GTI

Current Situation and Future Prospects of Freight Transport Infrastructure and Services between Japan and the Greater Tumen Region (GTR) [1]

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1 Introduction

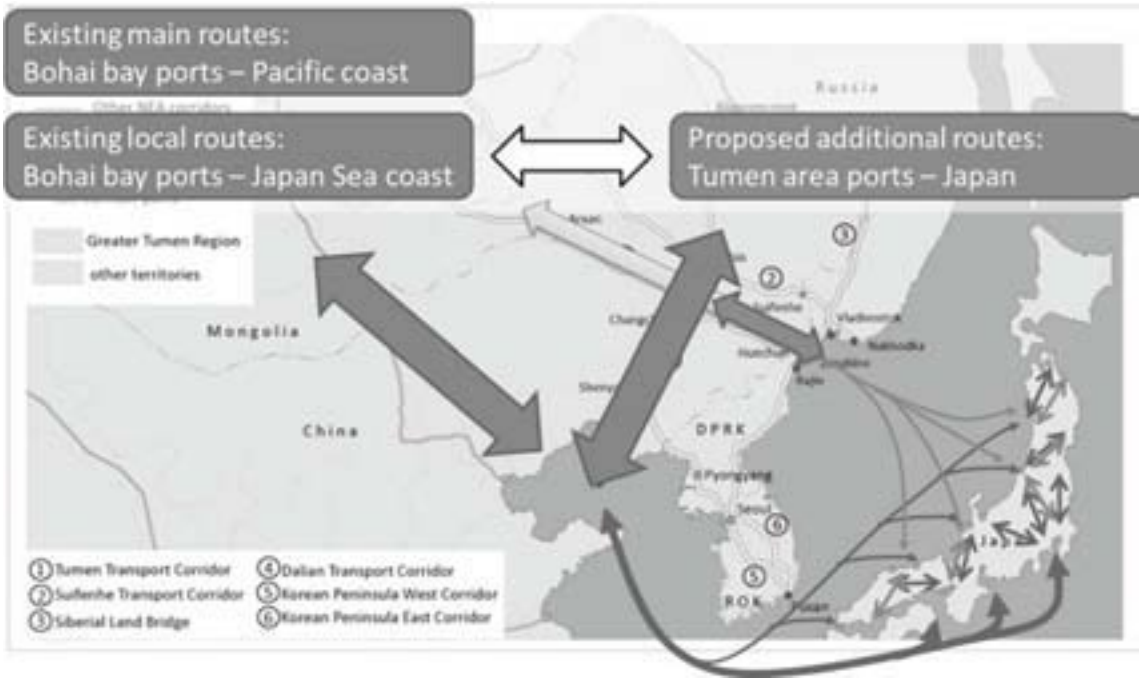
Geographically Japan is located beyond the sea, and none of the trans-GTR corridors run through its territory. At the same time, any sea routes from the GTR ports or the "exits" of the corridors should be regard as essential extensions of the corridors. Without effective connections with marine transport the corridors cannot realize their expected function. Discussing the marine segments, their first destinations are Japan and the ROK. Therefore, connectivity with Japan is among the key criteria to ensure the positive development of the trans-GTR corridors.

Nevertheless, the developments and good-functioning of corridors should have substantial impacts for Japan. The impacts might be different depending on where you are and what you do. The most significant impacts might be observed on the west coast of Japan. Currently, major amounts of freight are transported between the Bohai ports of China and the Pacific coast ports in Japan, as the bold arrows show in the diagram (Figure1-1). Smaller amounts of freight use the ports of the west coast of Japan. However, promoting the proposed corridors, namely the Tumen and Suifenhe corridors, this structure would be changed. Eastern Mongolia and Heilongjiang and Jilin provinces will be connected to Japan via ports in the Primorye region of Russia.

The same diagram suggests the reason why local societies along the west coast of Japan attach importance to cooperation and the economic development of Northeast Asia. They want to attract a certain part of the freight flows that are currently transported through the Pacific ports. It is quite a rational desire, considering the geographical situation. A cargo vessel from the Primorye ports, such as Zarubino and Vladivostok, will arrive at any port of the Japanese west coast within 2 days at maximum, performing a voyage of around 500 nautical miles.

Taking into account these circumstances, the paper put

Figure1-1: Trans-GTR corridors and Japan



Source: Author

[1] The content of the paper is based on the major outcomes of the investigative project which the GTI conducted in 2012 under the title of "Integrated Transport Infrastructure and Cross-Border Facilitation Study for the Trans-GTR Transport Corridors," in which the author participated as a national consultant.

more focuses on the west coast than the Pacific coast, even though economic activities are concentrated in the later.

2 Due Diligence Review of Transport between Japan and the GTR Region

2.1 Traffic Review

➢ Ocean freight traffic by country

MLIT conducts a nation-wide survey called the "Survey on Ports and Harbours", or "*Kowan Chosa*" in Japanese, annually. The results are published as the fundamental statistics of port activities. It contains the number of vessels calling at ports, the numbers of passengers and the volume of freight. The survey is organized in the form of reports submitted by the captain of a ship to the port management body, which are then aggregated by them for each port, and finally at the national level by Ministry of Land, Infrastructure, Transport and Tourism(MLIT).

The survey form contains such items as the port of destination/origin, the port of final unloading/ first loading, the type of cargo (container, on-chassis, or other), the classification of the commodity and the volume. Thus, if the export goods are transported to port A in country B with a transshipment at port C in country D, port A is reported as the port of the final unloading, with port C as the port of destination. The statistics submitted to MLIT, however, don't retain the port-specifying information, as MLIT requires aggregate figures by country. Consequently, the national statistics identify only country B as the country of final unloading, as well as country D as the port of destination.

Table 2.1-1 summarizes the ocean freight volume to/from Northeast Asian countries by the final unloading/first loading countries. Mongolia is not shown because it is a landlocked country without any sea ports. Most of freight traffic to/from Mongolia should be counted inclusively as a part of freight to/ from the PRC, which provides the shortest route to the sea.

Table 2.1-1 Freight Flows to/from NEA by Country (tons)

	2006	2007	2008	2009	2010
Exports	**77,834,900**	**84,540,201**	**83,805,286**	**79,800,099**	**83,667,255**
ROK	29,301,149	32,211,937	29,037,608	27,596,520	30,133,403
DPRK	139,285	18,846	8,320	2,102	2,098
PRC	43,157,600	46,222,472	47,340,040	50,792,664	50,657,664
Russia	5,236,866	6,086,946	7,419,318	1,408,813	2,874,090
Imports	**135,252,215**	**135,156,350**	**128,397,874**	**114,554,746**	**143,175,162**
ROK	26,823,450	24,398,303	24,677,815	20,518,696	25,666,821
DPRK	311,196	4,747	151,816	0	3,954
PRC	89,573,021	85,660,652	81,437,604	68,181,316	78,099,323
Russia	18,544,548	25,092,648	22,130,639	25,854,734	39,405,064

Source: MLIT "*Kowan Chosa* [Survey on Ports and Harbours]"

The year of 2009 observed a decline both in exports and imports, which is explained by the world financial crisis. The largest partner is the PRC. While freight shipped to China has demonstrated an increasing trend, inbound freight to Japan shows negative dynamics. The dynamics for the ROK are relatively insignificant compared to the other countries. With regard to exports to Russia, a change of customs tariff on used cars affected the situation greatly in 2009, reducing the number of exported used cars almost ten-fold compared to 2008. Expansion of imports from Russia was caused by the completion of the East Siberia-Pacific Ocean crude oil pipeline and an LNG plant on Sakhalin Island. The former enabled the export of crude oil extracted in the Siberian region to Japan. Although trade with the DPRK has been restricted in recent years and no trade was fixed in the trade statistics, freight turnovers were recorded. In fact, two records in the dataset were proved to be incorrect while double-checking the data. Therefore, there might be other incorrect records that should be counted for other countries, not for the DPRK. In any case, the volume is too small to distort the overall structure at the regional scale.

➢ Estimates by region

Even though Table 2.2.1-1 gives an overview of freight traffic within the Northeast Asian region, it is not sufficient for detailed analysis of freight flows with the GTR. This section tries to estimate the freight volume for Mongolia, Northeast China and the Russian Far East.

Assuming that transit freight with third countries other than Mongolia is small enough, the freight is divided up proportionally for the PRC and Mongolia using the ratio of the trade of Japan with both countries in terms of the value for each year (Table 2.1-2 and Table 2.1-3). Also freight volumes to/from the three Northeastern provinces (Liaoning, Jilin and Heilongjiang) are estimates, calculated by the share of these provinces in the PRC's trade with Japan in 2010.

