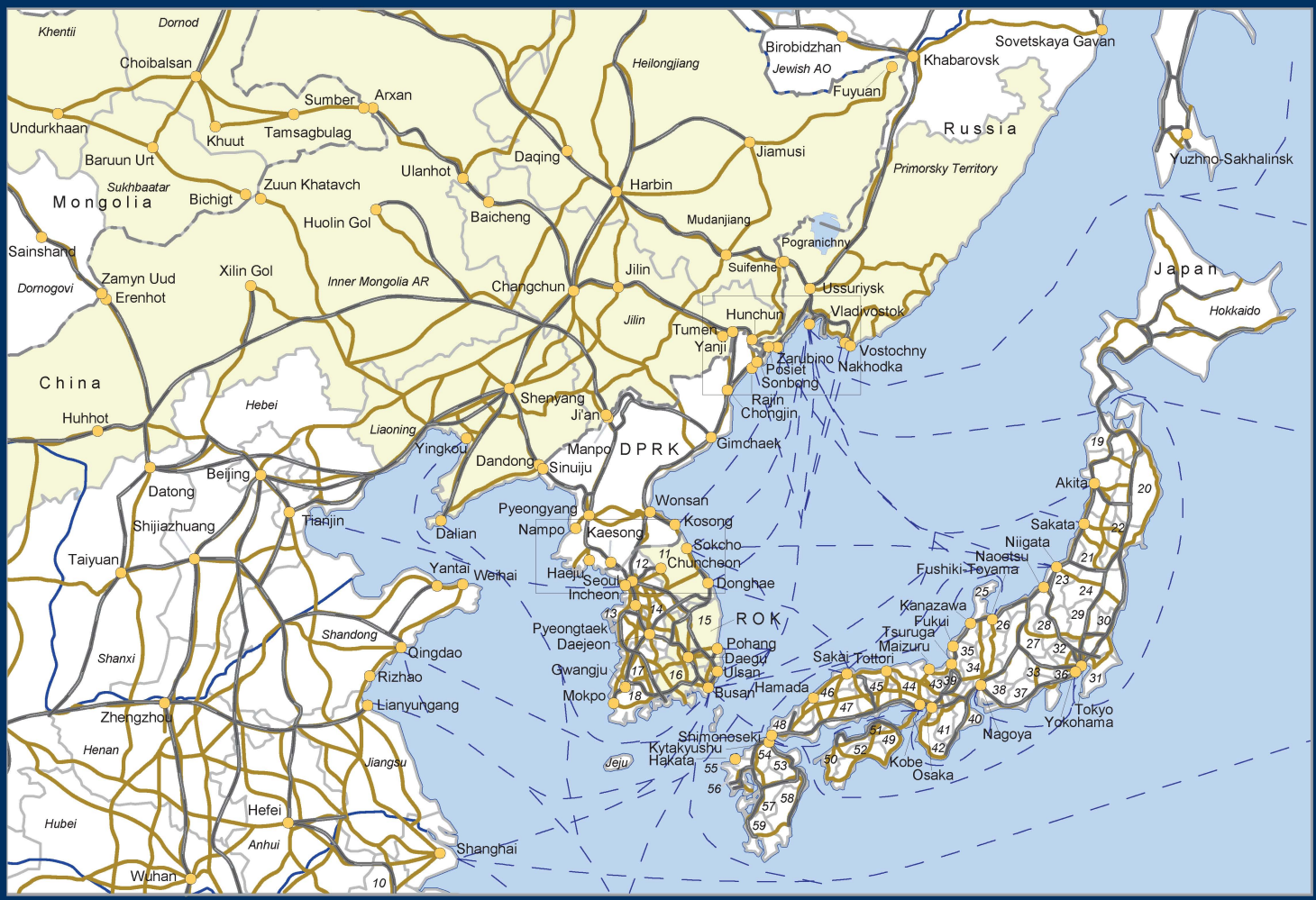
GTI Greater Tumen Initiative

KMI KOREA MARITIME INSTITUTE

EVALUATION STUDY ON THE SEA-LAND ROUTES IN NORTHEAST ASIA



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THE SEA-LAND ROUTES IN NORTHEAST ASIA

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2014

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"Evaluation Study on the Sea-Land Routes in Northeast Asia" was financed and carried out by Korea Maritime Institute, Dr. Lee Sung-woo, Dr. Kim Geun-sub and Dr. Kim Eun-woo.

The Study aimed at assessment of the problems and impediments for ferry services in East/Japan Sea. The Study results and conclusions serve to facilitate the intermodal transportation services in the Greater Tumen Region through the promotion of the land-sea shipping lines.

FOREWORD

Northeast Asia is one of the fastest growing economic blocks in the world. It carries large clout in the global economy and trade due remarkable growth it has posted so far. Its GDP and trade are expected to rise 4.3% and 7.9% by 2020 on annual average. Large scale development projects in Northeast Asia, particularly those planned for broad areas of the Tumen River, will dramatically increase logistics demand within the region.

Accordingly, need for transportation and logistics cooperation looms larger than ever before for development of regional economy and trade. Moreover, the supplementary economic structure and geopolitical factors raise desires for cooperation in sea-land multimodal transportation.

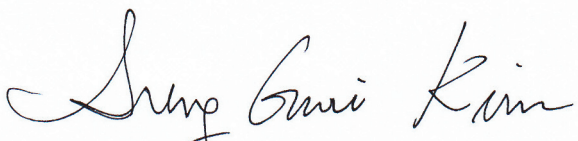
At present, basic foundation for sea-land multimodal transportation is already built in Northeast Asia with operation of Korea-China, Korea-Japan and Korea-Russia car ferry routes. Under the Korea-China Sea-Land Trucking Multimodal Transportation Agreement, the Pan Yellow Sea Region has enjoyed relatively active land multimodal transportation based on car ferries. In comparison, similar routes in the Pan East Sea Region were repeatedly opened, stopped, closed or reopened due to political, economic and physical causes.

On recognizing the need for cooperative system in regional multimodal transportation, Korea, China, Japan and Russia held a working-level meeting in Harbin, China in December 2011. At the meeting, the four nations agreed to prepare implementation plans, priorities and problem-solving measures as well as to compose an expert group. However, such agreements were not followed by subsequent joint studies.

This study analyzed conditions for sea-land multimodal transportation condition in the Tumen River area from economic, trade and infrastructure aspects. It also reviewed current multimodal transportation condition in the area and other problems. Based on the analysis on the current problems, it estimated corresponding demand based on car ferries and proposed measures to facilitate the sea-land multimodal transportation, logistics and trade.

At the request of the GTI secretariat and in consultation with the Korean government, KMI conducted the study with its own budget. Dr. Lee Sung-woo, Dr. Kim Guen-sub and Dr. Kim Eun-woo of KMI composed the research team.

I truly hope that this study will contribute to boosting sea-land multimodal transportation in wide areas of the Tumen River and Northeast Asia. I also appreciate this opportunity given by the GTI secretariat and promise continuant cooperation with the GTI in this research area.



Kim Sung-gwi
President
Korea maritime Institute

FOREWORD

The geographical landscape presents the Greater Tumen Region great opportunities and challenges in designing transport network and logistics routes. Existing railway corridors and ports create attractive options for supply chains that will be intermodal due to combination of land and sea sections.

These opportunities and challenges are recognized by countries within Greater Tumen Region and Northeast Asia (NEA), which are seeking new horizons for economic and business development. To give initial push for intermodal logistic services in the region, NEA countries started ferry lines connecting ports in Japan, ROK, China, and Russia with Trans-Siberian Railway and road network in Northeast China and Russian Far East.

These routes are operated by public-private regional joint ventures, use short and promising itineraries and have great potential for both passenger and freight transportation. They are deemed as important vehicles for promotion of trade, tourism and logistic services in NEA.

Guided by the vision of building a great partnership for common prosperity between neighbours, GTI is enthusiastic in support of these ventures and creation of an enabling environment for logistic industry development. Promotion of the sea-land intermodal services is one of the two main directions for work of the GTI Transport Board since its creation in 2009.

Following decisions and discussion of the second meeting of the GTI Transport Board, Korea Maritime Institute (KMI) generously pledged financial and research resources to carry out a detailed study on the sea-land routes that involve ferries in Greater Tumen Region and to outline main impediments for their development.

It is a great honor to present in this publication the results of KMI's comprehensive research, results that will serve as guidance for development of transport facilitation and infrastructure improvement agenda within the Greater Tumen Region. On behalf of GTI member countries I express sincere gratitude to KMI for such important and timely contribution to GTI cooperation.

Ms. Weina Wang
Director
GTI Secretariat

CONTENTS

List of Abbreviations

APEC	–	Asia-Pacific Economic Cooperation
CIS	–	Commonwealth of Independent States
GDP	–	Gross Domestic Product
GTI	–	Greater Tumen Initiative
GTR	–	Greater Tumen Region
KRW	–	ROK won
NAF	–	Northeast Asia Ferry Ltd.
NEA	–	Northeast Asia
PPP	–	Public Private Partnership
ROK	–	Republic of Korea
RUB	–	Russian ruble
RUS	–	Russia
TEU	–	Twenty-foot Equivalent Unit
TSR	–	Trans-Siberian Railway
UNDP	–	United Nations Development Programme
US	–	United State of America
USD	–	dollar of United State of America
WTO	–	World Trade Organization

Chapter 1 Introduction

1.1 Background and Objectives of the Study

Northeast Asia has come into the spotlight of the world as the region which achieves the most dynamic economic growth and the center of the world economy is shifting from the US and Europe to Asia, especially Northeast Asia.

Northeast Asia is taking more share in the world economy and trade and is experiencing the most vibrant economic activities thanks to its exponential growth; as of 2012 the GDP and trade amount of Northeast Asia accounted for 21% and 20.5% of the world respectively and the amount of intraregional trade in Northeast Asia reached 20.5% of the global trade amount.

In addition, the growth of the economy and trade in Northeast Asia will not slow down; the GDP and trade amount of Northeast Asia are expected to grow by 4.3% and 7.9% respectively by 2020.

The demand for transport and logistics in Northeast Asia are expected to experience exponential growth due to large-scale development projects conducted by Northeast Asian nations including China's Changchun-Jilin-Tumen River Pilot Area Strategy Project, Russia's development projects for Siberian and Far Eastern Areas, DPRK's Rajin-Sonbong Free Trade Zone, and Mongolia's mineral resources development projects. These massive-scale projects will contribute to the increase in the size of Asia's logistics market, including that of Northeast Asia, which is expected to account for 35.0% (worth 2.8 trillion USD) of the global logistics market in 2020.

All the above expectations explain why Northeast Asia will achieve steady growth in the volume of interregional and intraregional trade and logistics market. As a result, transportation and logistics in Northeast Asia should be strengthened more among Northeast Asian countries as the integral infrastructure which fosters greater economic and trade cooperation in the region.

The groundwork for multimodal transport on the sea and the land in Northeast Asia has been laid: increased multimodal transport in Northeast Asia is expected to work as the foundation for thriving logistics market as well as greater trade volume. Northeast Asia demonstrates considerable potential for multimodal transport on the sea due to its complementary economic structure and geographical factors; and ferry routes between ROK and China, ROK and Japan, and ROK and Russia are in operation.

Therefore, this study would like to introduce the methods to promote sea-land multimodal transport, especially by ferries, for economic cooperation and mutual prosperity in Northeast Asia.

The scope of this study covers the Greater Tumen Region (GTR)[1], especially the East Sea Rim, in Northeast Asia. Sea-land multimodal transport in the Pan-Yellow Sea Region has been relatively

[1] The Greater Tumen Initiative (GTI) GTI is a regional collaborative platform driven by the member countries to promote economic cooperation in the Greater Tumen Region and Northeast Asia as a whole. It is an intergovernmental cooperation mechanism in Northeast Asia, supported by United Nations Development Programme (UNDP), with the membership People's Republic of China, Mongolia, Republic of Korea and Russian Federation. GTR covers four Northeast provinces (Liaoning, Jilin, Heilongjiang and Inner-Mongolia) of China, three Eastern provinces (Khentii, Dornod and Sukhbaatar) of Mongolia, Primorsky Territory of the Russian Federation and the Eastern regions (Gangwon, Geongsangbuk, Busan and Ulsan) of ROK.

robust compared to that in the East Sea Rim; ferry routes in East Sea, especially multimodal transport routes via car ferry in the Russian Far East, have been opened, discontinued, closed, reopened, and then have repeated that process again.

The promotion of sea-land multimodal transport routes via ferry in the GTR is expected to work as the center for robust personal and material exchanges and to contribute to economic cooperation centered on the Tumen River Area by ROK, China, Russia, Japan, and Mongolia. And multimodal transport routes via ferry in the GTR are expected to open a new route for sea-land multimodal transport of goods connected to Europe via Trans-Siberian Railway, in addition to existing transport routes from ROK to Europe via Singapore and the Suez Canal.

The Objectives of this study are to check the current status of sea-land multimodal transport routes via ferry in the East Sea Rim, to analyze any problems with the routes, and to propose the methods to promote the routes.

1.2 Information on Previous Relevant Studies

International Multimodal Transport of Goods[2] is originated from the Door-to-Door services based on sea-land multimodal transport through the combination of different modes of transport such as vessels, trains, and motor vehicles.[3]

Studies on the sea-land multimodal transport via ferry in the East Sea Rim have been conducted through the China-Japan-ROK Ministerial Conference on Transport and Logistics[4]. To prepare for the implementation of Action Plan 2 of the 12 Action Plans under the conference, “the seamless logistics system in Northeast Asia”, researches on “mutual access of trailer chassis” were conducted. ROK and China reached “the Agreement between the Government of the People’s Republic of China and the Government of the Republic of Korea on Sea-Land Multimodal Freight Vehicle Transport and its Protocol”, which provides a legal framework for the implementation of the mutual access of trailer chassis of the two countries which defined routes, types of vehicles, and legal requirements and regulations, in 2010. ROK and Japan signed “Records of Discussion on the Implementation of the Pilot Project of Mutual Access of Trailer Chassis” at the 4th China-Japan-ROK Ministerial Conference on Transport and Logistics held in July 2012, as the first step for the promotion of mutual access of trailer chassis between two countries. These two measures for the mutual access of trailer chassis are based on ferry transport and are expected to cut transport time and expenses by reducing stages for loading and unloading cargoes at ports. Here are the list of studies which have been carried out to implement the projects of mutual access of trailer chassis: “Methods to Establish the Road Feeder Services connecting Korea, China, and Japan” (Korea Transport Institute, 2007), “Study on the Methods to Promote the Cooperation in Logistics among ROK, China, and Japan” (Korea Maritime Institute, 2008), “Study on the Methods to Promote the

[2] United Nations Convention on International Multimodal Transport of Goods (signed in 1980) defines international multimodal transport as “the carriage of goods by at least two different modes of transport on the basis of a multimodal transport contract from a place in one country at which the goods are taken in charge by the multimodal transport operator to a place designated for delivery situated in a different country.”

