

The role of knowledge-based bioeconomy and bioclusters in the transition towards a more sustainable future

Editors:

Frans Hermans^{a)}, Milad Abbasiharofteh^{a)}, Aitziber Elola^{b)}, Suyash Jolly^{c)}, Teis Hansen^{c)}

a) IAMO: Leibniz Institute for Agricultural Development in Transition Economies, Halle (Saale), Germany

b) Orkestra - Basque Institute of Competitiveness, Donostia-San Sebastian, Spain

c) Department of Human Geography, Lund University, Sweden

Abstract

The knowledge-based bioeconomy and bioclusters have recently attracted a lot of attention as contemporary economic development encounters ‘limits to growth’ due to the scarcity of natural resources and increasing concerns about climate change (Meadows 1974; Pyka 2017; Bugge et al. 2016; Dabbert et al. 2017). In addition to the shift away from a fossil-based economy toward renewable energy, the bioeconomy promises to contribute to the creation of new economic opportunities – for instance, through new business formation and entrepreneurship, increased resource efficiency, energy independence, and employment creation in knowledge-based sectors related to biotechnology and genomics, plant breeding, and plant-based processing. The concept of the bioeconomy is therefore not only closely associated with goals of environmental sustainability and energy independence but also with innovation and the valorisation of scientific knowledge (European Commission, 2012). As such the knowledge-based bioeconomy facilitates and provides solutions for ‘*the sustainable production and conversion of biomass into a range of food, health, fibre, and industrial products and energy*’ (Saviotti, 2017, p.17).

Bioclusters, here defined as ‘a geographically proximate group of interconnected companies and associated organizations in the various fields of the bioeconomy’, are expected to play a key role in the development of the bioeconomy (Zechendorf, 2011) and as a result, the promotion of bioclusters often features prominently in the bioeconomy policies of many countries (Dietz, Börner, Förster, & Von Braun, 2018). However, the concept of what a bioeconomy cluster is and what roles it can play in the transition towards sustainability has so far remained unclear (Hermans, 2018).

First, notwithstanding an increasing number of contributions on bioeconomy, it still remains a challenge to empirically define the domain of bioeconomy and its fundamental technologies (Bugge et al. 2016). Accordingly, the same problem applies to the definition of bioclusters.

Second, while this field of research has been embedded in the extant literature on transition studies, there has been little cross-fertilization between bioeconomy research and transition studies (e.g., see Hermans 2018). Thus, future research has to study the impact and dynamics of technical innovation systems and apply a multi-level perspective in order to study the key driving forces of path creation and path breaking at the sectoral and regional levels.

Third, since one of the key drivers of transition is radical innovation (Dosi 1982), innovation and its fundamental components should be studied more rigorously in the context of bioclusters. This calls for integrating literature on regional and national innovation systems into the bioeconomy research on the one hand (Cooke et al. 1997; Lundvall et al. 2002), and investigating the impact of inter- and intra- bioclusters' knowledge networks on the innovativeness of bioclusters on the other hand (Bathelt et al. 2004).

Fourth, a lack of empirical evidence also calls for a wide array of comparative studies that contribute to the understanding of how bioclusters varies across different institutional and regional settings, transition phases, and compared to clusters dominated by other technologies.

For this session, we therefore invite conceptual and empirical contributions on the knowledge-driven bioeconomy and bioclusters, which study the bioeconomy and bioclusters, and their relations to sustainable development including but not limited to the following topics:

- theoretical or empirical definition and classification of bioclusters;
- multiscale analysis of biocluster development trajectories;
- path dependence, path breaking, and path creation in bioclusters;
- circular and industrial ecology approaches to biocluster development;
- localisation of production versus dependence on imports;
- environmental and social effects of bioclusters at different scales (trade-offs and tele-couplings)
- bioclusters and urban–rural sustainable development;
- driving forces of radical innovation in bioclusters;
- analysis of inter- and intra-bioclusters knowledge networks.

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