N. (2011). Technology and the diffusion of renewable energy. Energy Economics, 33(4), 648-662.

Porter, A. L., Roessner, J. D., Cohen, A. S., & Perreault, M. (2006). Interdisciplinary research: meaning, metrics and nurture. Research evaluation, 15(3), 187-195.

Rafols, I., & Meyer, M. (2010). Diversity and network coherence as indicators of interdisciplinarity: case studies in bionanoscience. Scientometrics, 82(2), 263-287.

Seyedghorban, Z., Matanda, M. J., & LaPlaca, P. (2016). Advancing theory and knowledge in the business-to-business branding literature. Journal of Business Research, 69(8), 2664-2677.

Stein, Z. (2007). Modeling the demands of interdisciplinarity: Toward a framework for evaluating interdisciplinary endeavors. Integral Review, 4, 92-107.

Stern, N., & Stern, N. H. (2007). The economics of climate change: the Stern review. cambridge University press.

Stirling, A. (2007). A general framework for analysing diversity in science, technology and society. Journal of the Royal Society Interface, 4(15), 707-719.

Su, H. N., & Moaniba, I. M. (2017). Investigating the dynamics of interdisciplinary evolution in technology developments. Technological Forecasting and Social Change, 122, 12-23.

Tijssen, R. J. (2001). Global and domestic utilization of industrial relevant science: patent citation analysis of science–technology interactions

and knowledge flows. Research Policy, 30(1), 35-54.

Uzzi, B., Mukherjee, S., Stringer, M., & Jones, B. (2013). Atypical combinations and scientific impact. Science, 342(6157), 468-472.

Van Vianen, B. G., Moed, H. F., & Van Raan, A. F. J. (1990). An exploration of the science base of recent technology. Research Policy, 19(1), 61-81.

Wagner, C. S., Roessner, J. D., Bobb, K., Klein, J. T., Boyack, K. W., Keyton, J., ... & Börner, K. (2011). Approaches to understanding and measuring interdisciplinary scientific research (IDR): A review of the literature. Journal of informetrics, 5(1), 14-26.

Wilson, C., & Grubler, A. (2011). Lessons from the history of technology and global change for the emerging clean technology cluster.

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Challenges and opportunities for shaping the future world of brain-technologies: A technological sovereignty mixed approach

Aureliano da PONTE
UCM-ICEI (Complutense University of Madrid, Complutense Institute of International Studies, Madrid, Spain
(adaponte@ucm.es).

Short Bio

PhD Candidate in Economics and Innovation Management (UCM/ICEI-UAM-UPM); Master's degree in Economics and Innovation Management, Associate Researcher at the Complutense Institute of International Studies (ICEI). The research has been conducted as part of a contract with HBP assigned to the Universidad Politécnica de Madrid.

Abstract **– Innovation in neurostimulation has become a topic of increasing global relevance because it lies at the intersection of several emerging technologies where market opportunities for advanced products are exploding. The paper analyses the positioning and capabilities of nine European countries in shaping the nascent global network. A mixed approach is adopted, combining in-depth analysis with a multidimensional synthetic metric - the Technology Sovereignty Index (TSI) - which provides a global measure aimed at capturing the degree of a country's exposure to specific technologies, as well as the vulnerabilities it may present. The results reveal a medium-low level of technological sovereignty in the cases analyzed due to (i) the difficulties of interaction between companies and researchers; (ii) the scarcity of human capital specialized in certain related technological fields (e.g., ICT and electronics); (iii) dispersed and weakly articulated efforts among European countries; and (iv) regulatory fragmentation. Among Europe's greatest challenges in influencing this emerging sector is the possibility of improving coordination between countries when defining the public investments that will boost it, as well as the development of regulatory frameworks.**

Keywords **– Innovation policy, technological sovereignty, neuroscience, brain technologies**

INTRODUCTION

Innovation in brain technologies is becoming a topic of global relevance (Garden et al., 2019), as advances are providing relief to an unprecedented number of patients affected by debilitating neurological and psychiatric disorders. In the case of neurostimulation, it registers an evolution from a rudimentary and low-resolution approach to a very sophisticated methodology involving the use of cutting-edge technologies (Vebraité and Hanein, 2021), making it one of the most active subfields of healthcare in recent years. This situation is reflected in the increase in the number of published articles, applied patents, funded projects and devices in testing phase, but also the creation of technology-based start-ups in which venture capital investments and entrepreneurial funding are growing (Leon et al, 2022).

Neurostimulation offers bridges between a number of disciplines, including neuroscience, medicine, engineering, and cognitive science, but also lies at the intersection of many converging technologies such as microelectronics and nanoelectronics, novel materials (e.g., biomaterials and two-dimensional materials), high-speed wireless communication, and energy transfer embedded in advanced invasive implants and non-invasive sensors, where market opportunities for advanced products are expanding. Despite the persistent challenges of designing devices that can function reliably for long periods of time in the body, evidence seems to point to the deepening of a

broad bio-revolution in the coming years (McKinsey, 2020).

From an innovation perspective, neurostimulation, implies uncertainty as do other emerging fields (Kapoor and Klueter, 2021) insofar as neither the structure of the sector, nor the actors involved (the companies), nor the roles are consolidated or even defined. Even a crucial issue as regulations is evolving (e.g. for trials of new devices).

The lack of knowledge inherent in the evolution of neurostimulation as an industrial sector is part of a much broader process characterised by the "geopoliticisation" of the technology (US-China tensions, COVID, Ukraine) which not only deepens uncertainty, but also makes it more complex as it is unpredictably conditioned in the medium term by the global dynamics associated with access to and availability of certain key enabling or general-purpose technologies (e.g. semiconductors, Artificial Intelligence). Therefore, analysing the issue from the perspective of technological sovereignty allows us to assess Europe's situation with respect to the resources (tangible and intangible) associated with neurotechnologies, as well as its capacity to influence the shaping of the emerging global network, which in turn implies managing strategic dependencies in order to preserve competitive positions in the resulting value chain.

Research questions

Based on defining technological sovereignty *as the relative internal and external capacity of a country or group of countries to make and implement decisions regarding the generation, absorption, and exploitation of a technology, according to the actor's objectives under favourable or hostile conditions* (da Ponte *et al.,* 2022), the first question what is the level of technological sovereignty in neurostimulation techniques and devices (NDT) in Europe? The second question refers to how can this level influence the process of shaping the global innovation network associated with this emerging sector? The main objective of this paper is to analyse through a mixed approach that combines in-depth analysis with a multidimensional synthetic metric - the Technology Sovereignty Index (TSI) - specifically designed to capture the weaknesses and degrees of potential risk of a country or group of countries with respect to specific technologies, the level of technological sovereignty of the nine European countries selected on the basis of having the largest number of start-ups specifically dedicated to the field of neurostimulation devices and techniques (Belgium, Finland, France, Germany, Netherlands, Spain, Sweden, Switzerland, United Kingdom) (Velasco *et al*, 2022).

Methodology

The design of the Technology Sovereignty Index (TSI) is based on three pillars: Assets and Competences, Conditioners and Drivers of Technology Sovereignty, considered the most relevant aspects for exhibiting and analysing the position of an actor in a particular technology. The pillars are made up of sub-pillars comprising individual statistics compiled from various international datasets or constructed from official surveys.

According to the definition adopted, TSI reflects the net assets and competencies that allows a country (or group of countries) to make and implement decisions, revealing its need for external resources and the delocalization of core production processes associated with a given technology (outsourcing and subcontracting of R&D, critical components, and sub-systems). All these aspects are included among the 'enhancers/constraints' that imply dependence on a third party, regardless of the motivations (e.g., more competitive costs, market' access, etc.) This index also provides a general picture of possible resilience mechanisms.

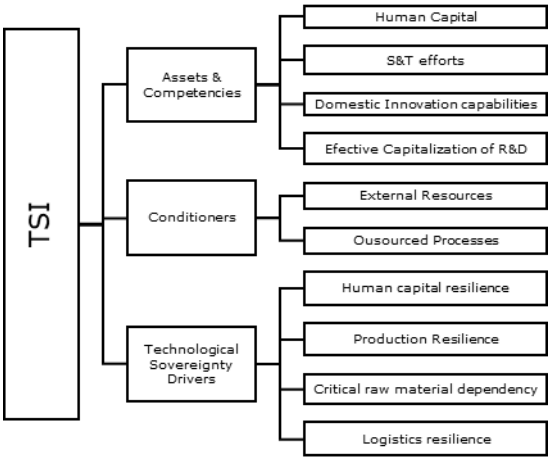


Figure 1. The structure of the TSI

The pillars reflect three analytical dimensions that converge on the concept. *Assets and Competencies (A&C)*, encompasses four composite indicators of the stakeholder's innovation capacity, including the proportion of scientists and technologists in the workforce, the investment in science and technological projects, the domestic innovation capabilities, and the capitalization of knowledge as measured by specialization in

technical fields and markets. The second pillar, *Conditioners (Co)*, refers to the external resources and outsourced processes generated along the value chain. To simplify the model and the analysis, two composite indicators are included: critical imports of raw materials and inputs related to technology; and any outsourced processes that involve high value-added. The third pillar is *Technological Sovereignty Drivers (TSDrvs)*, defined by those assets unexploited or underutilized by a stakeholder whose harnessing would enable management and reduce critical and unilateral structural and informational dependencies. This pillar is composed by resilience in human capital, production, and logistics, as well as critical raw material dependency, which refers to the resilience of supply chains – the ability to return to normal operating performance within a bearable timeframe, and the capacity to maintain regular functioning despite disruptions.

Given the rationale of the index, a comparative strategy has been adopted that benchmarks the position of the analyzed player in each individual indicator against its main direct competitors, since the focus is to highlight the strengths and weaknesses.

KEY FINDINGS OR EXPECTED RESULTS

Preliminary results reveal a mixed positioning resulting in a medium-low degree of technological sovereignty in Europe. While the medium level is explained by strength in terms of techniques, the low level is due to different weaknesses linked to devices. Relative difficulties of firms to capitalise on technological advances were identified as well as a shortage of human capital specialised in certain related technological fields (e.g. advanced chip design). In relation to the emerging sector configuration, the dispersion of efforts across European countries, reinforced by regulatory fragmentation that dilutes the effect of the single market (in the EU), are factors that undermine the ability to influence.

REFERENCES

da Ponte, A. Leon, G. and Alvarez, I. (2022). Technological sovereignty of the EU in advanced 5G mobile communications an empirical approach. Telecommunication Policy (2022). DOI: https://doi.org/10.1016/j.telpol.2022.102459

Leon, G.; Kireev, R.; Duran, T.; Velasco, G. and Strange, B. (2022). Neurostimulation devices and its role in the industrial health sector. Human Brain Project, grant agreement No 945539.

Garden, H.; Winickoff, D.; Frahm, N. and Pfotenhauer, S. (2019). Responsible innovation in neurotechnology enterprises. OECD Science, Technology and Industry Working Papers 2019/05, OECD: Paris. DOI: https://dx.doi.org/10.1787/9685e4fd-en

Kapoor R. and Klueter, T. (2021) Unbundling and Managing Uncertainty Surrounding Emerging Technologies. Strategy Science 6(1):62-74. https://doi.org/10.1287/stsc.2020.0118

McKinsey Global Institute (2020). The Bio Revolution. Innovations transforming economies, societies, and our lives.

Vebraité and Hanein (2021). Soft Devices for High-Resolution Neuro-Stimulation: The Interplay Between Low-Rigidity and Resolution. Front. Med. Technol., 14 June 2021 https://doi.org/10.3389/fmedt.2021.675744

Velasco, G.; Durán, T.; Beltrán, B. and León, G. (2021). Where is European Brain Innovation Happening? The role of tech-based start-ups. Human Brain Project.

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Learning for all to the energy transition: the case of Malilla energy community at València city

Carlos Delgado Caro
Ingenio (CSIC-Universitat Politècnica de València, Spain (cardelca@upv.es)

Jorge Mallén López
Universitat Politècnica de València, Spain (jormallo@alumni.upv.es)

Short Bio

Carlos is a PhD student in Local Development and International Cooperation. As Industrial Engineer with a Master's degree in Development Cooperation, his PhD thesis concerns conceptualising and promoting transformative learning spaces in Higher Education based on student experiences beyond the classroom. His current interests embrace transformative learning theory, adult education, and sustainability transitions focusing on the energy system.

Abstract **– The Malilla energy community (MEC) is a participatory community energy project based on collective energy self-consumption in València that can help to foster the energy transition, as with other initiatives that propose a non-market, decentralised, renewable, and cooperative energy system. Currently, the Spanish energy landscape is characterised by the global energy crisis, the contributions of grassroots innovation practices during the last decades and the new European regulation where the interaction between initiatives and local and regional administration is a key factor. This work focuses on the learning processes within this relationship using the socio-technical transitions approach and the multi-level perspective as the theoretical framework. Supported by elements of transformative learning theory such as critical reflection, participation (discourse), and problematic frames of reference, we try to understand better how niche and regime actors learn, in what conditions, and what they learn. The main research question for this on-first-stage case study is how to conceptualise and promote transformative learning processes of people involved in the energy transition. Energy (and education) policies should support not just the conditions for learning in the niches but also de-learning processes in the regime that change its assumptions over what means a just, inclusive and sustainable energy system.**

Keywords **– Energy communities, Energy transition, Sustainability transitions, Transformative innovation policy, Transformative learning**

Introduction

The Malilla energy community is a recent formal association funded by local citizenships in the borough of Malilla (València) in 2022. It aims to create a participatory community energy project, like in other parts of the city where they already have similar practices (e.g. Castellar-L'Oliveral), based on the concept and philosophy of collective energy self-consumption. During this short period, and after 2-3 years of trying to create the association, the relationship with other actors, especially at the local level (as the city council), has been detected as a critical issue. This research proposal is part of a work in which the authors are already involved.

It's a tendency that energy communities have begun to be recognised as a relevant practice for the energy transition (Caramizaru and Uihlein, 2020), which is moving away from a system that

considers energy a free market commodity. Currently, energy is mainly produced on big centralised generation plants, not necessarily renewables, and owned by a few companies: an oligopoly well related to the political power which doesn't let the users have more control or influence. Thus, the purpose is to build a just, inclusive and sustainable energy system in which energy is a human right. In this system, local decentralised actors produce energy at smaller renewable plants supported by informed and conscientious critical citizenships. The cooperative replaces/displaces competitiveness, something that can rarely happen in the current system and confront directly with its essence.

Among other grassroots initiatives, the energy communities can help to achieve this. Their framework has changed in the last years since the EU incorporated new regulations about them. Its adaptation in Spain's law framework is progressively being adopted. The Spanish environment for energy communities came from the last decade of practices around the country; most originated from energy renewables cooperatives, ecologist groups, and civil movements for the energy right. Still, they have been seen by many local and regional governments as an opportunity for social cohesion, increasing local activity, and the decentralisation of the system (Pellicer-Sifres et al., 2018).

ENERGY TRANSITION

From the socio-technical transitions approach, the energy transition is just one of the main processes needed for sustainable transitions. It conceptualises the energy system as a system with specific characteristics and dimensions that must change to consider that a deep transformation has happened. For Köhler et al. (2019), one of the main characteristics of the socio-technical transitions is that they happen necessarily as multi-actor processes. So that all people who can be affected must be part of the whole process. People are usually categorised by literature based on their role as actors: universities, government, companies, civil organisations, etc., so further from their own perspectives, these actors performance their agency for the transitions according to their role in the system. But the transitions are complex processes dependent on multiple dimensions and levels. Considering how they happen and based on the multi-level perspective (Geels, 2002; Geels and Schot, 2007; Smith et al., 2010), they can be facilitated if some conditions on niche, regime and landscape levels occur. Some of them are 1) the learning on the niches, 2) the pressure from the landscape to the regime, and 3) the open windows of opportunity in the regime for the niches.

Moreover, these levels are not isolated from each other as "watertight" compartments. Their interactions are constant and unavoidable and condition the whole process (Geels and Schot, 2007). On the niche level, Kemp et al. (1998) identified three main processes to niche development to which policy must contribute: 1) coupling expectations, 2) articulation processes (which include learning processes) and 3) network formation. This approach shows the niche actors' potential to influence and change the regime (Smith and Raven, 2012), but it also happens reciprocally. It can be seen how transitions need participation and a better understanding between niches and the regime. In this research, the Malilla energy community is a niche space where people involved interact with actors of the regime.

Recently, a new Spanish law has been approved and includes the creation of a new actor who can work as an intermediary between niche-regime interactions: the energy community manager. As Kivimaa (2014) claims, this kind of actor can play a significant role. Still, we must always be aware that they will not be neutral and can even reproduce the regime's vision about sustainability. The intermediaries should work with a systemic view of sustainability transition, helping the interaction of the actors in that direction.

It is also significant the work made in the transformative innovation field about the learning processes of the actors. Recalling elements from transition management (Loorbach, 2010), transformative innovation policies should support niche experimentation to promote learning within the niches and between niche and regime (Schot and Steinmuller, 2018). In this literature, they speak about first-order and second-order learning and propose 12 transformative outcomes, which should be the purpose of any innovation policy to be transformative. Two of them are directly related to learning processes. On the one hand, niches should have a favourable environment for learning, not just to flourish within it but to share it with others. On the other hand, regime actors should also experience a (de)learning process that makes them change their assumptions about the system.

TRANSFORMATIVE LEARNING

What seems to be clear is that different learning processes happen on niche and regime levels and on each actor's experience and interaction. This proposal analyse them from the transformative learning theory (Mezirow, 1990, 1997, 2003; Taylor, 1998, Taylor and Cranton, 2012). In this theory, the elements of critical

reflection (and self-reflection) on the assumptions and free and full participation in interactions with others are essential. Transformative learning is the process by which problematic frames of reference must change to make them more inclusive, perceptive, open, reflective and emotionally valid. Frames of reference are quasi-stable mental structures conformed in our transition to adult life through culture and language. They give coherence to the meanings we attribute to our experiences and operate consciously and unconsciously, forming our predisposition to accept or reject what fits (or not) into them. Change in these frameworks requires a situation or event from the experience that cannot fit into them and forces them to change: a disorienting dilemma. Through this theory, the research aim to analyse different dimensions of learning on the actors involved in Malilla community energy such as 1) the learning process itself (prior learning, disorienting dilemmas, critical reflection, deliberation and action); 2) the learning outcomes, and 3) the learning conditions (Rodríguez Aboytes and Barth, 2020).

RESEARCH QUESTIONS AND METHODOLOGY

For all the above, the main research question is how to conceptualise and promote the transformative learning processes of people involved in energy transition in terms of their experience, the learning outcomes and the conditions of the learning process. For that, this case study will work on the Malilla energy community with the following research questions: 1) How do actors involved in the Malilla energy community experience their learning process?; 2) What kind of learning outcomes do they recognise as necessary for the energy transition?; 3) What conditions facilitate or hinder the learning process?

This research is in its first stage, so the methodological design is still in progress, but the approach will be according to the interpretative paradigm. Because of that, it will be coherent with the transformative learning theory and its constructivist and humanist (relativist) roots. Also, since one of the Malilla energy community members is close to the author and future co-author, the subjective meanings derived from the empathy with the case will be recognised as part of the approach of this research. This case study aims for deeper meanings from the participants rather than statistically significant results (Summer & Tribe, 2008). It aims to highlight the relevance of the interaction between different actors with different frames of reference when energy transition takes place, so it hopes to bring more light to the transition studies in the topic of learning for sustainability from the actor's perspective.

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

The shape of cultural fit: an analysis on gender-lens investing

Hazal Kopal[1], **Chiara Cremasco**[2], Suwen Chen[3], Leonardo Boni[4]

[1] Politecnico di Milano, Department of Management, Economics and Industrial Engineering, Milano, Italy (zeynephazal.kopal@polimi.it)
[2] Politecnico di Milano, Department of Management, Economics and Industrial Engineering, Milano, Italy (chiara.cremasco@polimi.it); University College London, School of Management, London, UK (c.cremasco@ucl.ac.uk)
[3] Esade Center for Social Impact, Barcelona, Spain (suwen.chen@esade.edu)
[4] Politecnico di Milano, Department of Management, Economics and Industrial Engineering, Milano, Italy (leonardo.boni@polimi.it)

Short Bio

Chiara holds a degree in Management Engineering and is currently a PhD student at the School of Management of Politecnico di Milano, where she is affiliated with the TIRESIA Research Centre. Her current research interests focus on impact investing and in particular on the behavioural characteristics of institutional investors. She is also involved in teaching activities and in projects commissioned to the TIRESIA Research Centre by external clients, such as sustainable and impact investment funds. In these projects, the team to which Chiara belongs is responsible for managing the social and environmental impact throughout the investment process. Chiara is also a visiting PhD student at the UCL School of Management, London, where she manages the IMmPACT Project, aimed at developing a high-level process-based framework for managing the social impact of organisations and their initiatives at the ecosystem level.

Abstract **– We aim to study the emerging niche of gender-lens investing within the impact investment industry, with the objective of investigating if and how gender-lens investing can fully establish itself within the field of sustainable finance. We conducted 16 interviews with institutional investors that are aware of gender-lens investment strategies, trying to understand their cognitive interpretation of the phenomenon. We plan to analyse gathered data with an inductive approach, following the Gioia Methodology. Our ultimate goal is to define a conceptual framework that identifies the key constructs stimulating the adoption of this new niche by established investors.**

Keywords **– impact investing; gender-lens investing, gender issues, diversity**

Phenomenon

Sustainability issues are increasingly becoming urgent and spread across social and environmental settings (George et al., 2016).

Besides international institutions' advocacies, the world of finance is raising the attention towards sustainability (i.e., Larry Fink's letter to CEOs, 2018). In particular, given the broad spectrum of sustainability issues, specific niches in the financial sector are emerging to enable dedicated financial solutions and approaches to address the various facets of sustainability issues. Climate finance, social infrastructure finance, and microfinance are examples of some established sustainability-based niches in which the financial sector identified compatibility with intentionality of investments, direct beneficiaries, and types of investors.

However, as sustainable finance strategies are surging in the sector, not all sustainability niches have properly established and yet identified compatibility with the traditional world of finance, facing the risk of misinterpretation, lack of support, and difficulties to scale up. Gender-lens investing is an emergent sustainability niche that still needs to find its proper fit within the world of finance. Practitioners provide different definitions of the phenomenon: some of them consider gender-lens investing as an approach or an investment strategy considering gender-based factors across the investment lifecycle, with the objective of fostering gender equality (GIIN, 2019). Differently, another

definition considers gender-lens investing as an impact investment strategy integrating gender into the analysis of investments (KPMG, 2021), or more generally, "making investments not just for financial returns but also for women's benefits".

The complexity of gender lens investing is also represented in the broad range of beneficiaries that may or may not consider (i.e., women, women-men equality, non-binary, gender fluidity, LGBTQ, and LGBTQ+) and more in general, what is gender-lens investing and what is not. Moreover, as gender lens perspective could be addressed across multiple sustainability niches (i.e., microfinance may serve women-entrepreneurship), this poses the risk on how and whether gender-lens investing can be interpreted as a separated niche compatible with the current financial sector schemes.

Research Objectives

Researchers define the compatibility between new practices and traditional adopters with the degree of cultural fit (Canato, Ravasi, and Phillips 2013). Studies of cultural fit identified what determines the delay or the early adoption of new practices by adopters (Ansari, Fiss, and Zajak 2010). Accordingly, this research proposes to address the following research question: *How is gender lens investing compatible with the culture of financial sector adopters? How is cultural fit enacted when adopters face new practices?*

Extant literature evidenced that certain conditions of low cultural fit lead to adopting new practices ceremonially (Lozeau, Langley, and Denis, 2002), while in other perspectives the compatibility improved the cultural fit and redesigned values and norms of a certain field.

Accordingly, this work deepens the shape of the cultural fit (Ansari et al., 2010). By considering the field of finance and the emergence of gender-lens investing, this work proposes to provide theoretical contributions to the literature exploring the adopters and new-practices interactions (Canato, Ravasi, and Phillips, 2013), adding content on how cultural fit is enacted. From a practitioner standpoint, this work aims at understanding the phenomenon of gender-lens investing, capturing the mechanisms through which the financial sector is considering it as a proper field. Traditional actors need to fully understand the phenomenon, in order to propose such financial strategy to capture the logics under which they could enhance compatibility with the traditional finance schemes.

Ultimately, this work contributes to clarify whether and how gender-lens investing can establish itself within the field of sustainable finance. Consequently, gender-lens investing provides the opportunity to investigate and understand the levers determining the compatibility between new practices and the culture of adopters, identifying the pathway for legitimacy and endorsement.

Methodology

To achieve our objective, we conducted 16 interviews with institutional investors that are aware of gender-lens investment strategies, who represent the potential adopters of this new practice. Our objective is to understand their cognitive interpretation of the phenomenon, and the logics characterising the compatibility between the investment strategy and the traditional financial culture.

We propose to analyse data with an inductive approach, following the steps of the Gioia Methodology (Gioia, Corley, and Hamilton, 2012). Our work aims at defining a conceptual framework to understand the levers of compatibility in situations of established organisational cultures and the opportunity to adopt new strategies. From a managerial standpoint, we contribute to the emerging field of gender lens investing, identifying the key constructs that stimulate the adoption by established investors.

References

Mudaliar A., Bass R., Dithrich H., Nova N. (2019) *Annual Impact Investor Survey*. Global Impact Investing Network.

Ansari, S. M., Fiss P. C., Zajac E. J. (2010). Made to fit: How practices vary as they diffuse. *Academy of Management Review*, 35(1), 67-92. Canato A., Ravasi D., Phillips N. (2013). Coerced practice implementation in cases of low cultural fit: Cultural change and practice adaptation during the implementation of Six Sigma at 3M. *Academy of Management Journal*, 56(6), 1724-1753.

George G., Howard-Grenville J., Joshi A., Tihanyi L. (2016). Understanding and tackling societal grand challenges through management research. *Academy of Management Journal*, 59(6), 1880-1895.

Gioia D. A., Corley K. G., Hamilton A. L. (2012). Seeking Qualitative Rigor in Inductive Research: Notes on the Gioia Methodology. *Organizational Research Methods*, 16 (1), 15-31.

KPMG (2021) *What is Gender-lens investing*.

Lozeau D., Langley A., Denis J. L. (2002). The corruption of managerial techniques by organizations. *Human Relations*, 55(5), 537-56

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Collaboration for sustainability. The systems building approach of Sustainability-Oriented Innovation.

Clara Orellana-Rojas
Politecnico Di Milano, Department of Management, Economics and Industrial Engineering, Milan, Italy
claraelena.orellana@polimi.it

Clara Orellana-Rojas is a PhD student at the Management Engineering Department of Politecnico di Milano where she develops her research on Sustainability oriented Innovation with a special focus on collaboration between stakeholders. She holds a MSc. degree in Industrial Engineering from Universidad San Francisco de Quito, Ecuador. She has also earned the Micromasters Credential in Supply Chain Management from MITx in 2018. Her research interest includes Sustainability Oriented Innovation, Supply Chain Sustainability, Circular Economy and Collaboration for Sustainability.

Abstract **– Grand challenges are comprised of non-linear dynamics and multiple interactions posing a high level of uncertainty regarding the impacts on the world. These aspects are challenging existing welfare and business systems, claiming for new models that can address social and environmental issues. Therefore, there is a motivation for companies to play a bigger role and impact in society reframing their purpose by addressing social, environmental, and economic aspects simultaneously. Companies need to implement solutions that imply the incorporation of major innovation efforts at different levels, from products to business models considering sustainability aspects on their strategy. However, such solutions cannot be solved by companies alone, implying a major system-level transition and evidencing the need to create collaboration networks between different actors of the society. This scenario led to the development of the present research, which aims at investigating the collaboration process, the type, role, motivations and contributions of the different stakeholders involved in the successful sustainability-oriented innovation initiatives that are developed with a systems building approach.**

Keywords **– Sustainability-Oriented Innovation, Systems building approach, Collaboration, Stakeholders.**

Introduction

In recent years, the concept of sustainability has become increasingly relevant, impacting all actors of the society, from governments to business players and from non-governmental organisations to each individual. In fact, they are becoming increasingly aware that the traditional economic and development system, based on unlimited resource exploitation, is no longer sustainable. There are still many environmental issues, mainly climate change, in addition to social inequalities, such as poverty and low education in developing countries, that are still unsolved.

A radical transition to a more sustainable society and economy is inevitable, thereby necessarily requiring innovation, or, more precisely, sustainability-oriented innovation SOI (Bocken et al., 2019). The framework proposed by Adams et al. (2016) enclose this complex concept that goes beyond traditional market-oriented innovation, also covering new organizational culture and values that have an overall net positive impact by addressing environmental, social, and economic goals. Within this framework, the systems building (SOI-SB) approach endorses the implementation of radical changes that impact not only the internal operations of a company but also the system where it belongs, by transforming traditional business practices and strategies in ways that fully embed the sustainability concept (Ayuso et al., 2011). This framework is a cornerstone for the further development of firms that are aiming to implement sustainability and that are willing to join forces with other actors to have a positive impact

on society. Furthermore, a real sustainable transformation will be achieved when firms consider innovation as their main business strategy (Hall and Vredenburg, 2003) since innovation has turned vital for organizational survival and long-term growth (Teece, 2010).

The SOI-SB concept is about reframing the purpose of businesses in society into *"doing good by doing new things with others"* (Adams et al., 2016, p. 190). Given that the stakeholders involved differ in their nature and purposes (Goodman et al., 2017), it is complicated to set up and manage the collaboration process on SOI-SB initiatives. Literature is scant in describing the process and the stakeholders involved to develop such innovative initiatives. Given the novelty of the topic and the need to deepen the understanding of the SOI-SB collaboration process that stakeholders undertake while developing successful initiatives, this research tries to fill in this gap within the related literature. To this end, this study will address the following research questions:

RQ1: How is the collaboration process for the stakeholders involved in SOI-SB initiatives?

Answering this research question will expand the knowledge of the collaboration process followed by stakeholders on the different types of SOI-SB initiatives. The approach will be to understand more in-depth what are the steps and sequence of activities to develop successful SOI-SB initiatives.

RQ2: What are the different stakeholder's motivations and contributions in the different stages of the collaboration process of SOI-SB initiatives?

RQ3: How is the impact of primary and secondary stakeholders different at each stage of the collaboration process of SOI-SB initiatives?

Answering these final questions will contribute to the literature by understanding the motivations that stakeholders have for taking part in SOI-SB initiatives and the variety of contributions that they are willing to share with all the actors of the network. It is believed that depending on the purpose of each SOI-SB, there will be a different type of motivations and contributions from each stakeholder's side. On the other hand, the knowledge about the different levels of impact that stakeholders have within SOI-SB initiatives will be explored more in-depth. The focus will be on the impact of primary and secondary stakeholders in the different stages of the innovation process.

METHODOLOGY

For answering the proposed research questions, a multiple case study will be developed. For this purpose, semi-structured interviews with all the stakeholders involved in the SOI-SB initiative will be conducted, analysing the phenomenon from a multi-stakeholder perspective. The empirical setting is a textile innovation Hub that implements SOI-SB initiatives in collaboration with stakeholders of different sectors developing new products, processes, or business models considering sustainability strategies. The unit of analysis will be the SOI-SB initiative developed in the innovation Hub.

EXPECTED FINDINGS AND CONTRIBUTION

The expected findings of the present research are a thorough understanding of the collaboration process of SOI-SB initiatives. The theoretical contributions deal with: (1) elucidating the collaboration process that companies and stakeholders undertake to pursue SOI-SB initiatives; (2) opening new research avenues to understand the process and implications of the creation of such initiatives; (3) broadening the knowledge of the stakeholders' motivations and contributions while developing SOI-SB initiatives. Additionally, this work provides managers practical guidelines on how to develop SOI-SB initiatives considering the diversity of stakeholders and their roles within the collaboration process.

The present research project will also contribute to the "Approaches for addressing economic and societal challenges" theme given the fact that SOI is considered a wicked issue because it is associated with social pluralism (multiple stakeholders' interests), institutional complexity (inter-organizational cooperation and governance diversity), and scientific uncertainty (fragmentation and knowledge gaps) (Head and Alford, 2015). Studying more in-depth this topic will bring new avenues of research and practical contributions for businesses that are implementing sustainability on their strategy.

REFERENCES

Adams, R., Jeanrenaud, S., Bessant, J., Denyer, D., & Overy, P. (2016). Sustainability-oriented innovation: A systematic review. *International Journal of Management Reviews*, *18*(2), 180-205

Ayuso, S., Rodríguez, M. Á., García-Castro, R., & Ariño, M. Á. (2011). Does stakeholder engagement promote sustainable innovation orientation?. Industrial Management & Data Systems.

Bocken, N., Ritala, P., Albareda, L., & Verburg, R. (Eds.). (2019). Innovation for Sustainability: Business Transformations Towards a Better World. Springer.

Goodman, J., Korsunova, A., & Halme, M. (2017). Our collaborative future: Activities and roles of stakeholders in sustainability-oriented

innovation. Business Strategy and the Environment, 26(6), 731-753.

Hall, J., & Vredenburg, H. (2003). The challenge of innovating for sustainable development. MIT Sloan management review, 45(1), 61.

Head, B. W., & Alford, J. (2015). Wicked problems: Implications for public policy and management. Administration & society, 47(6), 711-739.

Teece, D. J. (2010). Business models, business strategy and innovation. Long range planning, 43(2-3), 172-194.

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Latin American University, Are you there? The impact of the entrepreneurial University model on the current Latin American University orientation. A text mining analysis of Mission Statement from a "Third Mission" perspective

Daniel Cuesta–Delgado
Phd Candidate at Ingenio (CSIC – Universitat Politècnica de València, Spain) dacuedel@doctor.upv.es

Short Bio

Systems engineer and master's in science, technology and innovation management, with experience in the productive sector and public and university policy. He is currently working on several projects in which he uses Data Science tools to find alternative ways to characterize universities and understand their identity.

***Abstract* – This paper studies the current orientation of universities based on how they have included the idea of Third Mission (TM) in their mission statements (MS). It identifies 2 orientations given by the TM, the first social related to Latin American university extension and the second economic related to the Entrepreneurial University. Specifically, it quantitatively analyses the presence of relevant terms related to these orientations in the Mission Statements of 1304 universities in 19 Latin American countries.**

The main results are that the social orientation that identified the Latin American University in the 20th century is still there, that the economic orientation promoted by the Entrepreneurial University model is permeating the MS of universities in the region and perhaps the orientation of the Latin American University is shifting towards a socio-economic sense.

***Keywords* – Third Mission, Higher Education Institutions, University, Latin America, Text Mining, Entrepreneurial University**

Introduction

The University has two well-defined missions: the first is teaching and the second one is research. Additionally, it had a Third Mission (TM), which is an ambiguous concept related to the Universities as engines of this environment's economic and social conditions (Compagnucci & Spigarelli, 2020; Laredo, 2007, p. 446; Molas-Gallart & Castro-Martínez, 2007). As we will see this TM ideas reflected in official documents like the Mission Statement can be a good way to identify the orientation of the University (Loi & Di Guardo, 2015).

At Latin American, the particular evolution of TM idea is interesting because differs from the other regions where the TM has not clearly identified as social (Albornoz et al., 2017; Arocena & Sutz, 2005; Cano Menoni, 2015; Laredo, 2007, p. 446; Molas-Gallart & Castro-Martínez, 2007, p. 13). The idea of the Social Function or Mission of the University as TM also called "Extension" was consolidated during the 20th century (Arocena, 2018, p. 65; Arocena et al., 2018; Tünnermann Bernheim, 1991).

In 1990s, in the USA the dominant university model the Entrepreneurial University (Arocena et al., 2018, p. 153; Benner, 2011, p. 13), defined his idea of TM: "… economic development is added to research and teaching as a legitimate function of the university. Now these three functions will be integrated." (Etzkowitz, 1990, p. 122). One of the reasons the USA University institutionalize Market Logic Practices based on "Technological Innovation" associated with "academic capitalism" (Slaughter & Leslie, 1997) or the "entrepreneurial university" was the "Innovation argument" promoted by economists and adopted by policy makers since 1980s (Berman, 2012, p. 278).

Instead, since 90s and specially at starts of XXI century the Latin American Universities was opened to this economical TM and had accepted and included the enterprise relationship in his agenda (Albornoz et al., 2017;Castro Martínez & Jurado, 2009, p. 76; Labraña & Brunner, 2022). This is one of the evidences that the Latin American University Model is losing ground to the Entrepreneurial University model (Bernasconi, 2008).

At the organizational level, the arrival of the Entrepreneurial University TM provoked tension in universities. Some authors suggest that in Latin America the university social commitment, was a key factor -in initial- rejecting the relations with the private companies, and marked a distance from economic TM (Castro Martínez & Jurado, 2009, p. 74). In the 1980s, even for several USA universities the idea of collaborating with industry met with resistance from both researcher and institutional (Loi & Di Guardo, 2015).

Moreover, from an organizational perspective, the mission statement is where the University answers the question "what is our business and what should it be?" (Drucker, 1976); consequently, the two TM perspectives (social and economic) must be reflected in this strategic U-MS, usually published on the web. The study of the Mission Statement focused on the University (U-MS) is relatively new, the Web of Knowledge WoS show only 38 articles that had as keyword: "University" or "Higher education" and "Mission Statement" (search on 2021-09-28). For the 90s found only 2 articles, in contrast to the recent five year when this number start to growing up.

The study of higher education has evolved from the traditional study of the university to the study of a complex system with a diversity of higher education institutions (Rama Vitale, 2022, p. 238). This systemic perspective requires an analysis at national level (Teichler, 2010, p. 11) to be coherent with the context and useful for policy makers. A national comparison of U-MS will help to understand the impact of these models in South American HEIs. In this regard, we selected 19 countries which had a common origin of higher education as Spanish colonies and which shared at least until the end of the 20th century a common idea of university (Bernasconi, 2008; Tünnermann Bernheim, 1991).

The research questions

1. To what extent does the Latin American University maintain a social orientation?
2. How does this orientation vary in the different countries of the region?

Variables:

1. University Country: Argentina, Bolivia, Colombia, Chile, Ecuador, Paraguay, Perú, Uruguay, Venezuela, Cuba, Costa Rica, Guatemala, Honduras, Nicaragua, Panama, Puerto Rico, Republica Dominicana, Salvador y Mexico.
2. Orientation:

a) **Social:** When use terms related with "Extension" TM: Comuninity, Culture, extension, Social Responsability, Human Development, Social Protection, Social Development, Cultural Development, Social Justice, etc.

b) **Economic:** When use Terms related to Technology transference TM: Innovation, Economy, Economic Development, Entrepreneur, Enterprise, Market, Productive Sector, Techonolgy Transfer, etc.

c) **Socio Economic:** When mention social and economic terms.

Methodology

We work with a deductive Iterative Model of research. As shown in Figure 1, working with textual data is appropriate to start an investigation with an iterative process until you have a good hypothesis, not based only on experience or instinct, but also based on data (Grimmer et al., 2022).

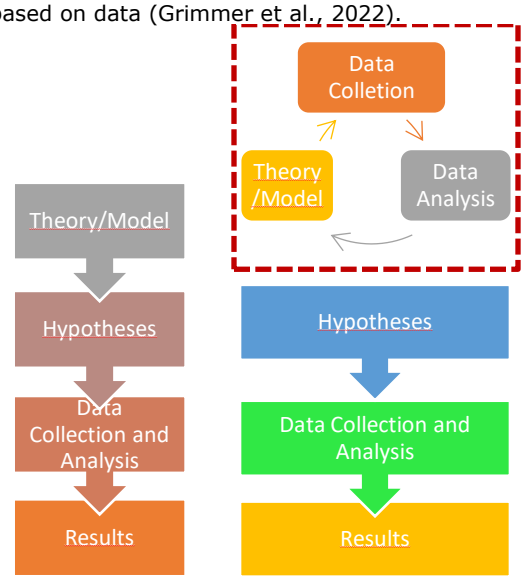


Figure 1. *Flowcharts for the standard deductive model of research (left) as compared to the iterative model of research (right). Red mark shines the iterative process.*

Source: Grimmer, J., Roberts, M. E., y Stewart, B. M. (2022, p. 15); the red mark is added by autor.

Method: Knowledge Discovery in Text KDT - KDD

We use KDT Knowledge Discovery in Text (a specific denomination for the KDD Knowledge Discovery in Data) to solve our research question. For wich using web-scrapping tools, we identified and extracted the U-MS published on the official web pages of 1304 Universities from the South American Spanish language region (19 countries with 2529 Universities). Then we use Data Content analysis tools to identify terms related to social and economic perspective. Finally, with these results, we analyze and compare the types of the Higher Education Systems. According to the literature reviewed, this study has the broadest sample of universities and countries. Additionally, it is the only study that involves a complete selection of regional universities, not only the Top ones.

For instance, we will explain each step (see Figure 2).

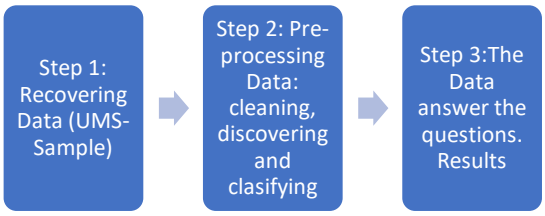


Figure 2. *Knowledge Discovery Process applied*

Step 1: Recovering Data (U-MS Sample).

First, we found a directory of universities. Chose Webometric because the editors are scientists (are not executives), and it "is a ranking of all the universities of the world, not only a few hundred institutions from the developed world." (Methodology | Ranking Web of Universities: Webometrics ranks 30000 institutions, s. f.) Second, we use an automatized process of search by google on each web page for: "Misión+Visión" terms. Third, we extract the MS of each page with an own-developed Python program. Finally, this MS passes a "manual validation process", where some of the U-MS were corrected, dismiss, or manually re-search and append.

Step 2: Pre-processing Data: cleaning, discovering and classifying key terms and classifying UMS.

Once that we recovered the U-MS from the web, then we clean and standardize the text applying operation like normalize to generic form of words, remove punctuation, convert to lowercase, and remove words with no relevant meaning. Next, we discover the most relevant, and some not explicit specified, key terms by occurrence or PMI score, and based on experts knowledge. Finally, proceed to find these terms on each UMS. If someone of our terms is in, this U-MS is classified/counted as the category of the term.

Step 3: Data answers

To answer the question 1, we count the classified UMS as Social, Economic or Socioeconomic for the whole region. And to answer the question 2, we count the classified UMS by countries.

Recovering Data Results

The ***Table 1*** show the result of the collection data process. We get 1304 U-MS that represent the 51,56% of all the Webometrics dataset referred to the 19 selected countries.

Results

1. To what extent does the Latin American University maintain a social orientation?

As we can see at ***Figure 3,*** currently, the 1 of each 3 universities in Latin America have a social orientation. This is a sign that the social orientation of the Latin American University is still there.

However, there is a not minor percentage (17%) of HEIs that have a mainly economic orientation, which mean that some ideas related to the "Entrepreneurial University" model are strongly present in the identity of some Latin American universities. Moreover, 36% of HEIs, the largest number of universities, have a socio-economic orientation, indicating that this balance may be the new Latin American orientation.

2. How does this orientation vary in the different countries of the region?

The orientation of HEIs in each country differs as can be seen at ***Figure 3.*** The countries showing the highest number of HEIs with a social orientation are Venezuela (54%), Guatemala (50%) and Puerto Rico (55%). Countries with the most economic orientation are Panama (40%) and Chile (28%). While the countries with the highest socio-economic orientation are: Cuba (55%), Panama (47%), Colombia (47%) and Costa Rica (45%).

These results show a variety of profiles and following Bernasconi (2008) can we ask us if still There are a Latin America Model of University?

References

Albornoz, M., Barrere, R., Castro Martínez, E., & Carullo, J. C. (2017). *Manual Iberoamericano de Indicadores de Vinculación de la Universidad con el Entorno Socioeconómico* (Red Iberoamericana de Indicadores de Ciencia y Tecnología (RICYT) & Observatorio Iberoamericano de la Ciencia, la Tecnología y la Sociedad (OCTS-OEI), Eds.).

Arocena, R. (2018). De los principios de la Reforma de Córdoba a la Universidad para el Desarrollo de América Latina en el siglo XXI. *Integración y Conocimiento*, *7*(1), 54-67.

Arocena, R., Goransson, B., & Sutz, J. (2018). *Developmental Universities in Inclusive Innovation Systems Alternatives for Knowledge Democratization in the Global South*. Springer International Publishing AG. http://nbn-resolving.de/urn:nbn:de:1111-20171018551

Arocena, R., & Sutz, J. (2005). Latin American Universities: From an Original Revolution to an Uncertain Transition. *Higher Education*, *50*(4), 573-592. https://doi.org/10.1007/s10734-004-6367-8

Benner, M. (2011). In Search of Excellence? An International Perspective on Governance of University Research. En *Universities in Transition. The changing role and challenges for academic institutions* (pp. 11-24). Springer. https://link.springer.com/chapter/10.1007/978-1-4419-7509-6_2

Berman, E. P. (2012). Explaining the move toward the market in US academic science: How institutional logics can change without institutional entrepreneurs. *Theory and Society*, *41*(3), 261-299. https://doi.org/10.1007/s11186-012-9167-7

Bernasconi, A. (2008). Is There a Latin American Model of the University? *Comparative Education Review*, *52*(1), 27-52. https://doi.org/10.1086/524305

Cano Menoni, A. (2015). La extensión universitaria en la transformación de la Universidad Latinoamericana del siglo XXI: disputas y desafíos. En *Los desafíos de la universidad pública en América Latina y el Caribe* (Primera Edición, pp. 287-380). CLACSO : Instituto de Investigaciones Gino Germani, Facultad de Ciencias Sociales, Universidad de Buenos Aires. http://biblioteca.clacso.edu.ar/clacso/posgrados/20150722114530/LosDesafiosDeLaUnivPublica.pdf

Castro Martínez, E., & Jurado, J. V. (2009). *Las relaciones universidad-entorno socioeconómico en el Espacio Iberoamericano del Conocimiento*. *4*, 11.

Compagnucci, L., & Spigarelli, F. (2020). The Third Mission of the university: A systematic literature review on potentials and constraints. *Technological Forecasting and Social Change*, *161*, 120284. https://doi.org/10.1016/j.techfore.2020.120284

Drucker, P. F. (1976). *Managing the public service institution*. 4-14.

Etzkowitz, H. (1990). The Second Academic Revolution: The Role of the Research University in Economic Development. En S. E. Cozzens, P. Healey, A. Rip, & J. Ziman (Eds.), *The Research System in Transition* (pp. 109-124). Springer Netherlands. https://doi.org/10.1007/978-94-009-2091-0_9

Grimmer, J., Roberts, M. E., & Stewart, B. M. (2022). *Text as data: A new framework for machine learning and the social sciences*. Princeton University Press.

Labraña, J., & Brunner, J. (2022). Transformación de la educación superior latinoamericana y su impacto en la idea de la universidad. *Perfiles Educativos*, *44*. https://doi.org/10.22201/iisue.24486167e.2022.176.60539

Laredo, P. (2007). Revisiting the Third Mission of Universities: Toward a Renewed Categorization of University Activities? *Higher Education Policy*, *20*(4), 441-456. https://doi.org/10.1057/palgrave.hep.8300169

Loi, M., & Di Guardo, M. C. (2015). The third mission of universities: An investigation of the espoused values. *Science and Public Policy*, *42*(6), 855-870. https://doi.org/10.1093/scipol/scv012

Methodology | Ranking Web of Universities: Webometrics ranks 30000 institutions. (s. f.). Recuperado 1 de octubre de 2021, de https://www.webometrics.info/en/Methodology

Molas-Gallart, J., & Castro-Martínez, E. (2007). Ambiguity and conflict in the development of 'Third Mission' indicators. *Research Evaluation*, *16*(4), 321-330. https://doi.org/10.3152/095820207X263592

Rama Vitale, C. (2022). Diversidad y nuevas tipologías universitarias en América Latina. En J. Brunner, J. Salmi, J. Labraña, F. Ganga-Contreras, M. González-Ledesma, A. García de Fanelli, P. Pineda, E. Rodríguez, E. Balbachevsky, & S. Schwartzman, *ENFOQUES DE SOCIOLOGÍA Y ECONOMÍA POLÍTICA DE LA EDUCACIÓN*

SUPERIOR: APROXIMACIONES AL CAPITALISMO ACADÉMICO EN AMÉRICA LATINA (pp. 217-251).

Slaughter, S., & Leslie, L. L. (1997). *Academic capitalism: Politics, policies, and the entrepreneurial university*. Johns Hopkins University Press.

Teichler, U. (2010). *Sistemas comparados de educación superior en Europa: Marcos conceptuales, resultados empíricos y perspectiva de futuro* (Ed. especial para el VI CIDUI). Octaedro : Universitat de Barcelona, Institut de Ciències de l'Educació.

Tünnermann Bernheim, C. (1991). *Historia de la universidad en América Latina: De la Epoca Colonial a la Reforma de Córdoba* (1. ed). Editorial Universitaria Centroamericana.

Table 1. *Country, University Webs and Mission Statements (U-MS) sample*

Region	Country	Sum of # Webs in Webometrics	Sum of # U-MS Sample	% U-MS sample / country	% U-MS sample / region	% U-MS sample / Hispanic America
South	Colombia	293	156	53,24%	29,10%	11,96%
	Argentina	144	66	45,83%	12,31%	5,06%
	Perú	134	68	50,75%	12,69%	5,21%
	Chile	133	72	54,14%	13,43%	5,52%
	Venezuela	67	35	52,24%	6,53%	2,68%
	Ecuador	65	50	76,92%	9,33%	3,83%
	Bolivia	56	41	73,21%	7,65%	3,14%
	Uruguay	43	18	41,86%	3,36%	1,38%
	Paraguay	40	30	75,00%	5,60%	2,30%
	Total	**975**	**536**	**54,97%**	**100,00%**	**41,10%**
Central	Costa Rica	66	29	43,94%	13,43%	2,22%
	República Dominicana	62	43	69,35%	19,91%	3,30%
	Nicaragua	50	33	66,00%	15,28%	2,53%
	El Salvador	39	24	61,54%	11,11%	1,84%
	Puerto Rico	37	22	59,46%	10,19%	1,69%
	Cuba	33	22	66,67%	10,19%	1,69%
	Panamá	29	17	58,62%	7,87%	1,30%
	Guatemala	22	14	63,64%	6,48%	1,07%
	Honduras	16	12	75,00%	5,56%	0,92%
	Total	**354**	**216**	**61,02%**	100,00%	**16,56%**
North	Mexico	1200	552	46,00%	100,00%	42,33%
	Total	**1200**	**552**	**46,00%**	**100,00%**	**42,33%**
Hispanic America	**Total**	**2529**	**1304**	**51,56%**	100,00%	**100,00%**

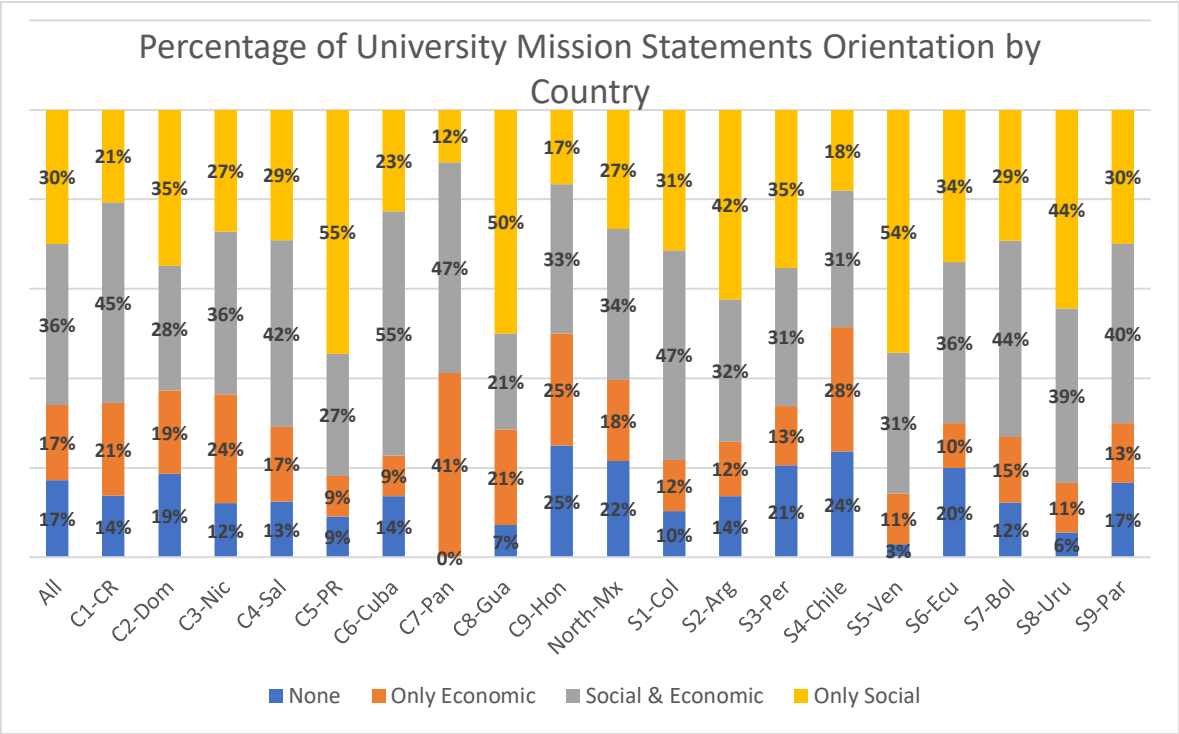


Figure 3 *Percentage of HIEs that include at UMS at least 1 Social or 1 Economic descriptor, or 1 social and economic descriptor, or no descriptor.*

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Proposal for a new infrastructure evaluation approach: ESFRI and the Social Sciences & Humanities case

Davide Emanuele Iannace
IRCRES (Rome) and University of Sapienza (Rome) - Italy (davideemanuele.iannace@uniroma1.it).

Short Bio

PhD student at the IRCRES-CNR of Rome and the "University of Rome" – La Sapienza. His curriculum focuses on evaluating public policies, their impacts, and outcomes. His interests cover the sociology of innovation, urban and rural communities and, more recently, energetic communities.

Research infrastructures (RI) are a cornerstone of contemporary sciences. More and more diffused in the STEM field, they are getting more renowned in the social sciences and humanities. Expensive in terms of time and resource usage, RIs require planned investments and a long-term vision to succeed. A prominent actor in Europe in investing in RIs was, and still is, the European Union – in particular, thanks to the European Strategy Forum on Research Infrastructures (ESFRI). But, especially in the Social Sciences and Humanities field, it is difficult to understand when the costs overcome the benefits of building a new RI. In this paper, we present a possible alternative to evaluate the success and the benefits of a RI, including the impacts it has not only on the direct scientific community of reference but also the possibility that such RI can have impacts on their local territory of reference – despite many of them being delocalised, digital and/or diffused.

Keywords **– ESFRI, research infrastructure, evaluation, European governance, DARIAH, OPERAS, Cost-Benefit Analysis, Social Network Analysis**

ESFRI

The European Strategy Forum on Research Infrastructures (ESFRI) is an attempt made by the European Union, in the context of the European Research Area (ERA), to answer to the lack of state-sponsored research infrastructures (RI) in the continent (ESFRI, 2020). Included in the ERA strategy, ESFRI can be considered a network operating to develop new infrastructures capable of supporting scientists and organisations in any scientific field (ESFRI, 2021).

ESFRI can be deemed an attempt to do *Big Science* (Capshew and Rader, 1992) in an environment where the costs of research are increasing due to the much more elevated complexity of the issues faced (Cramer & Al., 2020). We can define a Research Infrastructure as a facility, a resource or a service used by the scientific community to pursue its work and research activity (European Union, 2013). This means we can include in the definition of RI many different tools and instruments at the disposition of the scientific community, such as entire laboratories or even databases.

Of their nature of being the link and the environment to foster cooperation and collaboration between experts, RIs are deeply interlinked with the world surrounding them. We can read them as deeply involved in that Triple – or Quadruple – Helix (Ierapetritis, 2019), which involves actors of the political, economic, social and cultural world altogether.

EVALUATING INFRASTRUCTURES

If STEM RIs received attention in the last decades (Cfr. Florio, 2019; Florio et al., 2016; Farago, 2014) due to the amplitude of the studies conducted in such environments and their relevance for the future of science, RIs in the Social Sciences and Humanities (SSH) are a more recent trend (Farago, 2014). The diffusion of new RIs in the SSH is strongly linked with its new-born necessities, such as a significant reliance on

empirical data in massive datasets, the challenge of globalisation and the increased dependence on digital and informatics assets (Catalano et al., 2020).

The more the RIs start to grow and diffuse, the more it becomes relevant to how it is possible to evaluate the well-being of an infrastructure. As the massive investment they are, and in a limited resources environment, it becomes necessary for the policymaker to fully understand how the infrastructure will, on the one hand, be sustained in the long-term and if it will impact a significant size of the scientific community. ESFRI is not new to evaluation. Not only as a case study for specialists (Cfr. Zakaria et al., 2021; Franciosi et al., 2012) but also as internally scrutinised by the same European Union. The AEG (Franciosi et al., 2012) is an example of how ESFRI look at itself to improve and better face the challenges ahead of it. A team of experts and evaluators had the task of analysing the different infrastructures – projects and landmarks – considered by ESFRI as possible future infrastructures of the European programme. Using the tools of the in-deep questionnaire, the AEG focused on how each infrastructure faced different challenges – such as how to get new financing, their legal structure and so on.

COST-BENEFIT ANALYSIS

The Cost-Benefit Analysis (CBA) (Florio, 2019) proved essential in evaluating the performance of infrastructures, particularly the STEM ones. This methodology allows analysing a RI from both a financial and an economic perspective. If the financial side encompasses all the funding and budget operations, the economic analysis focuses on a broader range of effects and possible impacts an RI can have – i.e., impacting stakeholders outside the original organisation of the RI itself (Florio et al., 2016).
CBA introduced in the analysis of an infrastructure what we can label as local effects (Battistoni et al., 2016). The local effects can be direct or indirect consequences a RI can have on a territory – both urban and rural -such as creating new jobs or economic opportunities for a territory or increasing the social or cultural capital around the RI (Battistoni et al., 2016).

ANALYSING LOCAL EFFECTS

This combination of local effects is challenging to evaluate. At the same time, they can be the relevant outcomes of RIs belonging to SSH. Focusing on two infrastructures of ESFRI, DARIAH and OPERAS, we aim to explore the possibility that such infrastructures – even if delocalised – could directly sustain the institutions joining them – i.e., supporting their capacity to produce knowledge and attire new talents -, but at the same time, their effects could expand to stakeholders and actors (political, social, and economic ones) who interact with such institutions.
We can summarise the possible effects our RIs can have in four elements:

(i) Increase the calculus capacity of the single institutions entering the RI.
(ii) Refine the local academics' and experts' capacities, allowing them to connect with a broader audience and access more connections on non-local scales.
(iii) RIs should be able to connect the scientific community, improving the capacity of cooperation between different ones.
(iv) The RIs could have a spillover effect over the bottom-up network construction capacity of the local stakeholders and actors, who find themselves inside a more extensive network.
Some of these outcomes are directly linked with the capacity of the infrastructure itself to sustain the institutions. Some others are, instead, more intertwined with the capacity of the infrastructure to foster a new form of cooperation between different stakeholders belonging to the local realities.

We aim to use two different approaches to perform this attempt to evaluate our two infrastructures. Using the Social Network Analysis (SNA), we aim to understand and describe the functioning of the network built around each one of our case studies (Cfr. Giancola and Colarusso, 2020; Crossley et al., 2015). Using both qualitative in-deep interviews with the coordinators of each institution involved and questionnaires, we want to rebuild the network and the stakeholders that could be involved in OPERAS and DARIAH.
Using the SNA, we should be able to reconstruct every single actor and stakeholder position in the network. In the second phase of our analysis, we aim to understand the impact using the CBA itself (Florio, 2019) or adapting other impact evaluation techniques based on our data availability (Cfr. Reale et al., 2017).

CONCLUSION

What we expect from the upcoming analyses we aim to perform in the following years is to better understand how infrastructures operating in the SSH field could impact the institutions joining them and the territories where such institutions are located. Considering both DARIAH and OPERAS are digitalised and delocalised, this does not mean the institutions are not spatial entities strongly connected to stakeholders and actors, which are, in our hypothesis, influenced by the RIs. We aim to assess how these effects can be analysed not only in the form of a direct impact – on the institution and the stakeholder – but as a whole-network effect.

REFERENCES

Battistoni G., Genco M., Marislio M., Pancotti C., Rossi S. and Vignetti. S. (2016). Cost–benefit analysis of applied research infrastructure. Evidence from health care. *Technological Forecasting and Social Change*. Vol. 112, 2019, Pp. 79-91.
https://doi.org/10.1016/j.techfore.2016.04.001

Capshew J.H. & Rader K.A. (1992). Big Science: Price to the Present. *OSIRIS 2nd Series*. Volume 7, Number 1, Pp. 3-25. https://doi.org/10.1086/368703

Catalano G., Giffoni F., Morretta V. (2020). Human and social capital accumulation within research infrastructures: The case of CERN. *Annals of Public and Cooperative Economics*. Special Issue 2021. DOI: 10.1111/apce.12317

Colarusso S. and Giancola O. (2020). *Università e nuove forme di valutazione*. Sapienza Editore. Roma.

Cramer K.C., Hallonsten O., Bolliger I.K. and Griffiths A. (2020). Big Science and Research Infrastructures in Europe: History and current trends. In Cramer K.C. and Hallonsten O. (Eds) (2020). *Big Science and Research Infrastructures in Europe*. Elgar Online Library.

Crossley N., Bellotti E., Edwards G., Everett M.G., Koskinen J. and Tranmer M. (2015). *Social Network Analysis for Ego-Nets*. SAGE Publishing. New York.

ESFRI. (2020). *Making Science Happen. A new ambition for Research Infrastructure in the European Research Area*. ESFRI White Book. https://www.esfri.eu/esfri-white-paper

ESFRI. (2021). *ESFRI Roadmap 2021*. ESFRI Publications. https://roadmap2021.esfri.eu/

Farago P. (2014). Understanding How Research Infrastructures Shape the Social Sciences: Impact, challenges and Outlook. In Duşa A., Nelle D., Stock G. and Wagner G.G. (Eds) (2014). Facing the future European research infrastructures for the humanities and social sciences. *SCIVERO. Acts of the conference Facing the Future: European Research Infrastructure for Humanities and Social Sciences* (November 21/22, Berlin, 2013)

Florio M. (2019). *Investing in Science. Social Cost-Benefits Analysis of Research Infrastructures*. MIT University Press. Cambridge, Massachusetts.

Florio M., Forte S., Pancotti C., Sirtori E., Vignetti S. (2016). Exploring Cost-Benefit Analysis of Research, Development and Innovation Infrastructures: An Evaluation Framework. *Center for Industrial Studies – Working Paper Series N. 01/2016/*.

Franciosi A., Wade R., Calvia-Goetz A., Zic Fuchs M., Larsen, S., Marks, J. and Tichmann K. (2012). *Assessing the projects on the ESFRI roadmap*. European Commission Report. https://op.europa.eu/en/publication-detail/-/publication/f528df12-e57b-433d-8217-f8bfdf6041c5

Ierapetritis D. G. (2019). Discussing the role of Universities in Fostering Regional Entrepreneurial Ecosystems. *Economies*. Volume 7, Issue 4, Pp. 119. https://doi.org/10.3390/economies7040119.

Reale E. and Zinilli A. (2017). Evaluation for the allocation of university research project funding: Can rules improve the peer review? *Research Evaluation*. Vol. 26, Issue 3, Pp. 190-198. doi: 10.1093/reseval/rvx019

A Participatory Road to Research Impact: the case for participatory evaluation in nursing research projects

Eduard Güell
INGENIO (CSIC-UPV), Universitat Politècnica de València and UOC, Barcelona (guell@uoc.edu).

Short Bio

L'Hospitalet de Llobregat, 1990. Predoctoral researcher in science policy at INGENIO (CSIC-UPV) and Universitat Oberta de Catalunya (UOC). Research stay at the Center for Organization Research and Design, Arizona State University. Master of Arts in Political Philosophy at Universitat Pompeu Fabra (UPF), BA in Political Science at UPF and Sciences Po (Paris). Professional experience at the National Institute of Health Carlos III at the International Programmes division, and at the Agency for Health Quality and Evaluation (AQuAS).
Twitter
LinkedIn

Abstract

Background
Impact evaluation is difficult to operationalise. Agencies are opening evaluation to new approaches in order to capture research benefits. Participatory evaluation can orient research to impact while research is active; it is worth exploring it in nursing research.

Methods
Fifteen cases were selected to conduct participatory evaluation methods. During the project's last year, a formative workshop, two rounds of interviews and a questionnaire were implemented. Activities were organised following a five-dimensional design.

Results
The majority of nursing researchers changed their projects due to the formative workshop. The five dimensions increased the awareness of social impact related values.

Discussion and Conclusions
Participatory evaluation is a worth exploring tool to orient research projects to impact. It is advised to experiment with a larger number of cases.

Keywords **– participatory methods; formative evaluation; nursing research; dimensional evaluation**

Introduction

There is a growing trend to evaluate research impact across research agencies (Curry et al., 2020). The perception of a misalignment between research and social needs, especially noted in health research, drives agencies to increasingly focus on the evaluation of non-academic benefits or "impacts" (Sarewitz & Pielke, 2007). Research evaluation based only on standard output indicators (e.g., unidimensional indicators of performance, scientometrics) has been proven problematic (Wilsdon et al., 2015), limiting the use of evaluation as a source of knowledge. Consequently, impact evaluation has gained prevalence in evaluation practice as a mode to expand social return from research projects.