[3] International Shipping Agency Association of Korea (http://www.isaak.or.kr), retrieved on December 15, 2013.

[4] The China-Japan-ROK Ministerial Conference on Transport and Logistics is a biennial conference and ‘Establishing the seamless logistics system in Northeast Asia’ is one of the main purposes of CJK Ministerial Conference. The first conference was held in ROKs in January 2006 and the fourth conference was held in 2012.

Cooperation in the Establishment of the Integrated Logistics Market in Northeast Asia" (Korea Maritime Institute, 2009), and "Analysis of the Effects of Mutual Access of Trailer Chassis between ROK and Japan" (Korea Maritime Institute, 2011). These studies, however, concentrate on the sea-land multimodal transport in Pan-Yellow Sea Region, the east coast of ROK, and the west coast of Japan and on mutual access of trailer chassis.

Here are the list of studies on the current status of ferry transport in the GTR: "Methods to Establish the Multimodal Transport Network in the Tumen River Area" conducted by the Korea Maritime Institute (2005) as part of the United Nations Development Programme's project, "International Joint Study on the Cooperative Body for Transport and Logistics in Northeast Asia" carried out by Korea Transport Institute (2012), and "Integrated Transport Infrastructure and Cross-border Facilitation Study for the Trans-GTR Transport Corridors" [5] by Greater Tumen Initiative (GTI) (2013). These studies mainly deal with the current status and future prospect of the economy and trade in the nations surrounding the Tumen River, the current status of each nation's transport infrastructure, drawbacks of the multimodal transport system, methods to establish the multimodal transport system, and the cooperative methods and strategies for the establishment. The current status and drawbacks of ferry transportation in the East Sea Rim are included as part of the above-mentioned studies.

ROK, China, Japan, and Russia held Forum and Directors' Meeting on Northeast Asia Sea-Land Combined Transport Cooperation among China, Japan, ROK and Russia in Harbin, China in December 2011 to discuss the methods for developing the multimodal transport among the four countries and for cooperating in the multimodal transport. The four nations agreed to establish a system for intergovernmental meetings of high-ranking officials, to form a group of experts composed of public officials, researchers, and business people, to conduct joint studies by the group, and to seek for multimodal transport plans, priorities, and methods to deal with problems. However, follow-up studies on these issues have not been carried out so far.

Therefore, this study would like to conduct systematic assessment of the sea-land multimodal transport via ferry in the East Sea Rim and propose the method to facilitate the sea-land multimodal transport in Northeast Asia by promoting the use of car ferry routes for the sea-land multimodal transport in the East Sea Rim.

1.3 Contents and Methods of the Study

1.3.1 Structure of the Study

This study focuses on analyzing the current status of the sea-land multimodal transport via ferry in the East Sea Rim of the GTR, estimating possible demands for the transport, and proposing the methods to facilitate the transport.

The Structure of this study is as followed: Chapter 1 describes the background, objectives, methods, and previous relevant studies of this study; Chapter 2 analyzes the current status of the sea-land multimodal transportation in the GTR from the perspectives of economy, trade, and infrastructure; Chapter 3 reviews the current status and drawbacks of the sea-land multimodal

[5] "Integrated Transport Infrastructure and Cross-border Facilitation Study for the Trans-GTR Transport Corridors", GTI, 2013.

transportation in the GTR; Chapter 4 estimates possible demands for the sea-land multimodal transportation in the GTR; Chapter 5 proposes the methods to promote the sea-land multimodal transportation in the GTR.

1.3.2 Methods of this Study

This study examines the current status of the sea-land multimodal transportation via ferry in the East Sea Rim through analyzing the materials collected by reviewing local and overseas documents, conducting field trips to local and overseas locations, and interviewing local and overseas sources. Especially, we had interviewed with many experts who work in ferry firms that serve Greater Tumen Region. These interviews were very helpful to understand more precise market condition and prospect. In addition, this study includes what has been discussed in international meetings on GTI and opinions of experts as a means to estimate future objectives of GTI and to suggest appropriate measure by the ROK government to respond to the objectives.[6]

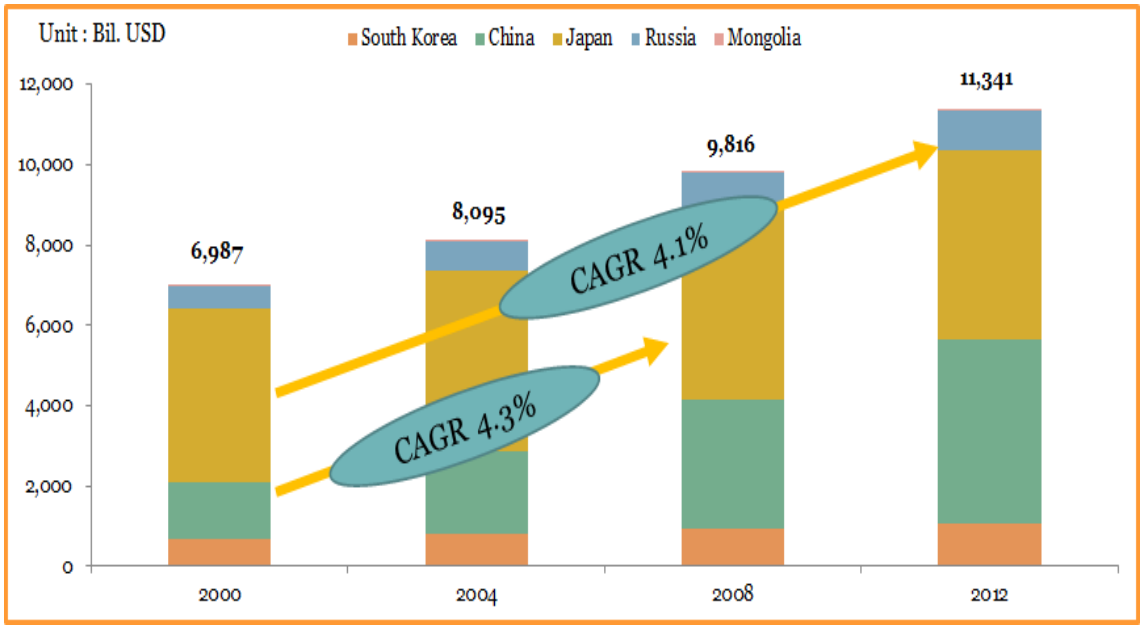
[6] "Current Status of the Implementation of Greater Tumen Initiative (GTI) and the methods for international cooperation in GTI", Korea Institute for International Economic Policy, 2010.

Chapter 2 Analyses on the Current Status of Sea-Land Multimodal Transport in Northeast Asia

2.1 Economy and Trade Status

Between 2000 and 2012, the average annual GDP growth rate of five Northeast Asian nations (China, Russia, ROK, Japan, and Mongolia) was 4.1%, 1.5 times higher than that of the world (2.6%). As of 2012, the GDP of the five nations accounted for 11 trillion and 341 billion USD, about 21% of that of the world. There has been steady increase in the share of the five nations in terms of GDP; they took up 17.5% of the global GDP in 2000, 18.2% in 2004, 19.4% in 2008, and 21% in 2012.

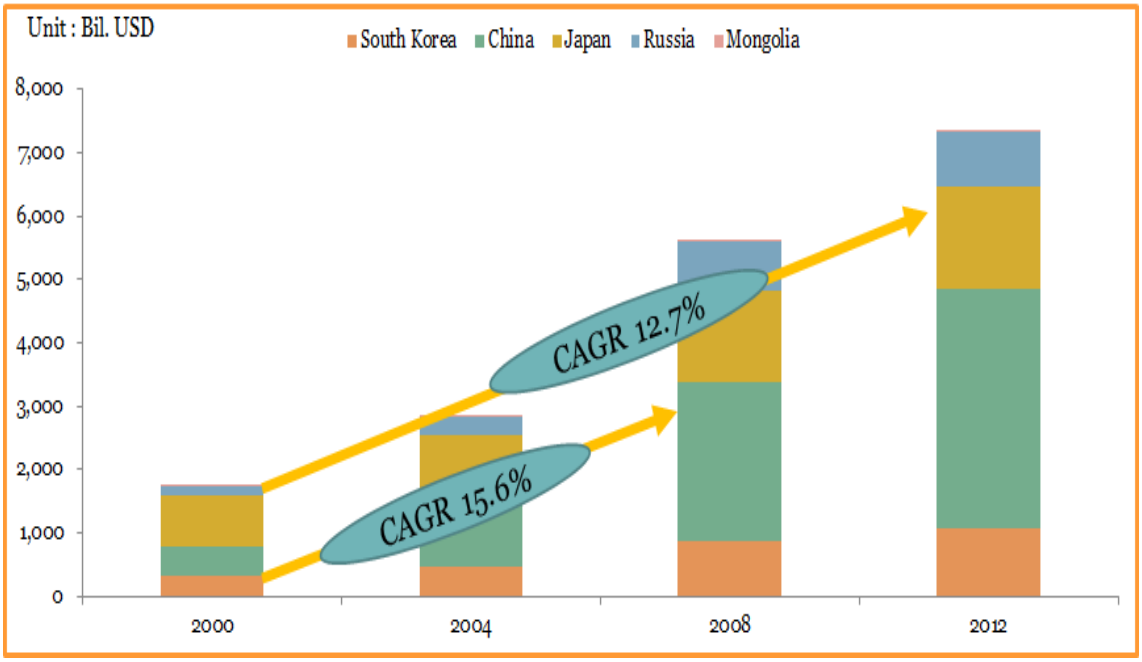
Figure 1: Real GDP Levels of NEA



Source: Global Insight, 2013.7.15.

Between 2000 and 2012, the trade amount of the five Northeast Asian nations showed exponential growth rate of 12.7% on average. As of 2012, the five nations accounted for 20.5% (or 7 trillion and 328 billion in USD) of the total amount of global trade. There also has been steady increase in the share of the five nations in terms of the global trade amount; they took up 13.8% of the global trade amount in 2000, 15.8% in 2004, 17.8% in 2008, and 20.5% in 2012.

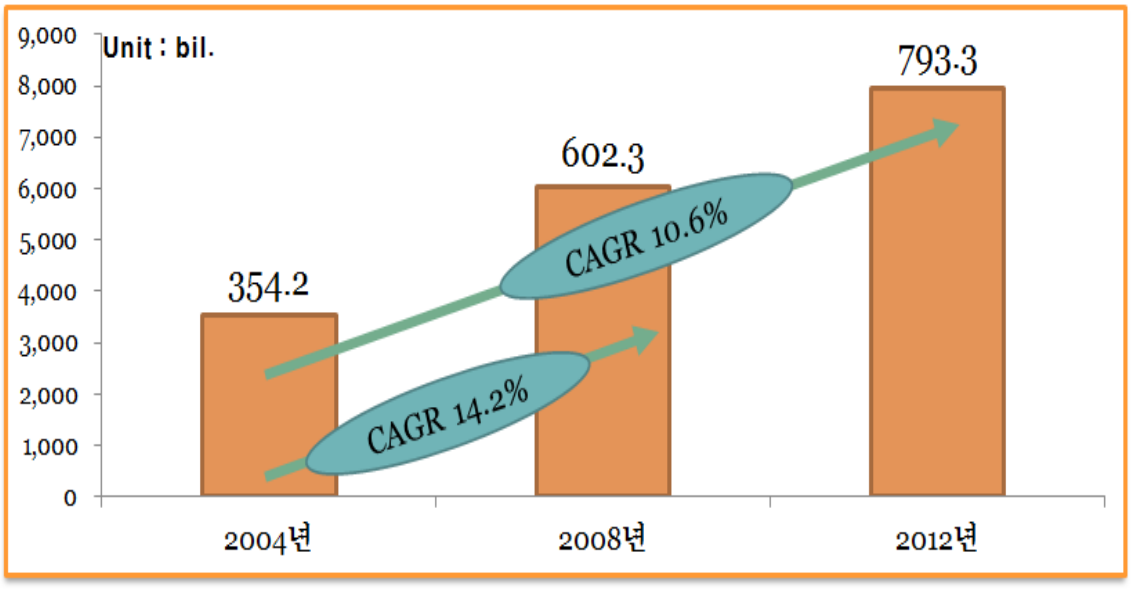
Figure 2: Trade amount of NEA



Source: Global Insight, 2013.7.15.

The size of the Northeast Asian market has continuously increased from 354.2 billion USD in 2004 to 799.3 billion USD in 2012. But the share of the intraregional trade in Northeast Asia compared to that of the global trade has remained the same from 12.3% in 2004 to 10.6% in 2008 and 11.1% in 2012. The share is expected to rise when trade conditions improve.

Figure 3: Trade amount of Intra-NEA



Source: KITA.NET.

The annual GDP growth rate and the amount of trade of Northeast Asia are expected to increase to 4.3% and 7.9% respectively. And the logistics market in Asia is expected to be worth about 2.8 trillion USD in 2020.

In conclusion, Northeast Asia is expected to show steady growth in interregional trade,

intraregional trade, interdependence, and the volume of the logistics market and is showing great potential for developing into a booming market when the logistics networks are established. And Northeast Asia has huge potential for the sea-land multimodal transport given its complementary economic structure and geopolitical factors.

2.2 Infrastructure Status for the Sea-Land Transport in NEA

GTI devises the concept of the trans-GTR transport corridors. Out of the six trans-GTR transport corridors, three are in connection with the sea-land multimodal transport in the East Sea Rim: ① Tumen Transport Corridor[7], ② Suifenhe Transport Corridor[8], and ③ Siberian Land Bridge.

Figure 4: Trans-GTR transport corridors

Source: GTI (2013).

The Tumen Corridor connects East Mongolia with Northeast China reaching the sea at the port of Zarubino in Primorsky Territory.[9]

The Suifenhe Transport Corridor runs from Vladivostok, Nakhodka and Vostochny ports in the Russian Far East, through the Chinese border city of Suifenhe to Harbin, and then stretches from Manzhouli to Zabaykalsk in Russia, before linking up with the TSR at Chita.[10]

The Siberian Land Bridge is a sea-land multimodal transport route which connects Asia and Europe and is a Russian corridor.

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[7] Zarubino/Posiet Ports –Hunchun – Changchun – Yirshi (Arxan) – East Mongolia – Trans-Mongolia Railway or Siberian Land Bridge

[8] Vostochny, Nakhodka, Vladivostok Ports –Grodekovo – Suifenhe – Harbin – Manzhouli – Zabaykalsk – Siberian Land Bridge

[9] "Integrated Transport Infrastructure and Cross-border Facilitation Study for the Trans-GTR Transport Corridors, Regional Summary Report", GTI, 2013, p.7.

