

## Towards Sustainable Evolution of Bioeconomy: The Role of Technology and Innovation Management

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**Abstract :** The bioeconomy is an inter- and cross-disciplinary field covering a large number and wide scope of existing and emerging technologies. It has a great potential to contribute to the transformation process of industry landscape and ultimately drive the economy towards sustainability. However, bioeconomy per se is not necessarily sustainable and technology should be seen as an enabler rather than panacea to all our ecological, social and economic issues. Therefore, to draw and maximize benefits from bioeconomy in terms of sustainability, we propose that innovative activities should encompass not only novel technologies and bio-based new materials but also multifocal innovations. For multifocal innovation endeavors, innovation management plays a substantial role, as any innovation emerges in a complex iterative process where communication and knowledge exchange among relevant stake holders has a pivotal role. The knowledge generation and innovation are although at the core of transition towards a more sustainable bio-based economy, to date, there is a significant lack of concepts and models that approach bioeconomy from the innovation management approach. The aim of this paper is therefore two-fold. First, it inspects the role of transformative approach in the adaptation of bioeconomy that contributes to the environmental, ecological, social and economic sustainability. Second, it elaborates the importance of technology and innovation management as a tool for smooth, prompt and effective transition of firms to the bioeconomy. We conduct a qualitative literature study on the sustainability challenges that bioeconomy entails thus far using Science Citation Index and based on grey literature, as major economies e.g. EU, USA, China and Brazil have pledged to adopt bioeconomy and have released extensive publications on the topic. We will draw an example on the forest based business sector that is transforming towards the new green economy more rapidly as expected, although this sector has a long-established conventional business culture with consolidated and fully fledged industry. Based on our analysis we found that a successful transition to sustainable bioeconomy is conditioned on heterogenous and contested factors in terms of stakeholders, activities and modes of innovation. In addition, multifocal innovations occur when actors from interdisciplinary fields engage in intensive and continuous interaction where the focus of innovation is allocated to a field of mutually evolving socio-technical practices that correspond to the aims of the novel paradigm of transformative innovation policy. By adopting an integrated and systems approach as well as tapping into various innovation networks and joining global innovation clusters, firms have better chance of creating an entire new chain of value added products and services. This requires professionals that have certain capabilities and skills such as: foresight for future markets, ability to deal with complex issues, ability to guide responsible R&D, ability of strategic decision making, manage in-depth innovation systems analysis including value chain analysis. Policy makers, on the other hand, need to acknowledge the essential role of firms in the transformative innovation policy paradigm.

**Keywords :** bioeconomy, innovation and technology management, multifocal innovation, sustainability, transformative innovation policy

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