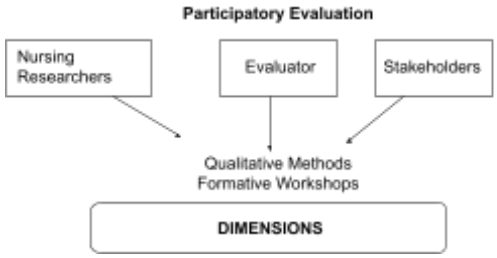
However, impact evaluation is difficult to operationalise. The majority of ex-post methods and indicators face problems to measure research impact, as it is identified in literature (Spaapen & van Drooge, 2011): i) the impact of a project occurs 10-20 years after the research is undertaken; ii) the problem of attribution to

actors; iii) impact depends on a socioeconomic context that flows affecting its potential outcomes. As a result of the difficulties in measuring impact, agencies are opening evaluation to new methods (Adam et al., n.d.; P. B. Joly et al., 2019; P.-B. Joly et al., 2015; Molas-Gallart et al., 2016; Wilson-Grau, 2018). The objective of some of these new approaches is not evaluating research impact itself but to orient research to impact while the project is still active. That is, using evaluation to anticipate impact outcomes rather than evaluate ex-post its impact potential outcomes. In this new context, a complementary approach worth exploring is opening evaluation to participatory methods in evaluation.

Participatory evaluation widens the decision spectrum through an active collaboration between evaluators, researchers and stakeholders, and it offers an opportunity to better understand what is occurring during a research process (Cargo & Mercer, 2008; Cousins & Whitmore, 1998; Domecq et al., 2014). Participation enables evaluators to identify interactions, project barriers and changes which can be used as signals for orienting research towards impact. It also serves as a platform to organise capacity building activities that benefit researchers, stakeholders and evaluators to learn on impact pathways. The organisational learning justification is worth emphasising in participatory evaluation. (Cousins & Earl, 1992). Opening evaluation to researchers and stakeholders can be a suitable way to affect research projects and bridge research outcomes and societal needs.

This article analyses a real experience introducing participatory evaluation methods into health research projects. In this case, participatory evaluation does not substitute ex-post evaluation but complement it. The selected case studies are research projects conducted by nursing professionals funded by the Catalan Health Department. Those cases present appropriate characteristics: research is linked to patients' needs; accurate number of projects (n=15); newness of nursery research projects; identified stakeholders and experts. During the research projects development, the evaluator applied different participatory evaluation methods joining together researchers, experts and stakeholders. Methods combined qualitative techniques with formative workshops framed under five dimensions of evaluation. The foreseen activities seeked to orient further research towards impact by fostering impact itineraries through qualitative methods and training activities.

Figure 1.



Main Objectives of Research

The main objectives of research are to design participatory evaluation methods tailored to nursing research projects, and to subsequently evaluate whether the research projects are better oriented towards social impact. This article aims to contribute to impact evaluation practices carried out by a public research agency.

O1: Fostering research impact through training and participatory sessions.

O2: Designing participatory evaluation methods tailored to nursing health research projects.

O3: Identifying changes through the evaluation practice to assess whether projects are better oriented to impact.

Research Questions

The following two questions are formulated to address the objectives described above.

RQ1: To what extent is participatory evaluation an effective mode to orient research towards impact?

RQ2: What participatory methods are suitable for grasping changes within a research project and alter its progress towards impact?

Methods

Implementing a participatory evaluation for the purpose of altering research projects towards impact redefines the role of evaluation, researchers and stakeholders. These new roles shall have a common understanding on what is expected to be considered impact, and on what methodology the foreseen participatory techniques are framed. In order to structure and address the characteristic aspects to be assessed

by the participatory evaluation, the evaluator used dimensions.

The evaluation model is based on five dimensions: training, knowledge, network, contribution and inclusion. The dimensions guided and structured the formative workshops and qualitative actions.

Figure 2.

The dimensions are based on the DARE model (Bone et al., 2020), an approach for assessing collaborations through analytical dimensions to foster diversity. The criteria used to structure the methodology is tailored to fit the principles of Responsible Research and Innovation (RRI) (European Commission. Directorate General for Research and Innovation., 2015), and therefore linked to a research impact standard approach. Each dimension corresponds to an aspect that the evaluator wanted to encourage and understand how it is evolving during the research project:

1. Training: Promoting the training of researchers during the project. The workshops will encourage training together with external experts and stakeholders.

2. Knowledge: Focused on the achievement of the objectives of the scientific and technical proposal. The workshop and the qualitative activities related to this dimension are aimed at informing about the changes that have allowed progress in the scientific and technical aspects of the project.

3. Network: Gathering information on the degree and characterization of the participation in the project of stakeholders. It focuses on the participation of stakeholders in research projects together with the researchers.

4. Contribution: Transfer of knowledge to external actors. This dimension also focuses on the degree of influence that can be exerted on the decision-makers. The communication and dissemination of knowledge are framed within this dimension.

5. Inclusion: Reports on progress in the inclusion of the gender perspective in research during the project. This dimension prompts an analysis of the characteristics of the network and informs about how diverse and inclusive it is.

As shown in figure 2., dimensions informed on how to implement both methods: formative workshops and qualitative methods.

- Formative workshops: Organising participative sessions with stakeholders (patients, associations, interested parties), the fifteen nursing researchers and experts for training in the impact of research and responsible research. Experts on gender perspective in research, inclusion of patients and research careers will be invited as well as relevant stakeholders for nursing research.

- Questionnaire: Designing an online questionnaire including open questions related to each of the five dimensions.

- Interviews: Organising semi-structured interviews to each nursing researcher. The objective is to capture information on the project's development, its changes and evolution since they began.

Key Findings

Participatory evaluation can be a useful approach towards research impact. Nursing researchers expressed they changed their projects due to the participatory activities. Through participation, a formative approach had consequences in real time. The dimensional-design helped to structure the activities and fostered researcher's changes in their respective projects.

It is expected to contribute to advancements in evaluation modelling; that is, highlighting dimensions of evaluation and its interaction to methods.

References

Adam, P., Solans-Domènech, M., Radó-Trilla, N., & Pons, J. M. V. (n.d.). El Sistema

d'Avaluació de la Recerca i la Innovació en Salut (SARIS): Un exemple d'avaluació responsable i transformadora. 4.

Bone, F., Hopkins, M. M., Ràfols, I., Molas-Gallart, J., Tang, P., Davey, G., & Carr, A. M. (2020). DARE to be different? A novel approach for analysing diversity in collaborative research projects. Research Evaluation, 29(3), 300–315. https://doi.org/10.1093/reseval/rvaa006

Cargo, M., & Mercer, S. L. (2008). The value and challenges of participatory research: Strengthening its practice. Annual Review of Public Health, 29, 325–350. https://doi.org/10.1146/annurev.publhealth.29.091307.083824

Cousins, J. B., & Earl, L. M. (1992). The Case for Participatory Evaluation. Educational Evaluation and Policy Analysis, 14(4), 397–418. https://doi.org/10.3102/01623737014004397

Cousins, J. B., & Whitmore, E. (1998). Framing participatory evaluation. New Directions for Evaluation, 1998(80), 5–23. https://doi.org/10.1002/ev.1114

Curry, S., de Rijcke, S., Hatch, A., Pillay, D. (Gansen), van der Weijden, I., & Wilsdon, J. (2020). The changing role of funders in responsible research assessment: Progress, obstacles and the way ahead [Report]. Research on Research Institute. https://doi.org/10.6084/m9.figshare.13227914.v1

Dahler-Larsen, P. (n.d.). The Evaluation Society. In The Evaluation Society. Stanford University Press. Retrieved 1 June 2021, from https://stanford.universitypressscholarship.com/view/10.11126/stanford/9780804776929.001.0001/upso-9780804776929

Domecq, J. P., Prutsky, G., Elraiyah, T., Wang, Z., Nabhan, M., Shippee, N., Brito, J. P., Boehmer, K., Hasan, R., Firwana, B., Erwin, P., Eton, D., Sloan, J., Montori, V., Asi, N., Dabrh, A. M. A., & Murad, M. H. (2014). Patient engagement in research: A systematic review. BMC Health Services Research, 14, 89. https://doi.org/10.1186/1472-6963-14-89

European Commission. Directorate General for Research and Innovation. (2015). Indicators for promoting and monitoring responsible research and innovation: Report from the Expert Group on policy indicators for responsible research and innovation. Publications Office. https://data.europa.eu/doi/10.2777/9742

Joly, P. B., Matt, M., & Robinson, D. K. R. (2019). Research Impact Assessment: From ex post to real-time assessment. Fteval Journal for Research and Technology Policy Evaluation. https://hal.archives-ouvertes.fr/hal-02382425

Joly, P.-B., Gaunand, A., Colinet, L., Larédo, P., Lemarié, S., & Matt, M. (2015). ASIRPA: A comprehensive theory-based approach to assessing the societal impacts of a research organization. Research Evaluation, 24. https://doi.org/10.1093/reseval/rvv015

Molas-Gallart, J., D'Este, P., Llopis, O., & Rafols, I. (2016). Towards an alternative framework for the evaluation of translational research initiatives. Research Evaluation, 25(3), 235–243. https://doi.org/10.1093/reseval/rvv027

Sarewitz, D., & Pielke, R. A. (2007). The neglected heart of science policy: Reconciling supply of and demand for science. Environmental Science and Policy, 10(1), 5–16. https://doi.org/10.1016/j.envsci.2006.10.001

Spaapen, J., & van Drooge, L. (2011). Introducing 'productive interactions' in social impact assessment. Research Evaluation, 20(3), 211–218. https://doi.org/10.3152/095820211X12941371876742

Wilsdon, J., Allen, L., Belfiore, E., Campbell, P., Curry, S., Hill, S., Jones, R., Kain, R., Kerridge, S., Thelwall, M., Tinkler, J., Viney, I., Wouters, P., Hill, J., & Johnson, B. (2015). The Metric Tide: Report of the Independent Review of the Role of Metrics in Research Assessment and Management. https://doi.org/10.13140/RG.2.1.4929.1363

Wilson-Grau, R. (2018). Outcome Harvesting: Principles, Steps, and Evaluation Applications. IAP.

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

The role of scientific entrepreneur's active strategy to institutional pressures: A case study within the medical technology sector.

Enrique Meseguer Castillo
INGENIO (CSIC-UPV), Universitat Politècnica de València, Camino de Vera s/n, 46022 Valencia, Spain (enmecas@doctor.upv.es).

Short Bio

He is working as a Ph.D. candidate and Researcher at INGENIO, a joint research institute of the Spanish National Research Council (CSIC) and the Polytechnic University of Valencia (UPV). In his professional career, he has 25 years of experience as a manager in a private company within the health technology sector. He has a Degree in Psychology and a Master's Degree in Sociology and Anthropology of Public Policies. The focus of his research is related to innovation, entrepreneurship, and research collaboration in the field of emerging medical technologies. His research combines qualitative research, bibliometrics, and social network analysis.

***Abstract* – This article presents a theory extension of the Knowledge-intensive Innovative Entrepreneurship (KIE) framework proposed by Malerba & McKelvey. The KIE process model involves individuals, organizations, institutions, the innovation system, and their mutual interactions and exchanges. Through an empirical case study, this paper shows that actors' actions and behaviour in certain complex contexts shape the innovation process influencing or even changing their institutional environment. Our study enriches KIE research with insights from the neo-institutional theory that highlights institutional pressures and the agency of scientific entrepreneurs by entering the notion of "institutional entrepreneurs." Our research is based on an in-depth case study of comparative KIE trajectories in the field of computational radiology. This case study was carried out from 2016 to 2020. Two primary data sources were used: 21 in-depth interviews with key informants and intensive and extended non-participant observation in the field. We expect theoretical and empirical contributions to the KIE process model and that such contributions can help foster and promote entrepreneurship with a high economic, social, and clinical impact.**

***Keywords* – innovative entrepreneurship; scientific entrepreneurs' agency; institutional pressures; medical technology.**

INTRODUCTION AND THEORETICAL BACKGROUND

Research on entrepreneurship has developed theoretical models to understand the foundations, trends, and interplay between the creation of new ventures, the knowledge production function, and the process of innovation and technological change within an organizational context (Acs & Audretsch, 2005). Recent studies integrating the Schumpeterian tradition, evolutionary economics, and innovation system perspective provide a new conceptual lens to examine entrepreneurship, knowledge, and innovation.

This paper builds on one of these new models, the so-called "Knowledge-Intensive Innovative Entrepreneurship" (KIE) by Malerba & McKelvey (2019). These authors conceptualize KIE firms as «new learning organizations that use and transform existing knowledge and generate new knowledge in order to innovate within innovation systems» (Malerba & McKelvey, 2020, p. 508). Malerba and McKelvey's framework build from the premise that innovation and entrepreneurship represent fundamental knowledge-generation processes favoring economic change and

dynamism (pp. 509-510). The model gives particular importance to the activities and functions of entrepreneurs, such as taking risks and making profits, converting technology and ideas into innovation in the market, dealing with uncertainty, creating opportunities, or driving and adapting to changes in the environment. Besides, it also accounts for the influence of the external context on the capacity and opportunities KIE firms have for innovation and entrepreneurship. Such a context is formed by institutions and agents whose interactions, rules, and pressures shape the innovation system (suppliers, users, scientific organizations, universities, government agencies, or financial organizations). We contend that the role attributed to such institutions is not sufficiently developed to comprehensively explain the case of KIE firms embedded in complex institutional environments.

It follows that our study aims to enrich KIE research with insights from new institutional theory (DiMaggio & Powell, 1983; Meyer & Rowan, 1977; Zucker, 1977) that highlights not only institutional pressures but also the agency of entrepreneurs. Battilana, Leca, and Boxenbaum (2009: pp. 66-68) argue that it is not only necessary to explain how institutions influence actors' behavior (individual or collective) but also how such actors to influence or even change their institutional environment. They introduce the notion of "institutional entrepreneurs" which refers to «actors who leverage resources to create new or transform existing institutions." Different types of actors act as institutional entrepreneurs, who initiate changes in the field when they see «an opportunity to realize interests that they value highly» (DiMaggio, 1988), and this opportunity is linked with certain environmental conditions and the agents' specific characteristics, qualities, and capacities (Scott et al., 2000; Maguire, Hardy, and Lawrence, 2004; Hardy & Maguire, 2017). Put differently, a complex environment generates constraints but also enables conditions for innovative entrepreneurship and creates opportunities for the agency by creating new organizational forms and institutional arrangements (Scott, 2014). The case study presented here reveals that neo-institutionalism provides conceptual and empirical means for the analysis of entrepreneurial organizations. The context of the study is the Spanish medical technology sector. The selected case study accounts for complex processes in terms of the founder's and stakeholders' perceptions, process dimensions, creation and use of new scientific concepts, research collaboration networks, and strategic agency that have given rise to different entrepreneurial trajectories.

MAIN OBJECTIVES OF THE RESEARCH AND RESEARCH QUESTIONS

The objectives of this study are two-fold: (a) understanding how institutional pressures are perceived and interpreted by agents, as well as cognitive, psychosocial, or moral factors underlying when and how organizations respond to these forces, (b) developing the notions proposed by neo-institutionalist theory within the KIE model proposed by Malerba and McKelvey (2019). To do so, we address the following research questions:

1) What does the comparison of KIE trajectories show about founders' and stakeholders' perceptions of the process and dynamics of innovative entrepreneurship and their interaction with their institutional environment?

2) How did the organizations adapt to a complex institutional environment, and how did they respond to institutional pressures?

3) What effects did this strategic response have on KIE's different trajectories and institutional environment?

CASE STUDY CONTEXT

In Spain, two research groups formed by medical specialists with recognized prestige and telecommunication engineers from the field of diagnostic imaging, computer scientists from medical image processing, together with leading figures from computational medical imaging launched two university spin-offs to commercialize their innovations in medical imaging technology. In 2012, Spin-off One started the project phase (willingness to create a university spin-off), while Spin-off Two was founded and started its activity in a Biomedical Research Institute integrated into a University Hospital. The starting point of both entrepreneurship trajectories is closely linked to a local and technological environment with very similar characteristics. For instance, the promoters of the new firms belong to the same scientific and collaboration network (i.e. co-authored scientific articles, shared thesis supervisors, and similar patent applications) and share institutional links.

METHODOLOGY

The overarching research approach was qualitative and exploratory. For this purpose, the adopted method is based on an in-depth case study of comparative KIE trajectories in the field of computational radiology. The rationale for the case

selection lies in its intrinsic uniqueness, importance, and relevance for knowledge-intensive innovative entrepreneurship research (Yin, 2009). Other selection criteria relate to the similarity in the initial phase of entrepreneurship, which allows for examining the different trajectories of both firms over time.

This comparative case study was carried out from 2016 to 2020. Two primary data sources were used. First, 21 in-depth interviews were conducted based on a semi-structured script. These interviews were recorded and transcribed verbatim, using NVivo software for the coding and subsequent analysis of the transcripts. Second, non-participant observation through visits to firms' central facilities was carried out, including communication exchange with firms' staff. Furthermore, additional evidence was gathered through secondary data sources: attendance at meetings, attendance and audio recording of presentations to different audiences, analysis of minutes of scientific societies meetings, internal documents of the organizations, information gathered from websites, monitoring on social networks and in the media, and institutional videos. When conducting the interview analysis, we followed the Gioia Methodology (Gioia, Corley, and Hamilton, 2012).

KEY FINDINGS OR EXPECTED RESULTS

Different trajectories. At the end of the observation period (2016-2020), Spin-off Two was consolidated as a company in the MedTech sector, with a clear upward trajectory and internationalization, while Spin-off One did not achieve its goal of commercializing its technological innovations. Qualitative data analysis points to some key factors that account for the different trajectories of both firms. One main factor was the degree of engagement with the environment and the innovation system. Spin-off One remained limited to the university environment, such as collaboration with other departments for co-author publications, technology transfer offices to find the appropriate transfer mechanism, and attendance at national and international congresses or research stays at other universities. Direct interaction with clinicians only took place in the prototype development stages, so the product was never tested in real environments. However, the relationships maintained with the environment and the local innovation system by Spin-off Two promoters were varied and interdisciplinary, highlighting its participation in an incubator program for start-ups.

Agentic or adaptive organizational role as a strategic response to institutional processes. One of the most interesting findings is the verification of the agentic role of Spin-off Two scientific promoters, even in periods prior to the creation and management of the firm. This agentic role functioned as a strategic response to the institutional pressures of the environment, which translated into developing new standards through the creation of a model for the clinical validation process of medical device software. Its strategic responses were "hybrid," mixing adaptive responses related to compliance with the regulatory processes of the MedTech sector environment (e.g. the lengthy and costly product medical device certification processes), with institutional entrepreneurial responses to cope with the complex institutional environment (e.g. direct involvement in the creation of a European Imaging Biomarkers Alliance within the European Society of Radiology). On the contrary, Spin-off One limited the use of the medical image processing pipeline they developed at the university through a free web page, with the commitment and responsibility of the user to use the offered service as a research prototype and, therefore, without the possibility of clinical use.

Concluding remarks. We expect theoretical and empirical contributions to the KIE process model, and inform policymakers interested in the complex processes leading to knowledge and innovation. Such contributions can help foster and promote entrepreneurship with a high economic, social, and clinical impact.

REFERENCES

Acs, Z. J., & Audretsch, D. B. (2005). Entrepreneurship, innovation and technological change. Foundations and Trends® in Entrepreneurship, 1(4), 149-195.

Battilana, J., Leca, B., & Boxenbaum, E. (2009). 2 how actors change institutions: towards a theory of institutional entrepreneurship. Academy of Management annals, 3(1), 65-107.

DiMaggio, P. (1988). Interest and agency in institutional theory. Institutional patterns and organizations culture and environment, 3-21.

DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. American sociological review, 147-160.

Gioia, D. A., Corley, K. G., & Hamilton, A. L. (2013). Seeking qualitative rigor in inductive research: Notes on the Gioia methodology. Organizational research methods, 16(1), 15-31.

Hardy, C., & Maguire, S. (2017). Institutional entrepreneurship and change in fields. The Sage handbook of organizational institutionalism, 2, 261-280.

Maguire, S., Hardy, C., & Lawrence, T. B. (2004). Institutional entrepreneurship in emerging fields: HIV/AIDS treatment advocacy in Canada. Academy of management journal, 47(5), 657-679.

Malerba, F., & McKelvey, M. (2019). Knowledge-intensive innovative entrepreneurship. Foundations and Trends® in Entrepreneurship, 14(6), 555-681.

Malerba, F., & McKelvey, M. (2020). Knowledge-intensive innovative entrepreneurship integrating Schumpeter, evolutionary economics, and innovation systems. Small Business Economics, 54(2), 503-522.

Meyer, J. W., & Rowan, B. (1977). Institutionalized organizations: Formal structure as myth and ceremony. American journal of sociology, 83(2), 340-363.

Scott, W. R. (2014). Institutions and organizations: Ideas, interests, and identities. Sage publications.

Scott, W. R., Ruef, M., Mendel, P. J., & Caronna, C. A. (2000). Institutional change and healthcare organizations: From professional dominance to managed care. University of Chicago Press.

Yin, R. K. (2009). Case study research: Design and methods (Vol. 5). sage.

Zucker, L. G. (1977). The role of institutionalization in cultural persistence. American sociological review, 726-743.

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

The Impact of Social Innovation Interventions

Esra Aydoğdu[1], Abdullah Gök[2]
1,2 University of Strathclyde, Hunter Centre for Entrepreneurship, Glasgow, UK (esra.aydogdu@strath.ac.uk).

Short Bio

Esra is a fourth-year PhD researcher at the University of Strathclyde and currently in her writing-up stage. She returned to academia after 15 years of professional experience in science and technology policies. Her bachelor's degree is in Mathematics and master's degree is in Science and Technology Policy Studies. She worked as a Scientific Programs Expert for almost 15 years in the Scientific and Technological Research Council of Turkey (TUBITAK), mainly involved the implementation of national and international entrepreneurship programs.

Abstract **– Social innovation (SI) is unique in its mission and is used to tackle grand challenges and is, therefore, funded and supported by varied actors, including governments, multi-national organizations, public institutions, the private sector, and philanthropists, through multiple programmes and policies, especially after the Covid-19 global pandemic. Despite many individual evaluations of interventions, it is still unclear when, for whom, and under what conditions such interventions work. This is because of their complex nature, difficult-to-measure metrics, and long-term visibility of outcomes. Furthermore, SIs are embedded in social systems and therefore influence and are influenced by the institutional environments in which they operate. This research aims to explore the latent mechanisms of SI interventions, and to reveal the contexts and mechanisms that generate outcomes in social innovation interventions. The research employs a realist synthesis methodology, using secondary data from 245 evaluation studies worldwide, including academic papers and public/private programme reports. Our research is started with constructing initial programme theories based on context-mechanism-outcome configurations, which we classified into four categories, namely: institutional settings, capital, actor interactions, and social entrepreneurship. These theories, then tested by available empirical evidence, were synthesized, and refined to help us contribute to SI theory and practice.**

Keywords **– social innovation, realist synthesis, evaluation, policy**

Introduction

Social innovation (SI) is a key concept with its unique mission to address grand challenges. A wide variety of actors including governments, multinational organizations, public institutions, private sector organisations and philanthropists support social innovation through diverse interventions. However, it is still unclear how SI processes differ depending on the context (Tracey and Stott, 2016) and making it difficult to understand what kind of policies might be effective to promote the emergence and growth of SI ideas (Borzaga and Bodini, 2014). This is because of their difficult-to-measure metrics, the long-term visibility of outcomes and the complex nature that occur through the myriad dynamics and relationships between actors.

To address this gap, this study aims to reveal the contexts and mechanisms that generate outcomes in social innovation interventions. The overarching purpose of the paper is to consider: "*What kinds of social innovation interventions are effective for whom and under what conditions in creating social value and contributing to social change?*"

Methodology

To investigate this question, the paper employs a realist synthesis methodology that has emerged as a standard for the contextual synthesis of policy

evidence in the health and social sector. Realist synthesis, also known as realist review, is derived from meta-analysis approaches. It is used to evaluate complex policy interventions and to identify mechanisms that determine whether these interventions succeed or fail in particular contexts (Pawson et al., 2005, Pawson et al., 2004a). The fundamental of the realist approach involves developing theories (Rycroft-Malone et al., 2012) which are assisted by the formal theories and previous research, to propose what might cause change (Goodridge et al., 2015). The purpose of this theory-building step is to create explicit assumptions in order to explain how a programme is supposed to work (Pawson et al., 2004b). Therefore, our research starts with constructing initial programme theories (IPTs) based on context-mechanism-outcome (CMO) configurations, which we classified into four categories, namely: institutional settings, capital, actor interactions, and social entrepreneurship. A total of 12 propositions, three in each category, were developed, but these propositions are not given here due to the word limit.

The dataset we used to test these theories consists of 245 publicly available evaluation studies that provide evidence, including academic articles and public/private programme reports from 70+ countries. An inclusion criterion was applied to ensure reliability and NVivo software was used to extract and analyse the content. The analysis was done by interpreting the evidence qualitatively based on the constructed programme theories.

Findings

The findings confirm the interconnection between formal and informal institutions and that both processes and outcomes of SI interventions are strongly influenced by and influence institutional settings in which they take place. Above all, policy interventions targeting social issues need to be integrated with other policies, based on the embeddedness of social problems and convergence in implementation processes. Soete et al. (2010) discuss such system failures in institutional settings and call for complementary policies to address these. They proposed the inclusion of all-important components such as education policy and regional policy when building innovation systems policies. Our results also suggest that SI is an effective way of overcoming institutional voids (Agostini et al., 2016) or strengthening institutional settings in emerging economies (Rao-Nicholson et al., 2017). However, such actions, triggered by institutional gaps, still need cooperation with the government to institutionalize their practice and have a legal identity, particularly in emerging contexts.

Regarding the role of capital, we followed previous studies and suggested that "funding alone will not produce system change" (Antadze and Westley, 2010, p.343). Indeed, human and social capital have been found as limiting factors for the success of financial incentives. Social capital is equally important as financial capital for new (and socially innovative) ventures because, they need to build knowledge and trust among potential stakeholders such as users, suppliers and volunteers (Murray et al., 2010). However, social interactions do not necessarily produce positive results, they can also have negative effects (Arrow, 2000). As confirmed by our data, some efforts have resulted in negative consequences such as confusion and distrust of beneficiaries. Finally, the effect of innovation policies that address grand challenges and system transformations, need non-traditional interventions including different forms of collaboration between actors from the public and private sectors (Kuhlmann and Rip, 2014). However, social capital has emerged as an obstacle again for developing good relations between actors. Coordination and communication are also found problematic in actor interactions, causing the interventions to overlap, and calling for new ways of 'working together' strategies.

Conclusion

We developed a theory-driven model to understand what works for whom under what circumstances in SI and why interventions produce specific outcomes. Our aim was to address the calls for theory building on SI and to understand how SI practices differ depending on the context (Tracey and Stott, 2016) and how they link to institutional settings (Ometto et al., 2019). Adopting the realist synthesis methodology, we first developed programme theories based on existing knowledge, then we used 245 evaluation studies with cross-country evidence over the 2005-2022 period to test our theories. However, SI interventions are complex and profound in their nature, so we did not aim to explain all dimensions available, but instead, focused on latent mechanisms that could improve our understanding of certain patterns. The main limitation of our research is that the review process cannot be reproducible, but we still believe that the present study can contribute to existing knowledge in two ways, with its theory-driven approach to SI interventions, and towards applying a realistic approach in the field of SI.

REFERENCES

AGOSTINI, M. R., VIEIRA, L. & BOSSLE, M. B. 2016. Social innovation as a process to overcome institutional voids: a multidimensional overview. RAM. Revista de Administração Mackenzie, 17, 72-101.

ANTADZE, N. & WESTLEY, F. 2010. funding social innovation: how do we know what to grow? The Philanthropist, 23.

ARROW, K. J. 2000. Observations on social capital. Social capital: A multifaceted perspective, 6, 3-5.

BORZAGA, C. & BODINI, R. 2014. What to make of social innovation? Towards a framework for policy development. Social Policy and Society, 13, 411-421.

GOODRIDGE, D., WESTHORP, G., ROTTER, T., DOBSON, R. & BATH, B. 2015. Lean and leadership practices: development of an initial realist program theory. BMC health services research, 15, 1-15.

KUHLMANN, S. & RIP, A. 2014. The challenge of addressing Grand Challenges. Report to the European Research and Innovation Area Board.

MURRAY, R., CAULIER-GRICE, J. & MULGAN, G. 2010. The open book of social innovation, Nesta London.

PAWSON, R., GREENHALGH, T., HARVEY, G. & WALSHE, K. 2004a. Realist synthesis: an introduction. ESRC Res Methods Program, 2.

PAWSON, R., GREENHALGH, T., HARVEY, G. & WALSHE, K. 2004b. Realist synthesis: an introduction. Manchester: ESRC Research Methods Programme, University of Manchester, 1-55.

PAWSON, R., GREENHALGH, T., HARVEY, G. & WALSHE, K. 2005. Realist review - A new method of systematic review designed for complex policy interventions. Journal of Health Services Research and Policy, 10, 21-34.

RAO-NICHOLSON, R., VORLEY, T. & KHAN, Z. 2017. Social innovation in emerging economies: A national systems of innovation based approach. Technological Forecasting and Social Change, 121, 228-237.

RYCROFT-MALONE, J., MCCORMACK, B., HUTCHINSON, A. M., DECORBY, K., BUCKNALL, T. K., KENT, B., SCHULTZ, A., SNELGROVE-CLARKE, E., STETLER, C. B., TITLER, M., WALLIN, L. & WILSON, V. 2012. Realist synthesis: illustrating the method for implementation research. Implementation Science, 7, 10.

SOETE, L., VERSPAGEN, B. & TER WEEL, B. 2010. Systems of innovation. Handbook of the Economics of Innovation. Elsevier.

TRACEY, P. & STOTT, N. 2016. Social innovation: A window on alternative ways of organizing and innovating. Innovation: Organization & Management, 19 (1), 51-60.

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Experimenting with multi-actor governance: impacts and challenges for local transitions

Felipe Quintão
(University Institute of Lisbon, Center for International Studies, Lisbon, Portugal (frquintao@gmail.com).

Short Bio

I have a Bachelor's degree and a Master's degree in Management from the Federal University of Santa Catarina (UFSC), Beazil. I am currently a PhD Candidate in Political Science at the University Institute of Lisbon, Portugal and a PhD Fellow in the action research project EuroREGEN - Transnational networks for regenerative development in Europe, a comparative perspective on grassroots mobilization and influence in political processes.

Experimenting with multi-actor governance: impacts and challenges for local transitions

Keywords **– Power and Politics; Governance; Empowerment; Experience; Public Problems Sociology.**

The Transition movement is a well-studied social movement grounded in the economic imaginary of degrowth (Longhurst et al., 2017), which started with a local initiative in 2005 in Totnes, UK. Since then, it has spread to over 48 countries, with thousands of groups organised in different contexts, such as towns, villages, cities, universities, and schools. The first initiatives soon created a charity in the UK called Transition Network which aims to support the movement. In 2017, the Hubs group, the deliberative instance that gathers the national/regional Hubs of the movement, launched in partnership with Transition Network the Municipalities in Transition (MiT) project, looking to explore how municipalities and civil society could work better together by codesigning a governance methodology. This methodology was tested within the project between 2018 and 2020 and constituted five pilot experiences in European countries (Macedo, 2019).

This paper aims to understand how these governance experiences contributed to (dis)empowering (Avelino et al., 2019) grassroots initiatives to promote local transitions. Some questions to guide the research are: 1) How has the experiment with the governance instrument reflected in the initiatives' ability to influence public policy at the local level?; 2) How was the relationship between actors involved in these interactions actually governed in different localities? 3) How do the different actors participating in these interactions assess their results and contributions to transitions? Data will be collected in the five European pilot cases of the MiT project. The research will rely on document analysis, analysis of the websites and other online material related to the participants of the partnerships or about the partnerships themselves, and semi-structured interviews with different actors involved in the processes in each case.

This research aims to address the epistemic bias towards power and empowerment as a strategic and instrumental action based on action-theoretical and resource mobilisation paradigms (Raj et al., 2022). To do so, this paper will bring a pragmatist perspective by applying analytical concepts from the Public Problems Sociology (Cefaï, 2011, 2013, 2017, 2021; Eliasoph & Cefaï, 2021) which counterpoints the notion of public policy in its rational and normative sense and offers a new epistemic perspective to understand the governance of public action, based on the actors experiences (Andion & Magalhães, 2021). The pragmatist approach also contemplates the conference theme

due to the centrality of actors reflexivity in the process of inquiry that they follow to identify and find solutions for public problems (Dewey, 1927, 1938).

References

Andion, C., & Magalhães, T. (2021). (Re)aproximando os pragmatismos da análise das políticas públicas. Experimentação e investigação pública em um cenário de crise democrática. Sociedade e Estado, 36(2), 513–543. https://doi.org/10.1590/s0102-6992-202136020007

Avelino, F., Wittmayer, J. M., Pel, B., Weaver, P., Dumitru, A., Haxeltine, A., Kemp, R., Jørgensen, M. S., Bauler, T., Ruijsink, S., & O'Riordan, T. (2019). Transformative social innovation and (dis)empowerment. Technological Forecasting and Social Change, 145, 195–206. https://doi.org/10.1016/j.techfore.2017.05.002

Cefaï, D. (2011). Arenas públicas—Por uma etnografia da vida associativa.

Cefaï, D. (2013). L'expérience des publics: Institution et réflexivité.

Cefaï, D. (2017). PÚBLICOS, PROBLEMAS PÚBLICOS, ARENAS PÚBLICAS…. SÃO PAULO, 28.

Cefaï, D. (2021). Ecologies of institutions. In Pragmatic inquiry: Critical concepts for social sciences (pp. 35–52). Routledge.

Dewey, J. (1927). The public and its problems.

Dewey, J. (1938). Logic. The Theory Of Inquiry. 550.

Eliasoph, N., & Cefaï, D. (2021). Bringing the Civic Landscape into Being: How Varied Patterns of Civic Action Respond to and Create Dilemmas in Empowerment Projects. International Journal of Politics, Culture, and Society, 34(2), 217–235. https://doi.org/10.1007/s10767-020-09380-6

Longhurst, N., Avelino, F., Wittmayer, J., Weaver, P., Dumitru, A., Hielscher, S., Cipolla, C., Afonso, R., Kunze, I., & Elle, M. (2017). Experimenting with alternative economies: Four emergent counter-narratives of urban economic development. Current Opinion in Environmental Sustainability, 22, 69–74. https://doi.org/10.1016/j.cosust.2017.04.006

Macedo, P. (2019). Municipalities in Transition: Deep collaboration between community-based initiatives and local governments (Research Report #2; p. 77). Centre for Ecology, Evolution and Environmental Changes, Faculdade de Ciências, Universidade de Lisboa. https://doi.org/10.5281/zenodo.3635471

Raj, G., Feola, G., Hajer, M., & Runhaar, H. (2022). Power and empowerment of grassroots innovations for sustainability transitions: A review. Environmental Innovation and Societal Transitions, 43, 375–392. https://doi.org/10.1016/j.eist.2022.04.009

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

The trickle down from environmental innovation to productive complexity

Francesco de Cunzo[1], Alberto Petri[2], Angelica Sbardella[3], and Andrea Zaccaria[2]
[1] *University of Siena, Department of Economics and Statistics, Siena, Italy*
[2]*University Sapienza, CNR - Institute for Complex Systems, Rome, Italy*
[3]*Enrico Fermi Research Center, Rome, Italy*

In this paper we propose a novel application of statistically validated networks that allows us to explore how green innovation in specific patent classes affects the production and export of individual products, also taking into account possible time lags. Our goal is to investigate the trickle down from single green technological innovations, as proxied by patenting activity in climate change adaptation and mitigation technologies (CCMTs), to industrial production at the level of single products, as proxied by export data. More in detail, we focus on the following questions: does the patenting of green technologies have an effect on the production and export of individual products? If so, which green tech- nologies and products are mostly affected? Additionally, we analyse whether increasing the time lag that occurs between the patenting of green technologies and the export of products changes this relationship.

Our analysis can offer a valuable perspective in understanding how economies can move towards a sustainable transition, which is increasingly necessary and at the centre of public debate. Several works focus on the topic: the goal is to contain and mitigate the nega- tive effects of climate change, such as greenhouse gas emissions (GHG). Moreover, there is a broad consensus among academics and policymakers that accelerating the develop- ment of new, far-reaching green technologies and promoting their global application are crucial steps, albeit not the only ones, towards containing and preventing GHG emissions and implementing the sustainability transition (OECD, 2011; Stern, 2006). However, it is important to be aware that the implementation of green technologies can indeed provide effective tools to tackle the climate crisis, but it will be the more effective the more it will be accompanied by a project of radical transformation of current production and develop- ment models (EC, 2019).

These are complex and multi-faceted phenomena. To address them, we devise an em- pirical strategy built on the recent literature on Economic Complexity (EC) (Tacchella et al., 2012; Hidalgo and Hausmann, 2009). By borrowing elements from the evolutionary (Nelson and Winter, 1982; Dosi and Nelson, 1994) and structural traditions in economics, EC interprets economic systems as complex and dynamic systems and proposes an inter- pretation of the growth and development potential of countries that goes beyond mere aggregate measures of productive inputs. In particular, in recent years the literature on EC has allowed to connect in a systematic and easily reproducible manner different dimen- sions of economic activities with very high resolution, building over the years a corpus of research that provides an integrated framework for economic analysis and forecasting that makes use of the Economic Fitness metric, a measure of complexity of geographical ar- eas which has proved highly successful in forecasting national economic growth (Tacchella et al., 2018), as well as the Product Progression Network (Zaccaria et al., 2014), multi-layer and random network methodologies (Pugliese et al., 2019; Saracco et al., 2017), that allow to dynamically trace the most profitable trajectories for entering into a new production lines or technological fields on the basis of pre-existing endowment of capabilities.

Using these methodologies with the aim of assessing how green patenting activity influ- ences productive sectors, we build a bipartite network linking environmental technologies to product belonging to different sectors. Our assumption is that whenever a green technol- ogy is linked to a product in the network they are sharing similar underlying technological and productive

capabilities needed to be competitive in both. As mentioned at the begin- ning of this document, we use data on patent applications in green technology domains as a proxy for environmental innovation and data on exported products as a proxy for industrial production: the different levels of aggregation with which these data can be processed provide a highly detailed view of which industrial sectors seem to benefit most from environmental technological development. Furthermore, the analysis is conducted over a temporal dimension, so that it is possible to see how the network evolves over time: more in detail, we are able to assess the evolution of the green technology-product network by taking into account a 10-year time lag between the adoption of green technologies and the export of products.

In particular, our results show that among the most linked industrial sectors are those related to the processing of raw materials, such as minerals, metals and chemicals, which we know to be crucial for the development of clean energy innovations (European Com- mission, 2020; Hund et al., 2020). Materials like lithium, cobalt, indium, nickel, and so on are necessary inputs for several green technologies: in fact, they are particularly relevant for technologies related to renewable energy sources and to the electrical mobility sector. An emerging literature on the topic is trying to estimate the mineral intensity of green technologies and to forecast how their spread will shape the mineral demand in the years to come (Hund et al., 2020; International Energy Agency (IEA), 2021; Herrington, 2021; Valero et al., 2018). Any future scenario outlined by countries and international organisa- tions to deal with the climate and environmental crisis must take into account the extent to which the shift to a cleaner energy system and green technologies adoption could impact mineral demand.

Another important result of this analysis is that increasing the time lag between green technology adoptions and product exports to 10 years increases their level of complexity, i.e. the skills and expertise needed to achieve a successful green technology adoption or product export. This suggests that more complex technological know-how requires more time to be transmitted to the productive sectors.

The results that emerge from our analysis are particularly relevant for a number of reasons. First of all, being able to go into such detail in assessing the implications that emerge from the adoption of green technologies, not only evaluating their collective impact on industrial production, but discussing individual product exports with individual tech- nology domains on a case-by-case basis, has very strong policy implications. For example, such an analysis could provide support for the industrial policies of a given country, even in the long term, by looking at the patent portfolio in which it is currently competitive. In addition, possible contributions could be made to the classification of environmental products: some products could be linked to green technologies because of the low environ- mental impact of their production processes.

A possible future development of the analysis that we believe might be of interest is to take in consideration time intervals of more years than those considered in our dataset. This in turn would allow us to increase the time lag of we consider even beyond 10 years. Finally, we believe another important aspect would be to extend the layers of activities, and consequently the type of data, taken into account in the analysis: for example, by including also data on employment and wages at a sector level, or on scientific productivity we could broaden our understanding of how the production and technological structure of a region can make the transition to new green sectors.

REFERENCES

Dosi, G. and Nelson, R. R. (1994), 'An introduction to evolutionary theories in economics', Journal of Evolutionary Economics 4(3), 153–172.

EC (2019), 'Towards a sustainable europe by 2030', Reflection paper, European Commission

European Commission (2020), Critical raw materials resilience: Charting a path towards greater security and sustainability, Technical report, European Commission, Brussels.

Herrington, R. (2021), 'Mining our green future', Nature Reviews Materials 6(6), 456–458. Hidalgo, C. A. and Hausmann, R. (2009), 'The building blocks of economic complexity',

Proceedings of the National Academy of Sciences 106(26), 10570–10575.

Hund, K., La Porta, D., Fabregas, T., Laing, T. and Drexhage, J. (2020), Minerals for climate action: The mineral intensity of the clean energy transition, Technical report, The World Bank Group, 1818 H Street NW Washington, DC 20433, USA.

International Energy Agency (IEA) (2021), The role of critical minerals in clean energy transitions, Technical report, International Energy Agency, Paris.

Nelson, R. R. and Winter, S. G. (1982), An evolutionary theory of economic change, Cambridge (MA): Harvard University Press.

OECD (2011), 'Towards green growth: A summary for policy makers', OECD Publishing .

Pugliese, E., Cimini, G., Patelli, A., Zaccaria, A., Pietronero, L. and Gabrielli, A. (2019), 'Unfolding the innovation system for the development of countries: coevolution of science, technology and production', Scientific reports 9(1), 1–12.

Saracco, F., Straka, M. J., Di Clemente, R., Gabrielli, A., Caldarelli, G. and Squartini, T. (2017), 'Inferring monopartite projections of bipartite networks: an entropy-based

approach', New Journal of Physics 19(5), 053022.
Stern, N. (2006), 'Stern review: the economics of climate change'.
Tacchella, A., Cristelli, M., Caldarelli, G., Gabrielli, A. and Pietronero, L. (2012), 'A new metrics for countries' fitness and products' complexity', Scientific Reports 723, 1–7.
Tacchella, A., Mazzilli, D. and Pietronero, L. (2018), 'A dynamical systems approach to gross domestic product forecasting', Nature Physics 14(8), 861–865.
Valero, A., Valero, A., Calvo, G. and Ortego, A. (2018), 'Material bottlenecks in the future development of green technologies', Renewable and Sustainable Energy Reviews 93, 178–200.
Zaccaria, A., Cristelli, M., Tacchella, A. and Pietronero, L. (2014), 'How the taxonomy of products drives the economic development of countries', PloS one 9(12), e113770.

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

HOW TECHNOLOGY DEVELOPMENT IN WESTERN COUNTRIES RELATES TO CONFLICTS IN AFRICA

Lupi Giacomo Roberto
Università degli Studi di Ferrara, Italy (lpugmr@unife.it).

Short Bio

Lupi Giacomo Roberto (1995) is a PhD candidate at the University of Ferrara in Environmental Sustainability and Wellbeing. He has a Master Degree in Economics, Finance and International Integration at the University of Pavia and a Bachelor in Finance at the University of Bologna.
His current research is about Green technologies, complementarities, and economic development.

Abstract – The aim of the research project is to investigate whether the change in the demand for minerals in Western Countries explains violence that have occurred on the African continent during the period 1997-2020, close to the source of the minerals.
A main research value added rests in proxying mineral demand by looking at the development in technology exploiting the minerals. New technologies use patents to protect their innovations from competition, which therefore drive the demand for mining activity.
Using patents development to study the demand for mineral can solve the problem of endogeneity and reverse causality that can occur when studying the relation between mines and conflicts in developing countries.

Keywords *– Patent, Minerals, Conflicts, Africa, Technology*

Main objectives of research

The rapid deployment of clean energy technologies as a key part of the energy transition implies a considerable increase in the demand for minerals. To make practical examples, if a normal car needs almost 33kg of copper and manganese, an electric car also needs lithium, nickel, cobalt and graphite, for a total amount of almost 210kg of minerals (IEA, 2022). Solar panels, whose diffusion is still increasing, needs 6.770 kg/MV of copper and silicon; offshore winds need almost 15.400 kg/MV of copper, nickel, manganese, chromium, molybdenum, zinc and rare earths (IEA, 2022).

The increase in the use of these technologies worldwide leads to an increase in the demand for these minerals and a decrease in other minerals used for technologies progressively less used. Moreover, as the technologies needed to produce green energy improve very quickly, this causes a further variation in the demand for various minerals that are needed to make them work.
These minerals are extracted from mines, that tend to be clustered in some part of the world, and Africa represents an important world supplier. Unfortunately, mines are found to produce both positive but above all negative externalities on the local population. They imply pollution and destruction of land and rivers, with the consequent inability for people to breed animals, cultivate lands and drink clean water. This leads to increased poverty conditions, higher social inequalities, child labour and migration. In turn these factors are at the base of conflict generation and exacerbation.
The literature distinguishes two main types of conflicts. The first concerns riots, protests and conflicts between rival ethnic groups competing for the same territory and for the same lands to be exploited for basic resources. Berman et al. (2017) showed that both ethnic differences and religious fractionalization or polarization are highly correlated with mine-related migrations. The second concerns violence against civilians by armed groups, sometimes supported by governments or international companies, which take possession of

the mines to appropriate wealth and in turn further expand the conflict, making it grow from local to national and even international scale. Appropriation of mines so becomes a key driver of violence and the increase in the price of mineral between 1997 and 2010 explains up to one-fourth of the average level of violence across African countries over the period (Berman et al., 2017).
Starting from these premises this work aims at contributing to shed light on the relationship between mines and conflicts. Specifically, its purpose is to investigate how the development of (green) technologies drives minerals extraction and in turn fuels conflicts in Sub Saharan Africa.

Research Question

The aim of my research is to quantify the impact of minerals extraction on conflicts through the rise in technology development, that we capture with patents, especially those related to the green transition. New green technologies use patents to protect their innovations from competition, which therefore become an innovative tool in the study of the mining world's demand.
The research combines georeferenced data on minerals extraction with information on conflict events at spatial resolution of 0.5° × 0.5° (roughly 55km × 55km at the Equator) for African countries between 1997 and 2020. This time frame allows to consider the end of blood diamonds plagues, the commodity super-cycle of the early 2000s and the intensification of the use of green technologies happened in the last decades.

Methodology

The empirical part of this project is inspired by the baseline equation posted in Berman et al., 2017 More specifically I aim at estimating the following model:

$$CONFLICT_{kt} = \alpha_1 M_{kt} + \alpha_2 lnp_{kt}^{W} + \alpha_3 (M_{kt} * lnp_{kt}^{W}) + FE_k + FE_{it} + \varepsilon_{kt}$$

Where:

- $\boldsymbol{k, t, i}$ are respectively cell, time, country.
- $\boldsymbol{CONFLICT_{kt}}$ is a dummy for the presence of conflict in cell k at time t
- $\boldsymbol{p_{kt}}$ is the number of patents related to the main mineral extracted in the cell k mine at time t
- $\boldsymbol{M_{kt}}$ is a dummy for the presence of active mine in cell k at time t
- $\boldsymbol{FE_k}$ is cell fixed effect
- $\boldsymbol{FE_{it}}$ is country-year fixed effect

While for Berman et al., 2017 $\boldsymbol{p_{kt}}$ is the world price of the main mineral extracted in the cell k mine at time t, in my project $\boldsymbol{p}$ becomes the number of patents, therefore of technologies, exploiting the use of the main mineral extracted from the mine(s) in the cell. Technologies will be associated to minerals by means of text-based analysis in patents abstract. The coefficient of interest would be α_3, which captures the impact by an exogenous increase in the number of patents that uses a certain mineral in the cells where that mineral is produced, on local violence.
In Berman et al., 2017 the use of mineral prices as an exogenous independent variable creates three major problems in econometric estimation.
First of all, there may be endogeneity among the covariates, since a large mine site could affect prices worldwide. Second, there is a problem of reverse causality between the outbreak of a war and the consequent opening/closing of a mine and third there is a problem of reverse causality between the outbreak of a war and the rising prices of interested minerals.
Two out of these three problems would be scaled down using patents as covariate. If it is plausible to think that the outbreak of a war for non-mining reasons could lead to a change in the price of minerals (as it is happening with Russian diamonds at the moment), it is more difficult to accept that the outbreak of war in a given African country can change technological progress worldwide. Obviously, the model need to be tested with sensitive analysis to control for the robustness of itself, in particular for what concern the reverse causality between conflicts and mines.
The strength tests, specifically, could be the following:

- Change the definition of "mining activity", for example by eliminating mines which open and close during the period or by lagging values during the time spam.
- Change the grid size or focus just on a specific part of it.
- Change the definition of "conflicts", which can be divided into sub-categories in terms of intensity, onset and ending.
- Improve the baseline model with a triple interaction between the main explanatory variable and indices of inequality and diversity, good governance, country characteristics.

Finally, I would like to test the model results for different types of inventions, such as green versus non-green type of technologies, or mineral-increasing versus mineral-reducing technologies.

Expected Results

The objective of the research project is to investigate whether the change in the demand for minerals, driven by innovation, explains part of the violence that have occurred on the African continent

from 1997 to 2020. Previous research in the same area has shown that the presence of natural resources increases rebellion feasibility, boosts the potential for rent-seeking, favours weak state capacity and extractive institutions, exacerbates grievances and drives down the opportunity cost of rebel recruitment by making production more capital-intensive (Berman et al., 2017). The aim of this project is that of questioning the role of technological development, and potentially the role of different types of technological generation (green versus non-green, mineral-increasing versus mineral-reducing technologies).
Demand for lithium reduced the education rates individuals living in cobalt rich regions of the Democratic Republic of Congo (Malpede, 2021) and where mineral activity is present women exhibit higher fertility rates (Malpede, 2022).
My project refers to this broader field of research on the consequences that (Western) mining demands has on local socio-economic conditions, by looking at how (green) innovation shape this relationship.

References

- Berman, N., Couttenier, M., Rohner, D., & Thoenig, M. (2017). This Mine is Mine! How Minerals Fuel Conflicts in Africa. American Economic Review, 107(6), 1564-1610. https://doi.org/10.1257/aer.20150774
- IEA 2022 - International Energy Agency – "The Role of Critical World Energy Outlook Special Report Minerals in Clean Energy Transition" – 03/2022. https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions
- Malpede, Maurizio, The Dark Side of Batteries: Education and Cobalt Mining in the Democratic Republic of the Congo (April 16, 2021). Available at SSRN: https://ssrn.com/abstract=3680730 OR http://dx.doi.org/10.2139/ssrn.3680730
- Malpede, Maurizio, Lithium-ion Batteries and Fertility in Africa (January 29, 2022). Available at SSRN: https://ssrn.com/abstract=3841523 OR http://dx.doi.org/10.2139/ssrn.3841523

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Indicator Design for Innovation for Sustainability – The Case of Smart Specialization Policy

Ghinwa Moujaes
INGENIO (CSIC – Universitat Politècnica de València), Valencia, Spain (gmoujae@doctor.upv.es).

Short Bio

Ghinwa Moujaes is a PHD Student at INGENIO, Valencia. She is part of an Innovation Training Network called Policies of Smart Specialization (POLISS), funded by the Marie Skłodowska-Curie grant agreement No 860887. Her research focuses on various approaches to analyze the inclusivity and sustainability of innovation, in order to contribute to the wider discussion on innovation policy.

Abstract **– This paper studies how monitoring indicators should change when designing innovation policies for sustainability in comparison to innovation policies, by focusing on the particular case study of Smart Specialization.**

Keywords **– Sustainable Innovation, Smart Specialization, Innovation Policy**

The world is constantly battling challenges of environmental degradation, global warming, aging societies and pandemics - "Grand Societal Challenges".

Such challenges are globally shared (Tödtling et al., 2021), but may have different local implications. They are complex, multi-sided and interconnected. Their intricacies imply that one partial solution at any given time may result in additional problems later. While these challenges are not new, their persistency and growing urgency have increased awareness amongst European regions that "business as usual" (European Commission 2013, p. 3) is failing and has increased the need for new ways to leverage policy for solutions. One specific example is the academic and policy debate on the role Smart Specialization Policy (RIS3), Europe's biggest innovation policy to date, can play (Tödtling et al., 2021; McCann & Soete, 2020; Foray, 2018). RIS3's experience in utilizing local assets, mobilizing stakeholder involvement and implementing locally specific solutions is particularly beneficial in a policy context on solving challenges with a global reach yet regional consequences. On a wider scope, the idea of integrating sustainability concerns in innovation policy has its basis in multiple streams of academic literature on sustainability transitions, mission-oriented policies, and challenge-oriented innovation policy.

When RIS3 was first developed and implemented, it was intended as an innovation policy encouraging stakeholder involvement and R&D specialization. As it transitions into a policy targeting innovation and sustainability, multiple challenges may arise, most significantly from a policy-maker's perspective. The practitioners involved in the policy process may lack the necessary skills to transition into directing innovation towards sustainability challenges. This paper studies how Smart Specialization Policy can practically achieve this transition by specifically zooming into the topic of policy design. While this is a big and important question, this paper takes a more precise approach by focusing on the role of monitoring indicators. Monitoring is an essential element of every policy in general but has played an important role due to the experimental nature of RIS3. To maximize RIS3 policy learning, a solid monitoring framework which provides evidence-based input for assessments is essential (Foray et al., 2012). While indicators do not represent the entire monitoring process, they are the essential starting point which any further assessment is built upon and thus need to be locally-specific and designed early on in the process.

This paper studies how monitoring indicators should change when designing innovation policies for sustainability in comparison to innovation policies, by focusing on the particular case study of Smart Specialization.
To answer this question, a conceptual and theoretical foundation describes the differences between regional innovation systems and challenge-oriented innovation systems. By doing so, we conceptualize the differences between innovation policy and innovation policy for sustainability. Then, the indicators used in the first phase of Smart Specialization regional policy reports are analysed and summarized. We use these indicators to understand how indicator design was done through the first phase of RIS3 and what, if anything, needs to be corrected as the policy changes its focus. We find that indicator design in RIS3 was focused on capturing basic output indicators of success, and the contribution of the policy to network formations, capabilities upskilling and infrastructural development. While many aspects of this monitoring may have been sufficient from a RIS3 perspective, a lot needs to change as we transition into Smart Specialization for Sustainability. We find that indicators should mature to provide more nuance and directionality into who is benefiting from innovation and how, and who is not benefitting from innovation and why. In addition, indicators should attempt to capture the policy's sustainable direction, and the institutional failures potentially blocking the final result from being achieved. As the literature on innovation for sustainability expands, it is necessary to provide a policy-focus on how policies should adapt accordingly. This paper contributes to that literature. By zooming into the case study of Smart Specialization, a specific context is considered. Nonetheless, findings and conclusions from this study can potentially guide policy makers, in general, focused on the intersection of sustainability and innovation.

References

European Commission (2013). Europe 2020: Europe's Growth Strategy. Brussels: European Commission.

Foray, D., Goddard, J., Beldarrain, X. G., Landabaso, M., McCann, P., Morgan, K., ... & Ortega-Argilés, R. (2012). Guide to research and innovation strategies for smart specialisations.

Foray, D. (2018). Smart specialization strategies as a case of mission-oriented policy—a case study on the emergence of new policy practices. Industrial and Corporate Change, 27(5), 817-832.

McCann, P., & Soete, L. (2020). Place-based innovation for sustainability. Publications Office of the European Union: Luxemburg.

Tödtling, F., Trippl, M., & Desch, V. (2021). New directions for RIS studies and policies in the face of grand societal challenges. European Planning Studies, 1-18.

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Tackling Grand Societal Challenges through alternative governance models of Innovation: A systematic scoping review

Giulia Rossi
Politecnico di Milano, Milan, Italy, giulia.rossi@polimi.it

Giulia is a PhD Candidate affiliated with the TIRESIA Research Centre, focused on the topics of Social Innovation and Social Impact Finance. Giulia holds a degree in Management Engineer at Politecnico di Milano, with a specialization in innovation and entrepreneurship. After an experience in the Social Impact Bank of Unicredit, she worked two years at Impact Hub Milano, certified incubator of social startups. In 2021 she joins Tiresia and began her research project related to the study of how alternative governance arrangements can support the development of impact-driven innovation processes.

Abstract **– Complex problems known as Grand Societal Challenges (GSCs) are affecting the sustainability of our society. In this context, innovation represents a potential solution for its ability to drive positive change by advancing society technologically and maximising positive impacts for people. However, the literature suggests that this can happen if innovation is governed appropriately, that is, innovation and its benefits should be accessible to all groups in society by means of multi-stakeholders, multidisciplinary and multisectoral governance configurations that are collaborative in nature.**
The key issue is whether and how these governance models can handle complex challenges and promote systemic, positive change. These issues are still undertheorized in the literature.
The goal of the research is to explore the potential of collaborative governance models to support innovation processes in tackling GSCs.
This paper is employing a systematic, scoping review method to explore and theorize, through existing literature, collaborative governance models for innovation and their potential in tackling GSCs and promoting systemic improvements.
The expected results will be a comprehension of existing alternative governance models, investigating the roles and characteristics of the key players involved, and the potential and limitations of such models in promoting positive changes for society. This research can be relevant for scholars, as it may extend innovation studies and support cross-fertilization with other fields of research, and for practitioners too, as it may provide guidelines for how innovation can be successfully managed to create a positive impact.

Keywords **– Innovation, Grand Societal Challenges, Governance, Commons**

Innovation has been a driving force in our society in terms of both technological and social advancements over the decades. However, the actual innovation paradigm, based on the belief that innovation always leads to societal advancement, is showing some limitations (Pansera & Fressoli, 2021). In line with this idea, innovation research has mainly focused its attention on the bright side of innovation, falling into what is called: pro-innovation bias (Biggi & Giuliani, 2021). Notwithstanding, it is evident how ungoverned innovation and its related economic growth can result in increasing inequalities and exacerbating

problems (Biggi & Giuliani, 2021; Martin, 2016; Pansera & Fressoli, 2021). It is evident how some of the latest technological innovations have been unevenly distributed, favouring specific groups of people at the expense of others, resulting in increased inequalities and exacerbating problems.

On the other hand, the role of innovation is considered of primary importance to address the most complex and pressing problems of our society. These problems, also known as Grand Societal Challenges (GSCs) are defined as wicked problems due to their complexity, broadness, urgency and systematicity (Mazzucato 2018) and are at the top of policymakers' agenda (Janssen et al. 2021). For their wicked nature, they require multi-stakeholders, multidisciplinary and multisectoral collaborations to be faced (Brammer, Branicki, Linnenluecke & Smith 2019). The features characterizing traditional models of innovation (e.g. profit-oriented goals, top-down processes and based on the assumption of resource abundance) are no longer adequate to address these challenges (Pansera & Fressoli 2020). There is a well-recognized demand for a paradigm change to manage innovation, that is models that can manage innovation and maximize its positive impacts in contexts of resource scarcity, in which multi-stakeholder actions are usually required. More precisely, these models entail completely different management of resources: i.e. different involvement of stakeholders (Grandadam, Cohendet, & Suire, 2021; Haddad, Nakić, Bergek, & Hellsmark, 2022; Mazzucato, 2018), alternative governance models (Janssen et al., 2021), overcoming the dichotomy between public and private sector and local and global (Grandadam et al., 2021), as well as the definition of variables that are able to capture the success of an innovation process (Haddad et al., 2022; Mazzucato, 2018).

The literature suggests that an alternative management approach to resources can be found in the concept of Commons. Commons can be defined as "*shared resources managed by a group of users who design and implement the rules for their provision, allocation, withdrawal, control and monitoring*." (Meyer, 2019). The value of Commons is larger than the sum of the values that they have for the single individual. Although Commons is frequently defined as a fuzzy concept with no consensus around its definition and classification (De Moor, 2011; Peredo, Haugh; Hudon & Meyer, 2020), many scholars underline the strong link between Commons and systemic change as well as the necessity to identify and implement innovative ways to manage the former to ensure a sustainable future (Meyer, 2019; Meyer & Hudon, 2018). Elinor Ostrom(1990) investigated communities that

succeeded in the governance of Commons and defined eight principles guiding sustainable Commons institutions. Through these principles, Elinor Ostrom (1990) highlights the abilities and potentialities of individuals, stating that many different solutions can co-exist and create a rich mixture of private-like and public-like solutions. More precisely, Elinor Ostrom (1990) suggests that also informal institutions can successfully manage Commons, even in the absence of a formal system of private property rights and strong regulatory authority.

Strictly related to the concept of Governing the Commons, there is the emergence of governance models oriented to wicked problems that are changing the attitudes toward the involvement of societal stakeholders in the process of public value creation (Mayne, De Jong, & Fernandez-Monge, 2020). There is a well-recognized need to involve in specific innovation processes other stakeholders to combine necessary resources that often a single stakeholder does not possess on its own (Klijn & Koppenjan, 2015). In these models of experimental governance, network strategies are often adopted to ensure openness to collaboration and participation in decision-making, in contrast with a traditional view of a top-down, government-driven approach to managing common resources (Steen & van Bueren, 2017). In particular, the literature suggests that experimental governance should consider both social and environmental needs present in territories to foster innovation for impact (Jackson, 2019).

However, the key issue is how this governance can handle complex challenges and promote systemic improvement. More precisely, more research is needed to explore the positive, long-term effects of such experimental systems of governance on innovation processes.

The goal of the research is therefore to study alternative governance models able to foster impact-driven innovation processes.

A suitable context to study commons and experimental governance models in innovation processes are the innovation districts, as they are characterized by multi-stakeholders, multi-sectoral collaborations with the ultimate goal of fostering innovation. Considered as a global phenomenon (Yigitcanlar, Adu-McVie, & Erol, 2020), innovation districts are hubs located in urban areas, usually near higher education institutions, often characterized by urban regeneration interventions, where private and public actors work together, create partnerships, exchange resources and knowledge to foster innovation and socio-cultural developments (ibid.). They are places designed in such a way that people

live in them, work in them, and spend their leisure time there.

In other words, different actors, with their own needs and objectives interact with each other in a mutually beneficial way in order to create a common good through tangible and intangible resources.

The paper will be structured as a systematic literature review on governance models that are characterized by multi-stakeholder and multi-sectoral collaborations. The literature review will be performed on the main conceptual building blocks that constitute the research. First, it explores the actual innovation paradigm and its role in developing new solutions able to face Grand Societal Challenges. Second, the literature focuses on existing governance arrangements (e.g. collective governance, experimental governance, etc…) with a particular focus on Commons governance, as an alternative resources management approach to support innovation processes. Finally, given the breadth of the concept, it will be necessary to narrow down and identify a specific realm of theory, i.e. innovation district, in which to investigate existing collective and experimental governance arrangements using the features of Commons as theoretical background.

The research question will be the following:

> RQ: To what extent do existing models of collective governance support innovation processes in generating positive social impact?

The expected outcome is a comprehension of governance models in innovation, outlining the main limitations, challenges and future research directions.

This research is relevant for academics, practitioners and policymakers. For scholars, it extends innovation studies and supports cross-fertilization with other fields of research. For practitioners, it provides guidelines on how innovation can be successfully managed to create a positive impact. Finally, this research can offer some of the possible directions for policymakers in terms of how to design and implement transformative innovation policies. Finally, the contribution of this paper falls mainly under the 3° research topic “approaches for addressing economic and societal challenges” of the conference, although some elements cut across multiple themes.

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Knowledge properties and geography as determinants of the quality of R&D collaborations: the European evidence 2000-2012

Guido Pialli
Affiliation (University of Torino, Italy & Maastricht University, Netherlands, (guido.pialli@unito.it)).

Short Bio

I was born in Cecina (LI), Italy, in 1993. I obtained a master's degree in Economics from the Sant'Anna School of Advanced Studies and the University of Pisa and the PhD in Economics from the University of Turin and Maastricht University. My research interests lie in the broad area of the economics of knowledge and innovation but also include other fields such as economic geography, labour economics and economic history. From March 2023, I will work as a (Post-Doc) Research Fellow at UCL, based at CASA (Centre for Advanced Spatial Analysis).

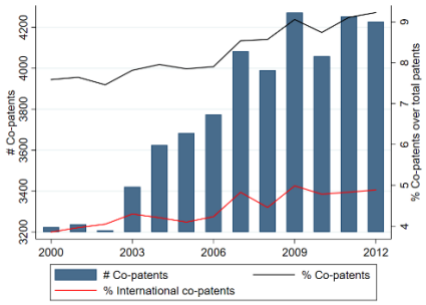
Abstract **– There is much evidence of the increasing role of research cooperation and globalization in the knowledge generation process. This paper aims to assess the determinants of the quality of research collaborations. Using a sample of joint patent applications to the European Patent Office between 2000 and 2012, the results of the empirical analysis show that the limited exhaustibility of knowledge and the geographical distance among research partners are crucial determinants of research quality. Specifically, the past-dependent character of knowledge and cross-border knowledge creation enhance patent quality. Furthermore, these findings are robust to several specifications and after accounting for endogeneity issues.**

Keywords **– Knowledge Limited Transferability; Cross-Border Collaborations; Patent Quality; Patent Co-ownership**

Introduction

Several studies documented that the production of new technological knowledge requires a growing quantity of researchers, knowledge stock and human capital, implying that "ideas are getting harder to find" (Bloom et al., 2020; Jones, 2009). For these reasons, firms may search for alternative strategies, such as looking for external knowledge beyond internal and local knowledge pools. Indeed, recent empirical evidence shows that international technological collaborations have increased (Dachs and Pyka, 2010; Briggs, 2015; Danguy, 2017). Figure 1 shows the steady increase of co-owned patents at the EPO for a selected group of European countries.