[10] op. cit.

Here are details of the infrastructure based on the above three transport corridors where China, Russia, and Mongolia can be linked on land.

2.2.1 Land Linkage Infrastructure between China and Russia

Jilin Province, Heilongjiang Province, and Inner Mongolia Autonomous Region of China are bordering Russia and Zabaykalsky Krai, Altai Republic, Amur Oblast, Jewish Autonomous Oblast, Khabarovsk Krai, and Primorsky Krai of Russia are bordering China. China and Russia are interconnected on land via railways and roads. Here are details of the railways and roads which connect China and Russia.

1) Roads

Eleven roads connect China and Russia but most of them are dilapidated. But the Hunchun–Ulanhot Expressway (G12) in Hunchun along with China National Highway 302 (G302) and the Suifenhe–Manzhouli Expressway (G10) (which links Suifenhe City and Manzhouli) along with China National Highway 301 (G301) are main roads connecting China and Russia.

(1) The Hunchun–Ulanhot Expressway (G12) along with China National Highway 302 (G302)

The Hunchun–Ulanhot Expressway and China National Highway 302 run from Hunchun, Jilin Province (neighboring DPRK, China, and Russia) to Tumen, Yanji, Changchun (all of which are in Jilin Province), and to Ulanhot, Inner Mongolia. G12 parallels much of China National Highway 302. Russia's Kraskino is connected to China's Hunchun via Changlingzi customs office and from Kraskino you can go to Zarubino Port via a Russian road. G12 and G302 are main routes which cut through Changchun, Jilin, and Tumen and play an essential role for China's Changchun-Jilin-Tumen River Pilot Area Strategy Project.

(2) The Suifenhe–Manzhouli Expressway (G10) along with China National Highway 301 (G301)

The Suifenhe–Manzhouli Expressway and China National Highway 301 run from Suifenhe City, Heilongjiang Province to the HaDaQi (Harbin, Daqing and Qiqihar) Industry Corridor and to Manzhouli, Inner Mongolia. Most of the trade between China and Russia are dealt with via G10 and G301.

2) Railways

Three railways are connecting China and Russia: Manzhouli of China and Zabaykalsky Krai of Russia are connected via Binzhou Railway; Suifenhe City of China and Pogranichny and Ussuriysk City of Russia are connected via Binsui Railway; and Hunchun of China and Mahalino of Russia are connected via Hunchun-Tumen Railway and Changchun-Tumen Railway.

(1) Binzhou Railway

Binzhou Railway is one of the arterial railways in the provinces in Northeastern China and is a double-track railroad. It is 964 km long and is between Manzhouli, Inner Mongolia, to Harbin, the capital and largest city of Heilongjiang Province. This railway is one of the major rail transport corridors between China and Russia. It begins Harbin and runs to Daqing City, Qiqihar City, Zhalantun City, Hailar District, and to Manzhouli. Manzhouli is connected to Russia's Zabaykalsky Krai via a railway customs office and then is connected to Trans-Siberian Railway.

(2) Binsui Railway

Binsui Railway runs from Harbin to Suifenhe and is 548 km long. It is a double-track railroad from Harbin to Mudanjiang City (351 km) and a single-track railroad from Mudanjiang to Suifenhe. Tujia (Tumen-Jiamusi) Railway meets Mudanjiang. Suifenhe is connected to Ussuriysk City of Russia and then is to Trans-Siberian Railway. Along with Binzhou Railway, Binsui Railway is one of the arterial railways as part of transport corridors between China and Russia.

(3) Hunchun-Tumen Railway and Changchun-Tumen Railway

Hunchun-Tumen Railway is a single-track railroad from Hunchun and Tumen of Jilin Province (73 km) and Mahalino of Russia is connected to Hunchun. It is linked to Tujia (Tumen-Jiamusi) Railway, Changchun-Tumen Railway, and East Northeast Railway at Tumen and Changchun-Tumen Railway is connected to Changchun, the capital and largest city of Jilin Province.

Railway between Hunchun of China and Mahalino of Russia was closed temporarily but opened again in August 2013 after China and Russia agreed to reopen it in 2011.

3) Border Clearance Facilities

(1) Hunchun / Kraskino Customs Office

Hunchun road customs office is the only customs office in Jilin Province which deals with customs issues between China and Russia. China's customs offices bordering Russia are Changlingzi customs office and Hunchun railroad customs office. Russia's Kraskino customs office is bordering China.

Hunchun-Kraskino customs offices cover the biggest share of the transport demand between China and Russia. Customs clearance procedures between these two offices are easy and cost less. Kraskino customs office has smaller and older facilities which lead to delay in customs clearance procedures. In addition, time difference between two nations also somewhat contributes to the delay. Therefore, some argue that overall clearance procedures should be improved for better performance. Facilities of Kraskino customs office are to be upgraded by 2012 and therefore overall conditions will be better. China is expanding the road between Hunchun and Changlingzi and a Chinese-Russian consortium is paving the road to Zarubino Port with asphalt.

As for Hunchun railroad customs office, railway between Mahalino and Hunchun was completed in 1997 and the first train started to run on the railway in 2000 before the railway was closed. The railway opened again at the end of 2003 but was closed again as the records of cargo transport were poor (only 902 tons of cargoes were delivered via the railway at the first quarter of 2004). This is because the fees to use the railway were relatively higher than those to pass the train station in Pogranichny as the railway was operated by a privately-owned company and consequently the number of users dropped.

An international transport corridor running from Hunchun railroad customs office to Kraskino customs office and then to Zarubino Port is essential for Jilin Province as a route to the sea and therefore China is under discussion with Russia to open a cargo route via the corridor.

(2) Suifenhe Customs Office

Suifenhe customs office is located at Suifenhe City, Heilongjiang Province, and is connected to

Russia's Pogranichny. Suifenhe customs office is railroad as well as road customs office and takes up larger share of the trade between China and Russia, next to Manzhouli customs office. Suifenhe railroad station (where Suifenhe railroad customs office is located) is linked with 40 railways (24 broad gauge railways and 16 standard gauge railways) and has a passenger terminal of 4,451 m^2, a cargo terminal of 1,170 m^2, and a cargo warehouse of 697 m^2. Suifenhe road customs office is 34.6 thousand m^2 in size and can deal with one million tons of cargoes and 500 thousand passengers. China and Russia are constructing and modernizing Suifenhe-Pogranichny road customs offices.

(3) Manzhouli Customs Office

Manzhouli customs office is located in Inner Mongolia Autonomous Region and is connected to Russia's Zabaykalsky customs office via railways and roads. The customs office deals with 60% or more of the trade between China and Russia. Petroleum, timber, and iron ore are the main items passing through the office. The volume of cargoes cleared by the office had increased since 2000 but dropped in 2009 due to the global financial crisis and subsequent economic downturn.

China and Russia are planning to upgrade the infrastructure of Manzhouli-Zabaykalsky customs offices via "Cooperative Agreement for Northeast China and Siberian and Far Eastern Areas of Russia (2009~2018)." China plans to build an international cargo terminal at Manzhouli, modernize the route between Manzhouli to Hulunbuir (part of China National Highway 301), establish an expressway between Manzhouli and Daqing, and build a railroad running from Manzhouli to New Barag Right Banner and to Earlsu.

Russian Railways is planning to modernize Zabaykalsky station as part of its project to renovate the railway between Karymskaya and Zabaykalsky and spent 10.6 billion RUB in 2008. By doing so, Russian Railways wants to increase the volume of cargoes passing through the point of entry between China and Russia by 2 to 2.5 times. Russia is also planning to renovate Russian Federal Highway A-166 between Chita and Zabaykalsk.

4) Plans to Establish the Infrastructures Connected to Land

Since the mid-2000, China is pushing ahead with the development policy named "Revitalize Northeast China". Revitalize Northeast China plans to revitalize old industrial bases in Northeast China and to develop advanced technologies and manufacturing industries. And it also aims to build six transport corridors, seven integrated transport systems, and interregional express transport infrastructure. By doing so, Revitalize Northeast China will lead the development of Northeast China. Besides Revitalize Northeast China, China is supporting the development of Northeast China by initiating other national and provincial development projects such as the Twelfth Five-Year Guideline for each province, Changchun-Jilin-Tumen River Pilot Area Strategy Project, Liaoning Coastal Economic Belt Development Plan, and HaDaQi (Harbin, Daqing and Qiqihar) Industry Corridor Development Plan.

Russia has "Strategy for Economic and Social Development of the Far East and Baikal Region for the Period until the Year 2025" and is in cooperation with China for "Program of Cooperation between the Regions of the Far East and Eastern Siberia and the Northeast of the People's Republic of China, 2009-2018". These are to upgrade the transport infrastructure in the Far East Region and to develop the bordering areas between China and Russia.

2.2.2 Land Linkage Infrastructure between China and Mongolia

As of today, the infrastructure which can connect East Mongolia and Northeast China isn't well-developed.

1) Roads

The road to China from Mongolia runs from Ulaanbaatar to Baganuur and then to Undurkhaan. From Undurkhaan, the road is diverged into Choibalsan and Baruun Urt. Asian Highway 32 includes the route from Mongolia to Choibalsan and from Choibalsan it runs to Tamsagbulag and Sumber and then is connected to the border of China at Arxan. A bridge is being built but there's no road boundary control point (BCP) at Nomrog. A road boundary control point exists at Bichigt connecting Baruun Urt and China and about 50 cargo trucks are passing the point each day.

Asian highway 32 Undurkhaan-Baruun-Urt-Bichigt road is 498 km. 50 km of road has been completed in 2009, 178 km from Undurkhaan-Baruun-Urt is planned to be completed by end of 2014 year and remaining 270 km from Baruun Urt-Bichigt construction work is planned to finish by 2016. This corridor will connect to Chinese roadway through Inner Mongolia reaching Jinzhou port of China and will be the shortest way for Mongolia as a landlocked country to access to the sea.

Cooperation on building Baruun-Urt-Bichigt-National border paved road between the Ministry of Roads and Transportation of Mongolia and Inner Mongolian Shilin Gol province was signed in 4th of June, 2014. After construction work of Undurkhaan-Baruun-Urt-Bichigt is completed the roadway will connect directly with China enabling Mongolia to reach the Chinese ports.

2) Railway in Mongolia

Currently the total length of Ulaanbaatar railway, including the branch lines, is 1815km, of which 1110 km is the main line connecting the Zamyn-Uud – Erenhot border-crossing point of Mongolia and the People's Republic of China (PRC) to Sukhbaatar-Naushki border-crossing point of Mongolia and the Russian Federation (RF). In addition, according to "Railway policy" approximately 5600 km of new railway will be constructed in 3 phases of which phase 1 and 2 will be constructed between 2013-2018. By doing so, there will be 4 more railway border crossing points meaning 5 corridors including the existing one. By constructing new railway lines in Mongolia will create integrated domestic railway network connecting major mining, synergies with other projects such as Sainshand industrial park, additional transit corridors connecting the region and more importantly, connect Russia, China, Asia with Europe and Mongolia as a landlocked country will be able to access to the sea and third countries.

Arxan is seasonal road BCP. It has already opened and operated seasonally from May 1 to November 1. The facility in Arxan Port was relatively backwards before. The road linked to the port was in a third technical level. The plan for a new port road was approved in December 2009. The new road adopted a second technical level was built and completed in 2010. The joint inspection building and the bridge between Arxan and Sumber, with 325 meter in length and 12 meter in height, was done in 2009.[11]

Mongolia plans to connect East Mongolia with the Gobi and important mines via railways and to

[11] Individual Country Report (China), GTI, 2013, p. 22.

begin the 2nd Stage of the Construction of Arterial Railroads. China already has railways which run from Arxan to Jilin and from Baicheng to Jilin and Hunchun; this means, if a connection from Choibalsan to Arxan is built, a route by which underground resources from Choibalsan can be exported to overseas via Northeast China is open.

The Parliament of Mongolia ratified the State Policy on Railway Transportation ("Railway Policy") in June 2010, concluding to construct approximately 5,600 km of railway infrastructure in three phases in an effort to extend the unified railway network, utilize large mines, and export commodities from those mines. The purpose of the Railway Policy is to support in a cost efficient and environmentally friendly manner the intensive development of the mining sector in Mongolia, while coordinating actions for the development of infrastructure. By constructing new railway lines in Mongolia will create integrated domestic railway network connecting major mining, synergies with other projects such as Sainshand industrial park, additional transit corridors connecting the region and more importantly, connecting Russia with China, Asia with Europe and Mongolia as a landlocked country will be able to access to the world market.

2.2.3 Land Linkage Infrastructure between Mongolia and Russia

Choibalsan and Khuut in East Mongolia are connected to border control points at Ereentsav and Solovievsk (located at the border of Mongolia and Russia) and then are connected to Trans-Siberian Railway. Cargoes passing through the border control points at Solovievsk are exports from Russia but the volume of the cargoes is steadily decreasing.

Choibalsan and Ereentsav are connected via an unpaved road and volume of the cargoes passing through the border control points at Ereentsav is very small.

Implementation period of Ereentsav-Choibalsan-Khuut-Bichigt (apprx.625 km) of railway (Railway policy phase 1&2) is between 2014-2018. We estimate that transportation capacity of goods from Khuut-Bichigt will be 24 million tons per year and Ereentsav-Khuut is 0.7 million tons per year. Ereentsav-Choibalsan-Khuut-Bichigt can form a vertical axis which will connect Russia and China that is vital for Mongolia as a landlocked country reaching to the sea and for the infrastructure and economic development of the country.

2.2.4 Siberian Land Bridge

Siberian Land Bridge is a sea-land multimodal transport route connecting Asia and Europe. Siberian Land Bridge begins at a port of the Russian Far East and uses Trans-Siberian Railway (TSR). Siberian Land Bridge had been neglected due to growing size of container vessels, lowering cargo charges, and the collapse of the Soviet Union. But since 2000, Siberian Land Bridge has drawn people's attention due to the development of the Russian economy and increasing volume of cargoes from China and ROK.

The Russian government is pushing ahead with the project named "Seven Days of Trans-Siberian Railway" as a means to revive the economy and strengthen the logistics of the Russian Far East. This project aims to run cargo trains to deliver cargoes from a port of the Russian Far East (Nakhodka Port) to Moscow in 7 days at 1,500 km a day by 2015. According to the project, the distance which a cargo train goes for a day from Nakhodka to Moscow on Trans-Siberian Railway

will increase from 910 km to 1,400 km in 2012 and to 1,500 in 2015. Then the cargoes on the train can be delivered in seven days.

