

The Hong Kong Polytechnic University
Department of Logistics and Maritime Studies
Research Seminar

Optimization Applications in Maritime Logistics and Operations

by

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The Hong Kong Polytechnic University

(Conducted in English)

Abstract:

This thesis investigates four optimization problems in maritime logistics and operations, where the first two problems are related to container ships that transport cargo and the other two problems are related to cruise ships that transport passengers. The first problem concerns the container ship type decision. It aims to determine the ship types deployed on shipping routes while taking the possible empty container repositioning and the usage of novel foldable containers into account. The second problem addresses the optimal reefer slot conversion for container freight transportation. It optimizes the number of reefer slots in a fleet of container ships deployed on a shipping route and re-optimizes the sequence of these ships to maximize the revenue. The third problem investigates the cruise itinerary schedule design for a cruise ship. It determines the visiting sequence of several ports of call and the corresponding arrival and departure times at the ports, so as to maximize the monetary value of cruise passengers' utility minus operations costs. The fourth problem focuses on cruise service planning. It proposes a solution approach to schedule available cruise services for a cruise ship over a planning horizon while considering berth availability at ports of call and decreasing marginal profit for each cruise service. To solve the four problems, different operations research methods are proposed, such as network flow modeling, mixed integer linear programming, simulation algorithms, dynamic programming, model linearization techniques, and heuristic algorithms. By referring to real-world data, extensive numerical experiments are conducted to validate the effectiveness of the proposed methods. Some potential managerial insights behind the problems are also revealed.

Bio:

Wang Kai received his B.Mgt in Engineering Management from Shanghai University (2014), and MSc in Supply Chain Management from National University of Singapore (2016), during which he has done some internship or part-time jobs in Atlas Copco, General Motors, and Delta Electronics, respectively. After the graduation from NUS, he also has worked as Teaching Assistant & Research Assistant in Engineering School of Griffith University for six months. He is currently pursuing his Doctor of Philosophy under the supervision of Dr. WANG Shuaian (Hans), sponsored by Hong Kong PhD fellowship Scheme. His interested research areas include cruise shipping, port logistics, maritime transportation and optimization algorithms.

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All are welcome!