ABSTRACT

The inventory control is the function of directing the movement of goods through the entire manufacturing cycle from the requisitioning of raw materials to the inventory of finished goods in an orderly manner to meet the objectives of maximum customer service with minimum investment and efficient plant operation. The stock level of various items in the inventory is governed by various constraints such as limited warehouse space, limited budget available for inventory, degree of management attention towards individual items in the inventory, and customer service level. The objectives of inventory control is to reduce financial investment in inventories, to facilitate production operations, to avoid losses from inventory obsolescence and to improve customer service. The factors affecting inventory control are demand, number of items, time horizon, ordering cycle, lead time, safety stock and reorder level.

Effective inventory flow management in supply chains is one of the key factors for success. The challenge in managing inventory is to balance the supply of inventory with demand.
It is often difficult to determine the actual inventory costs of the inventory problem. In most of the real world situations the cost parameters, the objective functions and constraints of the decision makers are imprecise in nature. They fluctuate depending upon different aspects. So the inventory cost parameters such as unit cost, holding cost, setup cost and shortage cost are assumed to be flexible i.e. fuzzy in nature. Decision maker may change these quantities within some limits as per the demand of the situation. Hence these quantities may be assumed uncertain in non-stochastic sense but fuzzy in nature. In this situation, the inventory problem along with constraints can be developed with fuzzy set theory.

A multi-item inventory model with possible constraints like limited storage space, percentage of utilization of volume of the warehouse space, finite investment and allowable setup cost is developed with unit price under fuzzy environment. An inventory model minimizing the annual total cost is proposed to determine the optimal values of unit price, lot size and shortage level. Demand is assumed to be dependent on unit price. The unit price is considered to be vague and imprecise. The impreciseness in the unit price has been expressed by fuzzy linear membership functions. The nature of the parameters are considered as fuzzy to make the inventory model more realistic.
An inventory model with demand dependent unit cost and leading
time crashing cost dependent on lead time is also solved for optimal minimum
total cost with possible constraints where no shortages are allowed.

The methodology used to solve the proposed model in the present
research is Karush Kuhn-Tucker technique. The implementation of the model
is demonstrated using numerical example and the results are compared.
Finally conclusion remarks are given at the end to summarize the
contributions. A sensitivity analysis is performed by changing the values of
each of the parameters.

The present research focuses on the sensitivity of the optimal
solution to changes in the values of the different parameters associated with
the system based on the example under possible constraints.

The research work presents how far the output of the model is
affected by changes or errors in its input parameters based on the numerical
example.

It is inferred from the experimental results that Karush Kuhn-
Tucker technique can be applied to solve the inventory model with possible
constraints than any other method to optimize the solution under fuzzy unit
price.