



## MIT SCALE RESEARCH REPORT

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**For more information, contact**  
MIT Global SCALE Network

**Postal Address:**

Massachusetts Institute of Technology 77  
Massachusetts Avenue, Cambridge, MA 02139 (USA)

**Location:**

Building E40, Room 267  
1 Amherst St.

**Access:**

Tel: +1 617-253-5320  
Fax: +1 617-253-4560

Email: [scale@mit.edu](mailto:scale@mit.edu)  
Website: [scale.mit.edu](http://scale.mit.edu)

**Research Report: ZLC-2007-2**

**Optimal channel design for electronic product returns in their useful lifecycle**  
**Francisco Cebrián**

**For Full Thesis Version Please Contact:**

**Marta Romero**

**ZLOG Director**

Zaragoza Logistics Center (ZLC) Edificio

Náyade 5, C/Bari 55 – PLAZA 50197

Zaragoza, SPAIN

Email: [mromero@zlc.edu.es](mailto:mromero@zlc.edu.es)

Telephone: +34 976 077 605

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## Optimal channel design for electronic product returns in their useful lifecycle

Francisco Cebrián

### EXECUTIVE SUMMARY

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The perception of the importance of Reverse Logistics is increasing as companies realize the considerable impact it can have on their bottom line. This becomes crucial for enterprises whose returns value is high, such as those specializing in electronic products in their useful lifecycle. In this case, the amount companies can recover from returned products becomes important. That amount is highly dependent on the time those products spend in the reverse chain. A responsiveness – cost efficiency tradeoff then arises that decision-makers need to consider in order to select the optimal reverse chain network.

This thesis aims at providing decision makers with tools for guidance so as to give a benchmark during the planning stages. In order to do so, a model has been developed so that different network option costs can be figured out in different scenarios. The structure is comprised of the following:

- **Network option definition:** Three different network options are defined that have one two and three aggregation levels respectively.
- **Scenario definition:** Different situations are considered that are represented by several scenarios using every possible combination of network and product characteristics considered. Since some of their variables are unknown beforehand the network options are optimized, using data from each scenario, and each option cost is obtained.
- **Relationship coefficient calculation:** Regression is used in order to figure out the values of the coefficients that establish the relationship between the product and environment characteristics and the cost incurred.

## **Optimal channel design for electronic product returns in their useful lifecycle**

Based on these coefficients, decision-makers would be able to know beforehand which type of network is more cost-efficient, depending on the product being considered and environment characteristics. The most notable observations are the following:

- High initial value makes a short chain the most cost efficient (one aggregation level)
- The higher the value of the product at the moment of return, the more cost-efficient a short chain is (one aggregation level)
- A high proportion of high value returns makes a short chain the most cost efficient (one aggregation level)
- The higher the average distance from product collection to disposal, the more cost efficient a long chain is (three aggregation levels)

Finally, these coefficients will enable decision-makers to assess the relative importance of each of the factors considered, as well as to determine the sensitivity of cost to any variation in these factors.