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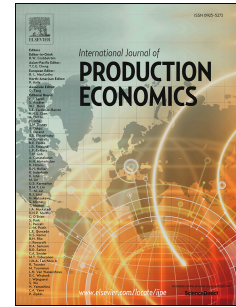
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Economic order quantity for multistage disassembly systems

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Abstract. Disassembly economic order quantity models are proposed in this paper in order to reduce inventory costs in reverse logistics. The problems is to determine the quantities and the timings of disassembly operations to generate components for which there are known, continuous and constant demands over a planning horizon. Disassembly operations generate unnecessary inventories when the demands are not the same for all components. The proposed models integrate disposal decisions to handle this inventory surplus. Three new models are developed to determine reorder intervals in disassembly systems according to fixed disassembly order costs and inventory costs. The first one is a single stage model (one product to disassemble with several requested components) with one reorder interval to determine. The other two are for multi-stage disassembly systems (one reorder interval to be determined for each stage) under nested policies and integer-ratio ratio policies.

Keywords: disassembly systems, economic order quantities, lot sizing, inventory, multistage systems.

1 Introduction

Disassembly is a central activity in a reverse supply chain connecting the collection of end-of-life products at customer locations to the recycling of components with residual value (for reuse, remanufacture, material recycling or energy recovering) or the processing and the conditioning of valueless components and material fractions. Before the disassembly of a product, each of its components or material fractions has to be allocated to a recovery channel, which generates demands and revenues, or allocated to other channels which reduce environmental impacts. The economic gain between revenues and disassembly costs can be low and right planning method can save logistic costs and improve product recovery rate. The reverse logistic activities, and in consequence the disassembly activity, need to develop to meet environmental constraints enforced by governmental regulation and customers' consciousness of environmental issues. Disassembly centers must integrate the industrial standards of manufacturing and assembly logistics to support the development of their activity and the increase of reverse flow while being more efficient. As in the case of the assembly process, appropriate planning and scheduling tools are needed to manage disassembly operations more economically [3]. One of these standards is the economic order quantity (EOQ) model which is a currently used approach in traditional logistics to optimize inventory costs while excess of inventory is often a limiting factor of the efficiency of disassembly

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