

# Author's Accepted Manuscript

The inventory-routing problem of returnable transport items with time windows and simultaneous pickup and delivery in closed-loop supply chains

Galina Iassinovskaia, Sabine Limbourg, Fouad Riane



[www.elsevier.com/locate/ijpe](http://www.elsevier.com/locate/ijpe)

PII: S0925-5273(16)30132-3  
DOI: <http://dx.doi.org/10.1016/j.ijpe.2016.06.024>  
Reference: PROECO6452

To appear in: *Intern. Journal of Production Economics*

Received date: 20 May 2015  
Revised date: 5 June 2016  
Accepted date: 23 June 2016

Cite this article as: Galina Iassinovskaia, Sabine Limbourg and Fouad Riane, The inventory-routing problem of returnable transport items with time windows and simultaneous pickup and delivery in closed-loop supply chains, *Intern. Journal of Production Economics*, <http://dx.doi.org/10.1016/j.ijpe.2016.06.024>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# The inventory-routing problem of returnable transport items with time windows and simultaneous pickup and delivery in closed-loop supply chains

Galina IASSINOVSKAIA<sup>a</sup>, Sabine LIMBOURG<sup>b,\*</sup>, Fouad RIANE<sup>c</sup>

<sup>a</sup>*Louvain School of Management, Université Catholique de Louvain, Mons, Belgium*

<sup>b</sup>*QuantOM, HEC Management School, University of Liege (ULg), Belgium*

<sup>c</sup>*Mechanical Engineering, Industrial Management and Innovation Laboratory, Hassan Premier University, Ecole Centrale Casablanca, Morocco*

---

## Abstract

Reducing environmental impact, related regulations and potential for operational benefits are the main reasons why companies share their returnable transport items (RTIs) among the different partners of a closed-loop supply chain. In this paper, we consider a producer, located at a depot, who has to distribute his products packed in RTIs to a set of customers. Customers define a time window wherein the service can begin. The producer is also in charge of the collection of empty RTIs for reuse in the next production cycle. Each partner has a storage area composed of both empty and loaded RTI stock, as characterized by initial levels and maximum storage capacity. As deliveries and returns are performed by a homogeneous fleet of vehicles that can carry simultaneously empty and loaded RTIs, this research addresses a pickup and delivery inventory-routing problem within time windows (PDIRPTW) over a planning horizon. A mixed-integer linear program is developed and tested on small-scale instances. To handle more realistic large-scale problems, a cluster first-route second matheuristic is proposed.

*Keywords:* Returnable transport item, Closed-loop supply chain, Inventory routing problem, pickups and deliveries, time windows.

---

## 1. Introduction

Following the first United Nations Conference on the Human Environment in 1972 and other summits on the subject, the paradigm of corporate environmental responsibility has

---

\*Corresponding author

*Email addresses:* galina.iassinovskaia@uclouvain-mons.be (Galina IASSINOVSKAIA), sabine.limbourg@ulg.ac.be (Sabine LIMBOURG), fouad.riane@centrale-casablanca.ma (Fouad RIANE)

Download English Version:

<https://daneshyari.com/en/article/5079093>

Download Persian Version:

<https://daneshyari.com/article/5079093>

[Daneshyari.com](https://daneshyari.com)