Table 2.1-2 Estimated Freight to the PRC and Mongolia

	Unit	2006	2007	2008	2009	2010
Japan-PRC Freight (O)	tons	43,157,600	46,222,472	47,340,040	50,792,664	50,657,664
Japan-PRC Trade (A)	Mil. Yen	10,794	12,839	12,950	10,236	13,086
Japan-Mongolia Trade (B)	Mil. Yen	12	18	24	10	14
Mongolia/PRC Ratio (C)=(B)/((A)+(B))		0.00114	0.00141	0.00184	0.00097	0.00107
Northeast Provinces		0.050	0.050	0.050	0.050	0.050
Ratio* (D)						
Final destinations						
Mongolia (E)=(O)*(C)	**tons**	**49,326**	**65,080**	**86,984**	**49,264**	**54,029**
PRC (F)=(O)–(E)	**tons**	**43,108,274**	**46,157,392**	**47,253,056**	**50,743,400**	**50,603,635**
Incl. Northeast Provinces (F)*(D)	**tons**	**2,155,414**	**2,307,870**	**2,362,653**	**2,537,170**	**2,530,182**

* Proportion of Liaoning, Jilin and Heilongjiang provinces in the PRC's trade with Japan in 2010. (Source: ZHU, Yonghao, "Trade and Investment Relations between the Three Provinces of China's Northeast and Japan" [in Japanese], *ERINA Report* No. 106, July 2012)

Table 2.1-3 Estimated Freight from the PRC and Mongolia

	Unit	2006	2007	2008	2009	2010
PRC-Japan Freight (O)	tons	89,573,021	85,660,652	81,437,604	68,181,316	78,099,323
PRC-Japan Trade (A)	Mil. Yen	13,784	15,035	14,830	11,436	13,413
Japan-Mongolia Trade (B)	Mil. Yen	1	2	4	1	2
Mongolia/PRC Ratio (C)= (B)/((A)+(B))		0.00007	0.00013	0.00025	0.00006	0.00015
Northeast Provinces Ratio* (D)		0.088	0.088	0.088	0.088	0.088
Origins						
Mongolia (E)=(O)*(C)	**tons**	**6,353**	**10,856**	**20,602**	**4,044**	**11,698**
PRC (F)=(O)–(E)	**tons**	**89,566,668**	**85,649,796**	**81,417,002**	**68,177,272**	**78,087,625**
Incl. Northeast Provinces (F)*(D)	**tons**	**7,881,867**	**7,537,182**	**7,164,696**	**5,999,600**	**6,871,711**

* Proportion of Liaoning, Jilin and Heilongjiang provinces in the PRC's trade with Japan in 2010. (Source: ZHU, Yonghao, "Trade and Investment Relations between the Three Provinces of China's Northeast and Japan" [in Japanese], *ERINA Report* No. 106, July 2012)

An assumption in the estimation of the regional distribution of Russia is that trading goods between the Russian Far East and Japan are carried either by direct shipping or transshipment via the PRC or ROK. Freight transshipped via other countries in Asia, and Europe, etc., is assumed as trade with European Russia. Due to the rough assumptions, the terms of "Far East" and "European" Russia should be interpreted as the eastern and western territories of Russia without strict definition of the dividing line between them. The results are presented in Table 2.1-4, which suggest that the majority of the bilateral trade may be attributed to eastern Russia.

Table 2.1-4 Freight Volume Transported to/from Russian Ports (tons)

	2006	2007	2008	2009	2010
Japan-Russia					
"Far East"	5,118,060	5,910,235	7,100,932	1,266,189	2,441,286
"Europe"	118,806	176,711	318,386	108,711	432,804
Total	5,236,866	6,086,946	7,419,318	1,374,900	2,874,090
Russia-Japan					
"Far East"	18,504,022	24,841,006	21,990,876	25,666,728	39,214,749
"Europe"	40,526	251,642	139,763	188,006	190,315
Total	18,544,548	25,092,648	22,130,639	25,854,734	39,405,064

Source: MLIT "*Kowan Chosa* [Survey on Ports and Harbours]"

Resulting from the estimates, the freight flows to/from the GTR are summarized as Table 2.1-5.

Table 2.1-5 Freight Flows to/from the GTR (tons)

	2006	2007	2008	2009	2010
Exports	**36,763,234**	**40,513,968**	**38,596,497**	**31,451,245**	**35,160,998**
ROK	29,301,149	32,211,937	29,037,608	27,596,520	30,133,403
DPRK	139,285	18,846	8,320	2,102	2,098
NE China	2,155,414	2,307,870	2,362,653	2,537,170	2,530,182
Mongolia	49,326	65,080	86,984	49,264	54,029
Russian FE	5,118,060	5,910,235	7,100,932	1,266,189	2,441,286
Imports	**53,526,888**	**56,792,094**	**54,005,805**	**52,189,068**	**71,768,933**
ROK	26,823,450	24,398,303	24,677,815	20,518,696	25,666,821
DPRK	311,196	4,747	151,816	0	3,954
NE China	7,881,867	7,537,182	7,164,696	5,999,600	6,871,711
Mongolia	6,353	10,856	20,602	4,044	11,698
Russian FE	18,504,022	24,841,006	21,990,876	25,666,728	39,214,749

Source: Author

➢ Estimated freight flows to/from Northeast China (port-to-port statistics)

As mentioned before, the statistics on freight published by MLIT identify destinations and origins by country, not by port. Meanwhile, some port management bodies or local governments release data broken-down by port. Although some statistics don't cover all ports, but only major ports, such as the top ten destinations/origins, they help to investigate certain topics.

In this section, the author attempted to estimate the freight volume between Japan and Northeast China. For this purpose, statistics for ten major ports are used. Seven of them are located in the central Pacific area and the other three are located on the west coast (Table 2.1-6). They altogether cover three quarters of Japan's freight flow to/from the PRC, with 69.5% of exports and 77.7% of imports. Therefore, one can expect to obtain a general outline of the freight flow by analyzing their statistics.

Table 2.1-6 Freight Volume of Selected Major Ports to/from the PRC (2010, tons)

	Exports	Imports	Total
Chiba	1,980,700	1,235,730	3,216,430
Tokyo	4,450,082	11,915,073	16,365,155
Yokohama	9,583,431	9,770,240	19,353,671
Kawasaki	1,418,548	531,050	1,949,598
Nagoya	6,793,800	10,408,852	17,202,652
Osaka	2,717,768	13,141,609	15,859,377
Kobe	4,429,393	5,445,145	9,874,538
Pacific Majors	**31,373,722**	**52,447,699**	**83,821,421**
Niigata	251,523	976,163	1,227,686
Kitakyushu	1,586,038	2,747,820	4,333,858
Hakata	2,049,275	3,156,171	5,205,446
West Coast Majors	3,886,836	6,880,154	10,766,990
Total	**35,260,558**	**59,327,853**	**94,588,411**
Japan Total	**50,714,880**	**76,342,778**	**127,057,658**
(Share)	69.5%	77.7%	74.4%

Source: Statistical data for each port

For the purpose of estimation, the three Liaoning ports of Dalian, Yingkou and Dandong are selected, taking that they represent Northeastern China. Table 2.1-7 suggests that the total amount of export freight from the selected ports to Northeastern China may have been approximately 1.6 million tons in 2010, considering unreported data. Assuming the same proportion (around 5% of the total exports to the PRC) for all the ports of Japan together, an estimated export freight volume can be calculated of 2.5 million tons.

Table 2.1-7 Exports from Selected Ports to Northeast China (2010, tons)

	PRC	Dalian	Yingkou	Dandong	Sub-total	(%)
Chiba	1,980,700	30,343	7,315	7,903	45,561	2.30%
Tokyo	4,450,082	218,244	30	n.a	218,274	4.90%
Yokohama	7,999,847	289,181	6,888	n.a	296,069	3.70%
Kawasaki	1,418,548	4,787	1,966	n.a	6,753	0.48%
Nagoya	6,262,758	435,290	n.a	n.a	435,290	6.95%
Osaka	2,717,212	104,076	n.a	n.a	104,076	3.83%
Kobe	4,429,393	232,432	0	0	232,432	5.25%
Pacific Coast	**29,258,540**	**1,314,353**	**-**	**-**	**1,338,455**	**4.57%**
Niigata	372,478	12,289	366	0	12,655	3.40%
Kitakyushu	1,586,038	89,545	0	0	89,545	5.65%
Hakata	2,007,232	121,721	n.a	n.a	121,721	6.06%
West Coast	**3,965,748**	**223,555**	**-**	**-**	**223,921**	**5.65%**
Sub-total	**33,224,288**	**1,537,908**	**-**	**-**	**1,562,376**	**4.70%**

* "n.a." refers to either absence of traffic at all or insignificant figures disregarded for publication.
Source: Statistical data for each port

In the case of imports from Northeast China, the share is assumed at around 8%, and the estimated volume amounts to 6.1 million tons (Table 2.1-8).

Table 2.1-8 Imports of Selected Ports from Northeast China (2010, tons)

	PRC	Dalian	Yingkou	Dandong	Sub-total	(%)
Chiba	1,235,730	511,401	73,623	27,637	612,661	49.58%
Tokyo	11,915,073	949,796	17,228	n.a	967,024	8.12%
Yokohama	8,141,726	506,418	8,299	n.a	514,717	6.32%
Kawasaki	531,050	29,561	n.a	n.a	29,561	5.57%
Nagoya	10,371,688	757,905	n.a	n.a	757,905	7.31%
Osaka	13,140,592	866,280	n.a	n.a	866,280	6.59%
Kobe	5,396,130	431,260	0	0	431,260	7.99%
Pacific Coast	**49,496,259**	**3,541,220**			**3,566,747**	**7.21%**
Niigata	1,381,602	234,244	3,460	0	237,704	17.20%
Kitakyushu	2,747,820	228,199	35,217	2,500	265,916	9.68%
Hakata	3,302,259	347,032	1,985	n.a	349,017	10.57%
West Coast	**7,431,681**	**809,475**			**852,637**	**11.47%**
Sub-total	**56,927,940**	**4,350,695**			**4,419,384**	**7.76%**

* "n.a." refers to either absence of traffic at all or insignificant figures disregarded for publication.
Source: Statistical data for each port

➢ International container freight

There were 63 ports handling international ISO containers in Japan in 2010. The non-profit organization the Port and Harbour Modernization Promotion Council of Japan publishes statistics on the numbers of international containers handled at the ports, aggregating the statistics gathered from each port authority's local government. A shortcoming of the statistics is that they don't contain data broken-down by country of origin/destination.

The five largest container handling ports are Tokyo, Yokohama, Nagoya, Osaka and Kobe, where annual throughput is around 2 million TEU or higher (Table 2.1-9).

Table 2.1-9 Containers Handled at the Five Largest Ports (TEU, incl. empty)

	Tokyo	Yokohama	Nagoya	Osaka	Kobe	Others	Total
2008	3,727,302	3,203,871	2,630,524	1,950,008	2,040,285	3,605,427	17,157,417
2009	3,381,498	2,555,236	2,051,769	1,843,069	1,772,904	3,152,088	14,756,564
2010	3,816,104	2,975,273	2,394,630	1,980,021	2,017,957	3,669,515	16,853,500

Source: Port and Harbour Modernization Promotion Council of Japan

There are 13 ports located on the west coast of Honshu Island and the north of Kyushu Island at which container vessels call regularly (from Akita in the north to Hakata in south, Figure 2.1-1). Among them the ports of Hakata and Kitakyushu, which are in the north of Kyushu Island, are the largest, handling 541,000 TEU and 331,000 TEU in 2010, respectively. The largest on the west coast of Honshu Island is Niigata Port.

