
Integrating social aspects into sustainability assessment of biobased industries: Towards a systemic approach

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Mrs. Parisa Rafiaani¹, Prof. Steven Van Passel², Prof. Philippe Lebailly³, Dr. Tom Kuppens⁴, Dr. Hossein Azadi⁵

¹Centre for Environmental Sciences, Hasselt University, Belgium/Economics and Rural Development, Gembloux Agro-Bio Tech, University of Liège, Belgium, ²Centre for Environmental Sciences, Hasselt University, Belgium/Department of Engineering Management, Antwerp University, Belgium, ³Economics and Rural Development, Gembloux Agro-Bio Tech, University of Liège, Belgium, ⁴Centre for Environmental Sciences, Hasselt University, ⁵Centre for Environmental Sciences, Hasselt University, Belgium/Economics and Rural Development, Gembloux Agro-Bio Tech, University of Liège, Belgium/Department of Geography, Ghent University, Belgium

Considering its potential impacts on development, biobased industries require to be assessed according to the positive and negative effects they can bring to the society. Typically, the implications of biobased industries are considered in terms of economic, environmental and technical indices while social factors are usually neglected in the majority of impact assessments. This is mainly due to the fact that social issues are not easy to be quantitatively analyzed, measured and monitored. Indeed, the following issues need to be addressed: (i) how the social dimension is understood from different stakeholders' perspective; (ii) how the social pillar can be properly integrated into sustainability evaluation methodologies which are mainly focused on environmental performance and (techno)-economic assessments of biobased industries. This review paper aims to answer these questions firstly through identifying the main social impacts and indicators of the biobased industries at local level in order to find an answer for the second question by analyzing and comparing the current methodologies for assessing social impacts in bioindustries. These methods mainly include Social Impact Assessment (SIA), Socio-economic Impacts Assessment (SEIA) and Social Life Cycle Analysis (SLCA). The latter, although is in its early steps of development, has been considered to have substantially promising methodological attributes for bioindustries' social sustainability assessment. Although ongoing research tackles the incorporation of the environmental dimension into extended techno-economic assessments, no integration of the social pillar into such assessments has been made. Given that, this review focuses on the social dimension for integrated sustainability assessments of biobased industries to assess the main social impacts resulting from each operation or from the bioenergy sector. The current review focuses on the importance of social sustainability indicators and evaluation techniques. By discussing the methodologies for evaluating social impacts, a systemic methodology for assessing and integrating the social dimension into the sustainability assessments of bioindustries is developed, considering the four main iterative steps of an SLCA framework and three useful SLCA-based approaches including Product Social Impact Assessment; Prosuite and the UNEP SETAC Guidelines for SLCA of Products. It is concluded that the term systemic analysis implies that the whole approach needs the capacity to understand different subsystems and relations between them. Accordingly, the systemic assessment of biobased technologies should simultaneously include technological, economic, social and environmental dimensions. The result of this study identifies social impacts in the bioeconomy and particularly highlight the importance of considering social issues in biobased industries' design and innovation.