This project will contribute to reduction in the time required for a container train to cross Asia and Europe and the cargoes moving from the Asia Pacific to Europe could be delivered via Trans-Siberian Railway.

2.3 Ports Infrastructure

Here are details of the five ports in the Russian Far East which play an essential role for the sea-land multimodal transport in the GTR.

Ports in the Russian Far East deal with 16% of Russia's foreign trade cargoes and 20% of trade cargoes passing through Russian ports. 77% of Russia's maritime cargoes are dealt with at ports in the Russian Far East.

2.3.1 Zarubino Port

Zarubino Port was first developed as a base for catching fishery products 30 years ago. It has four berths and each berth has different functions (for scrap metal, for vehicles and containers, for fishery products, and for ferries). Ships whose gross tonnage is up to 25 thousand can be anchored at the port. The depth of the port is between 7.5 m and 9.5 m. The length of its pier is 750 m.

Zarubino Port has the following facilities: terminus for small trucks and heavy equipment, storages for motor vehicles, and a food warehouse (5,000 m^2 in size and flour is mainly stored). At the early 2009, an access road behind the port was paved.

For 4 to 5 days a year, the low temperature becomes 22 below zero with 80% humidity and wind speed 15 m/s (the wind chill is -40℃). It snows a lot but snow is swiftly removed and therefore snow doesn't hamper logistics.

As of 2011, annual average volume of cargoes which Zarubino Port can deal with was 117.1 thousand tons. Public officials of Khasan proposed to build a logistics center which connects Kraskino, Zarubino, and Slavyanka to respond to growing volume of cargoes. According to the proposal, a location for an inland logistics center for trucks will be secured and then cargoes will be delivered to the center via railways.

2.3.2 Vladivostok Port

Vladivostok Port is a commercial port and mainly deals with metals, metal products, timber, unrefined sugar, crops, containers, cokes, and ores.

Vladivostok Port has 17 berths: No. 1 and 2 are for passengers, 14 and 15 are for containers, and the rest are for Bulk cargoes.

Table 1: Berths at Vladivostok Port

Berths	Terminals	Purposes

1-2	PortPasService	Passengers, General Cargoes
3-4	Vladivostok Vehicle Terminal	Vehicles, Heavy Equipment
5-8	UPEC	General Cargoes
9-10	TET	General Cargoes
11	Oil Terminal	Oil
12-15	UNECO	General Cargoes, Containers
16-17	Vladivostok Container Terminal	Containers

Source: Methods to Establish Competitive and Cooperative Relationship among Ports in Northeast Asia in Response to the Changes in External Factors, the Ministry of Maritime Affairs and Fisheries, 2013.

According to the plan to develop Vladivostok's commercial port by 2015, Vladivostok Port is expected to deal with 11.4 million tons of cargoes by increasing its ability to accommodate more containers and vehicle parts.

2.3.3 Nakhodka Port

Nakhodka Port is one of the three largest ports at the south of Russia's Far East and is 130 km apart from Vladivostok International Airport. It has relatively mild climate and is located at a position where logistics can be easily managed.

Nakhodka Port has modernized facilities and the system which helps ships safely arrive at and leave the port. It is also an ice-free port and therefore can operate all year round. It mainly deals with bulk cargoes and general cargoes and functions as an industrial port.

Nakhodka Port has 22 berths and the length of its pier is 3,500m. Up to 20 vessels can be anchored at the same time and about 1,500 large vessels can arrive at and leave the port for a year. All wharfs are suitable for multipurpose functions and therefore can deal with various types of cargoes according to the changes in market conditions.

Nakhodka Port was the only port which connected Trans-Siberian Railway and Russia's Far East until 1975. Though Vostochny Port took the role, Nakhodka Port is still linked with Trans-Siberian Railway.

2.3.4 Vostochny Port

Vostochny Port is the biggest container port at Russia's Far East and is an ice-free port. The depth of the port is 22m. It can port a ship with 150,000 DWT.

Vostochny Port consists of a coal terminal, a mineral fertilizer terminal, a container terminal, and vehicle terminal and has 17 berths. The total size of terminals is 73.4 hectare and the total length of berths is 1,284m.

Vostochny Port mainly deals with oil, bulk cargoes, timber, miscellaneous goods, and containers and most of the container cargoes are electronic appliances and miscellaneous goods. It can deal with up to 13 million tons of cargoes.

Vostochny Port is connected to Trans-Siberian Railway and the volume of the cargoes delivered from the port via TSR increased from 380 thousand tons in 2007 to 436 thousand tons in 2011.

Vrangel bay at which Vostochny Port is located freezes in January and February and therefore ships coming in and out of the port should get the help of tugboats.

2.3.5 Posiet Port

Posiet Port is an ice-free port located at Posiet bay in Primorsky Krai and is 40 km apart from the border of China. The depth of the port is 9.45 m. And it is linked by rail to north-eastern China, North Korea and TSR.

In 2004 the port joined Mechel Group, one of the leading Russian mining and metals companies. And Mechel launched a modernization program in order to boost the port's capacities.

Currently Posiet port can reload 4.5 m. tonnes of coals a year. Recently Mechel reported its successful tests of the first stage of Port Posiet's technical revamping investment project and the cargo turnover is expected to grow up to 7 m. tonnes a year.

The second stage is planned to be implemented in the next few years. The second stage includes construction of a deep-water berth and bottom dredging of the approach channel for Panamax-type vessels of up to 60,000-tonne cargo capacity.[12]

But because Mechel, the owner of Posiet port intends to use it for in-company cargoes, Posiet port gave up initiative in development of transit traffic via ITC Primorye-2 to Zarubino port.[13]

2.4 Obstacles to the Sea-Land Multimodal Transport

Figure 5: Major bottlenecks and BCPs along trans-GTR transport corridors

Source: GTI (2013).

[12] "Mechel Reports Successful First Tests of New Coal Export Terminal at Trade Port Posiet", BlobeNewswire, February 12, 2014(http://globenewswire.com/news-release/2014/02/12/609622/10068105/en/Mechel-Reports-Successful-First-Tests-of-New-Coal-Export-Terminal-at-Trade-Port-Posiet.html)

[13] Individual Country Report (Russian Federation), GTI, 2013, p.79.

2.4.1 Poor Infrastructure for Land Transport

Northeast China does not have enough infrastructures to accommodate relatively heavier transport load. Most of the infrastructure in Northeast China was built before China launched economic reforms in 1978. And even after the economic reforms, Northeast China has been left behind and therefore maintenance of existing infrastructure has not been carried out properly. As a result, most of the remaining infrastructure is old and isn't good enough to respond to growing traffic in Northeast China.

The Russian Far East accounts for 41% of Russia's territory but the infrastructure for inland transport in the Russian Far East takes up only 29% of all of the infrastructure for inland transport in Russia. Of seven federal districts of Russia, the length of roads and railways is the shortest in the Far Eastern Federal District.

Though Mongolia has vast territory, it has small population and suffers from severe weather conditions, which leads to restriction on transport and as a result national highways and expressways are not widely interconnected. In addition, railways in Mongolia mostly consist of arterial railways based on Trans-Mongolian Railway and lack branch railways.

2.4.2 Lack of Inland BCPs and Logistics Centers

The Russian Far East and Siberia cover a wide area and most of their trades are carried out via borders, which means inland BCPs and logistics centers should be built. In addition, it should be kept in mind that logistics centers play a vital role in the clearance of goods and the change in the mode of transport at border customs. However, the number of inland clearance points and logistics centers in the Russian Far East and Siberia isn't sufficient. Three provinces in Northeastern China and Mongolia are also suffering from similar problems and therefore logistics in these regions doesn't work properly.

2.4.3 Old and Insufficient Port Facilities

The volume of cargoes moving in and out of the Russian Far East and Siberia is expected to skyrocket but the ports in these regions are already heavily utilized or don't have enough space to deal with all cargoes and therefore, once more cargoes are passing through the ports, these ports will fail to meet increasing demand.

Here are several examples of the problems Russian ports have: Vladivostok Port is located inside Vladivostok City and therefore there's little room for the port to expand. Nakhodka Port; railway transport from Nakhodka Port is limited and therefore expansion of Nakhodka Port is severely restricted; Posiet Port is located at an environmentally sensitive place and therefore its expansion is limited; and loading and unloading facilities at Zarubino Port are old and in severe conditions.

2.4.4 Lack of Efficient System which Efficiently Connects Roads and Railways

China has standard gauge railways (1435 mm) but Russia has broad gauge railways (1520 mm). Such difference in track gauge between two nations requires transshipment of cargoes at the

border, which leads to delay in transport.

Trans-Siberian Railway is already heavily congested and therefore delay in ports is severe.

The efficiency in cargo transport is relatively low as road conditions are poor and temporary roads should be taken during the winter.

Missing links exist between roads and railways in inland border areas, which means multimodal transport cannot be done efficiently.

2.4.5 Lack of Integrated System for Customs Clearance

China, Russia, and Mongolia do not have an integrated customs clearance system and therefore each nation has different customs clearance system such as clearance procedures, border crossings management, and quarantine, which leads to higher clearance cost and lower efficiency. Such problems result in inconvenience to logistics and severe negative influence upon the competitiveness of the multimodal transport route in the Grater Tumen Region.

2.4.6 Lack of Comprehensive Customs Clearance Agreements

A multimodal transport network and corresponding facilities require international cooperation as well as various types of management and operation systems. That is to say, countries should reach a mutual agreement upon joint management and operation of facilities, equipment, and personnel required for international multimodal transport, transshipment and clearance of cargoes, and environment protection policies. But each nation surrounding the GTR has signed a mutual transport and trade agreement to meet its own national interest without caring for a comprehensive system and therefore difference among each nation persists.

2.4.7 Delay in Customs Clearance Due to Unnecessary Procedures

Unnecessary customs clearance procedures, such as inspection of a sealed cleared cargo by an inexperienced customs worker, result in delay of customs clearance. For example, a container sealed in China’s Jilin Province passes through Hunchun customs office but fails to pass through Kraskino customs office in Primorsky Krai; this is because Russian customs officers do not accept the seal attached to the container and demand inspection of the content of the container before they allow the container to be distributed freely in Primorsky Krai.

Chapter 3 Current Status of the Multimodal Transport via Ferry in the GTR

There are two multimodal transport routes via ferry passing through the GTR. Another two routes were not in operation now and one of which was discontinued after test run.

Out of the two remaining routes, one is Sokcho-Zarubino-Vladivostok route. It is managed by Stena Daea Line and was reopened on March 19, 2013. The other is Sakaiminato-Donghae-Vladivostok route. It is managed by DBS Cruise Ferry and was opened on June 28, 2009.

Out of the two halted routes, one was Sokcho-Zarubino-Hunchun route. It was opened in April 2000 and was called NEA Ferry route. The other was Sokcho-Niigata-Zarubino-Hunchun route. It was opened on July 28, 2009 and was called New NEA Ferry route.

3.1 Stena Daea Line Ferry Route

Stena Daea Line is a joint cooperation established by ROK's Daea Express Shipping and Sweden's Stena Line. It now operates ferry routes running from ROK's Sokcho to Russia's Vladivostok and from Sokcho to Russia's Zarubino and then to China's Hunchun.

Figure 6: Sea-land transport service map of Stena Daea Line

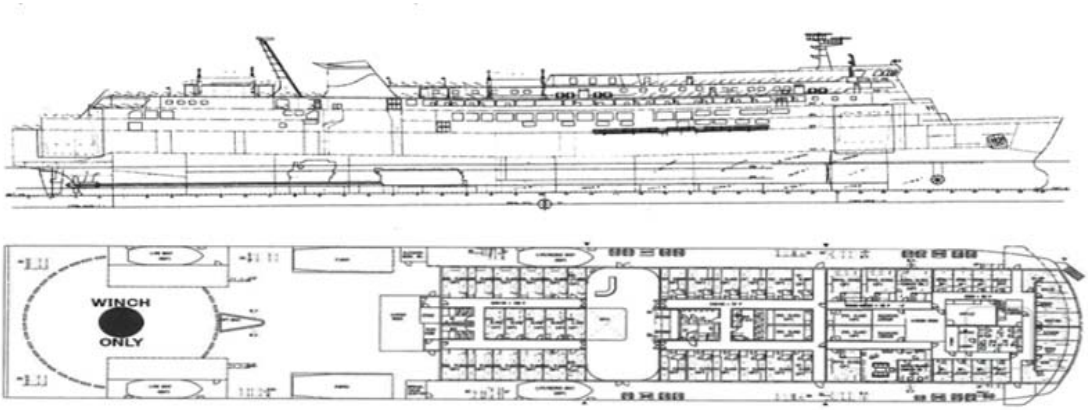
Source: Stena Daea Line(http://stenadaea.com).

These are ROK's only international ferry routes which connects ROK, the three provinces in

Northeast China, and the Russian Far East. These routes were at first opened by Dong Chun Ferry in 2000 but halted in October 2010 due to various troubles.

The routes were reopened on March 19, 2013 by Stena Daea Line. M.V. New Blue Ocean is the name of the ferry on the reopened routes. Gross tonnage of M.V. New Blue Ocean is about 16,000 and it can accommodate up to 750 passengers and 182 containers.

Figure 7: Specification of New Blue Ocean



Ship name	M.V. NEW BLUE OCEAN	Cruise speed	20Knotes
Tonnage	16,485 ton	Loading capacity	182 TEU
Length	160M/25M	No. of passenger	Max 750 persons
Lamp specification	4.5MX7.0M (H/W)	Date of operation	03.19.2013

Source: Stena Daea Line(http://stenadaea.com).

Stena Daea Line operated the vessel twice a week (Sokcho to Vladivostok once and Sokcho-Zarubino-Hunchun once) and it added one more operation on August 26, 2013 (Sokcho to Vladivostok once and Sokcho-Zarubino-Hunchun twice). In addition to passengers, the vessel carries cargoes such as containers, used cars, and heavy equipment.

