

MODELING CO2 EMISSIONS IN SOYBEAN TRANSPORTATION: A BRAZILIAN CASE STUDY WITH NETWORK EQUILIBRIUM

FERNANDO VINÍCIUS DA ROCHA
UNIVERSIDADE DE SÃO PAULO (USP)

JOSÉ EDUARDO HOLLER BRANCO
UNIVERSIDADE DE SÃO PAULO (USP)

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Introdução

Investing in transportation infrastructure is crucial for Brazil's economic development, especially for soybean exports. The current reliance on road transport increases costs and CO2 emissions. This study aims to assess the carbon footprint of soybean transportation using a Network Equilibrium Model, identifying high-emission regions and proposing solutions to reduce greenhouse gas emissions.

Contexto Investigado

Brazil is the world's largest soybean producer, requiring efficient transport to maintain competitive pricing. The high dependency on road transport leads to significant greenhouse gas emissions. This study investigates the carbon intensity of soybean transport within Brazil, focusing on the environmental impact and the need for sustainable logistics solutions.

Diagnóstico da Situação-Problema

The transportation sector in Brazil heavily relies on road transport, contributing to 35% of the nation's fossil fuel consumption and 48% of its greenhouse gas emissions. The inefficiency of the current transport system poses economic and environmental challenges, necessitating a shift to more sustainable modes like rail and waterways.

Intervenção Proposta

The study proposes utilizing a Network Equilibrium Model to optimize soybean transport flows, aiming to minimize total transportation costs and associated CO2 emissions. By integrating rail and waterway transport, the model seeks to identify key infrastructure projects that can significantly reduce the carbon footprint of soybean logistics.

Resultados Obtidos

The model revealed that soybean transportation in Brazil emits approximately 2744.54 million tonnes of CO2 annually, with road transport accounting for 81.7% of these emissions. The study identified Mato Grosso as a major emission contributor. Implementing multimodal transport solutions, including rail and waterways, can substantially lower emissions, enhancing both economic and environmental sustainability.

Contribuição Tecnológica-Social

This research provides a comprehensive assessment of the carbon footprint of soybean transportation in Brazil and proposes practical solutions to reduce emissions. By promoting sustainable transport infrastructure, the study contributes to the development of greener logistics practices, supporting global sustainability goals and enhancing the competitiveness of Brazilian soybeans in the international market.