Figure 1: Co-patents evolution



This paper investigates the hypothesis that the geographical variety of knowledge interactions and the non-exhaustible and past-dependent character of knowledge play a substantial role in improving innovation process efficiency. Specifically, I test whether the number of researchers, previous

technological knowledge and cross-border collaborations enhance the quality of knowledge output, measured by the number of forward citations received by patents.

Analysing a sample of co-owned patents, I find that cross-border technological collaborations are conducive to patents of better quality. I measure cross-border collaborations in several ways. The first set of results indicates that patent quality increases with the number of inventors and applicants from different countries. Then, I show that the geographical distance among the co-applicants positively affects patent quality. Finally, I hypothesize that a U-shaped relationship characterizes patent quality and distance among co-patenting firms. Firms located close to each other benefit from advantages linked to proximity. Instead, when distance increases, but under a certain threshold, firms' collaborations may produce lock-in effects in knowledge value because of the adverse effects of competition in the same product markets and the overlapping of reciprocal knowledge domains. On the other hand, sharing property rights increases the quality of the innovative output when cooperation is among firms in different countries, mainly when they are very far from each other. Indeed, cross-border knowledge creation enables us to combine different knowledge bases that nurture the recombinant generation of new technological knowledge.

Interpretative framework

The theoretical argument of the paper is that the generation of new technological knowledge is a cumulative and recombinant process of internal knowledge accumulated by firms in the past and knowledge external to it (Weitzman, 1996, 1998). Limited transferability characterizes knowledge as an economic good since firms must incur substantial absorption costs to scan, select and integrate external knowledge (Cohen and Levinthal, 1990). Research collaborations proxied by patent co-ownership reduce absorption costs in obtaining external knowledge possessed by other firms and help enhance the recombination of distinct varieties of knowledge with the ultimate effect of improving the quality of the knowledge output.

The relationship between patent co-ownership and the characteristics of innovative output has received minor consideration from the existing literature. The first stage of this sparse literature has interpreted joint ownership as a second-best option or an outcome of informal and unintentional research collaborations (Hagedoorn, 2003). On the contrary, recent empirical evidence has documented an increase in the share of co-owned patents over the number of total patents and a positive effect of co-ownership on the quality of the research output and several measures of firms' performance (Belderbos et al., 2014; Briggs, 2015). These results have enabled us to acknowledge co-patents as formal and structured knowledge interactions to enhance the quality of innovative output.

The existing literature has devoted much attention to exploring the role of technological proximity in implementing research cooperation (Boschma, 2005) and little attention to analysing the effects exerted by the geographical proximity of co-applicants on the quality of a patent. However, the new mechanisms of generation and exploitation of knowledge associated with the augmented levels of global competition and interactions have undermined the prerequisite of geographical proximity to local sources of knowledge externalities to acquire external knowledge. As a result, firms have expanded their boundaries of external knowledge acquisition even beyond national ones to widen the recombination of heterogeneous varieties of knowledge (Berchicci, De Jong and Freel, 2016; Giuliani, Martinelli and Rabellotti, 2016; Kerr and Kerr, 2018). Therefore, cross-border collaborations help the firm bring together diverse knowledge bundles that increase the efficiency and the quality of the knowledge output. These theoretical results complement the findings in economic geography that knowledge variety is a strong driver of economic growth through Jacobs' increasing returns (Frenken, Van Oort and Verburg, 2007; Quatraro, 2010).

Empirical analysis and results

The empirical analysis is based on a sample of 44037 co-patent applications to the EPO (European Patent Office) for a subset of European countries along the years 2000-2012. I estimate the following model with count data estimators (PPML):

$$cit3_i = \exp(\alpha + InternalKnowledge_i' \beta_1 + ExternalKnowledge_i' \beta_2 + DistantCollaborations_i' \beta_3 + e_i)$$

where *cit3* is the number of forward citations received by each patent within 3 years from the application date. The vectors *InternalKnowledge* and *ExternalKnowledge* include team size,

backward citations, non-patent literature, applicants' knowledge stock, applicants' country openness and human capital. *DistantCollaborations* are proxied by the (geographical) distance between applicants and the number of applicants' and inventors' countries represented. Country, year and technological class fixed effects are included.

Table 1: Main regression results

	(1)	(2)	(3)	(4)
No. Inv Countries	0.131***	0.170***	0.144***	0.130***
	(0.0256)	(0.0240)	(0.0245)	(0.0249)
No. App Countries	0.240***			
	(0.0379)			
GeoDist		0.0175***	-0.0488***	
		(0.00382)	(0.0117)	
GeoDistSq			0.00796***	
			(0.00136)	
MultiCountry				0.100**
				(0.0165)
MultiRegion				-0.109***
				(0.0252)

Notes: Poisson pseudo-maximum likelihood estimation with robust standard errors (in parenthesis). Controls and country, year, technological class fixed effects included in all the models.

The econometric model shows that past levels of technological knowledge and cross-border collaborations improve patent quality, measured in terms of forward citations received. Moreover, the empirical analysis reveals a U-shaped relationship between the geographical distance among co-applicants and patent quality. The results are robust to selected robustness checks. First, there may be issues in accurately defining the applicants' location. Especially in the case of multinational firms, a patent may be co-applied by the focal firm and one of its subsidiaries. For these reasons, I drop from the sample all the patents owned by the applicants in the top 25% of the patent distribution each year. Second, to check whether the applicant's location bias is relevant to my results, I limit the sample to patents owned by two applicants in which the multi-country ownership and the multi-country inventorship coincide. Third, the results are robust to the U-shaped test of Lind and Mehlun (2010), to using alternative time windows for forward citations (life and 5-years window), excluding self-citations and different measures of patent quality (claims, family size and originality). Finally, I implement an IV analysis in which I instrument the geographical distance among applicants and the multi-country collaboration dummies with a dummy variable that takes value one if one applicant is registered in a country that has a corporate income tax rate below the 25th percentile of the distribution of corporate income tax rate. The choice of this instrument is motivated by referring to a strand of literature showing that countries with low corporate income tax rates or preferential fiscal regimes may attract more investment in R&D (Lokshin and Mohnen, 2012; Mohnen, Vankan and Verspagen, 2017). The instrumental variable analysis confirm the previous findings.

References

Belderbos, R., Cassiman, B., Faems, D., Leten, B., Van Looy, B. (2014). Co-ownership of intellectual property: Exploring the value-appropriation and value-creation implications of co-patenting with different partners. *Research Policy*, *43*(5), 841–852.

Berchicci, L., de Jong, J. P., Freel, M. (2016). Remote collaboration and innovative performance: The moderating role of R&D intensity. *Industrial and Corporate Change*, *25*(3), 429-446.

Bloom, N., Jones, C. I., Van Reenen, J., Webb, M. (2020). Are ideas getting harder to find? *American Economic Review*, *110*(4),1104–44.

Boschma, R. (2005). Proximity and innovation: A critical assessment. *Regional Studies*, *39*(1), 61–74.

Briggs, K. (2015). Co-owner relationships conducive to high quality joint patents. *Research Policy*, *44*(8), 1566–1573.

Cohen, W. M., Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, *35*(1), 128.

Dachs, B., Pyka, A. (2010). What drives the internationalisation of innovation? Evidence from European patent data. *Economics of Innovation and New Technology*, *19*(1), 71-86.

Danguy, J. (2017). Globalization of innovation production: A patent-based industry analysis. *Science and Public Policy*, *44*(1), 75-94.

Frenken, K., Van Oort, F., Verburg, T. (2007). Related variety, unrelated variety and regional economic growth. *Regional Studies*, *41*(5), 685–697.

Giuliani, E., Martinelli, A., Rabellotti, R. (2016). Is co-invention expediting technological catch up? A study of collaboration between emerging country firms and EU inventors. *World Development*, 77, 192-205.

Jones, B. F. (2009). The burden of knowledge and the "death of the renaissance man": Is innovation getting harder? *The Review of Economic Studies*, *76*(1), 283–317.

Kerr, S. P., Kerr, W. R. (2018). Global collaborative patents. *The Economic Journal*, *128*(612), F235-F272.

Lind, J. T., Mehlum, H. (2010). With or without U? The appropriate test for a U-shaped relationship. *Oxford Bulletin of Economics and Statistics*, *72*(1), 109-118.

Lokshin, B., Mohnen, P. (2012). How effective are level-based R&D tax credits? Evidence from the Netherlands. *Applied Economics*, *44*(12), 1527-1538.

Mohnen, P., Vankan, A., Verspagen, B. (2017). Evaluating the innovation box tax policy instrument in the Netherlands, 2007–13. *Oxford Review of Economic Policy*, *33*(1), 141-156.

Quatraro, F. (2010). Knowledge coherence, variety and economic growth: Manufacturing evidence from Italian regions. *Research Policy*, *39*(10), 1289-1302.

Weitzman, M. L. (1996). Hybridizing growth theory. *The American Economic Review*, *86*(2), 207–212.

Weitzman, M. L. (1998). Recombinant growth. *The Quarterly Journal of Economics*, *113*(2), 331–360.

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Working Title:
Identifying characteristics of private-public collaborations for age-friendly housing and community development: an explorative case study

Hannah Rønhovde
PhD Candidate Responsible Innovation and Regional Development
Center for Care Research/ Norway University of Applied Sciences
Alrek Health Cluster: Årstadveien 17, 5009 Bergen, Norway
+41013948
Hannah.ronhovde@hvl.no

Short Bio

Ph.D. program: Responsible innovation and regional development and research topic are age-friendly communities, aging, collaboration, collaborative planning, and public-private collaboration in the advancement of age-friendly communities. Background, B.SC. Industrial and organizational psychology, M.Phil., System Dynamics.

Abstract **– Through an explorative qualitative approach, the article seeks to identify characteristics of public-private collaboration processes to spur the development of more age-friendly communities. The overall objective is to highlight characteristics associated with public-private collaborative platforms as sustainable paths for public-sector innovation using the theoretical framework of planning theory and the collaborative approach. Findings point to elements that influence the potential for such collaborative arrangements including the use of established platforms and their inherent institutional design as prevention for collaboration across sectors, cultural dimensions of difference influence the development of collaborative practices, hard infrastructure such as regulatory framework as a clear boundary, and an understanding of the local context for successful collaboration. Findings suggest there is an interest in reinvigorating existing meeting grounds between public and private for knowledge and idea sharing. Interviews suggest that an earlier, open, and transparent meeting space can lay fertile ground for housing and community development and provide more solid ground for sustainable collaborative arrangements.**

Keywords *– collaborative planning, collaboration, age-friendly communities,*

Introduction

Like many countries, Norway is facing an increase in an aging population providing both challenges and opportunities. The Norwegian policy document *called "A full life all your life- a quality reform for older persons (2017-2018)",* a follow-up to the national strategy for an age-friendly society "more years- more opportunities" (2016) is a national policy that emphasizes the need to plan and organize in ways that allow elderly people to live at home while still maintaining a healthy, active, and social life to the best of their abilities, rather than being placed in public care institution (Kjellberg & Ibsen, 2010). The policy document highlights 25 solutions in various areas in which inadequacies are prevalent. The program for age-friendly Norway is one of the focus areas of the

policy and the concept of age-friendly communities can be traced back to the age-friendly community framework set forth by WHO, which illustrates *"eight interconnected domains help to identify and address barriers to the well-being and participation of older people"* (WHO). This article focuses on two domains, namely housing and community (outdoor spaces and buildings) development.

The article's objective aims to explore the following question: *What characterizes a private-public collaboration for the development of age-friendly communities? What are some limitations on the institutional design that provides challenges for cross-sectoral collaboration?*

The context

Norwegian planning systems usually take place at the local municipal level and the Municipal Community Plan in Section 11-2 of the Planning and Building Act (2008) is the most important overarching, strategic and coordinating plan (Asplan Viak, 2019). Falleth (2010) explains that it must guide the municipalities' overall planning including land development plans i.e., housing, and community development. Institutionalized formal requirements are in place through structured and systematized activities including early-phase meetings between the developer and the planning authority. The municipality has procedures for interacting and collaborating with the private market and there are established routines in place to ensure judicial aspects of the planning process are followed through (Falleth et. al 2010).

The private market has according to Aarsæther et al (2012) *"a strong power to define their ownership to regulatory plans through the framework of the plan and building act".* As such the private market is often the stronger player (Knudtzon, 2018). However, citizens and civil society have through political influence, special interest groups and public debate voiced their opinions on municipal planning and started to gain some influence in their saying, but currently, the power to influence is in the formal phases, not in the early phases.

Theoretical framework

Planning theory and the collaborative approach to planning are suitable as the theoretical framework. One of the main aims of taking a collaborative planning perspective is that the epistemological foundation according to Forester (1999) is "to broaden the knowledge base for planning". Collaborative planning seems appropriate for analysis as Brand & Gaffikin 2007 mentions although the act of careful mediation is an essential piece, it is necessary to create arenas. Arenas that support the discussion of value systems, where reframing of conflicts could turn into goal alignment, and the dialogue between the different actors have transformed being purely a transactional conversation with a fixed interest to "a mode of negotiative problem definition and consensus building" (Brand & Gaffikin 2007 pp 10). From a planning perspective, a planner should facilitate the creation of platforms to achieve equal footing at the start of a conversation between actors where nurturing mutual dependencies is beneficial.

The influence of alternative collaborative processes is on the rise (Torfing et al, 2019). However, alternative collaborative arrangements such as co-creation is in practice often ad-hoc, experimental, and sporadic and in the public sphere the institutionalization of co-creation as a process grounded in a solid and comprehensive administrative framework is still missing (Ansell & Torfing 2021; Gravesgaard et al, 2018). According to Hofstad et al (2021), for co-creation to either co-exist with existing processes or become the new sustainable mode of governance, new forms of co-creational leadership are essential for its development along with solid strategies to deal with the tensions between the "old" and the "new" way of working.

Methodology

The case study entails an exploration of how both the public and private sector views the current landscape of collaboration and participation in the quest for advancing age-friendly communities. All the municipalities have their strategies and plans for the policy reform A Full life- all your life and has additionally committed to becoming a member of the national network for age-friendly communities. The interview subjects all have some connection to the policy or the national network. In each municipality each of the interview subjects were intentionally contacted, either through some research on their website looking for municipal officials associated with planning, building, or other association with housing and community development, an explorative case study was chosen as the most suitable method for exploring the concept of arenas and platforms for collaboration. The initial findings and the empirical context are based on a total of 18 qualitative interviews from both the private and public sector as well as one ideal organization. More specifically 14 municipal administrators, 3 property developers, and 1 ideal organization associated with housing and community development in

different district municipalities in Norway. The interviews lasted between 45-80 minutes, and 17 of the 18 interviews were conducted digitally via zoom or teams. The initial interviews took place over a period of seven months in the spring and summer of 2021.

Preliminary findings and analysis

The initial findings highlight characteristics of public-private collaboration based on the policy of developing more age-friendly communities. Firstly, existing platforms for collaboration and communication around plans are either formal or informal, which highlights some structural challenges. For example, some stakeholders experience exclusion from networks that are encouraging knowledge sharing around age-friendly communities. Furthermore, experiences of cultural clashes during communication on formal platforms were said to be discouraging. Both public and private stakeholders indicate the need for a better infrastructure for learning and sharing. Lastly, the importance of place, and that context matter in planning and collaboration, particularly when it comes to age-friendly community development. One example being a coastal municipality in which planners stressed the importance of having the ocean in mind when planning for old-age because many citizens have a special relationship with the sea and coastal living.

The current institutional structures concerning the development of housing and community development have created both formal and informal ways of communicating. But as some of the interview responses suggest, there are some challenges. Research on co-creation raises important questions about the relationship between knowledge generation and the distribution of power: how, why, and who creates the knowledge (Greenhalgh et al 2016) and particularly communication. As interviews suggest that although the idea of increased collaboration between public and private, and citizen engagement, we can ask ourselves whether the existing institutional design and the infrastructures in place can facilitate 'fear' and equal footing in co-creation processes. Particularly when hearings, town meetings, and other formal meetings between municipalities and citizens, or municipalities and the private sector often take place after initial plans have already been decided, in which the question of power may be an issue. As the aging population, and subsequently, its various solutions are considered wicked and complex the process of co-creation gives room to explore how knowledge is collaboratively generated and how existing infrastructure either creates sustainable synergies and supports or limits collaborative generation (Greenhalgh et al 2016**).** Graversgaard 2018, emphasized that due to the limited institutional framework in place for facilitation and mobilizing co-creation efforts despite collaboration through co-creation being both warranted and encouraged through various policies, designing alternative arenas may be of value

References

1. Leve hele livet: en kvalitetsreform for eldre (Vol. 15). (2018)
2. Flere år Flere muligheter Regjeringens strategi for et aldersvennlig samfunn. (2016).
1. Kjellberg, J. and Ibsen, R. (2010). Økonomisk evaluering af Længst Muligt i Eget Liv i Fredericia Kommune. *Copenhagen: Dansk Sundhedsinstitut*.
2. Asplan Viak (2019). Prioriterte mål kommunalt og fylkeskommunalt planarbeid. Retrieved from:extension://elhekieabhbkpmcefcoobjddigjcaadp/https://www.ks.no/contentassets/9b46a6940db54fae865da7dcd06fb7ec/rapport-fou-prosjekt-184011.pdf
3. Plan og Bygningsloven (2008). Lov om planlegging og byggesaksbehandling (plan- og bygningsloven) - Kapittel 5. Medvirkning i planleggingen - Lovdata
4. The WHO Age-friendly Cities Framework - Age-Friendly World
5. Falleth, Saglie, I.-L., & Hanssen, G. S. (2010). Makt og medvirkning i urban reguleringsplanlegging. Plan, 42(1), 64–67. https://doi.org/10.18261/ISSN1504-3045-2010-01-13
6. Aarsæther. (2012). Utfordringer for norsk planlegging: kunnskap, bærekraft og demokrati. Cappelen Damm Høyskoleforlag: *Utfordringer for norsk planlegging*: *Aktørmangfold i planlegging (pp.19)*
7. Lillin, C, Knudtzon (2018). Kan vi snakke om medvirkning?: sivilsamfunnets innflytelse og bidrag i reguleringsprosesser. Doctoral Thesis. Norwegian University of Life Sciences
8. Forester, J. (1999) The Deliberative Practitioner: Encouraging Participatory Planning Processes. Cambridge, MA and London: MIT Press
9. Brand, & Gaffikin, F. (2007). COLLABORATIVE PLANNING IN AN UNCOLLABORATIVE WORLD. Planning Theory

(London, England), 6(3), 282–313. https://doi.org/10.1177/1473095207082036
10. Torfing, J., Sørensen, E. and Røiseland, A. (2019) Transforming the public sector into an arena for co-creation, *Administration and Society*, 51(5): 795–825. doi: 10.1177/0095399716680057
11. Ansell, C. and Torfing, J. (2021) Co-creation: the new kid on the block in public governance, *Policy & Politics*, vol 49 no 2, 211–230, DOI:10.1332/030557321X16115951196045A rnstein, S. R. (1969). A ladder of citizen participation. Journal of American Planning Association, 35, 216-224.
12. Graversgaard, Hedelin, B., Smith, L., Gertz, F., Højberg, A. L., Langford, J., Martinez, G., Mostert, E., Ptak, E., Peterson, H., Stelljes, N., van den Brink, C., & Refsgaard, J. C. (2018). Opportunities and barriers for water co-governance-A critical analysis of seven cases of diffuse water pollution from agriculture in Europe, Australia and North America. Sustainability (Basel, Switzerland), 10(5), 1634. https://doi.org/10.3390/su10051634
13. Hofstad, H., Millstein, M., Tønnesen, A., Vedeld, T. and Hansen, K. B. (2021). The Role of Goal-Setting in Urban Climate Governance. *Earth System Governance*, *7*, 100088. https://doi.org/10.1016/j.esg.2020.100088
14. Greenhalgh, T., Jackson, C., Shaw, S. and Janamian, T. (2016) Achieving research impact through co-creation in community-based health services, *The Milbank Quarterly*, 94(2): 392–429. doi: 10.1111/1468-0009.12197 - [pp 19]

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

What about participation? Research processes towards monitoring and evaluation of Responsible Research and Innovation (RRI)

Irene Monsonís-Payá (presenting)
INGENIO (CSIC-UPV) Universitat Politècnica de València, Valencia, Spain (irmonpa@doctor.upv.es)

Edurne A. Iñigo
Department of Management, University of Deusto, Business School, San Sebastian, Spain

Vincent Blok
Philosophy Group, Wageningen University, Wageningen, The Netherlands

Short Bio

Irene Monsonís-Payá is an early career researcher at INGENIO (CSIC-UPV). In her PhD dissertation, she focuses on the processes of production of monitoring and evaluation tools of RRI. She holds a degree in Law (2007), Business Administration (2008), and Corporate Social Responsibility and Sustainability (2012). She has seven years of experience as a project manager and research assistant for EU-funded projects.

Abstract **–In parallel to the boost of the term Responsible Research and Innovation (RRI) in Europe, interest in developing monitoring and evaluation (M&E) mechanisms of RRI arose. The different accounts of RRI have in common the consideration of public engagement or inclusiveness, crucial concept elements. The participation of actors in designing and implementing M&E mechanisms of RRI can be justified by three types of arguments: increasing their adequacy to their evaluative purpose, exploiting the performative function of actors' involvement and aligning the process with the concept of RRI. The work we present explores how participation is embedded and foreseen in research processes towards M&E mechanisms of RRI. We present a systematic review that allowed identifying twenty-five mechanisms. Our findings show that participation is more common in the latter than early phases of the research and that there is scope for further reflexivity regarding how this key element of RRI is embedded in the design of monitoring and evaluation tools of RRI.**

Keywords **– Responsible Research and Innovation, Participation, Inclusiveness, Public Engagement, Evaluation, Monitorisation**

Introduction

The term Responsible Research and Innovation (RRI) has gained momentum in Europe, especially since 2009 (Timmermans, 2017). Its widespread use is due to its adoption by funding agencies, including the European Commission (Zwart et al., 2014), and recognition of the need to review the relations between science, innovation and society (Flink & Kaldewey, 2018). In turn, this sparked interest in the monitoring and evaluation (M&E) of RRI.

A common feature in the RRI literature refers to the inclusion of new types of knowledge

facilitated by the involvement of societal actors in the research and innovation process (Timmermans & Blok, 2021). The challenges of societal engagement in public research, scientific governance and industry have been widely documented (Bauer et al., 2021; Brand & Blok, 2019).

Despite the general acknowledgement of the need for more inclusive governance of science and innovation in the RRI literature, it needs to be clarified if a diversity of actors participate in the research processes towards M&E mechanisms for RRI. By M&E mechanism, we refer to methods, instruments and tools designed with monitoring or evaluation purposes, such as procedures, evaluation grids and sets of quantitative or qualitative indicators, qualitative questions or evaluation grids, among others. This paper investigates when, how much and in what ways the participation of different actors is considered in the approaches followed in the research process towards M&E of RRI and their implementation in real settings.

Materials and Methods

Our systematic literature review identifies the relevant literature and includes a directed content analysis of the text.

First, we conducted an iterative discussion of study objectives and theoretical approaches. Then, data selection was based on a review protocol, which included a search strategy and snowballing related to references and citation tracking in different issues of the Journal of Responsible Innovation, a scientific journal publishing work on RRI. Our final sample includes 37 articles, book chapters and reports. Some of this material referred to the same mechanisms, so we created clusters of documents representing the 25 research approaches.

In the initial phases of our study, we constructed an analytical framework based on theory and prior research. Therefore, we opted for a directed content analysis method whose main strength is that "existing theory can be supported and extended" (Hsieh & Shannon, 2005:1283). Our coding strategy included the following steps:

- Reading the articles and highlighting all text relevant to the elements in our analytical model (Figure 1). This framework involves three stages of research, the translation 1, 2 and 3 in the nomenclature used by Callon et al. The early and first stage of the research involves the problematisation phase when the research approach is designed, and key decisions such as monitoring and evaluation purpose are taken. The second stage refers to the development of the research itself. The third stage refers to the implementation into real settings of the research outputs. Regarding translation 3, our analysis will focus on the expected or foreseen participation of actors by the researchers carrying out the research process.
- Applying deductive coding to the highlighted citations and constructing a codebook that included all the elements in our analytical framework, their operational definitions and subcategories based on the existing theory.
- Inductive coding of additional citation information and its inclusion in the codebook.
- Reviewing the inductive codes and deciding whether a new category or a subcategory of the analytical framework was needed.

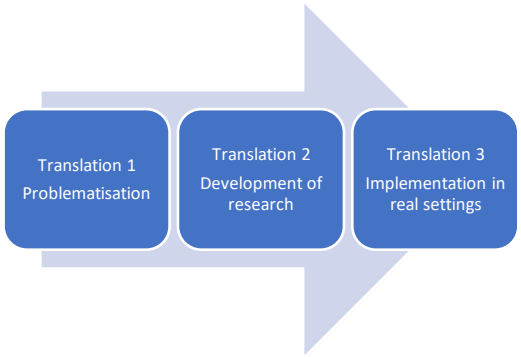


Figure 1. Analytical framework for the literature review based on Callon et al. (2009)

Findings

We reviewed 37 documents (19 journal articles, 10 book chapters and 8 project reports). From the 37 documents examined, we identified 25 M&E research approaches developing mechanisms.

The 25 mechanisms identified are diverse concerning different elements. In the first instance, we found processes developing M&E tools, including quantitative and qualitative instruments such as qualitative questions and indicators. In contrast, others proposed methodologies based on a series of procedural steps. In addition, the unit of analysis or evaluand differs among the mechanisms. Some are designed to assess units clearly defined as research and innovation projects, megaprojects or institutions, while others are more ambiguous, referring to research and innovation activities, policies or strategies. Limited cases considered people or complete systems of innovation and countries as the unit of analysis.

Finding a: The primary motivation to promote contextualisation through participation is to increase the evaluation effectiveness.

The three arguments discussed in favour of participation have been identified in the studies analysed.

Finding b: Participation is more common in the latter than early phases of the research process.

The analysis of the mechanisms identified shows limited participation in the early phases of research problematisation (translation 1). In contrast, participation tends to be more commonly embedded during the research development stage (translation 2) and expected in the application of the implementation in real settings (translation 3).

Finding c: Participation is most commonly linked to "Learning and Reflexivity" and "Trust and Cooperation" purposes.

Several sample documents referred to more than one purpose for a particular mechanism. We, therefore, included subcategories for primary and secondary objectives, identified by comprehensive analysis of the original codification.

The most frequent purposes are "Learning and Reflexivity" (10 as primary purpose and 5 as secondary), "Decision Making and Accountability" (8 as primary purpose and 9 as secondary), ", "Knowledge Creation" (6 as primary purpose and 7 as secondary) and "Trust and Cooperation" (1 as primary purpose and 3 as secondary).

Finding d: In translations 2 and 3, the participation of actors as criteria providers is aligned with conceptualisation through participation.

In the analysis of participation in translation 2, we found three roles of actors participating in translation 2: criteria providers - those that participate in the process to define the operationalisation and evaluative criteria-; design reviewers -those that participate in the research process to provide feedback to the M&E design (i.e. usability tests)-; and respondents or data providers -those that offer evaluation information.

The participation of actors as criteria providers during the research development is aligned with the principles of engagement in RRI. It implies consideration of actors as providers of knowledge and value to the design of M&E mechanisms in different types (different intensity and time commitment) of participation.

In translation 3, different roles are also foreseen for actors beyond the research teams in the mechanisms analysed. Similarly to translation 2, there are several cases in which actors are expected to participate in adapting the tools to the context of use by adopting the role of criteria providers through the process that we refer to as contextualisation through participation. Additionally, references to the involvement of actors acting as evaluator coordinators, final end-users, respondents or data providers are also foreseen in this phase.

References

Bauer, A., Bogner, A., & Fuchs, D. (2021). Rethinking societal engagement under the heading of Responsible Research and Innovation: (novel) requirements and challenges. *Journal of Responsible Innovation*, *8*(3), 342–363. https://doi.org/10.1080/23299460.2021.1909812

Brand, T., & Blok, V. (2019). Responsible innovation in business: a critical reflection on deliberative engagement as a central governance mechanism. *Journal of Responsible Innovation*, *6*(1), 4–24. https://doi.org/10.1080/23299460.2019.1575681

Callon, M., Lascoumes, P., & Barthe, Y. (2009). *Acting in An Uncertain World: An Essay on Technical Democracy*. MIT Press.

Flink, T., & Kaldewey, D. (2018). The new production of legitimacy: STI policy discourses beyond the contract metaphor. *Research Policy*, *47*(1), 14–22. https://doi.org/https://doi.org/10.1016/j.respol.2017.09.008

Hsieh, H. F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, *15*(9), 1277–1288. https://doi.org/10.1177/1049732305276687

Timmermans, J. (2017). *Mapping the RRI Landscape: An Overview of Organisations, Projects, Persons, Areas and Topics BT - Responsible Innovation 3: A European Agenda?* (L. Asveld, R. van Dam-Mieras, T. Swierstra, S. Lavrijssen, K. Linse, & J. van den Hoven (eds.); pp. 21–47). Springer

International Publishing. https://doi.org/10.1007/978-3-319-64834-7_3

Timmermans, J., & Blok, V. (2021). A critical hermeneutic reflection on the paradigm-level assumptions underlying responsible innovation. *Synthese*, *198*(S19), 4635–4666. https://doi.org/10.1007/s11229-018-1839-z

Zwart, H., Landeweerd, L., & van Rooij, A. (2014). Adapt or perish? Assessing the recent shift in the European research funding arena from 'ELSA' to 'RRI.' *Life Sciences, Society and Policy*, *10*(1), 11. https://doi.org/10.1186/s40504-014-0011-x

Bauer, A., Bogner, A., & Fuchs, D. (2021). Rethinking societal engagement under the heading of Responsible Research and Innovation: (novel) requirements and challenges. *Journal of Responsible Innovation*, *8*(3), 342–363. https://doi.org/10.1080/23299460.2021.1909812

Brand, T., & Blok, V. (2019). Responsible innovation in business: a critical reflection on deliberative engagement as a central governance mechanism. *Journal of Responsible Innovation*, *6*(1), 4–24. https://doi.org/10.1080/23299460.2019.1575681

Callon, M., Lascoumes, P., & Barthe, Y. (2009). *Acting in An Uncertain World: An Essay on Technical Democracy*. MIT Press.

Flink, T., & Kaldewey, D. (2018). The new production of legitimacy: STI policy discourses beyond the contract metaphor. *Research Policy*, *47*(1), 14–22. https://doi.org/https://doi.org/10.1016/j.respol.2017.09.008

Hsieh, H. F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research*, *15*(9), 1277–1288. https://doi.org/10.1177/1049732305276687

Timmermans, J. (2017). *Mapping the RRI Landscape: An Overview of Organisations, Projects, Persons, Areas and Topics BT - Responsible Innovation 3: A European Agenda?* (L. Asveld, R. van Dam-Mieras, T. Swierstra, S. Lavrijssen, K. Linse, & J. van den Hoven (eds.); pp. 21–47). Springer International Publishing. https://doi.org/10.1007/978-3-319-64834-7_3

Timmermans, J., & Blok, V. (2021). A critical hermeneutic reflection on the paradigm-level assumptions underlying responsible innovation. *Synthese*, *198*(S19), 4635–4666. https://doi.org/10.1007/s11229-018-1839-z

Zwart, H., Landeweerd, L., & van Rooij, A. (2014). Adapt or perish? Assessing the recent shift in the European research funding arena from 'ELSA' to 'RRI.' *Life Sciences, Society and Policy*, *10*(1), 11. https://doi.org/10.1186/s40504-014-0011-x

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Climate-neutral cities with a gender perspective: assessing the interaction between gender and climate objectives in urban policies

I. Aparisi-Cerdá[a], D. Ribó-Pérez[b], J. Gomar-Pascual[c], J. Pineda-Soler[c], R. Poveda-Bautista[d] M. García-Melón[d]

[a] Institute for Energy Engineering, Universitat Politècnica de València, Camino de Vera, s/n 46022 Valencia, Spain (isapcer@etsii.upv.es). [b] Delft University of Technology, Faculty of Technology, Policy, and Management, Delft, 2600 GA, The Netherlands. [c] Crearqcio Coop., cooperativa d'arquitectes, C/Jesús i Maria 19, Baix Dreta. València, Spain. [d] INGENIO (CSIC-UPV), Universitat Politècnica de València, Camino de Vera, s/n 46022 València, Spain

Short Bio

Gender studies have highlighted how policies and actions that are not drafted and planned with a gender perspective tend to produce a gender bias. Climate policies are not an exception. Measures to mitigate and adapt cities to climate change might produce undesired outcomes regarding gender equality or, in contrast, may help to improve equality. We propose a Multi-criteria Decision Making method to assess urban policies and relate them to climate and gender criteria.

Abstract **– Measures to mitigate and adapt cities to climate change might lead to undesired outcomes regarding gender equality or, in contrast, may help to improve equality. Ideally, cities should prioritise actions that aim to reduce their carbon footprint but also help promote gender equality. We aim to facilitate the inclusion of gender perspective in the 100 Climate-Neutral and Smart Cities by 2030 European Mission. We describe urban decarbonisation policies with non-negative gender outcomes and compare their impact when using climate and gender criteria. We use a DEMATEL-ANP technique to determine how policies contribute to climate action and gender equality. Experts in different areas and city planning respond to the DEMATEL-ANP model by comparing and relating criteria and actions. Our results show which policies have a significant potential to reduce cities' carbon footprint and increase gender equality. Prioritisation of policies changes when only gender criteria or climate criteria are considered. Regarding the former, we can conclude that gender criteria will contribute to closing the gender gap while having a widening impact on decarbonisation. Nevertheless, the inclusion of gender criteria is not enough to avoid bias, and multidisciplinary teams must participate in the decision-making process.**

Keywords **– Cities, Climate change, Urban decarbonisation, DEMATEL, ANP, Gender gap**

INTRODUCTION

Urban climate policies are cross-cutting issues and strategic for decarbonisation because they account for the majority of greenhouse gas (GHG) emissions. According to the European Environmental Agency (European Environment Agency, n.d.), the main emission sectors worldwide are energy, industry, transport, residential/commercial, agriculture and waste. Furthermore, the IPCC 2022 report (Shukla et al., 2022) cites energy, urban and other settlements, transport, buildings, industry, agriculture and other land use as sectors where mitigation should be addressed. According to the IPCC in Climate Change 2014: Impacts, Adaptation, and Vulnerability (Revi et al., 2014), the key adapting

sectors at the urban scale are energy, transport, food, housing, and urban planning. This report also outlines the role of government, planning, and management in putting the urban environment in place.

When the gender representation of sectors is examined, it is noticeable that the sectors with the greatest carbon impact also have a low representation of women. The Nordic Council of Ministers analysed climate policies in the Nordic countries with a gender perspective, looking into high carbon-emitting sectors with gender implications: mobility, energy, agriculture, food, construction and the built environment (Nordic Council of Ministers, 2022). Energy, transport, housing and agriculture are also analysed as key sectors in other reports on climate change policies and gender, where women's inclusion in decision-making and other aspects of governance is also highlighted as decisive (Clancy & Feenstra, 2019; Heffernan et al., n.d.; Heidegger et al., 2021). These previous studies emphasise the importance of including a gender perspective in climate change action (Heidegger et al., 2021). However, the role that the gender perspective plays in climate action is limited (Melin et al., 2022; Nordic Council of Ministers, 2022). These studies do not quantify the effects of urban policies in both gender and climate spheres or assess the bias produced due to the expertise field of the decision-makers.

STUDY DESIGN AND METHOD

This research uses an integrated MCDM approach based on a combination of DEMATEL and ANP to determine the impact of urban policy actions on both urban decarbonisation and gender gap closure. To accomplish this, we evaluate different gender criteria for the two goals, urban decarbonisation and gender gap closure. The selected policy actions belong to five clusters (energy, food, governance, mobility, and urban planning). All the
selected actions have at least a theoretical non-negative outcome regarding both climate and gender objectives. A multicriteria analysis is used to evaluate the actions and the criteria, enabling us to rank the actions in relation to the two objectives together.

MODEL DESCRIPTION

Figure 1 presents the ranking model characterised by a network of clusters of criteria and actions. The model is framed in the context of medium-sized European cities. Both the criteria and actions are derived from a literature review. The actions include measures to be implemented by city planners and all stakeholders involved at the city level or influencing it. A set of criteria are selected to represent the achievement of both goals, climate change mitigation and adaptation and closing the gender gap. Four criteria represent each goal.

Seventeen experts in the various fields involved in urban decarbonisation respond to the DANP model by comparing and relating criteria and actions. Therefore, we select experts with professional backgrounds in energy, food, governance, mobility, and urban planning.

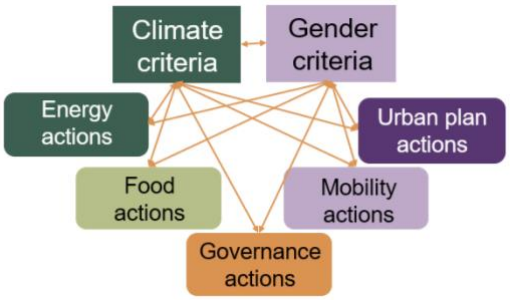


Figure 1. Overview of the studied model.

RESULTS AND DISCUSSION

We analyse the results from three perspectives. The first is considering the complete model that includes all the experts and the criteria of both groups (climate and gender). Governance actions are highly important, which is an interesting result given that governance is complementary to many other actions due to its more organisational and less capital-intensive role.

Figure 2 shows the final average priority of each action for the whole group of experts. According to them, the actions that better contribute to the two goals are: improving the public transport network (M1), ensuring the presence and participation of women in jobs, decision-making and project management (G1), analysing and evaluating measures and actions from a gender perspective (G4), promoting neighbourhood cooperative projects and community organisation (G2), and implementing of a dense network of pedestrian and cycle routes (M2). In contrast, promoting electric vehicles (M4) is the lowest-scoring action.

As a result, governance actions may be combined with outstanding mobility actions. Because of the high impact of mobility in cities and the large emission reduction potential of these two actions, the first two mobility actions are also very important.

The second one considers the field of expertise of the respondents (see Figure 3).

Experts prioritise the criteria differently depending on their field of expertise. However, rationalisation and

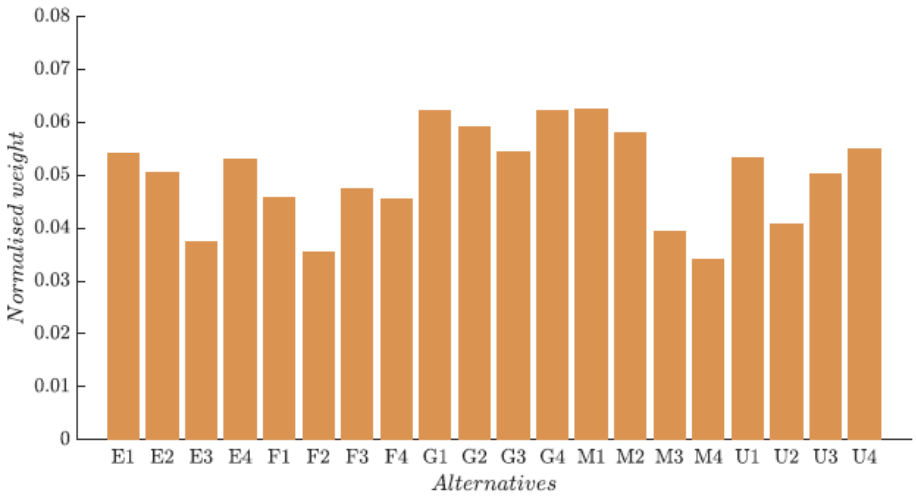


Figure 2. Aggregated weight of actions.

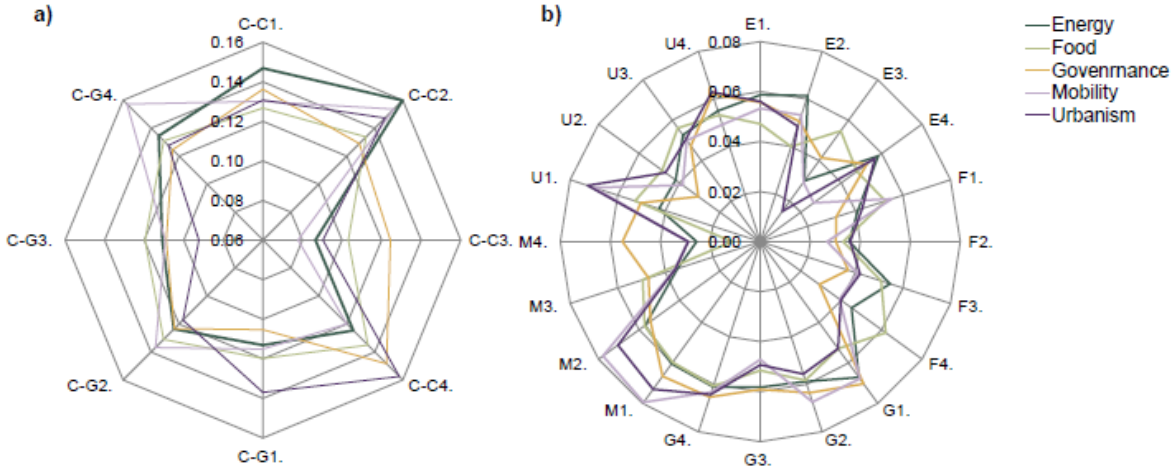


Figure 3. Analysis by expert group. A) Criteria b) Actions.

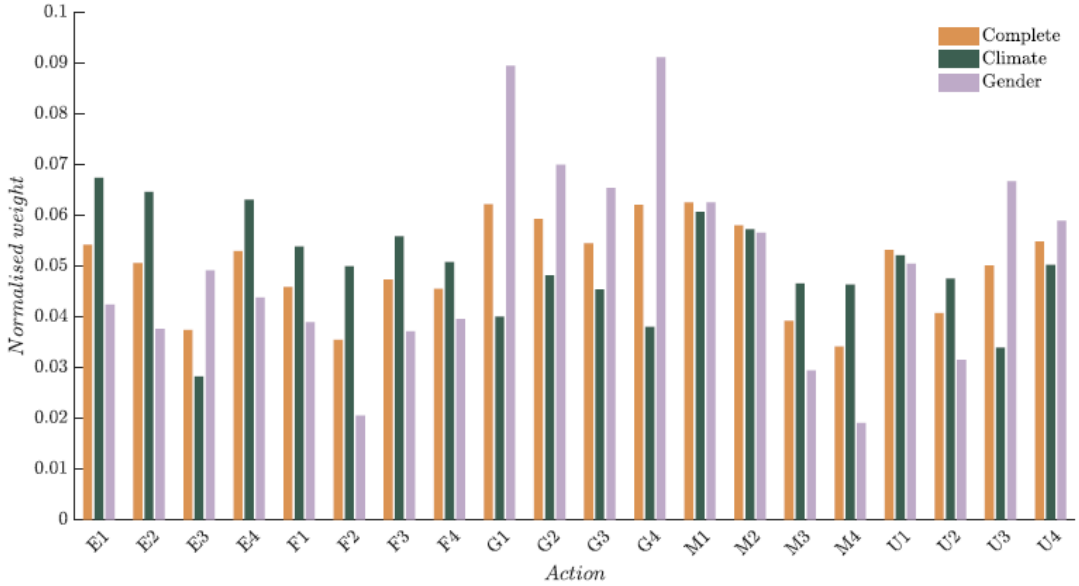


Figure 4. Aggregated weight of actions considering only climate or gender criteria.

reduction of energy consumption and raw material consumption is among the two main criteria for four of the five groups of experts. The priority of actions varies depending on the respondents' expertise field, although governance importance is extended among all groups. From these results, we conclude that expert decisions are biased toward their field of knowledge.

The third one analyses the groups of criteria separately to observe how actions are prioritised according to each of the criteria groups: climate and gender (see Figure 4). The main actions to be implemented change whether gender criteria are included or not. If gender criteria are not included (climate model), there is a bias towards actions with a more technical component. When gender criteria are included (full model), such actions of a purely technical nature lose importance to actions with more social elements.

To sum up, the findings show that whether gender criteria are included or not, the prioritisation of actions changes. In fact, there is a bias toward actions with a more technical component when gender criteria are not included. However, when gender criteria are included, actions of technical nature lose importance for the benefit of actions with social elements. Furthermore, the gender criteria have an impact on the climate criteria. Thus, gender criteria will also contribute to climate objectives, but not vice versa.

The prioritisation of urban policy actions changes depending on the goal of the focus. The ranking is different for the same actions depending on whether the purpose is only climatic or closing the gender gap too. Policymakers should take a gender perspective into account to achieve a just decarbonisation of cities. If both targets are set together, a better balance is established in the type of actions contributing to achieving a just decarbonisation and creating a positive reinforcement loop between gender to climate criteria. This study sets a precedent in the inclusion of gender criteria in urban policies for the decarbonisation of cities. We recommend the inclusion of gender criteria contribute to closing the gender gap while having a widening impact on decarbonisation, as our criteria analysis suggests. Nevertheless, the inclusion of gender criteria is not enough to avoid bias, and multidisciplinary teams must participate in the decision-making process.

REFERENCES

Clancy, J., & Feenstra, M. (2019). Women, Gender Equality and the Energy Transition in the EU. http://www.europarl.europa.eu/supporting-analyses

European Environment Agency. (n.d.). Greenhouse gas emissions by aggregated sector. Retrieved October 10, 2022, from https://www.eea.europa.eu/data-and-maps/daviz/ghg-emissions-by-aggregated-sector-5#tab-dashboard-02

Heffernan, R., Heidegger, P., Köhler, G., Stock, A., & Wiese, K. (n.d.). A Feminist European Green Deal. Towards an Ecological and Gender Just Transition.

Heidegger, P., Lharaig, N., Wise, K., Stock, A., & Heffernan, R. (2021). Why the european Green Deal needs ecofeminism. Moving from gender-blind to gender-transformative environmental policies.

Melin, A., Lily Magnusdottir, G., & Baard, P. (2022). Energy Politics and Justice: An Ecofeminist Ethical Analysis of the Swedish Parliamentarian Debate. https://doi.org/10.1080/21550085.2022.2115752

Nordic Council of Ministers. (2022). How climate policies impact gender and vice versa in the Nordic countries. https://www.norden.org/en/publication/how-climate-policies-impact-gender-and-vice-versa-nordic-countries

Revi, A., Satterthwaite, D. E., Aragón-Durand, F., Corfee-Morlot USA, J., Kiunsi, R. B., Pelling, M., Roberts, D. C., & Solecki, W. (2014). Urban areas. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. William Solecki.

Shukla, P. R., Skea, J., Slade, R., al Khourdajie, A., van Diemen, R., Mccollum, D., Pathak, M., Some, S., Vyas, P., Fradera, R., Belkacemi, M., Hasija, A., Lisboa, G., Luz, S., Malley, J., Cambridge,], Grubb, M., Okereke, C., Arima, J., … Köberle, A. (2022). Climate Change 2022: Mitigation of Climate Change Working Group III Contribution to the IPCC Sixth Assessment Report Citations Full report Chapter 1. https://doi.org/10.1017/9781009157926

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Local government approach to multiple regulatory and political uncertainties

Jessica Hadjis van Thiel
University of Sussex, Science Policy Research Unit (SPRU), Falmer, UK, j.hadjis-van-thiel@sussex.ac.uk

Short Bio

Jessica is a doctoral researcher in Science and Technology Policy Studies at SPRU. Her research seeks to address how organizations approach implementing digital regulation in an uncertain context (COVID-19 and Brexit). It aims to fill a gap in organizational studies literature regarding multiplee uncertainties and will contribute to understanding the broader societal implications of these questions..

***Abstract* – Multiple uncertainties can have lasting implications on local government. The current global context brought on by COVID-19 and Brexit (in the UK) have created unprecedented uncertainty. This paper explores the impact of multiple uncertainties on local government. It seeks to understand how local government in the UK and France deal with the regulatory and political uncertainties of COVID-19 and Brexit through the application of digital regulation.**

The research question, How do local government approach and adapt to multiple regulatory and political uncertainties?, aims to understand local government processes and strategies to implement digital regulation while dealing with multiple uncertainties, which will provide insights into how local authorities might act in the future.

Complexity theory and uncertainty literature, the underlying fields of study, are used to understand how local government approach the implementation of digital regulation and suggest that organizations in a state of "uncertainty" could thrive. Data from over 40 digital leads in local government in the UK and France support this, as they demonstrated unprecedented agility while they adapted to uncertainties operationally, and through the development of digital initiatives during the pandemic.

Keywords *– Local government agility; prioritizing multiple uncertainties; digital inclusion strategies at the local level; post-pandemic country approaches*

Introduction

The current global context brought on by COVID-19 has created unprecedented uncertainty. This paper explores the impact of multiple uncertainties on local government. Specifically, through the application of digital economy regulation, this research aims to understand how local government in the UK and France deal with the regulatory and political uncertainties of COVID-19 and Brexit. The research question, How do local government approach and adapt to multiple regulatory and political uncertainties?, aims to understand local government processes and strategies to implement digital regulation while dealing with multiple uncertainties, which will provide insights into how local authorities might act in the future.

Theory

The underlying field of study, complexity theory, is used to understand how local government approach the implementation of digital regulation in an uncertain climate. With respect to this research, complexity theory suggests that organizations in a state of "uncertainty" could thrive by succumbing to or adopting self-organization which could enable organizations to adapt and prosper in an era of rapid change (Allen 1988; Brown and Eisenhardt 1997; Charalabidis 2014). Another theory used in this research, is that uncertainty and complexity can be brought on by the digital economy (Gorzeń-Mitka and Okreglicka, 2015) which can create

challenges as well as opportunities for organizations to thrive (Brown, Fishenden, and Thompson 2015). Specifically, this paper will explore the fast-paced nature of digital technology, and how organizations respond (using adaptive and agile approaches) to digital innovation.

This paper addresses limitations in current knowledge, specifically regarding the implications of multiple uncertainties on organizations. Currently found in other disciplines, the concept of "double exposure" and "double uncertainties" are present in global environmental, ecology and evolution, and mathematical literature, however not in organizational literature.

Methods

The methodology of this paper consists of a comparative case study of UK and French local government, with qualitative interviews including 37 individual interviews (23 in the UK, 13 in France and one in Brussels, European Commission) and four focus group interviews (two in each country).

The interviews included questions on how local government implemented digital regulation, such as the UK Digital Economy Act and the Digital Republic Act in France. Specifically, Part One of the UK Act (the focus section of this research) requires local authorities to: specify that the target for broadband connections and services to be provided must have (a) speeds of 2 gigabits or more; (b) fibre to the premises (FTTP) as a minimum standard; (c) appropriate measures to ensure that internet speed levels are not affected by high contention ratios; (d) appropriate measures to ensure service providers run low latency networks (Parliament.UK, 2017).

This Act requires local authorities to have a significant strategy for implementation and adaptability to ensure the objectives of the Act are met (the same is true for the French equivalent - the French Digital Republic Act). Local government are therefore uniquely positioned to answer how organizations approach and adapt to (multiple) regulatory and political uncertainties.

Findings

One of the key findings of the paper is that the local authorities who thrived the most in their development of digital initiatives were those who were most agile and who collaborated with other stakeholders and local authorities during the pandemic.

Moreover, the research found that local government not only kept up with the technology, in several cases it actually defined some of the digital terminology, particularly related to digital inclusion. If it weren't for agility, this could not occur. It might be said that the pandemic was the perfect combination of urgency, importance on digital, support through internal and residents, and necessity to act that obliged local authorities to work in an agile way. This combination of factors resulted in unprecedented ways of working, resulting in exciting digital inclusion projects (and related programmes) with lasting implications.

Another key finding is in the differences and similarities observed between the UK and France. In France and in the UK, local authorities had to adapt to the new reality of the pandemic within a few days and did so with little direction from national government. They also both had to reorganize internal operations and management approaches in a very short period to accommodate to a new, virtual way of working. While there were many similarities in the two countries, one striking difference must be highlighted; with regards to operations going forward, the two countries have significantly different outlooks. Operationally, France anticipates going back to how things were pre-pandemic, whereas in the UK, there is an overwhelming desire to continue working from home or at the very least a hybrid way of working (combination of working from home and office time).

Conclusion

This research provides an understanding of solutions to implementing digital economy regulation in an agile way. The importance of digital was significantly increased during the pandemic coupled with local government agility translated into many noteworthy digital projects. However, what is perhaps most useful is the way in which local authorities achieved these strategies and projects; through agile approaches. The implications are therefore vast as the agility adopted by local government during the pandemic is not exclusive to digital regulation. The research is generalizable as extending the agile approaches to other regulation would be a valuable contribution to local government and organizational studies overall.

References

Allen, M. (2017). Confidentiality and Anonymity of Participants. Retrieved January 20, 2020, from https: //methods.sagepub.com/reference/the-sage-encyclopedia-of-communication-research-methods/ i3126.xml

Brown, A.W., Fishenden, J., and Thompson, M. (2015). Digitizing Government: Understanding and implementing new digital business models, Palgrave McMillan.

Brown, S., & Eisenhardt, K. (1997). The art of continuous change: Linking complexity theory and timepaced evolution in relentlessly shifting organizations, Administrative Science Quarterly, 42: 1-34.

Charalabidis, Y. (2014). Revolutionizing enterprise interoperability through scientific foundations. Hershey, PA: Business Science Reference, an imprint of IGI Global.

Gorzeń-Mitka, I., & Okręglicka, M. (2015, November 2). Managing complexity: A discussion of current strategies and approaches. Procedia Economics and Finance. Retrieved November 3, 2022, from https://www.sciencedirect.com/science/article/pii/S2212567115010187

UK Parliament. (2017, May 11). Digital Economy Act 2017 - parliamentary bills - UK parliament. UK Parliament. Retrieved November 3, 2022, from https://bills.parliament.uk/bills/1859

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

The Policy mix for sustainability transitions and green technologies: a systematic literature review

Kevin Souchard
Bordeaux School of Economics, University of Bordeaux, city of Pessac in France
kevin.souchard@u-bordeaux.fr

Short Biography

Kevin Souchard is currently a PhD student at the Bordeaux School of Economics (BSE) in France. Kevin's research interests cover the economic fields of innovation and sustainability transitions. His PhD subject emphasizes a potential bi-directional relation between the policy mix for sustainable transitions and green innovations. The whole issue of this investigation relates to the acceleration and orientation of the transition from current socio-technical systems to sustainable ones to mitigate the long-term effects of climate change and the challenges it raises.

Abstract

Policy makers face today an unprecedented challenge - decouple economic growth from negative consequences for natural ecosystems. In order to provide and answer, scholars in both, neoclassical and evolutionary theories, acknowledge that policies are essential drivers for sustainability transitions. Consequently, a growing interest in studying how the combination of different policy instruments might particularly influence eco-innovation[1] occurred trough the concept of policy mix. However, mainly because of its multifactorial and multi-scale aspects, the concept suffers from a lack of operationalization and empirical evidence of the causal relation regarding the eco-innovations. To this interest, based on a systematic literature review, the aim of this extended abstract is to emphasize the empirical gaps of the policy mix for sustainability transitions, with some proposals for analysis in relation to the green technologies. Hence, three main aspects attract our attention. Firstly, the necessity to look deeper at the interactions of the actors' influences on the policy processes, secondly, the instrument interactions analysis especially by considering temporal dynamics and thirdly,
the study of the causal link between the policy mix and the technological component of complexity for green innovations.

Keywords - Policy mix, Sustainability transitions, green technologies, economic complexity

INTRODUCTION

Contemporary challenges regarding environmental issues, such as the energy transition (e.g. Costantini et al., 2019), raised the interest for the policy mix[2]. Since the seminal work by Porter & van der Linde (1995), there has been a growing interest in understanding its role in stimulating and directing eco-innovations. Rogge &

[1] The most generalized definition of environnemental innovation is the production, assimilation or exploitation of a product, production process, service or management or business methods that is novel to the firm [or organisation] and which results, throughout its life cycle, in a reduction of environmental risk, pollution and other negative impacts of resources use (including energy use) compared to relevant alternatives" (Kemp and Pearson, 2007: p. 7).

[2] see Flanangan et al., (2011) for a review of the origins of this concept.

Reichardt (2016) have decomposed the policy mix into three main blocks: (1) the mix of political instruments and the policy strategy; (2) the policy processes and (3) the characteristics whose aim is to assess the entire policy mix. Such a conceptual framework allows to better apprehend the policy dimensions, but the empirical evidence of the causal relations between specific aspects of the policy mix and eco-innovations is far from being established.

Based on a systematic literature review, the aim is to emphasize the empirical gaps of the policy mix for sustainability transitions, with some proposals for analysis in relation to green technologies. In order to provide an answer, five sections are proposed, each of the first four refers to elements of the policy mix framework and the last one links the policy mix to the complexity of green technologies.

This extensive abstract is a part of a broader thesis project aimed at studying the specific case of the energy efficiency of buildings in EU countries and the potential two-way relationship between the policy mix and the emergence of green technologies related to building. Hence, three points in particular should be expended trough this last: the interactions of the actors' influences on the policy processes; the instrument interactions analysis especially by considering temporal dynamics and the study of the causal link between the policy mix and the technological component of complexity for green innovations.

SINGLE INSTRUMENT ANALYSIS

Traditionally, scholars have investigated single policy instruments and more especially, its type and design features (e.g. Kemp and Pontoglio, 2011). Nowaday, a typology of three instrument types seems to be mostly considered: demand-pull, technology-push and, finally, soft and systemic instruments (e.g. Costantini et al., 2017). Instead, the selection and conceptualization of the relevant design features are both still contested. Among them, the policy stringency is the most applied (e.g Carrion-Flores and Innes, 2010) but its definition and measurement is still in debate.[3] The policy intensity and the technology specificity (Schaffrin et al., 2015) are introduced conceptually and empirically by Schmidt and Sewerin (2019). Other instrument design features are discussed such as the predictability, flexibility, differentiation or the adaptability of an instrument (Kemp and Pontoglio, 2011). These lasts have got only a conceptual contribution due to the difficulty of identifying an adequate measure.

POLICY MIX EVALUATION

The growing interest for the policy mix led to the integration of a global assessment for the combination of policies through the policy mix characteristics.

Those characteristics have been the most applied part of the policy mix. They all had quantitative or qualitative measure (Schmidt and Sewerin, 2019; Costantini et al., 2023; Edmondson et al., 2020) including the characteristics added as extension of the initial framework (Mavrot et al., 2018; Scordato et al., 2018).

However, the authors agree on the fact that it is still unclear which ones the evaluators should select to evaluate the policy mix taking into account the policy context as well as how to adapt their operationalisation considering this last (Mavrot et al., 2018; Samset and Christensen, 2017). This point could be the subject of future work in order to refine the assessment of the policy mix.

INSTRUMENT INTERACTION ANALYSIS

Albeit it seems clear that scholars analyzed the individual instruments and then the characteristics of the overall policy mix, the instrument interactions analysis is for the most part lacking despite a consensual understanding on the complexity of interactions when studying the evaluation or designing of policy mixes (Edmondson et al., 2019; Rogge et al., 2017; Rogge & Reichardt, 2016). While it is known that the implemented policies are added as different layers to an existing mix in a process called 'layering' thus impacting on policy mixes' dynamics (Howlett and Rayner, 2007), this 'layering' as an empirical phenomenon is not clearly defined (Heijden, 2011). From this point, we provide suggestions for further analysis.

Schmidt et Sewerin (2019) proposed a first conceptual and empirical framework taking into account the temporal dynamics of the policy mix; their results are quite promising. Clearly, the temporal dynamics dimension of the policy mix could provide answers related to the right sequencing of instruments and potentially optimisations to the current policy mixes through the application of 'patching' (Howlett and del Rio, 2015; Kern et al., 2017). This application should be done by a richer measure, this dimension has not been applied taking into consideration most of the policy mix elements such as the characteristics and design features either as technological dimensions of the green innovation as outcome.

Furthemore, an underrepresented stream of the literature on Energy Efficiency focuses on assessing potential interactions between combinations of policies (e.g. Markandya et al.,

[3] for a recent development of this debate, see Galeotti et al., (2020)

2015; Rosenow et al., 2016). This policy interaction means that the influence of one policy to another can be either mitigating, neutral or reinforcing (Boonekamp, 2006). However, the majority of these applications are almost only qualitative or theory-based approaches with the exception of the simulation model of Boonekamp (2006). The framework of Boonekamp (2006) divides them in three categories: steering mechanisms, scope and timing. Overall, instruments tend to be reinforcing when they are different in at least one category (Wiese et al., 2018). This framework could be used as a starting point for a deeper assessment of policy interaction effects.

POLICY PROCESSES & POLICY CONTEXT

While we stressed the importance of the design of the policy mix through the interaction of its internal elements, we should not forget that the policy mix is implemented in a certain way and into a specific context in relation to external factors.

Indeed, the way that the policy context is considered in order to emphasize the necessity to look at interactions of the actors' influences on the policy processes is lacking in the literature. These influences take place in the policy strategy, where actors define a guidance to develop concrete instruments which, themselves, can be part of a way to evaluate the policy mix (Lindberg et al., 2019).

These relationships are pointed out by some studies, for instance, Lindberg et al. (2019) highlight the key industry actors preferences or Ingold et al. (2019), the citizens' acceptance and behavioral change.

Thus, we suggest a broader and more permanent consideration of these actors and particularly political actors who are considered as the most important factor (Rogge and Reichardt, 2016), but also, academicians and policy makers.

POLICY MIX & COMPLEXITY OF GREEN TECHNOLOGIES

Besides the need to develop the policy mix, advances must also be made to confront those elements with green technologies in order to achieve the initial expectation of promoting them. In this interest, it can be finer to understand which aspect characterizes them and has interest in being promoted by the green policies.

Recent works from the regional diversification literature highlight that green technologies seem to have higher complexity relative to none-green ones (Barbieri et al., 2020). This knowledge dimension has received increasing attention (Hidalgo & Hausmann, 2009; Balland & Rigby, 2017; Balland et al., 2022) as a high level of technology complexity seems to be a potential path to achieve a win-win situation between the economy and the environment (Hidalgo et Hausmann, 2009, Boleti et al., 2021; Mealy and Teytelboym, 2022; Romero and Gramkow, 2022) in line with the initial Porter's hypothesis (Porter et van der Linde, 1995).

To our knowledge, only a recent work from Dong et al. (2022) made a first connection between the knowledge component of technologies and environmental regulation. To this aim, they computed the knowledge dimensions of relatedness and complexity on the basis of the green patents and a measure of policy stringency as a proxy of environmental regulation. Their results showed that the policy stringency helps cities enter less related and more complex green domains.

Furthermore, it seems that studies on the relationship between the policy mix and green innovations mainly miss a deeper understanding of the elements from the policy mix and tend to not consider the embedded knowledge and technological structure brought into perspective by the regional diversification literature. This suggests to us promising perspectives given the potential importance of the complexity of green technologies if we succeed to bring empirically new elements of the policy mix in order to shed a light on new insights to focus on for policy makers and finally, represent a robust argument in favor of the Porter Hypothesis to reach path-breakthrough of the current socio-technical systems.

BIBLIOGRAPHIC REFERENCES

Balland, P.-A., Broekel, T., Diodato, D., Giuliani, E., Hausmann, R., O'Clery, N., & Rigby, D. (2022). The new paradigm of economic complexity. *Research Policy*, *51*(3), 104450. https://doi.org/10.1016/j.respol.2021.104450

Balland, P.-A., & Rigby, D. (2017). The Geography of Complex Knowledge. *Economic Geography*, *93*(1), 1-23. https://doi.org/10.1080/00130095.2016.1205947

Barbieri, N., Marzucchi, A., & Rizzo, U. (2020). Knowledge sources and impacts on subsequent inventions : Do green technologies differ from non-green ones? *Research Policy*, *49*(2), 103901. https://doi.org/10.1016/j.respol.2019.103901

Boleti, E., Garas, A., Kyriakou, A., & Lapatinas, A. (2021). Economic Complexity and Environmental Performance : Evidence from a World Sample. *Environmental Modeling & Assessment*, *26*(3), 251-270. https://doi.org/10.1007/s10666-021-09750-0

Boonekamp, P. (2006). Actual interaction effects between policy measures for energy

efficiency—A qualitative matrix method and quantitative simulation results for households. *Energy*, *31*(14), 2848-2873. https://doi.org/10.1016/j.energy.2006.01.004

Carrión-Flores, C. E., & Innes, R. (2010). Environmental innovation and environmental performance. *Journal of Environmental Economics and Management*, *59*(1), 27-42. https://doi.org/10.1016/j.jeem.2009.05.003

Consoli, D., Costantini, V., & Paglialunga, E. (2023). We're in this together : Sustainable energy and economic competitiveness in the EU. *Research Policy*, *52*(1), 104644. https://doi.org/10.1016/j.respol.2022.104644

Costantini, V., Crespi, F., Paglialunga, E., & Sforna, G. (2020). System transition and structural change processes in the energy efficiency of residential sector : Evidence from EU countries. *Structural Change and Economic Dynamics*, *53*, 309-329. https://doi.org/10.1016/j.strueco.2019.05.001

Costantini, V., Crespi, F., & Palma, A. (2017). Characterizing the policy mix and its impact on eco-innovation : A patent analysis of energy-efficient technologies. *Research Policy*, *46*(4), 799-819. https://doi.org/10.1016/j.respol.2017.02.004

Dong, Z., Sun, S., Balland, P.-A., & Zhang, W. (2022). *Environmental Regulation promotes Green Technological Diversification : Evidence from Chinese Cities*.

