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DEVELOPING A TRANSPORTATION STRATEGY FOR LARGE-SCALE TOMATO HARVESTING MANAGEMENT

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ABSTRACT

This research introduces a mixed-integer programming model designed to enhance logistical coordination during the industrial tomato harvesting process. The system focuses on optimizing the daily routing and scheduling of transport vehicles that shuttle tomatoes from agricultural fields to processing facilities. A common challenge during peak harvest periods is the buildup of queues at key stages, i.e. loading at farms, quality sampling, and unloading at factories, leading to inefficiencies and product deterioration. By strategically allocating truck arrivals across both time and location, the proposed model aims to minimize congestion at these operational bottlenecks. Simulation results indicate a substantial decrease in queue lengths at all critical checkpoints, with notable improvements in throughput efficiency. Beyond operational cost savings, this approach improves workflow predictability and supports the preservation of tomato quality. The model is also adaptable to similar large-scale agricultural logistics systems.

KEYWORDS. Transportation logistics. Queue management. Harvest scheduling, Agro-industrial Supply Chain.

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