

Preface

Decision making is the process of identifying and choosing alternatives based on the values and preferences of the decision maker. Decision making is also the process of sufficiently reducing uncertainty and doubts about alternatives to allow a reasonable choice to be made from among them. Optimization is a kind of decision making in which decisions have to be taken to optimize one or more objectives under some prescribed set of circumstances. The optimization model under the consideration of linear objective function and linear constraints becomes a linear programming model.

Over the past several decades linear programming models have been primarily developed in a deterministic, crisp environment. In such models the objectives and constraints are formulated in a ‘hard’ crisp manner leaving no scope for uncertainty and vagueness. Any linear programming model representing real-world situations involves a lot of parameters whose values are assigned by experts. However, both experts and decision makers frequently do not precisely know the value of these parameters. In such situations, it is practical to develop linear programming models of the realistic problem in a fuzzy environment and the linear programming problem under consideration becomes a fuzzy linear programming problem.

In the past few years, different methods have been proposed to find the fuzzy optimal solution of fully fuzzy linear programming problems in which all the parameters and decision variables are represented by nonnegative fuzzy numbers.

However, very few methods have been proposed to find the fuzzy optimal solution of such fully fuzzy linear programming problems in which all the parameters and/or decision variables are represented by unrestricted fuzzy numbers. The aim of this book is to present the existing methods for solving such fully fuzzy linear programming problems at one place in which some or all the parameters and/or variables are represented by unrestricted fuzzy numbers. This book presents the preliminaries, fundamentals, and methods to find the optimal solution, optimality of fully fuzzy linear programming problems, and the comparative study.

The contents of the book are divided into seven chapters. In Chap. 1, state of the art and origin of the fully fuzzy linear programming problems are presented. In

Chap. 2, the method to find the fuzzy optimal solution of such fully fuzzy linear programming problems with equality constraints in which all the variables are represented by nonnegative trapezoidal fuzzy numbers while all the other parameters are represented by unrestricted trapezoidal fuzzy numbers are presented. In Chap. 3, the method to find the fuzzy optimal solution of such fully fuzzy linear programming problems with equality constraints in which all the parameters and variables are represented by unrestricted trapezoidal fuzzy numbers is presented. In Chap. 4, the method to find the fuzzy optimal solution of such fully fuzzy linear programming problems with equality constraints in which all the parameters and variables are represented by unrestricted *LR* flat fuzzy numbers is presented. In Chap. 5, the method to find the fuzzy optimal solution of such fully fuzzy linear programming problems with inequality constraints in which all the parameters and variables are represented by unrestricted *LR* flat fuzzy numbers is presented. In Chap. 6, the method to find the unique fuzzy optimal solution of such fully fuzzy linear programming problems with equality constraints in which all the parameters are represented by unrestricted *LR* flat fuzzy numbers is presented. In Chap. 7, based on the present study the future work has been suggested.

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Theory, Methods and Applications

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