SOLVEING SSCWLP USING BENDERS' DECOMPOSITION: THEORITICAL AND COMPUTATIONAL STUDY FOR DIFFERENT FORMULATIONS

R. R. K. Sharma, Indian Institute of Technology, Kanpur, India
Pritee Agarwal, Indian Institute of Technology, Kanpur, India

ABSTRACT

In literature, single/multistage warehouse location problems have been attempted by Geoffrion and Graves (1974) and Sharma (1991) among others and they have given completely different formulations. In this research work the formulation style given by Sharma and Sharma (2000), Sharma and Berry (2007) and Verma and Sharma (2011) to develop variety of constraints that link real and 0-1 integer variables; thus developing many formulations of single stage capacitated warehouse location problem (SSCWLP). It has been shown that branch and bound method of the solution for SSCWLP is more effective for strong formulation of SSCWLP Sharma and Berry (2007). In this paper we find that Benders' decomposition is more effective for solving strong formulation of SSCWLP (compared to its weak and very weak formulation) in terms of number of iteration as well as execution time. An attempt has been made to investigate empirically which formulation provides better bounds of SSCWLP. It has been observed that formulation of SSCWLP using the style adopted by Sharma (1991) requires significantly less computational time for optimal solution compared to the time taken to reach optimality for the SSCWLP problems when formulated using the style due to Geoffrion and Graves (1974). Finally we conducted a computational investigation on problems of the sizes 5X5X5, 15X15X15, 30X30X30, 50X50X50, 75X75X75 and 100X100X100. For each category of the problem size, 25 problems of SSCWLP have been created which proves the effectiveness of â€˜feasibility' constraints proposed in this research work.

Keywords: *Single stage capacitated warehouse location problem, Benders' decomposition for SSCWLP, Distribution, Warehouse location, Mixed 0-1 integer linear program*