Figure 2.1-1: Container Handling Ports on Japan's West Coast

Source: Author

Table 2.1-10: Containers Handled at the West Coast Ports (TEU, loaded only, 2010)

Rank in Japan	Port	TEU (Loaded only)
6	Hakata	541,343
8	Kitakyushu	330,536
12	Niigata	120,512
16	Shimonoseki	55,256
20	Fushiki-Toyama	47,407
21	Akita	34,196
22	Kanazawa	32,353
34	Sakaiminato	17,774
35	Naoetsu	17,360
37	Tsuruga	15,319
50	Sakata	5,486
53	Maizuru	4,103
59	Hamada	2,216

Source: Port and Harbour Modernization Promotion Council of Japan

2.2 Infrastructure Capacity Review

2.2.1 Shipping Lines' Capacity

The GTR is connected with Japan, the ROK and other APR countries by marine transport. Focusing on the west coast of Japan, this section reviews the regular shipping services. Even though tramper services also play a significant role in transportation, in particular of bulk and liquid cargoes, their capacity is not discussed in this section, because their services are elastic enough to meet the demands once freight volume is specified. Thus, regular shipping services for general public users are the main topics of the section. Meanwhile, focus is placed on the shipping lines that transport container freight.

The reviewed shipping lines are as follows:

- Japan Trans-Siberia Line (JTSL)
- Sinokor Line
- Busan transshipment services
- DBS Cruise Ferry
- Niigata Zarubino Line

Shipping routes between Japan and Bohai ports (Dalian, Yingkou, and Dandong, etc) are excluded from the scope of the review, because there is highly-developed market competition and it seems that shipping companies are always ready to increase their capacity in response to demand growth.

➢ Japan Trans-Siberia Line (JTSL)

MOL, a Japanese shipping company, and FESCO, a Russian shipping company, jointly provide regular container transport services. There are "direct" and "transshipment" routes.

The former route operates a container vessel "VEGA DAVOS (698 TEU)" to call at the Japanese ports of Yokohama, Nagoya, Kobe, Kitakyushu (Moji), Toyama and the Russian ports of Vostochny and Vladivostok once every two weeks (Figure 2.2-1). The ultimate annual capacity of the shipping line can be calculated as a product of the vessel's capacity and number of voyages, while disregarding the factors of weather conditions, the need for technical maintenance, the dead capacity caused by the container inventory, and so on. Assuming that the vessel would perform 26 voyages per year, the capacity of this route is approximately 18,000 TEU one-way.

Figure 2.2-1 JTSL Direct Service

Source: Author

Along with direct shipping, the companies offer a transport service with transshipment at the Port of Busan. There are existing shipping routes operated by themselves and partner shipping companies between Japan and Busan, as well as between Busan and the Russian ports of Vladivostok and Vostochny. Connecting at Busan, they enable the transportation of containers between Japan and Russia. Thus, the companies improve the service quality in terms of frequency. Before they started the transshipment service, many shippers' clients had claimed that the direct

Figure 2.2-2 JTSL Transshipment Service

* The direct service ports also have transshipment services, although they are not shown on the map.
Source: FESCO (http://www.fesco.ru/clients/container/line/jtsl/) 2012.10.28

service of calling at the ports once every two weeks didn't satisfy their needs. In addition, the transshipment widens the geographic coverage on the Japanese side, collaborating with shipping companies working in the market of Japan-Busan container transportation (Figure 2.2-2).

FESCO put the container vessels "KAPITAN AFANASYEV" (1,748 TEU) and "SCIO SUN" (1,752 TEU) onto the shipping routes Vladivostok-Busan and Vostochny-Busan, respectively. Weekly voyages totaling 52 per year enable the transport of 182,000 TEU annually. This is the maximum capacity of the service for this section of the routes. In fact, however, they carry a certain amount of bilateral trade goods between Russia and the ROK, as well as those transshipped at Busan to/from third countries. The bilateral trade between Russia and Japan seems to occupy a minor portion of the total cargo carried by the two vessels, even though it is difficult to identify exact freight volumes by direction. Thus it is even more difficult, or practically impossible, to identify the capacities for each direction, because the vessels don't have any physical systems or mechanisms discriminating containers in terms of their origins and destinations.

The same can be said for the section between Busan and Japan. The situation is more complicated, because there is an even greater variety of vessels depending on the ports served. One key factor in the context of the report is that the overall capacity between Busan and Japan is quite large, which enables us to assume that the capacity in the section between Russia (Primorye) and Busan determines the total capacity of the transshipment service.

The author suggests a simple assumption that 10% of the maximum capacity of the Russia-Busan segment would be the capacity of the transshipment service. Considering the purpose of the report is to obtain an elementary overall understanding of the situation, it may not be justified to investigate further details of the capacity issues by employing more complicated assumptions. In this case, the combined capacity would reach 36,000 TEU, including the direct service capacity.

➢ Sinokor Line

An ROK shipping company, Sinokor Merchant Marine, has developed a regular container transport network in East Asia. After years of experience in transporting container freight between Japan and the Far East of Russia with transshipment at Busan, it started a non-transshipment service between Japan and Vladivostok in August 2012. The ports called at include the four west coast ports of Akita, Niigata, Naoetsu and Toyama (Figure 2.2-3). After departing the last port, Toyama, container vessels head to Vladivostok via Busan. The standard transport time between the Japanese ports and Vladivostok is 5-7 days, both for exports and imports.

The advantages of the new shipping line are less transport time, ensured transport time and less risk of damage. First, total transport time is reduced by eliminating transshipment operations and the waiting time for connection. Second, there is no risk of time loss at Busan, which is sometimes observed in the case of transshipment services. If the connecting vessel is overbooked, containers are stored at the container terminals of Busan until the next available vessel picks them up. The new service is able to avoid this kind of wasted time. Third, elimination of trans-loading operations for transshipment reduces the risk of physical damage from shock for the goods carried. Thus, the four west coast ports gained certain advantages with regard to container transport to the Russian Far East, compared to other Japanese ports where the shipping company continues to offer the Busan transshipment service.

The two container vessels "SINOKOR TOKYO" (834 TEU) and "GOLDEN WING" (656 TEU) have been put into operation. As the rotation along the route takes two weeks, the operation of the two vessels enables calling at each port once a week. If both vessels perform 26 voyages per year the annual total capacity is 38,740 TEU. There is, however, the same problem as in the case of the JTSL transshipment service. The capacity is not dedicated to bilateral trade between Russia and Japan only.

Just for simplification, the same assumption of 10 percent can be employed in this case as well. Thus, the annual capacity is suggested to be about 4,000 TEU.

➢ Busan transshipment services

Many other shipping companies also offer container transport services with transshipment at Busan Port. Among them are American President Lines (APL), CK Line, Dong Young, Hyundai Merchant Marine (HMM), Korea Marine Transport (KMTC), and Maersk, etc. Some of them operate routes both between Japan and Busan as well as between Busan and Vladivostok/Vostochny. The others operate only one segment and use their partners' shipping services in the other segment to organize the connecting transport.

Identification of capacity is more difficult than in the cases that were reviewed above, because some services use segments of the transcontinental trunk lines or intra-Asian multi-destination lines, which use large-scale vessels. In addition, some shipping companies charter slots of the other companies' vessels. Due to these difficulties, a quantitative

Figure 2.2-3 Sinokor Line

Source: Author

estimate of capacity cannot be conducted.

➢ DBS Cruise Ferry

A unique ferry route is operated by the Korean shipping company DBS Cruise Ferry. A ferry boat "Eastern Dream" (130 TEU) connects Sakai and Vladivostok in 2 days via Donghae (ROK) on a weekly basis(Figure 2.2-4). In terms of containers, the annual capacity is 6,760 TEU over 52 voyages. As is the case with the other above-mentioned shipping routes, the entire capacity is not able to be offered for the through freight between Vladivostok and Sakai. The Tottori Prefectural government officials suggested that there is a large amount of cargo in the Vladivostok-Donghae segment and very little available capacity. A conservative figure of 300 TEU can be taken as a possible rough estimate.

Punctuality, as well as short transit time, is among the advantages of the ferry route. The nature of regular ferry services requires the shipping company to keep to the announced schedule, particularly for passengers' convenience. In the words of Sakai port officials, overnight delays occur just a few times per year. Another specific feature is RO-RO cargo handling. It doesn't need heavy duty container cranes for the loading/unloading of containers on the one hand. On the other hand, it enables transportation of non-containerized general cargo, which provides local SMEs with opportunities to ship their small-lot trading goods at an appropriate cost.

Tottori Prefecture supports this route, as it should promote the port and local economy of Sakaiminato City and Tottori Prefecture. The prefecture, together with local municipalities, provides subsidies to the shipping company. The maximum amount of subsidy is 1.5 million yen (approx. US$20,000) for each call at Sakai port.

Figure 2.2-4 DBS Cruise Ferry

Source: Author

➢ Niigata-Zarubino line

There is another unique transportation route, connecting Niigata and Zarubino(Figure 2.2-5). Its most remarkable feature is that it targets dealing with trade cargo between Japan and Northeast China through the gate-city of Hunchun, Jilin Province. Multimodal transport is arranged for shippers, issuing a multimodal B/L, or so-called thru-B/L, covering land transport between Zarubino and Hunchun.

It is an ad-hoc on-demand service so far. A general cargo vessel "Teddy Bear", which usually runs between Nakhodka and Niigata, Naoetsu and some other Japanese ports according to shippers' requests, is arranged to call at Zarubino when needed. The route was opened in summer 2011 by a Japanese shipping company, Iino Koun, and then, from August 2012, a Russian transport company, "Primoravtotrans", has operated the route.

According to the promotion material of Niigata Prefecture, "Teddy Bear" is capable of transporting 65 TEU of containers. Assuming that there are none of the technical constraints mentioned below and it performs a voyage (one-way) in three days, the annual capacity could reach almost 4,000 TEU over 61 voyages in a year.

