EAEPE Special Session
A complexity perspective on innovation management and technological change

Aims and Scope

Innovation is a dynamic, complex phenomenon. Most scholars and practitioners would agree on that, and an empirical confirmation can be found in the recent dynamic reaction of innovation eco-systems to the COVID pandemic and to the transition towards circular economy, where companies are innovating their business models and supply chains. Innovation and technology development processes are actually evolving as complex adaptive systems, in which many diverse actors are leveraging their resources and capabilities and interacting with each other in a not linear way. Coevolving with the environment, these systems show the emergence of collective behaviors and patterns and self-organizational properties.

Exploring these complex aspects could be useful to better understand the mechanisms determining the role and impact of innovation and technological change both at individual (firm) and systemic (economy and society) level.

Despite the above, the use of complexity science in the field of innovation management is still very limited and, hence, it is not clear yet how studying innovation and technology development processes, such as real-world long-term technological change, with the lens of complexity science would help a better understanding of these systems overcoming the limitation of classical approaches.

Researchers in the field of innovation management could explore management systems, value and supply chains, organizational structures, and economies as systems with heterogeneous and interacting entities, and thus adopting complex systems approaches. In this regard, agent-based modelling and network theory can be employed to model and analyze the system behaviors, from the bottom-up, focusing on its microelements such as the agents, their attributes, actions, goals, and the network structure (and type of relationships) that connects them.

Furthermore, this modeling technique allow to build a computational laboratory where it is possible to perform experiments and the classical what -if analysis to explore the different dynamic.

ABM are not without limitations. In particular, it is worth mentioning the missing of standards in the development, calibration and validation of ABM in the scientific community.

This track is aimed at presenting and discussing current research that adopt the approach of complexity science and the related methodologies to investigate innovation and technology development processes and focusing on their organization, and evolution. The objective is to understand what the potential contributions of this approach are, whether it can provide insights for academic researchers and policymakers, and how it can be integrated with traditional approaches to achieve a more comprehensive and meaningful representation of innovation systems.

Special Session Scientific Relevance:

Complex adaptive systems (CASs) are systems made up of multiple and interconnected agents that emerge into coherent forms without any single entity deliberately managing the entire system (Holland, 1995). Organizations, supply chains, industrial districts, industrial symbiosis networks are framed as CASs, whose dynamics and behavior follow the CAS properties such as interconnectdness, adaptation at the edge of chaos, adaptive learning, resilience, co-evolution and emergence (Albino, Carbonara and Giannoccaro, 2006; Battistella and De Toni, 2018; Borrelli et al., 2005; Cannavacciuolo et al., 2017; Choi, Dooley, Rungtusanatham, 2001; Carbonara, Giannoccaro, McKelvey, 2010; Giannoccaro, 2015; Capaldo and Giannoccaro, 2015; Giannoccaro, Nair and Choi, 2017; Fraccascia, Giannoccaro and Albino, 2017; Chertow and Ehrenfeld, 2012; Albino, Fraccascia and Giannoccaro, 2016, Cincotti et al., 2003). In the last two decades, Agent-Based Modelling &Simulation (ABM&s) has been increasingly recognized not only as a suitable research approach to build theory and advance the understanding of CASs, but also as an adequate policy advice tool, particularly regarding issues such as regional or local systems of innovation (OECD, 2001; Albino et al., 2006; Axelrod, R., 1997, Bonabeau, E., 2002, Gilbert et al., 2001; Ponsiglione et al., 2018; Ponta et al., 2018, Squazzoni et al., 2002). In the era of big data, all the above-mentioned topics can be looked through new lenses, which help reduce their complexity. Social network analysis and text mining, as well as machine learning and simulation approaches, can be of great help for catching value by the high volume of data available to researchers.

CAS theoretical approach and related methodologies, as depicted above, can provide an adequate framework to study innovation systems from different points of view and at different scales, taking into consideration their complexity without reducing it, and supporting researchers, managers, and policy-makers in coping with contemporary challenges.

Invited Speakers

Stephan Leitner Associate Professor at University of Klagenfurt

Program

The special session will be organized in a workshop format where the topics will be discussed by the invited speakers and all the participants in very interactive session.

Organizers of Special Session

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