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Solving the problem of industry by formulating it as a fractional capacitated transportation problem with bounds on rim conditions

Kavita Gupta[1] · Ritu Arora[2]

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Abstract The main aim of this paper is to determine a transportation schedule that maximizes the profit percentage of a trading firm , D. M. Chemicals that deals in the trade of soap stone across various states of India. The problem under consideration is modeled as a fractional capacitated transportation problem with bounds on rim conditions. The data is taken from the account keeping books of the firm. A related transportation problem is formulated and the solution of the given problem is shown to be derivable from related problem. The developed solution is compared with the existing solution. Moreover, the solution obtained is verified by using a computing software Excel Solver.

Keywords Capacitated · Transportation problem · Optimal solution · Feasible solution · Fractional · Related transportation problem

Mathematics Subject Classification 90C08 · 90B06

1 Introduction

The transportation problem is a well-known problem which can be formulated and solved as a linear programming problem. The standard transportation problem is concerned with transporting at a minimum cost , a homogeneous commodity from each of the factories (or origins) to a number of markets (or destinations). Various variants of the transportation problem derived from practical applications attract the attentions of the scholars. Capacitated transportation problem is one of the important area of classical transportation problem. This class of transportation problem has a wide real world applications in the fields of production-distribution system, rail and urban road system, telecommunication networks etc., where finite capacity of resources such as vehicles,parking lots, equipments are taken into account. For instance, Gupta (2017) did inventory and transportation cost minimization in the delivery logistics of swine flu vaccine in a rural area by first formulating the problem as a capacitated transportation problem and then as an inventory model. Dahiya and Verma (2007) gave the solution procedure of the capacitated transportation problem with bounds on rim conditions. Gupta and Arora (2013a) studied bottleneck capacitated transportation problem where the objective function is to minimize the maximum time of transporting all the supplies to the destinations under certain conditions. Pandian and Natarajan (2010) proposed a new algorithm for finding a fuzzy optimal solution for fuzzy transportation problems. Singh and Yadav (2015) has given an efficient approach for solving type-1 intuitionistic fuzzy transportation problem Jain and Arya (2013) studied inverse version of capacitated transportation problem. Xie et al. (2012) studied duration and cost optimization for

✉ Kavita Gupta
gupta_kavita31@yahoo.com

Ritu Arora
ritunarora@yahoo.in

[1] Department of Mathematics, Kirori Mal College, University of Delhi, Delhi 110007, India

[2] Keshav Mahavidyalaya, University of Delhi, Delhi, India

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