Edmondson, D. L., Kern, F., & Rogge, K. S. (2019). The co-evolution of policy mixes and socio-technical systems : Towards a conceptual framework of policy mix feedback in sustainability transitions. *Research Policy*, *48*(10), 103555. https://doi.org/10.1016/j.respol.2018.03.010

Edmondson, D. L., Rogge, K. S., & Kern, F. (2020). Zero carbon homes in the UK? Analysing the co-evolution of policy mix and socio-technical system. *Environmental Innovation and Societal Transitions*, *35*, 135-161. https://doi.org/10.1016/j.eist.2020.02.005

Flanagan, K., Uyarra, E., & Laranja, M. (2011). Reconceptualising the 'policy mix' for innovation. *Research Policy*, *40*(5), 702-713. https://doi.org/10.1016/j.respol.2011.02.005

Galeotti, M., Salini, S., & Verdolini, E. (2020). Measuring environmental policy stringency : Approaches, validity, and impact on environmental innovation and energy efficiency. *Energy Policy*, *136*, 111052. https://doi.org/10.1016/j.enpol.2019.111052

Hidalgo, C. A., & Hausmann, R. (2009). The building blocks of economic complexity. *Proceedings of the National Academy of Sciences*, *106*(26), 10570-10575. https://doi.org/10.1073/pnas.0900943106

Howlett, M., & del Rio, P. (2015). The parameters of policy portfolios : Verticality and horizontality in design spaces and their consequences for policy mix formulation. *Environment and Planning C: Government and Policy*, *33*(5), 1233-1245. https://doi.org/10.1177/0263774X15610059

Howlett, M., & Rayner, J. (2007). Design Principles for Policy Mixes : Cohesion and Coherence in 'New Governance Arrangements'. *Policy and Society*, *26*(4), 1-18. https://doi.org/10.1016/S1449-4035(07)70118-2

Ingold, K., Stadelmann-Steffen, I., & Kammermann, L. (2019). The acceptance of instruments in instrument mix situations : Citizens' perspective on Swiss energy transition. *Research Policy*, *48*(10), 103694. https://doi.org/10.1016/j.respol.2018.10.018

Kemp, R. (2007). *Final report MEI project about measuring eco-innovation*. 120.

Kemp, R., & Pontoglio, S. (2011). The innovation effects of environmental policy instruments—A typical case of the blind men and the elephant? *Ecological Economics*, *72*, 28-36. https://doi.org/10.1016/j.ecolecon.2011.09.014

Kern, F., Kivimaa, P., & Martiskainen, M. (2017). Policy packaging or policy patching? The development of complex energy efficiency policy mixes. *Energy Research & Social Science*, *23*, 11-25. https://doi.org/10.1016/j.erss.2016.11.002

Lindberg, M. B., Markard, J., & Andersen, A. D. (2019). Policies, actors and sustainability transition pathways : A study of the EU's energy policy mix. *Research Policy*, *48*(10), 103668. https://doi.org/10.1016/j.respol.2018.09.003

Markandya, A., Labandeira, X., & Ramos, A. (2015). Policy Instruments to Foster Energy Efficiency. Dans A. Ansuategi, J. Delgado, & I. Galarraga (Éds.), *Green Energy and Efficiency* (p. 93-110). Springer International Publishing. https://doi.org/10.1007/978-3-319-03632-8_4

Mavrot, C., Hadorn, S., & Sager, F. (2019). Mapping the mix : Linking instruments, settings and target groups in the study of policy mixes. *Research Policy*, *48*(10), 103614. https://doi.org/10.1016/j.respol.2018.06.012

Mealy, P., & Teytelboym, A. (2022). Economic complexity and the green economy. *Research Policy*, *51*(8), 103948. https://doi.org/10.1016/j.respol.2020.103948

Porter, M. E., & Linde, C. van der. (1995). Toward a New Conception of the Environment-Competitiveness Relationship. *Journal of Economic Perspectives*, *9*(4), 97-118. https://doi.org/10.1257/jep.9.4.97

Rogge, K. S., Kern, F., & Howlett, M. (2017). Conceptual and empirical advances in analysing policy mixes for energy transitions. *Energy Research & Social Science*, *33*, 1-10. https://doi.org/10.1016/j.erss.2017.09.025

Rogge, K. S., & Reichardt, K. (2016). Policy mixes for sustainability transitions : An extended concept and framework for analysis. *Research Policy*, *45*(8), 1620-1635. https://doi.org/10.1016/j.respol.2016.04.004

Romero, J. P., & Gramkow, C. (2021). Economic complexity and greenhouse gas emissions. *World Development*, *139*, 105317. https://doi.org/10.1016/j.worlddev.2020.105317

Rosenow, J., Fawcett, T., Eyre, N., & Oikonomou, V. (2016). Energy efficiency and the policy mix. *Building Research & Information*, *44*(5-6), 562-574. https://doi.org/10.1080/09613218.2016.1138803

Samset, K., & Christensen, T. (2017). Ex Ante Project Evaluation and the Complexity of Early Decision-Making. *Public Organization Review*, *17*(1), 1-17. https://doi.org/10.1007/s11115-015-0326-y

Schaffrin, A., Sewerin, S., & Seubert, S. (2015). Toward a Comparative Measure of Climate Policy Output. *Policy Studies Journal*, *43*(2), 257-282. https://doi.org/10.1111/psj.12095

Schmidt, T. S., & Sewerin, S. (2019). Measuring the temporal dynamics of policy mixes – An empirical analysis of renewable energy policy mixes' balance and design features in nine countries. *Research Policy*, *48*(10), 103557. https://doi.org/10.1016/j.respol.2018.03.012

Scordato, L., Klitkou, A., Tartiu, V. E., & Coenen, L. (2018). Policy mixes for the sustainability transition of the pulp and paper industry in Sweden. *Journal of Cleaner Production*, *183*, 1216-1227. https://doi.org/10.1016/j.jclepro.2018.02.212

van der Heijden, J. (2011). Institutional Layering : A Review of the Use of the Concept. *Politics*, *31*(1), 9-18. https://doi.org/10.1111/j.1467-9256.2010.01397.x

Wiese, C., Larsen, A., & Pade, L.-L. (2018). Interaction effects of energy efficiency policies : A review. *Energy Efficiency*, *11*(8), 2137-2156. https://doi.org/10.1007/s12053-018-9659-z

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

How effective are cluster policies? Evidence from Germany

Knarik Poghosyan
Technical University Dortmund, Faculty of Macroeconomics, Dortmund, Germany
*(*knarik.poghosyan@tu-dortmund.de*).*

Short Bio

Knarik Poghosyan is a PhD student at the Chair of Macroeconomics at the Technical University Dortmund. Knarik holds Bachelor's and Master's Degrees in Management from the Armenian State University of Economics, and Master's degree in Economics from the Friedrich Schiller University of Jena. Her research is concentrated on innovation, regional economics, policy and social network analysis. Knarik is interested in working with huge data and applying advanced quantitative methods.

Abstract – We analyze the impact of cluster policy on firm performance, innovation and R&D collaboration using the German Leading-Edge Cluster Competition (LECC) as a testing ground. The analysis does not only quantify the direct effects of the policy on funded firms but also tests for possible spillovers on non-funded neighboring firms. This allows us to evaluate whether the LECC came with broader benefits for the development of regions that host cluster firms. For that purpose, we use multiple data sets (Bureau van Dijk's Orbis database, EPO Worldwide Patent Statistical Database (PATSTAT), the LECC Survey data) and implement an event study design covering the period of 2000-2016. To investigate the impact on neighboring non-funded firms, we identify non-funded firms in geographic proximity to cluster firms (the analysis accounts for distance rings up to 20 km radius). Preliminary results suggest that the cluster policy had a limited impact on firm performance and collaboration outcomes of funded firms and cluster-hosting regions. These findings align with the results of previous studies.

Keywords – Cluster Policy, Spillover Effects, Policy Evaluation, Regional Innovation, Patent Data, Event Study

Introduction

Over the last decades, considerable attention has been paid to clusters and cluster policies. Contrary to public R&D subsidies for individual firms and projects, cluster policies promise to be particularly successful in stimulating new innovation as they support the systemic nature of the innovation process (Smits and Kuhlmann, 2004). Despite the increasing popularity of cluster policies, the jury is still out regarding their effectiveness (Graf and Broekel, 2020). Many studies have found that cluster policies, due to their geographically concentrated setup, stimulate more interactions between cluster members, which contribute to the growth of firms' performance and innovation activity (Engel et al., 2019; Akcigit et al., 2018; Crass et al., 2017; Cantner et al., 2015; Engel et al., 2013; Uyarra and Ramlogan, 2012; Nishimura and Okamuro, 2011; Breschi and Lissoni, 2009; Baptista and Swan, 1998). The latter idea has been supported by Breschi and Lissoni (2005) and Acemoglu et al. (2016), who found that knowledge flows are localized and geographic proximity of collaborating actors may lead to more innovations via knowledge spillover. In contrast, many scholars claim that cluster policies are very costly and usually have only a short-term positive effect (Engel et al., 2013; Duranton, 2011; Martin et al., 2011). To shed more light on the ongoing debate about cluster policy benefits, our principal objective is to analyze the causal effect of cluster policies on innovative activity, firm performance and cooperation across actors. We use the implementation of the German Leading-edge cluster competition, which is one of the largest cluster policies worldwide, as a testing ground. The main research questions are (1) whether the policy increased innovative output and firm performance of funded firms, (2) whether there are knowledge spillover of the

policy, which affect non-funded neighboring firms, and (3) whether the cluster-policy indeed induced more collaborations across funded firms as well as funded and non-funded firms (thereby potentially moderating the effects in (1) and (2)). The latter question follows the ideas raised in the studies of Breschi and Lissoni (2005) and Acemoglu et al. (2016), where the authors claim that close location to the cluster firms might lead to a better performance of non-funded neighbors via knowledge spillover.

To address the research questions, we combine multiple datasets. We collect firm level data from Orbis for the period 2000-2016 and combine it with patent data from PATSTAT. Furthermore, we create a novel, geo-referenced data set, which contains information on firms funded by the leading edge cluster competition, which allows us to exploit geographical information to measure spillover. Methodologically, we employ an event study design following Sun and Abraham (2021) and matched difference in difference analysis.

This paper contributes to the existing literature in different ways. First, existing research on cluster policies concentrates mostly on regional analysis in a static framework (Graf and Broekel, 2019; Rothgang et al., 2017; Toepfer et al., 2017; Cantner et al., 2013). Our paper is the first to implement a firm-level analysis of the German Leading-Edge Cluster Competition (LECC) policy in a dynamic event study framework. Furthermore, our research also involves the analysis of spillover effects for neighboring firms. This is naturally infeasible when using regional data as in prior work. Lehman & Menter (2017) touch upon this question by investigating the effects of the LECC on regional productivity, documenting that the policy positively affected funded, and negatively non-funded regions. Detailed analyses tackling the spillover effects for innovation activity and productivity on the firm level and in a dynamic setup are, to the best of our knowledge, still missing. Our results offer valuable insights both, for the academic literature and for policymakers.

The leading edge cluster competition

We concentrate our analyses on the German Leading-Edge Cluster Competition, which is the biggest cluster initiative in Germany with an annual budget of € 600 M (€ 40 M per cluster). The policy supported in total 15 clusters over the period of 2008-2017. The funding was implemented in 3 rounds (2008-2012, 2010-2015, 2012-2017), where 5 cluster initiatives were selected by an independent jury in each round. The LECC had also no regional and industry focus. Clusters were spread across all Germany and were mainly operating in the following areas: health (Ci3, Medical Valley, BioRN, Munich BioTech), digitization, production and communication (It's OWL, Cool Silicon, MicroTEC South-West, Software Cluster), mobility and logistics (Hamburg Aviation, Effizienz Cluster Logistic Ruhr, Electro-mobility Southwest), and energy and resource efficiency (BioEconomy, Sollar Valley, Organic Electronics, Mai Carbon). The main goal of the policy was to stimulate collaboration and innovation via targeted funding of R&D projects in funded firms, firms from other industries in the cluster region, and firms outside the cluster region. (Rothgang et al., 2017).

Data and method

Data: The data used in this paper covers the period of 2000-2016 and comes from different datasets:

- Bureau van Dijk's "Orbis" database, which is a geo-referenced firm-level data containing information on firm financial accounting variables, industry code, location, etc.
- EPO Worldwide Patent Statistical Database (PATSTAT), which we use to calculate the number of patents per firm.
- Manually collected LECC data from the LECC evaluation in 2013, which contains information on cluster firm geographical location, cluster affiliation, funding period, etc.

Method: The paper applies different methodologies. Firstly, to address selection issue, we implement Coarsened Exact Matching (CEM) on several firm-level outcomes (firm size, age, and industry) before the treatment (year 2007). Then, to analyze the impact of the LECC on funded firms, we apply the event study design following Sun and Abraham (2021). In our study, we account for 6 pre and post-treatment periods (leads and lags) and three policy-interventions (cohorts treated in 2008, 2010, and 2012 respectively).

$$Y_{i,t} = \alpha_i + \lambda_t + \beta \sum_{l<-K} D_{i,t}^{l} + \sum_{l=-K}^{-2} \mu_l D_{i,t}^{l} + \sum_{l=0}^{L} \mu_l D_{i,t}^{l} + \gamma \sum_{l>L}^{L} \mu_l D_{i,t}^{l} + \varepsilon_{i,t} \quad (1),$$

where $Y_{i,t}$ is the outcome of interest (innovation (quality adjusted number of patents), collaboration (joint patents) and firm-level (fixed assets and employment costs) outcomes) for cluster firm i at time t, α_i is firm fixed effects, λ_t is time fixed effects, μ_l is average effect for being treated in periods l (period since treatment for cohort e), $D_{i,t}^{l}$ is the relative period indicator (lags/leads of treatment), and $\varepsilon_{i,t}$ is the error term (standard errors are clustered at firm level).

To observe spillover effects for neighboring firms, we construct geographic rings indicating the distance between funded cluster firms and non-funded neighbor firms calculated from the longitude and latitude information. Using event study framework by Sun and Abraham (2021), we identify dynamic spillover effects for the neighbors in two geographic rings (0-10 km, 10-20km) (Equation 1).

Results and discussion

Preliminary results suggest that the cluster policy had a positive impact on the firm performance and innovation outcomes of funded firms. Positive spillover effect is found only with respect to the firm level outcomes of non-funded neighbors only within 10 km distance, which supports knowledge spillover theory that the closer neighbors only benefit from spillovers. However, no impact is found for collaboration outcomes both for funded and non-funded neighbor firms. We also look at the treatment heterogeneity by distinguishing different sources that can alter the policy impact such as firm size (SMEs and large firms), and cluster membership type (funded and non-funded cluster members). The results show that while the LECC had a more pronounced positive impact on funded SMEs, it had no effect on non-funded neighbor SMEs. No direct effects are found for large firms, indicating more benefits of such policy initiatives for SMEs. In analyzing funded and non-funded cluster members, the LECC impact holds positive and significant for the firm-level outcomes in both cases. However, the impact magnitude is larger for funded cluster members, which indicates that the additional funding slightly increases the performance of funded firms in contrast to non-funded cluster members.

Conclusion

In the present study, we examine the impact of the German cluster policy (Leading- Edge Cluster Competition) on innovative activity, collaboration and firm performance of both funded and non-funded neighbour firms. First preliminary results suggest that the policy had positive significant impact on the firm-level and innovation performance of funded actors, and small firm-level impact on non-funded neighbours within 10 km distance. No effect is found for collaboration both in direct and spillover analysis. The effect was also more pronounced for SMEs and funded-cluster members.

References

(1) Acemoglu, D., Akcigit, U., and Kerr, W. R. (2016). Innovation networks. PNAS 113 (41), 11483-11488.

(2) Akcigit, U. Caicedo, S., Miguelez, E. Stantcheva, S. and Sterzi, V. (2018). Dancing with the Stars: Innovation Through Interactions. NBER Working Papers No 24466. National Bureau of Economic Research.

(3) Baptista, R., and Swann, P. (1998). Do Firms in Clusters Innovate More? *Research Policy* 27(5), 525–540.

(4) BMBF (2015). Gemany's Leading Edge Cluster Competition. The New High Tech Strategy, 1-49.

(5) Breschi, S., and Lissoni, F. (2009). Mobility of skilled workers and co-invention networks: an anatomy of localized knowledge flow. Journal of Economic Geography 9 (4), 439-468.

(6) Breschi, S., and Lissoni, F. (2005). Cross-Firm Inventors and Social Networks: Localised Knowledge Spillovers Revisited. Annales d'Economie et de Statistique 79, 189-209.

(7) Cantner, U., Graf, H., and Hinzmann, S. (2015). The role of geographical proximity for project performance: Evidence from the German "Leading-Edge Cluster Competition". Jena Economic Research Papers No. 2015-025, Friedrich-Schiller-University Jena.

(8) Crass, D., Rammer, C., and Aschhoff, B. (2017). Geographical clustering and the effectiveness of public innovation programs. *The Journal of Technology Transfer*, 1-32.

(9) Duranton, G. (2011). California Dreamin': The Feeble Case for Cluster Policies. *Review of Economic Analysis* 3 (1), 3-45.

(10) Engel, D., Rothgang, M. and Eckl, V. (2019). RD Funding and Private RD: Empirical Evidence on the Impact of the Leading-Edge Cluster Competition. Journal of Technology Transfer 44, 1720-1743.

(11) Engel, D., Mitze, T., Roberto, P., and Reinkowski, J. (2013). Does Cluster Policy Trigger R&D Activity? Evidence from German Biotech Contests. *European Planning Studies* 21 (11), 1735 1759.

(12) Graf, H., and Broekel, T. (2019). *A shot in the dark? Policy influence on cluster networks.* Jena Economic Research Papers No. 2019-007. Friedrich-Schiller-University Jena

(13) Martin, Ph., Mayer, Th., and Mayneris, F. (2011). Public support to clusters: A firm level study of French "Local Productive Systems". *Regional Science and Urban Economics* 41 (2), 108-123.

(14) Nishimura, J., and Okamuro, H. (2011). R&D productivity and the organization of cluster policy: An empirical evaluation of the Industrial Cluster Project in Japan. *The Journal of Technology Transfer* 36 (2), 117-144.

(15) Rothgang, M., Cantner, U., Dehio, J., Engel, D., Fertig, M., Graf, H., Hinzmann, S., Linshalm, E., Ploder, M., Scholz, A., and Töpfer, S. (2017). Cluster policy: Insights from the German leading-edge cluster competition. *Journal of Open Innovation: Technology, Market, and Complexity*, 3-18.

(16) Sun, L., and Abraham, S. (2021). Estimating dynamic treatment effects in event studies with heterogeneous treatment effects. Journal of Econometrics 225 (2), 175-199.

(17) Toepfer, S., Cantner, U., and Graf. H. (2017). Structural dynamics of innovation networks in German Leading-Edge Clusters. *The Journal of Technology Transfer*, 1-24.

(18) Uyarra, E., and Ramlogan, R. (2012). *The impact of cluster policy on innovation*. National Endowment for Science, Technology and the Arts (NESTA) Working Paper Series No. 12.05, Manchester Institute of Innovation Research.

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Strategies of Public Intermediaries: A Case Study of Swedish Municipal Energy Advisors

Lisa Winberg (& Ingrid Mignon)
Chalmers University of Technology, Department of Technology Management and Economics, Gothenburg, Sweden (lisa.winberg@chalmers.se).

Short Bio

I am Lisa Winberg, a second year PhD student at Chalmers University of Technology in Gothenburg, Sweden. My research focuses on public intermediaries as policy instruments in the transition to a more sustainable energy system. I use insights from the fields of sustainability transitions, energy policy, and intermediaries, and my empirical context is Swedish municipal energy advising. In my free time, I like to spend time outdoors, do gymnastics, and play the violin.

Abstract **– It is widely acknowledged that actors play a crucial role in enacting change in socio-technical transitions. In particular, intermediary actors have been given increased scholarly attention for their role in accelerating transitions, for instance by translating and implementing national visions to the local context. Yet, previous studies have pointed at a lack of consideration of intermediaries' individual strategies, resources, and interests. Contributing at closing this gap, the aim of this paper is to increase the understanding of intermediaries' individual agency and how this impacts the overall transition. Based on the analysis of an interview study of 22 Swedish municipal energy advisors, we show that intermediaries not only undertake bottom-up and top-down strategies, but also pursue middle-out strategies. Based on their individual interests and capabilities, intermediaries identify opportunities and design activities that they find fit to drive transitions forward. Intermediaries are thus not only passive implementers of national policy but do indeed show agency by setting their own agenda. This sheds a light on a new side of intermediation that has been understudied in the past.**

Keywords **– Intermediaries, strategy, agency, energy transition.**

Introduction

In the field of sustainability transitions, it is widely acknowledged that actors play a crucial role in enacting change in socio-technical systems (Farla et al., 2012; Köhler et al., 2019), such as the energy system (e.g., Backhaus, 2010; Bergek, 2020; Bush et al., 2017). Changes are not only required at the level of the system, e.g., in the way energy is produced (e.g., Hyysalo et al., 2018; Mignon and Broughel, 2020), but also at the level of actors, e.g., in the way energy is used (e.g., Gyberg and Palm, 2009; Heiskanen et al., 2013; Huttunen et al., 2021). In the context of transitions, it is necessary to recognize the dynamic interaction between system and actor level (Farla et al., 2012). For instance, researchers have acknowledged the contribution of actor-driven initiatives in the diffusion of renewable energy technology (e.g., Bush et al., 2017; Seyfang et al., 2014). Despite a growing interest in the actor level of transitions (Duygan et al., 2019), there is still a need of going deeper into the understanding of the strategies, resources and interests of the wide range of actors involved in transitions (e.g., academia, politics, industry, civil society, and households) (Köhler et al., 2019).

Intermediaries are one type of actors that have been given increased scholarly attention for their role in accelerating transitions (Bergek, 2020; Kivimaa et al., 2020; Kivimaa et al., 2019).

Intermediaries in the context of transitions are defined by Kivimaa et al. (2019) as "actors and platforms that positively influence sustainability transition processes by linking actors and activities, and their related skills and resources, or by connecting transition visions and demands of networks of actors with existing regimes in order to create momentum for socio-technical system change, to create new collaborations within and across niche technologies, ideas and markets, and to disrupt dominant unsustainable socio-technical configurations" (p. 1072). In other words, they act in-between actors, levels of the system, and visions and policy goals.

Different typologies of intermediaries have been developed to understand what types of intermediaries there exist, what they do, and how they differ from each other, e.g., in terms of activities, roles, and target groups (Bergek, 2020; Kanda et al., 2020; Kivimaa et al., 2019). While these typologies have provided a better understanding of the activities and functions of intermediaries, there is an underlying assumption that intermediaries of the same type (e.g., having the same organizational form, task, or customer segment) behave the same way. Likewise, the role(s) they play and the activities they perform seem to be assigned to them. In other words, there is a lack of consideration of intermediaries' agency (Huttunen et al., 2021; Parag and Janda, 2014). As a matter of fact, some authors criticize this lack of consideration of agency and propose that intermediary actors[2] may, independently from directives or missions defined by others, actively take initiatives to enable change in society (Parag and Janda, 2014). Looking at empirical studies on intermediaries, these studies also suggest that intermediaries do indeed exhibit a certain degree of agency. For instance, Aspeteg and Bergek (2020) show that intermediaries specialized in the support of renewable electricity technology adopters organize their businesses in different ways in order to create value for themselves and their customers. Likewise, some studies show that intermediaries engaged in project development use different strategies to meet the needs and demands of their clients (Aspeteg and Mignon, 2019; Mignon, 2017). In these articles, while the authors reflect on the consequences of these different behaviors, they do not address why these differences occur. Hence, it remains unclear why intermediaries of the same type have different strategies and behaviors.

To address this gap, we turn to the growing literature on agency in transitions. It draws attention to how individual actors impact the overall system and contribute to transitions, as well as how changes at the system level in turn impact actor strategies (e.g., Duygan et al., 2019; Farla et al., 2012; Patterson et al., 2017). This alternative perspective stresses the need to consider intermediaries' individual agency. For instance, some authors have highlighted that intermediaries are not only tools to implement national policies, but also actors who can gather local inputs to influence higher levels of decision-making (Gustafsson and Mignon, 2019). Likewise, Parag and Janda (2014) have shown that intermediaries are actors that have their own driving forces to change the system. As capable and driven actors, it is reasonable to assume that intermediaries also have the means to develop their own strategies rather than only following the paths and goals already set for them by decision-makers.

Against this background, we claim that it is important to take a deeper look at intermediaries' strategies and agency. Indeed, a better understanding of intermediaries' strategies may inform us on a variety of pathways that can be used to facilitate transitions. In some cases, intermediaries' strategies may need to be aligned (e.g., if they are conflicting), and in other cases, these strategies may need to be diversified (e.g., to reach a larger variety of actors or goals). Either way, by shifting focus from the functions and activities of intermediaries to their individual strategies and agency (Huttunen et al., 2021), a more nuanced picture of intermediaries in transitions can be drawn.

The aim of this paper is thus to increase the understanding of intermediaries' individual agency and how this impacts the overall transition. Our research questions are as follows:

- What strategies do intermediaries adopt when operationalizing their tasks?
- What explains the choice of strategies made by these intermediaries?

To this end, we perform a case study of municipal energy advisors in Sweden. They are public actors with the task to promote reduced CO_2 emissions and increased renewable energy investments, thus acting as transition intermediaries as defined by Kivimaa et al. (2019). They translate national goals and visions and provide locally adapted information and advice to households, small and medium sized enterprises, and associations. They are funded by the Swedish Energy Agency and employed by local municipalities. This implies that they have the same organization form and mission, but they also have different local contexts which they have to adapt to. This need for adaptation leaves room for energy advisors to use different strategies to reach their goals in their local contexts.

[2] Parag and Janda (2014) refer to them as 'middle actors' in contrast to the concept of 'intermediary', which they find too passive.

METHOD

The data was collected through 22 semi-structured interviews with energy advisors in Sweden. The sampling was made purposefully by choosing one respondent for each region in Sweden (two for the capital region due to the large number of inhabitants) to obtain a representative picture of the advisors. Thus, the data covered respondents from rural and urban as well as large and small municipalities. Questions were asked on how they operationalize their task, municipal organization and networks, and drivers, barriers, and enablers in their work. The interviews were recorded, transcribed, and analyzed using NVivo.

PRELIMINARY FINDINGS

The preliminary findings indicate that the energy advisors pursue different strategies given not only bottom-up and top-down pressures (e.g., client demands and rules and regulations), but also middle-out drivers. Based on their individual interests and capabilities, the energy advisors design different strategies that they find fit to drive transitions forward. From our cross-case analisis, we identify five different advising profiles that the energy advisors undertake, that are both complementary and overlapping.

The goal-oriented advisors are mainly guided by top-down drivers and plan their work based on what is expected of them, from the Swedish Energy Agency, the municipalities, and/or the energy offices. They strive to fulfill goals, both those set by themselves and others.

The service-oriented advisors have the clients' needs in focus. They are driven by understanding what the clients really need and helping clients in making decisions that are the best for them in their given situations.

The technology-oriented advisors are driven by learning new things about new techologies. They tailor information and advice to the clients' situation, and they strive to get the clients to understand the technical details behind the solutions.

The experimenters like to try new things and aim to continuously expanding their impact. They experiment with topics, activities, and methods, try to be proactive, and reach out to new target groups.

The networkers pursue strategies to increase their legitimacy and build their networks, in order to increase the incoming demand from clients. They try out new things to find out what works best for them and the clients in their municipalities.

These preliminary findings indeed confirm that intermediaries are not only passive implementers of national policy, but also agents in charge of driving their own agenda. This sheds a light on a new side of intermediation that has been understudied in the past.

REFERENCES

Aspeteg, J., Bergek, A., 2020. The value creation of diffusion intermediaries: Brokering mechanisms and trade-offs in solar and wind power in Sweden. Journal of Cleaner Production 251, 119640.

Aspeteg, J., Mignon, I., 2019. Intermediation services and adopter expectations and demands during the implementation of renewable electricity innovation–Match or mismatch? Journal of Cleaner Production 214, 837-847.

Backhaus, J., 2010. Intermediaries as innovating actors in the transition to a sustainable energy system. Central European Journal of Public Policy 4, 86-109.

Bergek, A., 2020. Diffusion intermediaries: A taxonomy based on renewable electricity technology in Sweden. Environmental Innovation and Societal Transitions 36, 378-392.

Bush, R.E., Bale, C.S.E., Powell, M., Gouldson, A., Taylor, P.G., Gale, W.F., 2017. The role of intermediaries in low carbon transitions – Empowering innovations to unlock district heating in the UK. Journal of Cleaner Production 148, 137-147.

Duygan, M., Stauffacher, M., Meylan, G., 2019. A heuristic for conceptualizing and uncovering the determinants of agency in socio-technical transitions. Environmental Innovation and Societal Transitions 33, 13-29.

Farla, J., Markard, J., Raven, R., Coenen, L., 2012. Sustainability transitions in the making: A closer look at actors, strategies and resources. Technological forecasting and social change 79, 991-998.

Gustafsson, S., Mignon, I., 2019. Municipalities as intermediaries for the design and local implementation of climate visions. European Planning Studies 28, 1161-1182.

Gyberg, P., Palm, J., 2009. Influencing households' energy behaviour—how is this done and on what premises? Energy Policy 37, 2807-2813.

Heiskanen, E., Johnson, M., Vadovics, E., 2013. Learning about and involving users in energy saving on the local level. Journal of Cleaner Production 48, 241-249.

Huttunen, S., Kaljonen, M., Lonkila, A., Rantala, S., Rekola, A., Paloniemi, R., 2021. Pluralising agency to understand behaviour change in sustainability transitions. Energy Research & Social Science 76, 102067.

Hyysalo, S., Juntunen, J.K., Martiskainen, M., 2018. Energy Internet forums as acceleration phase transition intermediaries. Research Policy 47, 872-885.

Kanda, W., Kuisma, M., Kivimaa, P., Hjelm, O., 2020. Conceptualising the systemic activities of intermediaries in sustainability transitions. Environmental Innovation and Societal Transitions 36, 449-465.

Kivimaa, P., Bergek, A., Matschoss, K., Van Lente, H., 2020. Intermediaries in accelerating transitions: Introduction to the special issue. Environmental Innovation and Societal Transitions 36, 372-377.

Kivimaa, P., Boon, W., Hyysalo, S., Klerkx, L., 2019. Towards a typology of intermediaries in sustainability transitions: A systematic review and a research agenda. Research Policy 48, 1062-1075.
Köhler, J., Geels, F.W., Kern, F., Markard, J., Onsongo, E., Wieczorek, A., Alkemade, F., Avelino, F., Bergek, A., Boons, F., 2019. An agenda for sustainability transitions research: State of the art and future directions. Environmental Innovation and Societal Transitions 31, 1-32.
Mignon, I., 2017. Intermediary–user collaboration during the innovation implementation process. Technology Analysis & Strategic Management 29, 735-749.
Mignon, I., Broughel, A.E., 2020. What interests do intermediaries prioritize during wind-and solar project development? Environmental Innovation and Societal Transitions 36, 393-405.
Parag, Y., Janda, K.B., 2014. More than filler: Middle actors and socio-technical change in the energy system from the "middle-out". Energy Research & Social Science 3, 102-112.
Patterson, J., Schulz, K., Vervoort, J., Van Der Hel, S., Widerberg, O., Adler, C., Hurlbert, M., Anderton, K., Sethi, M., Barau, A., 2017. Exploring the governance and politics of transformations towards sustainability. Environmental Innovation and Societal Transitions 24, 1-16.
Seyfang, G., Hielscher, S., Hargreaves, T., Martiskainen, M., Smith, A., 2014. A grassroots sustainable energy niche? Reflections on community energy in the UK. Environmental Innovation and Societal Transitions 13, 21-44.

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

The analysis of well-being impacts with the Capability Approach

Bartolomei Livia
University of Roma Tre, Department of Economics, Rome, Italy (livia.bartolomei@uniroma3.it)

Short Bio

I am a third-year Ph.D. Student in Economics. Currently, my Ph.D. thesis must be conceived within Biostar project (2020-2025) whose main goal is to investigate on the potential related to biomass conversion in bioenergy within rural areas of Western Africa, focusing on Small and Medium-sized Enterprises that operate within the agricultural production sector along five food supply chains (rice, cashew, peanuts, mango and karité). My task deals with the analysis of the project's socio-economic mid-term impacts by applying Sen's Capability Approach.

Abstract **–Impact evaluation stands for an evidence-based tool applied to analyze changes in outcomes given by an intervention; this tool has been largely employed in economics literature following several theoretical frameworks. This paper aims to capture the state of the art of how the Capability Approach (CA) has been applied to assess the well-being impacts of project-based development interventions (i.e., excluding policies), and to discuss whether it provides a more comprehensive framework in impact evaluation. In this regard, a systematic literature review has been conducted, picking the countries of the Global South in which development project-based interventions' impacts have been evaluated through the CA. Indeed, the analysis sought to determine which dimensions projects might have the greatest impact on and which indicators are used to assess which capabilities. Then, the capabilities found along the results have been categorized and uniformized according to Nussbaum's list of ten central capabilities in order to understand which are the most recurrent in the literature.**

Keywords **– impact evaluation- capability approach – systematic review – well-being**

INTRODUCTION

Impact evaluation represents an evidence-based tool to assess whether and how any changes in outcomes are due to a given intervention in virtue of a cause-effect relationship (Gertler *et al.*, 2016). Hence, although several theoretical frameworks have been employed within the economics literature in order to evaluate the impacts (such as the monetary approach, the Sustainable Livelihoods Framework, and so forth), the Capability Approach (CA) provides an alternative framework to measure well-being. Indeed, the *capabilities* represent the «real freedoms that people have to achieve their potential doings and beings» (Robeyns and Morten Fibieger Byskov, 2021) as being educated, being employed, being healthy. However, the impact evaluation literature seems to have lagged in measuring progress of interventions in terms of capabilities as defined by Amartya Sen. Indeed, this paper aims to capture the state of the art of how the Capability Approach (CA) has been applied to assess the well-being impacts of project-based development interventions (i.e., excluding policies), and to discuss whether it provides a more comprehensive framework to evaluating this type of interventions.

Hence, a systematic literature review has been conducted in order to proceed with a comparative analysis of how the CA has been used to evaluate project-based interventions in countries belonging to the Global South; the research has included every type of development intervention. The analysis sought to determine which dimensions interventions might have the greatest impact on and which indicators are used to assess which capabilities.

THE CAPABILITY APPROACH

The study is framed within the Capability Approach which emerged at the end of the 1970s as an alternative framework to the dominant neoclassical model (Jolly, 2009). Indeed, Amartya Sen in "Equality of What?" (1980) laid the first foundation of the CA that has been developed and expanded by Nussbaum (2000, 2011) and it consists of a normative framework according to which people should be able to expand and enhance their choices and develop their potential in every aspect of their lives (Sen, 1999). In a nutshell, the CA aims to evaluate the quality of people's lives by examining their individual freedoms (Ribeiro, 2015).

The CA emphasizes *functionings*, which have been defined as "the various things a person may value doing or being" (Sen, 1999: 75), such as being educated, employed, healthy, and so on. However, in order to evaluate the *functionings*, the real freedoms to achieve them (Robeyns, 2017: 39), which are the capabilities, must be examined. But the shift from capability (intended as the *opportunity freedom*) to functioning (the achieved capability) is influenced by the conversion factors (personal, social, and environmental), i.e., «the factors which determine the degree to which a person can transform a resource into a functioning» (Robeyns, 2017: 45). To this categorization, Haenssgen and Proochista (2018) in their "Technology-augmented Capability Approach" have introduced the technological conversion factors as well.

However, the categorization of functionings and capabilities is not uniform and universal, making the distinction difficult to achieve.

METHODOLOGY

In order to investigate how project-based development interventions are evaluated through the CA, a systematic literature review has been carried out. We included in our research any peer-reviewed papers present in Scopus and Web of Science, that present an impact evaluation of a project analyzed with the CA in Global South countries based on the classification given by the World Bank (Clarke, 2018), regardless of the sector of intervention. We excluded from the review impact evaluations of public policy interventions and of political, environmental, or social transformations or disruptions, such as migration flows, natural disasters, or conflicts.

Following the PRISMA (Preferred Reporting Items for Systematic reviews and Meta-Analyses) guidelines (J. Page *et al.*, 2021), in April 2022 we performed a comprehensive search on using the online SciVerse Scopus (*title*, *abstract*, and *keywords* search) and Thomson Reuter's Web of Science search engine (*topic* search).

The resulting database of 363 records fit for inclusion in the review was created, of which 65 papers were eligible for full-text assessment, with ultimately 30 records included in the review, representing our final sample.

DATA ANALYSIS

All the capabilities and/or functionings mentioned in the papers were identified. Subsequently, we classified them in broader dimensions according to Nussbaum's (2000) ten central capabilities list: Life; Bodily health; Bodily integrity; Senses, imagination and thought; Emotions; Practical reason; Affiliation; Other species; Play; Control over one's environment (political and material). Figure 1 shows the methodological approach.

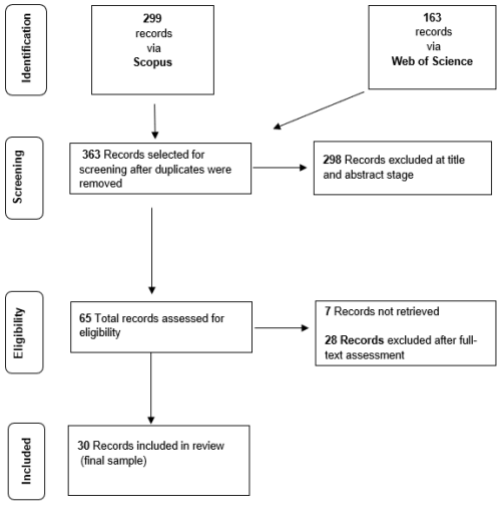


Figure 1. Methodological approach.

RESULTS

Peer-reviewed literature analyzing impacts of project-based interventions through the CA appears to have grown in particular since 2016 (Figure 1). Nonetheless, it is worth noting that the initial search on Scopus and Web of Science only retrieved 363 papers evaluating impacts with the CA in the Global South which is quite surprising, given that the CA has been a largely debated framework in the development economics literature since the 1970s.

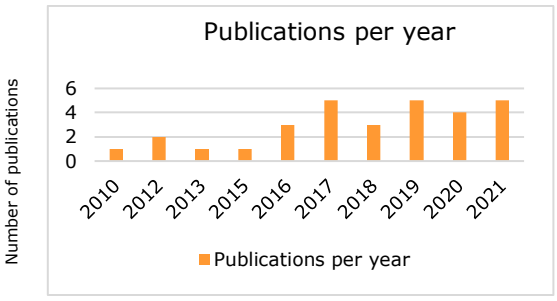


Figure 2. Number of publications per year.

The type of interventions studied include: 17 publications (57% of the total records) on the impacts of Informational and Communication Technologies for Development (ICT4D), and Informational and Communication Technologies (ICT) Programmes for social inclusion and rural development (52.95%); health (17.64%), agriculture (11.77%), women's empowerment (5.88%), finance (5.88%), and education (5.88%). This is shown in Figure 3. Nine interventions focus on education, i.e., Technical and Vocational Education and Training (TVET), service-learning, and PAR (Participatory Action Research).

One of the major results concerns the methods used in the assessments; indeed, twenty out of 30 publications apply qualitative methods, accounting for more than 67% of the sample; eight records applied mixed methods, and only two made exclusive use of quantitative methods. Only three papers use a counterfactual approach (beneficiaries vs non-beneficiaries) (Figure 4A). The data collection methods employed the most were interviews (77%), focus groups (67%), surveys (33%), participant observation, and document reviews (both 23%) (Figure 4B). Remarkably, 67% of the studies implemented a participatory approach. Impacts are analyzed in the papers through thematic analysis (43%), content analysis (30%), and descriptive statistics (10%). (Figure 4C). Eighty-seven percent of the records analyzed impacts at the individual level as the unit of assessment, only four records discussed collective capabilities.

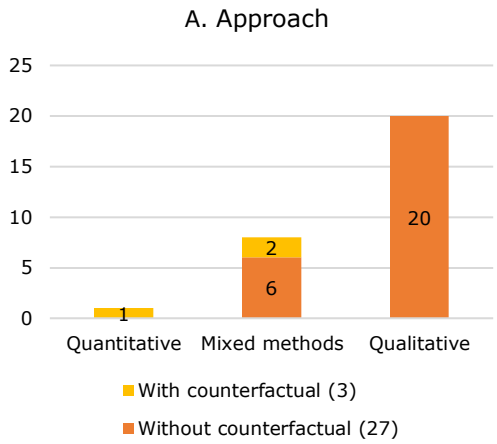


Figure 4A. Methods applied in impact evaluation with CA.

In regard to the theoretical approaches employed along the records, Sen's version of the CA (1999) has been rarely used alone in impact evaluation but matched by other approaches aimed at operationalizing it.
More than half of records deal with ICT4D interventions, integrating the CA with Kleine's choice framework (2010), the informational capabilities framework (Gigler, 2011) and the Technology-Augmented Capability Approach (Haenssgen and Proochista, 2018), just to cite the most employed.
We categorised the impact indicators that evaluated changes in capabilities and the related capabilities and/or functionings either based on how the authors explicitly defined them as capabilities or by classifying ourselves the indicators in terms of capabilities or functionings when the authors did not explicitly call them capability or functioning.
The results might be observed in Table 1:

Table 1. Categorization of capabilities/functionings according to Nussbaum's classification (2000)

Capabilities from Nussbaum's classification	Counting
Affiliation	39
Bodily health	15
Bodily integrity	6
Sense, imagination and thought	49
Emotions	13
Practical reason	46

Control over one's environment (political)	12
Control over one's environment (material)	54
Others (not included in Nussbaum's list)	1

CONCLUSIONS

There is no unambiguous relationship between indicators and capabilities/functionings because to each indicator might correspond different capabilities (e.g., to «business skills» correspond both capabilities connected to employment and knowledge) and at the same time to one capability/functioning might correspond several indicators (e.g., being well-nourished-> Body Mass Index, number of meals, of kcal, and so forth). In addition to that, conversion factors play an important role in the analysis of the impacts by making them heterogeneous among the beneficiaries of the intervention.
The results of the review will be useful in order to select the indicators on well-being and hence the questions that must be inserted in the survey for Biostar.

REFERENCES

Clarke, M. (2018) Global South: what does it mean and why use the term? https://onlineacademiccommunity.uvic.ca/globalsouthpolitics/2018/08/08/global-south-what-does-it-mean-and-why-use-the-term/. Accessed 7 December 2022.

Gertler, Paul J., Martinez, S., Premand, P., Rawlings, L.B., Vermeersch, C.M. J. (2016) Impact Evaluation in Practice, Second Edition. Washington, DC: Inter-American Development Bank and World Bank. https://openknowledge.worldbank.org/handle/10986/25030. Accessed 2 January 2023.

Haenssgen, M.J. and Proochista, A. (2018) The place of technology in the Capability Approach. *Oxford Development Studies* 46(1) 98-112, doi: 10.1080/13600818.2017.1325456.

Gigler, B.J. (2011) Informational Capabilities - The Missing Link for the Impact of ICT on Development. SSRN Electronic Journal 1. Available at SSRN: https://ssrn.com/abstract=2191594.

Jolly, R. (2009) Human Development and Neo-liberalism: Paradigms compared. In Sakiko Fukuda-Parr and A.K. Shiva Kumar (eds) *Handbook of Human Development: Concepts, Measures, and Policies*. New Delhi: Oxford University Press. 106- 116.

Kleine, D. (2010) ICT4WHAT? - Using the choice framework to operationalise the capability approach to development. *Journal of International Development,* 22 (5) 674–692. doi: 10.1002/jid.1719.

Nussbaum, M. (2000) Women and Human Development: the Capabilities Approach, Cambridge: Cambridge University Press.

Nussbaum M. (2011) Creating Capabilities: The Human Development Approach. Harvard University Press.

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E.A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McGuinness, L. A., Stewart, L. A., Thomas, J., Tricco, A. C., Welch, V. A., Whiting, P. and Moher, D. (2021) The PRISMA statement: an updated guideline for reporting systematic reviews. *Systematic Reviews* 10 (89) 1-9. doi: 10.1186/s13643-021-01626-4.

Ribeiro, A. S. (2015) A Normative Framework or an Emerging Theory? The Capability Approach in Higher Education Research *Theory and Method in Higher Education Research*, Volume1. Bingley: Emerald Group Publishing Limited. 277-294. doi: 10.1108/S2056-375220150000001013.

Robeyns, I. (2017) Well-being, freedom and social justice: the capability approach re-examined, Cambridge: Open Book Publishers.

Robeyns, I. and Fibieger Byskov M. (2021) The Capability Approach *The Stanford Encyclopedia of Philosophy* , Edward N. Zalta (eds.). https://plato.stanford.edu/archives/win2021/entries/capability-approach. Accessed 2 January 2023.

Sen, A.K. (1980) Equality of What?. In *McMurrin S Tanner Lectures on Human Values*, Volume 1. Cambridge: Cambridge University Press. 197-220.

Sen, A. K. (1999) Development As Freedom, Oxford: Oxford University Press.

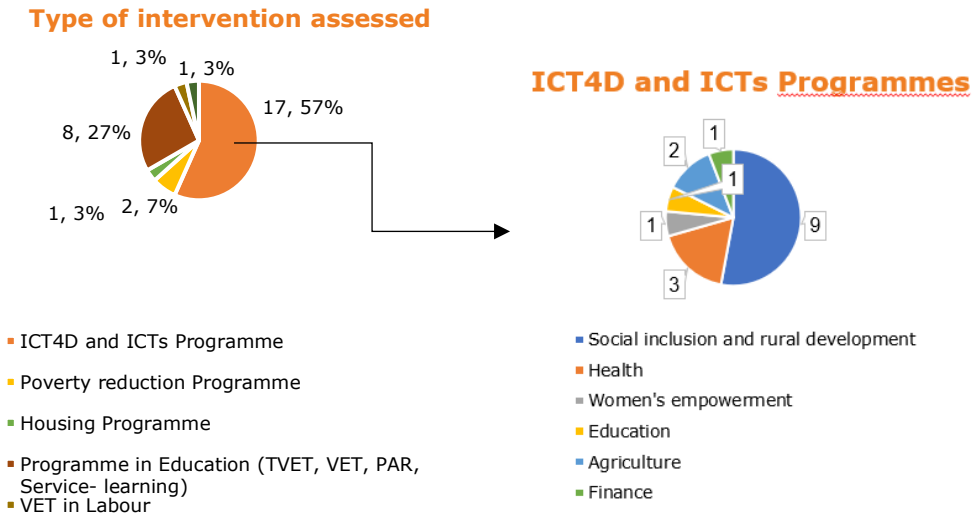


Figure 3. Type of intervention assessed.

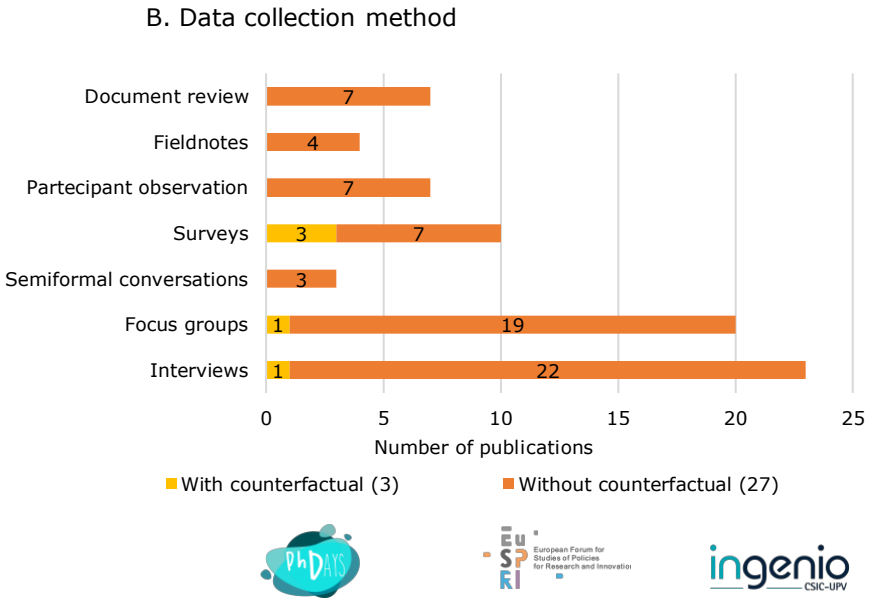


Figure 4B. Methods applied in impact evaluation with CA.

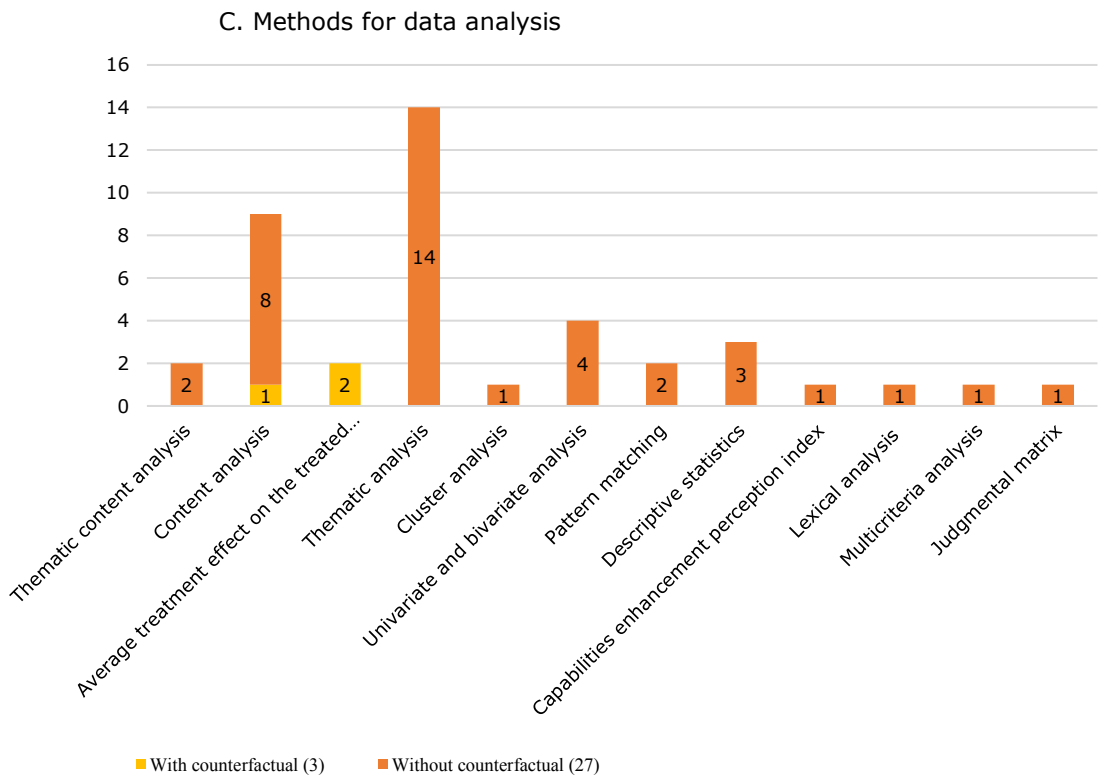


Figure 4C. Methods applied in impact evaluation with CA.

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Design of human-centric instruments to facilitate Positive Energy Districts' creation within Mediterranean cities

Louise-Nour Sassenou
Department of Construction and Technology in Architecture, Escuela Técnica Superior de Arquitectura, Universidad Politécnica de Madrid, Av. de Juan de Herrera 4, 28040, Madrid, Spain (l.sassenou@upm.es).

Short Bio

I am an environmental and Energy Engineer with a master's degree in Strategies and Technologies for Development. Currently in my second year of PhD studies, my research focuses on the design and implementation of strategies that address the wide challenge of urban energy transition. To do so, I am developing solutions and working within multidisciplinary research projects related to energy planning, heat island mitigation and social innovation.

***Abstract* – The multidimensional impacts of the current energy crisis have pointed out the dependence of our societies to energy and the vulnerability of our energy models to changes. Furthermore, the resulting increase in social inequalities has underlined once again the importance of energy for wellbeing and the necessity of considering energy access as a social right that should be guaranteed to all citizens. Therefore, in a context of climate change and associated uncertainty, the focus of strategy policies and plans should be on promoting an energy transition not only resilient and respectful of planetary limits but also socially fair and inclusive. Within cities, Positive Energy Districts (PEDs) could be part of the solution. Indeed, PEDs promote the construction of a decentralized energy model from a local basis, and therefore constitute a powerful tool to implement people centric strategies. The research presented in this paper seeks to facilitate their creation and design by developing instruments that foster the transition of existing districts into PEDs within Mediterranean cities.**

***Keywords* –Positive Energy District; Urban energy transition; Citizen participation; Mediterranean cities; Decision making tools.**

Introduction

Through the rapid urbanisation process of the last decades, it seems clear that cities are, on a global scale, key components of the necessary transition towards environmental and social sustainability. In particular, the urban energy transition constitutes a central axis within this strategy, highlighted in the new European Horizon Europe framework (European Commision, 2021) and national plans of most member countries. The gap between the current situation and the ambitious targets set out in these documents is huge (Stanica et al., 2021) and, in this context, Positive Energy Districts (PEDs) constitute an innovative and powerful instrument that could boost urban energy transformation. PEDs, whose concept was first introduced by the Strategic Energy Technology (SET) plan in 2018, are defined as "energy-efficient and energy-flexible urban areas or groups of connected buildings which produce net zero greenhouse gas emissions and actively manage an annual local or regional surplus production of renewable energy. They require integration of different systems and infrastructures and interaction between buildings, the users and the regional energy, mobility and ICT systems, while securing the energy supply and a good life for all in line with social, economic and environmental sustainability" (Urban Europe, 2020).

Since then, this ambit of research has arisen a lot of interest resulting on an increasing number of publications and projects throughout the years

(Hedman et al., 2021). However, so far, most of the scientific literature on PEDs has focused on the transformation and design of districts' energy system (Brozovsky et al., 2021). The novelty of this ambit of research may explain this trend, but even if the energy system is an essential component of the urban energy transition, other considerations are necessary to achieve the PED's twofold objective of reaching a positive energy balance and carbon neutrality.

On the one hand, concerning technical aspects, studies tend to focus on active solutions (Gabaldón Moreno et al., 2021) while the basis of an energy transition strategy should be to minimise losses, reduce consumption and improve energy efficiency. Furthermore, these different strategies are often studied independently from each other, when it has been demonstrated that good combination of solutions can improve the efficiency of the whole (Castaldo et al., 2018; Ciriminna et al., 2019). Then, most approaches only consider the building stock, whereas the district scale also covers the outdoor spaces existing between the buildings.

On the other hand, as highlighted in the definition, PEDs effective implementation must be in line with social and economic sustainability. To that end, technical strategies should be completed with non-technical solutions such as governance, business models or citizens involvement. The inclusion of these considerations would enable to connect energy assessment to other important components of district sustainability. Despites this clear need, these non-technical solutions have been barely studied. The present research seeks to address these gaps in PEDs applied research.

Objectives

The main purpose of the present research is to develop instruments that foster the transition of existing districts into PEDs, by combining solutions that address energy, environmental and social aspects of district sustainability, and tackle both buildings and public spaces issues.

Districts characteristics vary considerably depending on the city, and the locality must be considered in order to select appropriate solutions that enable PEDs effective operationalization. The present research focuses on the design and development of instruments for Mediterranean cities which, in addition to having similar climatic characteristics, share common social customs and lifestyles (Lopez, 2021). The first objective is to design a methodology to support the transformation of existing districts into PEDs. The second objective is to develop a scalability model of the methodology, demonstrating that the combination of PEDs would enable to accelerate the energy transition at city level.

To that end, the following research questions will be addressed:

- Which are the specific challenges of Mediterranean cities that PEDs should address?
- Which are the most suitable districts for PEDs deployment within Mediterranean cities?
- Which solutions should include a Mediterranean PED?
- How to involve citizens and make them part of the process of transformation of their district?
- How PEDs should be included in city strategies in order to accelerate urban energy transition?

Material and methods

The first step will be to develop a methodology for PEDs design, consisting in two main instruments. The first instrument will be a guide to identify the areas of the city that are most suitable for PEDs implementation, using a multiple-criteria decision analysis (MCDA). The MCDA will comprise criteria related to potential and necessities of the districts and cover economic, social, political, legal, environmental, and technical aspects.

The second instrument will be a decision-making tool to select the technical solutions to implement within the selected districts. This tool will encompass active and passive solutions, for buildings and their environment and take into account synergies that could exist between technologies (e.g., green roof and solar panels). Furthermore, the inhabitants of the district will be involved all along the decision-making process in order to ensure PEDs effective implementation and sustainability. This motivation arises from the need, highlighted by the European Union, to put citizens at the centre of the energy transition, and to consider them not only as beneficiaries or collaborators but also as real actors of change. In that sense, the methodology will incorporate activities to make citizens part of the transformation of their neighbourhoods into a PED tailored to their needs, resources and priorities. It is expected to be of particular interest to support energy communities' creation, a new actor in the energy system that is considered a key piece of the puzzle to achieve a just and inclusive European energy transition.

While acting at the neighbourhood scale reduces the complexity of the urban energy transition challenge, the sum of PEDs has the potential,

if properly coordinated, to transform the city. Demonstrate this claim will constitute the second step of the research: a model to scale-up the methodology from district to city-scale will be developed. In this model, the city will be divided into urban units or cells, and the developed methodology will be applied to transform some of them, the most suitable ones, into positive energy cells. Thanks to this model, it will be possible to test the relevance of driving the urban energy transition from the local scale and to convince municipalities to promote the use of the methodology in their cities. The model will also be a valuable instrument to assist local authorities in the decision-making and coordination at city level.

Conclusion

The research presented in this paper is aimed at creating value mainly for local authorities, citizens and energy communities of Mediterranean countries. Indeed, the two main outcomes of the research - the methodology and the model - are expected to have a wide range of impacts that encompass various scales and aspects of the urban energy transition. First, the model will convince local authorities to include PEDs in their urban planning and energy transition pathways. Then, the methodology will support local authorities in the effective implementation of PEDs in their territories, empowering citizens and making them part of the transformation of their districts. In line with this social dimension, the developed methodology is expected to be of particular interest for energy communities. Finally, thanks to all these impacts, both instruments are expected to boost the transition towards resilient, just, inclusive and sustainable energy models within Mediterranean cities.

Acknowledgements

The research presented in this paper has received funding from the Spanish Ministry of Science and Innovation via a doctoral grant to the first author (FPU20/07591) and from the Comunidad de Madrid through the call Research Grants for Young Investigators from Universidad Politécnica de Madrid as part of the project POSEIDON (APOYO-JOVENES-21-LI6SVQ-77-664ZUQ).

References

Brozovsky, J., Gustavsen, A., & Gaitani, N. (2021). Zero emission neighbourhoods and positive energy districts – A state-of-the-art review. *Sustainable Cities and Society*, *72*, 103013. https://doi.org/10.1016/J.SCS.2021.103013

Castaldo, V. L., Pisello, A. L., Piselli, C., Fabiani, C., Cotana, F., & Santamouris, M. (2018). How outdoor microclimate mitigation affects building thermal-energy performance: A new design-stage method for energy saving in residential near-zero energy settlements in Italy. *Renewable Energy*, *127*, 920–935. https://doi.org/10.1016/j.renene.2018.04.090

Ciriminna, R., Meneguzzo, F., Pecoraino, M., & Pagliaro, M. (2019). *Solar Green Roofs: A Unified Outlook Twenty Years On*. https://doi.org/10.20944/preprints201902.0074.v1

European Commision. (2021). *Horizon Europe Strategic Plan (2021-2024)*.

Gabaldón Moreno, A., Vélez, F., Alpagut, B., Hernández, P., & Sanz Montalvillo, C. (2021). How to Achieve Positive Energy Districts for Sustainable Cities: A Proposed Calculation Methodology. *Sustainability 2021, Vol. 13, Page 710*, *13*(2), 710. https://doi.org/10.3390/SU13020710

Hedman, Å., Rehman, H. U., Gabaldón, A., Bisello, A., Albert-Seifried, V., Zhang, X., Guarino, F., Grynning, S., Eicker, U., Neumann, H. M., Tuominen, P., & Reda, F. (2021). IEA EBC Annex83 Positive Energy Districts. *Buildings 2021, Vol. 11, Page 130*, *11*(3), 130. https://doi.org/10.3390/BUILDINGS11030130

Lopez, L. (2021). Does the Future Belong to Mediterranean Cities? In *Springer Geography* (pp. 287–308). Springer Science and Business Media Deutschland GmbH. https://doi.org/10.1007/978-3-030-49464-3_14

Stanica, D. I., Karasu, A., Brandt, D., Kriegel, M., Brandt, S., & Steffan, C. (2021). A methodology to support the decision-making process for energy retrofitting at district scale. *Energy and Buildings*, *238*, 110842. https://doi.org/10.1016/j.enbuild.2021.110842

Urban Europe. (2020). *Europe towards Positive Energy Districts* . https://jpi-urbaneurope.eu/

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Promoting urban food policies and transforming the urban food system through European Union funded project: the case-study of Turin

Luca Battisti[1], Federico Cuomo[2], Giacomo Pettenati[3], Egidio Dansero[1]
[1] *University of Turin, Department of Culture, Politics and Society, Torino, Italy (luca.battisti@unito.it; egidio.dansero@unito.it)*
[2] *Polytechnic of Milan, School of Management, Milan, Italy (federico.cuomo@polimi.it)*
[3] *University of Eastern Piedmont, Department of Economics and Business Studies, Novara, Italy (giacomo.pettenati@uniupo.it)*

Short Bio of the presenters

Luca Battisti: Research Fellow at the Department of Culture, Politics and Society, University of Torino. Ph.D. in Agricultural, Forest and Food Sciences, specializing in the analysis and evaluation of ecosystem services provided by landscape and urban horticulture. Since 2021 he has been involved in European projects related to the study and implementation of Nature-based Solutions and food policies in urban areas.

Federico Cuomo: After graduating in Political Science, I obtained a PhD in Innovation for the circular economy at the University of Turin. My research interests range from the analysis of urban collaborative governance systems to the evaluation of environmental, health, and justice public policies. Currently I am a postdoctoral researcher in policy analysis at the Department of Management Engineering at the Polytechnic of Milan.

Abstract **– The EU Commission has a growing interest in promoting programmes focusing on urban food policies that impact urban food systems. Specifically, this contribution aims at analysing projects financed through H2020 programmes with particular reference to the themes of urban food systems and urban food policies.**
The aim is to understand how such projects can respond to the need for how to plan and develop policies that are supportive in re-bridging cities and their hinterlands.
The overall intent of the projects funded should therefore envisage and foster actions and policies that can be transferred and replicated in very different contexts.
In order to better analyse these aspects, the FUSILLI project is examined in more detail, analysing in particular the Turin case study.

Keywords **– urban and peri-urban ecosystems; urban food policies; living labs; governance**

INTRODUCTION

The EU Commission has a growing interest in promoting programmes focusing on urban food policies that impact urban food systems.

Such programs have the power to make concepts, discourses and methodologies circulate at the international scale, addressing the development and implementation of food policies and practices at the local level (Morgan, 2013).

Some scholars, mostly from political and social science, have criticized the circulation of some discourses, derived from international policy framework, for having depoliticized highly political problems, such as urban environmental sustainability (Swyngedouw, 2015).

In line with this perspective, other studies have highlighted how food policy making is far from being neutral and has to deal with a wide range of interests and pressures from different levels of governance (Ward, 2006). Specifically, when food policies are about to be moved from one scale to another they are particularly exposed to political influence. Nonetheless, the mobility of policy is also considered as a promising process for questioning policy regimes at very different scales by promoting an alternative food system based on reuse, inclusion, accessibility and equity (Peck 2011). For this reason, from a policy and geographical perspective, it is gaining momentum the analysis of projects based on mixing policy transfer perspective with mobilities approach in order to highlight the relational dimension and to analyse what happens during the "journey" of policies.

Specifically, this contribution aims at analysing projects financed through H2020 programmes with particular reference to the themes of urban food systems and urban food policies.

The intent is to understand how such projects can respond to the need for how to plan and develop policies that are supportive in re-bridging cities and their hinterlands.

The overall objective of the projects funded should therefore envisage and foster actions and policies that can be transferred and replicated in very different contexts.

In order to better analyse these aspects, the FUSILLI project is examined in more detail, analysing in particular the Turin case study.

Methods

In order to achieve the objectives, a qualitative review of the programmes financed in the last 5 years by the European Union was conducted with particular reference to projects with a focus on urban food policies that impact urban food systems.

For each of the selected projects, several aspects were analysed including the role of the project leader, the total number of partners, the cities involved and the total cost of the projects.

In addition, an attempt was made to provide a first indication of the recurring keywords in the projects, trying to highlight their presence or absence in the overall objectives of the selected projects.

Furthermore, a food policy scheme is proposed, which attempts to illustrate how the relationships and flows between the directions indicated by the European Union and the local context in which the funded projects are set.

