

Abstract

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Modeling Sustainable Truck Rental Operations Using Closed-Loop Supply Chains Network

Moving industries consume numerous resources and dispose masses of used packaging materials. Proper sorting, recycling and disposing the packaging materials is necessary to avoid a severe pollution disaster. This research paper presents a conceptual model to propose sustainable truck rental operations instead of the regular one. An optimization model was developed to select the locations of truck rental centers, collection sites, maintenance and repair sites, and identify the rental fees to be charged for all routes that maximize the total closed supply chain profits. Fixed costs of vehicle purchasing, costs of constructing collection centers and repair centers, as well as the fixed costs paid to use disposal and recycling centers are considered. Operating costs include the truck maintenance, repair costs as well as the cost of recycling and disposing the packing materials, and the costs of relocating the truck are presented in the model. A mixed integer model is developed followed by a simulation model to examine the factors affecting the operation of the model.