Fuzzy Newsboy Problem with Random Variables in a Supply Chain Environment

Hui Zheng and Jicheng Liu

North China Electric Power University

Abstract

This paper investigated a single-period supply chain problem with one retailer and one manufacturer. The demand is assumed to be a fuzzy random variable. Two models for newsboy problem with fuzzy random demand in both non-cooperation and cooperation situations are constructed. The fuzzy random model is transformed into crisp model by employing the expectation theory and signed distance. The optimal solutions in the two decision-making situations are derived and analyzed contrastively. It reveals that the whole supply chain profit in the non-cooperation situation is smaller than that in cooperation situation. An allocation strategy for the joint profit from which both players will benefit is put forward. The effects of the fuzzy randomness of the demand on the optimal order quantity, the whole supply chain profit and the allocation of profit are analyzed via numerical examples.

Keywords: Supply chain, fuzzy set, fuzzy random variable, allocation of profit, newsboy problem.