Focusing on the Italian reality, an attempt has been made to highlight the Italian cities that are signatories of the Milan Urban Food Policy Pact, subdividing them according to the different roles they are playing in the implementation of food policies.

Finally, among the various projects selected, in order to better illustrate the activities and processes carried out by the EU-funded projects, particular attention was paid to the FUSILLI project and the case study of Turin.

Discussion and Findings

In total, six projects were selected for their possible impact on urban food policies. In particular, it can be seen that the role of universities as project leaders is particularly important, with four universities leading six selected projects. Moreover, the number of partners involved varies from 25 to 43, with an almost constant presence of Italian entities. Funding from the European Union is in the range of EUR 7-12 million. Among the various keywords mainly present in the overall objectives, worthy of mention are Policies and Living Lab as well as the topic of City Region Food System.

Taking into account this perspective, the European project FUSILLI aims at experimenting with 'mobile' pilots that, while implementing the same innovations in twelve cities, can be fixed and shaped according to the place-based features of the urban context. FUSILLI focuses on co-designing and co-producing Urban Food Policies (UFP) to turn the urban food system of 12 European cities (Athens, Castelo Branco, Differdange, Kharkiv, Kolding, Oslo, Rijeka, Rome, San Sebastian, Tampere, Turin) into an inclusive, sustainable and accessible one. According to the European Commission's 'Food 2030' strategy, FUSILLI promotes experimentations in five food policy domains: production, distribution, consumption, waste management and governance. As stressed by the project managers, these innovations should be 'mobile', namely transferable to contexts different from the original one, by fostering the distribution of new social and political paradigms and triggering multiscalar collaborations between state and nonstate stakeholders (Peck 2011). To accomplish this, all the urban governments adopt a joint methodology of applied research and policy action, the Living Lab (LL), based on the cyclic involvement of citizens in designing, prototyping, testing and

evaluating pilot actions in real-life contexts (Nesti 2018).

In Turin, the LL is placed in the district of Mirafiori Sud, a former industrial area at the south administrative borders of the city. In the short period, the project encompasses the experimentation of several food-related initiatives, such as the circular transformation of urban greening community spaces by means of reusing, reducing and recycling practices.

As a medium-term goal, FUSILLI aims at formulating a city strategy and establishing a Food Policy Council to coordinate food policies with a collaborative governance perspective.

CONCLUSIONS

The research underlines preliminary results about the selected H2020 financed programmes related to food policies. All those projects could represent a chance for existing local strategies in order to be implemented and boosted by framing and involving several local actors into a common projectual goal.

Although this research is ongoing, the general intention of the funded projects seems to be to promote actions and policies that can be transferred and replicated in very different contexts.

This is the specific case of the FUSILLI project, especially in Turin, which takes up the legacy of the initiatives and actions conducted in recent years aimed at constructing local food policies. The project acts as a catalyst for processes aimed at setting up an initial interdepartmental group with the objective of establishing a food policy agenda.

Based on this model, the process can also be replicated in other urban contexts, seeking to strengthen a dialogue between the urbanised area and its hinterland.

REFERENCES

McCann, E., & Ward, K. (Eds.). (2011). *Mobile urbanism: Cities and policymaking in the global age* (Vol. 17). U of Minnesota Press.

Morgan, K. (2013). The rise of urban food planning. *International Planning Studies*, *18*(1), 1-4.

Nesti, G. (2018). Co-production for innovation: the urban living lab experience. *Policy and Society*, *37*(3), 310-325.

Peck, J. (2011). Geographies of policy: From transfer-diffusion to mobility-mutation. *Progress in human geography*, *35*(6), 773-797.

Swyngedouw, E. (2015). Depoliticized environments and the promises of the Anthropocene. In *The international handbook of political ecology* (pp. 131-146). Edward Elgar Publishing.

The length of the short paper - or extended abstract - is maximum *1500 words*. References are required.

Ward, K. (2006). 'Policies in motion', urban management and state restructuring: the trans-local expansion of business improvement districts. International Journal of Urban and Regional Research, 30(1), 54-75.

An integrated management tool for assessing the economic, environmental and social impact for the development and integration of the cooperative supply chain

Ludovica Piergiovannii
Politecnico di Milano, Milan, Italy, ludovica.piergiovanni@polimi.it

Short Bio

Ludovica Piergiovanni is PhD student at the School of Management of Politecnico di Milano. She holds an MSc in Management Engineering from Politecnico di Milano with a focus on Sustainable Operations Management and Social Innovation. Being passionate about Social Innovation, she did an internship in UniCredit in the Internationalization project of Social Impact Banking in Milan on Microcredit, Impact Financing and Financial education. She has worked as Research Associate in EVPA where she has been involved in the content development of several research activities with a focus on impact measurement and management, data collection, analysis and visualisation on the European impact investment market. Her current research focuses on impact measurement and management in the cooperative supply chain.

***Abstract* – As climate change, wellbeing, health, and equality are challenging private and public actors, it has increased the need of accountable social impact performances and reliable data. This research aims to develop an impact measurement and management framework that integrates social, environmental and economic objectives and that underlines the additionality of the mutualistic characteristic of cooperatives as well as the value created by a meta-organisation. It aims to support managers in improving non-financial performance based on sustainability information, as well as developing purpose-driven public-private partnerships.**

***Keywords* – social economy, cooperatives, impact measurement, meta-organisations**

PHENOMENON

In a post-pandemic world, mortality and poverty increased due to COVID-19 has generated at least 68 million additional poverty years and 4.3 million years of life lost across 150 countries (Decerf et al.,2021). Now more than ever, it has increased the need of a strong and effective social economy that has demonstrated ready and valuable in the moment of crisis providing services in undercapitalized markets.

Its readiness and adaptively has proven the effectiveness of a holistic view in the economic paradigm, that considers environmental and social aspects in the value-creation equation, thorough a multi-stakeholder approach.

The attention of the public actors in the social economy has grown. Only in Europe, this year European Commission is developing the Social taxonomy in order to clearly state what a social investment is. In terms of resources, one pillar of the InvestEU package has an area dedicated to social investment and skills.

In FY 2019 in Europe impact investors supported Social Purpose Organisations with €6.2 billion of which €2.9 billion were newly deployed (EVPA, 2020). These are resources addressed with the primary objective to create societal impact, following the triad of impact i.e. measurability, intentionality and additionality.

On the demand side, the boundaries between for profit and not-for-profit organisations have blurred and there is an increase in the development of hybrid forms of social enterprises (Grieco et al., 2015).

There are 2.8 million social economy enterprises and organisations, ranging from SMEs to large EU groups employing 13.6 million people.

The social economy consists of a diversity of enterprises and organisations like cooperatives, mutual societies, associations, foundations, social enterprises among other forms specific to each country.

The growth of the supply side has encountered a mismatch with the demand side (Oxfam,

2017). Financial and impact return expectations have been hard to communicate throughout the value chain for a lack of common language. In the rapid growth of financial mechanisms such as Social Impact Bonds and their principle of payment for success, the need of accountable social impact performance and reliable data has grown (Nicholls and Tomkinson 2015).

Additionally, a gap has emerged on how to go beyond measurability and communication purposes and how to practically develop an integrated management tool that enables managers to align the organization and improve its non-financial performance based on sustainability information (Braig, 2020).

This underlines the relevance of intermediaries that understand the relevance of purpose-driven partnerships and act in multi-stakeholder sectors relevant for the public good. At national level, Consorzio Nazionale dei Servizi (CNS) acts as reference for the development and integration of the cooperative supply chain. Its mission is to promote and support growth, innovation, skills development, industrial and financial synergies, acting as a key interlocutor between the member world and the potential market.

RESEARCH OBJECTIVES

This research proposal focuses on developing an integrated impact measurement and management model, with a multi-stakeholder organisation such as CNS, to clearly measure the blended value created. This framework will consider relevant trade-offs between standardisation and tailor-made approaches in measuring the materiality of different type of impact i.e. economic, social and environmental. It aims to transfer relevant data and insights for all actors involved, both the supply and the demand side.

Three main questions emerge from this setting:

1. How to develop an impact measurement and management framework that integrates economic, environmental and social objectives and that ensures an intentional, measurable and additional impact?

2. How can this framework support the management of trade-offs and the decision-making process in a multi-stakeholder organisation?

3. How the integration of impact objectives can change the mechanisms in developing purpose-driven partnerships between public, private and third sector entities?

METHODOLOGY

As regards the methodological steps, the research will begin with a systematic review of literature. The literature review will be performed on the main conceptual building blocks that constitute the research. First, it will focus on the impact measurement and management methodologies that integrate economic, environmental and social dimensions. Secondly, it will explore which are the tools available to manage the trade-offs in the decision-making process. Finally, it will look at financial mechanisms involved in funding hybrid organisations and the role of intermediaries that aim to support social purpose organisations.

An empirical research will be carried on involving CNS and its members (currently 173 Italian cooperatives) in order to develop the entire measuring system, analysing how the integration of impact objectives is addressed to improve the non-financial performances and to develop purpose-driven partnerships.

This research holds relevance not only at academic level, but also for practitioners. The role of intermediaries and meta-organisations that facilitate hybrid organisations to access the market is crucial in prioritising services that serve the public good and that maximise a positive impact.

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Needs and Well-being towards the ecological transition

Marisol Manfredi
Economic Policies for the Global Transition (EPOG+), Università di Torino, Université Paris Cité, Université de technologie de Compiègne
(marisolmanfredi@gmail.com)

Short Bio

Marisol studied Economics in Argentina and did a Joint Erasmus Mundus MA in "Economic Policies for the Global Transition" in Italy (Torino) and France (Paris). Now she is starting her PhD on Sustainable Development and Climate Change in University of Pisa. Her research interests are policy making analysis regarding the topics of well-being and needs to explore the concept of "how much is enough". In in her PhD she will focus on the Dark Side of Innovation studies.

***Abstract* – The present work discusses the notion of well-being and needs aiming to build bottom-up policies for the ecological transition. It uses a multidimensional perspective of well-being, recognizing its objective and subjective perspective, and its material and immaterial dimension. It provides a discussion of the process of needs-formation with insights from the theory of needs of Marx explained by Heller. It discusses the necessity to reconfigure our democracies and involve the civil society, suggesting the use of innovative methods for defining its needs and satisfiers. It runs an exploratory experiment for defining the needs and drivers of well-being in the city of Mar del Plata, Argentina, during the Covid-19 pandemic. It uses the methodology of virtual ethnography harvesting tweets from Twitter accounts and explaining the results through network semantic analysis. It concludes that in a moment of material constraints and changing relationships with time and money, inner/radical or soul's needs appear at the same time that material needs decrease. This is an important insight for building the narrative of Degrowth in the Global South, which, instead of top-down policies prohibiting the satisfaction of material needs, can build bottom-up policies for incentivizing the satisfaction of immaterial needs, leading to the same result.**

Keywords **– well-being, needs, bottom-up policies, ecological transition, twitter, virtual ethnography, pandemic, degrowth, global south, mar del plata.**

Introduction

The environmental crisis is threatening the well-being and satisfaction of our universal needs (Gough, 2015). Since 2020, the acceleration of the ecological crisis, exacerbated due to the pandemic, put the topics of environmental and social sustainability at the core of the global policy agenda. A chaotic or deliberative change will have to take place (Keucheyan, 2018). Economic science has made great contributions in times of profound social crises. However, tackling the problems of modern society stemming from the past conditions that led to these problems, calls for new tools and combinations of them. Even though the intellectual effort to devise solutions on how to facilitate this transition is hard and ambitious, we argue that the production of knowledge in the form of practical solutions to meet the ecological emergency is a must.

The multidimensional crisis we are in can be seen from its social, economic, ecological, democratic, cultural and/or digital side. The fact is that due to its magnitude, we are not able to fully assimilate and internalize it. We are at a crossroads, at a turning point: we must define the paths to go while we walk, and to redraw in the shadows the signs that can symbolize our understanding of the threatening reality. We are facing a turbulent moment of creation (Max Neef, 1991). And we must re-question, inevitably, all

that is visible and legitimated in our science, in order to make the invisible paths possible.

This work does not pretend to build any model to follow, but to provide a change of perspective. This paper challenges the alternative, arguing that the mainstream have led us to the present eco-suicide: a term to explain how our humanity has suppressed its immaterial well-being, only focusing of the mechanisms of production and reproduction of the material, assuming a superior control over nature, putting in danger our habitability on the planet, and blindly summiting to the vicious circles of the fetishism, forgetting the valuable notion of *the enough*. This work inaugurates a discussion that does not finish with it. On the contrary, the aim is to open up the space in our field to start having fundamental discussions that have been undermined.

This paper is a challenge to bring back the immaterial components that also (and fundamentally) make us humans. We are living in an epoch of fundamental transitions, which implies that the changes of paradigms are not only necessary, but essential. Therefore, the objective of the current work is to contribute to the policy making arena on the construction of local, bottom-up well-being policies, widening the approach to embed all the different existential categories where human beings realized their needs. It is a reflection of the pandemic effects that analyze the civil society in a moment of material constraints. The question of what is essential for a good life is the guiding question of this work. Accessing the individuals through a perspective of well-being and human needs allows us to build bridges between economics, anthropology, psychology and politics. It also implies that the State can and should assume an active role in stimulating the drivers for people to live an alternative life, with greater consciousness about their immaterial needs.

The work begins discussing three theoretical and fundamental topics, as to know: well-being, needs and democracies.

In Section 1, Well-being, contributions about its conceptualization and operationalization are given. It criticizes the paradigm of economic growth and the direct association between GDP and well-being, exposing the theoretical and methodological limitations of the informational base in which it relies on (utilitarianism and welfare economics), as well as practical discoveries between the relationship between income and subjective well-being. It also brings the notion of happiness embed in the Greeks thoughts, highlighting the importance of the Aristotelian notion of *eudaimonia* (the practice of the soul's needs). It also brings the Latin American perspective with the contribution of the cosmovision of Buen Vivir, which recognizes the inner and immaterial side of humans in their connection with nature. There are three main conclusions of the chapter: 1) Welfare economics has relied on an incomplete conception of wellbeing, reducing it to its material dimension and undermining others, e.g., the spiritual, and assuming individuals as rational agents who defined themselves through their 'preferences' in the market 2) There is non-interchangeability of the objective and subjective dimensions of the well-being, arguing that for its definition both sources of data needs to be taken into account and 3) Well-being should be locally defined, according to the values, traditions, attitudes and habitus the community.

In Section 2, Needs, the main contributions of the Marxist theory of needs are explained. It describes the alienated process of needs-formation, leading by production and the valorisation of capital, reducing the individuals to mere consumers. It also raises awareness of the conception of 'radical needs', that is, non-alienated needs that arise when capitalism and its mechanisms are transcended. This section also discusses the phenomenon of overconsumption, exploring the notion of leisure time. The main conclusions of this chapter are: 1) Needs are alienated, legitimized through market exchanges and defined by production; 2) Inner, immaterial, radical or soul's needs do not appear under the current capitalistic system; 3) Leisure time has been undermined to 'unproductive time', and 4) There are not any natural limits to this process.

In Section 3, Democracies, a discussion about the current distrust on governments is provided. It is argued that for such a fundamental exercise as the definition of human needs, civil society needs to be at the centre of the discussion. The main conclusions are: 1) There is a crisis of representation in current democracies, and 2) The challenge is to innovate in the ways we can create bottom-up policies can be reached through the combination of the development of IT technologies with vast amount of digital traces that people leave in their social media accounts.

After the theoretical exploration, this work is put into context: the ecological crisis. It argues that it is now the moment to design a transition, pointing out the consequences of the growth paradigm into society and its well-being. It characterizes the ecological crisis as a care crisis, building bridges between feminist and ecological approaches. It discusses the notion of degrowth, arguing that it is a powerful narrative for leading the transition, but it is a concept mainly developed in the Global North. It argues that in the Global South this narrative is about to be written,

explaining that a discussion about well-being and human needs should be preceded. The main conclusions of this chapter are: 1) The consequences of the economic growth paradigm, 2) The links between caring activities and ecological processes -the maintenance economy- and 3) The need to raise the discussion of well-being in the Global South in order to embed the concept of degrowth in a wider, bottom-up manner.

Aiming to combine all the conclusions posed in the theoretical part, this work conducts an exploratory research about the needs of the specific locality of Mar del Plata (known as "the happy city" of Argentina). For doing so, it departs from the intuition that during the lockdown of the pandemic, the civil society asked themselves truly what they need. Aiming to catch them, it analyses the discourses on the social media platform of Twitter and put them into a semantic network analysis with Infranodus software.

The conclusions of the exploratory work in Mar del Plata show that during COVID, non-alienated needs appeared in a proportion of the sample, showing that this decreased the material needs. This poses a challenge for future degrowth policy makers in the Global South: incentivizing the immaterial needs can also decrease the material. For doing so, policy makers need to open their theoretical spectrum to multidimensional well-being theories. It also proves that among the existential categories in which people realize their needs (being, doing, having) the needs of the "being" were higher than the needs of the "having" during COVID-19. However, this process -which we called the "process of de-alienation without de-legitimization"- only lasted for two months, with no clear conclusions about the long-term effects of the pandemic on needs.

The main contributions of this paper are, on the one side, the proposal of an alternative innovative methodology to answer the question of "what do we need?", which cannot be left in the hands of a small group in power. On the other hand, it combines the theories of Buen Vivir with theories of consumption and needs to contribute on the narrative of degrowth for the Global South, taking into account the immaterial dimension of the well-being and proposing limits to material consumption patterns through the incentive of other corridors where we can realize our needs. It also brings a useful differentiation for the English language for the verb *to be*, exploring its multiple meanings. Finally, for the specific city of Mar del Plata, brings insights to understand the reason why it is called "the happy city", as well as possible paths to increase the immaterial dimension of wellbeing policies.

References

Aguado, M., Calvo, D., Dessal, C., Riechmann, J., González, J., & Montes, C. (2012). La necesidad de repensar el bienestar humano en un mundo cambiante. Papeles de relaciones ecosociales y cambio global, 119(2), 49-76.

Bornstein, B. Á., & Montesi, M. (2016). La comunicación entre investigadores en Twitter. Una etnografía virtual en el ámbito de las ciencias de la documentación. Revista española de documentación científica, 39(4), 8.

Gough, I. (2015). Climate change and sutainable welfare: the centrality of human needs. Cambridge Journal of Economics, 39(5), 1191-1214.

Keucheyan, R. (2018) La revolución de las necesidades vitales: Marx en la era de la crisis ecológica. Nueva sociedad, Nueva Sociedad, Friedrich Ebert Stiftung, 2018, pp.102-115. ffhalshs-01921922f

Manfredi, M., & Di Pasquale, E. A. (2021). Medición del bienestar objetivo y subjetivo: una propuesta de índice de desarrollo humano integral. Revista de economía mundial, (57).

Max-Neef, M. A. (1991). Desarrollo a escala humana: conceptos, aplicaciones y algunas reflexiones (Vol. 66). Icaria Editorial.

Sen, A. (1979) "Utilitarianism and Welfarism". En: The Journal of Philosophy, Vol. 76, No. 9. pp. 463-489.

Soper, K. (2020). Post-growth living: For an alternative hedonism. Verso Books.

Žižek, S. (2020). Pandemic!: COVID-19 shakes the world. John Wiley & Sons.

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

What is to be changed if my social organization is already feminist? Processes of feminist organizational change in Spain

Marta Maicas Pérez
INGENIO CSIC-Universitat Politècnica de València, València, Spain (marmaipr@ingneio.upv.es)

Short Bio

PhD student at the Doctoral Program in Local Development and International Cooperation at INGENIO CSIC-Universitat Politècnica de Valencia (UPV). Her main research topic is Feminist Economics. She holds a degree in Business Administration and Management, a master's degree in Development Cooperation, and a master on High School Education. Its fields of interest are feminisms, organizational change, participatory research methodologies, social and alternative economics, and transformative education.

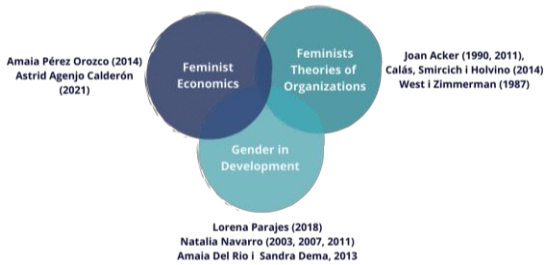
Organizations are not gender-neutral containers that, as such, reproduce multiple inequalities. Thus, gender is understood within a complex system of intersecting oppressions that shapes the norm and socioeconomic relations, performing "even" in Solidarity Economy (SE) organizations. This research is aimed to analyze the changes generated in SE organizations that conducted a process of feminist organizational change. Those processes boost organizational reflection and action (changes) to move towards more habitable organizations. For this purpose, a qualitative methodology has been implemented. We have facilitated a participatory process and conducted several interviews, participant observation, and documentary reviews to analyze two SE organizations in Valencia and the Basque Country. The study reveals the political, technical, and cultural changes in both analyzed experiences. Moreover, we identified some factors that boost feminist transformation in organizations and those barriers and resistances to change. Learnings from these experiences can help other social associations to develop processes of feminist organizational change and to construct more feminist and habitable institutions, far from reproducing and generating inequalities.

Keywords **– feminist organizations, organizational change, feminist methodologies, solidarity economy.**

FEMINISM IN ORGANIZATIONS? THEORETICAL FRAMEWORK

Three main areas of knowledge nourish this work. Firstly, Feminist Economics establishes the framework and guides organizational change processes. Feminist Theories of Organization help us to contextualize organizational realities and the different approaches of gender and changes discussed in the area of knowledge. Finally, the theories of Gender in Development help us to frame the origins of the feminist organizational change processes, coming from the analysis of the resistances and limitations that gender strategies generated in the third sector organizations. Figure 1 summarizes the primary authors and theories that build the theoretical framework.

Figure 1. Theories that build the framework



Objectives of research

Firstly, we will analyze the impact of feminist organizational change processes on Solidarity Economy organizations, looking for the elements that boost or limit the feminist transformation of the organization, as well as the contribution to this transformation of the participatory and feminist methodologies. The other objective of this thesis is oriented beyond the research itself since it consists of generating actions in the organizations with which this work is developed to build more inclusive, depatriarchalized, and not mercantile practices. We summarize the research objective as follows:
1. To analyze the impact of feminist organizational change/ processes in solidarity economy organizations.
1.1 Classify the levels of change generated in solidarity economy organizations by the processes of feminist organizational change.
1.2 Identify the limiting and enhancing factors of the feminist organizational change processes.
1.3 Explore how participatory and feminist methodologies contribute to the transformative capacity of organizational change processes.
2. To generate organizational actions and dynamics to build more inclusive, depatriarchalized, and not mercantile practices.

Research questions

1. What changes can the practices of Feminist Economics generate in solidarity economy organizations?
2. What aspects of organizational change processes drive or limit feminist organizational transformation in oil-based organizations?

Methodology

This research is based on a feminist research paradigm. The research design corresponds to an interpretative case study, where two cases of two organizations are analyzed: REAS País Valencià and REAS Euskadi. The case study is interpretative since the objective is not to compare both experiences but to develop a situated interpretation and reflection and, thus, be able to weave partial truths from the reality and context of each organization.
Regarding the methodological strategy, it has had different approaches in each of the case studies. In the case of REAS País Valencià, a Feminist Action Research-Action methodology has been developed based on the processes of feminist organizations. The work with REAS País Valencià, which is part of this research process, was born with an evident orientation to action, understanding research as another tool for social transformation, and a feminist approach in terms of the way of understanding, doing and living research. In this case, participatory and hermeneutic techniques are articulated: participatory workshops, participant observation, interviews, and documentary review. In addition, in the case study of REAS Euskadi, the methodology is more interpretive, using hermeneutic techniques such as semi-structured interviews and documentary reviews. The research began with a deductive-inductive approach since the framework of Feminist Economics motivated the same research question and the initial process approach; however, during the research development, the theoretical framework was completed more inductively.

Key findings

We have followed Natalia Navarro's proposal to identify the levels of change that have occurred due to the organizational modification processes developed by both organizations' case studies. Navarro contemplates changes at three levels for processes of pro-gender equity organizational change (Navarro, 2017): at a technical level, which refers to how its resources are aligned to achieve its priorities; at the political level, which refers to how it establishes gender equity as a priority and at the cultural level, referring to shared beliefs and how organizations and people learn from their experience.
About changes at the political level, we identify five significant aspects that refer to establishing gender equity as a priority for the organization. At first, participants point out that feminism has gained space and priority in most of the organization's projects and activities. On the other hand, it is observed that they have become part of the organizational identity. Furthermore, the experience of the change process can prompt other organizations to rethink and start similar processes, becoming the network a kind of reference for others. There is also evidence of a more significant presence of feminism and feminist practices.
At a technical level, we have identified that resources have been explicitly mobilized in organizations to develop the actions and changes resulting from the process. One of the aspects that changed the most or were the focus of more reflection was the work team (their distribution of tasks and working conditions). In addition, participation in organizations was reviewed and modified in the same way that the structure and work models were better adapted to their needs, which resulted in the identification and redistribution of tasks and responsibilities in organizations (not only of the work team but also of the board of directors/governance, member entities, volunteering). Protocols and procedures were established in topics such as welcome/newcomers, exit/goodbye processes, and aggression management. Specific training was carried out focused on violence and inequalities in

groups, power, and conflict management. Finally, internal and external communication was modified to promote transparency and greater fluidity of information and its distribution.

At the cultural level, there were changes in the organization's culture in recognizing the importance of care, emotions, and reproductive tasks that make network sustainability possible. There were processes of deconstructing productivist ideas and what is known as "heroic militancy ". Moreover, after experiencing this process, organizations have detected the need to continue working, betting on a procedural vision of change that breaks with the productivist and commodified agenda of projects in the short and medium term. It is understood, therefore, that the questioning and critical review of the organization is a fundamental axis for its health and search for habitability.

Regarding the changes in consciousness and identification of power, we observed how people changed their understanding and vision of feminism as the path to social transformation, breaking with some reductionist visions of the gender perspective as a variable (closer to gender in management approaches). This awareness allows the recognition of hetero-patriarchal and gendering attitudes and an understanding of the structural causes of inequalities and how the organization and its members reproduce them. In addition, conflict management is appreciated and valued, and the organization is de-idealized. Finally, we identify that learning and personal change is a drivers of change for organizational cultural change. Regarding power identification, we observe changes in the exercise of this identification and an effort to claim and redistribute power within the organization.

References

Acker, Joan (1990). "Hierarchies, Jobs, Bodies: A Theory of Gendered Organizations" en Gender & Society, 4(2), 139–158.

---------- (2006). Inequality regimes: Gender, class, and race in organizations. Gender and Society, 20(4), 441–464.

---------- (2011). "Theorizing Gender, Race and Class in Organizations" en Handbook of Gender, Work and Organization (Número de setembre), p. 65-80.

Agenjo-Calderón, Astrid (2013). "Economía Feminista: los retos de la sostenibilidad de la vida" en Revista Internacional de Pensamiento Político, 8 (I), p. 15-27.

---------- (2021). Economía política feminista. Sostenibilidad de la vida y economía mundial. Madrid, Catarata.

Calás, Marta B., Smircich, Linda, y Holvino, Evangelina (2014). "Theorizing Gender-and-Organization: Changing times... changing theories" en The Oxford Handbook of Gender in Organizations.

Del Río Martínez, Amaia y Dema Moreno, Sandra (2013). "El replanteamiento de la cooperación para el desarrollo desde el feminismo en un escenario de crisis estructural". En Voces y saberes feministas: hacia una agenda de cooperación emancipadora, 15-37. Bilbao, Hegoa.

Navarro Oliván, Natalia (2003). "Cambiar el chip: Revisión de algunos conceptos para poder impulsar cambios organizacionales en pro equidad de género" en Género en la cooperación al desarrollo: una mirada a la desigualdad, 53.

---------- (2007). "Desigualdades de género en las organizaciones. Procesos de cambio organizacional pro equidad" en América Latina Genera: Gestión del Conocimiento para la Equidad de Género en Latinoamérica y el Caribe (PNUD).

---------- (2011). "Cambio organizacional pro equidad de género" en Tercer Seminario Internacional Sobre Cultura Organizacional.

Pajares Sánchez, Lorena (2018). Análisis de las resistencias al género en las ONG de desarrollo. Visibilizando las incoherencias para la transformación en Servicio Central de Publicaciones del Gobierno Vasco.

Pérez Orozco, Amaia (2014). Subversión feminista de la economía. Aportes para un debate sobre el conflicto capital-vida. (3a Ed). Madrid, Traficantes de Sueños

West, Candace y Don Zimmermann (1987). "Doing Gender" en Gender and Society 1(2), pp. 125-151.

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

The role of the university and society in the process of migration to the circular economy: contribution towards sustainable tourism destinations in Chile.

M. Triviños-Velasquez[1,2], A. García-Aracil[3], R. Isusi-Fagoaga[4]
[1]*INGENIO CSIC-Universitat Politècnica de València, València, Spain (marmaipr@ingneio.upv.es)*
[2]*Universidad Austral de Chile, Instituto de Turismo*
[3]INGENIO, CSIC. Universitat Politècnica de València
[4]Universitat de València

Short Bio

Mauricio Triviños: Master's in education, Management and Educational Policy. Since 2013 he has worked as a professor at the Institute of Tourism at Austral University of Chile, linked to activities of territorial management, productive development and public policies for regional governments, municipalities, and unions of the South-Austral macrozone of Chile.

Abstract - This text seeks to address from the point of view of society and academia a binding work that leads to sustainable production systems in territories with high value in diversity and with productive vocation associated with tourism, specifically special interest tourism. The development of migration strategies towards circular economy models in portal communities associated with protected wild areas in an articulated manner seeks the generation of a dynamic that enhances the value chain of local production. The present work focuses on the progress and piloting of information, key actors and legal framework for the development of the doctoral thesis. "The role of the University and Society in the process of migration to the Circular Economy: Contribution towards Sustainable Tourism Destinations in Chile".

***Keywords*- Circular Economy, Vocation and Productive Matrix, Biodiversity, Local Development, Sustainability and Special Interest Tourism**

INTRODUCTION

The intensive use of natural resources, whether renewable or not, is a constant in countries that base their productive matrix on the extraction of resources and production of raw materials (commodities). The productive matrix of a locality or even of a country can be understood as the form of organization of territories and their social groups to produce and generate certain goods, whether material or immaterial. In turn, we could understand it as a system, therefore, the type and quality of the interrelations between the elements that make it up is relevant for its development. Although, we often conceive of the productive matrix as a system of a technical-economic nature, it should not be limited to this alone. Thus, the social relations of production and their elements play an important role, as the environment (territories) where these economic-productive activities take place, given the productive characteristics of the localities.

In this sense, Arce 2015, in his book "La Extracción de recursos Naturales y la Protesta social en Perú", points out that this extraction of non-renewable resources is "structurally significant" and

comprises a key aspect of the economic-political of a "developing" nation and a central source of the foreign exchange that sustains its economic development. However, these productive components, which are usually the mainstay of a country or territory (extractive industries), generate negative impacts on their natural, social, and even economic-productive environment. Also points out that, "the extraction of natural resources especially affects the rural poverty and generates grievances among the local population due to land expropriation, environmental degradation and inadequate employment opportunities" (Arce, 2015, p. 21).

Territories, especially those with high biodiversity value, must coexist with various forms of exploitation, uses and production, which are an important part of their productive matrix. One of these forms, which on paper generates fewer impacts, is the tourism industry. Tourism activity is characterized by providing visitors and excursionists (demand) with a series of satisfiers in the form of attractions, resources, products, services and/or experiences (supply); these components form part of a destination's tourism system. Although tourism activity should have the least impact on the territories where it is carried out, its practice often causes problems in cultural spheres (cultural appropriation), clusters (tourist ghettos) or changes in land use, labor instability, among others.

Industries linked to forestry, aquaculture, agriculture, mining or other extractive activities, usually have mitigation measures associated with their work or corporate responsibility agreements, continue degrade and impoverish the raw material that sustains the **SIT** activity, causing in many cases "productive incompatibilities" in the forms of exploitation of the territories, due to pollution in rivers, lakes, mining landslides, erosion of the territories, displacement of fauna and even transformation of the typical productive processes of the territories. However, these same industries have a greater impact on the traditional economic indicators of the territories and/or localities where they are installed.

Methods

This work focuses on the progress and piloting (in the Municipality of Valdivia, Los Ríos Region, Chile) of information, key actors, and legal framework for the development of the doctoral thesis. "The role of the University and Society in the process of migration to the Circular Economy: Contribution towards Sustainable Tourism Destinations in Chile". It is proposed to build a territorial development strategy in linkage between academia and society, which contributes to a gradual migration to a circular economic model for portal communities in territories with natural wealth and high biodiversity value.

The piloting information is based on mainly qualitative research, with a descriptive approach and the use of quantitative data, based on a case study, using the following methodological elements: Report (Ministry of Social Development and Family), Actors involved, Pilot choice (protected area and community involved), Identification of SDG targets and National legal framework. Among the tools used, the following stand out: Literature review, Previous contact, Panel of experts (virtual by Zoom meetting) and In-depth interviews.

Discussion and findings

"(..) a universal value that underlies the alternative development model of use and care of natural resources to produce environmental services that benefit all, the common good, as opposed to an unsustainable development that erodes the function of the sources of life"
(Sánchez Sotomayor, 2019).

The intensive use of natural resources in territories with high biodiversity value is a common factor in many Latin American countries, either for agricultural, forestry or mining use, according to ECLAC, Even when Ecuador, Peru and Chile have dissimilar total surfaces (28,360,000; 128,521,500 and 75,610,000 hectares respectively), the first two have a similar proportion of the surface covered by forest (2020 measurement) over 50% of their territory. Chile reaches 24%. And from these data, the use of forest plantations in the first two reaches 0.45% in Ecuador, 0.85% in Peru, but in Chile in 2020 it reached 4.28%. On the other hand, if we compare the proportion of land and marine protected areas in these three countries with a tourist vocation, we also have a dissimilar proportion Ecuador has 64%, Peru 15% and Chile 21%. (ECLAC, 2022)

These three countries compared, according to the World Tourism Organization (UNWTO), are attractive for their high biodiversity value (UNWTO, 2021), but also, coincide in the intensive use of their soils for resource extraction. At the same time, they show disparities in the percentages of protected territories in each of them.

The apparent "incompatibility of uses", which in most cases are observed by the same communities that receive these industries, are often overlooked, either because of indicators associated with job

stability, better salaries, seasonality of tourist activity, size of the extractive industry or even labor regulations. According to ECLAC 2019, in Latin American, industries associated with the extraction or intensive use of natural resources are strongly present in the productive matrix and contribute to local GDP, such as the mining, forestry, livestock, agriculture, salmon, and fish farming industries, among others. On the one hand, and according to the Chilean Undersecretary of Tourism, tourism has positioned itself in recent years among the main local industries. According to estimates, tourism activity in 2019 (without the effects of the pandemic and its restrictions) was $6,489 billion, representing 3.3% of GDP (Subsecretaria de Turismo, 2019).

The OECD, in its report, Policy brief on making the most of the Social Economy's contribution to the Circular Economy, defines some of the forms of organization and production that focus their role primarily on people, environment and outside the performance indicators of the traditional economy as "the set of associations, cooperatives, mutuals, foundations and social enterprises which activity is driven by the values of solidarity, the primacy of people over capital and democratic and participatory governance can help to strengthen both the circular economy and the social economy, cooperatives, mutuals, foundations and social enterprises whose activity is driven by the values of solidarity, the primacy of people over capital and democratic and participatory governance can help reinforce both the circular economy and its social impacts, for example, through inclusive and decent work." (OECD, 2022, p. 14)

Under this scenario, it is vital for the sustainability of the territories to investigate how to generate productive linkages and compatibility of extractive processes with economic models closer to the green and/or circular economy, through a strong link between society, academia, and other actors in the innovation helix. At the local level, it should be noted that commitment of Chile to the 2030 Agenda for Sustainable Development, (global development agenda, universal and holistic), related to the sustainability of territories, communities and protection of biodiversity mentions sustainable productive processes in the territories actions, at least in 7 of its Axes: E-1: Quality Education; E-2: Affordable and Clean Energy; E-3: Decent Work and Economic Growth; E-4 Sustainable Cities and Communities; E-5: Responsible Production and Consumption; E-6: Climate Action and E-7:Life of Terrestrial Ecosystems.

Conclusions

The conclusions associated with the piloting should be approached in a piecemeal manner. For example, a legal framework is observed, strengthened by international agreements (Ramsar, cooperation agreements, Agenda 2030, Sustainable Development Goals and others), and local legal elements (2 national policies; 8 laws; 1 decree with force of law and three decrees) all of which are linked to the 7 axes of sustainable development.

In turn, although the information gathering process associated with the pilot conducted in the Los Ríos Region was able to build up a network of key actors linked to a robust civil society with high levels of associativity (committees, neighborhood councils, women's associations and although), they lack knowledge of processes associated with non-traditional economy, but they do recognize the relevance of the urban protected areas of the pilot, of which they were part of its development since its inception through their participation in social movements. With respect to governmental actors, it should be noted that at the time of the information survey they were in the process of installation (new government in Chile), and lack of knowledge of the SDG commitments is striking. They were ascribed by Chile in 2015, being legally recognized in 2016 and that when asked about initiatives associated with some of the goals related to special interest tourism, sustainability and community, all the actors named widely known and publicized actions such as the change of heaters.

The linking work between academia and society involves an investment and transformation in new ways of thinking and doing, leading to sustainable production systems that, for example, harmonize with the local culture, the use of new materials with greater durability, making efficient use of available resources, weighing in eco-design, new forms of packaging, among others. The actions linked to the migration towards a circular economy carried out in an articulated manner seek to generate a dynamic that enhances the value chain of local production.

References

Arce, M. (2015). *La Extracción de Recursos Naturales y la Protesta social en Perú.* Bogota: Ediciones desde abajo.

Caravaca, D., Gutiérrez, M., Hernández, A., Luna, J., Rodríguez, J., & Villareal, D. (2014). *Introducción al sistema turístico: Una aproximación a los conceptos generales,*

Guía para la capacitación. Guanacaste: CEMEDE.

CEPAL. (18 de FEBRERO de 2022). *www.cepal.org/es*. Obtenido de www.cepal.org/es: https://statistics.cepal.org/portal/cepalstat/index.html?lang=es

CEPAL. (10 de febrero de 2022). *www.cepal.org/es*. Obtenido de www.cepal.org/es: https://statistics.cepal.org/portal/databank/index.html?lang=es&indicator_id=2021&members=20902,224

Comisión Europea. (2015). *COMUNICACIÓN DE LA COMISIÓN AL PARLAMENTO EUROPEO... Cerrar el círculo: un plan de acción de la UE para la economía circular.* Bruselas : Comisión Europea.

Comisión Europea. (2020). *Un nuevo plan de acción para la economía circular Para una Europa más limpia y competitiva.* Bruselas: Comisión Europea.

Ministerio de Desarrollo Social y Familia. (22 de febrero de 2022). *www.chileagenda2030.gob.cl/*. Obtenido de www.chileagenda2030.gob.cl/: http://www.chileagenda2030.gob.cl/Agenda%202030/sobre-agenda/sobre-la-agenda/1

OECD. (2022). *POLICY BRIEF ON MAKING THE MOST OF THE SOCIAL ECONOMY'S CONTRIBUTION TO THE CIRCULAR ECONOMY.* Luxembourg: Publications Office of the European Union.

Romero, P. (2018). ¿Y la matriz productiva? Replanteemos el debate sobre el desarrollo. *Koyuntura*, 3.

SERNATUR. (21 de febrero de 2022). *www.sernatur.cl*. Obtenido de www.sernatur.cl: https://www.sernatur.cl/destinos/

Subsecretaria de Turismo. (28 de septiembre de 2019). *www.subturismo.gob.cl*. Obtenido de www.subturismo.gob.cl: http://www.subturismo.gob.cl/documentos/estadisticas/

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Transport poverty and attitudes in relation to urban mobility: a bibliometric analysis

Miriam Revert Cabanes
(Universidad Politécnica de Valencia, Valencia, Spain (mrevcab@doctor.upv.es).

Short Bio

Miriam Revert is a Secondary Education Professor. Prior to that, she worked in strategic and change consultancy and in an in-company teaching. In particular, she is interested in understanding physical and social consequences related to urgent urban mobility challenges. The research is designed with a gender perspective and to encourage the Sustainable Development Objective number 11: "sustainable cities and communities".

Abstract **– This research on transport poverty has grown over the past ten years, making more evident the role of urban transportation in support of human developing. Our review contributes to current debates over sustainable inclusive cities, a crucial aspect for urban mobility transition. In this study, a total of 189 articles were explored, using the Bibliometrix R package to perform descriptive analyses. The top country researching on transport poverty was United Kingdom, while the top journal was Transport Policy. In terms of co-occurrence, the top keywords were "car dependence", "accessibility", and "social exclusion". The collaboration network map showed 11 small authors clusters characterized by a low level of connection. We find that transport poverty is an area of limited research, even being central for developing sustainable transport systems policies. Scientific research remains to be conducted to better understand behavioral responses to Sustainable Urban Mobility Plans, to greener modes of transport.**

Keywords **– Transport poverty, car dependence, sustainable urban mobility, proenvironmental travel just transition, bibliometric analysis.**

1. Introduction

The private car is the predominant option as a means of transport with urban sprawl. Cars and traffic congestion have been pointed to be the main factors affecting air pollution (Tao et al. 2021). However, this may result contradictory when exist an environmental concern. In fact, it is materialized in the Sustainable Development Goal (SDG) 11: "Make cities more inclusive, safe, resilient and sustainable", since it is expected that 60% of the population will live in cities by 2030 (SDG, 2022).

The origin of this reality can be found in Fordism, which forced a strict separation between working time and non-working time. This conditioned workers to consume two necessary material goods. The home, a place away from work to replace wear and tear, almost necessarily forced to acquire a car (Arribas, 2013). Still, the improvements that will lead to a progressive change towards a sustainable urban mobility also depend on individual motivations.

At the same time, transportation poverty is an underexplored and even poorly articulated term, both in developed countries and in developing countries (Lowans et al., 2021; Lucas et al., 2016). Following the definition of Lucas et al. (2016), it can be stated that an individual is poor in transportation if to satisfy their daily activity needs, there is no option available that is tailored to their physical condition or arrive at their destination. Transport poverty also referrers to the condition where the amount of money used for transportation leaves the household below the poverty line, an excessive amount of time needs to be spent in the trip (time poverty), or the conditions are dangerous or unhealthy.

In fact, living far from urban areas or having less means to travel to work can lead to social

isolation. This vulnerability, in turn, is sustained by structural problems, due to inequalities based on class, race, gender, age and/or disability (Simcock et al., 2021). Consequently, the following research is thought to be convenient to explore the global scientific literature on transportation poverty. The objective is to determine patterns concerning "transport poverty" within the literature. With this study, scientific evidence will be further given on how we move around cities, with what attitudes and difficulties and to what degree of satisfaction.

2. Research design and bibliometric analysis

Bibliometric analysis is a rigorous method for analyzing scientific data. It enables to appreciate the nuances of a specific field, while uncovering the emerging areas in the field (Donthu et al. 2021). To this end, the following search strategy was used on the Web of Science (WOS) platforms on 27/12/2022 to find specific literature.

TS=("transport poverty" OR "mobility poverty" OR "transport affordability" OR "forced car ownership" OR "car dependence") and Language:(English) and Document Types:(Articles)

Indexes=All
Timespan=1970-2022

In this first stage, 246 results were obtained, that were manually examined through a WOS marked list. The title, abstract and keywords were the basis for the exclusion criteria. All those papers whose analysis did not explicitly focus on poverty and transport were discarded, for example, studies aligned with walkability assessment or mobility as a service (MaaS). From this process, 57 results were excluded, and 189 articles were exported for detailed reading to further develop a consistent understanding of the topic.

These results were uploaded to Bibliometrix through its web-interface application Biblioshiny. This software is an open-source tool for conducting a comprehensive science mapping analysis of scientific literature (Aria & Cuccurullo, 2017). The four main levels of analysis were the authors (most productive and influential ones), documents (distribution areas and volume of publications through time), sources (journals in which the literature is published), and clustering (the networks of keywords co-occurrence).

3. Results: author, journal and publication trends within the literature

By determining patterns concerning transport poverty literature, it will be possible to identify a clear starting point to further develop this topic by investigating attitudes in relation to urban mobility problems and future policies. Applying bibliometric analysis, the following results have been obtained.

3.1. Co-authorship authors network

The top 12 authors ranked by number of publications are shown in *Table 1*. Only author with a minimum of 3 documents published on the topic were selected. Giulio Mattioli, with 11 articles and 111 citations, resulted the main contributor to the initial growth of the research on transport poverty.

Table 1. Most productive authors

Authors	Articles	(%)	Citations	Nationality
MATTIOLI, G.	11	5,8%	111	Italian
LUCAS, K.	9	4,8%	76	British
ALLEN, J.	5	2,6%	13	Canadian
FARBER, S.	5	2,6%	13	Canadian
CAULFIELD, B.	4	2,1%	5	Irish
ZHAO, P.J.	4	2,1%	4	Chinese
ZHOU, J.P.	4	2,1%	4	Chinese
AHERN, A.	3	1,6%	4	Irish
CHURCHILL, S.A.	3	1,6%	6	Australian
DELBOSC, A.	3	1,6%	22	Australian
LANZEDORF, M.	3	1,6%	1	German
SHAO, C.F.	3	1,6%	1	Chinese

The topic transport poverty is mostly investigated by authors specialized in "transport geography", "transport economics" and "transport policy", confirming the need for a multidisciplinary approach framework. The collaboration network map shows 33 authors grouped into 11 small clusters characterized by a low level of connection (*Fig.1*).

3.2. Co-authorship countries network

The results showed a total of 37 countries publishing on transport poverty. Out of the total number of countries, only 12 met the threshold of minimum 3 articles. The world map shows how collaborations among countries are mainly accomplished by United Kingdom, collaborating principally with Australia and the United States (*Fig.2*). This result demonstrates the existence of a very concentrated global network of researchers. in addition, it is remarkable that prior to 2008, literature about transport poverty was almost inexistent. It is from this year, when there is a rapid growth mainly in the United Kingdom, the United States and Australia (*Fig.3*).

3.3. Citation analysis of journals

The top 12 journals with a minimum of 4 articles published are ranked in *Table 2*. As shown, most of the research is in the fields of policy,

geography, and energy. Transport Policy and Journal of Transport Geography are the first ranked in terms of number of documents, being the second one more relevant in terms of citations. It is not common for transport poverty to appear in other source specializations, such as "Sustainability" or "Cities". It may indicate that literature is quite concentrated in a few areas, without being developed under a multidisciplinary approach.

Table 2. Most relevant sources

Journal	Articles	Citations
Transport Policy	19	496
Journal of Transport Geography	18	638
Sustainability	11	72
Transport Research Part A-Policy and Practice	11	426
Transportation Research Part D-Transport and Environment	7	177
Transportation Research Record	6	182
Research in Transportation Economics	5	46
Travel Behaviour and Society	5	40
Case Studies on Transport Policy	4	26
Cities	4	52
Energy Research & Social Science	4	58
Transport Reviews	4	202

3.4. Co-occurrence Keywords analysis

The analysis of keywords resulted in 547 entries. Identifying the first 100 words with more occurrences within the literature, a thematic map was generated (*Fig. 4*). Main cluster is on "car dependence and transport poverty", showing a high degree of relevance and a medium one of development. The network map in *Fig. 5* shows that "Car dependence", "accessibility" and "social exclusion" have the closest relationship to transport poverty. This may confirm how important may be the car issue in relation to inclusive transport and mobility systems. Sustainability keyword emphasises the necessity of developing a deep understanding of the interlinkages among social, economic, and environmental urban challenges for the achievement of the 2030 SDG.

4. Conclusions

In this study, the global scientific literature on transport poverty was explored through bibliometric analysis. The results provided an overview on the main features and permitted the analysis of the relationship among authors, journals, and keywords. The analysis showed that the research has grown since 2008, being this subject of a deep concern to a small concrete group of academics and countries.

Considering the importance of urban sustainable mobility, it is expected that the literature will continue growing. Being cities a place for personal developing and social connections, it is desirable that future investigations will explore attitudes in relation to urban mobility and the characteristics of sustainable cities under the public policy approach positioned towards safe, affordable, accessible, and sustainable transport systems for all people (in relation to objective 11.2. of SDG 11).

5. References

Aria, M., & Cuccurullo, C. (2017). bibliometrix: An R-tool for comprehensive science mapping analysis. Journal of Informetrics. https://doi.org/10.1016/j.joi.2017.08.007

Arribas, J. M. (2013). Sociología del consumo e investigación de mercados. UNED.

Donthu,N., Kumar, S., Mukherjee, D., Pandey, N. & Lim, W.M. (2021). How to conduct a bibliometric analysis: An overview and guidelines, Journal of Business Research, Volume 133, https://doi.org/10.1016/j.jbusres.2021.04.070

Lowans, C., Furszyfer, D., Sovacool, B., Rooney, D. & Foley, A. (2021). What is the state of the art in energy and transport poverty metrics? A critical and comprehensive review, Energy Economics, Volume 101 https://doi.org/10.1016/j.eneco.2021.105360

Lucas, K., Mattioli, G., Verlinghieri, E. & Guzman, A. (2016). Transport poverty and its adverse social consequences. Transport. Volume 169 https://doi.org/10.1680/jtran.15.00073

Simcock, N., Jenkins, K. Lacey-Barnacle, M., Martiskainen, M., Mattioli, G., & Hopkins, D. (2021). Identifying double energy vulnerability: A systematic and narrative review of groups at-risk of energy and transport poverty in the global north, Energy Research & Social Science, Volume 82. https://doi.org/10.1016/j.erss.2021.102351

Tao, A., Liang, Q., Kuai, P. & Ding, T. (2021). The Influence of Urban Sprawl on Air Pollution and the Mediating Effect of Vehicle Ownership. Processes 9, 1261. https://doi.org/10.3390/pr9081261

United Nations - Sustainable Development Goals (SDG). (2022). Sustainable Development Goals. Available at: https://www.un.org/sustainabledevelopment/cities/

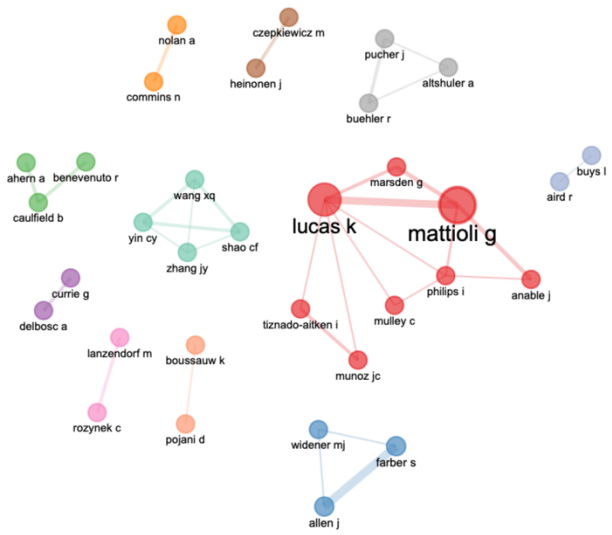


Figure 1. Collaboration network map.

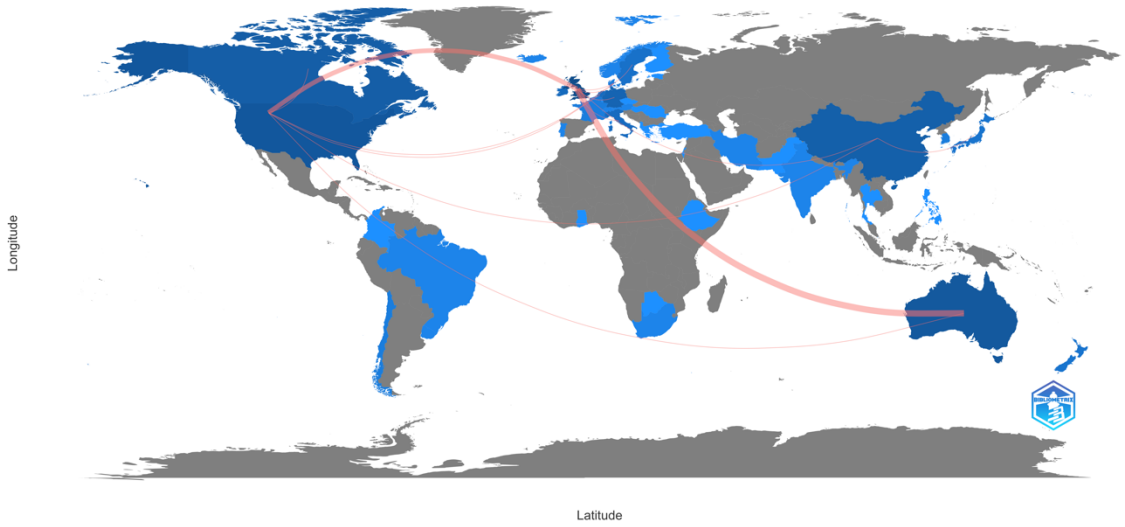


Figure 2. Collaboration World Map.

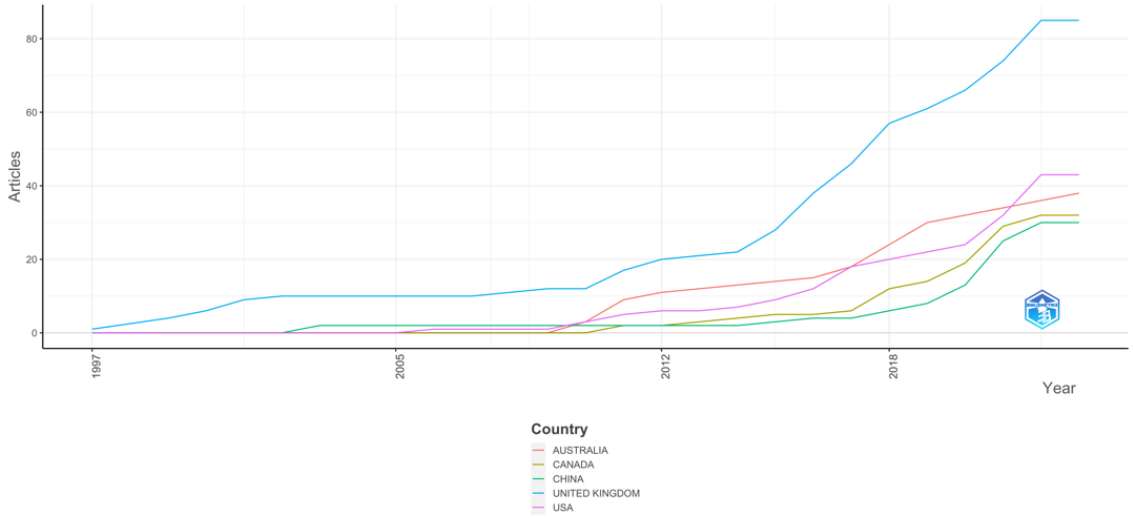


Figure 3. Country Production over time.

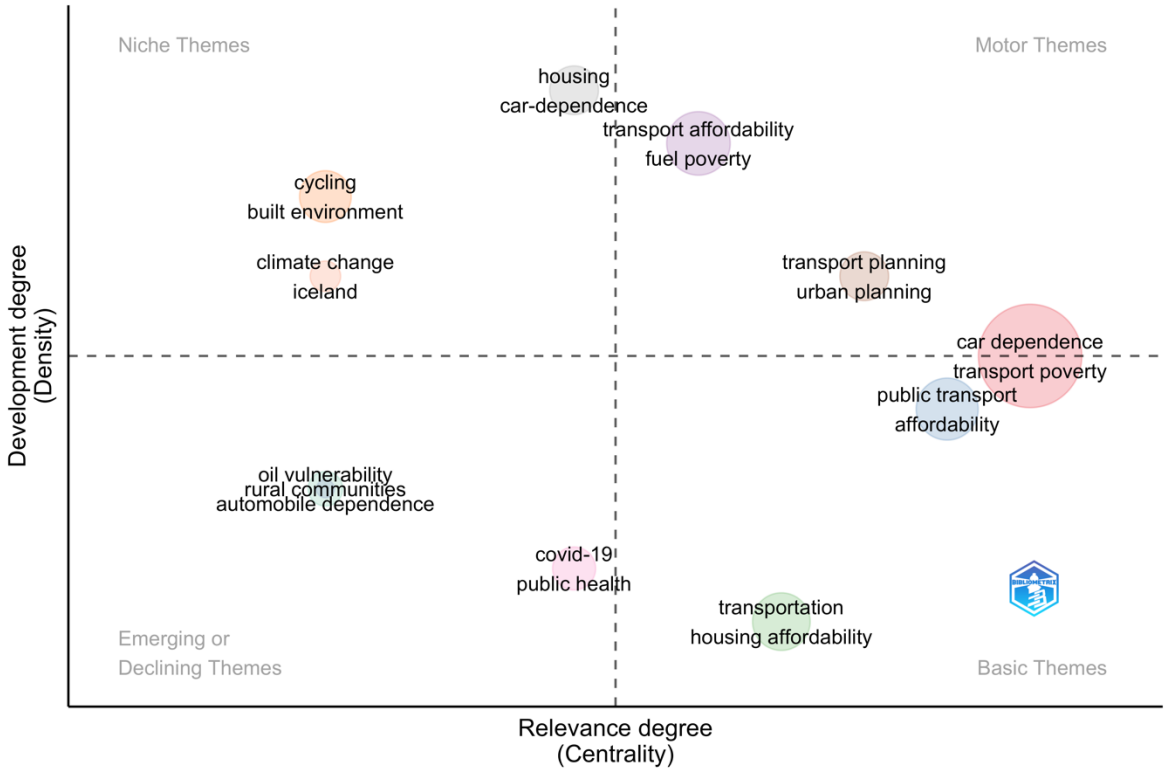


Figure 4. Thematic map in transport poverty.

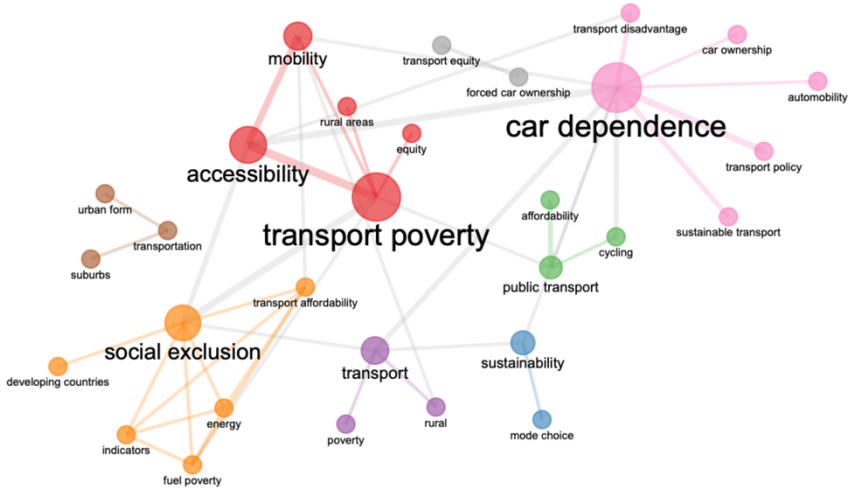


Figure 5. Co-occurrence network map in transport poverty.

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Critical Raw Materials and the 'Dark Side of Innovation': Addressing the economic and societal challenges arising from artisanal and small-scale mining

M. Adil Sait
PhD Candidate in Economic Geography
Department of Geography & Environment, London School of Economics and Political Science, London, United Kingdom (m.sait@lse.ac.uk).

Short Bio

Adil Sait is a PhD candidate in Economic Geography at the LSE Department of Geography and Environment. His doctorate focuses on mining of critical raw materials, crucial for Industry 4.0. and its implications for African countries. Adil holds a BSc. in Urban Planning, UCL (First Class Honours, 2015-18) and MSc. in Local Economic Development (LED), LSE (Distinction, 2018-19). His masters' research on LED in Liberia was funded by the Firoz Lalji Centre for Africa.

Abstract – Critical Raw Materials (CRMs) refer to a large group of natural resources defined by their supply constraints including the geographic concentration of mining deposits, production capacity and refining capabilities, alongside non-substitutability, low recycling rates, and few commercially viable alternatives. Increasingly important for technological innovation, CRMs are noted as forming the material basis of the shift to the next industrial revolution (Industry 4.0). Notable CRMs include cobalt, lithium, nickel, bauxite, alumina, and others – including so-called 'conflict minerals' i.e., tin, tungsten, tantalum and gold ('the 3TG') – essential to new technological innovations, despite various types of consequences for source countries. Mining for CRMs also results in heightened vulnerability for artisanal and small-scale mining (ASM) communities, especially compared with large scale mining (LSM), due to the loss of agricultural livelihoods, displacement, irreparable land degradation, damage to natural habitats, and lasting inequalities 'locked-in' by mining dependency. This research paper, utilising recent notions of the 'dark side of innovation' – highlighting the need examine further various consequences of technological change on society – focused on linkages between mining for CRMs and ASM practices across African countries. Its main findings suggest, more research is still needed to redress the various economic and societal consequences unsustainable practices on ASM communities.

***Keywords* – Critical Raw Materials; Artisanal and Small-Scale Mining; Dark Sides of Innovation; African development**

RESEARCH BACKGROUND

Recent notions of the 'dark side of innovation', focusing on the direct or indirect, inherent or unintended, immediate or long-term implications of innovation, highlight a need to examine further various consequences of technological change on society (Coad et al., 2021; Coenen and Morgan, 2020; Biggi and Giuliani, 2021). This includes long-known, geographically uneven, development consequences created, sustained, or mitigated by technological progress, which so far have been under-explored (Phelps et al., 2018). In the context of the shift towards the next industrial revolution (Industry 4.0.) so far commentary has focused mainly on perceived benefits of digitisation, smart technologies, and

artificial intelligence for improved production efficiency, low carbon transitions, a shift to product-service systems, and the ability of cloud computing to address public health challenges (Lasi et al., 2014; Bonilla et al., 2018; Helm and Hepburn, 2019). However, it has also been recognised that a non-trivial number of the advanced technologies involved rely on input of 'critical raw materials' (CRMs) (Lapko et al., 2016; Diemer et al., 2021; Li et al., 2022). These include cobalt, lithium, nickel, bauxite, alumina, and others – including so-called 'conflict minerals' i.e., tin, tungsten, tantalum and gold ('the 3TG') – essential to new technological innovations, despite various types of consequences for source countries (Berman et al., 2017; Church and Crawford, 2018; Shapiro et al., 2018).

Mining activities across African countries have been described as being 'dangerous, dirty and difficult' (Selmier II and Newenham-Kahindi, 2017). They have direct impacts on human health, and extraction and processing create lasting environmental damage, pollution, and contamination (Hilson and Murck, 2000; Nkulu et al., 2018). Mining for CRMs also results in heightened vulnerability for artisanal and small-scale mining (ASM) communities, especially compared with large scale mining (LSM), due to the loss of agricultural livelihoods, displacement, irreparable land degradation, damage to natural habitats, and lasting inequalities 'locked-in' by mining dependency (Ali et al., 2018; Ofosu et al., 2020; Kramarz et al., 2021). This is problematic not simply due to the geographic concentration of deposits and reserves, production capacity, refining capabilities, but also non-substitutability, low recycling rates, and few commercially viable alternatives (Reuter et al., 2013; Petavratzi et al., 2019). It also means potential beneficiaries, like those in the Democratic Republic of Congo with 64% of world cobalt reserves, remain amongst the poorest and most unstable economies in the world; despite, global demand for cobalt by 2050 predicted to rise by 585% to 644 kilometric tons (Sovacool et al., 2020; Fragkos et al., 2021).

This research focused on linkages between mining for CRMs and ASM practices across African countries. Framed by the research background, it responds to a single research question: 'How can policy-makers and other actors address economic and societal challenges arising from ASM activities across African countries?' The research focused on three dimensions: first, policy actions required to redress negative consequences of mining for CRMs; second, various actors and stakeholders (i.e., key players) involved in policy and decision-making processes in the ASM sector; third, barriers to implementing policy solutions linked to CRM mining.

Methodology

The research underpinning this paper is based on a mixed-methods approach; using descriptive data analysis, review of policy-relevant grey and academic literature, and preliminary fieldwork to construct the evidence-base required for answering the main research question presented in the research background. A key part of the methodological framework presented is filling gaps in the evidence on CRMs across African countries and helping to present an in-depth discussion over policy responses. To this end, there were interconnected parts of the methodological inquiry:

Data analysis. The paper used data from the United States Geological Survey (USGS), and other sources such as the World Bank, UNDP, and Chatham House, as well as data from UN Comtrade – with information on CRM exports and dependence – to construct profiles of CRM mining activities across African countries/regions. This helped construct 'pen portraits' of countries/regional that mine for CRMs.

Review of the (grey) policy and academic literature. This focused on various 'harms' arising from CRM mining across African countries (e.g., environmental, social and economic consequences on specific communities). These cases/examples will be collated into a database of policy actions and approaches that have been documented within the literature. It also helped to identify possibly relevant interventions, and key actors and stakeholders acting as custodians and gatekeepers for relevant policy action.

Presentation of preliminary fieldwork evidence. The research also considered preliminary interviews and discussions undertaken as part of fieldwork in Windhoek, Namibia. This provides a case study example of the 'real world' debates over CRM resource management and the implementation of policy framework in practice. This helped to triangulate (and validate) some of the discussion from the policy-relevant literature and help to give a detailed analysis of key barriers and opportunities from the viewpoint of stakeholders and actors.

