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Abstract

This paper develops a Vendor Managed Inventory (VMI) model for a two-level supply chain comprised of one vendor and several non-competing retailers in which both the raw material and the finished product have different deterioration rates. It is assumed that the market demand for the finished product is deterministic and price sensitive. The proposed inventory model optimizes the retail price, the replenishment frequency of raw material, the replenishment cycle of the product, and the production rate jointly with main objective of maximizing the total profit of the entire chain. In the development of the inventory model the Stackelberg approach is considered between the chain partners where the vendor is leader and the retailers are the followers. Moreover, the concavity of the profit functions is proven and based on this a solution algorithm is developed to find the optimal solutions. At the end, a numerical example is provided to illustrate the use of the production-inventory model and perform a sensitivity analysis. Finally, some conclusions and future research directions are proposed.

Keywords: Deteriorating Inventory, Pricing, Production, Supply Chain, Stackelberg approach.

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