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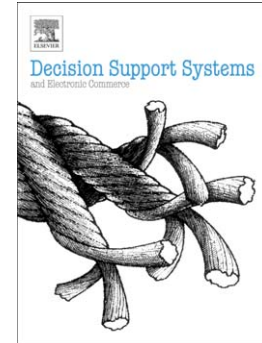
An Expanded Database Structure for a Class of Multi-period, Stochastic Mathematical Programming Models for Process industries

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**An Expanded Database Structure for a Class of Multi-period, Stochastic Mathematical
Programming Models for Process industries**

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Abstract

We introduce a multiple scenario, multiple period, optimization-based decision support system (DSS) for strategic planning in a process industry. The DSS is based on a two stage stochastic linear program (SLP) with recourse for strategic planning. The model can be used with little or no knowledge of Management Sciences. The model maximizes the expected contribution (to profit), subject to constraints of material balance, facility capacity, facility input, facility output, inventory balance constraints, and additional constraints for non-anticipativity. We describe the database structure for a SLP based DSS in contrast to the deterministic linear programming (LP) based DSS. In the second part of this paper, we compare a completely relational database structure with a hierarchical one using multiple criteria. We demonstrate that by using completely relational databases, the efficiency of model generation can be improved by 60% compared to hierarchical databases.

Keywords: Decision support system, process industries, optimization, stochastic programming (SLP), database structure, management science.

1. Introduction and Motivation

We introduce a user friendly, model data independent, model solver independent, stochastic optimization based DSS for strategic planning in a process industry. This research is an extension of earlier work by Dutta [12], and Dutta & Fourer [14, 24] where a multi-period optimization based DSS was developed for process industries. Fourer [24], in his seminal work, showed that the fundamental principles of relational database construction could be used to represent a linear program. This work

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