In practice, however, there are several constrains. The vessel is rather small and hardly keeps schedules under severe weather conditions. Meanwhile, lack of a heavy-load STS crane at Zarubino port makes container operation at the port significantly time-consuming, which should affect the shipping schedule when freight turnover grows.

The technical constraint of the loading/unloading operation is a significant problem even under the current minimum volume of freight. In fact, 40-foot containers as well as full-loaded 20-foot containers are not able to be handled at the port. A possible solution is to change the ship to a RO-RO ship, which doesn't need cranes. Despite the sincere efforts of related organizations, a suitable vessel has not been found so far. Another solution is to install one or more cranes at the berth, which requires more investment and time to realize. Once they are installed, however, the opportunity to develop shipping routes will be broadened.

Figure 2.2-5 Niigata-Zarubino Line

Source: Author

➢ Wrapping-up comments

There are several types of shipping routes between the ports of Primorye and Japan, including the west coast. According to the rough estimation argued above, there is a certain amount of capacity as shown in Table 2.2-1. It seems that the current capacity meets the current demand in terms of volume. One problem is the quality of service in terms of transportation time, frequency, punctuality, and cargo damage risks, as well as costs. This issue is argued later in the section reviewing time and cost factors.

Table 2.2-1 Estimated Capacity of Shipping Routes

	Capacity (TEU/year)	Comments
JTSL Direct	18,000	
JTSL Transshipment	18,000	About 10% of Russia-Busan segment capacity
Sinokor	4,000	About 10% of Russia-Busan segment capacity
DBS Cruise Ferry	300	About 5% of total capacity
Niigata-Zarubino	4,000	

Source: Author

Another potential problem is the uncertainty in the capability to meet future demand growth, even though one can expect that there will always be some shipping companies ready to launch new shipping lines or increase existing capacity when new trade flows come into reality.

2.2.2 Ports

Japan relies on marine transport to move the majority of the goods essential for its inhabitants' daily lives, and about 99.7% of all goods involved in foreign trade pass through Japan's ports and harbors. Marine transport accounts for 38.7% of all domestic cargo distribution on a ton-kilometer basis.

There are about a thousand ports across the country (Table 2.2-2). As of 31 March 2011, there were 23 "Designated Major Ports" in Japan. These are further divided into two categories; Strategic International Ports and Core International Ports. The Strategic International Ports are the ports in Tokyo, Yokohama, Kawasaki, Osaka and Kobe. The Japanese government is going to develop them as international container traffic hubs in east and west Japan. There are 5 Core International Ports along the west coast: from north to south, Niigata, Fushiki-Toyama, Shimonoseki, Kitakyushu, and Hakata.

Table 2.2-2 Number of Ports by Category (as of April 2012)

Category	Number
Strategic International Ports	5
Core International Ports	18
Major Ports	103
Local Ports	809
(incl. Harbors of Refuge)	(35)
Article 56 Ports	61
Total	996

Notes: Harbors of Refuge: The main purpose of these harbors is to allow small vessels to anchor during heavy windstorms or rainstorms. Established by government decree, they are not intended for the loading and unloading of cargo or passengers.
Article 56 Ports: These ports have been decreed by the prefectural governor as marine districts without any district boundaries, in order to ensure the absolute minimum necessary regulation, and have been set aside for use as ports in the future.
Source: MLIT

As mentioned above, there are 13 ports that accommodate regular container shipping services along the west coast of Honshu (the main) Island and the north of Kyushu Island. Because of their geographic position, they can be regarded as principal candidates for the target ports of the Trans-GTR corridors. Therefore, the outlines of their infrastructure development are summarized as follows:

➢ Port of Akita

Akita Port is located in Akita City, Akita Prefecture. There are 26 public berths with a depth of 4.5 to 13 meters, and 11 private berths.

Container loading is conducted at the Ohama and Gaiko terminals. The port handled 49,264 TEU (including empty containers) in 2010.

Table 2.2-3 Outline of Container Terminals at Akita Port

	Gaiko	Ohama
Depth (m)	-13	-10
Length (m)	270	185
Area (sq. m)	19,200	38,900
STS Crane Type	Container handling gantry	Tire-mounted mobile crane
Number of Cranes	2	1

➢ Port of Sakata

Sakata Port is located in Sakata City, Yamagata Prefecture.

Container loading is done at the multipurpose international terminal. The port handled 7,202 TEU (including empty containers) in 2010.

Table 2.2-4 Outline of Container Terminal of Sakata Port

Depth (m)	-13
Length (m)	280
Area (sq. m)	42,500
STS Crane Type	Container handling gantry
Number of Cranes	2

➢ Port of Niigata

Niigata Port is divided into the West Port and the East Port. The historical West Port is located in Niigata City, and the East Port sits astride Niigata City and the town of Seiro.

The container terminal is located in the East Port. The port handled 162,641 TEU in 2010. Construction on Berth No. 4 of the terminal was started in 2009 as a response to the rapid increase in container cargo. Use began on a 120m section of this berth in 2010, but as of June 2012 the full 250m berth is now being used as originally planned. Also, the overhaul of the container yard inside the terminal is advancing, and it will have the ability to handle 224,000 TEU annually. However, the amount of cargo handled in 2011 was 204,960 TEU, so there will not be much excess capacity. Therefore Niigata Prefecture is examining other ways to expand its terminal.

Table 2.2-5 Outline of Container Terminal of Niigata Port

Berth	No. 2	No. 3	No. 4
Depth (m)	-10	-12 (-14)	-12 (-14)
Length (m)	185	350	120 (250)
Area (sq. m)	274,880		
STS Crane Type	Container handling gantry	Container handling gantry	
Number of Cranes	1	2	

Note: Numbers in parenthesis are planned capacity.

➢ Port of Naoetsu

Naoetsu Port located in Joetsu City is the second largest port in Niigata Prefecture.

Container loading is performed at Berth No. 4 of the East Wharf. In 2010 it handled 23,338 TEU.

Table 2.2-6 Outline of Container Terminal of Naoetsu Port

Depth (m)	-10
Length (m)	200
Area (sq. m)	53,000
STS Crane Type	Container handling gantry
Number of Cranes	1

➢ Port of Fushiki-Toyama

Fushiki-Toyama Port is located in Toyama Prefecture. The port is divided amongst three areas: the Fushiki District, the Toyama District, and the Shinminato District.

Container loading/unloading operations are carried out at the multipurpose international terminal in the Shinminato District. As a response to the increase in container numbers, 2010 saw an additional gantry crane, with two gantry cranes currently in operation. The port handled 64,266 TEU in 2010.

Table 2.2-7 Outline of Container Terminal of Fushiki-Toyama Port

Depth (m)	-12 (-14)
Length (m)	333
Area (sq. m)	104,000
STS Crane Type	Container handling gantry
Number of Cranes	2

Note: Numbers in parenthesis are projected.

➢ Port of Kanazawa

Kanazawa Port is located in Kanazawa City, Ishikawa Prefecture.

Container loading is performed at Gokuden Wharf. It is a general purpose wharf, so other items besides containers, such as steel, are also dealt with at this location. The port handled 40,299 TEU in 2010. As a response to the increase in container numbers, the port authority is proceeding with the installation of a transfer crane in the terminal that is expected to be completed sometime in 2012. Handling capacity will increase up to 56,900 TEU annually.

Table 2.2-8 Outline of Container Terminal of Kanazawa Port

Depth (m)	-10
Length (m)	540
Area (sq. m)	-
STS Crane Type	Container handling gantry
Number of Cranes	1

➢ Port of Tsuruga

Tsuruga Port is located in Tsuruga City, Fukui Prefecture.

Container loading is mostly being conducted at the multipurpose international terminal in the Maruyama-South District. The remaining containers carried by RO-RO boats are handled in the Kawasaki-Matsue District. The port handled 18,973 TEU in total for 2010.

Table 2.2-9 Outline of Container Terminals of Tsuruga Port

	Maruyama-South	Kawasaki-Matsue
Depth (m)	-14	-10
Length (m)	280	370
Area (sq. m)	52,000	N.A
STS Crane Type	Container handling gantry	None
Number of Cranes	1	None

➢ Port of Maizuru

Maizuru Port is located in Maizuru City, Kyoto Prefecture. Most domestic cargo is handled at the East Port while international cargo is mainly handled at the West Port.

Container loading is performed at International Berth No.1 located at the East wharf. The port handled 5,645 TEU in 2010.

Table 2.2-10 Outline of Container Terminal of Maizuru Port

Depth (m)	-14
Length (m)	280
Area (sq. m)	59,000
STS Crane Type	Container handling gantry
Number of Cranes	1

➢ Port of Sakai

Sakai Port is located in Sakaiminato City, Tottori Prefecture, but as it is close to Shimane Prefecture it is managed by the Port Authority Association established jointly by Tottori and Shimane Prefectures.

Container loading is done mostly at the international container terminal. In addition, DBS Cruise Ferry, an ROK shipping company, has been conducting a regular ferry service from Sakaiminato-Donghae (ROK)-Vladivostok since July 2009. Containers are also handled at this ferry terminal. The port handled 25,757 TEU in total for 2010.

Table 2.2-11 Outline of (Container) Terminals of Sakai Port

	Int'l Container Terminal	Int'l Ferry Terminal
Depth (m)	-13 (-14)	
Length (m)	280	
Area (sq. m)	54,400	N.A
STS Crane Type	Container handling gantry	None
Number of Cranes	1	None

Note: Numbers in parenthesis are projected.

➢ Port of Hamada

Hamada Port is located in Hamada City, Shimane Prefecture.

Container loading is performed at the Fukui No. 4 wharf. The port handled 3,233 TEU in 2010.

Table 2.2-12 Outline of Container Terminal of Hamada Port

Depth (m)	-7.5
Length (m)	130
Area (sq. m)	16,000
STS Crane Type	Multipurpose
Number of Cranes	1

Note: Numbers in parenthesis are projected.

➢ Port of Shimonoseki

Shimonoseki Port is located in Shimonoseki City, Yamaguchi Prefecture. It faces the Kanmon Strait that lies between Honshu and Kyushu Islands.

