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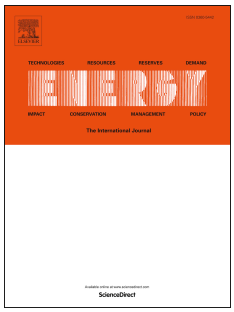

Modeling of China's cassava-based bioethanol supply chain operation and coordination

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Modeling of China's cassava-based bioethanol supply chain operation and coordination

Abstract: As a useful alternative to petroleum-based fuel, biofuels are playing an increasingly important role due to their economic, environmental, and social benefits. Cassava is viewed as an important and highly attractive nonedible feedstock for the production of biofuels. In this paper, a game-theoretic approach is proposed to explore decision behavior within a cassava-based bioethanol supply chain under the condition of yield uncertainty. In addition, a production cost sharing contract is proposed to overcome the double marginalization effect due to competition between supply chain players. With data from China's cassava-based bioethanol industry, the paper analyzes the effects of the farmer's capacity, risk aversion, yield uncertainty, the conversion ratio, the bioethanol's market price and ethanol plant's operation cost on optimal decisions within the supply chain and its overall performance. In addition, the effectiveness of the proposed production cost sharing contract is tested, and the results show that it can enhance the supply of cassava, increase the utility of the whole supply chain and reduce the level of greenhouse gas (GHG) emissions. The implications are set out for policy makers regarding how to promote the development of the biofuel industry, to guarantee the supply of feedstock, to reduce GHG emissions and to promote rural development.

Key words: Cassava; Bioethanol; Supply chain; Coordination; GHG emission