Preface

This book contains six chapters that can be used on a self-contained basis as teaching cases in an undergraduate or specialist class setting on OR techniques applied to maritime container operations or for port operations. Instructors and students can look forward to an insightful presentation of the challenges facing the maritime supply chains and container port logistics service providers in Asia and their innovative responses to these challenges through the real-world cases presented in this book.

Chapter 1 presents a candid look at the maritime trade logistics and supply chain landscape by examining the trend of globalization and port development within Asia, and its impact on container port business activities and the environment.

Chapter 2 explores the provision of container yard and quay services in detail. It examines how a leading port manages the port efficiently by joint optimization of the quay crane, yard crane, and prime mover, each of which is supported by extensive literature review.

Chapter 3 highlights how container terminal operations are bottlenecked by the yard cranes. So, this chapter develops a discrete time model and its associated algorithms for rapid yard crane scheduling, based on realistic operational constraints such as inter-crane interference, fixed separation distances, and simultaneous storage/retrievals in the yard.

Chapter 4 then goes on to study the continuous time model for multiple yard crane scheduling with additional practical constraints. This chapter specifically looks at the impact of last minute container job insertions and shows how the container yard problem can be solved quickly and robustly in polynomial time. This application is extremely useful for transshipment operations where there are numerous occasions of last minute destination port shifts.

Chapter 5 examines the role of heuristics in yard crane scheduling. We look specifically at two underlying concepts for our heuristics development in the case of multiple yard crane scheduling, namely that of the concurrent and divide and conquer approaches. We then provide a hybrid of the two approaches to yield the clustering-reassigning heuristic which is a better candidate for real-time scheduling. Again, this heuristic has practical industry value as container ports attempt to

reduce their time taken for creating loading plans in their bid to be competitive vis-à-vis the other ports nearby.

Chapter 6 revisits the frequent approach used in container scheduling by port operators and that is simulation. Specifically, we apply discrete time simulation to validate and assess the proposed hybrid heuristic in Chap. 5. Further, we deploy a simulation model on a mega transshipment container terminal in Asia and investigate the performance of the heuristic under various conditions such as different routing policies, equipment ratios, and so on.

We trust that you will enjoy reading the book and using the techniques as much as we have enjoyed writing them for you.

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