Figure 8: Cargo transportation process (Sokcho-Zarubino-Hunchun)

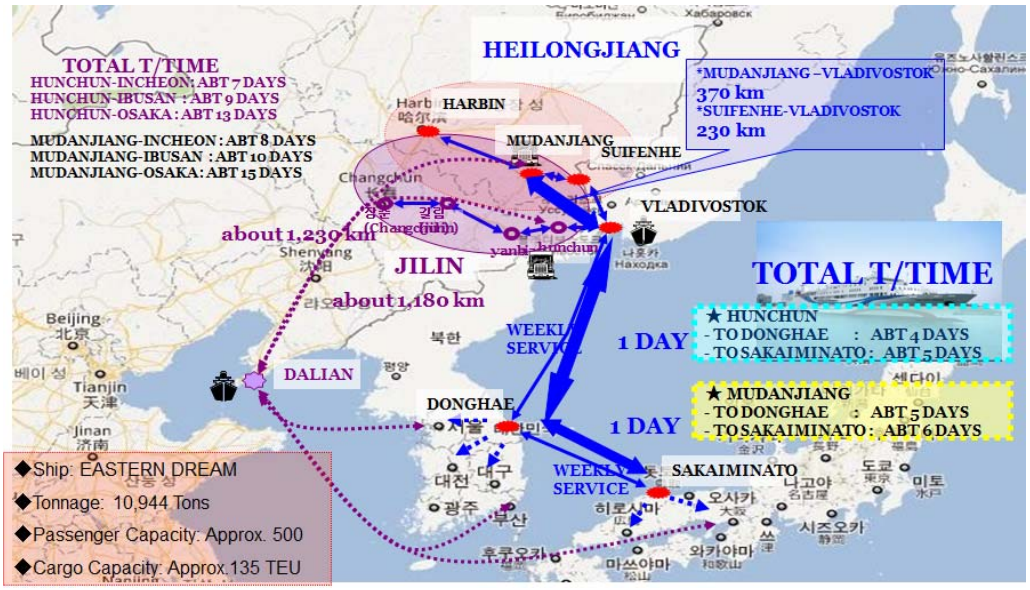
Source: Stena Daea Line(http://stenadaea.com).

3.2 DBS Ferry Route

DBS Cruise Ferry was a ROK company established in 2007. It obtained a license to operate ferry lines between ROK and Russia and ROK and Japan in 2008. Then it remodeled a vessel it had purchased before in 2009 and placed the vessel in commission on June 29, 2009.

DBS Cruise Ferry operates M.V. Eastern Dream for two routes – ROK's Donghae to Vladivostok and Donghae to Japan's Sakaiminato – and the vessel takes one route once a week.

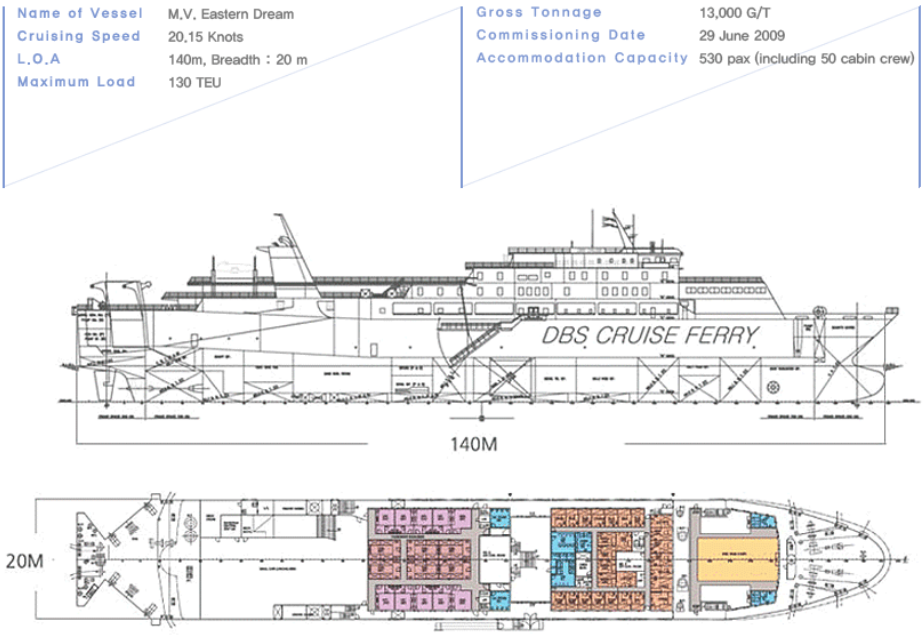
Figure 9: Sea-land transport service map of DBS Cruise Ferry



Source: DBS Cruise Ferry.

Gross tonnage of M.V. Eastern Dream is about 13,000 and it can accommodate up to 530 passengers, 60 vehicles, and 130 containers

Figure 10: Specification of M.V. Eastern Dream



Source: DBS Cruise Ferry (http://www.dbsferry.com).

M.V. Eastern Dream has been operated in the red even though the volume and number of cargoes and passengers have increased. The percentage of the cargoes from Russia is only 9%, which means the percentage should increase to cover the deficit. Meanwhile, Tottori Prefecture where Sakaiminato is located provides subsidiaries to operators and users of the vessels whose routes include Sakaiminato to help operators maintain and use the routes.

3.3 NEA Ferry Route

In April 2000, Northeast Asia ferry running from Sokcho to Zarubino and to Hunchun was opened. It was the only ferry route connecting ROK, China, and Russia and was the base for the sea-land multimodal transport. A ferry with 15,000 gross tonnage was on the route and it was operated by Dong Chun Ferry. It operated three times a week during the peak time (June to September) and two times a week during the rest of the time (October to next May).

The ferry route had contributed greatly to expansion and facilitation of personal and material exchanges among ROK, China, and Russia and to their economic development as a ferry sailed two to three times a week regularly. In addition, the route helped the international logistics network in Tumen River Golden Triangle, a development project by the UNDP, be upgraded and then generated momentum for the project to be turned into GTI.

In July 2007, NEA ferry route was connected to Trans-Siberian Railway which began from Zarubino port. This means cargoes which should be transported from ROK's capital area including Seoul to Central Asia and Europe could be carried via ferry from Sokcho port to Zarubino port and then delivered to their destinations via Trans-Siberian Railway. As a result, the time to deliver a cargo from ROK to Europe could be cut by at least seven days and therefore ROK's competitiveness could be strengthened.

However, NEA ferry route became unable to be operated regularly as planned after the ROK's Cheonan Ship sinking in March 2010 and the US government ordered passenger and cargo ships to sail in international waters instead of sailing in the Northern Limit Line in the East Sea for safety matters. In addition, after the financial crisis originated from the US in September 2008, the route became unable to generate profits and deficits widened. As a result, NEA ferry route was halted in October 2010.

Here are more reasons why NEA ferry route was closed, in addition to the above-mentioned political reason.

First, procedures to cross borders between China and Russia were complex and required too much expense. A cargo should go through two procedures: one was at Zarubino port and the other was at Kraskino customs office. The total expense including issuance of transit visa was 120,000 KRW and that was more expensive than a round-trip car ferry ticket between Incheon and China (220 USD).

Second, Kraskino terminal was small and in poor condition and therefore tourists who arrived at the terminal had to wait for five to six hours during the peak time (July and August).

Third, procedures for bonded transport between Zarubino and Vladivostok were complex and loading and unloading cargoes were unable at Vladivostok port at night. ROK requested Zarubino that

cargoes which should be carried to Vladivostok via Zarubino should be allowed to be transported by submitting manifests and Vladivostok that customs procedures at night should resume. But the request was not accepted.

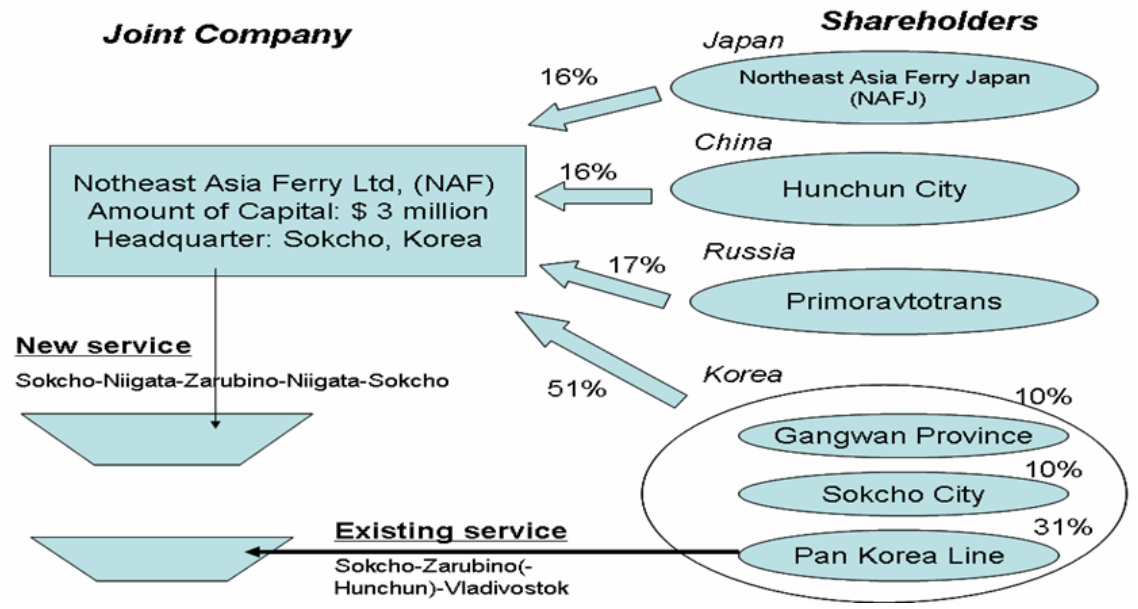
Fourth, departure lounge at Hunchun's Changlingzi BCP did not have enough space for small traders to wrap goods and to accommodate small traders while they were waiting before departure.

3.4 New NEA Ferry Route

New NEA ferry route was opened after Dong Chun Ferry (an affiliate of Bumhan Merchant Marine) proposed a route connecting ROK, China, Japan, and Russia at a GTI conference.

In December 2008, Northeast Asia Ferry Ltd. (NAF) was established jointly with funding from ROK (Gangwon Province, Sokcho (city), and Bumhan Merchant Marine), China (Hunchun (city)), Japan (Niigata (city) and Tohoku Ferry), and Russia (Primoravtorans). And NAF operated a multimodal route connecting Sokcho, Niigata, Zarubino, and Hunchun from July to September 2009.

Figure 12: Structure of NAF's shareholders

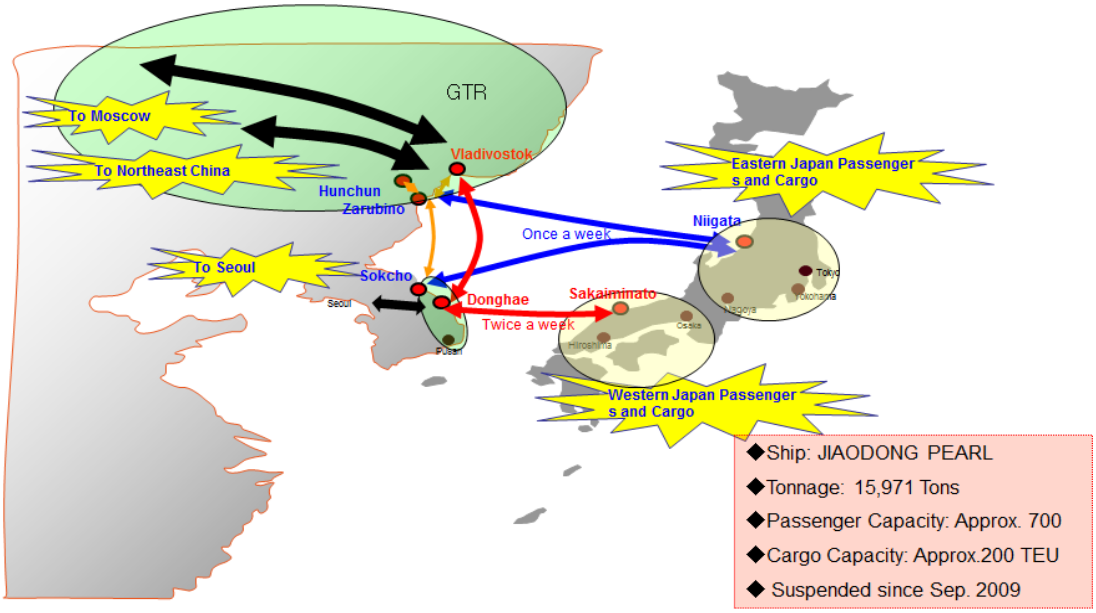


Source: Ikuo Mitsuhashi, "History and current issues regarding Northeast Asia Ferry", ERINA.

The route was intended to create more personal and material exchanges in Northeast Asia and generate new momentum for development projects of the GTR. However, the route was discontinued shortly after its opening due to the following reasons: shortage of demand for passengers and cargoes, expiry of the contract to borrow a vessel, and failure of ROK and Japanese local governments to grant subsidies.

As a result, the initial goal of the route – creation of more personal and material exchanges in Northeast Asia and generation of new momentum for development projects of the GTR – was not able to be reached.

Figure 12: Sea-land transport service map of NAF



Source: Junji YAMANE, "Towards the Further Development of Economic Exchange in Northeast Asia", 2010.6.24.

In addition, Russia's expensive transit visa fees, complex entrance procedures, lack of facilities at checkpoint in China's and Russia's borders resulted in decreased demand for tourists and cargoes and consequently in disappointing performance of the route. During the test run of the route, NAF ferry carried only 234 passengers and 238 TEU of containers.

Visa fees to go to Hunchun via Zarubino has doubled since April 2009 and ROK and Japanese passengers should pay additional charge of 100 USD. This is more expensive than Russia's single-entry visa fee of 70 USD.

The Russian government cut the working hours of officers at Kraskino checkpoint and didn't perform maintenance of the checkpoint's facilities in an effort to save government's budget. This was because of financial downturn but resulted in more inconvenience for tourists.

In addition, Russia's trade protectionism such as increasing of import duties upon used cars also hampered generation of more demand for cargo transport.

