CHAPTER 8

CONCLUSION AND FUTURE WORK

Though the inventories are essential and provide an alternative to production/purchase in the future, it also locks up assets of the enterprise. Thus, excess inventories are unwanted. Also, lack of inventories troubles the business. This calls for controlling the inventories in the most profitable way.

Control and upholding of inventories are essential for the associations mixed up in a supply chains as it helps to realize the highest level of buyer service and enhance the success of production leading to reduction in the cost.

Different mathematical models are developed using a process which systematically considers all the characteristic of the inventories. In this thesis, we have built a variety of inventory models under different backdrop to suggest the optimal inventory control decisions which can be enacted by different set of assumptions.

In this thesis, we have considered an integrated inventory model consisting of the single vendor and the single buyer in a supply chain system. The primary purpose of this thesis is supported for non-defective items and defective items under the investment for quality improvement.

In today’s aggressive business world, companies need small lead times, low costs and high customer service level for survival. As a result, companies have become more sensitive towards customer. Companies have been putting major effort to reduce their lead time.

In this thesis, chapter 3 focused on single vendor and single buyer integrated inventory model for both non-defective items and defective
items with quality improvement and negative exponential lead time crashing cost.

Two echelon supply chain inventory model is developed in chapter 4 with controllable lead time. In this model, we have contemplated an exponential lead time crashing cost for non-defective items in a single vendor and a single buyer.

Instead of non-defective items in chapter 4, we have considered defective items with an extension of investment for quality improvement in a single vendor and a single buyer integrated inventory model in chapter 5.

Setup cost and ordering cost is the main stream of inventory system. In chapter 6 we have developed an integrated inventory model with setup cost reduction and quality improvement for both non-defective items and defective items in a single vendor and a single buyer supply chain system.

As several authors proposed on either setup cost or ordering cost reduction in an integrated model in the supply chain system, in chapter 7 we have constructed the model, by reducing both setup and ordering cost for the single vendor and the single buyer integrated inventory model in which the demand during the lead time follows a normal distribution under a supply chain system. Therefore, especially this chapter aims to fulfill this extraordinary gap in the present literature.

In this thesis, process quality, setup cost and ordering cost are assumed to be a logarithmic function. An integrated total cost per unit time is mathematically derived for each model. A solution procedure is proposed and a relevant algorithm is presented based on the procedure to find the optimal solution such that the integrated total cost is minimized.
Numerical examples and sensitivity analysis along with graphical representations are given to illustrate the application and performance of the proposed model.

Solutions to all numerical examples are obtained by using Matlab 2008 software. This thesis attempted to determine order quantity, lead time, process quality and the number of deliveries of the two echelon supply chain system for each production runs with the objective of minimizing the integrated total cost.

We hope that this thesis will contribute to the ongoing investigation in the field of Operations Research and Management Sciences by incorporating various realistic factors and environments.

There are several potential extensions of this work that can constitute future research related to this field.

One immediate probable extension could be to discuss the effect of inflation and the time value of money. Another major extension of this work may be conducted by considering the vendor’s provision of a permissible delay in payments in this integrated inventory model.

An additional possible extension of this thesis may be conducted by considering a periodic review policy. In future research it would be interesting to extend this model to incorporate the influence of the vendor on the lead time.

One more possible extension can be examined by considering the deterioration of the items in the integrated inventory model. Finally, it would be interesting for future work to study the effects of item decay allowing backorders in an integrated supply chain context.

This thesis can be extended by assimilating generalized investment functions to reduce the ordering cost/setup costs and the lead time. For example, those cost and lead time can be reduced by using power
investment functions, ordering cost reduction act dependently on the lead time and setup cost reduction under a limited capital budget in inventory system.

A fruitful research can be done by assuming a discrete investment to reduce vendor’s setup cost/buyer’s ordering cost instead of continuous investment and also we have planned to work by considering polynomial lead time crashing cost, price sensitive demand and environmental sensitive demand in non-defective items and defective items.

Many researchers focused on either setup cost or ordering cost in single vendor and single buyer model under the normal distribution as well as distribution free cases. So this thesis can be further extended by considering both the setup and ordering cost reduction under distribution free case for integrated inventory model.

Furthermore, some of parameter of the model may be either fuzzy logic stochastic demand or fuzzy random variable in inventory models and uncertainty theory and the mixture of normal distribution and the distribution free integrated inventory model etc, can also be added for further extension.

In our future research, we plan to construct multi-echelon supply chains (more than two layers) under same/different assumptions considered in the proposed model. Therefore, attempt has been taken by the authors to fill up this incredible gap in the inventory literature.