

ABSTRACT

The first step towards developing a suitable decision for any given decision making problem is to develop a mathematical framework representing it. For this purpose, it is essential to acquire as much information as possible and to quantify this information to a mathematically usable form. In this process, the main difficulty is that the information regarding some or all the parameters involved in the decision may not be known with both precision and certainty. The literature mainly offers two different ways for tackling this problem. Imprecision or fuzziness of the acquired information is dealt with fuzzy set theory whereas uncertainty or randomness is dealt with the theory of probability. The majority of work done in various decision making problems is restricted to one of these concepts. But in real life coexistence of uncertainty and imprecision is a very common phenomenon. So to build truly realistic representations of real life decision making problems, the two approaches should be combined. The same arguments hold true for Inventory Management or Inventory Control problems as well. The principal objective of this thesis, therefore, is to explore the applicability of this fuzzy random framework in developing realistic inventory models.

Now there are numerous inventory models that have been developed over the years to represent various inventory situations that occur in real life. Among these, some of the most widely implemented models are the review systems and the single period models. Review systems, employed in almost all kinds of business, especially play an important role in the supply chain framework, while the single period model finds use in business involving fashion products, sports items, apparels etc. Thus keeping their wide applicability in real life inventory situations, special emphasis has been given to these two types of inventory models in this thesis. The principal features of the models discussed in the thesis are as follows:

- Application of fuzzy random variable to inventory models with special emphasis on representing customer demand information
- Methodology and analysis of the following inventory problems:
 - Single period problem and its extension to resalable returns
 - Continuous review system and its extension to setup cost reduction and quality improvement
 - Periodic review system with constant and variable lead-time

KEYWORDS

Inventory management ◦ Imprecision ◦ Uncertainty ◦ Fuzzy random variable ◦ Periodic review ◦ Continuous review ◦ Single period problem ◦ Resalable returns ◦ Fuzzy inequality ◦ Imprecise chance constraint

