

Reducing Carbon Emissions in Supply Chains

Melvin Drent

School of Industrial Engineering
Eindhoven University of Technology
Eindhoven, The Netherlands

m.drent@tue.nl

Abstract

Tackling the reduction of carbon footprints in global supply chains presents a significant challenge for many companies, driven by tighter governmental emission standards and increasing environmental consciousness among consumers. Therefore, it is crucial to incorporate carbon emissions considerations into supply chain management strategies. This work focuses on supply mode selection for a company that deals with a variety of products, each subject to periodic stochastic demand, with unfulfilled orders being backlogged. The products can be supplied through multiple distinct supply modes, each characterized by its own carbon emission levels, delivery speed, and cost implications. The company needs to allocate order quantities to each supply mode to minimize the costs associated with holding, backlogging, and purchasing, while also ensuring that the carbon emissions from these activities do not exceed a certain limit. We present a novel solution method for this problem, and benchmark it against other methods that are less sophisticated in a comprehensive numerical analysis.

Keywords

Inventory, Sustainability, Carbon emissions, Supply mode selection.

Biography

Melvin Drent is an Assistant Professor of Operations Management within the Operations, Planning, Accounting, and Control research group at the department of Industrial Engineering & Innovation Sciences. His research focuses on decision-making under uncertainty broadly, and in particular using data-driven approaches in the context of supply chain management, manufacturing operations, and after-sales services. Much of this research is in close collaboration with industry. His research has been published in journals such as *Manufacturing & Service Operations Management*, *Operations Research Letters*, and *European Journal of Operational Research*.