

Mixed Integer Programming for Multi-Tier Rebate with Discontinuous Cost Function

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Abstract : One challenge faced by procurement decision-maker during the acquisition process is how to compare similar products from different suppliers and allocate orders among different products or services. This work focuses on allocating orders among multiple suppliers considering rebate. The objective function is to minimize the total acquisition cost including purchasing cost and rebate benefit. Rebate benefit is complex and difficult to estimate at the ordering step. Rebate rules vary for different suppliers and usually change over time. In this work, we developed a system to collect the rebate policies, standardized the rebate policies and developed two-stage optimization models for ordering allocation. Rebate policy with multi-tiers is considered in modeling. The discontinuous cost function of rebate benefit is formulated for different scenarios. A piecewise linear function is used to approximate the discontinuous cost function of rebate benefit. And a Mixed Integer Programming (MIP) model is built for order allocation problem with multi-tier rebate. A case study is presented and it shows that our optimization model can reduce the total acquisition cost by considering rebate rules.

Keywords : discontinuous cost function, mixed integer programming, optimization, procurement, rebate

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