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Measuring the Contribution of the Bioeconomy: The Case of Colombia and Antioquia

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Abstract: This paper proposes a set of five indicators to monitor the bioeconomy in Colombia and Antioquia, one of the main regions of the country. The proposed indicators encompass the dimensions of sustainability and emphasize the role of knowledge and scientific research as driving forces of the bioeconomy strategies. To estimate the contribution of the bioeconomy to value added, employment, and greenhouse gas emissions, an input–output analysis is carried out. In addition, text mining analysis techniques are implemented to identify the research groups with an agenda related to bioeconomy fields. Our results reveal an important slot to foster the growth of a sustainable bioeconomy that enables local economies to achieve inclusive growth.

Keywords: knowledge-based bioeconomy; input-output analysis; sustainable development; bio-based industries; local strategies; Colombia

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1. Introduction

Society is facing global challenges that require urgent solutions to ensure social, economic, and ecological sustainability. Besides the current economic and social crisis raised by the outbreak of Covid-19, the expected population growth in 2050, the incidence of poverty, the climate change, the over-exploitation of natural resources, among other situations, obligate us to rethink the production model and the drivers of economic growth and social development, which have been based on fossil-fuel resources [1,2]. Therefore, it is imperative to use scientific knowledge and technological progress to seek production models that efficiently exploit and preserve natural resources. Accordingly, many countries have launched different strategies, such as green growth and circular economy as alternatives to pursuit sustainable, resilient, and inclusive economic growth. In this context, both policy and research debates coincide, in that in order to transit towards the green economy the incorporation of sustainable use of biodiversity and the development and strengthening knowledge-based value chains under the concept of bioeconomy is needed.

Bioeconomy has gained particular attention in recent years in the public policy agenda in several countries as an alternative to achieve the 2030 Agenda, its Sustainable Development Goals, and the Paris Agreement through the conversion of bio-based renewable resources into fibers, food, fuels, and chemicals. This has increased the interest in the development of a knowledge-based bioeconomy, mainly directed towards biotechnological advancement. However, bioeconomy is not necessarily a synonym for sustainability since there have been unintentional environmental and social impacts associated with it. In this context, several authors have analyzed the bioeconomy role in sustainability. Loiseau et al. [3] identified that the traditional concept of bioeconomy is more oriented