A lot-sizing model for catering service for high-speed railway with multiple-type food products and tight capacity restrictions facing time-dependent demands

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**Abstract**

Food catering, as an important part of rail passenger service, is to decide the locations of service stations and to control the inventory levels for food products on trains during their journeys. In this paper, a mixed integer programming (MIP) formulation based on a lot-sizing model is developed for establishing catering service for high-speed railway (CSHR) with multiple type of food products under limited refrigerated storage capacity on each train. The model also attempts to satisfy time-dependent demands that are highly affected by operating train timetables. A case study using 246 trains on the Beijing-Shanghai high-speedcorridor is finally implemented to demonstrate the applicability of our proposed model. It also shows that the proposed formulation can be solved efficiently by an off-the-shelf MIP solver.

## 1 Introduction

## 2 Problem statement



## 3 Model formulation

General upper bound constraints

Flow balance constraints

Capacity constraints

Demand satisfied constraints

Decision variables

## 4 Numerical example

## 5 Conclusions