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ORIGINAL PAPER

A Memory Dependent Partial Backlogging Inventory Model for Non Instantaneous Deteriorating Item with Stock Dependent Demand

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Abstract
In this paper we introduce a more generalized inventory model for deteriorating item where the memory effect is taken into consideration to analyze for generalization of our concept. Memory effect in inventory system is introduced here through the viable ideas of fractional calculus approach. Fractional Calculus has a proficiency through which we can signify the memory effect. Here a memory dependent inventory model for non instantaneous deterioration with stock dependent demand and partial backlogging is considered. Fractional order derivative and fractional order integration has been used to calculate holding cost, deterioration cost, backlogging cost, lost sale cost. Here the fractional order differentiation is introduced in terms of Caputo sense. The idea of memory kernel is considered to establish the memory dependent inventory model. Here the different type of costs, optimal ordering interval, minimized total average cost are calculated through both theoretical and numerical way. The memory effect is clearly justified by considering a numerical example. The order of the fractional derivative and integration is considered here as the memory index. Sensitivity analysis has also been presented to recognise the essential model parameter for various memory effected problem in different situation.

Keywords Fractional differential equation · Mittag-Leffler Function · Memory Kernel · Shortage · Backlogging

Mathematics Subject Classification 90B50 · 90C31 · 34A08 · 26A33

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An EOQ model for deteriorating item with continuous linear time dependent demand with trade of credit and replenishment time being demand dependent

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Abstract: This study is about an inventory model with continuous linear time dependent demand rate with constant rate of deterioration in the consideration of partial backorder including delay in payment and time period is demand dependent. Demand is the fundamental attribute for consideration of inventory related problem. In reality, there is some inter connection of demand function among various time interval for which the demand cannot change drastically at some critical point during the appearance of another state of system. Thus, it is quite natural that the demand function should be continuous in nature in inventory management problem. So, here the most prominent part of our present study is the consideration of time dependent continuous demand in the proposed model. A supportive numerical example of the proposed model is illustrated for insightful investigation. The solution method and sensitivity analysis has also been presented.

Keywords: inventory; deterioration; delay in payment; trade credit period; backlog dependent.