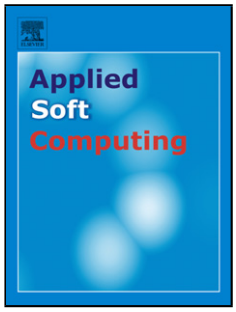

Title: A Stochastic Multi-Objective model for a Closed-loop Supply Chain with Environmental Considerations

Authors: Amir Mohammad Fathollahi Fard, Mostafa Hajiaghaei-Keshteli

PII: S1568-4946(18)30255-2
DOI: https://doi.org/10.1016/j.asoc.2018.04.055
Reference: ASOC 4860

To appear in: *Applied Soft Computing*

Received date: 29-9-2017
Revised date: 4-4-2018
Accepted date: 29-4-2018

Please cite this article as: Amir Mohammad Fathollahi Fard, Mostafa Hajiaghaei-Keshteli, A Stochastic Multi-Objective model for a Closed-loop Supply Chain with Environmental Considerations, Applied Soft Computing Journal https://doi.org/10.1016/j.asoc.2018.04.055

A Stochastic Multi-Objective model for a Closed-loop Supply Chain with Environmental Considerations

Amir Mohammad Fathollahi Fard*, Mostafa Hajiaghaei-Keshteli

Department of Industrial Engineering, University of Science and Technology of Mazandaran, Behshahr, Iran

* Corresponding author: Tel: (+98) 911-950-4755
Email addresses: amirfard@mazust.ac.ir (A. M. Fathollahi Fard), mostafahaji@mazust.ac.ir (M. Hajiaghaei-Keshteli)

Research Highlights:

- Developing a two-stage stochastic multi-objective mathematical model for a CLSC network design problem.
- Considering the downside risk along with the economic and environmental impacts simultaneously in a CLSC framework.
- Proposing two recent metaheuristics *i.e*. VCS and KA in the version of multi-objective programming.
- Presenting four assessment metrics to measure the efficiency of proposed methods in Pareto optimal solution sets.
- Exploring the sensitivity analyses to investigate the characteristic of model in a real industrial example.

Abstract

In today's world, environmental impacts usually motivate the governments and international comities to control special properties of the designing supply chain networks at the early steps. Closed-loop Supply Chain (CLSC) is one way to consider the recycling and the remanufacturing of used products to control environmental considerations more efficiently. Besides, uncertainty management is one of significant tools for controlling and predicting the CLSC's behavior for managers. The literature shows that using the stochastic models to design a CLSC is still scare and needed. Hence, this paper is among the first studies to develop a two-stage stochastic multi-objective model for a CLSC by considering the environmental aspects and downside risk, simultaneously. To solve the model, a number of memetic metaheuristics has been considered. Furthermore, ε-constraint method is used to validate the metaheuristic results in small sizes. The parameters of the proposed algorithms are tuned by Response Surface Method (*RSM*) via an MODM approach. A comparative study confirms the efficiency and effectiveness of Virus Colony Search