

Optimization of the Operation of Modern Sea Container Terminal

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Summary

The handling of containers in the ports of the world, the rate of loading and discharging became a key factor of the success of the carriage of containers at sea. In order to attract more customers the container lines and port terminals have to cut the transit times and the time the ship is operated in the port. At the same time the rapid expansion of the carriage of containers requires better planning of the operations and use of advanced technologies either to handle the containers in the port or to plan the operations. The dissertation is an attempt for all the above said problems to be analyzed based on the experience of the operations in the port of Varna. The research consists of three main parts and conclusion.

The first part is a detailed study of the essence and basic characteristics of modern container terminals with the principal elements of the hardware – container yard, quay, auxiliary buildings, ship-to-shore cranes, terminal machines; lift trucks, reach stackers, straddle carriers, rubber machine gantry cranes, rail mounted gantry cranes, etc. and software of the terminal – organization of the operations, computer based systems and automation. An integral part of that study is the electronic processing of the information and the development of the existing means of exchange of information and standards for electronic data interchange (EDI).

The second part of the dissertation includes the theoretical methods and approaches to the problem either in Bulgaria or worldwide.

The essential part of the research is the third part which is subdivided into several subtitles with analysis of the disposition of containers at the container yard when using different machines, traditional ways of location of containers and author's original ideas with comparison of the possibility of the yard to accommodate maximum number of TEUs and a method to calculate that number with criteria and indicators how to evaluate the usage of the territory of the yard. Various statistics had been made in the port of Varna East. During 2005 the number of containers in the yard of Varna East had been registered daily and the data strings had been analyzed in order for the principal conclusions to be extracted.

The fourth part is the conclusion combining the theoretical and practical deductions into one scientific contribution which is the definition of coefficients for comparative analysis of utilization of the container yard area K11, K12 и K13 and determination of their values for different existing container terminals altogether with their influence for effective operation of the container terminal. Several practical conclusions had been made about operation of a container terminal in principal and proposals for the effective planning and operation of the handling of containers in the port of Varna. Indexes of the terminal area for one teu, container disposition area, maneuvering area and their correlation are defined as well as average distance for taking out containers from the yard, average

number of moves to take out containers from container yard. Their meaning is determined when using different terminal machines and different patterns of disposition of the containers in the yard. The structural elements of a modern container terminal are defined and systemized in a scheme together with subdivision of the container yard in stacks and blocks. Based on the dynamics of the number of the containers situated daily at the container yard in Varna East a suggestion had been made for the area of the container yard which should accommodate 20 percent more than the average number of containers simultaneously in the yard.