Decision Support Model for a Seaport

by

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Abstract

TITLE: Decision Support Model for a Seaport

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The continuing growth of maritime transportation and the great competition in shipping industry have created a fertile field for applying computer simulation. In this research, a simulation model for a seaport is designed, analyzed and tested. This simulation model represents the model base in a port decision support system that can be used as a planning and process improvement tool. Through the designed model, the decision maker can conduct a collection of simulation experiments to compare between alternatives, and perform what-if-analysis.

The simulation model in this study is comprehensive; all the major components and factors that affect a seaport are considered. The simulation model is validated through a case study for port of Alexandria, Egypt; where, three different validation techniques are applied. These techniques are the comparison between the observed and the simulated outputs, the sensitivity of the simulation outputs to small changes in the input parameters of the simulation model, and regression metamodel. All of those techniques showed that the simulation model is valid and capable of

representing the operations of a seaport and rendering reliable performance indicators.

The most important factors are determined through a screening strategy; sequential bifurcation. Forty four factors are considered, the sequential bifurcation method figured out that six variables are important and have significant main effects. Surprisingly, all of the six variables are related to the cargo handling operations. These factors are the quay foreman, bags quay worker, bags hold worker, hook man, paper rolls crane cycle time and the average time after cargo handling. The steepest descent method is used to determine the optimal level of these factors.

Integrating Analytic Hierarchy Process (AHP) with simulation is not common; few researches emphasized the advantages of this integration. In this research, an AHP model is designed to compare between (n) seaports and choose the best one. The criteria of this model are the performance measures calculated by the simulation model. This model is applied to compare between two Egyptian ports; port of Alexandria and Portsaid port.

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Dedication

To my Parents, brothers and sister, my wife and my kids Ahmed and Youssef.