MetaModeling and Optimizing a Reverse Logistics System

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Abstract

This paper shows how reverse logistics problems can be addressed using a hybrid approach that combines simulation-based metamodels and optimization approaches. Our proposed framework (1) identifies the critical reverse logistics input and output variables, (2) proceduralizes joint qualitative and quantitative analyses into a coherent model, and (3) integrates computer simulation and optimization. This integration enables academics and practicing managers to explore the problem context and enhance the effectiveness of decision making. This approach is illustrated on a reverse logistics system where regression metamodels from simulation are used in a goal programming model to minimize operational cost and waste while meeting throughput requirements.

Keywords: Reverse logistics, simulation, regression metamodel, goal programming, optimization.