

Analysis of Port Logistics and Development of Predictive Model for Strengthening of International Competitiveness

Port Systems Division, Port and Harbour Department

Head Tomihiro Watanabe

Senior Researcher

Tomoko Sasaki

Senior Researcher

Kanpei Iwasaki

(Key words) Port Cargo, Container, Ferry, Predictive Model

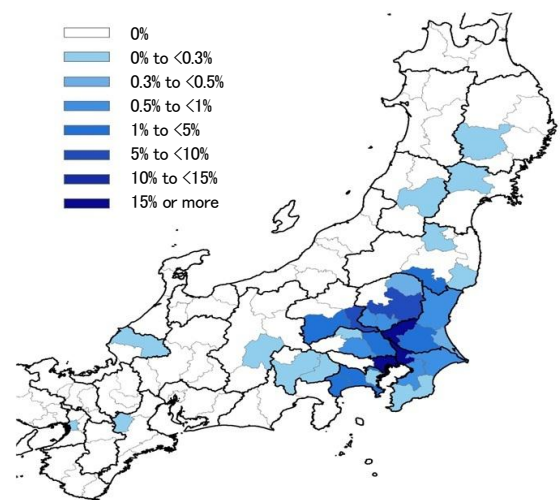
1. Introduction

The environment surrounding marine transportation is undergoing great changes, including increasing use of ultra-large container ships, construction of the new Panama Canal and expansion of international container/ferry traffic with neighboring countries. Amid these changes, Japan is deploying an international container strategic port policy, etc. to strengthen the international competitiveness of Japanese ports and industry.

Based on this background, we carried out an analysis of port logistics and developed a model for prediction of international container/ferry cargo flows which will be useful in the planning, drafting and execution of Japan's port policies. The following presents an outline.

2. Analysis of port logistics




An analysis of cargo flows was performed using data from the National Survey on Import/Export Container Cargo Flow (date: Nov. 2013), which made it possible to grasp the transportation routes for international marine container cargos between producing/consuming regions in Japan and destination/origin countries by net flows as a series of movements. Fig.-1 shows an example of an analysis of the distribution of consuming regions for import cargos into Japan for international RORO ship routes linking ports in Korea and the Kanto region. The differences between RORO ships and ferries, etc. are shown in Table-1. Fig.-2 shows an analysis of the regional ports used in the United States for export cargos from Japan to the US by four regions.



Source: Analysis of shares of Korea→Kanto ports by consuming region, based on data in text

Fig.-1 Example of analysis of cargo flows of international RORO ship cargos

Table-1 Features of ferry, RORO and container ships

	Ferry	RORO ship	Container ship
			
①	Roll-on/Roll-off (self-propelled)	Roll-on/Roll-off (self-propelled)	LOLO (Lift-on/Lift-off using crane)
②	· Passengers · Cargos (containers, trucks/cars, chasses)	· Passengers · Cargos (containers, trucks/cars, chasses)	· Cargos (containers)

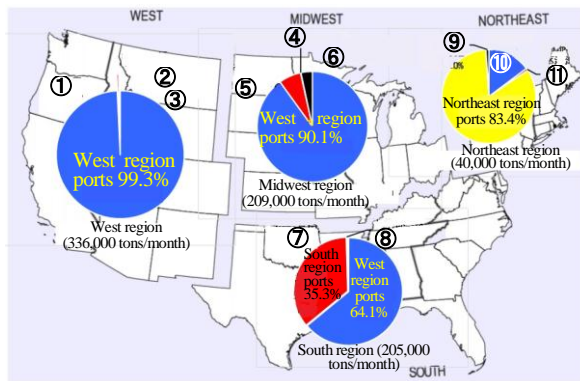


Fig.-2 Ports used for export cargos from Japan to various regions of United States

WEST

- ① South region ports 0.5%
- ② Northeast region ports 0.1%
- ③ Other (non-US) ports, 0.1%

MIDWEST

- ④ Northeast region ports 0.1%
- ⑤ South region ports 6.5%
- ⑥ Other (non-US) ports 3.3%

SOUTH

- ⑦ Other (non-US) ports 0.4%
- ⑧ Northeast region ports 0.1%

NORTHEAST

- ⑨ Other (non-US) ports 1.0%
- ⑩ West region ports 14.8%
- ⑪ South region ports 0.8%

3. Development of international container/ferry cargo flow model

Using the data from the above-mentioned National Survey on Import/Export Container Cargo Flow, etc., we developed a cargo flow model¹⁾ which makes it possible to analyze changes in the cargo volume by port, effect on the hinterland, etc. depending on changes in the service levels of international container/ferry routes, etc. by a sacrifice model, in which routes are selected to minimize the total sacrifice S of transportation routes ($S = \text{transport cost } C + \text{required time } T \times \text{cargo time value } \alpha$). Using the developed model, we also performed an impact analysis

to evaluate the changes in cargo flows on international ferry routes (i.e., volume of cargos, regions from which cargos are collected) depending on the opening of new international ferry routes and progress of mutual traffic of chasses on international ferry routes with Korea, and related issues.¹⁾

【Reference】

- 1) Technical Note of National Institute of Land and Infrastructure Management, No. 801
<http://www.nilim.go.jp/lab/bcg/siryoutnn/tnn0801.htm>