Integrated Scheduling of Equipments in a Container Terminal Using Simulation and Analytical Methods

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Abstract

Efficient operation of container terminal equipments directly links with the turnaround time of vessels at respective ports and this leads to increase the productivity of supply. Efficiency of a container terminal primarily depends on effective scheduling of handling equipments: query cranes, prime movers and yard cranes. Currently, many researches attempted to schedule these equipments on individual basis where different types of equipments were scheduled separately. Even the few works published on integrated scheduling, they only considered one cycle of either loading or unloading operations from or to vessels. Therefore, it is very difficult to synchronize solutions generated for individual problems in order to increase the overall efficiency of a terminal. This research focuses on an integrated scheduling of operational equipments of a terminal along with dual cycle mode as a single problem thereby attempts to increase the overall efficiency of the terminal. Problem is modeled using Arena simulation software package and queues were introduced to minimize congestions in query crane areas. Later, problem was formulated as a flow-shop scheduling problem and solved with Genetic algorithm. Different case studies were performed with both approaches and results reveal that integrated scheduling reduces vessels turnaround time considerably.

Keywords
Integrated scheduling, simulation, Genetic algorithm, queuing theory, supply chain management, logistics, Container terminal.