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Optimizing E-Commerce Profit By Integrating Order-to-Delivery Time Offers and Middle-Mile Consolidation Network Design

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In this work, we consider the problem of jointly selecting order-to-delivery time offers and designing a middle-mile consolidation network to maximize the profit of large e-commerce retailers. We embed order-to-delivery time-dependent sales volume predictions into a new mixed-integer program that simultaneously determines order-to-delivery time offers and consolidation plans to maximize sales revenue net fulfillment cost. To find high-quality solutions for large, practically-sized instances, we build an adaptive integer-programming-based local search. Results from a U.S.-based e-commerce partner show that incorporating customer purchase conversion rate estimation and order-to-delivery time offering into the consolidation network design can increase profit by over 15%. This work is joint with Lacy Greening, Jisoo Park, Alan Erera, and Benoit Montreuil.