Suwitchaporn Witchakul 2007: The Stochastic Knapsack Problem with Discrete and Continuous Random Capacity. Doctor of Engineering (Industrial Engineering), Major Filed: Industrial Engineering, Department of Industrial Engineering. Thesis Advisor: Associate Professor Prapaisri Sudasna-na-Ayudthya, Ph.D. 121 pages.

The principal objectives of this study were to propose theory and methods for solving the relaxed problem (relaxed integer constraints) of stochastic knapsack problem, and propose the heuristic for solving the stochastic knapsack problem with discrete and continuous random capacity. An efficiency and effectiveness of the proposed algorithms and the proposed heuristics were presented.

For discrete random capacity, two proposed algorithms for the solving relaxed problem with the general purpose method using CPLEX were compared. The results indicated that computing time of the proposed algorithm (algorithm 2) for solving relaxed problem was better than the general purpose method using CPLEX. Next, the proposed heuristic, where the relaxed problem was solved by using the algorithm 2, was compared with the general purpose method using CPLEX. The results indicated that the proposed heuristic was better than the general purpose method using CPLEX with the default settings (i.e., MIP gap is 0.01%) in terms of both computing time and quality of the integer solutions.

For continuous random capacity, two algorithms were proposed for solving the relaxed problem and compared with the general purpose method using the Monte Carlo simulation. As the results, for both the relaxed problem of stochastic knapsack problem with continuous random capacity and the stochastic knapsack problem with continuous random capacity, the algorithm 1 (or algorithm 2) with appropriate stepping size (ΔB) was superior to the general purpose method using the Monte Carlo simulation.

Suwitchaporn Witchakul

Student's signature

Thesis Advisor's signature

15 / 09 / 07