

Stock Dependent Inventory Models under Parameter Uncertainty

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Abstract

We consider a robust optimization model of determining an optimal order policy for items with an inventory level-dependent demand rate where demand rate is modeled as a decreasing power function of inventory level. While the general form of power function is given, it is assumed that parameters defining the power function involve a certain degree of uncertainty and their possible values can be characterized by ellipsoids. We show that the robust optimization problem can be transformed into an equivalent convex optimization which can be solved efficiently and effectively. In addition, we propose a practical (improved) implementation of the model, where the stochastic characteristics of parameters are obtained from regression analysis on past sales and production data, and ellipsoidal representations of the parameter uncertainties are obtained based on a combined use of genetic algorithm and Monte Carlo simulation.

Keywords

Robust optimization, inventory level-dependent demand, inventory model, convex optimization

Biography

Sungmook Lim is an Associate Professor of Operations Management at Korea University's Department of Business Administration. He earned his Ph.D. from Seoul National University. His current research focus is on mathematical optimization and its broad range of applications, operations and productivity, and performance evaluation and benchmarking. He has published papers in journals such as European Journal of Operational Research, Journal of the Operational Research Society, OMEGA, Optimization Methods and Software, and others.