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Survey of Inventory Models with Inflation

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ABSTRACT

In the present paper we analyzed the literature review of inventory models under the environment of inflation. The present study provides an up to date review of inventory models under the environment of inflation.

KEYWORDS Inventory, Inflation.

INTRDUCTION:

In the inventory control theory it is assumed that all the costs associated with the inventory system remain constant over time. Because most of the decision makers think that the inflation does not have a significant influence on the inventory policy. Nowadays inflation has become a permanent feature in the inventory system. Thus the inflation plays a vital role in the inventory system and production management though the decision makers may face difficulties in arriving at answers related to decision making. At present, it is impossible to ignore the effects of inflation and it is necessary to consider the effects of inflation on the inventory system.

ANALYSIS:

Buzacott (1975) developed the first EOQ (Economic Order Quantity) model taking inflationary effects into account. In this model, a uniform inflation was assumed for all the associated costs and an expression for the EOQ was derived by minimizing the average annual cost. **Misra (1975-a, 1979)** investigated inventory systems under the effects of inflation. **Bierman** and **Thomas (1977)** suggested the inventory decision policy under inflationary conditions.Economic analysis of dynamic inventory models with non-stationary costs and demand was presented by **Hariga (1994)**. The effect of inflation was also considered in this analysis. An economic order quantity inventory model for deteriorating items was developed by **Bose et al. (1995)**. Authors developed inventory model with linear trend in demand allowing inventory shortages and backlogging. The effects of inflation and time-value of money were incorporated into the model. The inventory policy was discussed over a finite time-horizon with several reorder points. It was assumed that the goods in the inventory deteriorate over time at a constant rate. The results were discussed with a numerical example and sensitivity analysis of the optimal solution with respect to the parameters of the system was carried out. Several particular cases of the model were discussed in brief. Effects of inflation and time-value of money on an inventory model was discussed by **Hariga (1995)** with linearly increasing demand rate and shortages. **Hariga** and **Ben-Daya (1996)** then discussed the inventory replenishment problem over a fixed planning horizon for items with linearly time-varying demand under inflationary conditions. **Ray** and **Chaudhuri (1997)** developed a finite time-horizon deterministic economic order quantity inventory model with shortages, where the demand rate at any instant depends on the on-hand inventory at that instant. The effects of inflation and time value of money were taken into account. A generalized dynamic programming model for inventory items with Weibull distributed deterioration was proposed by **Chen (1998)**. The demand was assumed to be time-proportional, and the effects of inflation and time-value of money were taken into consideration. Shortages were allowed and partially backordered. The effects of inflation and time-value of money on an economic order quantity model have been discussed by **Moon** and **Lee (2000)**. Authors have considered the normal distribution as a product life cycle in addition to the exponential distribution. The two-warehouse inventory models for deteriorating items with constant demand rate under inflation were developed by **Yang (2004)**. The shortages were allowed and fully backlogged in the models. Some numerical examples for illustration were provided.**Chang (2004)** proposed an inventory model under a situation in which the supplier has provided a permissible delay in payments to the purchaser if the ordering quantity is greater than or equal to a predetermined quantity. Shortage was not allowed and the effect of the inflation rate, deterioration rate and delay in payments were discussed as well. Models for ameliorating / deteriorating items with time-varying demand pattern over a finite planning horizon were proposed by **Moon et al. (2005)**. The effects of inflation and time value of money were also taken into account. An inventory model for deteriorating items with stock-dependent consumption rate with shortages was produced by **Hou (2006)**. Model was developed under the effects of inflation and time discounting over a finite planning horizon. The results were discussed with a numerical example and particular cases of the model were discussed in brief. Sensitivity analysis of the optimal solution with respect to the parameters of the system was carried out. **Jolai et al. (2006)** presented an optimization framework to derive optimal production over a fixed planning horizon for items with a stock-dependent demand rate under inflationary conditions. Deterioration rate was taken as two parameter Weibull distribution function of time. Shortages in inventory were allowed with a constant backlogging rate. Two-warehouse partial backlogging inventory models for deteriorating items were discussed by **Yang (2006)**. The inflationary effect was considered in the models. Deterioration rates in both the warehouses were taken as constant. Some numerical examples for illustration were provided and sensitivity analysis on some parameters was made.**Jaggi et al. (2007)** presented the optimal inventory replenishment policy for deteriorating items under inflationary conditions using a discounted cash flow (DCF) approach over a finite time horizon. Shortages in inventory were allowed and completely backlogged and demand rate was assumed to be a function of inflation. Optimal solution for the proposed model was derived and the comprehensive sensitivity analysis has also been performed to observe the effects of deterioration and inflation on the optimal inventory replenishment policies. Two stage inventory problem over finite time horizon under inflation and time value of money was discussed by **Dey et al. (2008)**. **Chern, Yang, Teng, and Papachristos, (2008)** developed an inventory lot-size model for deteriorating items with partial

backlogging and time value of money. **Roy, Pal and Maiti, (2009)** developed a production inventory model with inflation and time value of money. Demand of the item was stock dependent and lifetime of the product was taken as random in nature with exponential distribution. Learning effect on production and setup cost was incorporated. In their study, model was formulated to maximize the expected profit during the whole planning horizon. **Yang, Teng,** and **Chern, (2010)** developed an economic order quantity model, in which shortages were allowed with partial backlogging. The effects of inflation and time value of money were taken into consideration. **Chang, C.T. (2011)** developed an inventory model for weibull deteriorating items with ramp-type demand rate and partial backlogging. **Wee et al. (2011)** determines an optimal replenishment cost of life analysis of deteriorating green products. **Cardenas-Barron (2011)** considered an inventory model with shortage and find out an approximate solution by using basic algebraic procedure. **Sarkar and Moon (2011)** extended the economic production quantity model in an imperfect production system. **Sett et al. (2012)** formulated a two warehouse inventory model for time varying deteriorating items and stock dependent demand rate. **Ahmad et al. (2013)** developed an inventory model with ramp-type demand rate, partial backlogging and general deterioration rate. **Cardenas et al.(2013)** determines an improved solution procedure of the replenishment policy for the EMQ model with rework and multiple shipments. **Sarkar and Majumder (2013)** developed an integrated vendor buyer supply chain inventory model with the reduction of vendors set up cost. **Cardenas et al. (2013)** derived two easy and improved algorithms to determine jointly the replenishment lot size and number of shipments for an EPQ model. **Karmakar, B. and Choudhuri, K.D. (2014)** developed an inventory model for deteriorating items with ramp-type demand rate, partial backlogging and time varying holding cost. **Sarkar et al. (2014)** developed an inventory model with trade credit policy and variable deterioration rate for fixed life time products. **Sarkar et al. (2014)** developed an EMQ model with price and time dependent demand under inflation. **Sarkar et al. (2015)** derived a continuous review manufacturing inventory model with set up cost reduction, quality improvement and a service level constraint. **Kumar et al. (2015)** developed a two warehouse partially backlogging inventory model for deteriorating items with ramp-type demand rate.

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