The port has two container terminals; the Hananocho Wharf and the Shinko (new port) Wharf. In addition, its unique characteristic is its position as Japan's largest commuter ferry terminal. There are two regular services to the ROK and another two routes to China, resulting in 13 ferries each week. Hosoe Wharf, where the international regular ferries moor, has an area of 170,000 square meters. In total there are five berths which include two berths that each have a depth of 10m (total length 370m), two berths that each have a depth of 7.5m (total length 260m), and the remaining berth that is 5.5m in depth (total length 213m). The port handled 82,436 TEU carried by container vessels and ferries in 2010.

Table 2.2-13 Outline of Container Terminals of Shimonoseki Port

	Hananocho Wharf	Shinko (new port) Wharf
Depth (m)	-10	-12
Length (m)	370	300
Area (sq. m)	45,000	72,000
STS Crane Type	Container handling gantry	Multipurpose jib crane
Number of Cranes	1	1

➢ Port of Kitakyushu

Kitakyushu Port is located in Kitakyushu City, Fukuoka Prefecture at the northernmost tip of Kyushu Island.

The port has three terminals. The newest, Hibiki container terminal, which is equipped with 15-meter-depth berths and long-reach cranes, can accommodate large-size container vessels. The port handled 405,804 TEU in 2010.

Table 2.2-14 Outline of Container Terminals of Kitakyushu Port

	Tachiura No. 1 CT	Tachiura No. 2 CT	Hibiki CT	
Number of Berths	2	3	2	2
Depth (m)	-12	-10	-15	-10
Total length (m)	620	555	700	340
Area (sq. m)	161,500	161,547	385,100	
STS Crane Type	Container handling gantry	Container handling gantry	Container handling gantry	
Number of Cranes	4	3	3	

➢ Port of Hakata

Hakata Port is located in Fukuoka City, Fukuoka Prefecture.

Owing to its establishment in 1997, Hakata Port has a short history as a container port compared to others. While this may be so, recent years have seen a substantial increase in container cargo and the port has become the sixth largest port in Japan in terms of the number of containers handled.

Hakata Port has two modern container terminals: Kashii Park Port CT and Island City CT. The former was opened in 1997. The latter started operations at Berth No.1 in 2003 and has been expanding its capacity since. It is equipped with advanced energy-saving technologies and ICT. In addition to the regular container services, Hakata Port has a ferry route to Busan and a RO-RO boat service to Shanghai. The "Shanghai Super Express Service" by RO-RO ship can connect Hakata Port with Shanghai in only 28 hours, which gives it the characteristic of being faster than the usual container route and cheaper than air delivery.

Table 2.2-15 Outline of Container Terminals of Hakata Port

	Kashii Park Port CT	Island City CT
Number of Berths	2	2
Depth (m)	-13	-14 and -15
Length (m)	600	680
Area (sq. m)	223,195	284,000
STS Crane Type	Container handling gantry	Container handling gantry
Number of Cranes	4	5

➢ Total container handling capacity of the west coast ports

Most Japanese port management bodies do not announce their handling capacity. Therefore, the author would suggest simplified estimates considering the number of berths and cranes, as presented in Table 2.2-16. Under this assumption, the total annual capacity is calculated as approximately 2.7 million TEU.

Table 2.2-16 Container Terminals Capacity Estimates

Ports	Estimated Annual Capacity
Kitakyushu, Hakata	1,000,000 TEU
Niigata	200,000 TEU
Akita, Fushiki-Toyama, Shimonoseki	100,000 TEU
Sakata	50,000 TEU
Naoetsu, Kanazawa, Tsuruga, Maizuru, Sakai, Hamada	30,000 TEU

Source: Author

2.2.3 Road Network

The road network in Japan has developed very rapidly since the 1970s. The total length of public roads in Japan amounted to 1.2 million km as of April 2009. Public roads are classified into four categories according to the Road Act (Table 2.2-17).

Table 2.2-17 Types of Public Road in Japan

		Managing Body	Funding Body	Length in Operation (km)
National Expressways		MLIT	Expressway companies *	7,642
Ordinary National Highways	Specified Sections (Ministerial Highways)	MLIT	MLIT	22,874
	Non-Specified Sections (Subsidized Highways)	Prefecture (Designated City)	MLIT, Prefecture (Designated City)	31,916
Prefectural Roads		Prefecture (Designated City)	Prefecture (Designated City)	129,377
Municipal Roads		Municipality	Municipality	1,016,058

* Some sections of expressway are constructed by funding of MLIT or prefecture (designated city) in accordance with the national plan for expressway construction.
Source: Various materials of MLIT

The Japanese government is developing a national network of "arterial high-standard highways", which comprises the entire national expressway network and parts of the national highways. The total length of planned expressways is 11,520 km, of which 7,642 km are in operation and about 1,800 km are under construction (including at the design stage). The some 2,000 km remaining are to be developed in the future. MLIT has a plan for the development of ordinary national motorways, which compose parts of the arterial high-standard highways network, and at the same time, parts of the ordinary national highways, in terms of legal status in accordance with the Road Act. The total planned length of the ordinary national motor ways is 2,480 km. Although the network connects metropolitan areas and major cities across the country, there are still many missing links along the routes connecting local cities and substitute routes in the case of great disasters.

The designed maximum speed of the expressways is 100km/h on most sections or 80km/h on some sections. They are designed as roads of four lanes or more, while some sections have been put into operation as two-lane roads for the time being.

For the purpose of facilitating international business and trade, MLIT is running projects for the improvement of road access to major ports and airports and also the elimination of physical bottlenecks for ISO container transport. MLIT has selected 71 major ports and airports that should have quick access to the expressways. As a result of the development of access roads, 51 of the selected ports and airports can be reached from the nearest expressway interchanges in ten minutes as of March 2009.

As the technical standard for road structure had developed earlier than the implementation of the ISO containers, even expressways and highways have many sections where full-load containers and/or high-cube containers are not allowed to be transported. Shippers have to divide their freight into smaller units or take a detour, which burdens them with additional costs. To improve the situation, in 2008 MLIT designated the trunk-road network with a total length of 29,000 km that should enable transport of ISO containers by semi-trailer trucks of 44 tons in weight and 4.1m in height. There were 47 sections (560km) of bottlenecks at that time and MLIT has continued to eliminate these bottlenecks.

2.2.4 Rail Network

In 1987, the government privatized Japanese National Railways and split it up into six regional passenger rail companies and one national freight service company. The total operational length of the six JR passenger companies was 20,010.6 km as of March 2007. In addition to the JR companies, there were 92 private, 40 semi-governmental (third sector), and 11 public regional passenger railway operators in Japan, as of July 2007.

Japan Freight Railway Company is one of the seven companies established as a result of the national railway reform in 1987 and the only company specializing in freight. It doesn't own railway infrastructure, except for some sections with a total length of 44.8 km, and operates freight trains utilizing the railway networks owned by the six regional passenger companies or the other JR group companies.

The company covers the whole territory of Japan and the total length of its operations are over 8,000 km (Table 2.2-18).

Table 2.2-18 Outline of Japan Freight Railway Company

Number of Lines			77
Operation Length (km)			8,337.50
Number of Stations			253
Number of Trains			581 / day
Train-kilometers			about 219,000 km / day
Volume of Annual Traffic in 2009 (Tonnage: thousand tons / ton-km: millions of ton-km)			Total Tonnage: 31,050
			Total Ton-km: 20,400
Cars	Locomotives	Electric	490
		Diesel	227
	Electric Multiple Units		42
	Freight Wagons	JR for Containers	8,033
		JR for Others	533
		Private	2,588
12ft Containers	JR ownership		62,592 units
	Private		18,730 units
Loading Equipment		Top Lifters	72 units
		Fork-Lifts	440 units

As of 1 April 2010
Source: http://www.jrfreight.co.jp/english/corporate/overview.html

Although the company is expanding container cargo transport, that doesn't mean it plays a significant role in international trade. The company employs its own original container standard. The 12 ft container or "JR container" is much smaller than the ISO containers (Table 2.2-19). They are circulated exclusively within Japanese territory, except for a very limited commercial use to the ROK and some recent experimental shipments to China and Russia.

Table 2.2-19 Specifications of the Standard JR Container

Inside Measurement (mm)	L 3,642 x W 2,275 x H 2,252
Capacity (volume, cubic meters)	18.7
Capacity (weight, kg)	5,000

Source: http://www.jrfreight.co.jp/transport/container/index.html

Reasons why the ISO containers are generally transported by semi-trailer, not by railways, are:

1) No Japanese port has direct railway access to its container terminals;

2) Truck transportation is suitable for door-to-door delivery;

3) There are small-diameter tunnels that do not allow the high-cube ('9.6) containers to pass through.

Recently, however, rail transport is being reevaluated in the context of reducing CO_2 emissions. As explained later, there are several attempts to increase the usage of railways for ISO container transport.

2.3 Performance Review of Non-Physical Infrastructure

2.3.1 Supporting the Legal Environment of Transport Movements

➢ Legal environment for transport business

In the field of international marine transport business, Japan utilizes the "Act on International Carriage of Goods by Sea", which conforms to the "Hague-Visby Rules". Consequently, Japan's export and import goods by sea are carried under the "Hague-Visby Rules". In other words, the legal environment is harmonized with international rules and practices.

Domestic land transportation business is regulated under several laws, like the "Road Transportation Act", the "Act on Service of Cargo Transportation by Automobiles", the "Railway Business Act", the "Port Transport Business Act", and others. Those who want to do their business in any of these fields should obtain the respective license or approval, or should notify the respective authority in accordance with each of the Acts.

Japan has not joined the Convention on the Contract for the International Carriage of Goods by Road (CMR) and the Convention concerning International Carriage by Rail (COTIF). The main reason is the geographic situation of the country, which doesn't have any land-surface (road and railway) connections with neighboring countries. Taking this into account, one can understand that there are no significant problems in business practices even without the conventions.

The "Cargo Forwarder Service Act" is applicable to both domestic and international forwarding services that employ actual carriers' rail/truck/ocean/port transportation services to fulfill transportation contracts with clients (shippers). In practice, multimodal transport services can be understood as an advanced form of forwarding services. Many major Japanese forwarders provide international multimodal transport services. From this viewpoint, it can be said that the law governs multimodal transport business in Japan.

