A material purchase Model under a Buyer’s Minimum-Commitment Quantity Contract

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Abstract

In this paper we develop a material purchase model for manufacturer to determine the key component order quantity under a buyer minimum-commitment quantity contract and shortage compensation policy. Under contract, the buyer is required to place his minimum-commitment quantity order at the beginning of period where his real demand is uncertain, and the manufacturer is also required to guarantee to supply the minimum-commitment quantity at the end of period. Besides, the manufacturer provides a shortage compensation policy to compensate the buyer for shortage due to his supply below a given level L which depends on the buyer’s minimum-commitment quantity. The upstream supplier gives the manufacturer a flexible supply quantity and offers a quota to place his rush order. Under above-mentioned scenario the shortages and inventories are divided into two types respectively. Shortages are categorized according to whether or not to pay shortage compensation. Inventories are classified into: (1) buyer responsibility; and (2) manufacturer responsibility. In this paper we formulate a material purchase model for determining the key component order quantity to maximize the manufacturer’s profit. Then we propose a solution procedure. Finally, examples are given to illustrate the solution procedure. We also perform the sensitivity analysis for management insights.

Keywords: Supply contract, Minimum-commitment, Newsboy problem.