ABSTRACT

Inventory is an aid/resources such as raw materials, spare parts, work in process and finished goods that are owned by a business for the purpose of being sold to a customer. Inventory Management is a key concern of all business. An Inventory Problem has a major concern in making decisions that minimize the total cost or maximize the total profit. These decisive factors of this thesis are to optimize inventory decisions with minimizing system costs.

In a real environment, it is observed that a vendor may not be able to deliver the products ordered by the buyer due to some factors such as defectiveness, deterioration, obsolescence and so on. As this situation is common for all the consumable goods, this can’t be evaded in the inventory system.

In this direction, the thesis is confined to defective products. Lead time is comprised of many controllable components such as run time, setup time, waiting time, moving time and lot size inspection time. The reduction of lead time by an additional crashing cost is concentrated. The focus of the thesis is to reduce the ordering cost, setup cost and process quality by considering the capital investment as a logarithmic function negative exponential, exponential and piecewise linear function in a single vendor and a single buyer environment.

The third chapter is directed to lead time reduction in an inventory system dealing both non-defective items and defective items. The cost of the integrated model is minimized by considering a negative exponential lead time crashing cost. In the next two chapters, integrated models are developed by considering an exponential lead time crashing cost function for non-defective items and defective items respectively.
The focus of the last two chapters is to reduce the lead time by investing an additional amount which is assumed to be a piecewise linear function. Through, lead time reduction has beneficiary research work in thesis. Therefore, we have moved on to the setup cost reduction and ordering cost reduction. Due to this fact, we have worked out an integrated inventory model with setup cost reduction and quality improvement for non-defective items and defective items. We have framed that both setup and ordering cost can be reduced using additional investment under various environment.

Later, we tend to found that reducing setup cost higher than doesn’t given an excellent impact within the integrated inventory model. This impact induced us to reduce the ordering cost at equivalent time. At last we have contrived the joint optimizing inventory model with stochastic demand and controllable lead time by reducing ordering cost and setup cost, which could be more beneficiary to this integration system.

An algorithm is developed to find the optimal solution. The objective of this study is to seek the optimal the order quantity, lead time, process quality, setup cost, ordering cost and numbers of deliveries in a single vendor and a single buyer inventory system.

The optimal values are obtained which minimize the integrated total cost per unit time. A simple and classical differential calculus optimization technique is being adopted to find the optimal solutions of the models. Numerical examples are solved by Matlab 2008 software.

Sensitivity analysis of the optimal solution with respect to major parameters is carried out and managerial implications are also incorporated. Graphical representation is presented to show the convexity of the integrated total cost. A pictorial representation of the algorithm procedure is represented by a flowchart.