Meanwhile, because the draft international convention on multimodal transport proposed by UNCTAD in 1980 has not gained support from many countries, there are no international conventions in the field. Many Japanese international forwarders employ the standardized terms and conditions of the multimodal transport bill of lading developed by the Japan International Freight Forwarders Association (1993).

➢ Shipping services regulations (between Japan and Russia)

There is an old agreement between Japan and Russia from the Soviet era, which stipulates the procedure for opening new shipping lines between the two countries. It states that the name of the shipping company that plans to start a new line should be notified through a designated organization. They are MOL on the Japanese side and FESCO on the Russian side.

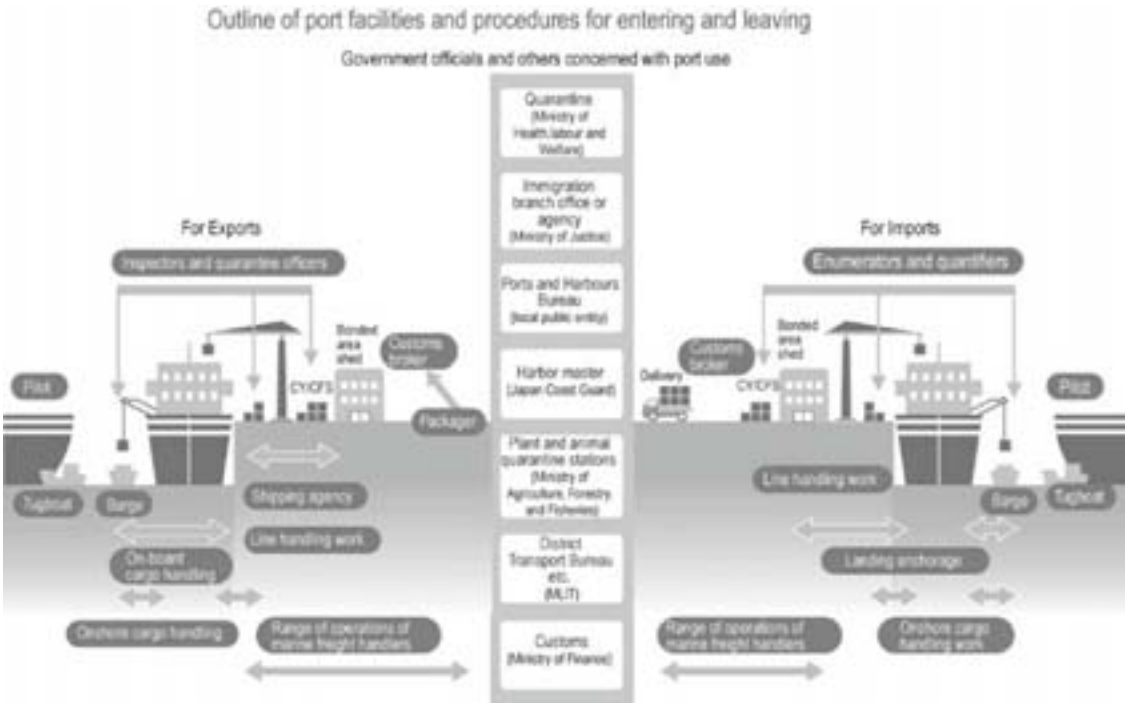
It is difficult to evaluate how much the agreement restricts new companies entering the market. Some people suggest that it practically closes the door of the market, in particular for regular shipping lines of full-container vessels. On the other hand, shipping companies of third

Table 2.3-1 Authorities Executing Control and Management at Ports and Harbors

Activity	Responsible Government Agency	Laws and Regulations
Navigation safety and systematic maintenance of port facilities	Port Master (MLIT, Coast Guard)	Harbor Regulation Law
Regulation of port transportation, supervision (sales registration, fee forwarding, etc.)	District Transport Bureau (MLIT)	Port Transportation Business Law
Supervision of coastal warehouse industry, Supervision of maritime service industry		Warehousing Law, Marine Transportation Law
Licensing and supervision of the piloting profession		Pilotage Law
Regulation of duties, tonnage taxes, special tonnage taxes,* other assessments, levies, and bonded areas	Customs (Ministry of Finance)	Customs Law
Approval of imported and exported goods	Regional Bureau of Trade and Industry (METI)	Foreign Exchange and Foreign Trade Control Law
Inspection and quarantine of imported and exported animals	Animal Quarantine Office (Ministry of Agriculture, Forestry and Fisheries)	Livestock Infectious Diseases Prevention Law
Inspection and control of imported and exported plants	Plant Quarantine Office (Ministry of Agriculture, Forestry and Fisheries)	Plant Quarantine Law
Control of Immigration and Emigration	Immigration Office (Ministry of Justice)	Immigration-Control and Refugee-Recognition Act
Port quarantine of seamen and passengers	Quarantine Office (Ministry of Health, Labour and Welfare)	Quarantine Law

Source: MLIT

Figure 2.3-1 Outline of Port Facilities and Procedures for Entering and Leaving



Source: MLIT

countries like the ROK are able to enter without any specific requirements. The case of the DBS Cruise Ferry and Sinokor direct services are the most outstanding examples.

➢ Authorities executing control and management of business activities at ports and harbors

Ports are subject to a variety of activities, including maritime transport, shipping, and marine services. An interconnected network of various administrative organizations manages port-related social and economic activities (Table 2.3-1 and Figure 2.3-1). Roughly speaking, MLIT controls business activities related to transportation, while other ministries control international trade. In addition to those functions stated in the table, the development and maintenance of port facilities like quay

walls are the responsibility of MLIT and the Port Management Body.

2.3.2 Net Transport Costs and Time Factors

A characteristic of marine transport is its flexibility in service performance, in terms of routes, frequency, and capacity, etc. In fact, there are a variety of freight transport services between Japan and the GTR. This section, in attempting to examine the costs and the time factors, summarizes the existing marine transport services between Japan and the GTR. It should be noted that shipping companies stop, change and (re)start their businesses in specific directions or routes so frequently that the following content may become out of date even in the very near future.

Another difficulty is that transportation fees fluctuate dynamically, as the market situations change. Also, transportation companies sometimes offer significant discounts to constant and sizeable clients. With regard to transportation fees, consequently, the figures presented in this section may not reflect the real picture of the market.

➢ Japan Trans-Siberia Line (JTSL)

MOL and FESCO jointly operate this service, which includes direct shipments and transshipments at Busan port.

The standard shipping time of the direct routes varies from 1 to 8 days (westbound) and from 4 to 12 days (eastbound) depending on the origin and destination ports (Table 2.3-2). The transshipment service takes a longer time in general, although it depends on the origin/ destination. At best, one could assume that it takes approximately a week when the shipping schedules of both legs match in the optimal way. On the other hand, there are some risks of accidents that leave containers stored at Busan port for a few weeks due to congestion or other factors.

Table 2.3-2 Standard Shipping Time of JTSL Direct Service (days)

	Yokohama	Nagoya	Kobe	Moji	Toyama
To Vostochny (westbound)	6	5	4	3	1
From Vostochny (eastbound)	7	8	9	10	12
To Vladivostok (westbound)	8	7	6	5	3
From Vladivostok (eastbound)	4	5	6	7	9

Source: Trans-Russia Agency Japan Co., Ltd.

According to the publicized tariff applicable from 1 August to 30 September 2012, the westbound freight charge is US$1,085-US$1,315 for a 20-foot dry container with non-dangerous cargo and US$2,080-US$2,510 for a 40-foot container including BAF. At the same time eastbound charges are less expensive: US$695-US$815 and US$1,380-US$1,630, respectively. In addition, there are additional costs such as THC at both ends.

➢ Sinokor Line

According to the press release announcing the launching of non-transshipment transportation, it takes 5-7 days between Vladivostok and the Japanese west coast ports (Table 2.3-3). Even though it takes more time than the possible direct shipping from the west coast ports to Vladivostok without any port calls on the way, which would take just 1-2 days, the transport time is almost in the same range as the JTSL direct shipping for the major Pacific ports of Yokohama, Nagoya and Kobe.

Table 2.3-3 Standard Shipping Time of Sinokor Direct Service (days)

	Akita	Niigata	Naoetsu	Fushiki-Toyama
To Vladivostok (westbound)	7	6	5	5
From Vladivostok (eastbound)	5	6	7	7

Source: Sinokor Seihon Co., Ltd.

➢ Busan transshipment services

In general, it takes more than a week from the loading port to the final destination port. Thus, in terms of time, it is not as competitive as the aforementioned lines. Extremely chaotic situations were observed in the spring-summer of 2012, when delays stretched to more than a few weeks in the worst cases and some shippers had to take another more expensive direct route.

As almost all Japanese container ports have regular shipping lines to Busan, it is a practical option to use the nearest port in order to minimize the land transportation costs to the port. This means that the transshipment services may be more attractive in terms of total transportation costs for the customers-shippers located far from the ports that offer the above-mentioned direct transport services. In some ports shippers can enjoy a higher frequency of services than direct shipping, which is another advantage.

➢ DBS Cruise Ferry

This company offers one of the fastest delivery times between Primorye and Japan. It takes just two days in both directions.

The Tottori Prefectural government publicizes a standard freight tariff, while the shipping company is ready to negotiate on the actual transport fee.

Table 2.3-4 Standard Freight Tariff of DBS Ferry (US dollars)

	Dry Container			Ref. Container	
	20 ft	40 ft	40 ft HC	20 ft	40 ft
From Sakai to Vladivostok	$1,100	$1,900	$1,900	$2,500	$3,900
From Vladivostok to Sakai	$850	$1,450	$1,450	$2,000	$3,900

Source: Tottori Prefectural government

➢ Niigata-Zarubino Line

The transportation time varies from 2 days to 5-6 days depending on port rotation, because sometimes the vessel calls at Nakhodka, Naoetsu or other ports on the way, subject to clients' requests. But, even in these cases, it is competitive in terms of delivery speed.

