Abstract

The fastest growing technologies, mathematical tools and softwares consistently make decision making problem (indeed inventory control problem, also) relatively easier. On the other side, technologies such as mobile phone, telephone, internet, digital sources of advertisement, etc. significantly influence the customers' modality, stimulate rivalry among enterprises. Consequently, the nature of key parameters of inventory problem changes rapidly. Thus, the complexity of inventory modeling problem has increased in recent years. The forecasting process depends upon previous data records and information, but in real life it rarely happens that data records carry full information. On the other side, impreciseness may present in past data records and information. Thus, information encoding inherent both linguistic impreciseness and random uncertainty. Hence, solely consideration of randomness or fuzziness is not very compatible. Though in this thesis, we developed a fuzzy EOQ model, but our main concentration is to deal with some fuzzy stochastic models in which fuzziness and randomness occur simultaneously.

Demand is the vitality of inventory control system. So, it is desirable to emphasize on demand pattern when modeling an inventory problem. Demand trend of seasonal or fashionable items have a specific tendency. It fluctuates over time. The fluctuations may come due to price, stock, etc. The random fluctuation as well as impreciseness in demand is also inclusive. However, multifariousness in demand pattern has been noticed. In this thesis, we consider ramp-type time dependent, fuzzy variable, random variable or fuzzy random variable demand rate. The production process does not grant the consistency without failure of machine. Moreover, failure time may not be prescribed by any constant or random variable. Similarly, the received lot size may not be cent percent perfect. Randomness as well as fuzziness may inherent in the fraction of imperfect quality items. Thus, we considered these factors of inventory system as fuzzy random variable. To handle the proposed inventory problems, many methodologies have been developed in order to optimize the operating policy. Accordingly, we use several mathematical tools such as fuzzy expectation, fuzzy mathematical programming, imprecise constraints, fuzzy random renewal rewards theorem, singed distance, GMIR, possibilistic mean, etc. as per requirement.

Keywords: Inventory control, Supply chain, Ramp-type demand, Demand uncertainty, Impreciseness, Deterioration, Minmax distribution free procedure, Single-vendor, Single-buyer, Imperfect quality, Process shifting, Learning effect, Fuzzy random variable, Fuzzy renewal reward theorem, Signed distance, GMIR, Fuzzy mathematical programming, Possibility/ Necessity constraints.