Table 2: Examples of delay in border-crossing between China and Russia

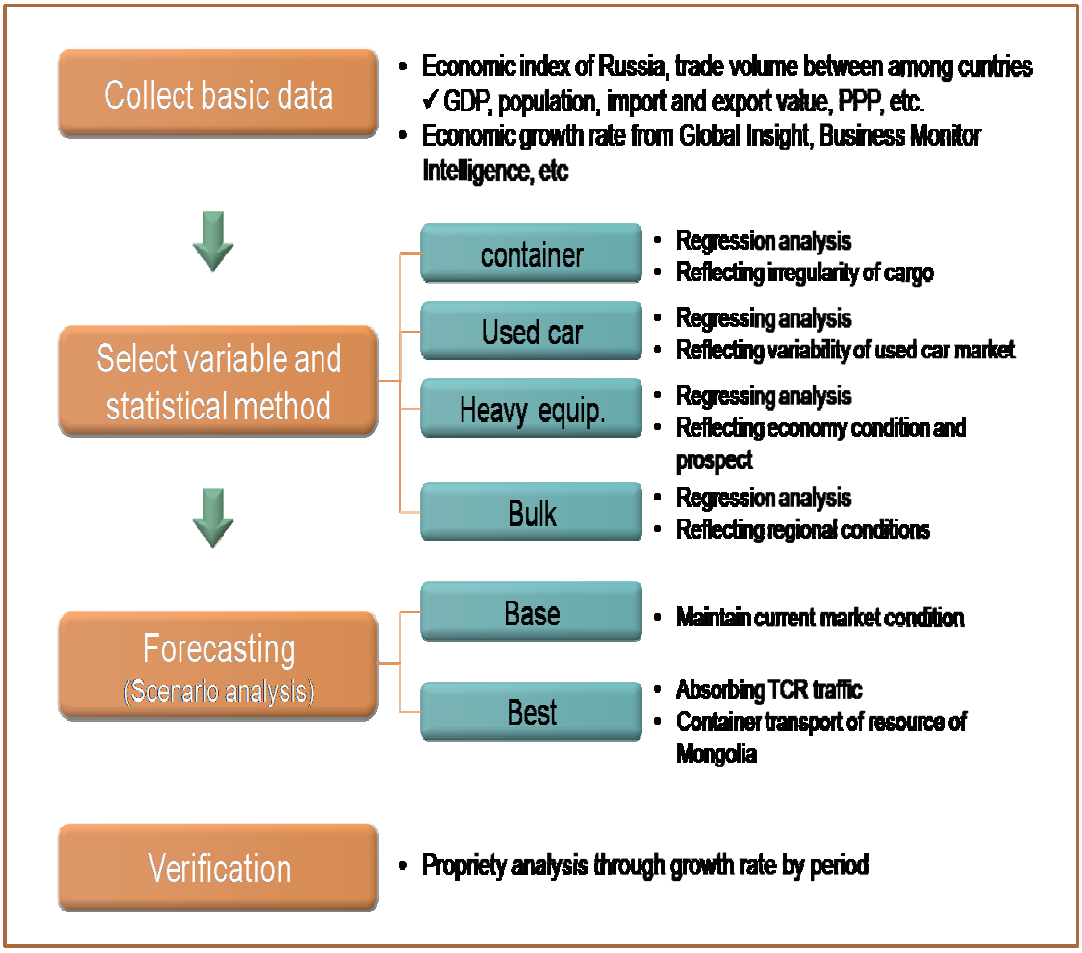
◇ Russia's Kraskino terminal (checkpoint) is located at the border of China and Russia but its shortage of facilities and personnel creates frequent delay in customs clearance procedures (six hours at worst)
◇ Due to the three-hour time lag in summer between China and Russia, tourists and cargoes that pass through the Chinese border become unable to pass through Russia's Kraskino terminal as the terminals' working hour ends.
◇ At a national holiday of China or Russia, Changlingzi customs office of China or Kraskino terminal and Zarubino port of Russia closes its business and therefore operation of international ferry liners has to stop partially.

Chapter 4 Prospects of the Market for the Sea-Land Multimodal Transport in the GTR

4.1 Procedures for Forecasting the Volume of Ferry Cargoes

The volume of ferry cargoes in Northeast Asia is forecasted in accordance with the following procedures.

Figure 13: Procedures to forecast the volume of ferry cargoes in NEA



Source: KMI.

4.2 Forecasting the Volume of Ferry Cargoes

4.2.1 Assessing Fundamental Data

1) Russia's Economic Condition and Forecast

Russia overcame economic slump and is experiencing economic development thanks to its new economic development strategy.

Russia's real GDP growth rate recovered to 4.3% and it showed robust economic growth in 2011; its industrial production growth rate was 4.7%, fixed capital investment growth rate was 8.3%, and retail sales growth rate was 7.2%. Russia became a member of the WTO and successfully hosted an APEC Economic Leaders' Meeting in 2012, which means Russia is an active member of the global community.

Table 3: Russia's economic growth rate

Year	2008	2009	2010	2011
Real GDP Growth Rate	5.6	-7.8	4.0	4.3
Industrial Production Growth Rate	2.1	-9.3	8.2	4.7
Fixed Capital Investment Growth Rate	9.8	-16.2	6.0	8.3
Retail Sales Growth Rate	13.0	-4.9	6.3	7.2

Source: Embassy of the Russian Federation

Russia's GDP is expected to show steady growth in the future.

Table 4: Russia's GDP forecast

Unit: billion USD

Year	2015	2020	2025	2030
GDP	1,086	1,285	1,500	1,719

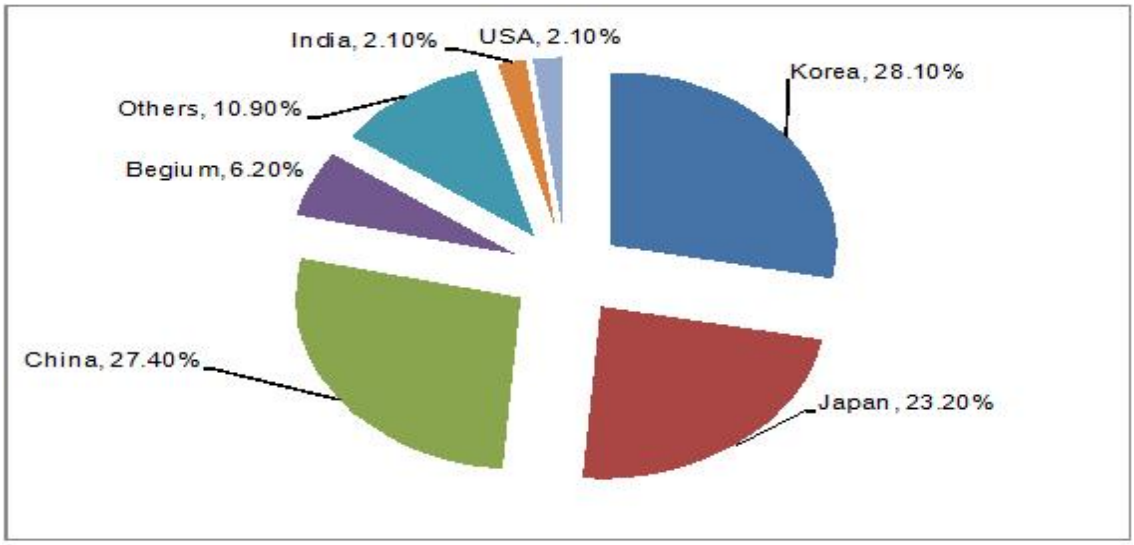
Source: Global insight.

2) Trade of the Russian Far East

Russia's major trade partners in the Russian Far East are ROK, China, and Japan. As of 2012, trade amount between ROK and the Russian Far East was 10.261 billion USD; that figure was a 5.0% rise from last year's and accounted for 28.1% of the total trade amount of the Russian Far East. Trade amount between Japan and Russia was 8.450 billion USD; that figure was a 8.9% rise from last year's and accounted for 23.2% of the total trade amount of the Russian Far East.

According to the Russian government's economic development plan, the Russian Far East is designated as the center for energy development and balanced national development. The Russian government finally approved "Energy Strategy 2030" in 2009 which aimed to place Russia as the main energy exporter to Asia-Pacific countries and to boost economic development by utilizing natural resources in the Russian Far East. The strategy also planned to engage in natural resources development in East Siberia, the Russian Far East, the Yamal Peninsula, and continental shelves in the Arctic Ocean and the Caspian Sea and to increase national financial support for exploration in the Arctic Ocean.

Figure 14: Major trade partners of the Russian Far East (as of 2012)



Source: Customs Office of the Far Eastern Federal District of Russia

Main export items of the Russian Far East are food products, food ingredients, fishery products, minerals, energy sources, chemicals, and rubber.

Table 5: List of export items of the Russian Far East

Unit: thousand USD

Items	Export			Import		
	2011	2012	Growth Rate	2011	2012	Growth Rate
Food products and ingredients	2,114,051	2,329,297	110.2%	1,086,216	1,113,108	102.5%
Fishery products	2,047,430	2,214,698	108.2%	43,474	38,249	88.0%
Minerals	16,792,704	17,473,155	104.1%	201,116	194,850	96.9%
Energy sources	16,400,268	17,015,917	103.8%	143,568	141,335	98.4%
Chemicals, rubber	143,470	104,609	72.9%	731,121	920,215	125.9%
Hide, fur and their products	650	1,149	176.8%	136,712	138,955	101.6%
Timber and paper products	1,154,270	987,605	85.6%	159,673	186,184	116.6%
Textile and shoes	1,226	2,695	219.8%	1,266,077	1,214,480	95.9%
Metal	624,051	611,796	98.0%	803,520	875,163	108.9%
Machinery, equipment, and vehicles	588,815	688,740	117.0%	4,238,572	5,283,969	124.7%
Others	6,658,065	3,723,856	55.9%	486,171	602,841	124.0%

Source: Customs Office of the Far Eastern Federal District of Russia

3) Trade between ROK and Russia

Trade between ROK and Russia has steadily increased and therefore demand for international logistics centered on ports has grown. As of 2012, the amount of trade between ROK and Russia was 22.451 billion USD and the annual trade growth rate was 18.8% since 2000.

Table 6: Trade between ROK and Russia

Unit: million USD

Year	2000	2007	2008	2009	2010	2011	2012	CAGR
Volume	2,846	15,065	18,088	9,983	17,659	21,161	22,451	18.8%

Source: Korea International Trade Association.

ROK's main export items to Russia are vehicles, machinery, computers, electric machinery and equipment, plastics, iron and steel, optical instruments, rubber, petroleum and coal, articles of iron or steel, and furniture. ROK's main import items from Russia are petroleum, coal, aluminum, steel, fish, inorganic chemicals, pulp, rubber, aircraft and nickel.

Table 6: Major trade items between ROK and Russia by amount (as of 2012)

Ranking	Export items (from ROK)	Import items (from Russia)
1st	Vehicles	Petroleum, coal
2nd	Machinery, computers	Aluminum
3rd	Electric machinery, equipment	Steel
4th	Plastics and articles thereof	Fish
5th	Iron and steel	Inorganic chemicals
6th	Optical Instruments	Wood and articles of wood
7th	Rubber and articles thereof	Pulp
8th	Petroleum, coal	Rubber and articles thereof
9th	Articles of iron or steel	Aircraft
10th	Furniture	Nickel and articles thereof

Source: Korea Customs Service

4) Volume of Trade Cargoes in accordance with each Route and Operator

As of today, DBS Cruise Ferry route is the only route which can provide time-series-based performance records. DBS cruise ferry route also deals with ferry transport between Japan and Russia. Not enough time has passed for Stena Daea Line Ferry route to provide time-series-based performance records. So the data from Stena Daea Line ferry route isn't included in the following forecast.

Table 7: Volume of the cargoes delivered by DBS Cruise Ferry

		2009	2010	2011	2012	CAGR (10-12)
Containers (TEU)	Donghae→ Vladivostok	32	234	788	876	93.5%
	Vladivostok→ Donghae	0	41	101	72	32.5%
	Donghae →Sakaiminato	25	96	138	215	49.7%
	Sakaiminato→ Donghae	21	22	22	28	12.8%
	Sakaiminato→ Vladivostok	17	169	306	38	-52.6%
	Vladivostok→ Sakaiminato	18	41	75	69	29.7%
	Subtotal	113	603	1,430	1,298	46.7%
Vehicles (piece)	Donghae→ Vladivostok	121	1,366	2,248	2,531	36.1%
	Vladivostok→ Donghae	3	0	25	24	-
	Donghae→ Sakaiminato	0	0	0	2	-
	Sakaiminato→ Donghae	0	9	0	1	-66.7%
	Sakaiminato→ Vladivostok	19	302	90	45	-61.4%
	Vladivostok→ Sakaiminato	0	3	2	5	29.1%

		2009	2010	2011	2012	CAGR (10-12)
	Subtotal	143	1,680	2,365	2,608	24.6%
Heavy equipment (piece)	Donghae→ Vladivostok	16	182	823	842	115.1%
	Vladivostok→ Donghae	0	0	2	0	-
	Donghae→ Sakaiminato	1	0	0	0	-
	Sakaiminato→ Donghae	0	1	9	13	260.6%
	Sakaiminato→ Vladivostok	1	230	162	26	-66.4%
	Vladivostok→ Sakaiminato	0	1	0	0	-100.0%
	Subtotal	18	414	996	881	45.9%
Bulk cargoes (ton)	Donghae→ Vladivostok	601	1,099	925	283	-49.3%
	Vladivostok→ Donghae	334	835	396	203	-50.7%
	Donghae→ Sakaiminato	5	261	6	22	-71.1%
	Sakaiminato→ Donghae	136	19	45	208	231.2%
	Sakaiminato→ Vladivostok	81	1,016	1,776	3,914	96.3%
	Vladivostok→ Sakaiminato	1	130	766	17	-64.2%
	Subtotal	1,159	3,360	3,915	4,646	17.6%

Source: DBS Cruise

Dong Chun Ferry stopped its operation in 2010 so the available performance records of Dong Chun Ferry from 2000 to 2010 were used for the analysis. As DBS Cruise Ferry route is the only ferry route in Northeast Asia which can provide performance records, previous performance records before the operation of DBS Cruise Ferry route should rely on those of Dong Chun Ferry. And Dong Chun Ferry's records are required for forecasting the volume of the cargoes delivered by ferry in the future.

Table 8: Volume of the cargoes delivered by Dong Chun Ferry

Dong Chun (ROK-Russia)		2000	2005	2006	2007	2008	2009	2010
Containers	Departure (ROK→ Russian Far East)	297	2,234	2,360	2,571	1,170	1,907	1,012
	Entry(Russian Far East→ ROK)	482	2,369	3,138	2,747	1,593	2,030	985
	Subtotal	779	4,603	5,498	5,318	2,763	3,937	1,997
Vehicles	Departure (ROK→ Russian Far East)	0	2,116	1,804	3,164	11,179	707	1,035
	Entry (Russian Far East→ ROK)	0	16	24	8	10	3	7
	Subtotal	0	2,132	1,828	3,172	11,189	710	1,042
Heavy equipment	Departure (ROK→ Russian Far East)	0	127	148	328	489	121	96
	Entry (Russian Far East→ ROK)	0	0	0	0	0	1	0
	Subtotal	0	127	148	328	489	122	96
Bulk cargoes	Departure (ROK→ Russian Far East)		271	333	319	181	146	
	Entry (Russian Far East→ ROK)		110	117	127	69	108	

Dong Chun (ROK-Russia)		2000	2005	2006	2007	2008	2009	2010
	Subtotal	0	381	450	446	250	254	0

Source: Dong Chun Ferry

The following table is the combination of the above tables. The following table includes performance records of Japan-Russia ferry routes and therefore the table represents the total volume of cargoes delivered via ferry in Northeast Asia.

