

Discrete Event Simulation Approach for Container Terminal Loading and Unloading Productivity Evaluation

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Abstract

The productivity measure reflects how reliable a port is in serving customers as a competitiveness of one port against another. This is what makes it important to evaluate the productivity of a port in order to maintain its existence. From the data obtained from the case study port, it is known that in each loading and unloading parameters, the productivity generally still has not reached the specified target. This study discusses the evaluation of productivity in loading and unloading operations of a port due to this operation is the main selling point offered. This study uses a discrete simulation method that can be used to accommodate complexity and uncertainty. By using the discrete event simulation method, the behaviour of the system can be described well by imitating the existing system behaviours in the field. From the analysis that has been done, it is found that the factors that affect the productivity of container loading and unloading at the port are the availability of *Combined Tractor Terminal* (CTT) trucks, the length of the pier, and the number of *Ship to Shore Crane* (STS) that must be reviewed comprehensively and systematically. Because if these factors are reviewed independently, these factors cannot show a significant effect on overall loading and unloading productivity. Based on several scenarios that have been tested in this study, the results of the analysis produce two best improvement scenarios to increase loading and unloading productivity at the port.

Keywords

Optimization, Least Flexible Job, Longest Processing Time, Production Schedule, and Variable Neighborhood Search

Biographies

Nurhadi Siswanto is a faculty member and the Head of Department of Industrial and Systems Engineering at Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia. He earned his bachelor degree in Industrial Engineering from Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia, a master degree in Industrial Engineering from Purdue University, USA and a PhD from University of New South Wales, Canberra, Australia. His research interests include operation research, large-scale optimization, simulation and modeling of maritime transportation.

Atika Tri Wahyuningsih is a master degree student in Industrial and Systems Engineering at Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia. During this research was conducted, she was a bachelor degree in Industrial Engineering from Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia. She is able to develop her research in operations research, optimization, and simulation modeling as a contribution to the academic fields.