Optimal Investment and Lot-Sizing Policies for Improved Productivity and Quality

A. Gunasekaran, A.R. Korukonda, Ilkka Virtanen and Paavo Yli-Olli

Abstract

Productivity and quality are an integrated component of the operational strategy of any firm. An increase in productivity implicitly assumes an improvement in quality. The concept of dynamic process quality control and smaller lot-size production have been employed to eliminate defective items, to reduce the cycle time of a product and to improve quality and productivity. We present a mathematical model to establish the relationship between various parameters of productivity and quality. In addition, the proposed model is used to determine the optimal levels of productivity and quality parameters such as batch sizes, and investment in set-up and process control operations. The basic criterion considered for optimizing the level of such parameters is the minimization of total system cost. The proposed model relates productivity and quality to set-up reduction, queueing of batches, batch sizes, and drift rate reduction. We conclude with an example problem to illustrate the behaviour and application of the model.