ABSTRACT

The instability of a supply chain will affect supply chain performance in running business activities. One of the causes of supply chain instability is disruption. Supply chain disruptions are unplanned and unpredictable events that disrupt the expected flows of goods and materials in the supply chain. Potential disruption in the supply chain can be caused by natural disasters and human actions such as political stability and terrorism, etc. Consequently, companies must improve their performance as a resilient supply chain development. Supply chain resilience is the adaptive ability of the supply chain to deal with unpredictable events, respond to disruptions, and restore them into the initial state or a better state. In this research, a Mixed Integer Nonlinear Programming (MINLP) model is developed to analyze a location-allocation problem with supply disruption in a three-echelon network. Sourcing strategy is evaluated to create supply chain resiliency. This study uses (s,S) and (s,Q) inventory policy to manage the inventory. The sourcing policy is conducted by considering single-sourcing and multiple-sourcing. Furthermore, the model also considers environmental effects by calculating carbon emissions resulting from transportation and manufacturing processes. Numerical analysis is evaluated using a Lingo solver. According to the result, implementing multi-sourcing under supply disruption can reduce the total cost of the supply chain by 4 %. In addition, sensitivity analysis is conducted to know the impact of changing some parameters to the objective function and decision variable.

Keywords: location-allocation problem; carbon emission; inventory control; supply chain network resilience; mixed-integer nonlinear programming