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# A Retailer Oriented Closed-loop Supply Chain Network Design for End of Life Construction Machinery Remanufacturing

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**Abstract:** Due to the rising environmental pressure and economic benefit, a growing number of firms including some original equipment manufacturers and retailers are devoted into collecting and remanufacturing end of life construction machinery. Concentrating on the optimal design of a retailer oriented closed-loop supply chain network for the end of life construction machinery remanufacturing, we develop a mixed integer linear model incorporating the reverse logistics network into the forward logistics network, and apply an improved hybrid genetic algorithm, the performance of which has been evaluated by the optimization software LINGO, to solve how to optimize the structure of the closed-loop supply chain network. By conducting a real-life case study on a target construction machinery remanufacturing firm in China, our research confirms that the proposed model can successfully determine the location of different types of function centers and manage the flows of used products, various components and remanufactured products. In addition, the influence of the collection ratio and the capacity of facilities is also elaborately explored to give manage insights to the firms on future strategies making and gaining profits in the execution of this environmentally friendly practices.

**Key words:** Retailer oriented, Closed-loop supply chain network, End of life construction machinery, Genetic Algorithm, Remanufacturing

## 1. Introduction

In this century, a substantial amount of construction machinery is supposed to be abandoned as the result of industrialization. The end of life construction machinery (ELCM) may become hazardous waste and pollute the environment, if it hasn't been properly managed. Fortunately, due to the

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