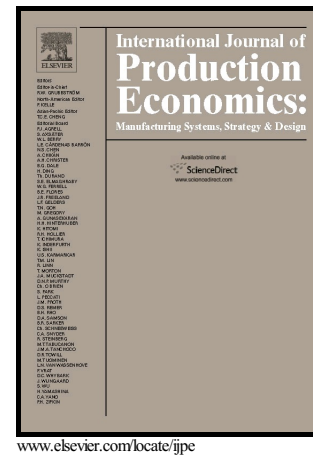


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Multi-period inventory routing problem under carbon emission regulations

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The page proof should be sent to the corresponding author.

Abstract

This paper analyzes the impacts of carbon emission regulations on the traditional inventory routing problem (IRP). We first present the traditional IRP model, which is an inbound commodity collection system consisting of one assembly plant and a set of geographically dispersed suppliers. At the beginning of each period, a fleet of capacitated identical vehicles depart the depot to pick up products from suppliers to meet the assembly plant's demand, which is deterministic and time-varying. We use fixed transportation cost, fuel consumption cost and inventory holding cost to evaluate the system's total cost, in which fuel consumption cost is determined by fuel consumption rate, distance and fuel price. Then we investigate the impacts of carbon emission regulations on the traditional IRP problem, wherein carbon emissions are generated by fuel consumption. A series of mixed integer nonlinear programming models are constructed and linearization methods are used. A hybrid genetic algorithm based on allocation first and routing second is proposed to find near-optimal solutions for these problems.

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