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TRANSPORTATION PROBLEMS ON A FUZZY NETWORK

Minghao Chen[1], Hiroaki Ishii[2] and Congxin Wu[1]

[1]Department of Mathematics
Harbin Institute of Technology
Harbin 15001, P. R. China
Chenmh130264@yahoo.com.cn

[2]Graduate School of Information Science and Technology
Osaka University
Suita, Osaka 565-0871, Japan
ishii@ist.osaka-u.ac.jp

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Abstract. *This paper considers fuzzy transportation problems with satisfaction degrees of routes since except of transportation costs about routes, its safety or transportation time etc should be taken into account. Further flexibility of demand and supply quantity should also be taken into account. Moreover the fuzzy goal about total transportation cost is considered in place of minimizing the total transportation cost directly. So we consider two criteria. One is to maximize the minimal satisfaction degree with respect to the flexibility and fuzzy goal .The other is to maximize the minimal satisfaction degree among routes used in transportation. But usually there exists no solution that optimizes both objectives at a time. So we seek some non-dominated solutions after defining a non-domination.*

Keywords: Transportation problem, Fuzzy goal of the total transportation cost, Flexibility of demand and supply quantity, Preference of routes, Non-dominated solutions, Efficient algorithm

1. **Introduction.** The purpose of traditional transportation problems is to determine the optimal transportation pattern of a certain good from suppliers to demand customers so that the total transportation cost becomes minimum. It has been investigated by many researchers and is known as the Hitchcock Koopman transportation problem. Typical solution methods are that of using maximum flow algorithm [2], Hungarian method [3] and combinatorial one [7] etc. This paper extends the classical transportation problem by considering preference of arcs in a transportation route, flexibility of demand and supply quantities, and randomness of unit transportation cost of each route. This flexibility reflects on the actual situation that total quantity supplied from suppliers is less than the total requirement of demand customers. That is, two criteria are taken into account in this paper. One is to maximize the minimal satisfaction degree with respect to the flexibility of demand and supply quantity, and fuzzy goal. The other is to maximize the minimal satisfaction degree among routes used in transportation. But usually there exists no solution that optimizes two objectives at a time. So we seek some non-dominated transportation patterns after the definition of non-domination. Our Model is an extension of previous models [5,6,8-11]. As for another fuzzy version, we have considered competitive transportation problems also in order to cope with an actual situation [4].

Section 2 formulates our problem and defines non-domination. Section 3 proposes an algorithm for seeking non-dominated solutions. Finally Section 4 summarizes this paper and discusses further research problems.