Flex Serv Manuf J (2017) 29:1–3
DOI 10.1007/s10696-017-9281-y

EDITORIAL

Maritime and container logistics

Rommert Dekker[1] · **René de Koster**[2] · **Kap Hwan Kim**[3]

Published online: 2 February 2017

Today's world economies are connected through intercontinental supply chains, consisting of a combination of land and sea transport and using terminals and warehouses as nodal points. Containerization has lowered transportation and handling costs substantially and has allowed international trade to reach today's high levels. In search of lower costs, companies have looked for increasing economies of scale in larger ships and in terminal automation, driven by advances in information technology. Yet these developments have led to new problems due to the complexity of automated systems. Bottlenecks have shifted from sea to land transport, while environmental pressures encouraged the development of intermodal transport and slow steaming.

The primary objective of this special issue of the *Flexible Services and Manufacturing* (*FSM*) *Journal* is to reflect on 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. Five papers, written as a result of the LOGMS 2014 Conference on Logistics and Maritime Systems, held in Rotterdam, Netherlands,

✉ René de Koster
rkoster@rsm.nl

Rommert Dekker
rdekker@ese.eur.nl

Kap Hwan Kim
kapkim@pusan.ac.kr

[1] Erasmus School of Economics, Erasmus University, Burgemeester Oudlaan 50, 3062 PA Rotterdam, The Netherlands

[2] Rotterdam School of Management, Erasmus University, Burgemeester Oudlaan 50, 3062 PA Rotterdam, The Netherlands

[3] Department of Industrial Engineering, Pusan National University, 30 Jangjeon-Dong, Gumjeong-Ku, Pusan 609-735, Korea

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

1 Papers in the special issue

The first paper by *Branislav Dragović*, *Ernestos Tzannatos*, and *Nam Kuy Park* presents a detailed review of research literature on the application of simulation models in port development and container terminal operations over the last 50 years. Most of the research literature addresses operational issues. More recently, simulation modelling appears also to be used to offer integrated solutions for transport and maritime operations. The authors also find that simulation tools are increasingly used to offer tangible solutions to the maritime and transport industry.

The second paper, by *Leonard Heilig* and *Stefan Voß*, presents a review on inter-terminal transportation. Many port regions contain multiple container terminals that carry out part of the operations, including value added services and connecting other sea terminals or the hinterland. This requires efficient inter-terminal transportation. The authors present a chronological overview of literature as an annotated bibliography reflecting the current state of research. They identify future research issues and propose a research agenda.

The third paper, on a flexible crane scheduling methodology for container terminals, by *Guvenc Dik* and *Erhan Kozan* is about scheduling the container terminal quay cranes to load or unload containers on a vessel. Since large vessels are handled by multiple quay cranes that drive on common rails, the cranes have to move collaboratively between the vessel's bays. The paper proposes a flexible neighbourhood search algorithm for quay crane scheduling problems in combination with tabu search. The problem is highly complex. In the literature, the container workload of a ship is partitioned into a number of fixed jobs. This paper proposes an approach with flexible jobs which are dynamically changed throughout the search process to eliminate the impact of fixed jobs on the generated schedules. Comparative computational experiments are conducted that show that the algorithm is capable of generating high quality schedules for quay crane handling operations within a reasonable time.

The next paper, by *Vibhuti Dhingra*, *Debjit Roy*, and *René De Koster*, is on a cooperative quay crane-based stochastic model to estimate vessel handling time. Having a good estimate of a vessel's handling time is essential for planning and scheduling container terminal resources, such as berth positions, quay cranes and transport vehicles. However, estimating the expected vessel handling time is not straightforward, because it depends on vessel characteristics, resource allocation decisions, and uncertainties in terminal processes. The authors propose a two-level stochastic model. The higher level model consists of a continuous-time Markov chain (CTMC) that captures the effect of QC assignment and scheduling on vessel handling time. The lower level model is a multi-class closed queuing network that models the dynamic interactions among the terminal resources and provides an estimate of the transition rate input parameters to the higher level CTMC model. They estimate the expected vessel handling times for several container load and

unload profiles and discuss the effect of terminal layout parameters and crane service time variabilities on vessel handling times. The vessel handling time is strongly dependent on the variation in the QC service time and on the vehicle travel path topology.

The final paper is by *Francesco Corman*, *Francesco Viti*, and *Rudy Negenborn*, on an equilibrium model in multimodal container transport systems. The model aims to balance costs, expressed as a function of transport mode (e.g. truck, train, or barge), travel time and related congestion, and waiting time for bundling sufficient demand in order to fill a vehicle in a multi-mode transport network. Given a particular demand, the model provides an assignment of the demand over the transport modes. The equilibrium distribution minimizes the costs. The model deals with the reaction of the players towards the actions of the others. The authors study the influence and sensitivity of different model parameters, to find a target modal share for freight transportation and under which conditions the different modes can serve as substitutes for each other.

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.

Rommert Dekker is a full professor of Quantitative Logistics and Operations Research at the Erasmus University Rotterdam. His research interests include maritime and port logistics, transport optimization, sustainability, reverse and service logistics and inventory control. He has written over 200 papers in those areas and cooperated with many companies, like ECT Container Terminals, Maersk Line, Fokker Services, Shell International, Ortec Consultants, IBM, ASML, Netherlands Railways.

René de Koster is professor of Logistics and Operations Management at Rotterdam School of Management, Erasmus University. His research interests are warehousing, terminal, and behavioural operations. He is author/editor of 8 books and over 150 papers in books and journals. He is/was in the editorial boards of Operations Research, Journal of Operations Management, Transportation Science (SI editor), and other journals. He is member of several international research advisory boards (like the European Logistics Association and BVL). His research has received several awards (IIE Transactions 2009, 2016; Journal of Operations Management finalist 2007), Academy of Management best paper finalist 2013).

Kap Hwan Kim is working at the Department of Industrial Engineering of Pusan National University. He studied at the Seoul National University (Bachelor) and the Korea Advanced Institute of Science and Technology (Master, Ph.D.). He was a visiting scholar at Purdue University, Montreal University, and Shanghai Maritime University. He was the director of the Institute of Logistics Innovation and Networking at Pusan National University and the president of the Korean Institute of Industrial Engineers. His research is focused on the design and operational problems of container terminals. He published many papers at international journals such as Flexible Services and Manufacturing Journal, Transportation Science, Transportation Research B, Transportation Research E, European journal of Operational Research, and so on.