CHAPTER 8

CONCLUSION AND FUTURE WORK

The present research work focuses on the optimal solution of the inventory model with demand dependent on unit price and leading time crashing cost depending on lead time. Then consideration is adopted as a multi-item inventory model where average annual total cost of the items are minimized and is formulated in fuzzy environment introducing fuzziness in the cost parameter namely the unit cost price. The models are illustrated with some numerical values for the inventory parameters and the results of the models with different parameters are compared. The sensitivity analysis is done for the changes in the unit cost, ordering quantity and annual total cost with respect to different values of the parameter $\beta$.

Non-linear Programming is a mathematical technique for determining the optimal solutions to many business problems. In a non-linear programming, either the objective function is non-linear, or one or more constraints have non-linear relationship or both. A linear programming problem can be easily solved by simplex method or its variations. The optimum solution lies at one of the extreme points of the convex feasible region. But in a non-linear programming problem (NLPP), the optimum solution can be found anywhere on the boundary of the feasible region and even at some interior point of it. Inspite of the substantial advancement in the solution methods of NLPP in recent years, an efficient simplex-like technique for a general NLPP is yet to be found. Some available techniques for solving
some special cases of general NLPP are graphical solution method, Karush Kuhn-Tucker conditions method, geometric programming method etc.

An analytical solution of the inventory model is derived using simple technique called Karush Kuhn-Tucker conditions approach. The objective is to minimize the total annual cost function based on the values of demand rate, rate of production, unit cost, inventory carrying cost and order quantity.

The results from the research consists of the optimal values of the unit price, lot size, shortage level, lead time, demand that minimizes the annual total cost is obtained by varying the parameters under possible constraints like limited storage space, percentage of utilization of volume of the warehouse space, finite amount of investment and allowable setup cost. The effect of the parameters on the decision variables and the objective function is explained through graphical representation.

Fuzzy mathematical programming has been applied to several fields like project network, reliability optimization, transportation, media selection for advertising, air pollution regulation problems formulated in fuzzy environments. Developed models are non-linear and one of its parameters is considered as fuzzy one.

**FUTURE WORK**

The present analysis can be easily extended to other type of inventory models with finite replenishment, full or partially backlogged shortages, fixed time horizon etc. In future research some assumptions about demand distribution and warehouse can be assumed. Other methods can also be used in solving to optimize the objective function and the result can be compared with this method. It can also be extended to any number of items.
The model could, in the future, be extended to cover more membership functions than the linear membership function. In addition, different case studies that give rise to a systematic way of obtaining the membership functions could be considered.

Fuzzy geometric programming technique can also be applied to this model for improvement of the value of average annual total cost. Parameters like demand, lot size and lead time can also be fuzzified.