Integrating a cost reduction shipment plan into a single-producer multi-retailer system with rework

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SUMMARY

This study integrates a cost reduction shipment plan into a single-producer multi-retailer system with rework process. In a recent article, Chiu et al. [1] examined a single-producer multi-retailer integrated inventory model with a rework process. For the purpose of reducing the inventory holding cost, this study combines an alternative n+1 product distribution policy into their model. Under the proposed shipment plan, an extra (initial) delivery of finished items takes place during the production uptime to meet retailers’ product demands for the periods of producer’s uptime and reworking time. Upon completion of rework, multiple shipments will be delivered synchronously to m different retailers. The objectives are to find optimal production-shipment policy that minimizes the expected system cost for such a supply chains system, and demonstrate that the result of this study gives significant holding cost savings in comparison with Chiu et al.’s model [1]. With the help of a mathematical modeling and Hessian matrix equations, the optimal operating policy for the proposed model is derived. Through a numerical example, we demonstrate our model gives significant savings in stock holding cost for both the producer and retailers.

Key words: optimization, supply chains, production lot-size, multiple retailers, rework, multi-delivery

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