Project Title: Ensuring the operational resilience of shipping by integrating vessel slot allocation and container supply planning with uncertain demand for yield management and order fulfilment in the global supply chain
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Abstract

The global supply chain has been increasingly disrupted by cargo demand fluctuations, trade policy restrictions, pandemic measures, price competitions, factory order changes, and other economic factors, leading to frequent mismatch of the shipment demand against vessel and container supplies. This disruption has evolved from an industrial problem to a threat to economic stability. Ship liners strive to ensure smooth cargo delivery by seeking more agile management of the vessel slots, shipping network, container supply, repositioning strategies, and slot exchange to lower operation costs and improve shipping yield and profitability. Slot allocation is typically based on the demand prospects from the traffic control regions in which cargoes are directly loaded or transshipped at the port calls of the service routes served by ship liners. With the demand and supply are frequently mismatched, it is necessary to realise consistent and synchronised planning considering the container supply, empty container repositioning, and demand prospects of the cargo control party. Optimal slot allocation for laden and empty containers on own and alliance partner vessel spaces is vital. The existing slot allocation planning strategies based on container supply planning methods, such as container repositioning, new container purchasing, lease-in, one-way free use, disposal control, and slot exchange, are implemented over separate entities in a sequential manner. The slot allocation operations are simulated without considering and integrating the changes in all the container supplies as well as cargo demand from cargo control parties. These deficiencies in slot allocation operations are expected to result in container supply shortage, booking shortfall, low vessel utilisation, and order fulfilment failure.