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Sustainable supply chain design with water environmental impacts and justice-oriented employment considerations: A case study in textile industry

H.R. Jafaria ¹, [Mehdi Seifbarghy](#)² and M. Omidvaric¹

¹ Department of Industrial Engineering, Science and Research Branch, Islamic Azad University, Tehran, Iran.

² Department of Industrial Engineering, Alzahra University, Tehran, Iran.

³ Faculty of Industrial and Mechanical Engineering, Qazvin Branch, Islamic Azad University, Qazvin, Iran.

Abstract

The concept of sustainability in supply chain management refers to a logical balance between economic development, environmental considerations, and social responsibilities. In this paper, a sustainable model has been proposed to design a supply chain network in textile industries considering the key environmental and social factors. Regarding the type of industry and characteristics of the area under study (Zanjan, northwest Iran), minimizing the negative effects of wasteful extraction of ground waters and the environmental pollution resulting from industrial wastewaters and maximizing justicebased employment were considered. The supply chain consists of the following elements: suppliers, plants, distribution centers, water refinery centers, and customer zones. One of the important features of the proposed model is that it considers the lost opportunity cost of facilities and focuses on wastewater recycling in water refineries. To solve the model, the Multi-Objective Vibration Damping Optimization (MOVDO) algorithm has been used. In addition, to evaluate the proposed model, as a case study, the supply chain network design problem was solved in textile industry. In addition, to evaluate the solution performance of the used algorithm in comparison with that of the NSGA-II algorithm, ten random problems with different sizes were solved, and the results were analyzed using different indexes. All in all, the results show that the proposed method has the necessary performance.

Keywords: Sustainable supply, chain network design, Justice-oriented, employment, Water consumption, Textile industry.