Design of recovery supply chains: a Portuguese recovery network for WEEE

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Abstract

All European countries are building structures to support collection and recovery of electric and electronic waste (WEEE). In this work, the study of a Portuguese recovery network is presented. A MILP model is developed in order to determine the best WEEE network structure as well as the associated optimal plan. Several different analyses are performed.

Keywords: Supply chain design, Optimization, Electric and electronic waste.

1. Introduction

The European Union (EU) estimates a growth of 3 to 5% per year for the electrical and electronic equipment waste (WEEE). These figures are three times greater than for general waste. The EU also estimates that 90% of WEEE is going to landfills. The Directive 2002/96/EC on electrical and electronic waste aims at the reduction of the environmental impact of WEEE, encouraging end-of-life management, eco-design, life cycle analysis and extended producer responsibility [1]. Under this directive, producers are responsible not only for the new products placed on the market, but also for those equipments that were sold before 2002. This represents a new driving force that is enforcing producers to support the collecting and the recycling costs of their products.

All European countries are building structures to support this waste stream in order to meet the legal targets. Recovery networks have to be established, which may integrate various kinds of entities: collection centres, municipal sites, store retailers and/or producers, take-back centres and recyclers, among others.

In the last few years, several studies have been published for the design of recovery networks, in particular for electric and electronic equipments [2, 3].