Chapter 10

Summary and future research work

Summary of the Thesis

In this dissertation, some innovative real-life transportation problems in second and third dimensions have been formulated and solved in imprecise environments.

In chapter-1, some necessary preliminary ideas have been discussed with the historical background of the transportation models. For numerical illustrations of the proposed models, some solution methodologies related to those problems have been discussed in chapter-2.

Chapter-3 contains a solid transportation problem with different types of vehicle costs. The fixed charge, unit transportation cost (which is under AUD) are treated as fuzzy parameters. The problem is formulated as a profit maximization problem. The budget constraint has been incorporated as a constraint. To find the optimal solution, genetic algorithm is considered.

In chapter-4, a solid transportation problem is constructed as a two staged problem for breakable items. To reduce the amount of breakability, a safety cost is introduced here.

Also there is a restriction on breakability of the items in the conveyances. The model has been optimized under imprecise environment with a numerical example.

The Vogel's Approximation method has been introduced in a solid transportation problem in chapter-5. Here, the unit transportation costs are assumed to be imprecise in nature and their comparison, algebraic operations are performed by using the concept of rank of fuzzy numbers. The obtained solution is optimized using the Modi-indices technique. A sensitive analysis has been done for the availabilities, demands and capacities of the considerable illustration, which shows the effects of such parameters on the total transportation cost.

In chapter-6, an imprecise solid transportation problem is considered where unit transportation cost has two parts (i) unit transportation cost for the type of item like liquid or solid or breakable and (ii) unit cost related to distance. Both the unit cost are executed through fuzzy inference logic. The proposed model is optimized through genetic algorithm based on fuzzy logic. As a special case, the STP is transformed to TP considered here. Finally, a numerical example has been illustrated to discuss the model.

A solid transportation problem for substitutable items with imprecise cost is considered in chapter-7. Henceforth, the demand of one item may be fulfilled by the stock of another item. The substitutability of the items are measured by the tools of fuzzy logic. The model also consists of the infrastructural cost of the origin and destination. Moreover, the most of the optimal solution of STP are feasible with respect to the availability of the origin, demand of the destination and capacity of the conveyances only, they do not agree with maximum number of allocation. In this regard, an imprecise multi-objective STP is formulated here in terms of maximization of entropy function. Finally, the model has been optimized numerically using genetic algorithm technique.

In chapter-8, a solid transportation problem has been considered with non-linear unit transportation cost of the item depended on the amount of transportation. In this model, the availability of the sources, demand of the destinations, capacity of the conveyances are considered as a type-2 fuzzy parameters. The model is solved following CV-based reduction method, nearest interval approximation method and Chance constrained programming based credibility measures. Finally, the model has been optimized with numerical example.

In chapter-9, A solid transportation model has been developed considering two objective functions in terms of total transportation cost and total transportation time. The availability of the sources, demand of the destination and conveyance's capacities have been taken as fuzzy. In this chapter, all fuzzy numbers are treated as trapezoidal. A realistic discounts policy (AUD) has been proposed to transportation cost depending on the amount of transportation units. A pair of mathematical programs is formulated to calculate the lower and upper bounds of the fuzzy total transportation cost at possibility level α. From different values of α, the membership functions of the objective functions are constructed numerically.

Future Research Work

This thesis contains seven interesting transportation and/or solid transportation problems in imprecise environments, All the problem has some new- innovative idea(s) that/those have not been considered by earlier researchers. In this regard, a comparative literature survey have been considered here in each chapter. Beside that, there are few scope/challenge to extend the model.
Model-1,2 (chapter-3,4), can be extended to multi-stage transportation problem for ameliorating items. In Model-3(chapte-5), it is seen that every transportation problem can be solved through Vogel's approximation method and verify the solution for its optimal-

ity conditions. There is a scope to consider time parameter in all the first six models also following the last (seventh) model. In Model-4,5(chapte-6,7), the fuzzy inference criteria may be allowed to any multi-item transportation/solid transportation problem. In Model-6(chapte-8), the non-linear transportation cost opens a new area to the transportation researchers.

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