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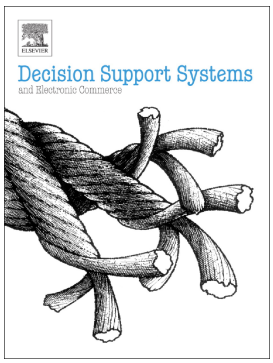

Decision support to product configuration considering component replenishment uncertainty: A stochastic programming approach

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Decision Support to Product Configuration Considering Component Replenishment Uncertainty: A Stochastic Programming Approach

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Abstract: Product configuration is to make decisions on component selections and combination to constitute a customized product under mass customization production. However, the uncertainties (such as component supplies) in product configuration setting are not considered in the existing product configurators. To handle the uncertainty in component replenishment lead-time, a new stochastic decision model is proposed in this paper using two-stage stochastic programming approach. Further, a pre-procuring strategy for component supply is employed to reduce total configuration costs and shorten the delivery date of customized products. The stochastic decision model for product configuration is solved by using Lagrangian relaxation algorithm. The effectiveness of the stochastic decision model is demonstrated through case studies from both computer configuration and ranger drilling machine configuration. Computational comparisons with a commercial solver (CPLEX) indicate that the proposed stochastic decision model provides competitive solution results.

Key words: product configuration decisions; stochastic programming; mass customization; Lagrangian relaxation

1 Introduction

Stimulated by growing demand for quick response to customer requirements and providing individualized products, an increasing number of manufacturers are transforming from mass production to mass customization (MC) production [1, 2]. Modular product design