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B.C. Giri, C. Mondal, T. Maiti



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Analysing a closed-loop supply chain with selling price, warranty period and green sensitive consumer demand under revenue sharing contract

B.C. Giri¹, C. Mondal² and T. Maiti³

^{1,2}*Department of Mathematics, Jadavpur University, Kolkata - 700 032*

³*Department of Mathematics, Gurudas College, Kolkata - 700 054*

Abstract

In this paper, a two-echelon closed-loop supply chain with one manufacturer and one retailer is considered, and two game theoretic models are presented in which the first model (Model I) considers demand dependent on selling price and warranty period while the second model (Model II) considers demand dependent on greening level in addition to the selling price and warranty period. During the warranty period offered by the manufacturer, a portion of the returned items is refurbished and sent back to the customer while the remaining portion is remanufactured and sold in the secondary market, and the same portion is replaced by the new products in the market. Both the models are solved under centralized, decentralized, and revenue sharing contract scenarios. In the decentralized scenario, a Stackelberg game is considered between the manufacturer and the retailer in which the manufacturer is assumed to be the leader and the retailer as the follower. Through analytic and numerical analyses, it is seen that Model II gives better response on all the key decisions of the supply chain than Model I. The centralized scenario achieves higher greening level and warranty period compared to the decentralized scenario. Sensitivity analysis is performed to investigate the effect of key-model parameters on optimal decisions.

Keywords: Closed-loop supply chain; warranty period; green sensitive consumer demand; remanufacturing; game theory; revenue sharing contract.

¹bcgiri.jumath@gmail.com;

²chirantan.mondal94@gmail.com;

³tarun.ju@gmail.com

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