As mentioned above, this line cannot accept 40-foot containers due to the limited handling capacity at Zarubino

port. The through-transportation fee for a 20-foot container is set at around $1,250, including land transportation between Hunchun and Zarubino. This is a special rate for the promotion of the new route, supported by subsidies from the Niigata Prefectural government.

➢ Overall review of the shipping routes between Japan and Primorye

While some shipping companies publicize freight tariffs, the actual market prices may differ. Table 2.3-5 summarizes interviews with small-scale Japanese exporters to Russia who mainly use Yokohama port. They say the fees are higher if they use local ports. Compared to other intra-Asian shipping fees, like the Japan-Dalian route as discussed below, the fees are much more expensive.

In terms of technical criteria like transport time, frequency, punctuality and capacity, each route has its advantages and weaknesses, as presented in Table 2.3-6. In general, it should be noted that there is still much room for improvement in the shipping services.

Table 2.3-5 Freight Charges of Regular Container Services (US dollars)

	20 ft	40 ft
Busan Transhipment	Approx. $850	Approx. $1,400
Direct	Approx. $1,300	Approx. $2,000

Source: Interviews with exporters in 2012

Table 2.3-6 Technical Parameters of Shipping Routes

	Transport Time	Frequency	Punctuality	Damage Risk
JTSL Direct	Moderate / Worse	Worse	Moderate	Moderate
JTSL Direct (Export from Toyama)	Better	Worse	Moderate	Moderate
JTSL Transshipment	Worse	Moderate	Moderate	Worse
Sinokor Direct Service	Moderate	Moderate	Moderate	Moderate
DBS Cruise Ferry	Better	Moderate	Better	Better
Niigata-Zarubino Line	Better	Worse	Worse	Moderate
Other Busan Transshipment Services	Worse	Moderate	?	Worse

Source: Author

Under these circumstances, exporters select a route considering the trade-off of the time and costs. One key factor is the inland transportation costs in Japan. For example, one-way truckage of a 20-foot container from Niigata to Tokyo/Yokohama (350-400km) may cost around US$1,500. This is an estimate for occasional transport and there should be substantial discounts for constant clients depending on their shipping volume. Nevertheless, shippers have a strong incentive to shorten the inland transportation distance.

Another factor is the sensitivity of transported items to physical shocks at the transloading operations. Highly delicate goods tend to be transported without transshipment in order to reduce the risk of physical damage.

➢ Ocean freight tariffs and shipping time between Japan and Dalian

Market competition in Japan-China container transport is considerably fierce. People in the forwarding companies have suggested that the current standard transportation fee from major Japanese ports to Dalian port is around US$200 per 20-foot container. In practice there are additional charges, such as terminal handling charges, bunker (fuel) surcharges, and others. The total fee could be estimated roughly as US$400 or thereabouts. In the case of importing from China, they say that the ocean freight fee might be almost zero or even negative, which means shipping companies collect surcharges only partially.

At the same time, the transport time between Dalian and major Japanese ports is usually less than a week. Many shipping companies offer weekly or more frequent services. Meanwhile, well-developed systems of transport services ensure a sufficiently stable safe delivery of freight. Conservative shippers prefer the proved services that have been improved through years of practice in dealing with the various requirements from shippers.

Thus, the shipping routes between Japan and Dalian are more competitive than those between Japan and Primorye. In addition, expensive inland transport costs make it unfeasible that Japanese Pacific coast shippers trading with Northeast China would shift their transport route to the proposed route that goes across Japanese territory to the west coast and then across the sea to the GTI ports in Russia. The author sees a strong need for comprehensive measures to improve the competitiveness of the Tumen and Suifenhe corridors, as well as their extension to the sea and Japan.

2.4 Physical and Non-Physical Constraints

2.4.1 Constraints in the Marine Section and Japan

Summaries of the reviews of infrastructure capacity and performance constraints in the area of marine transport and Japan's inland transport are presented in Table 2.4-1.

2.4.2 Constraints in the Continental Sections

As the constraints in the continental sections are thoroughly reviewed in the other country reports, the constraints presented in Table 2.4-2 are supplements to them. The two issues are revealed from interviews with Japanese shippers and forwarders, and represent external views.

In fact, the issue of the double cross-checks at the Chinese-Russian border as well as the Russian ports may not be recognized as problematic if they are viewed from the viewpoint of each country's normal cross-border control. The respective authorities should control cross-border transport according to the regulations, which they actually conduct. However, it certainly degrades the competitiveness of the routes against the Dalian corridors in terms of direct and indirect costs, including the costs for preparing the necessary documents.

The second problem deepens the first one. Officials at the borders do not have enough experience to deal with transit cargo going through the routes. The Japanese forwarders and shippers complained that too many documents and explanatory materials are required when they try to ship specific goods for the first time. The situation improves when they ship the same goods the

Table 2.4-1 Constraints along the Trans-GTR Corridors

	Constraint	Importance (How much it restricts the flow)	Timeframe (Reflects the urgency)	Mitigation Measures
1) Tumen Transport Corridor, 2) Suifenhe Transport Corridor and 3) Siberian Land Bridge				
For the section of shipping routes across the sea to the Japanese west coast				
Infrastructure				
Vessels	- Inadequate vessel operating between Zarubino and Niigata	Significant	Urgent	Replacement with a larger RO-RO type vessel
Transport Regulation	- Regulated opportunities to start a new regular service	Less	Mid-term	Removal or amendment of the Japan-Russia Agreements of Marine Shipping
Cross-Border Regulation	- Embargo on trade with the DPRK	Significant	Long-term	Removal of the embargo
Cost and Time Factors	- Expensive transport fees	Significant	Urgent	Promotion & marketing to realize economies of scale
	- Under-developed shipping services (directions, frequency, punctuality, etc.)	Moderate	Urgent	Support to the operating companies to encourage further development
For the section of land transport across Japanese territory (between the west coast and the Pacific coast)				
Infrastructure				
Rail	- No on-dock railways	Less	Mid-term	Construction of rail access to ports
	- Small diameter tunnels	Less	Mid-term	Introduction of low floor wagons
Road	- Limited height and axle load sections	Less	Mid-term	Reconstruction
Ports	- Limited capacity of cargo handling	Less	Long-term	Construction of new berths and/or introduction of cargo handling equipment
Transport Regulation	- Strict regulation on usage of foreign vehicles	Less	Long-term	Realization of mutual access of trailer chassis
Cost and Time Factors	- Expensive transport fees	Significant	Urgent	Promotion & marketing to realize economies of scale

Source: Author

Table 2.4-2 Constraints in the China-Russia-Sea Section

	Constraint	Importance (How much it restricts the flow)	Timeframe (Reflects the urgency)	Mitigation Measures
1) Tumen Transport Corridor and 2) Suifenhe Transport Corridor				
For the section of China-Russia-Sea				
Cost and Time Factors	- Double cross-border checks at the Chinese-Russian border and the Russian ports	Significant	Urgent	Introduction of simplified scheme for transit cargo
	- Less efficient implementation of regulations	Moderate	Urgent	Capacity building and routinization of transit practices

Source: Author

second time. However, if they want to transport other items they have to suffer the same problem.

3 Measures and Investment Programme Proposed to Improve Transport Movements along the Corridors

3.1 Measures

3.1.1 Legal Environment

In the short term, the current Japanese legal environment can properly accommodate expected freight traffic. A potential challenge might be the lack of the legal base for usage of foreign vehicles for inland transportation in its territory. In that case, amendments of the Road Transportation Vehicle Act and participation in the CMR convention should be considered, which will make Japan a virtual continental country connected by roads instead of marine transport.

It should not be an urgent issue while Japan continues to be an island country as it is presently. It will become a serious problem when there will be many more special traffic demands that require direct transport without any transloading from one semi-trailer truck to another. Such cargo might be super-precision machines, delicate live vegetables, fruit and fish, all of which are vulnerable to shocks during the lift-on/off transloading operation at ports. Currently, in order to ease the damage they usually need special treatment in terms of packing and harnessing, which burdens shippers with additional costs. Direct transport without transloading will improve this problem. On the other hand, the inventory costs of trailer trucks will increase if they go beyond the sea. Therefore, the through-operation of trailers is not necessarily the most efficient solution. It requires more in-depth studies on traffic demands, the requirements of transport quality, and the costs of trans-ocean trailer operations, etc.

3.1.2 Designation of "Base Ports"

In 2010, MLIT announced its intention to select several base ports on the west coast for enhanced development. Although there are skeptical views on the expected outcomes and effectiveness of the policy, its outline is reviewed in this section as below.

The main purpose of the initiative at its initial stage was to strengthen the international competitiveness of all the west coast ports, while taking into consideration the economic development of the countries on the other side of the sea, as well as clarifying the roles of each port and promoting mutual cooperation among them; this will eventually contribute to the economic development of the west coast region. In the meantime, the Great East Japan Earthquake occurred in March 2011 and added another purpose of building a strong distribution network against a disaster, while securing an alternate function for the Pacific coast ports, as well as to strengthen their own disaster prevention function.