Table 9: Volume of the Cargoes Delivered via Ferry in Northeast Asia

Year		2000	2005	2008	2009	2010	2011	2012
Containers (TEU)	ROK→ Russian Far East	297	2,234	1,170	1,939	1,246	788	876
	Russian Far East→ ROK	482	2,369	1,593	2,030	1,026	101	72
	Subtotal (ROK→ Russian Far East)	779	4,603	2,763	3,969	2,272	889	948
	Japan→ Russian Far East				17	169	306	38
	Russian Far East→ Japan				18	41	75	69
	Subtotal (Japan→ Russian Far East)	0	0	0	35	210	381	107
	Subtotal (containers)	779	4,603	2,763	4,004	2,482	1,270	1,055
Vehicles (piece)	ROK→ Russian Far East	0	2,116	11,179	828	2,401	2,248	2,531
	Russian Far East→ ROK	0	16	10	6	7	25	24
	Subtotal (ROK→ Russian Far East)	0	2,132	11,189	834	2,408	2,273	2,555
	Japan→ Russian Far East				19	302	90	45
	Russian Far East→ Japan				0	3	2	5
	Subtotal (Japan→ Russian Far East)	0	0	0	19	305	92	50
	Subtotal (vehicles)	0	2,132	11,189	853	2,713	2,365	2,605
Heavy equipment (piece)	ROK→ Russian Far East	0	127	489	137	278	823	842
	Russian Far	0	0	0	1	0	2	0

Year		2000	2005	2008	2009	2010	2011	2012
	East→ ROK							
	Subtotal (ROK→ Russian Far East)	0	127	489	138	278	825	842
	Japan→ Russian Far East				1	230	162	26
	Russian Far East→ Japan				0	1	0	0
	Subtotal (Japan→ Russian Far East)	0	0	0	1	231	162	26
	Subtotal (heavy equipment)	0	127	489	139	509	987	868
Bulk cargoes (ton)	ROK→ Russian Far East	0	271	181	747	1,099	925	283
	Russian Far East→ ROK	0	110	69	442	835	396	203
	Subtotal (ROK→ Russian Far East)	0	381	250	1,189	1,934	1,321	486
	Japan→ Russian Far East				81	1,016	1,776	3,914
	Russian Far East→ Japan				1	130	766	17
	Subtotal (Japan→ Russian Far East)	0	0	0	82	1,146	2,543	3,931
	Subtotal (bulk cargoes)	0	381	250	1,271	3,080	3,864	4,417

When you look at in/out balance of the volume of the cargoes delivered via ferry in Northeast Asia, you'll find out that most of the cargoes are exported items to Russia. That means, imported items from Russia rarely exist. From the perspective of trade performance, the scale of import and export look similar. Most of the imported cargoes from Russia are delivered via container vessels, which explain the reason of the imbalance.

Table 10: In/out balance of the cargoes delivered via ferry in NEA

		2006	2007	2008	2009	2010	2011	2012
Containers	outbound	42.9%	48.3%	42.3%	48.9%	57.0%	86.1%	86.6%
	inbound	57.1%	51.7%	57.7%	51.1%	43.0%	13.9%	13.4%
Vehicles	outbound	98.7%	99.7%	99.9%	99.3%	99.6%	98.9%	98.9%
	inbound	1.3%	0.3%	0.1%	0.7%	0.4%	1.1%	1.1%

		2006	2007	2008	2009	2010	2011	2012
Heavy Equipment	outbound	100.0%	100.0%	100.0%	99.3%	99.8%	99.8%	100.0%
	inbound	0.0%	0.0%	0.0%	0.7%	0.2%	0.2%	0.0%
Bulk cargoes	outbound	74.0%	71.5%	72.4%	65.2%	68.7%	69.9%	95.0%
	inbound	26.0%	28.5%	27.6%	34.8%	31.3%	30.1%	5.0%

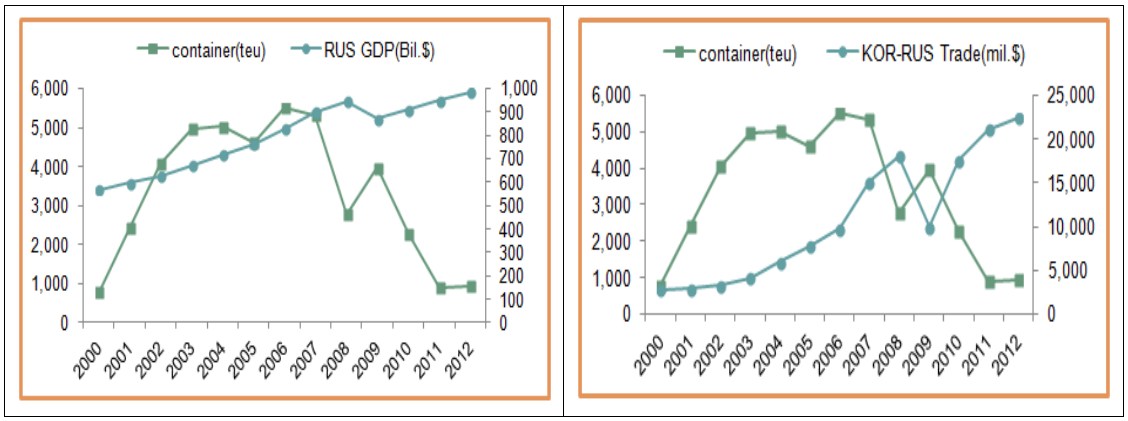
4.2.2 Selection of Predictor Variables and Methodologies

1) Containers

Trend analysis of the volume of the containers traded and Russia's major economy indicators shows that the volume of the containers traded and the growth rate of the trade between ROK and Russia look very similar. There's a direct correlation between the volume of the containers traded and a nation's GDP. The volume of ferry cargoes traded is influenced by a nation's economic and political situations. This means the volume of ferry cargoes traded is the factor most influenced by direct increase in trade.

Therefore regression analysis of the trading volume between ROK and Russia is adopted for forecasting the volume of the containers traded via ferry. Regression analysis is said to be the most suitable one for forecasting the volume of the containers traded via ferry whose variability is high. And many pilot studies also adopt regression analysis.

Figure 15: Comparison between the volumes of the containers traded via ferry and Russia's major economy indicators

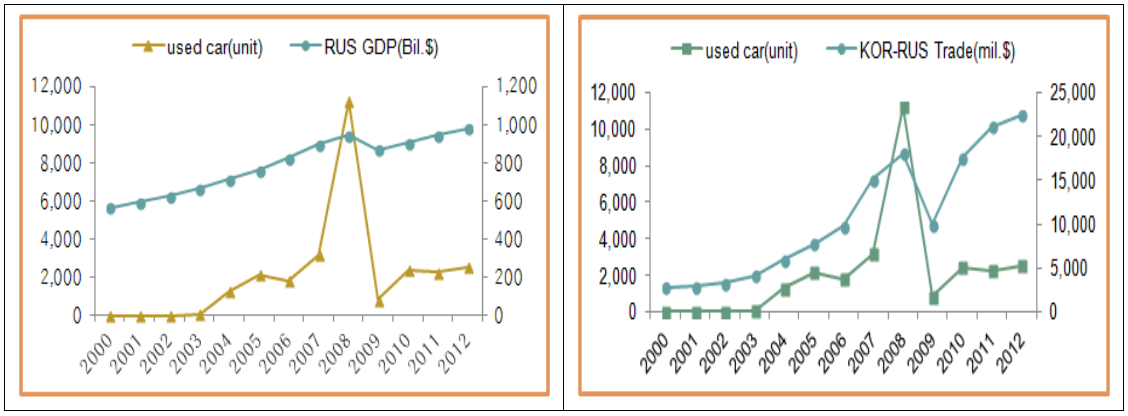


Source: KMI.

2) Used Cars

The volume of the used cars traded and the growth rate of the trade between ROK and Russia show very similar patterns. This is because Russia's import policies directly affect the volume of the used cars traded. Therefore, regression analysis of the growth rate of the trade between ROK and Russia is adopted for forecasting the volume of the used cars traded. Forecasting the growth rate of the trade between ROK and Russia is carried out by regression analysis of Russia's GDP and the growth rate of the trade between ROK and Russia.

Figure 16: Comparison between the volumes of the used cars traded via ferry and Russia's major economy indicators

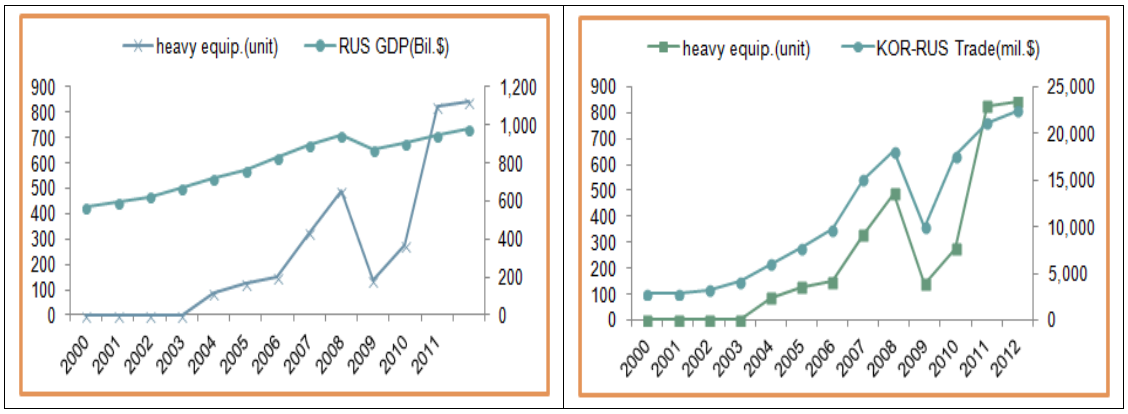


Source: KMI.

3) Heavy Equipment

The volume of the heavy equipment traded and the overall trend the trade between ROK and Russia show very similar patterns. Therefore, regression analysis of the growth rate of the trade between ROK and Russia is adopted for forecasting the volume of the heavy equipment traded via ferry in Northeast Asia.

Figure 17: Comparison between the volumes of the heavy equipment traded via ferry and Russia's major economy indicators

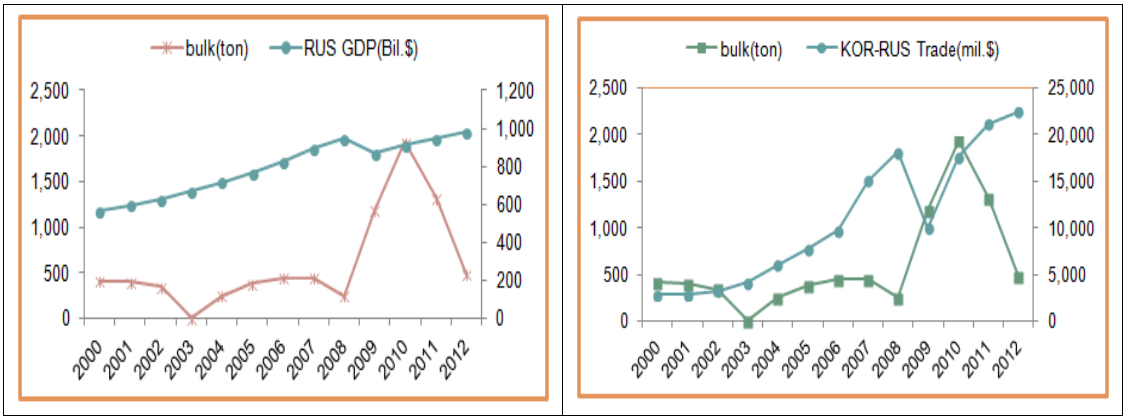


Source: KMI.

4) Bulk Cargoes

The volume of the bulk cargoes traded via ferry and the overall trend the trade between ROK and Russia show very similar patterns. Therefore, regression analysis of the growth rate of the trade between ROK and Russia is adopted for forecasting the volume of the bulk cargoes traded via ferry in Northeast Asia.

Figure 18: Comparison between the volumes of the bulk cargoes traded via ferry and Russia's major economy indicators



Source: KMI.

5) Selected Predictor Variables and Methodologies

Here are the list of a predictor variable and methodology for each factor used for forecasting the volume of cargoes traded via ferry in Northeast Asia.

Table 11: List of adopted predictor variables and methodologies

Item	Predictor Variable	Methodology
Containers	The volume of trade between ROK and Russia	Regression analysis
Used Cars	The volume of trade between ROK and Russia	Regression analysis
Heavy Equipment	The volume of trade between ROK and Russia	Regression analysis
Bulk Cargoes	The volume of trade between ROK and Russia	Regression analysis

6) Forecast of the Volume of Trade between ROK and Russia

Forecast of the volume of trade between ROK and Russia is carried out by conducting regression analysis of Russia's GDP and the volume of trade between ROK and Russia. Regression equation analyzed in this study is as follows:

Estimated regression equation: $Y=-24{,}708.02x_i+44.48(GDP)$

The forecast says the volume of trade between ROK and Russia is expected to grow by 5.7% annually from 2012 to 2030. This figure is 1.8 times higher than the average growth rate of Russia's GDP (3.2%). This forecast is based on the expectation that more and more ROK companies will extend their business into the Russian Far East when the development projects for the Russian Far East are in full force. In addition, this forecast is also reflecting recent surge in the volume of trade between ROK and Russia.

Table 12: Forecast of the amount of trade between ROK and Russia

Unit: billion USD

Year	Russia's GDP	Amount of Trade (ROK-Russia)
2000	567	2,846

Year	Russia's GDP	Amount of Trade (ROK-Russia)
2001	596	2,867
2002	625	3,284
2003	670	4,181
2004	718	6,010
2005	764	7,801
2006	826	9,752
2007	897	15,065
2008	944	18,088
2009	870	9,983
2010	909	17,659
2011	948	22,451
2012	980.9	18,925
2015	1,085.8	23,589
2016	1,126.6	25,404
2017	1,167.1	27,206
2018	1,205.3	28,905
2019	1,245.4	30,688
2020	1,285.2	32,458
2021	1,325.5	34,252
2022	1,367.2	36,109
2023	1,411.2	38,064
2024	1,456.2	40,068
2025	1,499.7	42,000
2026	1,542.1	43,888
2027	1,585.1	45,800
2028	1,628.6	47,736
2029	1,673.7	49,740
2030	1,719.3	51,769

4.2.3 Forecast of the Volume of Ferry Cargoes

1) Base Cases

(1) Containers

Regression analysis of the trading volume between ROK and Russia and the volume of the containers traded gives statistically meaningless results due to unpredictability of the volume of the containers traded and other reasons. To correct the irregularity of the volume of the containers traded, dummy variables are applied before estimating the volume of the containers traded.

