Maritime container logistics and onshore transportation systems (part 3)

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The last decade has seen tremendous investments in new container ports, vessels, and linked onshore transportation systems. Due to the high level of customer service requested and the complexity of logistic processes in seaport container terminals, many terminal operators have attempted to improve the performance of their terminals by applying new technologies including automated equipment, advanced information technologies, and optimization techniques. The demand for these new technologies has been further intensified as the size of deep-sea vessels gets larger and coastal and landside transportation systems are linked to major container ports. As a result, global freight networks are emerging which combine maritime transport, inland waterways and onshore road and rail transportation systems.

The primary objective of this special issue is to reflect the recent developments in maritime and landside container transport and to examine research issues concerned with quantitative analysis and decision support for container terminal logistics and freight transportation systems. For the third and final part of the special issue six

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papers have been selected for publication after a thorough peer-review according to the standards of the FSM journal.

The first and the second part with the following papers have been published in Volume 23 (2011), Number 4, and Volume 24 (2012), Number 3 of FSM.

- Do Ngoc, A.D., Moon, I.-K.: The storage capacity expansion and space leasing for container depots
- Douma, A.M., Schuur, P.C., Schutten, J.M.J.: Aligning barge and terminal operations using service-time profiles
- Wang, S. Wang, T., Meng, Q.: A note on liner ship fleet deployment
- Kim, J., Morrison, J.R.: Offshore port service concepts: classification and economic feasibility
- Kim, J., Morrison, J.R.: Erratum to: Offshore port service concepts: classification and economic feasibility
- Hendriks, M.P.M., Armbruster, D., Laumanns, M., Lefeber, E., Udding, J.T.: Strategic allocation of cyclically calling vessels for multi-terminal container operators
- Ku, L.P., Chew, E.P., Lee, L.H., Tan, K.C.: A novel approach to yard planning under vessel arrival uncertainty
- Caris, A., Macharis, C., Janssens, G.K.: Corridor network design in hinterland transportation systems
- Lee, C.-Y., Yu, M.: Inbound container storage price competition between the container terminal and a remote container yard
- Line Blander Reinhardt, L., Pisinger, D.: A branch and cut algorithm for the container shipping network design problem

1 Papers in part 3 of the special issue

The first paper by *J. Wiese, L. Suhl, and N. Kliewer* presents an analytical model for designing yard layouts of container terminals at which straddle carriers are used. The authors derive estimates for the expected cycle times of the straddle carriers considering different layout alternatives as well as various driving and storage space allocation strategies. Numerical results are presented for several parameter settings. The results show that for driving strategies, storage options, and layout orientations it cannot be concluded that one option is superior to another. For each layout option situations might exist in which that particular layout works best.

The subsequent paper by *O. Kulak, O. Polat, R. Gujjula and H.-O. Günther* considers the case of a container terminal in Turkey which has been established long time ago and faces severe difficulties in competing with other terminals which have a more efficient layout and use more modern equipment. By means of a simulation study directions for the future development of the configuration and the operational control system were identified. Among the tested strategies there are ones which require substantial financial investments, e.g. replacing yard trucks with self-loading vehicles like straddle carriers. Other strategies, like altering the yard space allocation, promise productivity gains with only little financial investments.

In their paper *R. Dekker, S. van der Heide, E. van Asperen* and *P. Ypsilantis* present and analyze a chassis exchange terminal concept to reduce truck congestion at container terminals. The main idea is that during the night containers are collected using chassis (or trailers) and then in daytime these containers on chassis are exchanged with export containers also on chassis. The main advantage of this concept is to increase the handling capacity of the container terminal particularly during peak hours. As a case study the Maasvlakte container terminals in Rotterdam are investigated.

The impact of truck announcements on container stacking efficiency is studied in the paper by *E. van Asperen, B. Borgman* and *R., Dekker*. A discrete-event simulation model is used to evaluate the impact of a truck announcement system on the performance of online container stacking rules. Specifically, the expected departure time for an import container can be used to schedule remarshal moves at times when the workload is low in order to decrease the export time and the crane workload at peak times. Even the algorithms that use approximations of this departure time information have a better performance than the more basic stacking algorithms that are enhanced with truck arrival information.

K. Shin and *T. Lee* address “Mobile Harbours”, a new type of mobile floating port system equipped with an on-board crane for off-shore container handling capability. Due to its unique operational features, it creates a new type of operational scheduling problem, namely scheduling container loading and unloading operations for the on-board crane. In this paper, a genetic algorithm (GA) and a local search method are developed to generate a feasible unloading schedule. Experimental results show that both the GA and the local search method generate solutions of similar quality when the stability constraint is loose and that the local search method is not effective under tight stability constraints.

The final paper by *H. Nam* and *T. Lee* also addresses “Mobile Harbours” as a movable floating platform with a container handling system on board. A specific scheduling problem is to determine a timed sequence of loading/discharging tasks, the assignment of mobile harbour units to each task and their docking position with the objective of minimizing the make span of a series of incoming container ships. As a practical solution method this paper proposes a rule-based algorithm and a random key based genetic algorithm (rkGA). Computational results show that the rkGA outperforms the rule-based method, while requiring longer computation time.

2 Concluding remarks

This special issue has greatly benefited from the cooperation among the authors, reviewers, and editors. We would like to express our sincere thanks to the reviewers for their excellent and timely refereeing. Last, but not least, we thank all authors for their contributions which made this special issue possible.