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Cold Chain Distribution Path Optimization from the Perspective of Low-Carbon Multi-Factor

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ABSTRACT

This paper delves into the intricate relationship between costs and carbon dioxide emissions in the cold chain logistics distribution process. It meticulously examines various factors that influence these emissions, including the flexible (soft) and inflexible (hard) time windows at distribution points, the condition of distribution roads, and how these elements collectively impact the overall efficiency of the cold chain logistics network. Furthermore, the study incorporates an analysis of China's current carbon emission trading policy, evaluating its implications for the low-carbon cold chain logistics landscape in the country. To achieve this, a robust mathematical analysis model is developed, aiming to minimize the total distribution costs while addressing the environmental challenges posed by carbon emissions. By applying a sophisticated design scheme and fitting algorithms, the research reveals optimal solutions that demonstrate how the total costs associated with cold chain logistics extend beyond mere distribution expenses. Notably, it highlights the potential for significant cost reductions through the application of an enhanced genetic algorithm, validating the effectiveness of the proposed model and the improved algorithmic approach. This comprehensive exploration not only sheds light on cost management strategies in cold chain logistics but also emphasizes the critical need for environmentally sustainable practices within the sector.

Keywords: Low carbon, Cold Chain Logistics, Distribution Route Optimization, Genetic Algorithm