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Implementation of a metaheuristic in a simulation model for programming in a port system

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Abstract

This paper studies the problem of programming the ships loading to the bulk, in port systems. Identical loaders called Shiploaders must attend bulk carriers. When programming the ships, the charterer tries to minimize the incurred penalization cost when the Laydays is breached. The charterer will be penalized based on the amount of time that passes from the ending of the Laydays until the beginning of the bulk carrier loading. This problem is analyzed as a Berth Allocation Problem – (BAP), which is an NP-hard problem. Different metaheuristics have been implemented to address this type of problems. In order to explore the uncertainty in the bulk carrier loading, a metaheuristic is implemented on a simulation model. The metaheuristic Simulated Annealing (SA) was integrated using Flexsim Software 2018 to address the uncertainty of the loading times in the programming of the ships. The results were compared with previous work where only genetic algorithms had been applied, without simulation. It was demonstrated that the simulation and the Simulated Annealing minimized the breach of the Laydays facing the uncertainty associated to the operation from the maritime port to the bulk carriers, bearing in mind more real instances.

Keywords
Simulated Annealing, Simulation, Maritime Ports, Scheduling.

Biographies

Daniel Mendoza-Casseres is an Associate Professor of Industrial Engineering at the Universidad del Atlántico, Barranquilla, Colombia. He holds a Bachelor of Science degree in Chemical Engineer and a Master of Science degree in Industrial Engineering. He has published journal and conference papers. His research interests include simulation, optimization and logistics. More than fifteen years orienting teaching and learning processes in undergraduate and postgraduate. Director of the research group 3i + d, recognized by Colciencias in Colombia.

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