Main results

The main results of this paper emphasis the distinctive nature of the mining practices of ASM communities in precarious social and economic circumstances. ASM communities are often viewed as benefiting from mining activities in the short-term but having economic and social consequences for their long-term development (Diemel and Hilhorst, 2019; Wakenge et al., 2021). Yet, the main challenges of data availability, heterogeneity of experiences across African mining regions, and a bias towards LSM (see Hilson, 2019), mean that the experiences of marginalised ASM communities are often overlooked, despite disproportionately contributing to the negative perceptions and realities of mining for CRMs. None-the-less, there are some common themes that emerge from the evidence and interviews with practitioners in Namibia:

1. Need to develop a more solid research and evidence base (both quantitative and qualitative) on the experiences of ASM communities, documenting and analysing their experiences across African countries, with particular reference to the differences in mining practices across different commodities and in different country contexts (e.g., mining for Cobalt in the Eastern DRC's conflict affected regions).

2. Need for developing a multi-scalar, multi-stakeholder view of ASM practices, focusing on the roles of different stakeholders: government, businesses, NGOs, researchers, and communities. Particularly, linked to the view that ASM communities are more vulnerable to exploitation, and the effects of mining on livelihoods (i.e., growing dependence on the mining sector, knock-on effects on agriculture).

3. Need for an integrated approach to researching CRMs in the context of ASM practices; understanding that ASM and LSM are often spatially co-located and interdependent. Focus is particularly needed on governance, social development, corporate social responsibility (CSR), and integrating investments in local mining economies with targeted interventions for sustainable development.

4. Addressing the economic and social challenges associated with ASM practices in the context of CRMs therefore requires reference to and application of local economic development tools and strategies for ensuring the use of a sustainability-focused, joined-up governance approach to ensure environmental sustainability and community wellbeing.

Discussion and conclusions

'Dark side of innovation' perspectives suggest the need to consider both the cost and benefits of innovation – and their geographical distribution – whether they be related to areas of public health and environmental wellbeing or others (Coad et al., 2021; Biggi and Giuliani, 2021; Phelps et al., 2018). In the case of CRMs, costs and benefits of mining are unevenly distributed and they are necessarily understood in the wider context of the development challenges facing African countries. Responses need to deal credibly with local actors, specific capacity issues, and misalignment of policy objectives at the supranational, national and local levels in order to redress the major economic and societal consequences of CRM mining, especially given dependency and livelihood issues (Diemel and Hilhorst, 2019; Wakenge et al., 2021).

Local communities have long been highlighted as bearing the disproportionate impacts of mining and is especially true in the context of ASM practices (Kelly, 2014). Despite this, a bias towards focusing on LSM, because of four main factors: first, better access to data and information; second, the nature of mining sector organisation; third, biases within research (including focused on CSR); and finally, the focus on mining sector investment as a potential source of economic development. This has had distinctive consequences, for example as Hilson (2019: p.12) notes:

"A large-scale 'bias' has also influenced policy treatment of small-scale mining, which, throughout sub-Saharan Africa, due to its labour-intensive nature, dependency on local finance and grassroots-level support services, and inseparable linkages with other sectors, namely agriculture (ILO, 1999; Maconachie and Binns, 2007; Hilson and Garforth, 2012) […] despite targeting mostly the alluvial and near-surface deposits which large-scale mining companies have little interest in working, small-scale mining, *A Strategy for African Mining* argues, should *not* be afforded special treatment. It specifically states that 'new policy frameworks should eliminate distinctions between small and large-scale mining so as to encourage all potential interested parties', because 'there is no reason to create differential access to mineral

rights for different classes of mining investor' (p. 22)."

Thus, the main findings of this research paper re-emphasise need for greater attention to implications of mining for CRMs on ASM communities and further development of perspectives that can inform policies to redress the various consequences of mining, while strengthening economic development potential.

References

Ali, S. H., Sturman, K., & Collins, N. (Eds.). (2018). *Africa's Mineral Fortune: The Science and Politics of Mining and Sustainable Development*. Routledge: London, UK.

Berman, N., Couttenier, M., Rohner, D., & Thoenig, M. (2017). This mine is mine! How minerals fuel conflicts in Africa. *American Economic Review*, *107*(6), 1564-1610.

Biggi, G., & Giuliani, E. (2021). The noxious consequences of innovation: what do we know?. *Industry and Innovation*, *28*(1), 19-41.

Bonilla, S. H., Silva, H. R., Terra da Silva, M., Franco Gonçalves, R., & Sacomano, J. B. (2018). Industry 4.0 and sustainability implications: A scenario-based analysis of the impacts and challenges. *Sustainability*, *10*(10), 3740.

Church, C., & Crawford, A. (2018). *Green Conflict Minerals*. International institute for sustainable development.

Coad, A., Nightingale, P., Stilgoe, J., & Vezzani, A. (2021). the dark side of innovation. *Industry and Innovation*, *28*(1), 102-112.

Coenen, L., & Morgan, K. (2020). Evolving geographies of innovation: existing paradigms, critiques and possible alternatives. *Norsk Geografisk Tidsskrift-Norwegian Journal of Geography*, *74*(1), 13-24.

Cullen, H., (2015) The irresistible rise of human rights due diligence: conflict minerals and beyond. *The George Washington International Law Review*, *48*, 743-780.

Diemel, J. A., & Hilhorst, D. J. (2019). Unintended consequences or ambivalent policy objectives? Conflict minerals and mining reform in the Democratic Republic of Congo. *Development Policy Review*, *37*(4), 453-469.

Diemer, A., Iammarino, S., Perkins, R., & Gros, A. (2022). Technology, resources and geography in a paradigm shift: the case of critical and conflict materials in ICTs. *Regional Studies*, 1-13.

Fragkos, P., van Soest, H. L., Schaeffer, R., Reedman, L., Köberle, A. C., Macaluso, N., ... & Iyer, G. (2021). Energy system transitions and low-carbon pathways in Australia, Brazil, Canada, China, EU-28, India, Indonesia, Japan, Republic of Korea, Russia and the United States. *Energy*, *216*, 119385.

Helm, D., & Hepburn, C. (2019). The age of electricity. *Oxford Review of Economic Policy*, *35*(2), 183-196.

Hilson, G. (2019). Why is there a large-scale mining 'bias' in sub-Saharan Africa?. *Land Use Policy*, *81*(C), 852-861.

Hilson, G., & Murck, B. (2000). Sustainable development in the mining industry: clarifying the corporate perspective. Resources policy, 26(4), 227-238.

Iammarino, S., & Sait, M. A. (2022). Critical raw materials, technological change, and the Sustainable Development Goals, In Vang, J. (Eds). *Handbook of global sustainable production: putting the SDGs in perspective*, Edward Elgar Publishing: Cheltenham, UK (forthcoming)

Kelly, J. T. (2014). "This mine has become our farmland": Critical perspectives on the coevolution of artisanal mining and conflict in the Democratic Republic of the Congo. *Resources Policy*, *40*, 100-108.

KPMG. (2013). *Dodd-Frank Act Conflict Minerals (Section 1502), Overview Advisory*, [Available at: https://assets.kpmg/content/dam/kpmg/pdf/2013/05/conflict-minerals-overview-deck-2013.pdf].

Kramarz, T., Park, S., & Johnson, C. (2021). Governing the dark side of renewable energy: A typology of global displacements. *Energy Research & Social Science*, *74*, 101902.

Lapko, Y., Trucco, P., & Nuur, C. (2016). The business perspective on materials criticality: Evidence from manufacturers. *Resources Policy*, *50*, 93-107.

Lasi, H., Fettke, P., Kemper, H. G., Feld, T., & Hoffmann, M. (2014). Industry 4.0. *Business & information systems engineering*, *6*(4), 239-242.

Li, Y., Ascani, A., and Iammarino, S., (2022) *The Material Basis of Modern Technologies - A Case Study on Rare Metals*, Copenhagen Business School, Copenhagen, [Available at: https://conference.druid.dk/acc_papers/4wr7yzxojw2djnvroj9xdekxy8vfqn.pdf]

Nkulu, C. B. L., Casas, L., Haufroid, V., De Putter, T., Saenen, N. D., Kayembe-Kitenge, T., Obadia, P. M., Mukoma, D. K. W., Ilunga, J. M. L., Nawrot, T.S., & Numbi, O. L. (2018). Sustainability of artisanal mining of cobalt in DR Congo. *Nature sustainability, 1*(9), 495-504.

Ofosu, G., Dittmann, A., Sarpong, D., & Botchie, D. (2020). Socio-economic and environmental implications of Artisanal and Small-scale Mining (ASM) on agriculture and livelihoods. *Environmental Science & Policy*, *106*, 210-220.

Petavratzi, E., Gunn, G., & Kresse, C. (2019). *Commodity Review: Cobalt*. British Geological Survey: London, United Kingdom.

Phelps, N. A., Atienza, M., & Arias, M. (2018). An invitation to the dark side of economic geography. *Environment and Planning A: Economy and Space*, *50*(1), 236-244.

Radley, B., and Vogel, C., (2015) Fighting windmills in Eastern Congo? The ambiguous impact of the 'conflict minerals' movement. *The Extractive industries and society*, *2*(3), 406-410.

Reuter, M.A., Hudson, C., Van Schaik, A., Heiskanen, K., Meskers, C. and Hagelüken, C., (2013). Metal recycling: Opportunities, limits, infrastructure. *A report of the working group on the global metal flows to the international resource panel*. United Nations Environment Programme (UNEP).

Shapiro, D., Hobdari, B., & Oh, C. H. (2018). Natural Resources, Multinational Enterprises and Sustainable Development. *Journal of World Business*, *53*(1), 1-14.

Sovacool, B. K., Ali, S. H., Bazilian, M., Radley, B., Nemery, B., Okatz, J., & Mulvaney, D. (2020). Sustainable minerals and metals for a low-carbon future. *Science*, *367*(6473), 30-33.

Wakenge, C. I., Nyenyezi, M. R. B., Bergh, S. I., & Cuvelier, J. (2021). From 'conflict minerals' to peace? Reviewing mining reforms, gender, and state performance in eastern Democratic Republic of Congo. *The Extractive Industries and Society*, 100894.

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Opportunities and limitations of open data and text mining for mapping research portfolios

Nicolau Duran-Silva
SIRIS Lab, Research Division of SIRIS Academic, Barcelona, Spain (nicolau.duransilva@siriscademic.com); LaSTUS Lab/TALN Group, Universitat Pompeu Fabra, Spain.

Short Bio

I'm a computer scientist, interested in the field of Natural Language Processing/Text mining. This year I begin an Industrial PhD at Universitat Pompeu Fabra in Barcelona and with the company SIRIS Academic, where I have been working for more than four years. SIRIS Academic (SIRIS) is a knowledge-intensive company that offers consultancy, analysis and evidence-based services to provide support, inform and improve the decision-making process for public R&D&I policies for domains of higher education, research and innovation. Working at SIRIS Academic where I have been exploring new approaches to semantic information retrieval, by combining machine learning and computational linguistics techniques, to nourish evidence based policymaking and to analyse data of higher education institutions, regions and their smart specialization strategies. The topics of my research during my PhD are automatic text classification of scientific and technical documents, automatic information extraction from multi-source documents (such as news, social media, scientific publications or patents), and textual simplification of heterogenous technical documents. My main hobbies are music (playing and listening), cooking, and hiking.

Abstract **– Decision-makers in the Science, Technology and Innovation (STI) sector generally need to understand what is researched and by whom in their territories, universities, or funded by their agencies. They typically require "maps" with information about the innovation topics and about the relevant actors linked to them, to inform their decisions and support policies. A major challenge in this context is the difficulty of accessing relevant data, of combining information from different sources, and of automatically extracting information from texts to answer questions. The objective of my research is the exploration and development of methodologies based on natural language processing and machine learning for the mapping of activities of STI in different domains, on data from open repositories. The systems to be developed have to deal with emerging domains without a clear definition, societal challenges or complex categories, to classify activities that respond to these domains.**

Keywords **– Research mapping, text mining, open data, deep learning**

Introduction

Decision-makers in the Science, Technology and Innovation (STI) sector generally need to understand what is researched and by whom in their regions, universities, or funded by their agencies. They typically require "maps" with information about the innovation topics and about the relevant actors linked to them, to inform their decisions and to propose effective policy-actions covering the appropriate scientific areas and supporting the right actors. These "maps" about research portfolios should be comprehensive, broadly covering the whole STI ecosystem from basic to industrial innovation, the diverse scientific and technical domains, and all potential relevant actors. They should be based on different data sources with the aim of providing a picture as broad as possible of STI inputs and outputs (Bovenzi *et al.*, 2022). For example, these maps could be built on data from scientific publications, research projects funded by different parties (e.g.,

the region, the EU), patents, etc (Fuster *et al.*, 2020).

However, some major challenges arise because many of those data sources are (i) not openly available, complete and interoperable (Bovenzi *et al.*, 2022); (ii) information about actors is messy and incomplete (Donner *et al.*, 2020; l'Hôte & Jeangirard, 2021); (iii) data collections are large, and the extraction of information, from them is time-consuming and not feasible by hand, and therefore has to be automatised (Minae *et al.*, 2021), (iv) hardly manageable, and it becomes a problem when to allow stakeholders and non-expert users to engage in turn with the processes analytical process (Fuster *et al.*, 2020).

The first issue could be mitigated by the growing of several initiatives that, fuelled by the Open Science movement, are making STI input and output data (e.g., projects, publications, datasets, or reports) increasingly openly available (Hutchins, 2021). Initiatives like OpenAlex (Priem *et al., 2022)*, OpenAIRE (Rettberg & Schmidt, 2012), CrossRef (Hendricks *et al.*, 2020), Open Citation (Peroni & Shotton, 2020) or ORCID (Haak, 2012), are providing different and complementary access to data and metadata from research outputs, which can greatly help to overcome the access limitations of the analytical challenges at the STI policy level (Bovenzi *et al.*, 2022). However, while data availability is slowly becoming less of an issue; data curation, quality, interoperability between sources and coverage, remain a big challenge in open data sources.

The second big challenge arises when identifying links between innovation topics, scientific areas, or technical domains, and those data sources. The industry sector classifications still used to analyse the competitiveness and specialisation of the economy, bibliometric categories, are becoming less and less useful in a context of complex and changing value chains, where the boundaries between sectors and technologies are increasingly unclear. This limitation becomes even more pressing when research is called into action to tackle societal challenges such as globalisation, the negative effects of new technologies, the transition to a circular, carbon-neutral economy, the loss of natural capital, and, more recently, the COVID-19 pandemic (Bigas *et al.*, 2021; Bovenzi *et al.*, 2022). To capture all this information, we are forced to go beyond metadata, and to exploit textual data which contain very rich and relevant information about problems addressed, areas of application, challenges and objectives addressed, or technologies used. But to automatically extract meaning information from natural-language textual data is challenging, specially in scientific and technical domains, which present additional challenges (Minae *et al.*, 2021).

Natural language processing (NLP) is the research field that aims to study human language so that computers can understand natural language as humans do, and its applications range from identifying parts of speech of words, classifying, summarising or translating documents, to answering questions, to name just a few. However, the complexity and technicality of scientific language makes general-domain systems perform poorly in comparison to domain-specific ones (Cohen, 2013). The approaches and techniques used in this domain have evolved over the years, but the arrival of deep learning and Transformer architecture, has changed the NLP game rules in very few years, and some of the most notable developments have been around large pre-trained language models (Devlin *et al.*, 2018; Qiu *et al.*, 2020).

To be able to automatically extract relevant information from scientific documents or descriptions of research projects, it is necessary to have manually annotated data for the training and evaluation of the systems; this is how artificial intelligence and machine learning mostly work, extracting patterns from samples annotated by human and then predicting on new samples. The construction from scratch of quality manually annotated data sets requires a great effort, and in specific scientific domains, the contribution of experts. Systems based on deep learning require a large number of samples in order to be able to generalise the categories correctly. For each new set of categories of interest, it is not possible to create an annotated data set, due to resources, time and reproducibility issues. Datasets and annotated data is one of the major bottlenecks in AI-based systems. However, thanks to recent advances, it is possible to overcome the training data bottleneck or to face with low-resource scenarios.

Main objectives of research

The objective of my research is the exploration and development of methodologies based on natural language processing and machine learning for the mapping of activities of science, technology and innovation in different domains, on heterogeneous textual records obtained from different repositories (like scientific publications, research projects, patents, news or social media), based on the state of the art in natural language processing and deep learning. The systems to be developed have to deal with emerging domains and without a clear

definition[1], societal challenges[2] or categories from a value-chain perspective[3], to classify STI activities that respond to these domains and assign these categories to units of text such as sentences, paragraphs or documents.

Research Questions

To successfully identify these topics in scientific papers or research project descriptions, it is necessary to have manually annotated example data available for the training and evaluation of the systems. Unfortunately, the vast majority of annotated corpora available in the scientific domain are generic in nature or cover very specific categories of a field of knowledge, and cannot be used for the identification of these categories. The construction of quality manually annotated data sets from scratch requires a great effort; and in specific scientific domains, the contribution of experts. Deep learning-based systems require a large enough number of samples to be able to generalise the categories correctly. For each new category given, it will not be possible to create an annotated data set, due to resources available, time and reproducibility.

Some of the main research questions on the technical side are the following:

- Can the classification of research documents in complex emerging domains or societal challenges be addressed automatically?
- With which kind of techniques can these problems be solved? Can recent deep learning-based language models improve on traditional methods?
- Do domain specific strategies outperform generic techniques?
- How can we benefit from unsupervised, weakly supervised, and transfer learning approaches?
- How can these automatic classification systems be pertinently evaluated?

Regarding the applications and how to make sense of all these technical experiments, the work carried out aims to answer the following questions:

- What kind of data and indicators can help policymakers and other actors better understand the dynamics of sociotechnical systems in order to address more effectively those challenges that really matter?
- What kind of data and indicators can support policies, strategies, and actions to accelerate transitions?
- How can we use available technologies and knowledge to design the new monitoring systems that public policies so urgently need?

Methodology

Research in the field of natural language processing and artificial intelligence has advanced very quickly in recent years. The incorporation of techniques based on deep learning and the emergence of pre-trained large language models (such as BERT (Devlin *et al.*, 2018), GPT (Radford *et al*., 2018), and their successors) have changed the rules of the game in a few years. These advances have allowed us to reduce efforts in feature engineering, to train more generalisable systems, to improve the performance of systems and to reduce the need for computation resources. The application of these techniques has also had special importance in scientific literature or patent documents, and even in specific domains, such as biomedical and clinical. These types of scientific-technical documents offer a set of particular challenges and difficulties due to their complexity.

In response to the lack of labelled data, insufficient domain expertise to label the samples and insufficient time to label the data, the following approaches are proposed to be explored:

- Zero-shot/few-shot learning (Yin *et al.*, 2019; Tunstall *et al.*, 2022)
- Weakly supervised learning (Ratner *et al.*, 2017)
- Data augmentation (Wang *et al.*, 2020)
- Self-supervised learning (Meng *et al.*, 2020)
- Semi-supervised learning (Zhu *et al.*, 2021)
- Active learning (Lybarger *et al.*, 2021)
- Reinforcement learning (Xu *et al.*, 2020)

Key findings and expected results

The expected results are statistical evaluation frameworks of quality metrics of the automatic classification of scientific documents across different categories of interest, the interaction of experts and stakeholders during the process, and the final application in specific case studies. Also, the definition of a methodological framework for addressing using most recent deep learning advancements with techniques proposed to face

[1] Such as: circular bioeconomy, deep tech, eHealth, aging, cardiovascular regenerative medicine or agritech.

[2] As for instance: the reduction of plastics in the sea, climate change and the mental health of older people.

[3] Phases of an area with different types of relationships between the categories, such as the research phases in the revalorization of plastic-based materials, or the phases of the development of a drug.

the training data bottleneck, which can allow the interaction of experts and stakeholders and to develop automatic classification algorithms for specific taxonomies of interest.

For the exploration, I am currently working on the next case studies:

- Classification of research priorities defined by the Smart Specialisation Strategy (S3): exploring the cases of Catalonia and Emilia-Romagna.
- Classification of research projects and scientific publications in the ERC panels (25 disciplinary panels proposed by the European Research Council) and thematic clusters proposed by the new Horizon Europe framework.
- Identification of mentions of technology families in scientific publications.
- Classification of scientific publications and projects of a university according to the research priorities defined in its strategic plan.
- Classification of scientific publications and projects in categories of the research value chain: exploring the domains of biomedical research and plastic waste reduction.

References

Bigas, E., Duran, N., Fuster, E., Parra, C., Cortini, R., Massucci, F., Quinquillà, A., Fernández, T., Romagosa, M., & Cortijo, M. (2021). Monitoring smart specialisation with open data and semantic techniques. *"RIS3CAT Monitoring" collection, number 16.*

Bovenzi, N., Duran-Silva, N., Massucci, F. A., Multari, F., & Pujol-Llatse, J. (2022, September). Mapping STI Ecosystems via Open Data: Overcoming the Limitations of Conflicting Taxonomies. A Case Study for Climate Change Research in Denmark. In *Linking Theory and Practice of Digital Libraries: 26th International Conference on Theory and Practice of Digital Libraries, TPDL 2022, Padua, Italy, September 20–23, 2022, Proceedings* (pp. 495-499).

Cohen, K. B. (2013). Biomedical natural language processing and text mining. *Methods in biomedical informatics: a pragmatic approach, 141*.

Devlin, J., Chang, M. W., Lee, K., & Toutanova, K. (2018). Bert: Pre-training of deep bidirectional transformers for language understanding. arXiv preprint arXiv:1810.04805.

Donner, P., Rimmert, C., & van Eck, N. J. (2020). Comparing institutional-level bibliometric research performance indicator values based on different affiliation disambiguation systems. *Quantitative Science Studies*, 1(1), 150-170.

Fuster, E., Massucci, F. A., & Matusiak, M. (2020). Identifying specialisation domains beyond taxonomies: mapping scientific and technological domains of specialisation via semantic analyses. In *Quantitative Methods for Place-Based Innovation Policy* (pp. 195-234). Edward Elgar Publishing.

Haak, L. L., Fenner, M., Paglione, L., Pentz, E., & Ratner, H. (2012). ORCID: a system to uniquely identify researchers. Learned publishing, 25(4), 259-264.

Hendricks, G., Tkaczyk, D., Lin, J., & Feeney, P. (2020). Crossref: The sustainable source of community-owned scholarly metadata. *Quantitative Science Studies*, 1(1), 414-427.

Hutchins, B. I. (2021). A tipping point for open citation data. Quantitative science studies, 2(2), 433-437.

l'Hôte, A., & Jeangirard, E. (2021). Using Elasticsearch for entity recognition in affiliation disambiguation. arXiv preprint arXiv:2110.01958.

Lybarger, K., Ostendorf, M., & Yetisgen, M. (2021). Annotating social determinants of health using active learning, and characterizing determinants using neural event extraction. *Journal of Biomedical Informatics, 113,* 103631.

Meng, Y., Zhang, Y., Huang, J., Xiong, C., Ji, H., Zhang, C., & Han, J. (2020). Text classification using label names only: A language model self-training approach. *arXiv preprint arXiv:2010.07245*.

Minaee, S., Kalchbrenner, N., Cambria, E., Nikzad, N., Chenaghlu, M., & Gao, J. (2021). Deep learning--based text classification: a comprehensive review. *ACM Computing Surveys (CSUR)*, 54(3), 1-40.

Peroni, S., & Shotton, D. (2020). OpenCitations, an infrastructure organization for open scholarship. Quantitative Science Studies, 1(1), 428-444.

Priem, J., Piwowar, H., & Orr, R. (2022). OpenAlex: A fully-open index of scholarly works, authors, venues, institutions, and concepts. *arXiv preprint arXiv:2205.01833*.

Qiu, X., Sun, T., Xu, Y., Shao, Y., Dai, N., & Huang, X. (2020). Pre-trained models for natural language processing: A survey. *Science China Technological Sciences, 63*(10), 1872-1897.

Radford, A., Narasimhan, K., Salimans, T., & Sutskever, I. (2018). Improving language understanding by generative pre-training.

Ratner, A., Bach, S. H., Ehrenberg, H., Fries, J., Wu, S., & Ré, C. (2017, November). Snorkel: Rapid training data creation with weak supervision. In *Proceedings of the VLDB Endowment. International Conference on Very Large Data Bases* (Vol. 11, No. 3, p. 269). NIH Public Access.

Rettberg, N., & Schmidt, B. (2012). OpenAIRE—Building a Collaborative Open Access Infrastructure for European Researchers. *Liber Quarterly: The Journal of European Research Libraries,* 22(3).

Tunstall, L., Reimers, N., Jo, U. E. S., Bates, L., Korat, D., Wasserblat, M., & Pereg, O. (2022). Efficient Few-Shot Learning Without Prompts. *arXiv preprint arXiv:2209.11055*.

Wang, Y., Liu, F., Verspoor, K., & Baldwin, T. (2020, July). Evaluating the utility of model configurations and data augmentation on clinical semantic textual similarity. In *Proceedings of the 19th SIGBioMed workshop on biomedical language processing* (pp. 105-111).

Xu, L., Hogan, J., Patzer, R. E., & Choi, J. D. (2020, July). Noise Pollution in Hospital Readmission Prediction: Long Document Classification with Reinforcement Learning. In *Proceedings of the 19th SIGBioMed Workshop on Biomedical Language Processing* (pp. 95-104).

Yin, W., Hay, J., & Roth, D. (2019). Benchmarking zero-shot text classification: Datasets, evaluation and entailment approach. *arXiv preprint arXiv:1909.00161.*

Zhu, M., & Jiang, K. (2021, June). Semi-Supervised Language Models for Identification of Personal Health Experiential from Twitter Data: A Case for Medication Effects. In *Proceedings of the 20th Workshop on Biomedical Language Processing* (pp. 228-237).

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Structure of the Spanish R&D system: a look through the Spanish National Plan for Scientific Research and Technological Development

Pablo Sastrón-Toledo[1,2]
[1]LEMI Research Group, Carlos III University of Madrid, 126 Madrid Str., 28903, Getafe, Spain (psastron@bib.uc3m.es)
[2]Research Institute for Higher Education and Science (INAECU), UAM-UC3M, 28903 Getafe, Spain

Short Bio

PhD student interested in data science and R&D policies. I am currently working at INAECU Institute (Research Institute for Higher Education and Science) studying the composition and performance of the Spanish R&D system from the viewpoint of public competitive funding allocation.

Abstract The aim of this research is to study the configuration and performance of the Spanish R&D system. To achieve it, the study will analyze the different actors that have participated in the Spanish National Plan for Scientific Research and Technological Development (SNP in advance), the most important instrument of basic scientific research in the country.

Keywords – **Research Policy; Funding; R&D; Spanish National Plan for Scientific Research and Tech-nological Development**

Introduction

The study of national R&D systems performance has been broadly addressed, although with different approaches (Bloch et al., 2014). Some studies have focused on the measurement of the productivity of R&D funds (Aksnes et al., 2017; Wang et al., 2020); other studies have investigated the public attention and social implications of funded science (Yin et al., 2022). Additionally, there has been some research in R&D composition regarding the distribution of R&D funding, particularly in the European Framework Programs for Research and Innovation (EU FPs) (Piro, 2019; Piro et al., 2022). This research has taken the allocation of funds as an indicator of R&D performance. Thus, the study of the institutions applying for competitive funding can reveal insights about the characteristics of a determined R&D system (i.e. which institutions are more competitive in certain areas, which regions concentrate more institutions awarded with funding).

Moreover, previous research on Spanish R&D structure has specially been focused on the innovation stage, whether analyzing firms' performance (Blanes & Busom, 2004; De Marchi, 2012) or the relations between firms, research centers and universities (Bayona Sáez et al., 2002; Ballesteros & Rico, 2001). Little research has focused on research systems, plus addressing specific areas of research such as energy (Guerrero-Lemus, 2009) or health (San Marutl et al., 2011).

Therefore, this research expects to reveal insights about the SNP institutional structure. An initial research questions would consider:

Q1: How are SNP funds distributed across regions and across the different types of institutions?

Methodology

To address this research questions, the final resolutions of SNP Programs 'Knowledge

Generation' and 'Societal Challenges' from 2013 to 2020 were extracted from the Spanish National Research Agency's website. All resolutions were downloaded in PDFs and then converted to structured data using tabula-py 2.5.1, a Python's library designed for reading information in PDFs. This data includes projects information such as project code, projects' title, research area, awarded institution, region of the awarded institution, funding budget, reception of a predoctoral student.

After structuring the data, we manually add information regarding the type of institution of the awarded institutions. We found seven types of institutions applying to the program: Spanish National Research Council (CSIC), Regional R+D Centres, Universities, Public Research Bodies (PRBs), Hospitals, Innovation Hubs and Private entities. As the different research centers of CSIC were assigned to the administrative unit located in Madrid thus blurring the results, we manually classified the different centers and assigned them to their current region.

Results

We retrieved information about 22.964 SNP funded projects from 2013 to 2020. This means an expenditure of 2270M euros in the period described. Regarding Q1(*how are SNP funds distributed across regions and across the different types of institutions?),* the results evidence a highly skewed distribution of funding across regions: Madrid accounts to a 26% of the SNP funds and Catalunya to a 24% in the period studied. This means that half of the program's funding is split between these two regions, highlighting their R&D predominance. Regarding the distribution of the different institutions, Universities account for a 61,35% of the funds, followed by CSIC (20,94%) and Regional R+D Centers (8,85%). The remained 9% of the funds are shared between PRBs (5,54%), Hospitals (2,74%), Innovation Hubs (0,52%) and Private entities (0,07%). It is important to remark that Hospitals tend to apply to the Spanish Sanitary Research Plan run by the Carlos III Institute of Health, explaining their low participation in the SNP. Future studies will include this information to improve the analysis.

Thus, universities account for almost two thirds of the funds, placing them as the main actor of the R&D system under SNP funding. Likewise, seeking to the number of projects, universities capture 73,92% of the total amount of projects. Regional R+D Centres account for half of the funds that CSIC raises and are the only institution whose participation is growing steadily during the period studied. In contrast, PRBs are the institution whose participation drops the most. On the other hand, Private Entities and Innovation Hubs have a much lower participation rate, contrary to EU FPs (Børing et al., 2020). Future studies may explore the reasons why private firms avoid the SNP and apply to EU funds instead.

These insights reveal determined characteristics of the competitiveness of institutions within the Spanish R&D system. Future research should look more deeply into other aspects such as the intersections between type of institution and region to gather the distribution of institutions per region; research area and regions to explore the expertise of determined regions; and research area and type of institution to study the expertise of the different type of entities.

Acknowledgements

This study was funded under an FPI contract PRE2020-092917 of the Spanish Ministry of Science and Innovation from the DOSSUET project (Diagnosis of open science in the Spanish university system and mechanisms for its transformation and improvement) grant number PID2019-104052RB-C21.

References

Aksnes, D. W., Sivertsen, G., van Leeuwen, T. N., & Wendt, K. K. (2017). Measuring the productivity of national R&D systems: Challenges in cross-national comparisons of R&D input and publication output indicators. Science and public policy, 44(2), 246-258.

Ballesteros, J. A., & Rico, A. M. (2001). Public financing of cooperative R&D projects in Spain: the Concerted Projects under the National R&D Plan. Research Policy, 30(4), 625-641.

Bayona Sáez, C., García Marco, T., & Huerta Arribas, E. (2002). Collaboration in R&D with universities and research centres: an empirical study of Spanish firms. R&D Management, 32(4), 321-341.

Blanes, J. V., & Busom, I. (2004). Who participates in R&D subsidy programs?: The case of Spanish manufacturing firms. Research policy, 33(10), 1459-1476.

Bloch, C., Sørensen, M. P., Graversen, E. K., Schneider, J. W., Schmidt, E. K., Aagaard, K., & Mejlgaard, N. (2014). Developing a methodology to assess the impact of research grant funding: A mixed methods approach. Evaluation and program planning, 43, 105-117.

De Marchi, V. (2012). Environmental innovation and R&D cooperation: Empirical evidence from Spanish manufacturing firms. Research policy, 41(3), 614-623.

Guerrero-Lemus, R., Díaz-Herrera, B., & Martínez-Duart, J. M. (2009). Study of the Spanish R&D&I Plan 2004–2007 in energy. Energy policy, 37(11), 4779-4786.

Børing, P., Fevolden, A. M., Mark, M. S., & Piro, F. N. (2020). Bringing home the bacon: the relationship between firm characteristics and participation in EU Horizon 2020 projects. Applied Economics Letters, 27(19), 1556-1561.
Piro, F. N. (2019). The R&D composition of European countries: concentrated versus dispersed profiles. Scientometrics, 119(2), 1095-1119.

Piro, Fredrik Niclas, Seeber, Marco, & Wang, Lili. (2022, September 7). Regional and sectorial variations in attractiveness of funding from the European Union's Framework Programs: evidence of increasing divergence. 26th International Conference on Science, Technology and Innovation Indicators (STI 2022), Granada, Spain. https://doi.org/10.5281/zenodo.6946138

Sanz Marutl, E., Pérez Ortega, J. M., Fernández Formoso, J. A., & Blázquez Herrainz, M. (2011). Proyectos de investigación en salud del Fondo de Investigaciones Sanitarias 2008: permanencia y adaptación al VI Plan Nacional de Investigación, Desarrollo e Innovación 2008 2011. Med. clín (Ed. impr.), 637-342.

Yin, Y., Dong, Y., Wang, K., Wang, D., & Jones, B. F. (2022). Public use and public funding of science. Nature human behaviour, 1-7.

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Coverage and content analysis of non-indexed regional scientific production

Patricia Alonso-Álvarez
LEMI Research Group, Carlos III University of Madrid, 126 Madrid Str., 28903, Getafe (Spain)
Research Institute for Higher Education and Science (INAECU), Carlos III University of Madrid, 126 Madrid Str., 28903, Getafe (Spain) (patalons@bib.uc3m.es).

Short Bio

Patricia Alonso is a predoctoral researcher at the University Carlos III of Madrid. She holds a Bachelor's in Political Sciences and Law from the same university and an MSc in Social Research Methods from the London School of Economics and Political Science. Her methodological interests are natural language processing methods, social network analysis, and mixed methodologies, and her thesis and current projects focus on the recognition and analysis of peripheral science, the social and political impact of science, and Open Science

Abstract **– The academic center-periphery model mimics the traditional economic model developed by Wallerstein (1974), creating an inside/outside logic that reproduces geographical hierarchies. Previous research has shown the limitations of using international databases to assess regional or local research. This research aims to explore peripheral systems of knowledge production. To do so, it focuses on a particular initiative that can be seen as a paradigmatic case of a regional strategy for increasing local research's global visibility and use, namely African Journals Online (AJOL). Dependency theories are explored from different angles: coverage analysis, local research priorities and international agenda, visibility and recognition of local research published in regional circuits and international databases, and geo-contextualization of research. The research hopes to contribute to the increasing evidence that shows the unequal conditions of the knowledge production and publishing system and to the global conversation that proposes alternative models that do not mimic the current publication logic.**

Keywords **– Regional research; research equity; dependency theories; Africa**

Introduction and main objectives

The academic center-periphery model mimics the traditional economic model developed by Wallerstein (1974), creating an inside/outside logic that reproduces geographical hierarchies. The center-periphery model has been studied by its intrinsic inequalities, which has generated an extensive debate about the so-called 'dependency theories' and their components. Alatas (1969) defined 'academic dependency' as the intellectual subordination of research produced in the Global South to the ideas, methods, and resources of the North. The concept has been explored, adapted, and transformed to different research contexts, such as Latin America (Biegel, 2006) or Africa (Andrews & Okpanachi, 2012).

The unequal knowledge production and circulation structure divide the world's academic system into a dominating mainstream circuit and a peripherical one. The creation of 'universal' and 'objective' procedures to assess papers' and journals' quality led by the Institute of Scientific Information (ISI, now the Web of Science) consolidated the division. Although SCOPUS expanded mainstream science, including a less restrictive set of journals, an analysis of its election criteria shows that SCOPUS shares WoS's general principles (Archambault et al., 2009). Recent theories suggest the possibility of alternative circuits of knowledge that coexist with the traditional division. Beigel (2014) proposes four different circuits of knowledge: 'mainstream' circuits (WoS, SCOPUS); b) open-access transnational circuits and repositories (DOAJ, Dialnet, Arvix, among others); c) open-access regional circuits (Latindex, SciELO, AJOL, among others); and d) local circuits based on non-indexed publications. By using this classification, Beigel argues that the circulation of knowledge is a

complex phenomenon that cannot be explained only using the center-periphery dichotomy and the autonomy of peripheral systems.

This research aims to explore peripheral systems of knowledge production. It understands knowledge dissemination as an essential part of academic production. Publishing is central to academic research as knowledge production is inherently collaborative. It is also a common requirement for academic promotion and recognition. Therefore, this project uses academic publications to study the relationships between circuits of knowledge. It also uses bibliometric analyses to explore the notion of academic dependency and its presence. To do so, it focuses on a particular initiative that can be seen as a paradigmatic case of a regional strategy for increasing local research's global visibility and use, namely African Journals Online (AJOL). AJOL is a non-profit aggregator platform of African-published scholarly journals. It currently hosts 637 journals (359 open access) and over 200 000 research articles.

Research questions

The project aims to answer the following questions:

What is the role of regional circuits of knowledge?

How do peripheral systems of knowledge production coexist and interact with international mainstream circuits? Do dependency theories affect research conducted in peripherical systems? If so, how?

Why AJOL?

AJOL is "the world's largest and preeminent platform of African-published scholarly journals." (African Journals Online, n.d.). Since 2002 the number of journals has risen from 71 to 637. Since January 2022, it has increased the number of almost 100 new journals (555 in January 2022). The data has been retrieved from the 2006 INASP report (Cumming, 2006) and the records of the Wayback Machine.

Despite its broad coverage of the African publishing environment, AJOL is an understudied source of bibliometric information. Preliminary WoS searches show that only a few papers mention AJOL as a data source. Using TS=(AJOL OR "African Journals Online") as search strategy, WoS only retrieves 467 papers, the majority of which are from Medicine and Biomedical Sciences, and only 12 belong to Information Science and Library Sciences. I also did the same search on the abstracts of the papers downloaded from AJOL to explore their use in local literature. The strategy only showed 22 coincidences.

Finally, AJOL uses the Journal Publishing Practices and Standards (JPPS) framework, which ensures that journals meet a specific set of criteria (which depends on their JPPS classification). Although this research does not address journal quality, a transparent classification is needed to make a comparative analysis that includes other regional or international indexes and databases.

Data

AJOL

In this project, we downloaded all article data from the AJOL website using ojsr and rvest; two R packages developed to retrieve information from Open Journal Systems and general web scraping, respectively. Journal information (discipline, country, quality score, and open access) was scraped from AJOL's website using rvest.

Although the underlying structure is OJS, content aggregation is entirely decentralized, and all the information is provided and submitted by the journals and AJOL. Preliminary tests showed some missing data, errors, and inconsistencies.

Other databases

Other databases are used to contextualize, complete, and compare AJOL data. Crossref has been used to clean, correct, and complete AJOL data when possible. Additionally, Open Alex is used to complement Crossref data.

Ulrich's periodicals database is being used to analyze and contextualize AJOL coverage.

Web of Science and Scopus databases are used to analyze international circuits' coverage of regional databases.

Methodology

Coverage analysis

Previous research has shown the limitations of using international databases to assess regional or local research (e.g., Khanna et al., 2014; Brasil, 2021). However, research outside the Latin American context has been scarce. This project analyses the presence of African-based research in the main bibliometric databases (WoS and Scopus) and alternative online libraries (Dimensions and Open Alex). It also studies the characteristics of the journals included in the specific databases to explore the factors that might influence their integration in international rankings (e.g., geographical location, language, discipline).

Coverage is analyzed at the publication and the journal level. At the publication level, we use AJOL and Crossref data to match publications in AJOL, Scopus, and Web of Science. We first correct

publication DOIs using Crossref data. Then, I matched AJOL, WoS, and Scopus using DOIs. Further steps include using statistical matching procedures to match articles with missing DOIs (Visser, Eck & Waltman, 2021). The study explores articles' metadata to get insights about WoS and Scopus coverage. Special attention is given to document topic analysis.

Journal analysis uses journal title, ISSN, and e-ISSN as matching fields. Ulrich is used to contextualizing AJOL coverage of the African publication landscape. Then, WoS's and Scopus's coverage of Africa is analyzed. Following Chavarro, Ràfols & Tang (2018), the analysis explores the characteristics of the journals included in international databases and studies quality guidelines applied by AJOL, WoS, and Scopus to explore the hypothesis of objective and universalistic quality criteria.

Further analysis

Dependency theories are explored from different angles: local research priorities and international agenda, visibility and recognition of local research published in regional circuits and international databases, and geo-contextualization of research.

Expected results

This thesis builds into the center-periphery model and academic dependency theories. It explores a regional circuit of knowledge production and tries to understand the dynamics that send some forms of knowledge production to peripherical areas. Preliminary results show the unsurprising low coverage WoS and Scopus have of AJOL journals and publications, although further analysis is needed to unveil the mechanisms behind this phenomenon.

The research hopes to contribute to the increasing evidence that shows the unequal conditions of the knowledge production and publishing system and to the global conversation that proposes alternative models that do not mimic the current publication logic. More importantly, it seeks to cooperate with other researchers and projects providing recommendations on how to make our knowledge system more inclusive for researchers at all levels. However, the project rejects the idea of a universalistic system. It instead supports the thesis of alternative circuits that are able to accommodate local research priorities and broader transnational projects.

ACKNOWLEDGEMENTS

This project is partially funded by the regional Grants for carrying out R&D activity programs between research groups of the Community of Madrid in Social Sciences and Humanities (2019) through the project "Towards the consolidation of inclusive cities, a challenge for Madrid" (CM-INCLUSIVA-CM, H2019/HUM5744).

Bibliography

African Journals Online (n.d.) [Main page]. https://www.ajol.info/index.php/ajol

Alatas, S. H. (1969). The Captive Mind and Creative Development. International Social Science Journal. Vol. 36(4), 691–9.

Andrews, N., & Okpanachi, E. (2012). Trends of epistemic oppression and academic dependency in Africa's development: The need for a new intellectual path. Journal of Pan African Studies, 5(8), 85-104.

Beigel, F. (2006). Vida, muerte y resurrección de las "teorías de la dependencia". Crítica y teoría en el pensamiento social latinoamericano, 287-326.

Beigel, F. (2014). Publishing from the periphery: Structural heterogeneity and segmented circuits. The evaluation of scientific publications for tenure in Argentina's CONICET. Current sociology, 62(5), 743-765

Brasil, A. (2021). Beyond the Web of Science: an overview of Brazilian papers indexed by regionally relevant databases. In W. Glänzel, S. Heeffer, P.-S. Chi, & R. Rousseau (Eds.), Proceedings of the 18th International Conference on Scientometrics & Informetrics (pp. 193–204). Leuven, Belgium: KU Leuven

Chavarro, D., Ràfols, I., & Tang, P. (2018). To what extent is inclusion in the Web of Science an indicator of journal 'quality'?. Research evaluation, 27(2), 106-118.

Cumming S. (2006). African Journals OnLine (AJOL). A second internal evaluation (2003-2005).

Khanna, S., Ball, J., Alperin, J. P., & Willinsky, J. (2022). Recalibrating the Scope of Scholarly Publishing: A Modest Step in a Vast Decolonization Process. SciELO Preprints

Visser, M., van Eck, N. J., & Waltman, L. (2021). Large-scale comparison of bibliographic data sources: Scopus, Web of Science, Dimensions, Crossref, and Microsoft Academic. Quantitative Science Studies, 2(1), 20-41.

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Towards societal impact pathways: the critical role of individual motivations

Paula Schipper*, Jarno Hoekman, Maryse Chappin, Koen Frenken
Utrecht University, Sustainable Development, Utrecht, The Netherlands (p.schipper@uu.nl)

Short Bio

I'm doing research on the topic of knowledge development and dissemination. I have been involved in multiple projects investigating the different roles different types of organisations can have. Currently I focus on the role of academics and their role in creating societal impact. As a Junior Assistant Professor, at the Copernicus Institute (Utrecht University) I'm also busy teaching Bachelor courses about for instance innovation theories, system thinking, and research methods.

Societal impact of research is becoming more and more important for universities. Individual academics play a crucial role in realizing societal impact. To understand and support the creation of societal impact by academics one must first understand what motivates the academic to create and contribute to impact pathways. This research focusses on the following research question: "How do motivations of individual academics shape societal impact pathways?". By means of a mixed methods approach we add depth to the existing literature on societal impact pathways and the role of individual academics in this. We sampled academics from Utrecht University within all stages of academic careers (after obtaining a PhD degree). We see a broad diversity of used societal impact pathways within our sample. Looking at differences between extrinsic and intrinsic motivations, with a specific interest in pro-social motivation, we find that pro-social motivations of academics play an important role in how the academic perceives and defines societal impact and how societal impact pathways are chosen. In the end findings of, this research can be used for creating more fitting support systems and evaluation models for the societal impact of academics.

Academic engagement – Societal impact – Knowledge diffusion – Motivation – Universities

Introduction & theoretical background

The 'third mission' of universities to create societal impact has gained increased attention as a way for universities to contribute to solving complex societal problems (Molas-Gallart & Castro-Martínez, 2007; Muhonen, Benneworth, & Olmos-Peñuela, 2020; Secundo, Perez, Martinaitis, & Leitner, 2017). Creating societal impact occurs in different settings, such as 'training', 'science', 'commercial', and 'pro-social', all asking for different institutional support (Llopis, D'Este, McKelvey, & Yegros, 2022; Van De Burgwal, Hendrikse, & Claassen, 2019). Although realizing societal impact is high on universities' policy agenda, there are academic, ethical, and organizational challenges for engaging with societal partners and the public at large (Atta-Owusu & Fitjar, 2022; Llopis, D'Este, McKelvey, & Yegros, 2022; Matt, Gaunand, Joly, & Colinet, 2017). Perkmann et al. (2021) stress the importance of investigating the various ways in which societal impact may be achieved, and the relation between the individual academic and organizational and institutional context with the importance of the individual academic.

Prior research suggests that individual academics play a critical role in contributing to realizing societal impact. Van Rijnsoever & Hessels (2021) have previously researched motivations of academics for choosing research projects. Based on original research from Lam (2011), they distinguish puzzle, ribbon, and gold academics (van Rijnsoever & Hessels, 2021; Lam, 2011). Research has also specified motivations especially for creating societal impact, and highlighted the importance of pro-social motivations (e.g. Lorio, Labory, & Rentocchini, 2017; Atta-Owusu & Fitjar, 2022), while differences between intrinsic and extrinsic motivations have also been further specified by others (e.g. Bénabou & Tirole, 2006; Van De

Burgwal, Hendrikse, & Claassen, 2019). However, the different settings for creating societal impact ask for further exploration of the typology of the knowledge on used motivations. In addition, research on motivations for the creation of societal impact has so far mainly applied a quantitative approach and asks for a more qualitative approach and understanding of how these motivations influence the behaviour and impact activities of individual academics.

Muhonen, Benneworth & Olmos-Peñuela (2020) recently proposed the typology of impact pathways for social sciences and humanities, capturing the depth of productive interactions (Spaapen & van Drooge, 2011) in pathways between academics and someone or something in society. Impact pathways are defined as the productive interactions of academics, taking account for the context in which they take place and specified for different impact processes (Muhonen, Benneworth, & Olmos-Peñuela, 2020). Other research fields similarly tried to capture 'Impact pathways' in order to find a fitting evaluation tool for societal impact and the pathway towards societal impact (e.g. Martin, 2011; Matt, Gaunand, Joly, & Colinet, 2017). With the development of expectations towards generating societal impact, and the broadness of options academics can choose from in how to fulfil these expectations, a sole focus on productive interactions no longer feels sufficient.

Therefore, in this study, we aim to further develop the understanding on how motivations of individual academics contribute to the pathways to societal impact creation. The proposed research question is: *"How do motivations of individual academics shape societal impact pathways?"*. This research can be a steppingstone in the development of more fitting support systems for academics and evaluation models for societal impact of academics.

Methods

Our research consists of a mixed methods approach, with a structured survey and semi-structured interviews among academics. The survey and interview were coupled, so academics were only interviewed when they completed the survey. With our data collection strategy, we aim to provide a comprehensive overview of used impact pathways and individual motivations.

Academics were sampled from the Faculty of Geosciences of Utrecht University, which has a diverse palette of academics working on research and education on earth systems and sustainability. The faculty hosts approximately 250 permanent staff members and consists of four departments: Earth Sciences, Physical Geography, Sustainable Development (Copernicus Institute), and Human Geography and Spatial Planning. The faculty is a mix of natural and social sciences-oriented academics. By focusing on four departments within a single faculty of one university, we aim to understand the role of organizational and institutional conditions shaping societal impact strategies.

The used survey had three main goals for data retrieving. First, it was used to gather general information about the respondent by, for instance, asking questions about their function within the department and research area. Second, we focused on retrieving more data on which academic engagement activities were performed and how this may lead to societal impact. The respondents were given a list of five categories of activities, derived from Hughes et al. (2016), for which we wanted to know if they performed any of the activities and to list a maximum of three most used activities within the category. Third, respondents were asked about their productive interactions with three of their most important stakeholders. Besides solely asking to name the interaction, we also explicitly asked about the interaction type, interaction intensity, and what activities were performed within the interaction, to enable us to generate more depth for developing impact pathways.

With the interviews, we took more of an open investigation role. We started by asking how the respondent would define societal impact in their own words. From that answer onwards, we invited respondents to reflect on what drives and motivates them to generate societal impact and how they see their role as academics in creating societal impact. We also asked about perceived barriers and how they experienced the supporting role of the faculty to create a full understanding of their role as an academic.

In total, 40 academics have filled out the survey and have been interviewed. A first analysis of the survey and interview data is completed, resulting in the first results and at the same time creating a point of departure for the remainder of the analysis. Societal impact pathways lead to some sort of creation of societal impact, it is expected that when this impact is perceived differently different activities or steps will be taken towards the goal of societal impact. Further analyses will focus on defining and delineating the role of different pro-social motivations of academics and how they contribute to shaping societal impact pathways. We will explore associations between the individual characteristics, individual motivations and perceived barriers, and the societal impact pathways.

Most interesting first Results

Our first analyses show that the academics in our sample define societal impact in different ways. Some acknowledge the importance of creating a

change in behaviour by society whereas others see it more as a linear form of transferring knowledge to the 'outside world'. The role of the receiving party clearly differs in these two definitions from an active one to a more passive one. The different definitions academics gave to societal impact show a first indication that different societal impact pathways are present within our sample. Academics also discuss an important role of education and blue-sky research (fundamental research) when defining societal impact and its creation.

When looking at the discussed motivations we focused on the difference between extrinsic and intrinsic motivation. Specifically defining either *Pecuniary* or *Career advancement* as extrinsic motivations and *Pro-social* or *Learning* as intrinsic motivations. We see that extrinsic motivations of academics are almost always combined with intrinsic motivations. Overall, we also see that more specific motivations are often mentioned in combinations instead of alone. The first analysis shows that Pro-social motivations were mentioned most frequently and provide a broad set of reasonings leading up to pro-social behaviour and the creation of associated impact pathways. We aim to further investigate this finding.

We do see a clear connection between mentioned barriers and possible extrinsic motivations. The interviews reveal that a lack of *Career advancement* disincentives academics to act in a way that creates societal impact. Especially academics for whom career advancement is still of more importance, due to the starting position in their career, focus more on fundamental research and output than on societal impact as this is where they are more often evaluated on.

Also, considering the career position the findings show that those who are less advanced are more dispersed in their choice of societal impact pathways, perform a more diverse set of academic engagement activities, and are more diverse in their choice with whom to interact. In general, we see a focus on *Joint research* activities (45% of used activities), such as 'Contract research', 'Research consortia', and 'Joint publications' and with *Meeting, Consulting and Advice* activities (38% of used activities), such as 'Attending conferences', 'Participating in networks', and 'Giving invited lectures/workshops'. This connects to the fact that we see that overall most academics interact with *Governmental* receiving actors, as 38% of interactions are with governmental actors.

The preliminary results show individual differences among academics of the faculty of Geosciences, making it even more interesting to explore the association between individual characteristics, individual motivations and perceived barriers, and the different aspects of the societal impact pathways. To this end, our coming analysis will look specifically at what motivations relate to what kind of societal impact pathways, with a focus on the role of pro-social motivations.

References

Atta-Owusu, K., & Fitjar, R. (2022). What motivates academics for external engagement? Exploring the effect of motivational drivers and organizational fairness. Science and Public Policy, 49(2), 201-218.

Bénabou, R., & Tirole, J. (2006). Incentives and Prosocial Behavior. American economic review, 96(5), 1652-1678.

D'Este, P., Ramos-Vielba, I., Woolley, R., & Amara, N. (2018). How do researchers generate scientific and societal impact? Toward an analytical and operational framework. Science and Public Policy, 45(6), 752-763.

Hughes, A., Lawson, C., Kitson, M., Salter, A., Bullock, A., & Hughes, R. (2016). The changing state of knowledge exchange: UK academic interactions with external organisations 2005-2015. London: NCUB.

Lam, A. (2011). What motivates academic scientists to engage in research commercialization: 'Gold', 'ribbon' or 'puzzle'? Research policy, 40(10), 1354-1368.

Llopis, O., D'Este, P., McKelvey, M., & Yegros, A. (2022). Navigating multiple logics: Legitimacy and the quest for societal impact in science. Technovation, 110, 102367.

Lorio, R., Labory, S., & Rentocchini, F. (2017). The importance of pro-social behaviour for the breadt and depth of knowledge transfer activities: An analysis of Italian academic scientists. Research Policy, 46(2), 497-509.

Martin, B. (2011). The Research Excellence Framework and the 'impact agenda': are we creating a Frankenstein monster? Research evaluation, 20(3), 247-254.

Matt, M., Gaunand, A., Joly, P.-B., & Colinet, L. (2017). Opening the black box of impact - Ideal-type impact pathways in a public agricultural research organization. Research Policy, 46(1), 207-218.

Molas-Gallart, J., & Castro-Martínez, E. (2007). Ambiguity and conflict in the development of 'Third Mission' indicators. Research Evaluation, 16(4), 321-330.

Muhonen, R., Benneworth, P., & Olmos-Peñuela, J. (2020). From productive interactions to impact pathways: Understanding the key dimensions in developing SSH research societal impact. Research Evaluation, 29(1), 34-47.

Perkman, M., Salandra, R., Tartari, V., McKelvey, M., & Hughes, A. (2021). Academic

engagement: A review of the literature 2011-2019. Research Policy, 50(1), 104-114.

Perkmann, M., Tartari, V., McKelvey, M., Autio, E., Broström, A., D'Este, P., . . . Sobrero, M. (2013). Academic engagement and commercialisation: A review of the literature on university industry relations. Research Policy, 42(2), 423-442.

Secundo, G., Perez, S. E., Martinaitis, Ž., & Leitner, K. H. (2017). An Intellectual Capital framework to measure universities 'third mission activities. Technological Forecasting and Social Change, 123, 229-239.

Smit, J. P., & Hessels, L. K. (2021). The production of scientific and societal value in research evaluation: a review of societal impact assessment methods. Research Evaluation, 30(3), 323-335.

Spaapen, J., & van Drooge, L. (2011). Introducing 'productive interactions' in social impact assessment. Research Evaluation, 20(3), 211-218.

Van De Burgwal, L., Hendrikse, R., & Claassen, E. (2019). Aiming for impact: Differential effect of motivational drivers on effort and performance in knowledge valorisation. Science and Public Policy, 46(5), 747-762.

van Rijnsoever, F., & Hessels, L. (2021). How academic researchers select collaborative research projects: a choice experiment. Journal of Technology Transfer, 46(6), 1917-1948.

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

A change of direction: Mapping and managing problem-solution constellations in mission-oriented innovation policies

Remi Elzinga *, Matthijs J. Janssen, Simona O. Negro, Marko P. Hekkert
Copernicus Institute of Sustainable Development, Utrecht University, Princetonlaan 8a, 3584 CS Utrecht

** Corresponding author*
email: r.elzinga@uu.nl

Abstract - Missions prioritizing an ambitious and measurable societal goal are believed to provide the directionality needed to mobilize and align actors that may contribute to the development and diffusion of solutions. However, this proclaimed directionality stemming from merely a mission goal cannot be taken for granted. Directionality for transformation requires collective priorities, which do not always automatically emerge when public and private actors only follow their own interests. Moreover, it remains hard to properly understand how directionality or different innovation directions are shaped over time, and how they interact. New insights are needed to map the complex interactions between the mission, the societal problems it aims to tackle, the actors engaged, and the solutions proposed to contribute to mission fulfilment. This study draws multiple interaction archetypes illustrating different potential transition impasses. Sequentially, intervention strategies were identified for each archetype to overcome these impasses. This research analyzed the Dutch transition to a circular plastic chain focusing on bioplastics. Different archetypes were found and interventions were designed to accelerate the transition.

Introduction

Recent years have seen a rising interest for state-led missions as a means to facilitate societal transformations and, thereby, tackle societal challenges (Mazzucato, 2018). Missions prioritizing an ambitious and measurable societal goal are believed to provide the directionality needed to mobilize and align actors that may contribute to the development and diffusion of solutions. However, this proclaimed directionality stemming from merely a mission goal can not be taken for granted. Scholars and policy practitioners are increasingly questioning what processes and agents play a role in defining the scope of the problems and solutions that should unite diverse stakeholders in innovation development and diffusion (Wanzenböck et al., 2020; Janssen et al. 2023).

Directionality for transformation requires collective priorities, which do not always automatically emerge when public and private actors only follow their own interests - or even their own view on public interests (Hekkert et al., 2007). Weber & Rohracher (2012) label this as directionality failure. When considering with which solution(s) to address a societal challenge, actors might have different expectations, perspectives and interests. This holds especially when urgent problems and innovative solutions are characterized by uncertainty, contestation, and complexity (Wanzenböck et al., 2020).

The current debate on directionality harbors different views on what the concept really entails, how it should be assessed and what factors determine its scope and evolution. Scholars like Hekkert et al. (2020) and Yap & Truffer (2019) describe directionality as a process powered by shared expectations, functioning as a catalyst to generate momentum and encourage actors to innovate and invest. Other scholars describe directionality not as a process, but rather as an articulation of priorities in relation to driving transformative change (Anderson, 2021; Yang, 2021; Souza, 2020). Multiple studies aimed to identify what factors influence the process and scope of directionality.

Despite these valuable contributions, it remains hard to properly understand how directionality or different innovation directions are shaped over time (Souza, 2020; Janssen et al., 2023). This holds severe implications for the possibility for actors to coordinate transformative transitions. Moreover, current directionality research hardly accounts for the fact that transitions can include multiple positively or negatively interacting innovation directions, nor the complexity that arises from such interactions (Stirling, 2011; 2009).

In sum, new insights are needed to map the complex interactions between the mission, the societal problems it aims to tackle, the actors engaged, and the solutions proposed to contribute to mission fulfilment. Better insight in these dynamics would greatly enhance the capability to steer, govern and complete societal mission. To advance current thinking on directionality emergence, this paper proposes an approach for systematically mapping problems-solutions interactions. By discussing some archetypical constellations we explain how such mapping provides a basis for identifying intervention strategies suitable for enhancing a mission's potential to install clear directions different stakeholders can respond to. To demonstrate the approach, we illustrate it by looking into the Dutch mission of creating a fully circular economy (CE) by the year 2050, focusing on the role of bioplastics in the transition to a circular and fossil-free plastic supply-chain.

Theory

Almost by definition, an ambitious long-term missions allows for different views on how to complete it. Allow for unexpected cross-sectoral and multidisciplinary solutions, technological and/or non-technological, is even one of the promises of mission-oriented innovation policy (Mazzucato, 2018; Janssen et al., 2021). As a result, (incumbent) market actors will attempt to align the mission goals with their own agenda. While mobilizing resources is an objective of missions, this does come with the risk that actors highjack the mission or dilute its focus by including or prioritizing new problems to solve.

Moreover, when setting the mission to tackle a societal-problem, it might be unclear which technological, economical or social solution is best fit to do so (Elzinga et al., 2021; Wanzenbock et al., 2020). Especially when multiple problem framings are included, the multitude of potential solutions results in uncertainty and complexity. Different solutions could propagate diverging and conflicting claims and values, resulting in contestation (Wanzenböck et al., 2020). From thereon it might be (too) difficult to monitor mission progress and intervene to accelerate completion.

Lastly attention should be paid to the interaction of these solutions, or innovation directions, as well. Sanden et al. (2011) show that innovation directions can interact positively and create so-called synergies, can have a neutral interaction, or influence each other negatively competing for resources and attention.

These relations and interactions can be mapped as discussed by Elzinga et al. (2021). Starting from the hypothetical situation in which a mission addresses multiple societal-problems, let's say two (for simplicity sake), and multiple solutions are brought forward to resolve these problems, we can create the interaction archetypes as illustrated in figure 1.

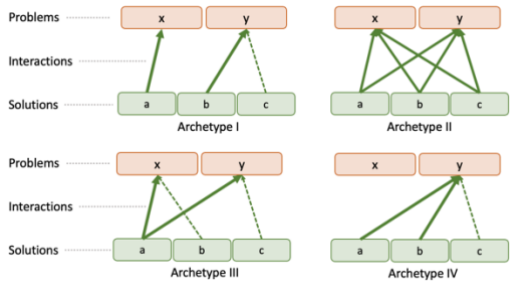


Figure 1: *Potential hypothetical archetypes. A connecting arrow from a solution to a problem implies the solution could prove useful in resolving the problem. Dotted lines imply this contributing will be minor compared to other solutions. (WORK IN PROGRESS - archetypes should be extended using different system factors, Interaction*

amongst solutions not included yet, reasoning/logic of archetypes should be elaborated upon)

As shown in figure 1, multiple interaction archetypes can be drawn, illustrating different potential transition impasses. In each archetype, private and public actors have to deal with numerous interactions between problems and solutions increasing the complexity of the situation. This will result in uncertainty and contestation and therefore paralysis of the transition. Identifying intervention strategies for each archetype to overcome these impasses would help accelerate the transition.

Looking at archetype I, different problem-solution clusters can be observed, meaning actors are trying to tackle different problems which each have their own respective solutions to do so. An intervention for policymakers could then be to reduce the perceived complexity by simply splitting these problem-solution clusters into two separate missions (figure 2).

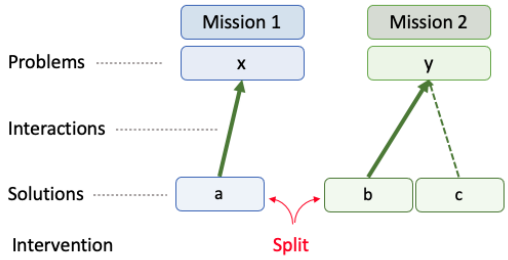


Figure 2: Intervention for Archetype 1 is to split up the mission

The number of interactions, and therefore the actual complexity, of archetype II is higher. Also no clear problem-solution clusters can be observed as most (to all) solutions interact with the problems. Therefore an intervention to accelerate mission completion without picking or prioritizing a single solution, is to boost complementarities of the different solutions. That is, when solution or innovation directions make use of similar infrastructure or have likewise knowledge gaps, investment in resolving these barriers will boost both solutions. Previous studies like Sanden & Hillman (2011) proposed such an approach by examining where value chains of (technological) innovations overlap. Alternatively Elzinga et al. (2021) build on Sanden & Hillman (2011) to also include socio and economic innovation directions. (Figure to be added).

Archetype III displays a problem-solution cluster, but alternatively to Archetype I, this cluster includes all problems. Moreover, other solutions are not expected to contribute significantly to resolving either problem. This could be the result of lobbying efforts by actors to include their solution in the mission utilizing its momentum and resources. Prioritization could be an intervention strategy to again limit the number of interactions, meaning competition from solution b and c would diminish.

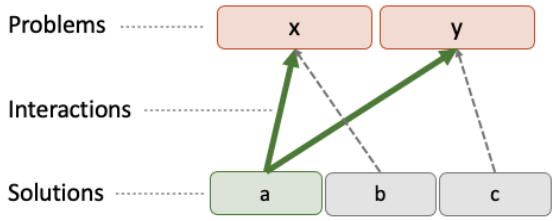


Figure 3: Intervention for Archetype III is to prioritize a solution

Archetype IV shows a problem different problem-solution constellation which includes multiple solutions, but a single problem. Again, lobby efforts could have aimed at the inclusion of an extra problem fitting their agenda. Alternatively, the urgency of a problem could have decreased over time. Exclusion of this problem from the mission statement could help limit confusion. New missions using different problem framing could be set to address the excluded mission.

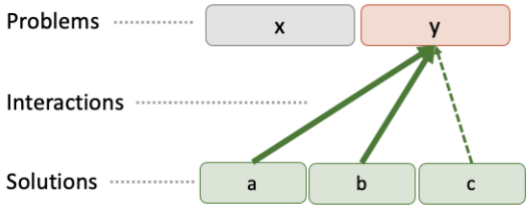


Figure 3: Intervention for Archetype IV is to exclude a problem framing

Empirical case

Using interviews and deskresearch, this research shows that actors in the transition act upon the ambiguity of the proposed mission by trying to steer problem framings based on their own interests. This process resulted in distinct subgoals of the mission for bioplastics, namely: *Being fossil free, preventing plastic pollution of the natural environment*, *reducing greenhouse gas emissions*, and *promoting the use of reusable or recyclable materials* in order to be circular. Our analyses indicate that the variety of goals interact in inconsistent manners with the different proposed

solutions, resulting in different types of conflicts among actors. Over the past years, this resulted in strongly polarized actor groups all trapped in discussions in which they don't understand each other, disagree with each other, or both. By creating various problem framings, actors created the room to set their own priorities. These various priorities often mismatch with other stakeholders' opinions or solutions.

