Simultaneous determination of production and shipment decisions for a multi-product inventory system with a rework process

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Abstract

In a turbulent and highly competitive business environment, management always pursues options to reduce overall operating costs. The vendor-buyer integrated system has recently drawn attention from managers, because it can benefit both parties of the supply chain and it is suitable to be applied to a so-called intra-supply chain system within the present-day globalized enterprise. This study attempts to simultaneously determine production and shipment decisions for a multi-product vendor-buyer integrated inventory system with a rework process, wherein multiple products are fabricated in sequence by a single machine under a rotation cycle time policy. All defective items produced in regular production are assumed repairable, and are reworked right after the regular production ends. Finished goods of each product are transported to sales offices/customers after rework. A multi-delivery policy is applied, wherein a fixed quantity of n installments of the finished batch is delivered at fixed intervals during the delivery timeframe. Mathematical modeling and optimization techniques are used to help simultaneously determine the optimal production and shipment decisions that minimize the expected overall system costs. A numerical example is used to show the applicability of our research results.

Keywords: Multi-product inventory system; Vendor-buyer integrated system; Intra-supply chain; Common production cycle time; Rework

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