

Designing a multi-period production-distribution system considering social responsibility aspects and failure modes

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Abstract

Reliability of facilities and vehicles in a supply chain and the social responsibility are of high importance in designing a supply chain network in many industries; fewer studies have studied the addressed concepts simultaneously. This paper proposes a multi-objective mixed-integer programming model for a multi-period multi-product supply chain considering conflicting economic and social responsibility objectives; furthermore, the reliability of the supply chain facilities and vehicles are integrated into the model rather than separate objectives. The possibility of disruption in the facilities of the supply chain is considered using the exponential distribution together with the effect of social responsibility as a significant pillar of sustainability. Various practical parameters such as accessibility of facilities, unemployment rate, number of created job opportunities, and level of regional development are considered in the modeling framework. Computational analysis is provided using the real dataset of a communication technology company as a case study to manifest the performance of the proposed model. A sensitivity analysis is performed for some specific parameters to recognize the most effective factors of the proposed model. The results can give good guidelines to the practitioners on the importance of considering network reliability and social responsibility as two important issues in network design problems..

Keywords: Supply chain, Social responsibility, Reliability, Network Design, Bi-objective optimization