

Maintaining and improving the efficiency of hinterland transport for international maritime containers

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Port, Coastal and Marine Department, Port Planning Division

Head
(PhD (Engineering)) ABE Motohisa

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1. Introduction

To address truck driver shortages and help realize carbon neutrality, we have conducted research on the improvements in the efficiency of hinterland transport for international maritime containers since FY2021. This paper presents the findings of the research to date, as well as future issues and challenges based on those findings.

2. Hinterland transport functions for international maritime containers: Current state and challenges

Figure 1 illustrates the shipping process for a container (export scenario)—a common form of hinterland transport—through steps (1) to (8). In this process, trailers specialized for the transport of international maritime containers (“maritime trailers”) are used. Because empty containers are sent in one direction in both export and import transactions, these containers are sometimes reused in hinterland areas using a “container round use” system intended to improve transport efficiency. From April 2024, work style reform legislation was enacted that tightens regulations governing work hours for drivers who transport maritime containers (giving rise to the so-called “2024 Problem”). To maintain hinterland transport functions in such an environment, transport efficiency needs to be improved. This may also contribute to a reduction in CO₂ emissions, and confer other benefits.

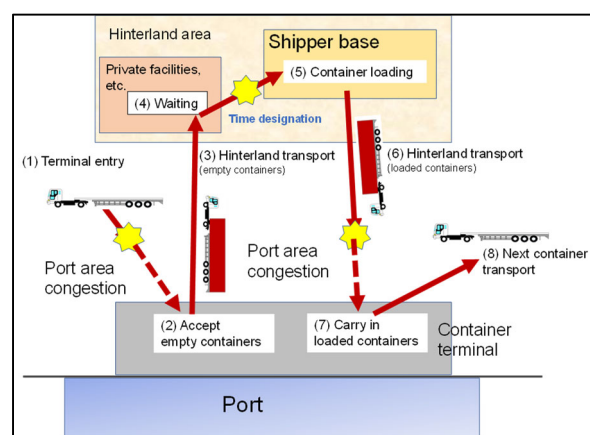


Figure 1: Current state of hinterland transport

3. Outlook for driver surpluses/shortages

We have estimated the outlook for driver surpluses/shortages in 2030. Under present conditions, demand and supply appear to be closely matched, but our estimates indicate that driver shortages will emerge for hinterland transport from East Japan to the Keihin ports in 2030 (**Figure 2**). In this scenario, our estimates also show that shortening waiting times (assumed 20-minute reduction at ports, and 10-minute reduction at shipper bases) at transportation hubs (shipper bases at ports and in hinterland areas) would alleviate the shortage ratio.

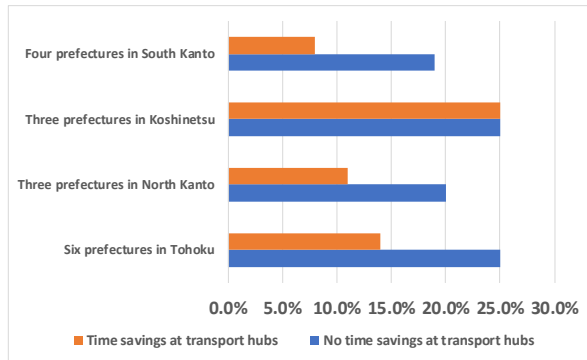
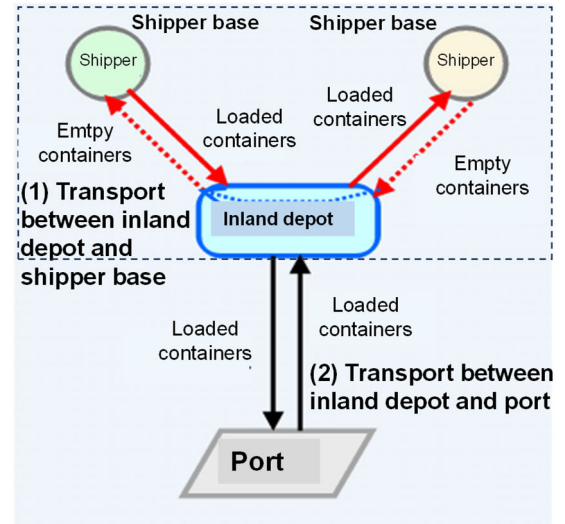


Figure 2: Results of driver shortage ratio estimates (2030)

