

Production and Distribution Network Planning Optimization: A Case Study of Large Cement Company

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Abstract : This paper describes the implementation of a large-scale SAS/OR model with significant pre-processing, scenario analysis, and post-processing work done using SAS. A large cement manufacturer with ten geographically distributed manufacturing plants for two variants of cement, around 400 warehouses serving as transshipment points, and several thousand distributor locations generating demand needed to optimize this multi-echelon, multi-modal transport supply chain separately for planning and allocation purposes. For monthly planning as well as daily allocation, the demand is deterministic. Rail and road networks connect any two points in this supply chain, creating tens of thousands of such connections. Constraints include the plant's production capacity, transportation capacity, and rail wagon batch size constraints. Each demand point has a minimum and maximum for shipments received. Price varies at demand locations due to local factors. A large mixed integer programming model built using proc OPTMODEL decides production at plants, demand fulfilled at each location, and the shipment route to demand locations to maximize the profit contribution. Using base SAS, we did significant pre-processing of data and created inputs for the optimization. Using outputs generated by OPTMODEL and other processing completed using base SAS, we generated several reports that went into their enterprise system and created tables for easy consumption of the optimization results by operations.

Keywords : production planning, mixed integer optimization, network model, network optimization

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