
Introduction

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Containerisation has increasingly facilitated the transportation of goods since the 1970s. The average annual growth rate of world container traffic has been around 10% in the last three decades, which is well above the world trade growth rate. These increasing demands drive the development of the supply side. Accordingly, the world container fleet and container vessel fleet has also maintained around 10% annual growth. However, in recent years, the trade demands are getting more and more imbalanced and volatile, ports are struggling with congestion and capacity and shippers are demanding more to pursue global supply chain management. Meanwhile, the container shipping industry is facing challenges of managing container operations more effectively to meet the demands in a dynamic, stochastic and intermodal environment.

This special issue focuses on a range of important issues in container shipping supply chains. Lagoudis and Fragkos (2009) address a strategic-level decision for container fleet sizing and vessel fleet sizing. Feng and Chang (2009) and Song et al. (2009) consider operational-level decisions such as slot allocation and container dispatching. Le-Griffin and Griffin (2009) investigate the economic viability of using short sea shipping to manage empty container flows in US West Coast region. Papadopoulou et al. (2009) looked at a broader aspect of the container shipping development and discuss the transition of ocean carriers from maritime transport providers to supply chain integrators, i.e., an evolution from shipping to logistics. Stahlbock and Voß (2009) focus upon port management issues and examine how rail-mounted gantry cranes can help to improve a container terminal's efficiency. The following gives more specific view of the papers in this special issue.

Lagoudis and Fragkos (2009) consider joint container fleet sizing and vessel fleet sizing in a cyclic container shipping service. The paper develops a holistic model which intends to identify the factors that affect container utilisation in order to minimise container idle time. Results indicate that the development of such a model can assist container shipping companies in improving their operations related to container fleet sizing, vessel capacity utilisation, scheduling and frequency of shipping service. The authors point out that whilst there is significant literature on containership routing, scheduling and empty container repositioning problems, hardly any studies take a more holistic approach incorporating the problems of optimum vessel and container fleet size in order to satisfy customer demand. This research fills the research gap in this aspect.

Feng and Chang (2009) study the optimal slot allocation problem in an intra-Asia shipping service route by maximising the operational profit of an ocean carrier. A revenue management model is developed using linear programming. The cost of empty container repositioning and the constraints of vessel capacity, container demand and empty container supply are considered. The results can serve as guidelines for shipping agencies and ocean carriers to allocate port-to-port slots appropriately and provide a criterion to review the status of strategic alliance among ocean carriers. The authors state that the proposed model may be suitable for a stable market environment with a surfeit of demand. For an unstable market, carriers could change dynamically the demand data to obtain optimal slot allocation.

Song et al. (2009) consider the optimal container-dispatching problem for both laden and empty containers and explore its structural characteristics in a two-terminal service system with finite shipping capacity and random customer demands. With the assumptions that no short-term leasing is permitted and unmet demands within one period are lost, the optimal dispatching policy is obtained using the Markov decision process approach and the value iteration algorithm. The structural characteristics of the optimal policy are then illustrated using numerical examples, which lead to a four-parameter threshold policy. A range of scenarios with different combinations of the degrees of demand uncertainty, the patterns of trade demands and the container fleet sizes, were tested. It was found that the proposed threshold policy is extremely close to the optimal policy. The main advantage of the proposed threshold policy is that the policy is easy-to-understand and easy-to-operate for operational managers. From the form of the four-parameter threshold policy, it implies that a good control policy should take into account a great deal of dynamic information, e.g., inventory level, customer demands and shipping capacity.

Le-Griffin and Griffin (2009) investigate the viability of using short sea shipping along the US West Coast to manage the flow of empty containers as an integral aspect in the regional port systems. An operational framework for short sea shipping is proposed and its economic and environmental efficiency is compared quantitatively with a truck-only service. The paper finds support for the implementation of short sea shipping and argues in favour of the establishment of regional port systems to provide an appropriate institutional framework for coordination of public and private investments in short sea shipping. Overall, the paper finds that short sea shipping represents a viable tactic in the implementation of a regional port system development strategy on the West Coast of the USA and should be considered as a possible method for alleviating landside congestion stemming from commercial traffic in major urban corridors.

Papadopoulou et al. (2009) examine the need for ocean carriers to move forward and provide maritime logistics instead of plain maritime transport. This paper analyses the transportation characteristics and the technological means that will promote maritime logistics integration. Through a case study of Maersk Logistics, the role of the fourth party logistics provider (4PL) is examined and the evolution from ocean carrier to 4PL is described. It argues that the transition from an ocean carrier to a type of logistics provider is not feasible within the same company, but can be achieved through mergers, acquisitions, alliances or establishment of affiliate companies.

Stahlbock and Voß (2009) investigate to what extent double-rail-mounted gantry cranes can help to improve a container terminal's efficiency. A simulation study is conducted for evaluating different online algorithms for sequencing and scheduling of jobs for automated double rail mounted gantry cranes serving a terminal's storage block.

The experiments are based upon scenarios that are derived from the real world [Container Terminal Altenwerder (CTA), Hamburg]. The simulation experiments show that for up to a workload of 25 box/h the results of the proposed algorithms are not significantly different. For high workload, the simulated annealing approach dominates the priority rule-based heuristics, in particular with respect to the important waterside. It also revealed that the proposed methods are able to increase the reliability of synchronisation of the horizontal transport and achieve more efficient use of the terminal equipment.