Assessing Social Sustainability for Biofuels Supply Chains: The Case of Jet Biofuel in Brazil

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Abstract : Globally, the aviation sector is seeking for sustainable solutions to comply with the pressure to reduce greenhouse gas emissions. Jet fuels derived from biomass are generally perceived as a sustainable alternative compared with their fossil counterparts. However, the establishment of jet biofuels supply chains will have impacts on environment, economy, and society. While existing studies predominantly evaluated environmental impacts and techno-economic feasibility of jet biofuels, very few studies took the social / socioeconomic aspect into consideration. Therefore, this study aims to provide a focused evaluation of social sustainability for aviation biofuels with a supply chain perspective. Three potential jet biofuel supply chains based on different feedstocks, i.e. sugarcane, eucalyptus, and macauba were analyzed in the context of Brazil. The assessment of social sustainability is performed with a process-based approach combined with input-output analysis. Over the supply chains, a set of social sustainability issues including employment, working condition (occupational accident and wage level), labour right, education, equity, social development (GDP and trade balance) and food security were evaluated in a (semi)quantitative manner. The selection of these social issues is based on two criteria: (1) the issues are highly relevant and important to jet biofuel production; (2) methodologies are available for assessing these issues. The results show that the three jet biofuel supply chains lead to a differentiated level of social effects. The sugarcane-based supply chain creates the highest number of jobs whereas the biggest contributor of GDP turns out to be the macauba-based supply chain. In comparison, the eucalyptus-based supply chain stands out regarding working condition. It is also worth noting that biojet fuel supply chain with high level of social benefits could result in high level of social concerns (such as occupational accident, violation of labour right and trade imbalance). Further research is suggested to investigate the possible interactions between different social issues. In addition, the exploration of a wider range of social effects is needed to expand the comprehension of social sustainability for biofuel supply chains.

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