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Dynamic product acquisition in closed loop supply chains

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Abstract

We consider a closed-loop supply chain where demand can either be satisfied by manufacturing new products or by buying back used products from customers and upgrading their functionality by remanufacturing. A joint buy-back pricing and manufacturing–remanufacturing decision model at the operations–marketing interface is presented that allows for dynamic parameters, e.g. product life cycles and seasonal aspects. The model allows the identification of beneficial opportunities for buying back and storing used products. We determine the optimal buy-back price and the optimal inventory and production policies. The model is solved by dynamic programming. Numerical results show that the joint buy-back pricing and manufacturing–remanufacturing decision model is more profitable than the separate decision models. In general, the joint decision model is more profitable than the separate decision models. To synch future remanufacturing, and intervals where demand is satisfied by a mix of

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manufactured and remanufactured products. Furthermore, we discuss several reactive and proactive acquisition and remanufacturing heuristics and show under which conditions they are optimal. The findings are illustrated by numerical examples.

Keywords: reverse logistics supply chain management

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