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Multi-level Capacitated lot-sizing with Backlogging and Environmental Considerations

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Abstract

Recently there is a growing concern of global warming, which is mainly because of the carbon emission generated from industrial activities. There is emission due to production, holding and set-up of production process. Cap-and-trade is one of the emission regulations commonly used to control the industrial carbon emissions. In addition to that, tree plantation can help mitigate against climate change by eliminating greenhouse gases from the atmosphere. In this paper, a multi-level lot-sizing problem with environmental impact of greenhouse gas emission in a capacitated job shop situation for multi-period planning horizon is considered. Backlogging is also taken into account in order to incorporate shortage. A mixed integer linear programming model has been developed taking into consideration both carbon cap and trade policies as well as emission reduction activities to optimize the lot size with the objective of minimizing total cost.

Keywords

Multi-level lot-sizing, carbon emission, Cap-and-trade, emission reduction, mixed integer linear programming.

Biography

Nusrat Tarin Chowdhury is currently doing her PhD in Industrial and Manufacturing System Engineering at University of Windsor. She completed her Bachelors in Industrial and Production Engineering from Bangladesh University of Engineering and Technology (BUET) in 2008 and joined there as a lecturer in Industrial and

Production Engineering department. She completed her Masters from BUET in March, 2011 and became assistant professor in September, 2011. She started her PhD program in University of Windsor from fall 2013.

Dr. Fazle Baki is a Professor in the Odette School of Business at the University of Windsor, Canada. He graduated in Civil Engineering from Rajshahi University of Engineering and Technology (RUET) in 1987. He received MBA degrees from the University of Dhaka, Bangladesh in 1991 and the University of New Brunswick, Canada in 1995. He received a Ph.D. degree in Operations Management from the University of Waterloo, Canada in 1999. His research interest lies in the development and application of quantitative methods in business and industrial engineering. He is particularly interested in the combinatorial problems that arise in manufacturing, supply chain management, and healthcare management.

Dr. Ahmed Azab is an associate professor of Industrial & Manufacturing Systems Engineering, and Director of the Product Lifecycle Management Research Lab. He has a successful record of industrial experience and publications. He has been involved in projects with local industry and has been effective in acquiring funding as sole Principal Investigator and else. He serves as a reviewer for a number of international journals; he also sits on the editorial board for Industrial Engineering & Management. Dr. Azab was awarded in 2009 the Outstanding Graduate Research Award at University of Windsor, and in 2015 the Faculty of Engineering Medal of Excellence for his role leading the undergraduate Industrial Engineering program's national accreditation efforts from CEAB (Canada Engineering Accreditation Board).