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循环取货下基于随机提前期波动压缩的库存优化模型

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Optimal inventory model with stochastic lead time and variance reduction for milk-run

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摘要 针对循环取货过程中提前期波动较大及其对企业成本的直接影响, 将总提前期方差增加为决策变量, 并把赶工成本概念引入随机提前期波动(方差)压缩分析, 建立了循环取货下基于随机提前期波动压缩且含车载量约束的多供应商多产品库存模型, 讨论如何合理压缩生产和运输过程中的提前期波动来降低总成本. 结果表明: 企业可以在提前期方差压缩成本与提前期方差过高所带来的库存持有成本和缺货成本之间进行权衡, 通过合理压缩总提前期方差, 有效降低系统总成本, 尤其在车载量小、集货物资单价高且需求量大的情况下成本降低更为显著.

关键词: 循环取货　随机提前期　方差压缩　库存　总成本

Abstract： Considering the large lead-time variance in milk-run processes and its direct effects on total system costs, this paper added total lead-time variance into decision variables and introduced crashing cost for lead-time variance reduction. First, a multi-supplier and multi-item inventory model for milk-run was proposed with stochastic lead-time variance reduction and vehicle capacity constraint, and then the optimal variance crashed level was studied for production and transportation lead-times aiming at reducing system costs. Results showed that properly crashing lead-time variance can effectively reduce system costs by balancing inventory cost plus penalty cost and crashing cost. The cost saving is more significant in cases of small load capacity or high-value items with large demand.

Key words： milk-run　stochastic lead time　variance reduction　inventory　total cost

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