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# Joint advertising, pricing and collection decisions in a closed-loop supply chain

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**Abstract:** Manufacturers today are more inclined to engage in product remanufacturing due to strict environment legislations and awareness of resource shortage worldwide. Meanwhile, Empirical studies have shown that advertising plays an important role in influencing consumer acceptance of remanufactured products. In fact, advertising has significant effects on supply chain member's pricing, reverse channel performance, demand and profit in a closed-loop supply chain (CLSC). However, most studies on remanufacturing to date have only assumed that the market demand is influenced by retail price, regardless of the effect of advertising investment. To address this gap, this paper build Stackelberg game models to investigates the optimal decisions of local advertising, used-product collection and pricing in centralized and decentralized closed-loop supply chains. When considering decentralized channels, we establish and compare three models: M-collection, R-collection and TPL-collection. We analytically show that local advertising strongly influences channel members' pricing strategies, used-product collection decisions and profits. We also show that it is optimal for the manufacturer to authorize the retailer for collecting used products. In addition, we find that cooperative advertising cannot coordinate the CLSC, but a simple two-part tariff contract can coordinate the members of the decentralized CLSC by generating the same performance as in a centralized decision-making system.

**Keywords:** Closed-loop supply chain management, Advertising, Coordination mechanism, Stackelberg game

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