

# Abstract

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## **Inventory Control for a Joint Replenishment Problem with Stochastic Demand**

—Most papers model Joint Replenishment Problem (JRP) as a  $(r, Q)$  where  $r$  is a multiple value for a common review period  $T$ , and  $Q$  is a predefined order up to level. In general the  $(r, Q)$  policy is characterized by a long out of control period which requires a large amount of safety stock compared to the  $(T, S)$  policy. In this paper a probabilistic model is built where an item, call it item  $i$ , with the shortest order time between interval  $T_i$  is modeled under  $(r, Q)$  policy and its inventory is continuously reviewed, while the rest of items  $(j)$  are periodically reviewed at a definite time corresponding to item  $i$ . An order up to level policy for items  $(j)$  is applied in synchronization with item  $i$ . For the sake of inventory out of control period reduction for items  $i$ , an inventory review is done on the inventory position for items  $i$  one period before replenishment, at  $T_i - 1$  period. A lower control value  $S_i$  is determined using an iterative method, if the inventory position is above this value then an order is done at the  $T_i$  period, otherwise it is made at  $T_i - 1$  period. Another iterative method is used to find the optimum order up to level  $Q_i$  for this policy.