

# An Optimisation Approach to Planning Micro-logistics Centers for On-demand Food Delivery Service with A Mixed Operational Model

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This work presents a comprehensive framework to assist on-demand meal delivery platforms with the decision-making of delivery model choice and the planning of the micro-logistics centers within a mixed operational model. We consider two prevalent delivery models: (a) the owner-operator model operating with independent contractors (IC); and (b) the company-vehicle model with micro-logistics centers (CV). These centers serve as the place to accommodate company-owned vehicles. Assuming platforms have operated with independent contractors for some time, we aim to determine the necessity of micro-logistics centers, indicating whether to maintain the IC model or adopt a hybrid approach, and optimize the planning of necessary centers. We propose a mixed integer optimization problem to minimize the total costs while considering the convenience for couriers. It combines strategic decisions for locating micro-logistics centers considering the dimensions of the centers (number, locations and vehicle stock) with operational considerations (the impact of couriers' distribution and shifts on repositioning company vehicles). For the CV model, two operational policies are considered: fixed coverage with return-to-origin requirement, and time-variant coverage with global redistribution considering the spatial-temporal variation of demand. Our findings suggest that diverse market conditions and operational approaches can lead to different strategies. We also applied the model for the city of Amsterdam, and it reveals that multiple centers are needed and the platform may invest in courier convenience by choosing center locations with great accessibility.

Link to the thesis: <http://resolver.tudelft.nl/uuid:d8ecbe1a-4370-48ca-94fa-ccc77831312e>