Abstract

Over the last three decades mathematical realization of control and management of inventory systems has been gaining more and more interests among the Operations Research methodologists. To tackle the uncertainty factors in inventory modeling, probabilistic representations of parameters and approaches have been received attention. Recently, in accordance with the advancements of the theory of fuzzy sets and applications, fuzzy inventory related models have also been discussed. But there remains much more scope in developing more realistic inventory models in mixed imprecise and uncertain environment assigning proper stress to the nature of attributes and relationship present in the situation – if imprecision or vagueness is to be tackled, fuzzy sets will be used and to tackle uncertain parameter random variable will be used simultaneously.

The investigations present in this thesis boardly pertain to study of inventory problems in imprecise and/or uncertain environments. In this thesis, we have studied mainly two types of inventory models – single period inventory model and continuous review inventory model. Initially in the thesis we consider the models in fuzzy environment with various context such as multi-item phenomenon, product substitution, reordering opportunities, etc. And in the next few chapters we develop techniques that justifiably amalgamate fuzziness and randomness in modeling and analysis of inventory systems in one model.

Keywords: Single period inventory, Profit maximization, Multi-item, Product substitution, Reordering opportunity, Continuous review inventory, Lead-time, Cost minimization, Customer demand, Triangular fuzzy number, Fuzzy random variable, Fuzzy expectation, Interval-valued expectation, Possibilistic mean value, Graded mean integration representation.