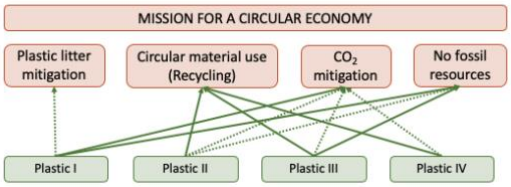


Figure 4: Interactions among problems and solutions in the Dutch mission for a circular plastic chain

For example, claiming bioplastics should *counter plastic pollution* forces bioplastics to be fully degradable under natural circumstances while maintaining their functional properties. Such demands strictly limit the innovative freedom and dominate the discourse. Biodegradability contests with making materials and product more durable and therefore reusable or recyclable. Therefore, actors focused on biodegradability have long been in conflict with actors perusing recycling or reusing strategies. Such conflicts could, and probably will, hamper mission progress.

Discussion and conclusion (WORK IN PROGRESS)

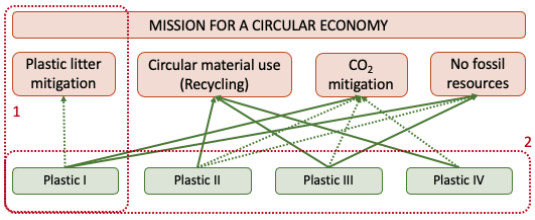


Figure 5: Interventions for the Dutch mission for a circular plastic chain

By mapping the interaction amongst and dynamics of multiple missions and corresponding solutions, this research provides input for developing an analytical tool to design intervention strategies. For the Dutch bio-plastic sector two interventions can be proposed (figure 5). The first intervention is based on Archetype I and recommends splitting the mission in two separate missions. The problem of plastic littering is (weakly) addressed by a single solution, asking for a separate (sub-)mission. Secondly, the lack of further problem-solution clusters (archetype III) demands finding complementarities between the different value chains. Pointing out such barriers provides a basis for developing targeted responses and policies that can accelerate the transition.

Reference

Andersson, J., Hellsmark, H., & Sandén, B. (2021). The outcomes of directionality: Towards a morphology of sociotechnical systems. Environmental Innovation and Societal Transitions, 40, 108-131.

Elzinga, R., Janssen, M., Negro, S., & Hekkert, M. (2021). Mission-Oriented Innovation Systems Dynamics in the Circular Economy. In DRUID Conference 2021 (p. 1).

Hekkert, M. P., Suurs, R. A., Negro, S. O., Kuhlmann, S., & Smits, R. E. (2007). Functions of innovation systems: A new approach for analysing technological change. Technological forecasting and social change, 74(4), 413-432.

Hekkert, M. P., Janssen, M. J., Wesseling, J. H., & Negro, S. O. (2020). Mission-oriented innovation systems. Environmental Innovation and Societal Transitions, 34, 76-79.

Janssen, M., Wesseling, J., Torrens, J., Weber, M., Penna, C., & Klerkx, L. (2023). Missions as boundary objects for transformative change: Understanding coordination across policy, research and stakeholder communities. Science and Public Policy.

Mazzucato, M. (2018). Mission-oriented innovation policies: challenges and opportunities. Industrial and Corporate Change, 27(5), 803-815.

Sandén, B. A., & Hillman, K. M. (2011). A framework for analysis of multi-mode interaction among technologies with examples from the history of alternative transport fuels in Sweden. Research Policy, 40(3), 403-414.

Souza, J. C. P. V. B. (2020). Directionality and systemic governance: Lessons from Brazilian pig system transformations from the 1960s to date (Doctoral dissertation, Wageningen University and Research).

Stirling, A. (2011). Pluralising progress: From integrative transitions to transformative diversity. Environmental Innovation and Societal Transitions, 1(1), 82-88.

Stirling, A. (2009). Direction, distribution and diversity! Pluralising progress in innovation, sustainability and development.

Weber, K. M., & Rohracher, H. (2012). Legitimizing research, technology and innovation policies for transformative change: Combining insights from

innovation systems and multi-level perspective in a comprehensive 'failures' framework. Research policy, 41(6), 1037-1047.

Wanzenböck, I., Wesseling, J. H., Frenken, K., Hekkert, M. P., & Weber, K. M. (2020). A framework for mission-oriented innovation policy: Alternative pathways through the problem–solution space. Science and Public Policy, 47(4), 474-489.

Yap, X. S., & Truffer, B. (2019). Shaping selection environments for industrial catch-up and sustainability transitions: A systemic perspective on endogenizing windows of opportunity. Research Policy, 48(4), 1030-1047.

Yang, K. Schot, J. & Truffer, B. (2021): Shaping the directionality of sustainability transitions: the diverging development patterns of solar photovoltaics in two Chinese provinces, Regional Studies, DOI: 10.1080/00343404.2021.1903412

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Artistic participation processes in the Valencian public space

Ruth M-Domenech
INGENIO CSIC - Universitat Politècnica de València (Valencia, Spain) (rutmuodo@bbaa.upv.es).

Short Bio

Graduated in Design and Creative Technologies at the Universitat Politècnica de València (UPV) and student of the Master in Development Cooperation at the UPV. Her research interest lies in using participatory methodologies to generate community artistic processes that facilitate the creation of futures (some authors call it "futuring").

Abstract – The use of the public space in urban territories is conditioned by urban planning. Several authors speak of "urbanizing for vitality" considering the social fabric to determine the future of urban areas. This research analyzes how participatory artistic interventions in urban public spaces function as a tool for social transformation to generate processes of political incidence and appropriation of the territory focusing on two social movements in the municipality of Valencia. The first one, the urban agriculture initiative Cabanyal Horta, together with several neighborhood associations that support it in the Cabanyal-Canyamelar district. The second one, the *Assemblea Feminista de València Poblats Marítims-Algiròs*. These two participatory processes have been carried out in the public space. The analysis of the interventions has been complemented with the development of other techniques such as semi-structured interviews and participant observation. The processes of artistic participation have favored the construction of community discourses, reinforcing the collective identity around the territory.

Keywords – **Public space; Urban planning; Participation; Artistic Processes; Community discourses; Collective identity**

Introduction

In a context where communication and public space are conditioned by political interests, artistic interventions in public fields improve citizens' access to the production and dissemination of popular knowledge. Local management needs citizen participation to improve its democratic quality. At present time there are static, inaccessible, and unattractive formulas that do not consider the identities (existing or under construction) of the cities. Therefore, it is relevant to consider new "formulas of cooperation, execution or management through civil society" (Jordi Borja & Zaida Muxí, 2002).

Likewise, in this context of search for identity and reformulation of citizen participation, community art is linked to civil society. Since the end of the 20th century, art has been related to the social context in Western societies and has functioned as an intrinsic element of democracy. Artistic processes come along social processes to facilitate the direct participation of civil society by helping to question static formulas of participation. In the words of Paul Ardenne (2006), "to open up the meaning and scope of the work of art, to resort to gestures that require authentic contact, is to re-evaluate the notion of "society'". This paper analyzes participatory artistic interventions in urban public spaces as a tool for social transformation to generate processes of political incidence based on two case studies.

Theoretical basis

This research seeks to rely on theoretical arguments that respond to the social, cultural, and political nature of the public, specifically associated with space as a territory of relationship, identification, political manifestation, and community expression. According to Borja and Muxí (2002),

"what defines the nature of public space is its use and not its legal status". The use of public space is conditioned by the design, functioning and management that is articulated in it through urban planning. This urbanism uses planning methods often not linked to what happens on the territory. For this reason, several authors such as Jane Jacobs (1961), criticize urban theories planned from offices, which only generate unsafe and sterile spaces that do not urbanize "for vitality".

Also in this context, and due to the social and political changes in the 1970s (Paloma Blanco et al., 2001), Western art started to deal with "the public issue" focusing on both physical and social contexts and how public interactions worked with art itself. Projects carried out from the 1990s which relevance relies on "the process" barely show the separation between art and social action. Social movements gradually left their exclusive links to the class struggle to change its activism into community identity and new ways of popular sovereignty (Julia Ramirez, 2015).

This paradigm shift facilitated the evolution of art towards alternative disciplines that sought to challenge the hegemonic regime based on a democratic exercise, accompanying, and making visible the speeches of people deprived of the right to participate, as well as bringing art closer to a broader public (Blanco et al. al., 2001). The author Ramírez (2015) links this new practice with the construction of utopias, also known as "construction of the social dream".

In summary, community art is characterized by "a strong educational intentionality in its emancipatory sense as a tool for human development" (Alfredo Palacios, 2009), which favors the emergence of unusual methods in the world of art to encourage community participation and its scope in the public sphere (Blanco et al., 2001). Assessment the impact on this kind of intervention, Blanco et al. (2001) consider relevant five strategies and methods beyond its visual or physical manifestation. (1) Focusing on the process (in form and method), rather than focusing on the product, where art takes its meaning in the making process and reception;(2) taking place in public spaces away from normative exhibition settings; (3) adopting temporary forms of intervention such as performance, media events, exhibitions and installations; (4) employ mainstream media techniques in order to send subversive messages of mass communication; and (5) prioritize collaborative methods, from preliminary research to the facilitating activity of the participants.

Case studies

Using the participatory methodology of Action-Research, we have worked with civil society groups in the community creation of artistic interventions that accompany their political agenda by occupying the public space. All this, through simultaneous processes of research and action using techniques of knowledge co-production and critical analysis of reality with feminist and epistemic justice transversal approaches. The use of the I-A methodology is carried out in two different case studies, corresponding to two groups in the municipality of Valencia.

The first case study was carried out with the Cabanyal Horta urban agriculture initiative, together with various neighborhood associations that support it in the Cabanyal-Canyamelar district. Cabanyal Horta makes use of an occupied space in a communal way by the neighbors, exposed to numerous threats due to new urban development plans aimed at "exploiting" the maritime area of the city. In this area, a participatory artistic process has taken place to work on food sovereignty and the right to the city through three artistic interventions performed in three different places in the city of Valencia: on the maritime promenade, in the Cabanyal Horta urban garden area and in the Town Hall Square of Valencia.

The second case study was accomplished with the *Assemblea Feminista de València Poblats Marítims-Algiròs*. This organization is part of the feminist movement of Valencia and is characterized by being open, self-managed and not mixed, besides being familiarized using the public space as a place of denunciation where to develop different actions aligned with its political agenda. We worked with them regarding the International Day for the Elimination of Gender Violence, on November the 25th, in an interactive artistic intervention where other feminist groups in the city and people from the neighborhood were invited to participate.

Methodology

The participatory process follows a qualitative methodological strategy that combines the facilitation of two other artistic participatory processes, semi-structured interviews, and participant observation. It has different moments of data collection and information analysis; it is not a linear process, so it makes use of various qualitative techniques. The process is structured around five different phases distributed in various participatory workshops.

First, the process begins with a "Diagnosis" phase, where the group identifies its needs in one session. Secondly, the "Training and Design" phase is carried out, in which training on artistic methodologies is provided and the intervention is designed collectively in another. More sessions may be needed for the design of the intervention, depend-

ing on the group and how the consensus of the action is reached. This is followed by the "Participatory Action" phase, where coordination meetings, rehearsals, and any activity related to the implementation of the intervention until its realization is due.

Once the artistic intervention has been completed, a "Final Reflection" session is held to share all the lessons learned throughout this process and take on account possible future activities generated from it. Finally, once the research has been concluded, the "Return of results" phase is carried out, which can be either public or internal and will depend on the needs of the group. As a complement to the I-A process, semi-structured interviews are conducted with some of the participants.

The expected impact of the processes

This research process is currently under development and in very early stages. Although the results of the definitive process have not yet been obtained, it is expected that a series of interviews will soon be taken place to provide information on the I-A process and share them in the medium term. However, because of the participant observation and the co-creation process of the artistic initiatives, it has been possible to identify some of the impacts of the process. First, relationships between neighborhood groups have been strengthened, increasing participation and collaboration among them. Actions of the neighborhood have been also opened to a greater extent to the rest of the city, taking more into account the participation of people who did not participate on a regular basis. Thirdly, in the case of the Cabanyal-Canyamelar district, an organized group has been created to lead the neighborhood fight against the PECC. Finally, all the participants in both participatory processes agree on the importance of using artistic techniques to facilitate the impact of their actions and speeches.

The work developed so far shows that, indeed, through processes of community artistic intervention in public space, the creation of community discourses is strengthened and reinforces collective identity. In the case around l'Horta valenciana, the rights to the city and the fight against gender violence. All this, thanks to the direct-action initiatives resulting from the common development of a political advocacy strategy.

Bibliography

Ardenne, Paul. (2006). *Un arte contextual: creación artística en medio urbano, en situación, de intervención, de participación*. Cendeac Editorial.

Blanco Aristín, Paloma., Carrillo Castillo, Jesús., Claramonte Arrufat, Jordi., & Expósito Prieto, Marcelo. (2001). *Modos de hacer. Arte crítico, esfera pública y acción directa*. Ediciones Universidad de Salamanca.

Borja Sebastià, Jordi., & Muxí Martínez, Zaida. (2002). *El espacio público: ciudad y ciudadanía*. Electa España. www.t.ly/zm9f

Jacobs, Jane. (1961). *Muerte y vida de las grandes ciudades* (2011.a ed.). Capitán Swing Libros.

Palacios Garrido, Alfredo. (2009). El arte comunitario: origen y evolución de las prácticas artísticas colaborativas. *Arteterapia. Papeles de arteterapia y educación artística para la inclusión social, 4*, 197-211.

Ramírez Blanco, Júlia. (2015). *Utopías artísticas del mundo contemporáneo, 1989-2012: Arte, movimientos sociales y utopía en Europa Occidental*. Universidad Complutense de Madrid.

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Menstrual Health. Bloody Important

Sara Sánchez López[1], Santiago Moll López[2], Dani Barrington[3], and Rocío Poveda Bautista[1]

[1] *INGENIO (CSIC-UPV), Universitat Politècnica de València, Valencia, Spain (sasanlo@upv.es)*
[2]*Departamento de Matemática Aplicada, Universitat Politècnica de València, Valencia, Spain*
[3] *School of Population and Global Health, The University of Western Australia, Crawley, Western Australia, Australia, School of Civil Engineering, University of Leeds, Leeds, West Yorkshire, United Kingdom*
[4]*INGENIO (CSIC-UPV), Universitat Politècnica de València, Valencia, Spain*

Short Bio

Sara Sánchez López is an engineer with experience in Research and Innovation in water and sanitation treatment technologies. Having worked on different development projects is now developing her doctoral thesis on how to improve menstrual experiences in Spain while working on projects for gender equality. Member of the Steering Committee of Young Water Professionals Spain and Women in Water and Sanitation Network (WWSN).

Abstract – There is growing recognition of the importance of the role menstruation plays in achieving health, education, and gender equality. Evidence of period poverty including the struggle to access menstrual hygiene products has impulse new policies in high-income countries. Yet, stigmatisation and taboo remain present and negative emotions like fear and shame dominate the narrative when speaking about periods. This paper aims to analyse the information provided about menstruation, to understand its role in the way it is experienced and to identify what information should be provided.

An online survey with more than 4000 participants was conducted to study how menstruation is experienced in Spain. Data was gathered by using the digital platform Typeform and descriptive and inferential statistics analyses were performed with SPSS software. Many participants declared not having received sufficient information on menstruation prior to menarche, particularly about how to physically manage it. Furthermore, negative emotions like shame, worry and fear were recurrently reported to describe menarche. It is recommended that menstrual education -including how to physically manage periods- is integrated in the schools' curricula. Menstrual education can change how menses are lived and thus it needs to be ensured to increase in wellbeing for girls, women and other people who menstruates.

Keywords *– Menstrual hygiene, menstruation, menstrual literacy, menstrual health.*

Introduction

Ten percent of the world's population is menstruating at this moment (Bull, 2019). Approximately the equivalent of half the population of China. However, despite the increasing attention on menstruation in recent years, studies on menstruation and its social, and economic consequences remain significantly scarce, especially in Spain where there are hardly any studies on the subject.

Menstrual health is defined as a state of complete physical, mental, and social well-being, and not merely the absence of disease or illness, in relation to the menstrual cycle (Hennegan, 2021). This definition includes living the cycle with dignity, having access to menstrual hygiene products, and clean washing and sanitation facilities, as well as reliable information. The explicit mention of mental and social well-being is especially relevant, as these aspects have been particularly neglected.

The lack of access to menstrual hygiene has been identified as a barrier to fulfilling basic human

rights and achieving United Nations Sustainable Development Goals (SDGs) such as gender equality, quality education, safe drinking water, and sanitation (United Nations, 2016). It is essential to raise menstrual literacy to achieve these goals. Studies indicate that menstruation should be on the agenda not only in Low-Income Countries (LICs) but also in other countries.

Yet, girls worldwide are taught that menstruation is something to be hidden and to be ashamed of. The stigma and taboo surrounding menstruation lead to stress, shame, and fear of leakage or spotting.

METHODS

A dynamic survey was designed consisting of a maximum of 42 questions, which were adapted according to the answers provided by the respondents (which determined the next question according to the answers given previously. Data collection and survey design were done using TypeForm platform (TypeForm, 2022). The survey was disseminated through different channels, such as contact groups, and social networks, to maximize the reach of the study. The data were processed using different software (Excel, SPSS, and NvS). (Excel, SPSS and Nvivo). Different statistical analyses have been applied to obtain the results. The questionnaire was filled out by 4028 individuals, with an average completion time of 17 minutes. Approximately 10% of the responses were from male individuals or other people who do not menstruate. Use the following guidelines: the titles of the sections should be in capital letters as in the title of this section.

RESULTS AND DISCUSSION

As few as 6.9% of the participants considered that they had a high amount of information regarding how to manage their menstruation when it happened. Whereas 39.6% scored 4 or less on the question 'How much information did you have during your first menstruation about what products or method to use?' from 1 to 10, 1 being 'No information whatsoever', and 10 'A high level of information, including different methods and types of products available'.

Table 1. Statistics on the questions on how much information did they have by the time of their first menarche.

How much information did you have by the time you had your first menstruation on...	Mean	Median	Std. Deviation
...how to manage the bleeding?	5.23	5.00	2.70
...what was the bleeding?	6.58	7.00	2.82

By the time of their first bleeding, less than 4% of the respondents declared having a high amount of information on different methods and types of menstrual hygiene products. The 36% only knew about pads, and the 48% both pads and tampons. Finally, the 8.4% reported not having knowledge about any method, nor product to manage their menstruation.

Altogether, girls could have been better prepared for their first bleeding. This lack of information is heavily affected by stigmatisation and its perception as a taboo. An issue that must also be tackled urgently.

While easy access to information through the internet is an advantage, it may also increase misinformation. Myths and misconceptions are still prevalent nowadays. Therefore, it is crucial that reliable information is provided, but it is also important to do so in time.

Formal education could address menstrual education and provide reliable information. Yet, formal education in Spain often only addresses menstruation as part of its role in reproduction. What information should be provided and how much attention shall be paid to this matter lies in the hands of the centres of even individual teachers because the curricula does rarely define any specific content. Figure 1 shows the contents specified on the schools' curricula about menstruation.

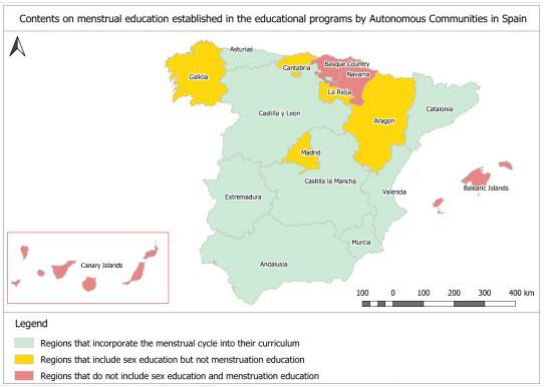


Figure 1. Content on menstrual education established in the educational programs by Autonomous Communities in Spain.

The economic impact of menstruation is an important factor of inequality. Participants were asked whether they have struggled economically to get menstrual hygiene products. (Figure 2). And we are talking about the best possible scenario since the people who answered our questionnaire are middle class, and upper middle class, and the vast majority have higher education.

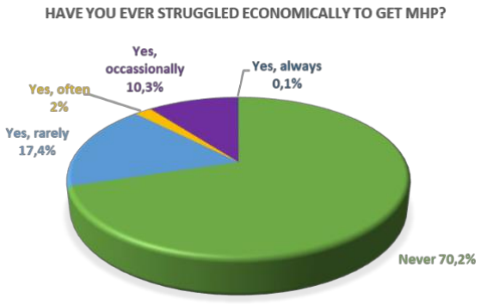


Figure 2. Results to the question 'Have you ever struggled economically to get Menstrual Hygiene Products?

CONCLUSIONS

In Spain, many girls and women lack sufficient information on how to manage menstruation when they experience it for the first time.

According to the data, knowledge of how to manage menstruation decreases the experience of negative emotions (shame, fear, worry, and disgust) during menarche.

Information plays an important role in how menstruation is experienced. Therefore, it is advised to include education about menstruation matters in the curricula to guarantee every child is provided with reliable information independently of their personal circumstances.

Girls, women, and people who menstruate struggle to afford menstrual hygiene products in Spain. The economic impact of is not neglectable and should be addressed.

REFERENCES

Andalucía. Consejería de Educación., "Decreto 110/2016," Boletín Of. la Junta Andalucía, no. 22, de 14 junio, pp. 15–16, 2016, [Online]. Available: https://www.juntadeandalucia.es/boja/2016/122/1

Bull, J. R., Rowland, S. P., , Scherwitzl, E. B., Scherwitzl, R., Danielsson, K. G., &Harper, J. (2019). Real-World Menstrual Cycle Characteristics of More than 600,000 Menstrual Cycles. Npj Digital Medicine 2:1 2(1):1–8. doi: https://doi.org/10.1038/s41746-019-0152-7.

C. Consejería de Educación, Cultura y Universidades, "Decreto n.o 220/2015, de 2 de septiembre de 2015, por el que se establece el currículo de la Educación Secundaria Obligatoria en la Comunidad Autónoma de la Región de Murcia.," Boletín Of. la Región Murcia, pp. 30729–31593, 2015, [Online]. Available: https://www.carm.es/web/pagina?IDCONTENIDO=51745&IDTIPO=100&RASTRO=c77$m4507,3993,21221

C. D. E. Gobierno, "7.5.varios," pp. 20441–21321, 2022.

C. y D. Consejería, Educación, "Decreto 40/2015 CLM, circulo de Educación Secundaria Obligatoria y Bachillerato en la Comunidad Autónoma de Castilla- La Mancha," D. Of. Castilla-La Mancha, pp. 18872–20324, 2015.

C. y D. Departamento de Educación, "Orden de 9 de mayo de 2007, por la que se aprueba el currículo de la Educación secundaria obligatoria y se autoriza su aplicación en los centros docentes de la Comunidad Autónoma de Aragón," Boa, 2007, [Online]. Available: http://benasque.aragob.es:443/cgi-bin/BRSCGI?CMD=VEROBJ&MLKOB=201255412828

Consejería de Hacienda, "Boletón Oficial de la Rioja," vol. 156, pp. 24921–24955, 2014, [Online]. Available: http://ias1.larioja.org/boletin/Bor_Boletin_visor_Servlet?referencia=1902409-1-PDF-486979

Conselleria, "Decreto 87/2015, de 5 de junio, del Consell, por el que establece el currículo y desarrolla la ordenación general de la Educación Secundaria Obligatoria y del Bachillerato en la Comunitat Valenciana.," D. Of. la General. Valencia., pp. 1–28, 2020.

C. de E. y Cultura, "Decreto 67/2008, de 6 de junio, por el cual se establece la orde- nación general de las enseñanzas de la educación infantil, la educación primaria y la educación secundaria obligatoria en las Islas Baleares," pp. 47–54, 2008.

Decreto. Gobierno de Extremadura, "Decreto 98/2016, de 5 de julio, por el que se establecen la ordenación y el currículo de la Educación Secundaria Obligatoria y del Bachillerato para la Comunidad Autónoma de Extremadura," D. Of. Extrem., no. num 129, pp. 17347–18550, 2016, [Online]. Available: http://doe.gobex.es/pdfs/doe/2016/1290o/16040111.pdf

E. Consejería, Decreto 6/2013, de 31 de enero, por el que se modifica el Decreto 40/2007, de 3 de mayo, por el que se establece el currículo de la Educación Primaria en la Comunidad de Castilla y León. 2013, pp. 8771–8786.

P. de Asturias, "I . Principado de Asturias," Bopa, pp. 1–3, 2018.

Generalitat de Catalunya Departament d'Ensenyament, "Decret 187/2015," Dogc, vol. Núm 6945, no. Disposició, p. 305, 2015.

G. de Navarra, "DECRETO FORAL 71/2022, DE 29 DE JUNIO, POR EL QUE SE ESTABLECE EL CURRÍCULO DE LAS ENSEÑANZAS DE LA ETAPA DE EDUCACIÓN SECUNDARIA OBLIGATORIA EN LA COMUNIDAD FORAL DE NAVARRA," 2015.

Gobierno Vasco, "Currículo de educación básica," Currículo carácter orientador que Complet. el Anexo II del Decreto 236/2015, pp. 1–695, 2015.

Hennegan, J., Brooks, D. J., Schwab, K. J., & Melendez-Torres, G. J. (2020). Measurement in the Study of Menstrual Health and Hygiene: A Systematic Review and Audit. PLOS ONE 15(6):e0232935. doi: https://doi.org/10.1371/JOURNAL.PONE.0232935 .

J. del Estado, "LOMLOE 3/2020, de 29 de diciembre," BOE núm.340, pp. 122868–122953, 2020.

MECD, "Proyecto de real decreto por el que se establece el currículu básico de la educación secundaria obligatoria y del bachillerato," 2013.

Ministerio de Educación Cultura y Deporte, "Ley Orgánica 1/1990, de 3 de octubre, de Ordenación General del Sistema Educativo.," Boletín Of. del Estado, vol. 238, pp. 28927–28942, 1990, [Online]. Available: https://www.boe.es/boe/dias/1990/10/04/pdfs/A28927-28942.pdf

Typeform Web Page. (2022). Typeform: Formularios Pensados Para La Gente. Available in https://www.typeform.com/es/. Accessed November 12, 2022 ().United Nations General Assembly Human Rights Council Thirty-third session. (2016). Report of the Special Rapporteur on the Human Right to Safe Drinking Water and Sanitation Note by the Secretariat. Retrieved from https://www.ohchr.org › A_HRC_27_55_ENG. Accessed November 12, 2022.

United Nations General Assembly Human Rights Council 50th session. (2016). Panel discussion on menstrual hygiene management, human rights and gender equality. Retrieved from https://www.ohchr.org/en/statements/2022/06/high-commissioner-human-rights-statement-menstrual-health. Accessed January 23, 2023Vicepresidencia Consejería de Educación y Universidades, Decreto 65/2022, de 20 de julio, del Consejo de Gobierno, por el que se establecen para la Comunidad de Madrid la ordenación y el currículo de la Educación Secundaria Obligatoria., no. 176, 26 de julio del 2022. 2022, pp. 396–716. [Online]. Available: https://www.bocm.es/boletin/CM_Orden_BOCM/2022/07/26/BOCM-20220726-2.PDF

Xunta de Galicia, "DECRETO 156/2022, de 15 de septiembre, por el que se establecen la ordenación y el currículo de la educación secundaria obligatoria en la Comunidad Autónoma de Galicia," D. Of. Galicia, 2022, [Online]. Available: https://www.xunta.gal/dog/Publicados/2022/20220926/AnuncioG0655-190922-0002_es.html

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

The role of universities in the commercialisation and economical success of university spin-offs in emerging economies.

Sebastián Alonso Arriagada Mujica
University of Manchester, United Kingdom, sebastian.arriagada@manchester.ac.uk

Bio

Sebastián Arriagada is a professional specialised in innovation and entrepreneurship with more than ten years of experience working for different business incubators, universities, and innovation agencies in Latin America. Entrepreneur and founder of 5 startups. PhD candidate in Science, Technology, and Innovation Policy at the University of Manchester (UK) and Master of Engineering Management at the University of Melbourne (Australia).

Abstract **– Universities are critical to the development of Entrepreneurial Ecosystems because they contribute, in different aspects, to the development of new technology companies. As a result, the number of university spin-offs emerging from universities has grown in recent years worldwide. However, one of the most critical challenges faced by university spin-offs, especially in emerging countries, is related to the difficulty these companies have in successfully commercialising their technologies in the market. The success of any university spin-off is affected by a set of conditions and factors associated with the different levels associated with the generation of this kind of company. However, although the commercial success of a spin-off does not depend only on universities, these organisations play a fundamental role in the success of university spin-offs, promoting the development of different critical success factors. This article aims to identify, visualise and understand in depth the role of universities in promoting the development of different factors that influence the commercialisation of university spin-offs in emerging countries, as well as the good practices that encourage their successful formation.**

Keywords **– Entrepreneurship Ecosystems, University Spin-Offs, Entrepreneurship Commercialisation.**

The creation of companies based on technologies and knowledge generated within universities has become, in recent years, one of the most effective mechanisms for transferring and commercialising research results from universities to the productive sector (Fini et al., 2017). These companies, called university spin-offs, play a critical role in innovation processes, generating new technologies, creating qualified employment, and contributing to socioeconomic development (Hayter et al., 2018). Moreover, their scientific-technological solutions contribute to closing the gap between knowledge generated in laboratories and research centres and the market (Barron and Amorós, 2019).

The emergence of these companies depends significantly on the existence of an entrepreneurial ecosystem (EE) that provides them with resources, infrastructure and connections that allow them to develop and commercialise disruptive solutions (Isenberg, 2011; Stam, 2015). In this context, diverse evidence has shown that universities are essential players within the EE, contributing to developing and commercialising cutting-edge new technologies (Malecki, 2018; Hayter et al., 2018; Swamidass, 2013).

The main objectives of any university are to generate new knowledge through scientific research (Arshad et al., 2019). These scientific discoveries are fundamental when developing new technologies that solve various global problems for humanity. Thus, universities are key to the development of EEs because they contribute, in different

aspects, to the development of new companies (Audretsch, 2021). On the one hand, universities are the institutions responsible for promoting the development of the personal skills necessary for generating spin-offs (Yip et al., 2019). On the other hand, universities possess the necessary infrastructure and resources to generate new disruptive solutions (Malecki, 2018). Therefore, universities are the perfect platform for these companies to emerge since, by the very nature of disruptive innovation, they require more significant financing, technological infrastructure, and planning than traditional entrepreneurship (Moray & Clarysse, 2005).

In this context, universities are responsible for generating numerous technological companies from which EEs are nurtured (Spiegel, 2017). As a result, the number of spin-offs emerging from universities has grown in recent years worldwide. For example, between 2013 and 2019, the number of spin-offs from top universities in the United States increased, on average, by more than 200% (Frietsch et al., 2021). A positive trend is also evident in Europe, where countries such as Germany, England and France have seen a sustained increase in the number of spin-offs generated by leading universities over the last decade (Fraunhofer, 2021).

However, in the existing cases of analysing the university's role in developing spin-offs, most of these studies have focused on analysing the phenomenon in developed economies. In contrast, works analysing spin-offs in emerging economies are scarce. Thus, according to Kantis & Angelelli (2021) in emerging economies the average number of spin-offs per 1000 researchers in universities does not exceed two companies. Several reasons may explain this phenomenon. On the one hand, these universities must face cultural, bureaucratic, financial, and regulatory barriers that make it challenging to transform the knowledge generated into new products/services (Boffo & Cocorullo, 2019) On the other hand, these organisations lack academics or researchers prepared for developing new technologies due to the small budget they manage, mainly from public funding (Mathisen & Rasmussen, 2019).

In general, starting a university spin-off is particularly challenging in emerging economies. This is consistent with the evidence provided by the Global Entrepreneurship Monitor (2021), showing that wealthier countries have better wider conditions for the generation of spin-offs, which influences the existence of a much higher success rate when compared to countries where the diffusion of knowledge and economic growth is slower (Frietsch et al., 2021). Moreover, in countries where economic and social development is precarious, technological solutions are more challenging to develop due to the lack of conditions for the prosperity of these kinds of companies (Swamidass, 2013).

In this context, one of the most critical challenges faced by university spin-offs in emerging countries is related to the difficulty these companies have in successfully commercialising their technologies in the market (Kantis, 2021). The success of any university spin-off is affected by a set of conditions and factors associated with the different levels associated with the generation of this kind of company. However, although the commercial success of a spin-off does not depend only on universities, these organisations play a fundamental role in the success of university spin-offs, promoting the development of different critical success factors (Stam, 2015; Spiegel, 2017). On the one hand, many of the entrepreneurial skills needed to succeed in business are taught in universities, where participation in training programs and entrepreneurial courses for developing entrepreneurial skills are some of the main reasons students want to start new businesses (Fayolle, 2018). On the other hand, the university's reputation and networks of contacts are factors that these companies use to make a more significant number of sales and allow them to obtain more significant validation of the solution when receiving private financing (Breznitz & Zhang, 2019).

This article aims to identify, visualise and understand in depth the role of universities in promoting the development of different factors that influence the commercialisation of university spin-off emerging countries, as well as the good practices that encourage their successful formation. University spin-off success factors are derived from a literature review and have been grouped into four main categories: individual, organisational, technological, and environmental. For each section, a series of hypotheses are derived that are used to build the conceptual framework for the study. The research questions addressed in this paper are 1) What are the susceptive factors to be influenced by universities related to the commercial success of university spin-offs in emerging economies? 2) How do universities promote these factors to contribute to the creation and success of university spin-offs in these countries?

The study focusses on the case of Chile, a country with a high profile in science, technology, and innovation within amongst Latin American countries (Garzon & Ladino, 2018) and one of the

leaders in developing university spin-offs on the continent (GEM, 2021). I make use of the official science-technology-based companies registry of the Ministry of Science, Technology and Innovation of Chile to determine the sample of high-tech start-ups (Observa, 2022). This registry is the official government directory which identifies 295 companies that are currently developing disruptive solutions using high-tech components and thus appropriate for the purpose of this research. I matched this data with a number of other Chilean company databases to acquire information on location, sales, financing, founders etc. I further conducted an extensive search of the web, including Linkedin and company or university websites to collect additional information on company structures and founder/manager information. Finally, patent and publication data was obtained from WIPO and Web of Science for the companies and the founders respectively. The resulting database provides a rich picture of the 295 high-tech start-ups in the database.

Importantly the detailed data allows to discriminate which of these companies are 'successful' university spin-offs. Overall around 85% of the companies emerged from universities, as staff or graduate spin-offs. The majority of these is successful at acquiring external funding and we thus can assume that more than half of the companies in our sample could be considered successful university spin-offs.

A preliminary descriptive analysis shows a concentration of university spin-offs in the central part of the country, especially in large cities such as Santiago and Valparaíso, due to the more significant development that these areas have concerning other regions of the country, where the 70% of these companies are led only by men with an average of the numbers of founders per company is three people, where a certain heterogeneity can be seen in the skills of each of these professionals. In addition, it is observed that 40% of the spin-offs generated are concentrated in only two universities, the institutions with greater prestige in the country. Using the QS ranking, which measures the academic performance of universities in the world, it can be visualized that the best-positioned institutions generate a more significant amount of university spin-offs in the country where if the quality of the institutions goes down, there is a downward trend in the number of spin-offs generated by these institutions.

Moving forward this research will use regressions to analyse the different factors that determine spin-off success in the Chilean context, and to answer the research questions posed. This stage of the paper will be completed in the next month. Moving forward I will also survey the 295 companies to gain a deeper understanding of the different ways in which universities can support high-tech enterprises in Chile. The survey research will commence in late 2022 and I hope to be able to present first results at the INGENIO PhD days.

The results of this research benefit academics and researchers who wish to understand better the variables that influence the generations of successful spin-offs in emerging countries. A better understanding of this phenomenon will allow the design of programs and strategies that are better aligned with the objectives of universities in developing disruptive technological solutions.

REFERENCE LIST

Arshad, A., Matharoo, J., Arshad, E., Sadhra, S. S., Norton-Wangford, R., & Jawad, M. (2019). Knowledge, attitudes, and perceptions towards waterpipe tobacco smoking amongst college or university students: a systematic review. BMC Public Health, 19(1), 1-11.

Audretsch, D. B., Belitski, M., & Cherkas, N. (2021). Entrepreneurial ecosystems in cities: The role of institutions. PloS one, 16(3), e0247609.

Barron, E., & Amorós, J. E. (2019, March). When science meets the market: a multidisciplinary approach of entrepreneurship education. In 2019 IEEE Integrated STEM Education Conference (ISEC) (pp. 347-353). IEEE.

Boffo, S., & Cocorullo, A. (2019, March). University Fourth Mission, Spin-Offs and Academic Entrepreneurship: Connecting Public Policies with New Missions and Management Issues of Universities. In Higher Education Forum (Vol. 16, pp. 125-142). Research Institute for Higher Education, Hiroshima University. 1-2-2 Kagamiyama, Higashi-hiroshima, Hiroshima City, Japan 739-8512.

Breznitz, S. M., & Zhang, Q. (2019). Fostering the growth of student start-ups from university accelerators: an entrepreneurial ecosystem perspective. Industrial and Corporate Change, 28(4), 855-873.

Fayolle, A. (Ed.). (2018). A research agenda for entrepreneurship education.

Fini, Riccardo & fu, Kun & Mathisen, Marius & Rasmussen, Ei- nar. (2017). Institutional

determinants of university spin-off quantity and quality: a longitudinal, multilevel, cross-country study. Small Business Economics. 48. 10.1007/s11187-016- 9779-9.

Fraunhofer. (2021). Spin-off report for 2021. Retrieved From: https://www.fraunhofer.de/en/press/research-news/2021/march-2022/spin-off-report-for-2021.html

Frietsch, R., Darold, D., Karaulova, M., Gruber, S., Neuhäusler, P., Rammer, C., Doherr, T., Dörr, J., y Gottschalk, S. (2021). Spin- Offs from Public Research Organisations in Germany: A Comprehensive Analysis based on Bibliometric, Patent, Website and Company Register Data

Garzon, D. C. C., & Ladino, A. L. N. (2018). Análisis del emprendimiento en los países de Colombia y Chile en los últimos 10 años. Punto de vista, 9(14).

GEM. (2021). Global Entrepreneurship Monitor. Retrieved From: https://www.gemconsortium.org

Hayter, C. (2016). "A trajectory of early-stage spinoff success: the role of knowledge intermediaries within an entrepreneu- rial university ecosystem". Small Business Economics. 47, pages 633–656

Hayter, C. S., Nelson, A. J., Zayed, S., & O'Connor, A. C. (2018). Conceptualizing academic entrepreneurship ecosystems: A review, analysis and extension of the literature. The Journal of Technology Transfer, 43(4), 1039-1082.

Isenberg, D. (2011). The entrepreneurship ecosystem strategy as a new paradigm for economic policy: Principles for cultivating entrepreneurship. Presentation at the Institute of International and European Affairs, 1(781), 1-13.

Kantis, H. y Angelelli, P. (2021) Grandes empresas, startups e innovación en América Latina: Promesas y desafíos. Banco Interamericano de Desarrollo. Disponible en este link (última visita, mayo 2021)

Malecki, E. J. (2018). Entrepreneurship and entrepreneurial ecosystems. Geography compass, 12(3), e12359.

Mathisen, M. T., & Rasmussen, E. (2019). The development, growth, and performance of university spin-offs: A critical re- view. The Journal of Technology Transfer, 44(6), 1891-1938.

Moray, N., & Clarysse, B. (2005). Institutional change and resource endowments to science-based entrepreneurial firms. Research Policy, 34(7), 1010-1027.

Observa. (2022). Official registry of science-technology-based companies. Retrieved From: https://observa.minciencia.gob.cl/encuestas/directorio-ebct

Spigel, B. (2017). The Relational Organization of Entrepreneurial Ecosystems. Entrepreneurship: Theory and Practice, 41(1), 49–72.

Stam, E. (2015). Entrepreneurial ecosystems and regional policy: A sympathetic critique. European Planning Studies, 23(9), 1759–1769

Swamidass, P. M. (2013). University startups as a commercialization alternative: lessons from three contrasting case studies. The Journal of Technology Transfer, 38(6), 788-808.

Yip, G. S., Prashantham, S., Grosse, R., & Meyer, K. E. (2019). Innovation in emerging markets. The Oxford handbook of management in emerging markets, 351-372.

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Unintended Consequences of IPRs. Historical lessons from Emerging Innovation Networks in Spain.

Sergio Barbosa Martinez*, Patricio Sáiz (UAM) & José Luis Zofío (ERIM)
Universidad Autónoma de Madrid (Madrid, Spain) sergio.barbosa@uam.es

Short Bio

I am a second year PhD Candidate from a doctoral program in Economics and Innovation Management. I am interested in Economic History, Intellectual Property, and Innovation Economics, all from a quantitative perspective, adding econometrics and SNA to the field.

Abstract **– Social Network Analysis has become a relevant tool to analyze collaboration patterns within national innovation systems, NISs. In particular, the intensity of collaboration measured by the density of the links between actors of the system. The effects of collaborating in innovation activities have shown relevant to explain economic development over the long-term because they encourage strong positive externalities resulting in increased social welfare. Therefore, it is central to delve into the origins and evolution of collaboration to explore path dependency weaknesses. Furthermore, collaboration networks are drawing increased attention from scholars because nowadays the solution to complex problems requires the integration of different sources of knowledge that favors what several authors call 'recombinant capital'. Specifically, we analyze how collaborative innovation networks emerge and determine the factors that encourage the growth in the size of the innovation clusters (components) among patentees. In doing so, we study co-patentee networks as an innovation proxy, by analyzing more than 73.000 patent applications registered in Spain from 1878 to 1939. Our central focus is to explore and understand the main factors that ease connections among patentees, promoting the evolution of the innovation network. First, variables related to the quality of the invention protected such as duration, and the geographical and sectorial concentration of patentees, are instrumental in triggering collaboration (i.e., are significant in the probability of transition from being isolated to establishing links). Second, variables such as the geographical or sectorial concentration of patentees explain the emergence and development of highly connected (larger) components in the network. On the contrary, institutional weaknesses such as patents of introduction to copy foreign technologies hampered the formation of solid innovation hubs.**

Keywords **– Networks, patents, collaboration, innovation, Spain.**

Collaboration structures and Innovation networks are drawing increased attention from academics and R&D managers because nowadays the solutions to complex problems are almost impossible without the integration of distinct sources of knowledge and scientific fields (Owen-Smith and Powell, 2004; Breschi and Lenzi, 2015). Interdisciplinary collaboration favors disruptive advances and combinations of know-how that several authors call 'recombinant capital' (Carnabuci and Operti, 2013; Endres and Harper, 2019). In this fashion, the way people share information, merge ideas, collaborate, or compete when fetching solutions to scientific or technical problems could make the difference to succeed (Baba et al., 2009; Cantner et al., 2016).

Social Network Analysis (SNA) is a key tool that provides an understanding of how agents are connected and how information is shared, critical in social sciences to study collaboration trends. SNA methodologies are nowadays used to delve into the role of collaboration dynamics in R&D activities, allowing us to highlight the importance of innovation networks and their topological properties (Phelps et al., 2012; Pippel, 2013). Part of the

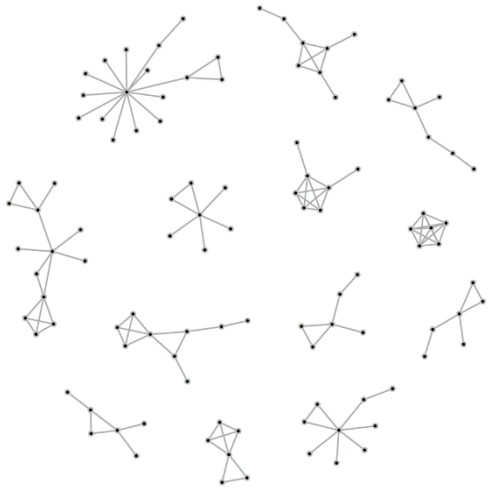
specialized literature uses patent data as the best proxy to analyse innovation networks of co-patentees/co-inventors and relate them with economic, technological/sectoral, and geographical variables to conclude the features driving the growth of collaboration. In this analysis, topological attributes such as membership, the proportion of triadic closures or cliques, and the emergence of large and giant components are the key variables (Breschi and Lenzi, 2015; Zacchia, 2018; Galaso and Kovářík, 2021). In general, all these studies have one thing in common: the analysis of recent patent data (from the 1970s onwards) and therefore mature innovation networks.

As a novelty, we combine historical patent data, SNA, and discrete choice regression models to analyse the origins and evolution of innovation networks, using as a case of study the Spanish innovation system. We want to offer a long-term perspective of how cooperation emerged, especially in follower and late-comer countries in the European periphery. To do so, we rely on SNA methods to generate a historical co-patentee's network and scrutinize its topological properties. Then, we focus the investigation on the dynamics underlying the evolution of the size of the components and their membership. This is a central aspect of innovation networks because the literature concludes that the larger the components the higher the flow of information among actors and the entire network (Cantner and Graf, 2006; Schilling and Phelps, 2007). Thus, our objective is to analyse how collaborative innovation emerged and developed in early steps of innovation systems (completely disconnected at that time).

Data come from historical documentation of the Spanish Patent and Trademark Office (OEPM). We analyse more than 68,000 patent applications from residents (and linked non-residents) from 1878 to 1939, a key period on Spanish industrialization. We construct the networks for two periods: 1) 1878 to 1914, i.e., from the Spanish new patent law during the Restoration to the First World War (WWI), and 2) 1878 to 1939, i.e., the entire cumulative period until the end of the Spanish Civil War.

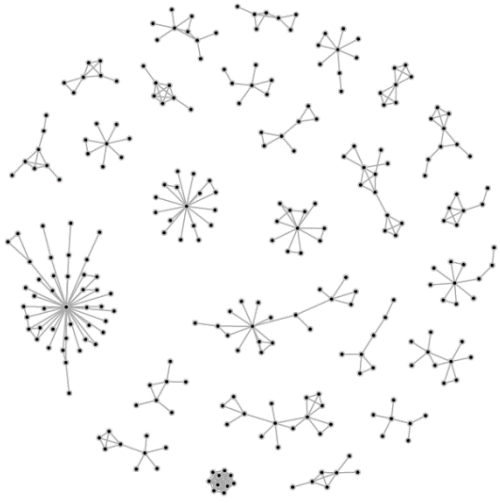
Thanks to the richness of all the information collected from each patent and patentee, as well as to the elaboration of other variables we set up a linear probability model that tests the likelihood of membership transition within the network. This let us identify the group of relevant characteristics that stand out from the rest when explaining the emergence and development of connections and the size of the components.

Figure 1: Co-Patentees Network of Spain (1878-1914)



Our results say that technological dispersion of patentees is instrumental in triggering collaboration (i.e., is relevant in the probability of abandon isolation). Besides that, other variables related to patent intensity, or the geographical/technological patent diversification explain the increase from dyads and triads/triples to higher connected components in the network. On the contrary, patent duration and other institutional weaknesses such as patents of introduction hampered the formation of solid innovation hubs.

Figure 2: Co-Patentees Network of Spain (1878-1939)



These results contribute to a better understanding of the historical backwardness of the Spanish innovation system and are useful to develop policies aimed at fostering social capital. For instance, during the nineteenth century, patents of introduction were common in many countries to

facilitate technology transfer, being progressively banned as innovation systems got more developed. However, countries as Spain maintained this patent institution, that is playing against collaboration in R&D (Sáiz, 2014). In the same way, another serious policy implication obtained from these results is that patent length, i.e., the strength of the intellectual monopolies, seems to work against collaboration, reinforcing the findings of scholars that claims a shortening of patent duration (Boldrin and Levine, 2009).

References

- Baba, Y., Shichijo, N., Sedita, S.R., 2009. How do collaborations with universities affect firms' innovative performance? The role of "Pasteur scientists" in the advanced materials field. Res. Policy 38, 756–764. https://doi.org/10.1016/j.respol.2009.01.006
- Boldrin, M., Levine, D.K., 2009. Market size and intellectual property protection. Int. Econ. Rev. 50, 855–881. https://doi.org/10.1111/j.1468-2354.2009.00551.x
- Breschi, S., Lenzi, C., 2015. The role of external linkages and gatekeepers for the renewal and expansion of US cities' knowledge base, 1990–2004. Reg. Stud. 49, 782–797. https://doi.org/10.1080/00343404.2014.954534
- Cantner, U., Graf, H., Herrmann, J., Kalthaus, M., 2016. Inventor networks in renewable energies: the influence of the policy mix in Germany. Res. Policy 45, 1165–1184. https://doi.org/10.1016/j.respol.2016.03.005
- Carnabuci, G., Operti, E., 2013. Where do firms' recombinant capabilities come from? Intraorganizational networks, knowledge, and firms' ability to innovate through technological recombination. Strateg. Manag. J. 34, 1591–1613. https://doi.org/10.1002/smj.2084
- Endres, A.M., Harper, D.A., 2019. Economic development and complexity: the role of recombinant capital. Camb. J. Econ. 44, 157–180. https://doi.org/10.1093/cje/bez036
- Galaso, P., Kováříik, J., 2021. Collaboration networks, geography and innovation: Local and national embeddedness. Pap. Reg. Sci. 100, 349–377. https://doi.org/10.1111/pirs.12578
- Owen-Smith, J., Powell, W.W., 2004. Knowledge networks as channels and conduits: the effects of spillovers in the Boston biotechnology community. Organ. Sci. 15, 5–21. https://doi.org/10.1287/orsc.1030.0054
- Phelps, C.C., Heidl, R., Wadhwa, A., 2012. Knowledge, networks, and knowledge networks: a review and research agenda. J. Manag. 38, 1115–1166. https://doi.org/10.1177/0149206311432640
- Pippel, G., 2013. The impact of R&D collaboration networks on the performance of firms: a meta-analysis of the evidence. Int. J. Netw. Virtual Organ. 12, 352–373. https://doi.org/10.1504/IJNVO.2013.057282
- Sáiz, P., 2014. Did patents of introduction encourage technology transfer? Long-term evidence from the Spanish innovation system. Cliometrica J. Hist. Econ. Econom. Hist. 8, 49–78.
- Schilling, M.A., Phelps, C.C., 2007. Interfirm collaboration networks: the impact of large-scale network structure on firm innovation. Manag. Sci. 53, 1113–1126. https://doi.org/10.1287/mnsc.1060.0624
- Zacchia, P., 2018. Benefiting colleagues but not the city: localized effects from the relocation of superstar inventors. Res. Policy 47, 992–1005. https://doi.org/10.1016/j.respol.2018.03.004

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Transforming healthcare practices: How multi-actor interactions shape opportunity spaces in regional healthcare paths

Stefan Philipp
Centre for Social Innovation, ZSI (Vienna, Austria) & Laboratoire Interdisciplinaire Sciences Innovations Sociétés, Paris, France, (philipp@zsi.at).

Short Bio

Stefan Philipp is a project manager and researcher at the Centre for Social Innovation, Vienna, as well as a PhD student at the *Laboratoire Interdisciplinaire Sciences Innovations Sociétés (LISIS) in Paris. With a background in regional studies, he is involved in research and applied projects on the intersection of innovation, society and policy.*

Abstract - Healthcare systems and its constituents are increasingly experiencing pressure by aging populations, chronic and degenerative diseases. In this context, innovation is seen as a means to respond to these pressures and transform healthcare systems. However, healthcare innovations often fail even if there is robust evidence of their benefits. Thus, in order to understand why innovations, fail, the multi-actor interaction shaping the opportunity space for changing practices needs to be understood, to answer the question of how actors are restrained (or enabled) in transforming healthcare practices. The paper will compare the health and care development paths of Murcia (ES) and Örebro (SE), taking a micro-perspective on agency-practice-structure dynamics. It will illustrate how the multi-actor interactions shape the opportunity space for implementing novel healthcare practices and how these dynamics contribute to different paths and social developments in the two regions.

Keywords - Transformation, healthcare, agency, structure

Introduction

The healthcare sector is undergoing tremendous changes throughout Europe as well as in other OECD countries (Marjanovic et al., 2020; Nolte, 2018). Healthcare systems are facing an environment of increasing pressures from chronic diseases and comorbidities, challenges from accelerating technological change, as well as requests for more personalised treatment provision (Broerse & Grin, 2017; Schiavone & Ferretti, 2021). The sector's problems as well as many of the bottlenecks encountered in trying to resolve them have systemic roots and, thus, can be described as "persistent" problems (Broerse & Grin, 2017). In order to ease this pressure, innovation is seen as a means to transform the healthcare systems and to provide a respond to the challenges they face in supporting high quality, safe, and effective care. However, the multiple actors in healthcare systems, their preferences and competences (Windrum & García-Goñi, 2008), their mix of complementary and conflicting interests (Greenhalgh et al., 2018) shape a complex selection environment, that often obstructs the embedding of novelty in healthcare practice. In this complex environment, healthcare innovations often fail, even if there is robust evidence of their benefits (Greenhalgh & Papoutsi, 2019) and successful implementation of new approaches represents a contested social negotiation process with significant differences in the balance of power of the different stakeholder groups.

Thus, this paper aims to understand how actors are restrained when implementing innovative approaches into healthcare practice. Whereby, the required change and co-evolution of

practice, organisations and institutions (Bögel et al., 2019) is defined as transformative change as it requires a purposeful adaptation of the directions embedded in the socio-technical system of healthcare (Schot & Steinmueller, 2018). The purposefulness implies that agents set strategic actions in order to shape their environment in accordance to their interest. The analysis of transformation, thus requires a relational perspective that acknowledges the (co)-evolution of structural configurations and links it with the past experiences and future expectations that shape agency (Steen, 2016).

Theoretical background

In order to be able to understand, how actors can initiate transformation processes in such a complex environment, this study follows Fünfschilling's (2014) conceptualisation of socio-technical change by integrating insights from Giddens' structuration theory (Giddens, 1984), institutional theory (DiMaggio & Powell, 1983; Tolbert & Zucker, 1999) as well as evolutionary economics (Dosi, 1982). Whereby, healthcare practice is conceptualised as the interaction between healthcare professionals and patients. This practice is embedded in the structure of the healthcare system and depending on the agency of all involved actors (Barlow, 2016; Consoli & Mina, 2009). The structure of the healthcare system can be interpreted as an organisational field (DiMaggio & Powell, 1983) or field of practice (Fraser et al., 2019), which in turn is shaped by its institutional environment, that provides socially-constructed patterns of practice, assumptions, values, and rules (Battilana et al., 2009; Thornton & Ocasio, 2008). Hence, the structure can be interpreted as the way healthcare practice is organised and as the institutions that shape it. Building on Giddens' (1984) "duality of structure", these structures shape the way actors operate while at the same time through their actions reproduces these structures.

However, actors are, to some extent, able to change structures through their action (Battilana et al., 2009; Grillitsch & Sotarauta, 2020). The directionality of change is depending on the actors' preferences and competences (Windrum & García-Goñi, 2008) as well as the path-depended constrains and opportunities that arise from the sectoral structures (Battilana et al., 2009; Hassink et al., 2019; Tolbert & Zucker, 1999). Thus, the path-dependency of existing structures and the actors' past experiences shape the way change agency can be conducted by actors in the present. However, not only the past but also perceptions and visions of the future shape the way actors engage in change agency (Steen, 2016). Future practice, as the outcome of change agency, lays in an opportunity space that is shaped by path-depended structures and the agency of involved actors as they are time-, space-, and actor-specific (Grillitsch & Sotarauta, 2020) and, thus, future practices are contested, which raises questions of power in the multi-actor interaction that shape future practice (Avelino, 2021). Finally, change can be radical or cumulative, whereby the former changes an underlaying paradigm that subsequently allows to for cumulative changes on this new path (Dosi, 1982).

Methodology

The overall methodology consists of a process tracing methodology (Sotarauta & Grillitsch, 2022). The regional path trajectories have been captured via a document analysis, qualitative interviews with key stakeholders as well as by studying regional innovation projects. We aimed to

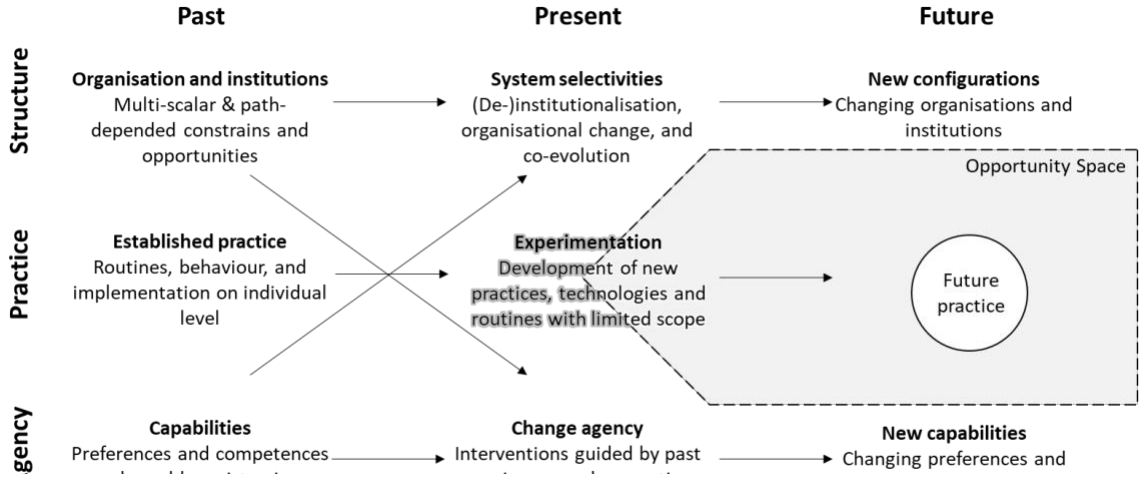


Figure 1: Conceptualisation of Agency-Practice-Structure dynamics

study events signifying and surrounding the innovation processes on multiple scales to reconcile the micro-perspective on agency with the meso-perspective on changing structures. Interviewing actors on their perceived role and activities in promoting the respective innovation process is a central methodological step in this regard. In this regard, the methodology follows Suitner et al. (2022), who developed a methodology along the lines of the innovation biography approach (Butzin & Widmaier, 2016). In the two regions a total of eight innovation cases (four each) have been studied and in total 27 interviews have been conducted with policy makers, healthcare professionals, healthcare managers, entrepreneurs

Cases & Findings

Both regions are facing pressure on the healthcare systems that makes the current practices and sectoral structures unsustainable. Thus, in both regions the question is how the increasing number of patients can be treated best with limited resources. However, the varying structuration of the health and care systems in the two regions is leading to different path trajectories. The public healthcare system in Murcia is organised in one organisation (SMS) and the region has policy competences and budgets for healthcare. In the Swedish region of Örebro, the competences for healthcare policy and provision lay with the regional government but the field of social care is part of the municipal responsibilities. Over the last decade, in both regions a development trajectory has been established that aims to change the way health and social care is delivered. In both regions these new paths are visible as changes in the structures of the system as well as in the actors' agency.

In Murcia, the regional digital health cluster introduced SMS to FP projects with a focus on the adoption of digital technologies in healthcare. Through these projects, SMS gained agency as an actor within the healthcare innovation ecosystem and subsequently adjusted its organisational structures, by creating an innovation unit to manage these projects operatively. This agency changed the nature of the projects away from a technology push logic towards a demand-orientation. First, healthcare professionals and later patient organisations as well, were included in defining innovation needs. The cascading nature of these projects open room for collaborating with SMEs in co-creation activities during the solution development. This interaction changed to opportunity space of all involved actors and aligned their perception of future healthcare provision.

In Örebro, the locus of change lays in the social economy and social care rather than within the healthcare system itself. Within the regional ecosystem, there is a long tradition of the public sector collaborating with CSOs and Social Enterprises. The regional development unit of the Örebro County initiated the Partnership for Social Innovation (PSI), with more than 40 member organisations, as an arena for exchange of experience on societal challenges and social innovation, and as project support. The PSI and the regional projects aimed at breaking silos and better integrating the different public services, which due to the multitude of actors resembled a bricolage in mobilising actors in change processes. The PSI network, building on their successful engagement in change processes in social care, increasingly aims to enter the sphere of healthcare. While the healthcare sector is hesitant of these new actors, the PSI is building up political support beyond the regional development department and thus increases its agency.

In summary, in both cases a new structural element enabled actors within the existing structure to engage in processes of change agency. This resembles new "paradigm" (Dosi, 1982) that enable cumulative innovations in the process of path development. Over the last years, the nature of both path trajectories and thus the opportunity spaces of actors changed. In Murcia, the involvement of healthcare professionals and patients reinforced the role of the healthcare professionals over technology and put preventive solutions to the foreground. In Örebro, an actor network active in social care aims to integrate their services closer with the healthcare system. Political decisions provide a mandate for these actors. In both cases, the changed trajectories opened opportunity spaces for change actors, that use this deinstitutionalisation of old logics to shape the system according to their interest.

References

Avelino, F. (2021). Theories of power and social change. Power contestations and their implications for research on social change and innovation. https://doi.org/10.1080/2158379X.2021.1875307

Barlow, J. (2016). *Managing Innovation in Healthcare.* World Scientific Publishing Europe.

Battilana, J., Leca, B., & Boxenbaum, E. (2009). How Actors Change Institutions: Towards a Theory of Institutional Entrepreneurship. *Academy of Management Annals, 3*(1), 65–107. https://doi.org/10.5465/19416520903053598

Bögel, P., Pereverza, K., Upham, P., & Kordas, O. (2019). Linking socio-technical transition studies and organisational change

management: Steps towards an integrative, multi-scale heuristic. *Journal of Cleaner Production, 232,* 359–368. https://doi.org/10.1016/J.JCLEPRO.2019.05.286

Broerse, J., & Grin, J. (2017). *Toward sustainable transitions in healthcare systems.* (J. Broerse & J. Grin, Eds.). ROUTLEDGE.

Butzin, A., & Widmaier, B. (2016). Exploring Territorial Knowledge Dynamics through Innovation Biographies. *Regional Studies, 50*(2). https://doi.org/10.1080/00343404.2014.1001353

Consoli, D., & Mina, A. (2009). An evolutionary perspective on health innovation systems. *Journal of Evolutionary Economics, 19*(2), 297–319. https://doi.org/10.1007/s00191-008-0127-3

DiMaggio, P. J., & Powell, W. W. (1983). The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields. *American Sociological Review, 48*(2), 147. https://doi.org/10.2307/2095101

Dosi, G. (1982). Technological paradigms and technological trajectories: A suggested interpretation of the determinants and directions of technical change. *Research Policy, 11*(3), 147–162. https://doi.org/10.1016/0048-7333(82)90016-6

Fraser, A., Stewart, E., & Jones, L. (2019). Editorial: The importance of sociological approaches to the study of service change in health care. *Sociology of Health & Illness, 41*(7), 1215–1220. https://doi.org/10.1111/1467-9566.12942

Fünfschilling, L. (2014*). A dynamic model of socio-technical change: Institutions, actors and technologies in interaction.* https://doi.org/10.5451/UNIBAS-006309921

Giddens, A. (1984). *The Constitution of Society.* University of California Press.

Greenhalgh, T., Fahy, N., & Shaw, S. (2018). The bright elusive butterfly of value in health technology development: Comment on "providing value to new health technology: The early contribution of entrepreneurs, investors, and regulatory agencies". *International Journal of Health Policy and Management, 7*(1), 81–85. https://doi.org/10.15171/ijhpm.2017.65

Greenhalgh, T., & Papoutsi, C. (2019). Spreading and scaling up innovation and improvement. *BMJ (Online),* 365. https://doi.org/10.1136/bmj.l2068

Grillitsch, M., & Sotarauta, M. (2020). Trinity of change agency, regional development paths and opportunity spaces: *Progress in Human Geography 44*(4), 704–723. https://doi.org/10.1177/0309132519853870

Hassink, R., Isaksen, A., & Trippl, M. (2019). Towards a comprehensive understanding of new regional industrial path development. *Regional Studies, 0*(0), 1–10. https://doi.org/10.1080/00343404.2019.1566704

Marjanovic, S., Altenhofer, M., Hocking, L., Chataway, J., & Ling, T. (2020). Innovating for improved healthcare: Sociotechnical and innovation systems perspectives and lessons from the NHS. *Science and Public Policy, 47*(2), 283–297. https://doi.org/10.1093/scipol/scaa005

Nolte, E. (2018). How do we ensure that innovation in health service delivery and organization is implemented, sustained and spread? *WHO Europe, 28.*

Schiavone, F., & Ferretti, M. (2021). The FutureS of healthcare. *Futures, 134*, 102849. https://doi.org/10.1016/J.FUTURES.2021.102849

Schot, J., & Steinmueller, W. E. (2018). Three frames for innovation policy: R&D, systems of innovation and transformative change. *Research Policy.* https://doi.org/10.1016/j.respol.2018.08.011

Sotarauta, M., & Grillitsch, M. (2022). Path tracing in the study of agency and structures: Methodological considerations. *Progress in Human Geography,* 03091325221145590. https://doi.org/10.1177/03091325221145590

Steen, M. (2016). Reconsidering path creation in economic geography: Aspects of agency, temporality and methods. *European Planning Studies, 24*(9), 1605–1622. https://doi.org/10.1080/09654313.2016.1204427

Suitner, J., Haider, W., & Philipp, S. (2022). Social innovation for regional energy transition? An agency perspective on transformative change in non-core regions. *Regional Studies, 1–13*. https://doi.org/10.1080/00343404.2022.2053096

Thornton, P., & Ocasio, W. (2008). Institutional logics. In R. Greenwood, C. Oliver, R. Suddaby, & R. Sahlin (Eds.), *The Sage handbook of organizational institutionalism* (pp. 99–128). SAGE.