The selection was conducted for each of the port functions specified by MLIT. In fact, there were six key functions or cargo items specified: namely international container port, international ferry and/or RO-RO, regular international passenger lines, international cruise, timber, and finally "other cargo." The port management bodies of the Core International Ports and the Major Ports, which are 26 in total, from Wakkanai in the north to Nagasaki in the south, were eligible to submit applications, which were to include future visions and measures to enhance one of the listed functions. If they considered that their port has good

Table 3.1-1 "Base Ports" of the Japanese West Coast

Comprehensive Base Ports (5 ports)	
	Niigata, Fushiki-Toyama, Shimonoseki, Kitakyushu and Hakata
Base Ports (19 ports, 28 plans)	
International containers (10 ports, 9 plans)	Hakata port, Kitakyushu and Shimonoseki ports, Niigata port, Fushiki-Toyama port, Akita port, Imari port, Sakaiminato port, Maizuru port, and Kanazawa port
International ferry and/or International RO-RO (7 ports, 6 groups)	Hakata port, Tsuruga port, Kitakyushu and Shimonoseki ports, Wakkanai port, Fushiki-Toyama port, and Maizuru port
Regular international passenger lines (5 ports, 3 groups)	Hakata port, Kitakyushu and Shimonoseki ports, and Nagasaki and Sasebo ports
International cruise (fixed cruise) (2 ports)	Hakata port and Nagasaki port
International cruise (hinterland tourism cruise) (5 ports, 3 groups)	Otaru, Fushiki-Toyama and Maizuru ports, Kanazawa port and Sakaiminato port
Timber (2 ports)	Sakai port and Hamada port
LNG (3 ports, 2 groups)	Naoetsu and Niigata ports, and Ishikariwan-New port
Goods for recycling (1 port)	Sakata port
Base Formation Promotion Ports (4 ports, 4 plans)	
	Rumoi port (timber), Noshiro port (goods for recycling), Nanao port (timber), Karatsu port (international cruise (hinterland tourism cruise))

Source: MLIT

Figure 3.1-1 "Base Ports" of the Japanese West Coast

Source: Author

prospects for handling cargo not specified in the above-mentioned functions, they could choose the sixth function of "other cargo," identifying the cargo item. MLIT allowed the port management bodies to apply jointly with other eligible ports, establishing an alliance and developing a plan together.

Among the 26 eligible ports, 23 ports submitted application documents to MLIT in the summer of 2011. The screening committee established by MLIT reviewed the submitted plans and selected 5 Comprehensive Base Ports, 19 Base Ports with 28 plans, and 4 Base Formation Promotion Ports (Table 3.1-1, Figure 3.1-1).

As a result all the 23 ports that submitted an application were approved as Base Ports or Base Formation Promotion Ports. In fact, not all the plans of all the ports were endorsed. For example, Sakata port submitted two plans for "international container port" and "other cargo (goods for recycling)" and received an approval for the plan for "goods for recycling" only. In addition, the 4 Base Formation Promotion Ports can be regarded as semi-base ports, which don't fulfill all the criteria for a Base Port but should be treated honorably, considering some other factors.

One year has passed since the results were publicized in November 2011. Any significant measures have not been observed, however, to promote the proposed plans. There are disappointed sentiments in the local societies which supported MLIT's initiatives, because MLIT has not and will likely not allocate special resources, in particular financial ones, to realize the plans that they approved.

The weak support was predicted in advance, however. As mentioned before, all applicants won the status of Base Port or Semi-Base Port, which means that the screening process was rather mild. This fact, in turn, suggests that MLIT doesn't have a strong intention to differentiate its support to specific ports.

In the end the west coast ports should still continue to develop and promote projects mainly by their own resources, while cherishing the slight expectation for financial and other sorts of support from the central government in future.

3.1.3 Experimental Shipments

Aiming at the promotion of new shipping routes to the Russian Far Eastern ports, the local governments of the Japanese west coast are implementing various measures. Among those are experimental shipments of containers to/from the Northeast provinces of China. In this section, we focus on two examples as follows.

➢ Transport experiment by Niigata Prefecture

In October 2010, Niigata Prefecture carried out a multimodal container transport experiment. This transport experiment selected China's Northeast region as the point of origin for cargo. Usually export goods from the city of Harbin in Heilongjiang Province to the port in Niigata are

transported through Dalian port, which is a transport distance of roughly 3,000 km. This experiment of sending cargo from Northeast China across the Russian border, through Zarubino Port and finally connecting to Niigata Port yields a shortcut that results in a 40%, or roughly 1,300 km, reduction of this transport distance (Figure 3.1-2).

For this experiment the prefecture chose household goods as well as clothing. The household goods departed from Harbin for Jilin Province's Hunchun City, where they were loaded into a 20-foot container. The clothing was produced and packed in Hunchun. These two 20-foot containers cleared the customs of China and Russia at the BCP, and were then sent by truck to Zarubino Port. From Zarubino to Niigata, the cargo was sent by a chartered cargo ship that usually calls at Nakhodka Port. From Niigata Port, the cargo was transported to Japanese domestic destination points by the use of trains amongst other methods.

Activities such as freight transport, loading operations and inspections took a total of 6 days. Compared to the Dalian route which takes over 10 days for work operations, the route through Zarubino Port definitely has predominance. However, this 6-day period doesn't include waiting and other lost time. Consequently, it should be regarded as an idealistic amount of time for extremely rationalized operations and circumstances.

As far as transport costs are concerned, this particular experimental route was comparatively expensive. Compared to the Dalian route where multiple firms are in direct competition, this experimental route cost around 100,000 yen more per TEU.

The customs procedures were smooth for the most part. Yet during the Zarubino to Niigata Port leg, one portion of the cargo still took over ten hours. The reason was because it was the first inspection for these particular goods. With continued use of the route, we expect the amount of time taken will become much less.

Several problems came to our attention when trying to construct a full-fledged distribution route, as follows:

- When preparing schedules for land and sea transport, it will be necessary to coordinate them to establish a service that has no waiting;
- It is necessary to secure a sufficient cargo amount to create similar fees to the Dalian Port route and reduce land transport costs;
- It should be considered whether to improve or replace the crane at Zarubino Port, or use a RO-RO ship or ferry;
- The Chinese customs seal is invalid in Russia, and Russian customs operates with its own separate container seal. Since the Chinese seal potentially might be broken in Russia, no forwarder can guarantee the safety of the cargo and issue a through B/L. This becomes problematic for shippers.

➢ Transport experiment by Tottori Prefecture

In order to promote the DBS Cruise Ferry, Tottori Prefecture is advancing the cultivation of China's Northeast market.

The shipping route is operated by the DBS Cruise Ferry Company (ROK). With a ship called "Eastern Dream", the ferry handles approximately 480 passengers, or around 130 TEU if converted to container freight. The ferry

Figure 3.1-2 International Transport Experiment Integrated Map

Source: Niigata Prefectural government

started running in July of 2009. The Sakaiminato Port-Donghae City (ROK)-Vladivostok route does one complete round trip each week. From the beginning it was expected that operating the ferry with enough passengers or cargo onboard would be difficult, so both the Japan side and the ROK side are finding ways to support this operating route. In Japan, Tottori Prefecture and the Council of Cities of the Nakaumi Area have cooperated by subsidizing the operating costs by 10%, an allowance of up to 1,500,000 yen per voyage. From its inception this program was planned for three years until June 2012. However, it was extended for another year and the necessary money has been appropriated into the FY 2012 budget.

From factors such as the stabilization of ferry operations and its punctuality, the reputation of its shipping company and the amount of cargo handled has gradually increased. The amount of cargo handled at Sakaiminato Port went from 4,320 tons in 2010 to 6,278 tons in 2011 (a 45% increase from the previous year). However, this amount only comprises 17.3% of the cargo weight travelling on this sea route, and as such is a small amount.

Peculiarly, the amount of cargo from Russia is small, so Tottori Prefecture anticipates cargo originating from the Northeast region of China. As part of this area, they conducted trial transport experiments utilizing wooden chopstick imports from Heilongjiang Province and exhibition imports/exports from Jilin Province. They used the transit transport route that connected Vladivostok Port with Suifenhe City. In addition to the 6,500,000 yen (1,300,000 yen x 5 trips) allocated in the 2012 budget for conducting these trials, they also created a subsidy system to support the continued use of these routes shortly after.

3.2 Infrastructure Development

From a practical point of view Japan does not have any completely missing links of transport, including international container transport, as shippers and carriers are able to find an appropriate port with proper access to the road network to reach not only major metropolitan areas but also rural towns across the country. A problem is time and the costs of transportation. As mentioned in the chapter on infrastructure review, MLIT continues to improve road access to major ports and to eliminate bottlenecks where fully-loaded containers and/or high-cube containers cannot pass. These efforts should result in the reduction of transport time and costs within Japan. Another problem is network redundancy in case of a natural disaster. In this regard MLIT promotes improvement measures, as mentioned in the chapter on infrastructure review.

With regard to railway transport, however, almost all Japanese ports lack direct rail access to wharfs. This is because railways have become less competitive than truck transport in recent decades in Japan and there is no strong need to have railway links to ports. As mentioned above, the share of railways in freight turnover (ton-km) occupies about 4% and its share is merely 1% in terms of freight tonnage. Only limited numbers of port-side large-scale factories working on imported raw materials still keep railway access in order to ship their products to the domestic market.

A limited number of ports, however, are located in proximity to railway freight stations, where international containers can be transported at rational costs between them. Among those are the ports of Kitakyushu and Hakata. Because of their geographical location midway between East Asia and the capital metropolitan area of Tokyo, costs and time for the short drayage can be compensated by the benefit of express freight trains, which run more than a thousand kilometers in about 20 hours to/from Tokyo. Thus, the intermodal transport service connecting the "Shanghai Super Express" and the JR container freight train is exploring a niche market that is less expensive than aviation transport and has faster delivery than conventional container ships.

While no Japanese port has direct rail access to its container terminals, Niigata prefectural government is studying the feasibility of extending a branch track into the container terminal at the Niigata East Port. The plan was approved by the National Transport Policy Council. Among challenges in its realization are the uncertainty of cargo owners' attitudes to the changes in transport mode and route from current motor transport to railways, the physical constraints of some tunnels which high-cube containers (height = 9.6ft) cannot go through, and the limited space and capacity of the terminal in the port itself.

Niigata port is expanding its container terminal. A new berth (L=250m, D=−12) will be put into operation at the end of June. It is expected to reduce container ships' berth wait time drastically, which happened a recorded 100 times in 2010. The handling capacity will become 224,000 TEU/year. Considering the growing container turnover, the terminal needs further expansion. The port authority is drafting a plan of reconstruction reclaiming a part of the waterways and converting an existing wharf to a specialized container wharf. It should be finalized within the Niigata government, which then needs an endorsement by the national Council for Ports and Harbours before its implementation.

Akita port just opened a new container terminal in April 2012. Its handling capacity is now 70,000 TEU/year. The terminal area is 11.3ha, with a berth 270m long (D=−13). There is a plan for a second stage development, expanding the capacity up to 100,000 TEU/year.

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