

# **Optimal Order Quantity Models for three types of reverse logistics networks in Product Recovery Environment**

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## **Abstract**

Due to limitation of resources and increasing concerns about environment, reverse logistics has received growing attention in recent years. In this paper, we propose three types of reverse logistics networks based on reuse of returnable containers, materials recycling process and remanufacturing for parts reuse. First, the sender in the re-usable item network supplies containers for the recipient and orders either new containers from external supplier or returnable containers cleaned from the container depot. Second, the recycling center in the proposed recycling network collects either end of life products from customer or faulty goods from manufacturer, collected products are dismantled into materials and materials go into recycling process. Finally, the manufacturer in the proposed remanufacturing network has two alternatives for supplying parts: either ordering the required parts to external supplier or overhauling disassembled parts and bringing them back 'as new' conditions.

In this product recovery environment, we build optimal order quantity models to minimize the total logistics costs related to reverse logistics network. The validity of the proposed model is investigated through comprehensive computational experiments.

**Key Words:** remanufacturing, recycling, reuse, reverse logistics

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