Tolbert, P., & Zucker, L. (1999). The Institutionalization of Institutional Theory. In S. Clegg & C. Hardy (Eds.), *Studying Organization: Theory and Method* (pp. 169–184). SAGE Publications Ltd. https://doi.org/10.4135/9781446218556

Windrum, P., & García-Goñi, M. (2008). A neo-Schumpeterian model of health services innovation. *Research Policy, 37*(4), 649–672. https://doi.org/10.1016/J.RESPOL.2007.12.011

This study was supported by the European Union's Horizon 2020 research and innovation programme under grant agreement nº 872873.

Social Impact Measurement in PPPs: a systematic literature review

Tommaso Tropeano
Politecnico di Milano, Milan, Italy, Tommaso.tropeano@polimi.it

Short Bio

Tommaso is a second year PhD candidate in Management Engineering and his main research area regards the integrated impact and the sustainability strategies that connect the social, environmental and economic fields. His research area has the goal to find a way to put the social impact at the centre of sustainability answer to the global societal challenges and wicked problems. He is part of TIReSIa, the International Research Center focused on the topics of Social Innovation and Social Impact Finance.

Abstract - PPPs have always been used in response to market failures and are now identified as key instruments for mission-oriented policies and a transition to a more sustainable and justice-oriented economy. It is therefore becoming increasingly necessary to measure whether PPPs generate social impact for everyone. This seems very difficult because both in academia and among practitioners there is not much attention paid to this issue. Therefore, this research aims to understand the approaches to and functions of social impact measurement (SIM hereafter) in PPPs. The paper tries to systematically analyze the characteristics of SIM today in PPPs in terms of whether and how social impact is measured, by whom and to what extents is used and when.

The research is developed through a systematic literature review on the presence of social impact measurement in PPPs. This methodology was chosen to identify approaches to and functions of SIM in PPPs. This is coherent with academia which has repeatedly emphasized the need to assess the social performance of PPPs and the social value generated.

Through the systematic literature review, the authors highlighted a lack of attention regarding the role that social impact measurement plays in public-private partnerships today and the characteristics it should have. Extant literature assumes that it is difficult to evidence PPPs are a valuable tool for achieving mission-oriented policies, especially when it comes to traditional PPPs (i.e., those PPPs that rely on procurement processes and concessions and are not necessarily designed with an ex-ante measurement system such as in outcome-based contracts). More precisely, there seems to be a lack of an evolved debate on the role of the measurement of the social impact for traditional types of PPPs, which are still extensively used in the context of mission-oriented policies.

Keywords: Public-Private Partnership, Social Impact Measurement, Sustainability, Systematic Literature Review

Considerable policy and scholarly attention have been devoted to addressing social, environmental, and economic challenges, also known as "grand challenges". These include, among others, poverty, discrimination, migration, environmental threats, and the challenges of generating sustainable and inclusive growth. These wicked problems are urgent, systemic, and interconnected, thus requiring nontrivial solutions and coordinated effort. This is linked to the idea that groups of heterogeneous actors can solve these challenges. Furthermore, the literature suggests that public and private actors can jointly work

towards practical solutions to grand challenges when their relationships are underpinned by "mission-oriented" policies.

Since the 1980s, with the New Public Management, Public-Private Partnerships (PPPs hereafter) have been widely used to deliver economic and social infrastructure projects. In this context, PPPs have enabled governments to provide public services (e.g., transport infrastructures, and water supply, among others) to address market failures. However, today, PPPs have evolved and are not just tools for dealing with market failures. PPPs have served to make the public actor's policy actions more effective and address complex challenges where all actors are needed. Moreover, PPPs offer the private actor an excellent opportunity to compete in new markets. For example, PPPs may be functional to the strategic investments envisaged in the NGEU or the projects linked to Horizon 2021-2027.

Therefore, PPPs are used and designed to tackle complex problems and generate overall value for society. The concept of public value generated by PPPs for society is therefore crucial and assessing whether and how social impact is generated is quite pressing nowadays. Although academics and practitioners recognize this, little attention is paid to measuring social impact, and metrics are often focused on purely economic or environmental aspects. Defining and measuring social impact is challenging but urgent.

In addition, measuring social impact can be one of the causes of the success or failure of PPPs and the transaction between the actors involved. In PPP management, there are some challenges as informative asymmetry in the agreement between private and public actors, and opportunistic behaviors. In essence, the issues limiting the impact generation of PPPs are “relational”. Social impact measurement (SIM hereafter), as a form of guarantee and collaborative commitment to impact creation, can support some of these relationships and rebalance them where there are imbalances (in economic and governance terms). Coherently, the research aims to explore how social impact is evaluated in PPPs. The paper attempts to answer the following research question: *What are the approaches to and functions of SIM in PPPs?* (RSQ1).

I conducted a qualitative synthesis through keyword-based literature search (Kitchenmann et al., 2009) and a systematic review method. I developed a search protocol with a

key-word strategy[1] and inclusion and exclusion criteria to select the documents of interest. Secondly, key databases were identified – Scopus and Web of Science – and interrogated by applying the key-word strategy developed in the protocol. The searches on Scopus and Web of Science returned a total of 3690 documents. Documents were screened by title and abstract according to the inclusion/exclusion criteria identified through the protocol. The inclusion criteria were:

- Papers employed mixed data (primary, secondary, empirical…)

- Papers focused on PPPs and dimensions of SIM and Sustainability

- Papers based on theoretical relevance of studies

Duplicates were removed manually. A total of 64 papers met the inclusion criteria and read in full. A total of 13 papers were finally included in the review as their full text was consistent with the criteria identified in the protocol. The searches were conducted between January 2022 (first search) and July 2022 (follow-up search). Paper meeting the inclusion criteria were analyzed through a content and thematic analysis process. To do this, I exploited a content-analysis approach based on Gioia et al. (2013). I coded the studies retrieved according to (i) descriptive overview of studies: author, year, relevance, journal, discipline, countries, data approach, keywords, methods, (ii) typology of PPP, (iii) typology of SIM, (iv) policy sector, (v) relationship between SIM and PPP, (vi) overall findings. In a second stage, I analyzed the findings in Nvivo with some specific nodes selected according to the typology of PPP, SIM, and theoretical findings of relevant studies: agency theory (cost transaction, adverse selection…), SIM methodology, policy sector, characteristics of SIM, configurations of PPP, actors involved, the impact of SIM and type of PPPs. This methodology will help the author understand social impact measurement's characteristics and whether it is evaluated correctly.

This systematic review found that there is a general lack of theoretical and empirical frameworks for understanding social impact generation in PPPs (Agarchand et al., 2017;

[1] (TITLE-ABS-KEY ("Public-Private Partnership*" OR "Public Private Partnership*" OR "PPP*" OR "Cross-sector* collaboration*" OR "Cross sector* collaboration*" OR “Collaborative governance”) AND TITLE-ABS-KEY ("Social Impact Measurement*" OR "Social Impact Assessment*" OR "Social Impact Evaluation*" OR "Social Outcome*" OR "Social Impact*" OR "Social Value*" OR "Social Metrics*" OR "Social Performance*" OR "Social Impact Generation*" OR "Sustainab*"))

Berezin et al., 2018; Berrone et al., 2019; Boardman et al., 2012; De Pieri et al., 2022).

In the literature, SIM is mainly discussed for PPPs that are forms of outcome-based contracts and public-private-people-partnerships (4Ps) (Chamaki et al., 2018; De Pieri et al., 2022; Xiahou et al. 2021). All of these configurations foresee forms of SIM from the contract's design and, for this reason, use already well-defined methodologies: Social Impact Assessment (SIA) and Social-Life Cycle Assessment (Khorassani et al., 2018; De Pieri et al., 2022). On the other hand, it seems that for more traditional forms of PPP, such as public procurement and concessions, it is more challenging to apply already defined methodologies. The literature focusing on traditional PPPs seems to approach SIM through frameworks that are adapted to the context in which the partnerships were designed to work (Agarchand et al., 2017; Berezin et al., 2018; Berrone et al., 2019; Boardman et al., 2012, Chu et al., 2016; Hueskes et al., 2017; Liang et al., 2019). As such, it could be concluded that procurement-based PPPs still lack a comprehensive approach to SIM.

Secondly, this systematic review showed little focus on studying what characteristics SIM should have, what it should be evaluated and when in a complex context such PPPs. The issue is that there exists a lack focus on studying SIM as a management tool for PPPs. In fact, concerning the characteristics that SIM can have in PPPs, the literature only suggests that SIM should be employed as a tool for measuring impact in an integrated manner: social, economic and environmental (e.g. Berezin et al., 2018; Berrone et al., 2019; Chu et al.,). The measurement of social impact in PPPs is entrusted chiefly to independent bodies/organizations and is mainly conducted ex-post (e.g., Agarchand et al., 2017; 2016; Hueskes et al., 2017; Esposito et al., 2021; Liang et al., 2019). Only one paper is spatial and community-focused, showing that no participatory decision-making processes based on co-design are used in this specific literature (Xiahou et al., 2021).

Finally, this systematic review found that SIM can influence the ability of PPPs to generate impact (e.g., Hueskes et al., 2017). More precisely, the literature suggests that SIM can trigger good practice between actors and in partnership management (Agarchand et al., 2017; Boardman et al., 2012; De Pieri et al., 2022). However, this literature remains silent on how SIM can guide public and private actors to achieve such good practice.

To sum up, through this systematic literature review, I found that there exists a lack of attention regarding the role that SIM plays in public-private partnerships and the

characteristics that it should have. Extant literature assumes that it is difficult to evidence PPPs are a valuable tool for achieving mission-oriented policies, especially when it comes to traditional PPPs (i.e., those PPPs that rely on procurement processes and concessions and are not necessarily designed with an ex-ante measurement system such as in outcome-based contracts). More precisely, there seems to be a lack of an evolved debate on the role of the measurement of the social impact for traditional types of PPPs, which are still extensively used in the context of mission-oriented policies such as, for example, PON/POR programs. For this reason, the paper's originality consists in its ability to suggest more empirical work is needed to explore these issues in practice.

Key references

Agarchand, N., & Laishram, B. (2017). Sustainable infrastructure development challenges through PPP procurement process: Indian perspective. *International Journal of Managing Projects in Business*, *10*(3), 642–662. https://doi.org/10.1108/IJMPB-10-2016-0078

Andonova, L. B. (2018). The power of the public purse: financing of global health partnerships and agenda setting for sustainability. *Chinese Journal of Population Resources and Environment*, *16*(3), 186–196. https://doi.org/10.1080/10042857.2018.1502388

Anopchenko, T., Gorbaneva, O., Lazareva, E., Murzin, A., Ougolnitsky, G., Carbonara, N., & Longo, F. (2010). Are Italian healthcare organizations paying too much for their public-private partnerships? *Public Money and Management*, *30*(2), 125–132. https://doi.org/10.1080/09540961003665586

Arena, M., Azzone, G., & Bengo, I. (2015). Performance Measurement for Social Enterprises. *Voluntas*, *26*(2), 649–672. https://doi.org/10.1007/s11266-013-9436-8

Banerjee, A., Murphy, E., & Walsh, P. P. (2020). Perceptions of multistakeholder partnerships for the sustainable development goals: A case study of Irish non-state actors. *Sustainability (Switzerland)*, *12*(21), 1–15. https://doi.org/10.3390/su12218872

Barraket, J., & Loosemore, M. (2018). Co-creating social value through cross-sector collaboration between social enterprises and the construction industry. *Construction Management and Economics*, *36*(7), 394–408. https://doi.org/10.1080/01446193.2017.1416152

Bartels, K., & Turnbull, N. (2020). Relational public administration: a synthesis and heuristic classification of relational approaches. *Public Management Review*, *22*(9), 1324–1346. https://doi.org/10.1080/14719037.2019.1632921

Benington, J., & Moore, M. H. (2011). Public value in complex and changing times. *Public value: Theory and practice*, *1*.

Berrone, P., Ricart, J. E., Duch, A. I., Bernardo, V., Salvador, J., Peña, J. P., & Planas, M. R. (2019). EASIER: An evaluation model for public-private partnerships contributing to the sustainable development goals. *Sustainability (Switzerland)*, *11*(8). https://doi.org/10.3390/su11082339

Boardman, A. E., & Vining, A. R. (2012). The political economy of public-private partnerships and analysis of their social value. *Annals of Public and Cooperative Economics*, *83*(2),

117–141. https://doi.org/10.1111/j.1467-8292.2012.00457.x

Cappiello, G., Garrone, P., & Nardi, P. (2018). Infrastructure projects as a value co-creation process. *Studies in Public and Non-Profit Governance*, *6*, 131–153. https://doi.org/10.1108/S2051-663020180000006007

Chan, A. P. C., Lam, P. T. I., Chan, D. W. M., Cheung, E., & Ke, Y. (2010). Critical Success Factors for PPPs in Infrastructure Developments: Chinese Perspective. *Journal of Construction Engineering and Management*, *136*(5), 484–494. https://doi.org/10.1061/(asce)co.1943-7862.0000152

Cheng, Z., Yang, Z., Gao, H., Tao, H., & Xu, M. (2018). Does PPP matter to sustainable tourism development? An analysis of the spatial effect of the tourism PPP policy in China. *Sustainability (Switzerland)*, *10*(11), 1–15. https://doi.org/10.3390/su10114058

Costumato, L. (2021). Collaboration among public organizations: a systematic literature review on determinants of interinstitutional performance. *International Journal of Public Sector Management*, Vol. 34 No. 3, pp. 247-273. https://doi.org/10.1108/IJPSM-03-2020-0069

De Pieri, B., Chiodo, V., & Gerli, F. (2022). Based on outcomes? Challenges and (missed) opportunities of measuring social outcomes in outcome-based contracting. *International Public Management Journal*, *0*(0), 1–26. https://doi.org/10.1080/10967494.2022.2077490

Dewatripont, M., Jewitt, I., & Tirole, J. (2000). Multitask agency problems: Focus and task clustering.

E., W., & Khademian, A. (2008). Wicked Problems, Knowledge Challenges, and Collaborative Capacity Builders in Network Settings. *Public Administration Review*. https://doi.org/10.1111/j.1540-6210.2007.00866.x

Edler, J., & Fagerberg, J. (2017). Innovation policy: what, why, and how. *Oxford Review of Economic Policy*, *33*(1), 2-23. https://doi.org/10.1093/oxrep/grx001

Edquist, C., & Zabala-Iturriagagoitia, J. M. (2021). Functional procurement for innovation, welfare, and the environment. *Science and Public Policy*, *47*(5), 595–603. https://doi.org/10.1093/scipol/scaa046

Ergas, H. (1987), Does technology policy matter. *Technology and Global Industry: Companies and Nations in the World Economy*. pp. 191–245.

Esposito, P., Brescia, V., Fantauzzi, C., & Frondizi, R. (2021). Understanding social impact and value creation in hybrid organizations: The case of Italian civil service. *Sustainability (Switzerland)*, *13*(7), 1–26. https://doi.org/10.3390/su13074058

Esposito, P., & Dicorato, S. L. (2020). Sustainable development, governance and performance measurement in Public Private Partnerships (PPPs): A methodological proposal. *Sustainability (Switzerland)*, *12*(14). https://doi.org/10.3390/su12145696

European Commission (2004). *Green Paper on Public-Private Partnerships and community law on public contracts and concessions*. Retrived from: https://op.europa.eu/en/publication-detail/-/publication/94a3f02f-ab6a-47ed-b6b2-7de60830625e/language-en

European Court of Auditors. (2018). Public Private Partnerships in the EU: Widespread shortcomings and limited benefits. *European Court of Auditors*, *287*(09), 92.

Ghazinoory, S., Nasri, S., Ameri, F., Montazer, G. A., & Shayan, A. (2020). Why do we need Problem-oriented Innovation System (PIS) for solving macro-level societal problems? *Technological Forecasting and Social Change*, *150*, 119749.

Hall, D. (2015). Why Public-Private Partnerships Don't Work: The many advantages of the public alternative. *Public Service International*, 56.

Head, B., & Alford, J. (2015). Wicked Problems: Implications for Public Policy and Management. *SAGE Journal*.

Hueskes, M., Verhoest, K., & Block, T. (2017). Governing public–private partnerships for sustainability: An analysis of procurement and governance practices of PPP infrastructure projects. *International Journal of Project Management*, *35*(6), 1184–1195. https://doi.org/10.1016/j.ijproman.2017.02.020

Klijn E., & Koppenjan J. (2000) Public Management and Policy Networks: The Theoretical Foundation of the Network Approach to Governance. *Public Management*, 2000 (2) nr 2, pp135-158

Klijn, E. H., & Teisman, G. R. (2003). Institutional and strategic barriers to public-private partnership: An analysis of Dutch cases. *Public Money and Management*, *23*(3), 137–146. https://doi.org/10.1111/1467-9302.00361

Koppenjan, J. F. M., & Enserink, B. (2015). Wiley American Society for Public Administration Public-Private Partnerships in Urban Infrastructures: Reconciling Private Sector Participation and Sustainability. *Source: Public Administration Review*, *69*(2), 284–296.

Leydesdorff, L. (2012). The triple helix, quadruple helix, …, and an N-tuple of helices: explanatory models for analyzing the knowledge-based economy? *Journal of the knowledge economy*, *3*(1), 25-35.

Liu, J., Love, P. E. D., Davis, P. R., Smith, J., & Regan, M. (2015). Conceptual Framework for the Performance Measurement of Public-Private Partnerships. *Journal of Infrastructure Systems*, *21*(1), 04014023. https://doi.org/10.1061/(asce)is.1943-555x.0000210

Mazzucato, M., & Robinson, D. K. R. (2018). Co-creating and directing Innovation Ecosystems? NASA's changing approach to public-private partnerships in low-earth orbit. *Technological Forecasting and Social Change*, *136*, 166–177. https://doi.org/10.1016/j.techfore.2017.03.034

Mazzucato, M. (2014), Think piece: "a mission-oriented approach to building the entrepreneurial state",' Paper Commissioned by Innovate UK-Technology Strategy Board November 2014T14/165.

Mazzucato, M. (2017), Mission-oriented innovation policy: challenges and opportunities. *UCL Institute for Innovation and Public Purpose Working Paper*, (2017-1).

Millner, R., & Meyer, M. (2022). Collaborative governance in Social Impact Bonds: aligning interests within divergent accountabilities? *Public Management Review*, *24*(5), 720–742. https://doi.org/10.1080/14719037.2021.2000253

Mohaddes Khorassani, S., Ferrari, A. M., Pini, M., Settembre Blundo, D., García Muiña, F. E., & García, J. F. (2019). Environmental and social impact assessment of cultural heritage restoration and its application to the Uncastillo Fortress. *International Journal of Life Cycle Assessment*, *24*(7), 1297–1318. https://doi.org/10.1007/s11367-018-1493-1

Narbaev, T., De Marco, A., & Orazalin, N. (2020). A multi-disciplinary meta-review of the public–private partnerships research. *Construction Management and Economics*, *38*(2), 109–125. https://doi.org/10.1080/01446193.2019.1643033

Nazari Chamaki, F., Jenkins, G. P., & Hashemi, M. (2019). Social Impact Bonds: Implementation, Evaluation, and Monitoring. *International Journal of Public Administration*, *42*(4), 289–297. https://doi.org/10.1080/01900692.2018.1433206

Quélin, B.V., Kivleniece, I. & Lazzarini, S. (2017), Public-Private Collaboration, Hybridity and Social Value: Towards New Theoretical Perspectives. *Journal of Management Studies*, 54: 763-792. https://doi.org/10.1111/joms.12274

Uyarra, E., Zabala-Iturriagagoitia, J. M., Flanagan, K., & Magro, E. (2020). Public procurement, innovation and industrial policy: Rationales, roles, capabilities and implementation. *Research Policy*, *49*(1), 103844. https://doi.org/10.1016/j.respol.2019.103844

Vecchi, V., & Casalini, F. (2019). Is a Social Empowerment of PPP for Infrastructure Delivery Possible? Lessons From Social Impact Bonds. *Annals of Public and Cooperative Economics*, *90*(2), 353–369. https://doi.org/10.1111/apce.12230

Vecchi, V., & Leone, V. (2020). *Creare Partnership Pubblico Privato. Policy, contratti e metodologie* (EGEA, Ed.). Milano.

Vecchi, V., Cusumano, N., & Casalini, F. (2022). Investigating the performance of PPP in major healthcare infrastructure projects: the role of policy, institutions, and contracts. *Oxford Review of Economic Policy*, *38*(2), 385–401. https://doi.org/10.1093/oxrep/grac006

Xiahou, X., Tang, L., Yuan, J., Zuo, J., & Li, Q. (2022). Exploring social impacts of urban rail transit PPP projects: Towards dynamic social change from the stakeholder perspective. *Environmental Impact Assessment Review*, *93*(November 2021), 106700. https://doi.org/10.1016/j.eiar.2021.106700

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Research evaluation: an effect on researcher' research agenda setting?

Valentina Carazzolo
University of Rome La Sapienza, IRCRES Research Institute on Sustainable Economic Growth, Rome, Italy (valentina.carazzolo@uniroma1.it).

After an educational path focused on public policy and the impact of policies, I have re-oriented my focus on Higher Education studies, with a specific interest in research evaluation policies.

Abstract **– Since the introduction of research evaluation policies, many scholars have attempted to investigate whether research evaluation has produced any effect, both at organisational and at individual level. In the present paper, we aim at understanding whether the introduction of research evaluation policies in Italy has been produced an effect on how researchers formulated their own research agenda. Research agenda setting is defined as the sequence of medium and long-term actions to organize research-related interests, according to researchers' working goals. A mixed-method approach was chosen for the purpose of our research. A webmail survey and qualitative interviews were conducted on our target population, that is composed by economists, sociologists and political analysts currently working in Italian universities. The analysis is still at an ongoing status, and it is our expectations that the implementation of the VQR has not produced a significant impact on researchers' research agenda setting process.**

Keywords **– Research evaluation, knowledge production, webmail survey, mixed-method approach**

Introduction

In the last decades, Italian universities have increasingly become a core target of evaluation and quality assurance policies, as a result of the necessity of introducing the principles of accountability and efficiency in higher education, to meet the Bologna process principles. The implementation of research evaluation policies (the so-called VQR, namely, the Evaluation of the Research Quality, whose focus is to evaluate universities' performance, and ASN meaning the National Scientific Habilitation, on which academics' recruitment is based), and the consequent introduction of market-based principles in academia (Borrelli, Stazio, 2018, Campbell,2013), has triggered a lively debate on their consequences on researchers' productivity and research-agenda related choices.

Research questions

The purpose of the present contribution is to provide an insight into the effects of the implementation of research evaluation on knowledge production processes. Indeed, conducting research in higher education is getting more and more challenging, since academics usually have to deal with a relevant amount of workload and with an increasing number of tasks (Shattock, 2014). Alongside the daily difficulties in performing academic tasks, Italian researchers have to deal with national research exercises, whose declared aim is to foster Italian universities' research production quality (Colarusso, Giancola, 2020). Hence, the purpose of our research is to understand whether the research evaluation policies implemented by the Italian Ministry of Higher Education (VQR and ASN) have had effects on researchers' research agenda-setting process. It is possible to define the research agenda-setting as the sequence of medium and long-term actions to organize researchers' research-related interests, according to their working goals (Ertmer, Glazewski, 2014). Indeed, research agenda settings a complex process representing an essential phase of the individual researchers'

knowledge production progress, for the opportunity of building solid and meaningful bridges which may let researchers foster their own credibility cycle (Latour, Woolgar, 1979).

More specifically, our research questions are:
Have researchers' research agenda setting been influenced by research evaluation policies?
Are there differences between individual-oriented evaluation policies (ASN) effects and universities-oriented evaluation policies (VQR) effects?

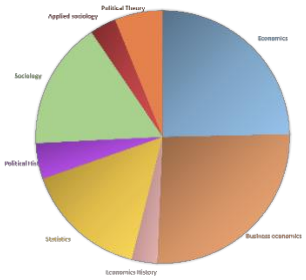
Method

For the purpose of our research, and for the newness of the topic, we have decided to adopt a mixed-method approach. First of all, we opted for the webmail survey methodology (Schlipphak, Isani, 2018), for the possibility it grants to easily reach out to the entire reference population (that is, the researchers currently working in Italian private and public universities). In the second phase of our research, we have conducted qualitative interviews with experts of the research evaluation topic in the Italian context.

The target population counts for 6297 people, including full professors, associate professors, temporary researchers, and full-term researchers (Fig. 1 below). We focussed on social scientists, namely economists, sociologists and political analysts.

Figure 1: Population distribution by gender

Figure 2: Population distribution by academic role



The survey was sent from January 2022 to February 2022.

Survey provisional results

The research is currently still at an ongoing status, and the analytical phase is at its final stage.
In the next research stage, we aim to conduct qualitative interviews with survey respondents who expressly communicated their availability to be interviewed. The objective of the interviews is to further explore the various factors that might come into play during the research agenda-setting process. It is our expectation that the implementation of the VQR has not produced a significant impact on researchers' research agenda-setting process, while the ASN has partially addressed researchers' research agenda, especially of youngest researchers'. A relatively stronger impact may be produced by the availability of funds tied to specific topics or the collaboration with colleagues

Figure 3: VQR influence on research agenda per disciplinary sector

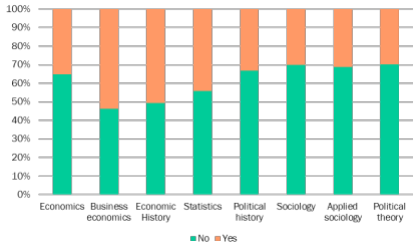
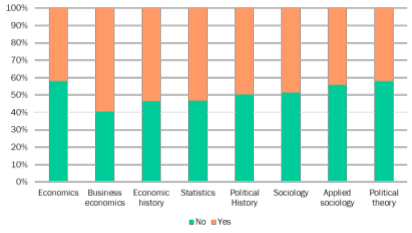


Figure 4: ASN influence on research agenda per disciplinary sector



Qualitative interviews management and provisional results

The interviewees were selected among the survey participants who voluntarily expressed their interest for the research second phase. Particularly, among those who expressed their interest, we selected the experts of Italian research evaluation system, with working experience in evaluation bodies or agencies. The goal of the interview was to match the evaluator and the evaluated experience. We conducted semi-

structured interviews, with10 fixed questions and further variable questions on the issues perceived important by the interviewee.
On a continuum between advocates and critics of research evaluation, 9 over 11 express concerns. VQR is mainly perceived as reducing research production quality, while ASN is mainly perceived as huge obstacle for young researchers' career without granting a general raise in research quality. Professors generally feel quite overwhelmed by their research and institutional tasks, and their teaching endeavours neglected. A common negative perception of the effects VQR and ASN on national research production quality emerged.

References

According to the analysis conducted so far, we can conclude that VQR has produced a minor impact on researcher's research agenda setting in comparison to ASN. However, both VQR and ASN have produced different effects on the several disciplines at issue, with a more significant effect on economists research agenda setting. From the interviews, a general concern over the long-term consequences of research evaluation policies (especially ASN) on young researchers' research practices.

References

Borrelli, D., & Stazio, M. (2018). La «grande trasformazione» dell'università italiana. *Rivista Trimestrale di SCIENZA dell'AMMINISTRAZIONE*, *1*, 1-19.

Colarusso, S., & Giancola, O. (2020). *Università e nuove forme di valutazione: Strategie individuali, produzione scientifica, effetti istituzionali* (Vol. 59). Sapienza Università Editrice.

Ertmer, P. A., & Glazewski, K. D. (2014). Developing a research agenda: Contributing new knowledge via intent and focus. *Journal of Computing in Higher Education*, *26*(1), 54-68.

Latour, B., Woolgar, S., (1979), Laboratory life. The social construction of scientific facts, Cambridge University Press

Shattock, Michael (2014). Can we still speak of there being an academic profession?. *History of Education*, *43*(6), 727-739.

Schlipphak, B., & Isani, M. (2020). Designing survey questions and choosing survey formats. In *Handbuch Methoden der Politikwissenschaft* (pp. 351-371). Springer VS, Wiesbaden.

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Building and experimenting with multi-stakeholder spaces for water innovation

Valentina Monico-Gonzalez[1], Manuel Pulido-Velazquez[1], Sergio Segura-Calero[2]

[1] *Universitat Politècnica de València, Research Institute of Water and Environmental Engineering (IIAMA-UPV), Valencia, Spain (vamo3@posgrado.upv.es) (mapuve@hma.upv.es)*
[2] *Spanish National Research Council (CSIC), Institute of Innovation and Knowledge Management - INGENIO (CSIC-Universitat Politècnica de València), Valencia, Spain (serseca@upvnet.upv.es)*

Short Bio

Valentina Mónico-González (PhD Candidate in Hydraulic and Environmental Engineering, Universitat Politècnica de València) is an early-career researcher with particular interest in the field of water innovation towards sustainability transition. She is currently working on multi-stakeholder engagement processes and their role in decision-making supported by her PhD Thesis directors Manuel Pulido-Velazquez and Sergio Segura-Calero.

Abstract – After years, researchers in the field of water governance are still claiming the need for measures beyond top-down approach towards sustainability transition. Until now, water management and its associated systems have represented a challenge for decision-makers. This is not only because of the uncertainty it entails but also because of the difficulty of implementing the different measures established from a top-down approach.
In this sense, this study seeks to implement a bottom-up approach, identifying the system's vulnerabilities from a participatory perspective. To do so, we were developing multi-stakeholder engagement spaces, together with traditional approaches, which guarantee the involvement of all stakeholders from the earliest stages to bring about transformative changes and to guide the decision taking.
The case studies selected for this work are the Jucar River Basin, the Tagus River Basin and the Segura River Basin. These basins are located in Spain and present significant complexities in water management, currently including a water transfer and socio-political conflicts.

Keywords **– Water innovation, water governance, multi-stakeholder spaces, sustainability transition**

Introduction: main objectives and research questions

Globally, following the last World Water Development Report, the United Nations emphasizes the need to visualize problems related to water (UN, 2022). In this way, a crucial field of study is water governance and the related drivers and issues. In turn, water governance regulations have advanced both in Europe and in Spain. Furthermore, the academic community focused on water governance is claiming the need for measures beyond top-down approach towards sustainability transition. There is also a lack of innovation in the matter with respect to theory and practice, and stakeholder involvement in public decision making towards sustainability transformation (Köhler et al., 2019; Wehn & Montalvo, 2018). Nevertheless, there have been implemented several participatory processes and methodological frameworks under different approaches (Roque et al., 2021) but much more effort is needed. In particular, there have been highly appreciated global adaptation approaches towards sustainability based on co-production of knowledge (Schneider et al., 2021), alternative scenarios and bottom-up formulas in water management (Pulido-Velazquez et al., 2022). That

way, in order to improve water governance and stakeholder involvement in water systems, it still seems essential working with transparency and with the plurality of actors involved in the comprehensive management of common water resources (Trawick, 2008).

The objective of this piece of work is to show the utility of multi-stakeholder spaces in order to implement experimentation about transformative change in the water socio-technical system. We think there is room to combine the traditional participatory approaches in water governance with the plurality of actors under the frameworks of innovation studies. The selected case-studies and the multi-stakeholder spaces under development are related to the Jucar River Basin, the Segura River Basin, and the Tagus River Basin. Learning during the processes, the main challenges of this study are how to avoid path-dependencies and how to improve such untraditional multi-stakeholder spaces in Spain.

Methodology

Research methodology was based on qualitative methods including semi-structured interviews and analysis of research papers, relevant documents and regulation. The primary data was collected through semi-structured interviews who were involved in the stakeholder mapping process in building multi-stakeholder spaces for water governance in Spain. In particular, the stakeholder mapping followed the DRIFT Institute methodology for actor analysis in transition management processes (Roorda et al., 2014) and the Visual toolbox for stakeholder mapping in innovation systems by Climate-KIC (De Vicente & Matti, 2016). The interviews were developed through a systematic coverage and balanced representation of critical stakeholders: government agencies (national, regional and local), civil society and Non-governmental organizations (NGO), academia and intermediaries.

Secondary data from documents, research papers and the media were also analysed to contextualise the primary information. Furthermore, all collected data was combined in order to enrich discussion and interpretation.

Case studies

The case studies selected for this work are the Jucar River Basin, the Tagus River Basin and the Segura River Basin.

Thanks to their nature and how they have been managed up to now, these basins present significant complexities and recurring conflicts between the different actors.
Therefore, it is considered fundamental to create transparent and safe spaces for every one of the actors involved in the process.
A first round of participatory dialogues has been conducted in all the study cases. On them, different synergies have been generated between actors and the creation of collective knowledge related to the principal vulnerabilities of the system, as well as possible measures that the actors and entities in charge of management can take.

In the same way, different challenges have arisen when implementing the methodology, such as the difficulty in establishing a balance between people who are used to assuming roles of power with those who do not usually participate in these spaces.

First findings and discussion

Transdisciplinarity, transparency and inclusiveness are essential principles in order to come up with new transformative narratives and discourses through the bottom-up approach. The role of power, the trust issues and the path dependencies are further elements to be analysed in the context of river basin governance. Altogether, these elements are especially underdeveloped for the cases of the Spanish river basins. Consequently, the role of a transition team, in steering multi-stakeholder spaces, becomes even more relevant as a starting point in these contexts without such a collaboration tradition. Furthermore, the results of the stakeholder mapping processes and the interviews showed historical conflicts and issues related to institutional trust in the Spanish water systems. For example, the role of farmers seems to be crucial for system changes since the irrigation systems monopolize almost 80% of freshwater resources in Spain. The concentration of power in farmers and water administration could be considered the major lock-in towards sustainability transitions in the water socio-technical system. There is no room for alternative narratives or initiatives to shake the rules of the game. Transparency and inclusiveness efforts are not yet enough and we could easily notice a lack of gender balance at multiple levels and dimensions in the water systems. Finally, we can also highlight the role played by the media. Certainly, they can easily influence the cultural narratives in water systems. For example, water transfer stories and water demands appear on the front page of all the newspapers and it is used as part of the political campaigns. Considering these reasons, the water stakeholders felt comfortable within new spaces for dialogue without such pressures and under the protection of the academy.

Preliminary conclusions

The analysis and identification of transformative factors between traditional water management and new approaches based on multi-stakeholder engagement spaces or platforms are crucial to improve water governance. In Spain, we should highlight the role of the transition team and its composition as a first facilitator or steering group of these multi-stakeholder spaces towards sustainability transition in the water systems. Furthermore, much more effort is needed in order to further develop transdisciplinarity, transparency and inclusiveness principles in water governance. Political agendas must include innovation embedding in water governance in order to improve multi-stakeholder governance spaces and innovation in participatory processes beyond the tradition in water decision-making.

Finally, we can also highlight the role played by the media. Certainly, they can easily influence the cultural narratives in water systems. For example, water transfer stories and water demands appear on the front page of all the newspapers and it is used as part of political campaigns.

Acknowledgements

This piece of research work was developed under the framework of GoNEXUS project (H2020, Grant Ag. number: 101003722) and *Programa per a la promoció de la investigación científica, el desenvolupament tecnològic i la innovació a la Comunitat Valenciana (PROMETEO)* under the WATER4CAST project. In addition, it has received funding from the Generalitat Valenciana and the European Social Fund through the grant CIAPOS/2021/178.

References

Confederación Hidrográfica del Júcar-CHJ (2022). Plan Hidrológico de la Demarcación Hidrográfica del Júcar. Confederación Hidrográfica del Júcar. Ministerio para la Transición Ecológica y el Reto Demográfico. Gobierno de España. Disponible en: https://www.chj.es/es-es/medioambiente/planificacionhidrologica/Paginas/PHC-2022-2027-Plan-Hidrologico-cuenca.aspx

de Vicente Lopez, J. and Matti, C. (2016). Visual toolbox for system innovation. A resource book for practitioners to map, analyse and facilitate sustainability transitions. Brussels, Belgium: Transitions Hub Series, Climate-KIC.

Köhler, J., Geels, F. W., Kern, F., Markard, J., Onsongo, E., Wieczorek, A., Alkemade, F., Avelino, F., Bergek, A., Boons, F., Fünfschilling, L., Hess, D., Holtz, G., Hyysalo, S., Jenkins, K., Kivimaa, P., Martiskainen, M., McMeekin, A., Mühlemeier, M. S., … Wells, P. (2019). An agenda for sustainability transitions research: State of the art and future directions. Environmental Innovation and Societal Transitions, 31, pp. 1–32. https://doi.org/10.1016/J.EIST.2019.01.004

Pulido-Velazquez, M., Marcos-Garcia, P., Girard, C., Sanchis-Ibor, C., Martinez-Capel, F., García-Prats, A., Ortega-Reig, M., García-Mollá, M., Rinaudo, J-D. (2022). "A Top-Down Meets Bottom-Up Approach for Climate Change Adaptation in Water Resource Systems". In: Kondrup C. et al. Climate Adaptation Modelling. Springer Climate (SPCL), Springer. Pp. 149-157. https://doi.org/10.1007/978-3-030-86211-4_18

Roorda, C., Wittmayer, J., Henneman, P., Steenbergen, F. van, Frantzeskaki, N., & Loorbach, D. A. (2014). Transition management in the urban context: Guidance manual. Rotterdam: DRIFT, Erasmus University Rotterdam.

Roque, A., Wutich, A., Quimby, B., Porter, S., Zheng, M., Hossain, M. J., Brewis, A. (2022). "Participatory approaches in water research: A review". Wiley Interdisciplinary Reviews: Water, 9(2), e1577. https://doi.org/10.1002/wat2.1577

Schneider, F., Tribaldos, T., Adler, C., Biggs, R., Bremond, A., Buser, T., Krug, C., Loutre, M-F., Moore, S., Norström, A. V., Paulavets, K., Urbach, D., Spehn, E., Wülser, G., Zondervan, R. (2021). "Co-production of knowledge and sustainability transformations: A strategic compass for global research networks". Current Opinion in Environmental Sustainability, 49, pp. 127–142. https://doi.org/10.1016/j.cosust.2021.04.007

Trawick, P. (2008). "Scarcity, Equity, and Transparency: General Principles for Successfully Governing the Water Commons". In: Wiegandt, E. (Ed) Mountains: Sources of Water, Sources of Knowledge. Advances in Global Change Research, Springer, pp. 43-61. https://doi.org/10.1007/978-1-4020-6748-8_4

United Nations (2022). The United Nations World Water Development Report 2022: Groundwater: Making the invisible visible. Paris: UNESCO.

Wehn, U., Montalvo, C. (2018). "Exploring the dynamics of water innovation: Foundations for water innovation studies". Journal of Cleaner Production, Volume 171, pp. S1-S19. https://doi.org/10.1016/j.jclepro.2017.10.118

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Food welfare as a new paradigm to deal with food poverty. The case study of Turin

Veronica Allegretti and Riccardo Giovanni Bruno
Affiliation (Università degli Studi di Torino, Torino, Politecnico di Torino, Italy (veronica.allegretti@unito.it; riccardo.bruno@polito.it).

Short Bio

Veronica Allegretti, PhD candidate in Sociology and Methodology of Social Research, specializing in food poverty studies and welfare policies. She currently collaborates with the Atlante del Cibo project at the University of Torino, where she co-coordinates the "Food Poverty in Torino" research project. She is also teacher assistant in Sociology of Work at the University of Torino.
Riccardo Bruno, PhD candidate in Urban and Regional Development, specializing in urban food policy and urban food system studies. He currently collaborates with the Atlante del Cibo project at the University of Torino. He is also Cultore della Materia in International Cooperation for Development: Practices and Project Design.

Abstract – The present research aims to highlight the political systems' inability to address emergency and incidental approaches behind food aid, on one side. On the other side, we mean to debate how local political systems may develop innovative transversal approaches to deal with food security.
Much effort is put into the comprehension of the issue of "food welfare", meant as a new conceptual term through which it may be possible to set up a series of structural measures regarding food accessibility. The research is carried out by addressing a theoretical level in which we analyse the literature advancements regarding the theme of "food welfare"; successively, we intend to carry out empirical research in the City of Turin to determine the number of food aid-related actors, their locations and their capacity of providing solutions for people's needs. Hence, we intend to figure out how food aid is conceived and structured in Turin.
The third and final part of the research consists in interviewing a series of policy-makers from the City of Turin meaning to comprehend their perceptions regarding the necessity of stronger and more effective food aid strategies, inserting them in a broader food welfare approach.

Keywords **– food welfare; food aid; urban food policy, food poverty**

The present paper is part of the growing body of studies on food accessibility, that aim at highlighting, on one side, the severe inability of political systems to overcome the emergency and incidental approach behind food aid; on the other side, they want to propose innovative transversal approaches aimed at implementing more effective and widespread food distribution tools.

In this context, we intend to discuss the issue of "food welfare" as a new dialogical and political means, useful to structure valid opportunities for food accessibility. The need for this perspective is motivated by the absence of an effective approach to food welfare, due to, presumably, a severe lack of knowledge behind the concept of food welfare itself. Indeed, perceiving welfare as the set of socio-economic measures promoted by the state and aimed at protecting the well-being of individuals, it is evident that the food dimension cannot be excluded from this sphere. In this sense, it is relevant to emphasise that, although the academic literature promoted several debates on the importance of treating food assistance as a matter of welfare conditions and not as a purely emergency instrument, there are no globally shared structured definitions of "food welfare" and, consequently, there are no valid policies in this field at any level.

Several previous studies (see Riches, 1997) reflected with stimulating interest on the importance of juxtaposing "hunger", "food security" and "welfare policies"; however, no successive work kept the focus on these themes meaning to advance the research and to find proper points of junction among the several. This gap generated further serious voids in research which were clearly visible in the field of socio-geographical studies; more precisely, due to the theoretical voids, descriptions of conditions of urban food aid below systemic perspectives are today absent or incomplete, since they are not included within a broader approach. In other words, some studies on food aid services tended to be incapable of providing clear knowledge of the food aid experiences in the territory and, from this, extrapolating useful information to propose a strategic food welfare plan.

We, therefore, intend to formulate a definition of "food welfare", setting its theoretical basis on the body of work that the discipline produced over time, and, consequently, intersecting it with the empirical evidence of its usefulness. To this end, we will conduct research in the City of Turin meaning to determine the number of food aid-related actors, their location on the territory, the population's needs that they meet, and their proposals for assistance, to understand how food aid is conceived and implemented in the city, and what role local government plays in this context. Moreover, given that the City of Turin is currently engaged in the process of Urban Food Policy structuring, it is relevant to recall it within the research because UFPs may also address the different facets of food aid policies from a systemic perspective (see Bruno, Dansero, & Tesfay, 2023). Further, this piece is crucial since Turin is already implementing some food welfare-related policies, which take place in the so-called "Torino Solidale" framework; nonetheless, the existing measures are few and far from the potential benefits of a specific food welfare system.

Therefore, by combining the aspects mentioned above, we intend to understand which opportunities the urban context may experience if the concept of food welfare was adopted as a fundamental approach to formulating systemic responses to food poverty (Q). This question primarily means to clarify the concept of food welfare, determining which elements should be included in the structuring of the definition; to do this, the concept of food poverty is particularly relevant as it describes the dimensions of the phenomenon and the framework within which, welfare must act. Then, once the guidelines of the definition have been cleared, its potential is then explored by the following sub-question: "what social and political opportunities can take place if the food welfare definition is adopted at the level of urban governance and in food aid contexts?" (SQ1). Although the answer must once again be structured primarily on a theoretical level, this is not sufficient for an overall comprehension of the question. Hence, it is necessary to consider the real characteristics of a territory and its capacity to react to food poverty situations. To this end, it is therefore fundamental to place the issue in the political and geographical context of reference, Turin in the present case, and to ask which elements in the conceptual City of Turin's food welfare system, should be considered. Indeed, if we consider that, on the one hand, there are numerous food aid experiences, but these are not well coordinated, and, on the other hand, an Urban Food Policy is being structured, but it does not yet possess the capacity to implement real measures, it is essential to comprehend which pieces may play a crucial role in the food welfare setting process (SQ2).

To answer these questions, we want to adopt different study methodologies in terms of means and targets to produce wide and comprehensive knowledge despite the numerous aspects considered.

The first tool consists of an accurate literature review of the studies that have already investigated the possible correlations of the concepts of "hunger", "food security", "food poverty", "food aid" and "welfare", to produce a kind of work that prosecutes what has been produced so far. Next, we mean to map the several actors who currently provide food aid services in the Turin area and connect their food aid proposals, to ascertain whether the city has a sufficiently large number of food aid initiatives for the needs (see Allegretti *et alii*, 2022; Allegretti, 2020; Toldo et Allegretti, in review). This phase is carried out using the cartographic software QGIS, which is useful to geographically understand the location of the various food aid services in Turin. In fact, assessing the positioning of these experiences allows a better understanding of the city food aid system. Carrying out a series of semi-structured qualitative surveys, we, therefore, intend to carry out a number of interviews subdivided as follows: first of all, we want to delve into the contents of the various food aid proposals, asking the managers of these projects to describe

the structure of the service (whether structural or emergency), the ability to coordinate with other similar relevant actors and the perception of the usefulness of acting within a food welfare framework. We then interview a number of policymakers in the City of Turin in order to understand their perception of the need for a systemic and no longer emergency-guided approach to challenge food poverty and, more precisely, to determine whether a process of production and implementation of food welfare-based measures is taking place at the level of urban governance or not. The sample is purposive; this choice is motivated by the intention of gathering all the necessary information, and, to do so, interviewing particularly relevant individuals coming from food aid-related organizations.

Given the particularly innovative targets of this research, it is difficult to define which results will emerge; however, it is expected that this work will provide a solid theory in the food welfare field of studies, even reaching a clear definition of the topic, which will be then applied to the empirical context of the research. Indeed, such a definition becomes the tool by which we intend to ascertain whether the ongoing food aid processes are emergency-guided or are rather part of a broader political framework; moreover, albeit with difficulty, it is possible to assume that the nature of the food aid support is well-structured and long-term if adopting the organisations' perspective; however, they are emergency strategies if reasoning from the systemic perspective of the potential food welfare approach. Evidently, in this context, policymakers may expectedly be unlikely to describe a well-conceived and structured model of food welfare and, instead, may be likely to explain that the process is still far from complete.

The present socio-spatial analysis of the food welfare situation in Turin is thus intended as a cognitive and data set tool for multi-stakeholder actors who are carrying out the UFP setting process; relying on these data, policymakers may be able to go beyond the usual emergency-guided food aid system and integrate food welfare policies within a larger set of political tools. By relying on a rights-based approach, food may be addressed as a matter of right, not anymore as a matter of need.

BIBLIOGRAPHY

Bruno, R.; Dansero, E.; Tesfay, K.; (2023) Processi di costituzione di urban food policy. Il caso studio di Addis Abeba, *Semestrale di studi e ricerche di geografia*, p. 7-22;

Allegretti, V. (2019). L'implementazione del FEAD. Criticità e opportunità nella relazione di aiuto, in *Prospettive Sociali e Sanitarie*, 4/2019, 10-14;

Allegretti, V.; Battisti, L.; Cuomo, F.; Dansero, E.; Pettenati, G.; Ravazzi, S.; Toldo, A.; (2022), L'evoluzione delle politiche alimentari a Torino, in *Re/Cibo n1*;

Hunger, (1997), Food security and welfare policies: issues and debates, in *First World societies BY GRAHAM RICHES Proceedings of the Nutrition Society*, 56, p. 63-74;

Allegretti, V.; Toldo, A.; Genova, C.; Socio-spatial analysis of food poverty. A research in Turin. *AESOP 20-23 October 2022 Conference Proceedings*, Almere.

PhDays 2023
Addressing old and new social challenges: knowledge, policies, inclusion
8, 9, 10 February
Valencia, Spain

Artificial Intelligence, environmental friend or foe?

Xinger Wei
The University of Manchester, Manchester Institute of Innovation Research, Manchester, United Kingdom
(xinger.wei@postgrad.manchester.ac.uk)

Short Bio

Second year PhD student in Science Technology and Innovation Policy
MRes Management (with focus on innovation)
MSc Project Management
BEng Thermal Energy and Power Engineering

***Abstract* – This research aims to use patent data to investigate the impact of artificial intelligence technologies in manufacturing on the development of environmental technologies. How to use intelligent technology to increase innovation, stimulate economic growth and ultimately achieve sustainable goals has become a key concern for the manufacturing industry. This research will focus on answering the following research questions to achieve the research aim: 1) What are the features of AI technology development in the manufacturing sector? 2) Do companies that use more AI technologies tend to use more environmental technology? 3) To what extent does development in AI technologies affect development in environmental technologies? In other words, do environmental technologies associated with AI technology have higher patent quality and patent value? To address these research questions, the Orbis database will be used to analyse AI patent data and environmental technology patent data from Chinese manufacturing industries.**

***Keywords* – Artificial intelligence, environmental sustainability, patent data, manufacturing**

LITERATURE REVIEW

Artificial Intelligence

AI is defined as "a system's ability to interpret external data correctly, to learn from such data, and to use those learnings to achieve specific goals and tasks through flexible adaptation." (Kaplan & Haenlein, 2019). Russell et al. (2022) state artificial intelligence as a system with natural language processing, knowledge representation, automatic reasoning, and machine learning capabilities. Yet, the lack of a consistent definition has not stopped the spread of research into new applications of AI in the world.

From Sustainability to Environmental Sustainability

Sustainability as a policy concept has its roots in the Brundtland report of 1987. The document was concerned with the tension between the human desire for a better life and the limits imposed by nature. Over time, the concept has been reinterpreted to include three dimensions: social, economic and environmental, which also usually be called the "triple bottom line". There can be seen that the concept of sustainability has changed from focusing on nature to "triple bottom line" (Slaper & Hall, 2011; Alhaddi, 2015). However, Kuhlman and Farrington (2010) argued that this change in meaning **a)** obscures the real contradiction between the goal of well-being for all and environmental protection; **b)** risks diminishing the importance of the environmental dimension; and **c)** separates the social and economic aspects, when in fact they are one and the same. The discussion of sustainability in this paper will return

to the original definition of sustainability, which is environmental sustainability.

Artificial Intelligence Under the Lens of Environmental Sustainability

From a technical perspective, advances in artificial intelligence will support the understanding of climate change and the modelling of its likely impacts. AI will support low-carbon energy systems that are highly integrated with renewable energy and energy efficiency, all of which are needed to combat climate change (PwC and Stanford Woods Institute for the Environment, 2018). Feroz et al. (2021) find that digital (AI technologies are included) transformation is helpful for environmental sustainability in four ways: **1)** Pollution control; **2)** Waste management; **3)** Sustainable production: sustainable manufacturing, sustainable supply chain; **4)** Urban sustainability. In addition to the positive impact, AI can also have a negative impact on the environmental dimension especially due to the contribution it makes towards further acceleration, and consumption of technological devices (Khakurel et al., 2018). The increase in the production and consumption of equipment will have two negative effects, namely planned obsolescence and depletion of natural resources (Loureiro et al.). Bohnsack et al. (2021) refer to the pros and cons of digital technologies such as AI technology as technological ambiguity. Due to its generative nature, the introduction of digital technology can also have unintended consequences for sustainability: it has positive or negative side effects. These unintended consequences can add to the results already achieved or create entirely new pathways. Based on this ambiguity, insight into the impact of AI technologies on environmental sustainability requires an assessment of both direct and indirect impacts. The negative impacts of AI technologies require urgent intervention by governance mechanisms. However, effective governance measures cannot be proposed without an understanding of the impact of AI technologies on individuals or organisations.

From a disciplinary development perspective, the development of artificial intelligence has three phases, 1) massive influx of new disciplines; 2) concentrated development of specific disciplines or hotspots; 3) gradual maturation of related theoretical approaches and application areas (Loureiro et al., 2021) (Haefner et al., 2021). Nishant et al. (2020) argue that the real value of AI in environmental sustainability is not in how it reduces energy use and pollution emissions, but at a higher level - in how it contributes to and facilitates environmental governance. And innovation in business has a profound impact on environmental governance (Zhang et al., 2022). We can see a gap here, current research on AI for environmental sustainability mostly emphasises technical issues in the computer science or engineering fields (Vinuesa et al., 2020; Khakurel et al., 2018). However, innovation, as the AI-related marginal discipline Li and Wang (2019), has not received much attention from researchers.

RESEARCH AIM AND QUESTIONS

Research Aim

The aim of this study is to explore the impact of the development of AI technologies on the development of environmental technology in manufacturing.

Research Questions

RQ1 - What are the features of AI technology development in the manufacturing sector?

- What are core AI technologies in manufacturing?
- What are core firms in the network of patentees?

RQ2 - Do companies that use more AI technologies tend to use more environmental technology?

- What are co-development environmental technologies with AI?

RQ3 - To what extent does development in AI technologies affect development in environmental technologies?

- Does the environmental technology associated with AI technology have higher patent quality?
- Does the environmental technology associated with AI technology have a higher patent value?

METHODOLOGY

The methodology of this research is quantitative analysis. The secondary patent data from Orbis IP will be used.

Comparison of the patent database

As the use of different databases can lead to completely different analysis results, it is necessary to establish a procedure to validate the database characteristics and then select the most appropriate database according to the objectives of the study. Discussed below is the logic of database selection for this study.

This study focuses on AI patent data and environmental sustainability related patent data at the company level, with a geographical focus on China, and therefore the following questions need to be considered in selecting a patent database:

1) Does the database contain comprehensive information on Chinese companies (including SMEs)?

2) Does the database cover a wide range of AI technologies and environmental sustainability technologies?
3) Does the database have a wide range of national diversity?
4) Is the patent data easily retrievable?

There are two categories of patent databases: free databases (e.g. USPTO, CNIPA, JPO IPDL, Lens.org, esp@cenet, etc.) and commercial databases (Kim & Lee, 2015). The benefit of free-of-charge data is the accessibility of the data. Compared with free-of-charge databases, commercial databases have corrected bibliographic data, improved classification/indexing, patent topographical maps, citation analysis, and semantic search (Andrew, 2011). They also provide integrated access to multiple sources of patent and non-patent literature (NPL). Commonly used commercial databases are Orbit, EPO Worldwide Patent Statistical Database (PATSTAT), Derwent Innovations Index (DII), Orbis Intellectual Property, etc. Orbis Intellectual Property is a full-text patent database of private and public companies around the world, comprising 131 million patents and patent applications, more than 2 million patent holders and 300 million companies. Orbis' patent data is provided by Lighthouse IP. In addition to the usual patent data authorities (including USPTO, EPO, WIPO etc.), Lighthouse IP also includes patent information from 159 bibliographic authorities and 130 legal status authorities. This maximises the retained patent data of some SMEs. Compared to other databases, Orbis Intellectual Property combines company and patent information for intellectual property management and strategy (Ribeiro et al., 2010). This helps organisations judge the alignment of IP between business strategies at the decision-making level, and compare the volume and value of IP (Santhosh, 2022). Comprehensive and good quality micro-data has become an important tool for evidence-based decision-making on complex issues (Ribeiro et al., 2010). Orbis contains a wealth of administrative data, which facilitates the analysis of innovation and economic performance at a micro-level by linking the characteristics of patent data to corporate performance.

Comparison of the different methods to identify AI patents

1) Keyword search method

The keyword search method refers to researchers using their discretion to develop a set of terms that reflect the latest developments in artificial intelligence. The advantage of using the keyword approach is that it is easy to implement. And carefully selected keywords can capture the latest changes in the field of AI. However, the success of this approach depends on the researcher's familiarity with the AI field. The omission of important keywords may result in missing data for a particular AI subfield (Hötte et al., 2022).

This study uses a set of keywords defined by (Cockburn et al., 2018) (Appendix 1). The company's country is selected as "China" in Orbis. This approach yields 1,411,846 patents.

2) WIPO method

The limitations of keywords have been mentioned above. Patent codes (IPC/CPC) also have their limitations. A relatively large number of AI-related patents are not classified in non-specifically AI-related classification codes and can only be captured using keywords, so a part of the query has to be based on specific keywords only.

WIPO use keywords, CPC and IPC code to retrieve information related to AI (WIPO, 2019). Keywords, CPC and IPC codes are shown in Appendix 2. The aim behind the methodology is to capture three aspects of AI technology: a) core AI techniques (deep learning, other learning methods, various type of logic, clustering, etc.); b) functional applications of AI that can be used to simulate human-like cognitive capacities (such as vision, language, or decision-making); and c) end-user application fields (such as automation in business, health, or military).

The company's country is selected as "China" in Orbis. This approach yields 9,977,645 patents.

It can be seen that the WIPO method obtains far more patent data than the keyword method, so the WIPO method will be used for the search of AI patents in my research.

Data collection

1) Choose patent priority date – 01/01/2012 to 31/12/2022
2) Choose companies geographic – China's mainland (China, Central China, East China, North China, North East China, North West, South China, South West China)
3) Choose companies activity – trade description "manufacturing"
4) Patent classifications – use CPC/IPC codes (Appendix 2)
5) Patent text – use keywords shown in Appendix 2

The Boolean search is "a AND b AND c AND (d OR e)"

The total number of patent data obtained using WIPO method is 312,03

NEXT STEPS

1) Data cleaning and screening; finish descriptive statistics for data.
2) Finish patent citation network analysis; identify the co-development of environmental technology with AI (use Cosine similarity and cross-reference).
3) Assess the value of the quality of patents (look at patent features and patent ownership).

REFERENCES

Alhaddi, H. (2015). Triple bottom line and sustainability: A literature review. *Business and Management Studies*, *1*(2), 6-10.

Andrew, C. (2011). *Overview of Free & Commercial Patent Databases*.

Bohnsack, R., Bidmon, C. M., & Pinkse, J. (2021). Sustainability in the digital age: Intended and unintended consequences of digital technologies for sustainable development. In: John Wiley & Sons Ltd.

Cockburn, I. M., Henderson, R., & Stern, S. (2018). The impact of artificial intelligence on innovation: An exploratory analysis. In *The economics of artificial intelligence: An agenda* (pp. 115-146). University of Chicago Press.

Feroz, A. K., Zo, H. J., & Chiravuri, A. (2021). Digital Transformation and Environmental Sustainability: A Review and Research Agenda [Review]. *Sustainability*, *13*(3), 20, Article 1530. https://doi.org/10.3390/su13031530

Haefner, N., Wincent, J., Parida, V., & Gassmann, O. (2021). Artificial intelligence and innovation management: A review, framework, and research agenda☆. *Technological Forecasting and Social Change*, *162*, 120392.

Hötte, K., Tarannum, T., Verendel, V., & Bennett, L. (2022). Exploring Artificial Intelligence as a General Purpose Technology with Patent Data.

Kaplan, A., & Haenlein, M. (2019). Siri, Siri, in my hand: Who's the fairest in the land? On the interpretations, illustrations, and implications of artificial intelligence. *Business Horizons*, *62*(1), 15-25. https://doi.org/https://doi.org/10.1016/j.bushor.2018.08.004

Khakurel, J., Penzenstadler, B., Porras, J., Knutas, A., & Zhang, W. L. (2018). The Rise of Artificial Intelligence under the Lens of Sustainability [Article]. *Technologies*, *6*(4), 18, Article 100. https://doi.org/10.3390/technologies6040100

Kim, J., & Lee, S. (2015). Patent databases for innovation studies: A comparative analysis of USPTO, EPO, JPO and KIPO. *Technological Forecasting and Social Change*, *92*, 332-345. https://doi.org/https://doi.org/10.1016/j.techfore.2015.01.009

Kuhlman, T., & Farrington, J. (2010). What is sustainability? *Sustainability*, *2*(11), 3436-3448.

Li, S., & Wang, Y. (2019). Research on interdisciplinary characteristics: a case study in the field of artificial intelligence. IOP Conference Series: Materials Science and Engineering,

Loureiro, S. M. C., Guerreiro, J., & Tussyadiah, I. (2021). Artificial intelligence in business: State of the art and future research agenda. *Journal of Business Research*, *129*, 911-926.

Nishant, R., Kennedy, M., & Corbett, J. (2020). Artificial intelligence for sustainability: Challenges, opportunities, and a research agenda [Article]. *International Journal of Information Management*, *53*, 13, Article 102104. https://doi.org/10.1016/j.ijinfomgt.2020.102104

Ribeiro, S. P., Menghinello, S., & Backer, K. D. (2010). The OECD ORBIS Database. https://doi.org/doi:https://doi.org/10.1787/5kmhds8mzj8w-en

Russell, S. J., Norvig, P., & Chang, M.-W. (2022). *Artificial intelligence : a modern approach* (Fourth edition. ed.). Pearson.

Santhosh, M. (2022). *21stCentury IP analytics: linking patent data to company data*.

Slaper, T. F., & Hall, T. J. (2011). The triple bottom line: What is it and how does it work. *Indiana business review*, *86*(1), 4-8.

Vinuesa, R., Azizpour, H., Leite, I., Balaam, M., Dignum, V., Domisch, S., Felländer, A., Langhans, S. D., Tegmark, M., & Fuso Nerini, F. (2020). The role of artificial intelligence in achieving the Sustainable Development Goals. *Nature communications*, *11*(1), 1-10.

WIPO. (2019). *WIPO Technology Trends 2019 – Artificial Intelligence*. https://www.wipo.int/publications/en/details.jsp?id=4386

Zhang, N., Deng, J., Ahmad, F., Draz, M. U., & Abid, N. (2022). The dynamic association between public environmental demands, government environmental governance, and green technology innovation in China: evidence from panel VAR model. *Environment, Development and Sustainability*. https://doi.org/10.1007/s10668-022-02463-8

APPENDIX

Appendix 1. *Artificial intelligence keyword allocation*

Symbols	Learning	Robotics
Natural language processing	Machine learning	Computer vision
Image grammars	Neural networks	Robot
Pattern recognition	Reinforcement learning	Robots
Image matching	Logic theorist	Robot systems
Symbolic reasoning	Bayesian belief networks	Robotics
Symbolic error analysis	Unsupervised learning	Robotic
Pattern analysis	Deep learning	Collaborative systems
Symbol processing	Knowledge representation and reasoning	Humanoid robotics
Physical symbol system	Crowdsourcing and human computation	Sensor network
Natural languages	Neuromorphic computing	Sensor networks
Pattern analysis	Decision- making	Sensor data fusion
Image alignment	Machine intelligence	Systems and control theory
Optimal search	Neural network	Layered control systems
Symbolic reasoning		

Symbolic error analysis

Appendix 2. AI patent search index

Keywords	CPC	IPC
artific intelligen, computation intelligen, neural network, neuralnetwork, bayes network, bayesiannetwork, chatbot, data mining, decision model, deep learning, deeplearning, genetic algorithm, inductive logic programm, machine learning, machinelearning, natural language generation, natural language processing, reinforcement learning, supervised learning, supervised training, supervisedlearning, swarm intelligen, swarmintelligen, unsupervised learning, unsupervised training, unsupervisedlearning, semi-supervised learning, semi-supervised training, semisupervised learning, semisupervised training, semi supervisedlearning, semisupervisedlearning, connectionis, expert system, transfer learning, transferlearning, learning algorithm, learning model, support vector machine, random forest, decision tree, gradient tree boosting, xgboost, adaboost, rankboost, logistic regression, stochastic gradient descent, multilayer perceptron, latent semantic analysis, latent dirichlet allocation, multi-agent system, hidden markov model, clustering, combinatorial explosion, comput creativity, deep blue, descriptive model, inductive reasoning, overfitting, predictive analytics, predictive model, target function, test data set, training data set, validation data set, backpropagation, self learning, selflearning, objective function, feature selection, embedding, active learning, regression model, stochastic approach, stochastic technique, stochastic method, stochastic algorithm, probabilist technique, probabilist approach, probabilist method, probabilist algorithm, recommend systemrobot, autonomous system, medical imag, healthcare, virtual assist, personali medic, precision medic, genomic screening, drug discover, medical diagnos, drug creation, medication manag, autonomous vehicle, transportation, driverless, smart car, smart cars, smart city, smart grid, automotive, agriculture, irrigation system, fintech, banking, finance, economics, text analysis, speech analysis, hand writing analysis, handwriting analysis, facial analysis, face, text analytic, speech analytic, hand writing analytic, handwriting analytic, facial analytic, face analytic, text recognition, speech recognition, hand writing recognition, handwriting recognition, facial recognition, face recognition, cybersecurity, predictive analysis, predictive analytic, predictive purchas, marketing analytic, video game	G10L13/00, G10L25/00, G10L99/00, G06F17/14, G06F17/153, G10H2250/005, G06F17/30, G06F17/50, G06Q, G06Q30/02, G06T7/00, G06T1/20	A61B5/00, A63F13/67, B23K31/00, B25J9/16, B29C65/00, B60W30/06, B60W30/10, B60W30/14, B62D15/02, B64G1/24, E21B41/00, F02D41/14, F03D7/04, F16H61/00, G01N29/44, G01N33/00, G01R31/28, G01R31/36, G01S7/41, G05B13/02, G05D1/00, G06E1/00, G06E3/00, G06F9/44, G06F11/14, G06F11/22, G06F15/00, G06F17/00, G06F19/00, G06G7/00, G06J1/00, G06K7/14, G06K9/00, G06N3/00, G06N5/00, G06N7/00, G06N99/00, G06T1/20, G06T1/40, G06T3/40, G06T7/00, G06T9/00, G08B29/18, G10L13/00, G10L15/00, G10L17/00, G10L25/00, G10L99/00, G11B20/10, G16H50/20, H01M8/04992, H02H1/00, H02P21/00, H02P23/00, H03H17/02, H04L12/24, H04L12/70, H04L12/751, H04L25/02, H04L25/03, H04N21/466, H04R25/00