ANALYSIS OF RESOURCE CYCLES IN MARINE CONTAINER TERMINALS

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The aim of the article is to illustrate with the help of the model of the *Baltic Container Terminal* the possibilities of optimal use of existing resource pool of the terminal as well as analyzing marginal efficiency by adding or replacing existing units.

The reader is first introduced to the block model of the marine container terminal. Among the available resources there are distinguished separate resource cycles. The model identifies a two-tier resource parameter structure: parameters of the lower technological level (durations and parameters of probability distributions of elementary operations), parameters of resource cycles (cycle durations and parameters of probability distributions). Parameters of the model also include numbers of simultaneously employed resources of each type, number of containers of different types, and hatch covers necessary to be processed of the vessel. A separate group of parameters consists of hierarchically organized monitoring variables of each process modeled, which allows spot measurements. These monitoring variables are recorded in a dynamic database and can be traced for analyzing different 'what if' scenarios.

Adjustment of model parameters involved indirect methods, whose attractiveness lies in much lower financial and time costs compared to direct measurements. Moreover, such an approach allows determining combinations of model parameters, leading to optimal overall performance and thus identifying existing inefficiencies in the resource chain.

The article focuses on identifying the resource cycle parameters statistically complying with the real-life performance observations. The modeling relied on container terminal productivity data which do not represent commercial secrets. At the first stage the optimization task was evaluating duration of three resource group cycles (quay crane, tugmasters, and yard cranes) through minimization of container moves discrepancy.

Thus, the solution of the task is considered: studying the dependence of the efficiency criterion (discrepancy between observed and modeled data by number of container moves within one hour's time) on the cycles of three types of resources. The minimum search yields diverse results, which indicated an existence of a single local minimum or a continuous set of minima, indicating flaws in operation efficiency. The article includes a thorough study of efficiency criterion (discrepancy between statistically observed data and the modeled ones) with different levels of other variables (available number of specific resources).