A bi-objective solution procedure to investigating tradeoffs between travel costs and quality losses during urban food deliveries

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Within food logistics, the characteristics of perishable items require special attention to deliver products on time and in the right quality to customers. To support related delivery processes, this work presents a bi-objective metaheuristic. It focuses on trade-offs between minimizing travel distances and food quality losses in urban store-based e-grocery deliveries. Varying temperature zones along delivery processes are integrated to calculate quality losses and derive optimal pickup times. Additionally, the procedure includes tailored neighbourhood operators, which consider and update current inventory levels at stores in the study area. This enables one to flexible decide where to pick up orders for subsequent shipments to customers. Results of computational experiments highlight the importance of integrating food quality functions in related optimization procedures. Additionally, the specific temperature ranges in stores, on board a vehicle and during loading activities majorly influence related food quality losses.