ISTANBUL KÜLTÜR UNIVERSITY

DEPARTMENT OF INDUSTRIAL ENGINEERING

SEMINAR SERIES

Quantitative Models for Decision Making in Reverse Logistics Network Design

by

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Abstract: The importance of reverse logistics (RL) has increased in the past decade. The reuse opportunities lead to a flow of goods from the customers back to the manufacturers. The management of this reverse goods flow opposite to the conventional forward flow is the main concern of RL. There are no worldwide estimates of the economic scope of reuse activities, but the number of firms engaged in this sector is growing rapidly in response to the opportunities for creating additional wealth and the growth in extended producer responsibility legislation in several countries. Take-back obligations, customer pressure, and economic motivation stimulate a number of companies to explore options for take-back and recovery of their products. Unfortunately, even with this significant development for the RL market in recent years, not enough analytical models exist which assist in RL strategic decisions. New planned legal regulations in Turkey for European Union will enforce Turkish producers to recover and recycle at least a predetermined fraction of sold products. These activities involve collection of used products, inspection/separation to determine the condition of the return (i.e., whether it is recoverable or not), reprocessing the return (which may include reuse, recycling, remanufacturing or repair), disposal of returns which are found to be unrecoverable due to economic and/or technological reasons, and redistribution of recovered products.

In this study, we focus on a problem in reverse logistics network design where the aim is locating distribution centers, inspection centers and remanufacturing facilities, determining the acquisition price as well as the amount of returned goods to be collected depending on the unit cost savings and competitor's acquisition price. The coordination of the forward and reverse flows in the network is also taken into account in order to minimize the transportation costs, fixed costs and used product acquisition costs. A mixed-integer nonlinear programming problem has been formulated and exact algorithms have been suggested to solve it. When the acquisition price is set to a given value, the remaining problem becomes a mixed-integer programming problem which can be solved by Lagrangean relaxation, Benders Decomposition and Cross Decomposition algorithms. The best value of the acquisition price that minimizes the total cost is determined by the Golden Section search and computational results have been reported. Moreover, the effect of fixed cost, capacity as well as unit cost savings on the solution time has been analyzed.

All interested are cordially invited.

Date : June 11, 2009

Time : 14:00-15:00

Room : Faculty of Engineering and Architecture Seminar Room (2nd floor, 215)