Information and Management Sciences
Volume 11, Number 4, pp.31-44, 2000

Setup Cost Reduction in the Lumpy Demand Production Quantity Model with Discounting

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Abstract

Economic order quantity (EOQ) models were extended previously to include the option of investing in setup cost reduction with setup cost as a function of investment. Most of earlier research on this issue has assumed that the demand is continuous and smooth and that the discounting rate is zero. This paper extends the previous research in two directions. First, a production system, in which the manufacturer produces and supplies a fixed quantity of finished goods to outside buyers at a regular interval of time, with setup cost reduction is investigated. Second, both an initial capital expenditure and an ongoing operating cost incurred in setup cost reduction are considered and a present value analysis is applied to justify this investment. A production quantity model is proposed to derive the optimal production batch quantity and setup cost. Numerical examples along with sensitivity analysis for a logarithmic and a linear setup cost functions are presented to provide further insights of our model.

Keywords: Setup Cost, Production Quantity, Lumpy Demand, Discounting.