4. Measures to improve hinterland transport efficiency and results

In this research, we divided the hinterland into three areas based on distance from Keihin ports, and studied various measures to improve efficiency and their results. In this paper, we present our research on medium-distance locations. These include the North Kanto area (Gunma Prefecture, Tochigi Prefecture, and Ibaraki Prefecture) and Fukushima Prefecture, all of which are located at a certain distance from Keihin ports and have a concentration of export companies. This makes them suitable candidates for improvements in transport efficiency. As a measure to increase transport efficiency, we envision the use of inland facilities that handle containers (inland depots), as illustrated in **Figure 3**. These inland depots serve as container round use hubs. Furthermore, through the inland depots, we assume functions can be divided into (1) transport between inland depots and shipper bases, and (2) transport between inland depots and ports (Keihin ports).



- Using container round use system between shippers through an inland depot
- Division of functions: (1) transport between inland depot and shipper base, and (2) transport between inland depot and port

Figure 3: Improving transport efficiency through the use of inland depots

Under (1), goods are transported short distances in the area surrounding the inland depot, making it possible to increase the daily turnover per driver. Furthermore, the time restraints per transport shorten, facilitating flexible work styles and enabling support for the promotion of employment of female and elderly staff. **Table 1** shows estimated results of the implementation of measures to improve efficiency. The results confirm improvements in both CO₂ emissions and productivity of maritime container operators. While the aforementioned measures are expected to significantly alleviate shortages of drivers that transport maritime containers, they will not entirely eliminate the problem. Therefore, we are also studying other measures such as automated driving.

Table 1: Estimated results of implementation of efficiency improvement measures (example)

Item	Estimated item	Estimated result of efficiency improvement measures
Improvement in shortage of truckers who transport maritime containers	Contribution to reduction in shortages of drivers of maritime container trucks	Shortages to improve by 10% or more, but not be eliminated fully
Improvement in transport times	Time required per round use transport and number of rotations in working hours after tightened regulations	Driver operational efficiency can be improved by allowing 2–3 rotations per day
Reductions in CO2 emissions	CO2 emissions generated through required hinterland transport	Potential improvement of 5% or more
Transport costs	Transport costs shouldered by shippers (including depot usage fees)	Expected to increase
Business productivity	Productivity of maritime container transport companies	Expected to improve
Profitability of inland depots	Profitability of establishment and operation of inland depots	Additional cost of roughly 2,000 yen per container per time is required

Assuming the inland depot establishment and operating costs are shouldered by shippers, improvements in transport efficiency through the container round use system can be confirmed, but there will be a slight increase in overall costs. As to the question of how this cost burden should be borne, there is room to explore measures such as the use of carbon credits.

5. Toward the implementation of efficiency improvement measures for hinterland transportation

Conventional hinterland transport takes the form of separate round trips for each import/export transaction, but society demands solutions to driver shortages and other related problems. Consequently, hinterland transport can be regarded as an essential social system. Another conceivable option is to improve efficiency under a collaboration of stakeholders, including through public-private partnerships. Below, we present challenges that will be faced in implementing improvement measures for hinterland transportation.

First, to improve shortages of drivers who transport

maritime containers, it is necessary to reduce waiting time that does not add value. To shorten loading and unloading times at port terminals, information systems are being rolled out, and there are also calls for reductions in waiting times at shipper bases in hinterland areas. Second, the participation or collaboration of stakeholders plays an important role. For example, when establishing and operating inland depots, it is worth considering support from public institutions (there are already cases of inland depots that have been set up by local governments). Furthermore, when implementing a container round use system, it is necessary to monitor the locations of empty containers in real time and share them among stakeholders. Another requirement is to introduce a mechanism to share information and collaborate among maritime container operators and shipping companies who own containers, while considering the transportation-related procedures among shippers. Third, the applications of new technologies can also be assumed to be effective—particularly, the introduction of automated platooning, and the development of information systems that support the operation of a hinterland transport system.

6. In closing

In the foregoing, we have introduced the current status of hinterland transport for international maritime containers, measures to improve related efficiency, and other information. Going forward, we intend to continue studying measures to improve efficiency with an eye toward the application of new technologies and digital transformation (DX), starting with the monitoring of the impact of the 2024 Problem.

For more details, please refer to the following.

- 1) National Institute for Land and Infrastructure Management Technical Note No.1239
<https://www.ysk.nilim.go.jp/kenkyuseika/pdf/ks1239.pdf>