

A multi-product pricing and inventory model with production rate proportional to power demand rate

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ABSTRACT

This paper deals with an economic lot size model when demand follows a power law and changes with time, owing to the fact that this kind of pattern is suitable for so many real situations. Production rate is presumed to be proportional to demand rate. Also since that demand is price sensitive in reality, we suppose that demand decreases linearly with price. With regard to these points, in this article a joint pricing and inventory model is presented where demand depends on time with a power pattern and price linearly, production rate changes pro rata with demand rate and multiple items are considered. The principal consideration of the study is to satisfy the demand and optimize the profit for all items in the system, simultaneously. Setup, holding, backlogging and production costs are involved in the inventory system. The aim is to maximize total profit function and achieve optimum values of scheduling period, reorder point and price. Employing mathematical modelling and optimization methods, the existence of the optimal solutions is proved, and then a simple heuristic algorithm is presented to maximize total inventory profit and determine the best values of variables. A numerical analysis is carried out to illustrate the applications of the proposed models.

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