Axis Value Chains, Sustainability and Circular Bioeconomy

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Climate change is imposing new perspectives and constraints on industrial sectors with a high environmental impact. As the objectives of more rational use of resources and the closing of material and energy flows become increasingly prevalent, the adoption of a diversity of innovations calls for a renewal of methods for analyzing the productive system, and questions our development models (Touzard, 2017).

Ecological transition and sustainability as a line of sight for the mutation or construction of new economic value chains then appears as the main solution for orienting the current economic model towards a more sustainable industrial, agricultural, forestry and marine model (Gallaud and Laperche, 2016; Picard and Tanguy, 2017; Debref, 2018; Vernier, 2023, Innovations n°70, 54, 29). The notion of sustainability is widely debated in academic literature. This concept of sustainability plural and unstable. On the one hand, weak sustainability, using the tools of dominant economic theory, focuses on mitigating the negative effects of growth on the environment through green growth and the circular economy in its liberal version. Opposed to this, strong sustainability, widely explored by heterodox economics, considers that the transformation of social relations and the relationship with the environment must be called into question, insofar as economic, natural and social capital would be substitutable or complementary and not reducible to technical capital. Ecological transition implies taking into account the thermodynamics of socio-economic systems in the normative management of resources, and its multiple non-monetizable, even incommensurable dimensions (Vivien, 2007). In this sense, not only economic and technological, but also social and environmental dimensions are taken into account.

The vision of sustainability at institutional level corresponds to a conception of the economy as weakly sustainable, without any profound questioning of corporate strategies. Operationalizing the ecological transition from this perspective undoubtedly leads to rebound effects[1], which constitute a paradox of optimizing resource and process management with a view to sustainability, but which ultimately contributes directly or indirectly to overstepping the limits of the biosphere (Lewkowicz, 2009; Debref, 2021). In addition to the potential increase in greenhouse gases, water, air and soil pollution generated by intensified production,

[1] The rebound effects refer to the paradox of Jevons, a British economist who highlighted in 1865 that, in the case of coal, an improvement in the efficiency or energy effectiveness of processes could lead to increased demand for the resource, and thus to increased exploitation of this resource and consumption of the energy input (Daumas, 2020).

it is possible to list numerous other rebound effects such as increased energy expenditure and water consumption, the use of polluting inputs and the loss of biodiversity (Lewandoski, 2018).

With the environmental objective of replacing fossil carbon with renewable carbon, the bioeconomy is a central element of the ecological transition and a new hope for bringing our society into a post-oil era. It is a source of technological, organizational and social innovation (Uzunidis et al. 2021; Debref et al. 2022). The concept of the bioeconomy generally refers to the valorization of biomass, the biorefineries that enable it to be transformed, thanks in particular to biotechnological processes, and the bio-based products derived from it, and is thus based on the development of new bio-based industries (de Rouffignac et al., 2024 forthcoming; Pahun et al., 2018, JIEM n°38). At present, however, it has to be said that the vision of the bioeconomy being developed by European institutions is confined to a concept of weak sustainability with regard to the development of the biosourced chains on which it is based (Vivien et al., 2019). In fact, increased demand for biomass for existing and new uses, as well as the growth in volumes mobilized, reveal sensitive issues (environmental pressures, conflicts of use, social acceptability, ethical choices, etc.) attached to the mutations of these commodity chains, which can thus move away from a strong sustainability conception of the development of the bioeconomy (Delgoulet et al., 2015).

Thus, this axis proposes to develop reflections on the sustainability of industrial sectors, particularly in the context of the bioeconomy, on the interactions between stakeholders involved in its construction, and on the forms of technological, organizational and social innovation required, through 4 themes:

1- Ecological transition and circular bioeconomy

What are the contours and prospects of the ecological transition and the circular bioeconomy? Are they systematically ecological and circular? What are the controversies surrounding these concepts? How are these concepts operationalized and instrumentalized by the various players?

2- Analysis of industrial and/or bio-based processes

How can we explain the current revival of production chain analysis? What are its methodological and conceptual tools? What new value chains are emerging in the context of the bioeconomy? How are existing sectors changing?

3- Measuring the sustainability of biobased industries

How can we assess behavioral changes in design, production and consumption systems? What analytical tools and approaches should be used? What quantitative indicators and qualitative methods should be used? How can we consider the economic, social and environmental dimensions of bio-based supply chains in a holistic and integrated way?

4- Stakeholder strategies and innovation ecosystems in the context of the bioeconomy

How do stakeholders build strategies within the bioeconomy? How do players define common (or divergent) trajectories for the evolution of the production system? How do their relationships enable (or hinder) the creation of knowledge and innovation? How do bioeconomy innovation ecosystems is constructed and evolve?

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