Chapter 8
A Technique for Resolution of the Assignment Problem Containers in a Container Terminal

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ABSTRACT

A container terminal is a complicated system made up of several components in interdependence. Several materials handle possible to move containers at the port to better meet the needs of ships awaiting loading or unloading. In order to effectively manage this area, it is necessary to know the location of each container. Containers search times can be considerable and lead to delays that cause financial penalties for terminal management operators. In this chapter, the authors propose an approach to solve the problem of placement of containers through the description of a model that optimizes available storage space to handle the distance travelled between the containers and the storage locations in a seaport. In other words, a model that minimizes the total number of unnecessary movement while respecting the constraints of space and time. This work develops a software tool enabling identification of the best location of a container using the methodological resolution Branch and Bound.

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INTRODUCTION

To Upon arrival at a port, the ships docked remain inactive for the duration of loading and unloading. Handling port terminal operators receive a schedule indicating the dates of loading and unloading of containers and their locations in the storage areas. The challenge for the port authority is to determine the storage plan containers so as to minimize the total processing time (loading or unloading) of the latter. The processing time depends on various parameters such as:

1. The distance between the ship and the storage area.
2. The arrival and exit date of containers.
3. The time required to perform container movements (movement required of a container in a buffer space before the processing of another container).

This work's objective is to minimize the container investment cost and to increase the efficiency of transport companies by minimizing the time occupied by a container or ship in port. This amounts to revise the placement of containers in the storage area (taking into consideration the distance between the container and the storage area, and within each type of a container) by minimizing the number of unnecessary movements.

In this sense the authors are studying how to organize the container storage area, so that the authors find the optimum location for each container.

Consequently, the authors in this chapter are interested in the development of an optimization model that allows the identification of the best location for a container at a seaport.

This chapter is structured as follows: Section 2: presents a state of art concerning the various works in the field of containerization while positioning the contribution. Section 3: shows the model proposed, section 4: demonstrates the results obtained in the implementation of this approach. Section 5: illustrates the conclusion and some perspectives.

RELATED WORK AND CONTRIBUTION

In The container storage problem the authors are concerned is a decision problem representing the container storage business, predominant component of the whole process of managing a port.

The resolution of the container storage problem in a container terminal is a logistical problem that has captivated scientists for decades. Two main lines of storage resolutions are usually studied: optimization of storage time and optimize storage space. These two questions are often treated separately. Therefore, the authors offer some of the work in this area on the optimization of the storage space.

In the work of Kim et al. (1997) planning of container loading sequences to be exported in a seaport was made by using an optimal routing algorithm. Korbaa et al. (2004) using a dynamic programming algorithm based on a stochastic arrival barges law to solve the real-time allocation problem of containers unloaded to storage areas while minimizing the number of unwanted movements .

In the work of Murthy et al. (2005) a decision support system for minimizing the time allocation of ships to berths was proposed. Dubreuil (2008) used an intelligent transport system for treating containers transition problem in port. Kefi (2008) used the greedy heuristics in a multi-agent architecture to optimize the storage containers.