7 Efficient Closure of Material and Component Loops – Substance Flow Oriented Supply Chain Management

Martin Ploog, Wiebke Stölting, Marcus Schröter, Thomas Spengler, Christoph Herrmann, René Graf

Martin Ploog, Institute of Business Administration, Department of Production Management, Technical University of Braunschweig, Germany
E-Mail: m.ploog@tu-bs.de

Wiebke Stölting, Institute of Business Administration, Department of Production Management, Technical University of Braunschweig, Germany
E-Mail: w.stoelting@tu-bs.de

Marcus Schröter, Institute of Business Administration, Department of Production Management, Technical University of Braunschweig, Germany
E-Mail: marcus.schroeter@tu-bs.de

Thomas Spengler, Institute of Business Administration, Department of Production Management, Technical University of Braunschweig, Germany
E-Mail: t.spengler@tu-bs.de

Christoph Herrmann, Institute of Machine Tools and Production Technology, Department of Production and Life-Cycle-Management, Technical University of Braunschweig, Germany
E-Mail: c.herrmann@tu-bs.de

René Graf, Institute of Machine Tools and Production Technology, Department of Production and Life-Cycle-Management, Technical University of Braunschweig, Germany
E-Mail: r.graf@tu-bs.de
7.1 Introduction

In view of the integration of product stewardship into environmental law and the accompanying task faced by manufacturers in taking back and recycling products at the end of their service lives, existing logistics chains (supply chains) need to be extended to include the after-use phase. Linking a supply chain with the after-use phase of the product creates a substance flow oriented supply chain. The goal of such a substance flow oriented supply chain management is to design and co-ordinate all company functions and processes in a way that enables closing the flow of goods and materials while at the same time cost-efficiently meeting customer service objectives. In this regard, the resultant co-operation between manufacturers and recycling companies can on the one hand fulfill future legal requirements and on the other exploit existing economic potentials that arise from efficiently planned take-back of used equipment and its recycling. Up to now, such expanded supply chains have only rarely been found in practice. For this reason, an integrated concept is needed that takes into account both the strategic and operative planning levels as well as the information management for the expanded supply chain. Such a comprehensive concept was developed in the BMBF\textsuperscript{1} funded project StreaM – Substance Flow Oriented Closed Loop Supply Chain Management in the Electrical and Electronic Equipment Industry and validated over the course of several case studies. Selected results from these will be presented in this paper.

Partners in the substance flow oriented supply chain especially include manufacturers and recycling companies. Within the scope of the co-operation, the manufacturer takes on the position of the focal company, assuming a managerial role and co-ordinating the cross-company task allocation process.\textsuperscript{2} The recycling company recycles the used equipment in a co-operative collaboration with the manufacturer, with the disassembly and processing subareas playing a particularly important role.

To ensure the economic and ecological advantageousness of recovery systems, efficient closed loop strategies have to be identified and pursued in the future. While numerous approaches for systematising possible closed loop strategies can be found in the literature\textsuperscript{3}, they are frequently inconsistent. Thus, in the StreaM project, a systematisation method was

\textsuperscript{1} Bundesministerium für Bildung und Forschung/ Federal Ministry of Education and Research
\textsuperscript{2} See Picot et al. 2003
\textsuperscript{3} Gungor and Gupta, 1999, provide an overview of such systematisation approaches.