We have studied various inventory models, periodic review and continuous review, for single item. Time dependent demand, stock dependent demand, stock and time dependent demand, stock, time and selling price dependent demand are considered in these models. The idea of cost minimization and profit maximization has been done in our models. Some researches like Lau and Wang [58] estimated the distribution of lead time demand. Some authors assumed that the lead time demand follows normal distribution. But in real life the lead time demand may follow any distribution. Its nature cannot be predicted. Hence in our thesis we have taken the lead time demand as distribution free. We have applied the mini-max distribution free procedure to minimize expected annual cost. Existing research articles in the literature focused either setup cost reduction or lead time reduction. But in the proposed models in this thesis, we have reduced both setup cost and lead time.

In our daily life we have observed that some manufacturers send lesser quantity than the order placed. That is, the yield is a random variable in one of our proposed models and we have reduced yield variability also. Concepts like partial backlogging of stock out items, deterioration of items, permissible delay in payments, backorder price discounts and inflation have been dealt with. We assumed that backorder ratio depends on the amount of price discount from a supplier which is very common in our day to day life. Our models have been compared with existing models in the literature and cost savings per unit in our
proposed models are clearly shown. The scenario of a supply chain with a single vendor, a single buyer for a single product is considered. The gap between the vendor and the supplier is bridged through credit period mechanism and order cost reduction. A situation which involves two echelon systems for differential items, different natures of demand at primary and secondary shop, is also addressed.

Setup cost can be reduced by starting a business where raw materials, skilled laborers are plenty. A firm can apply a variety of means to reduce lead time such as constructing many regional manufacturing centers. Modern production technology can improve the production process and amount of yield. To reduce the yield variability the manufacturers can purchase the raw materials in large quantities during the season and process them for non-seasonal requirement. In order to minimize total annual inventory cost, the retailer should improve the backlogging rate. The retailer can also minimize his total annual inventory cost if he gets longer permissible delay period from the supplier. By offering price discounts the supplier can secure more backorders with no loss and in fact with less cost. A supplier can get more back orders by offering higher price discounts. The supplier can earn more profit by getting more orders. Prices of the commodities increase due to the effect of the inflation. So we come to know that if rate of inflation is higher, the trader should order a lesser quantity to get more profit. The efficient management in a supply chain can be achieved through better coordination and more cooperation between the vendor and buyer. Credit period offer from the vendor is an effective mechanism for the buyer vendor coordination.
There are many inventory models regarding single item. Very few models have been developed for multiple items. We too have the inclination to consider multiple products in future. Time dependent deterioration rate, non-instantaneous deterioration, multi item inventory models and multi channel supply chain are also in our consideration for future study.