

Solving a novel inventory location model with stochastic constraints and (R,s,S) inventory control policy

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We solve a novel inventory-location model with a stochastic capacity constraint based on a periodic inventory control (ILM-PR) policy. The ILM-PR policy implies several changes with regard to other previous models proposed in the literature, which consider continuous review as their inventory policy. One of these changes is the inclusion of the undershoot concept, which has not been considered in previous ILM models in the literature. Based on our model, we are able to design a distribution network for a two-level supply chain, addressing both warehouse location and customer assignment decisions, whilst taking into consideration several aspects of inventory planning, in particular, evaluating the impact of the inventory control review period on the network configuration and system costs. Because the model is a very hard-to solve combinatorial nonlinear optimisation problem, we implemented two heuristics to solve it, namely, Tabu Search and Particle Swarm Optimisation. These approaches were tested over small instances in which they were able to find the optimal solution in just a few seconds. Because the model is a new one, a set of medium-size instances is provided that can be useful as a benchmark in future research. The heuristics showed a good convergence rate when applied to those instances. The results confirm that decision making over the inventory control policy has effects on the distribution network design. © 2013 Guillermo Cabrera et al.