Sustainable supply chain network design: A case of the wine industry in Australia

Mohsen Varsei, Sergey Polyakovskiy

www.elsevier.com/locate/omega

PII: S0305-0483(16)00015-3
DOI: http://dx.doi.org/10.1016/j.omega.2015.11.009
Reference: OME1647

To appear in: *Omega*

Received date: 29 December 2014
Revised date: 15 October 2015
Accepted date: 22 November 2015

Cite this article as: Mohsen Varsei and Sergey Polyakovskiy, Sustainable supply chain network design: A case of the wine industry in Australia, *Omega* http://dx.doi.org/10.1016/j.omega.2015.11.009

Sustainable supply chain network design: A case of the wine industry in Australia

Mohsen Varsei[a,*], Sergey Polyakovskiy[b]

[a] *The University of South Australia Business School Adelaide, SA 5001, Australia.*
[b] *School of Computer Science, The University of Adelaide Adelaide, SA 5005, Australia*

Abstract

This paper comes at a time when many companies and people are increasingly facing various global problems linked to sustainability challenges, and when the literature is still scarce on research incorporating all three dimensions of sustainability in supply chain analytical models. The paper conducts a case-based modeling study to address this gap in the area of supply chain network design. We investigate the wine supply chain and propose a generic model for sustainable wine supply chain network design encompassing economic, environmental and social objectives. The case company is a real large-sized wine company located in Australia, for which a customized model is provided. Both models are formulated as a multi-objective mixed-integer program and solved using the augmented ϵ-constraint method by CPLEX. Social implications of the feasible scenarios are examined through introducing social impact coefficients. Non-dominated solutions are obtained and some balanced scenarios are proposed. The results show trade-offs between the objectives, yet more interestingly demonstrate how large is the gap between the existing supply chain configuration and the proposed scenarios in terms of supply chain cost and emissions.

Keywords: Supply chain network design, Sustainability, Multi-objective optimization, Wine industry, Social impact coefficient, Carbon emissions.

1. Introduction

In the past decades, supply chain network design has attracted close attention of academia and industry [1, 2]. It typically involves several strategic decisions about the number, location and capacity of facilities in forms of production plants and distribution centers, and decisions about supplier selection.

*Corresponding author.
Email addresses: mohsen.varsei@mymail.unisa.edu.au (Mohsen Varsei), sergey.polyakovskiy@adelaide.edu.au (Sergey Polyakovskiy)