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Capacity analysis of storage area in a maritime container terminal

F. Rusca, M. Popa, E. Rosca, M.A. Rosca & A. Rusca

Faculty of Transports, University POLITEHNICA of Bucharest, Bucharest, Romania

ABSTRACT: Logistic chain with containerized transport which includes a maritime component must transit through a container maritime terminals. In case of dangerous goods special operating conditions are required (e.g. specialized staff, special vehicles, dedicated storage areas, segregation rules, etc.). Stochastic vessels arrival process in the container terminal and the variable number of dangerous goods containers make proper dimensioning of the storage area in the terminal difficult. In this paper, using ARENA simulation software, are develops a simulation model in order to analyse the activities in a container terminal and to assess the operating parameters of terminal facilities. The operation capacity for different port logistics sub-system is assessed taking into consideration the required operating standards and the measures of performance of the logistic system. The obtained results allow proper evaluation of the processing capacity of container terminals which can be used in sustaining studies to develop new ways to process container terminals.

1 INTRODUCTION

The transit operation of container terminals placed inside the seaports raises a number of specific issues that the administrators of the logistics chains must cope with.

Thus, the proper dimensioning of the storage area should lead to a minimization of the costs incurred by the owner of the container terminal. On the other hand, this storage area must be large enough to allow the storage of the containers that are unloaded/loaded from maritime vessels providing minimum waiting time.

Additional problems arise also in the case of dangerous goods containers.

According to IMO regulations their handling is performed in compliance with special safety conditions by trained personal and with strict adherence to specific rules.

The storage area inside the terminal is designed respecting the rules of segregation of dangerous goods in particular specialized locations or locations inside the terminal marked in accordance with IMO regulations.

Also, the stochastic vessels arrival process in the container terminal and the variable number of containers carrying dangerous goods make the

proper dimensioning of the storage area in the terminal difficult. The stacking problem can be considered to be more difficult than the storage planning as there can be uncertainty about container handling succession ([Decker et al, 2006](#)). The normal functioning of the storage area is conditioned by the existence of the free slots for containers in the storage spaces. Containers, which arrive during the periods in which the storage area is plenty, must wait a free slot or be stored in case of container loaded with dangerous goods in unsuitable areas for the type of freight, leading to additional risks. Modelling the storage area as a queuing system, one can be estimate operational risk not to find an appropriate free cell in the storage area, known as the probability of refuse.

The sizing operation of the storage space is realized by the owner of maritime container terminal which is trying to keep the previous mentioned operational risk under a threshold accepted by customers of the terminal.

This risk assessment and determination of the number of cells in the storage area is difficult to predict using the existing mathematical models. A feasible solution is represented by the computer simulation models that allow to evaluate the

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