

Impact of Northern Sea Route on China's grain imports with EU countries

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Abstract

The Northern Sea Route (NSR) has been navigated successfully with the melting polar ice and developing technology, which will impact China's bulk trade with the European Union (EU) countries. This research mainly investigates the effect of using NSR for grain transport with a minimum comprehensive cost, including shipping costs and environmental effects. Integer programming has been applied to optimize the simulation system with 24 routes and six types of vessels (five conventional vessels and one ice-class vessel) in the with-NSR and without-NSR situations. The result shows that the cost will be reduced by 20% with-NSR scenario, and an additional 7% reduction can be found with the increase in the ice-class vessel fleet. Due to the current demand, panamax-sized vessels are the most preferable. This article also provides an optimal and feasible framework for vessel scheduling in with-NSR and without-NSR situations.

Keywords

Northern sea route (NSR), Bulk shipping, China-EU transportation, Ship routing and scheduling, Grain import, Carbon tax