Chapter 10 Conclusion and Future Work

10.1 Conclusions

The science of inventory management has gradually developed, not because the theories have improved but because requirements have changed a lot over time. No longer is inventory management a single problem but it is integrated into the whole of logistics of supply. The whole study has been done in, as every problem has been formulated keeping this fact in mind. Although in our study, we have used a modified version of the approach, as we have also incorporated the effects of trade credits in our work.

(i) We deal with the concept of an inventory model having two warehouses. An inventory control model for decaying items with stock dependent demand under trade credits has been developed. For both warehouses deterioration rate is taken as different. It is taken as time dependent in owned warehouse (OW) and it follows a two parameter Weibull distribution in rented warehouse (RW). Shortages are allowed and partially backlogged. Due to different facilities and storage environment, inventory holding cost was considered to be different in different warehouses.

(ii) We have developed an inventory control production model for time dependent deteriorating items under the condition of linear trend in demand and also, deterioration rate at any item follow three parameter Weibull distribution function of time. This deterioration rate is suitable for items with and without life-period. In this model, shortages are allowed with partial backlogging. In this study, the production rate is taken as decision variable and unit production cost is assumed as a function of the production rate. To get the expression of the profit function, the profit maximization technique is used.

(iii) Next, we have considered an inventory model for deteriorating items with linearly time dependent demand rate and lost sales under inflation. It is assumed that the supplier offers a trade-credit period to the retailer. We allow for shortages and time dependent backlogging rate is considered. We use numerical examples to illustrate the model with sensitivity analysis.

(iv) In most of the research, demand is considered either constant or a function of single variable which is not practical, since selling price and inventory level consequently may affect the
customers’ purchasing demands so it is more realistic to propose a partial backlogging inventory model for decaying items considering stock and selling price dependent demand rate in fuzzy environment. Also demand rate, ordering cost, purchasing cost, holding cost, backordering cost and opportunity cost are considered as triangular fuzzy numbers. Graded mean integration representation method is used for defuzzification.

(v) We have developed a model for reduction in the selling price when the capacity of OW is limited and RW is used, if needed. The demand rate is fixed up to time and after time the demand rate $d_2$ dependent on its reduction rate. The demand rate has an exponential trend that can be estimated/fitted using a curve fitting method. The cost minimization technique is used in this study. All possible cases of the model with the facility of allowable delay in payment are formulated and then numerically illustrated.

(vi) In the classical inventory models, the demand rate is regularly assumed to be either constant or time-dependent, but independent of the stock levels. Since the demand rate is not only influenced by stock level, but also is associated with the selling price. Therefore, we also take into account the selling price and we have developed an EPQ model, in which the demand rate is a function of the selling price. The time dependent rate of deterioration is taken into consideration and demand rate is price dependent. With today’s highly competitive market, afford the cost of warehouses is a very difficult task for the management in most of the countries. So, it is economical to order the inventory according to available storage space. This problem is developed with the concept of space restriction in which demand is exponential, and deterioration is time dependent. Production is taken as a function of demand. All the numerical data obtained has been graphically represented.

10.2 Scope for Future Work

This work provides ample scope for further research and exploration. For instance, we have considered dynamic but deterministic rates wherever required. The study has attempted to contribute in understanding the application of the techniques in inventory control by developing models, which are closer to reality. All these works can be further developed by considering a probabilistic frame of reference. In probabilistic frame demand is not pre known, which can bring the study closer to reality. There is ample range of different assumptions that can be imbibed in the present study to come up with better models, which can help to develop the theory further.
Although many different kinds of rates have been experimented with, even then, there are a number of different functions available, which can be used to approximate the demand for any kind of inventory. These functions along with other newer ideas and ideology can be combined to form different fields of study. The scope of this study is tremendous considering the range of models that have been studied and developed which bring the theory of inventory control closer to understanding reality.