Estimated regression equation: $Y = -24708.02x_i + 44.48(GDP)$

Table 13: Forecast of the amount of trade between ROK and Russia

Unit: billion USD

Year	GDP (RUS)	Amount of Trade (ROK-RUS)
2010	909	17,659
2011	948	21,161
2012	980.9	22,451

Year	GDP (RUS)	Amount of Trade (ROK-RUS)
2013	1,008.5	20,152
2014	1,045.8	21,813
2015	1,085.8	23,589
2016	1,126.6	25,404
2017	1,167.1	27,206
2018	1,205.3	28,905
2019	1,245.4	30,688
2020	1,285.2	32,458
2021	1,325.5	34,252
2022	1,367.2	36,109
2023	1,411.2	38,064
2024	1,456.2	40,068
2025	1,499.7	42,000
2026	1,542.1	43,888
2027	1,585.1	45,800
2028	1,628.6	47,736
2029	1,673.7	49,740
2030	1,719.3	51,769

Based on the estimated volume of the trade between ROK and Russia, the following equation is used to forecast the volume of the containers traded via ferry with dummy variables applied.

Regression equation: $Y = 507.511x_i + 0.062[Trade(KOR - RUS)] + 3516.431$

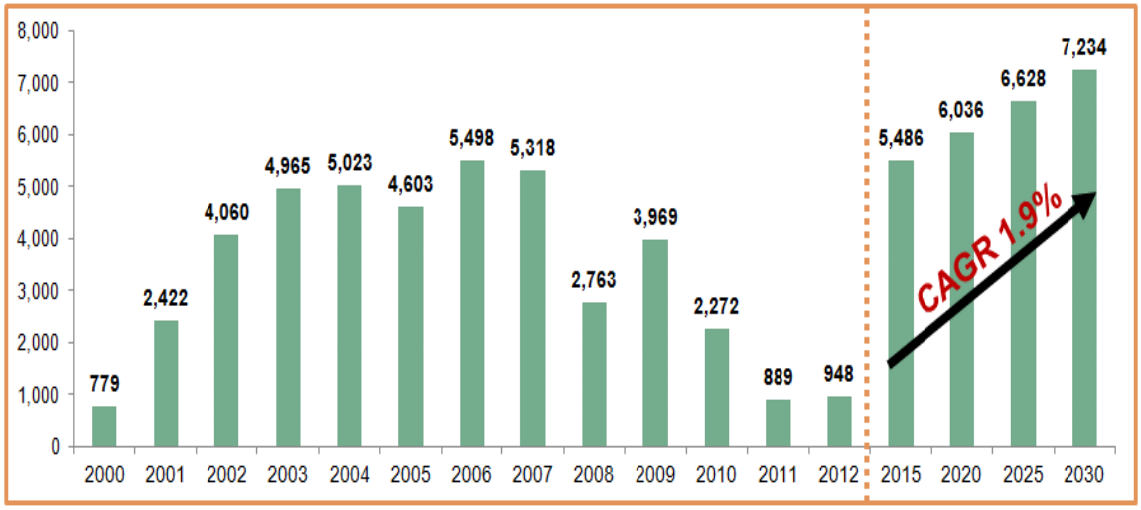
The forecast says the volume of the containers traded via ferry will grow by 1.9% annually from 2015 and the volume is expected to be 7,234 TEU in 2030. This result is based on the fact that most of the containers traded via ferry are processed at the hinterland of a port in the Russian Far East and as the hinterland has limited space the volume of the containers processed at the port is also limited. In addition, the fact that the number of ports which ferries can call at is limited and lopsided in/out balance also contributes to the result.

Table 14: Forecast of the volume of the containers traded via ferry (Base case)

Year	GDP (Billion USD)	Amount of Trade (ROK-RUS) (Million USD)	Containers (TEU)
2015	1,085.8	23,589	5,486
2016	1,126.6	25,404	5,599
2017	1,167.1	27,206	5,711
2018	1,205.3	28,905	5,816
2019	1,245.4	30,688	5,927
2020	1,285.2	32,458	6,036
2021	1,325.5	34,252	6,148
2022	1,367.2	36,109	6,263
2023	1,411.2	38,064	6,384
2024	1,456.2	40,068	6,508
2025	1,499.7	42,000	6,628
2026	1,542.1	43,888	6,745

Year	GDP (Billion USD)	Amount of Trade (ROK-RUS) (Million USD)	Containers (TEU)
2027	1,585.1	45,800	6,864
2028	1,628.6	47,736	6,984
2029	1,673.7	49,740	7,108
2030	1,719.3	51,769	7,234

Figure 18: Forecast of the volume of the containers traded via ferry (Base case)



(2) Used Cars

Regression analysis of the volume of the used cars traded between ROK and Russia gives statistically meaningless results due to inconsistent ferry routes which have been opened and closed sporadically. As a result, dummy variables are applied for the forecast. The following equation is used to forecast the volume of the used cars traded via ferry with dummy variables applied.

Regression equation: $Y = 3207.953x_i + 0.2[Trade(KOR-RUS)] - 3841.660$

The forecast says the volume of the used cars traded via ferry will grow by 6.0% annually from 2015 and the number of the used cars traded is expected to be 9,720 in 2030. Russia's import policies directly affect the volume of the used cars traded via ferry but recent growth in the volume will guarantee healthy growth in the future.

Used cars are sold in all around Russia and therefore as Russia's economy expands so does the number of the used cars sold. In addition, as the number of imported used cars increases in Central Asia, more used cars will be imported via Trans-Siberian Railway.

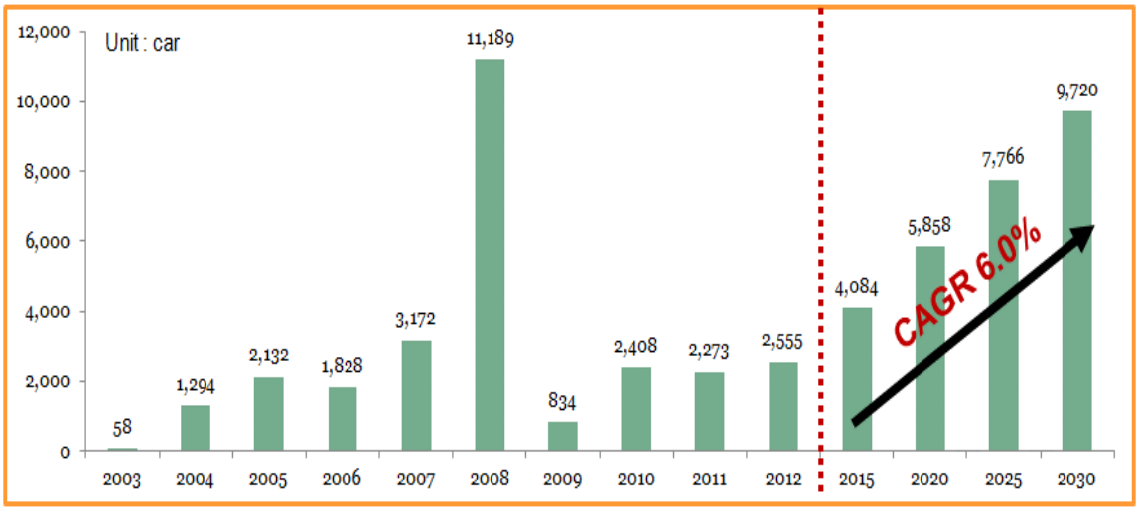
Table 15: Forecast of the volume of the used cars traded via ferry (Base case)

Unit: piece

Year	Amount of Trade (ROK-RUS)	Used car
2015	23,589	4,084
2016	25,404	4,447
2017	27,206	4,808

Year	Amount of Trade (ROK-RUS)	Used car
2018	28,905	5,147
2019	30,688	5,504
2020	32,458	5,858
2021	34,252	6,217
2022	36,109	6,588
2023	38,064	6,979
2024	40,068	7,380
2025	42,000	7,766
2026	43,888	8,144
2027	45,800	8,526
2028	47,736	8,913
2029	49,740	9,314
2030	51,769	9,720

Figure 19: Forecast of the volume of the used cars traded via ferry (Base case)



Source: KMI.

(3) Heavy Equipment

Regression analysis of the volume of the heavy equipment traded between ROK and Russia gives statistically meaningless results due to inconsistent ferry routes which have been opened and closed sporadically. As a result, dummy variables are applied for the forecast. The following equation is used to forecast the volume of the heavy equipment traded via ferry with dummy variables applied.

Regression equation: $Y = -368.885x_i + 0.047[Trade(KOR-RUS)] + 90.017$

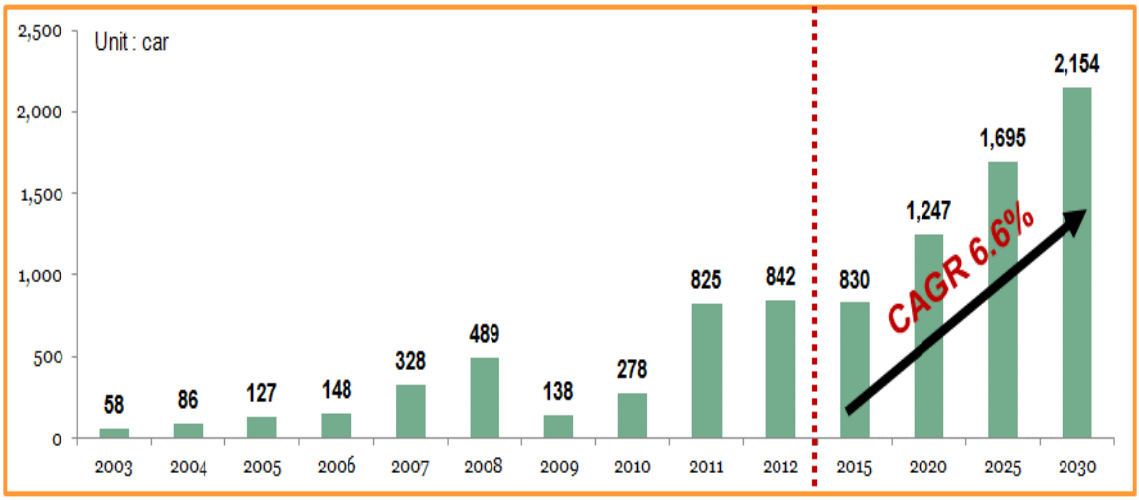
The forecast says the volume of the heavy equipment traded via ferry will grow by 6.6% annually from 2015 and the number of the heavy equipment traded is expected to be 2,154 in 2030. This forecast is based on the fact that steady economic growth and subsequent growth in construction business of members of Commonwealth of Independent States such as Kazakhstan and Uzbekistan will require more heavy equipment. In addition, this forecast reflects the demand for heavy equipment which has been increased due to the development of the Russian Far East.

Table 16: Forecast of the volume of the heavy equipment traded via ferry (Base case)

Unit: piece

Year	Amount of Trade (ROK-RUS)	Heavy equipment
2015	23,589	830
2016	25,404	915
2017	27,206	1,000
2018	28,905	1,080
2019	30,688	1,163
2020	32,458	1,247
2021	34,252	1,331
2022	36,109	1,418
2023	38,064	1,510
2024	40,068	1,604
2025	42,000	1,695
2026	43,888	1,784
2027	45,800	1,874
2028	47,736	1,965
2029	49,740	2,059
2030	51,769	2,154

Figure 20: Forecast of the volume of the heavy equipment traded via ferry (Base case)



Source: KMI.

(4) Bulk Cargoes

Regression analysis of the volume of the bulk cargoes traded between ROK and Russia gives statistically meaningless results. As a result, dummy variables are applied for the forecast. The following equation is used to forecast the volume of the bulk cargoes traded via ferry with dummy variables applied.

Regression equation: $Y = -460.668x_i + 0.059[Trade(KOR-RUS)] + 610.306$

The forecast says the volume of the bulk cargoes traded via ferry will grow by 5.0%% annually

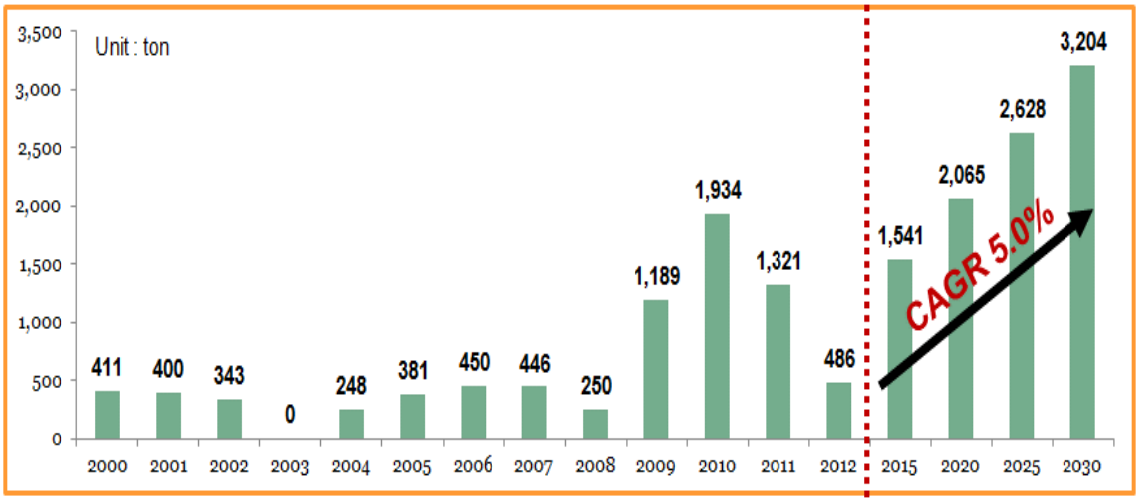
from 2015 and the volume of the bulk cargoes traded is expected to be 3,204 tons in 2030. As the volume of the trade between ROK and Russia increases, so does the bulk cargoes traded via ferry.

Table 17: Forecast of the volume of the bulk cargoes traded via ferry (Base case)

Unit: ton

Year	Amount of Trade (ROK-RUS)	Bulk
2015	23,589	1,541
2016	25,404	1,648
2017	27,206	1,755
2018	28,905	1,855
2019	30,688	1,960
2020	32,458	2,065
2021	34,252	2,171
2022	36,109	2,280
2023	38,064	2,395
2024	40,068	2,514
2025	42,000	2,628
2026	43,888	2,739
2027	45,800	2,852
2028	47,736	2,966
2029	49,740	3,084
2030	51,769	3,204

Figure 21: Forecast of the volume of the bulk cargoes traded via ferry (Base case)



Source: KMI.

2) Best Cases

(1) Containers

Here are the best case scenarios for the containers traded between ROK and Russia.

- First: once a ferry route between Japan and Russia opens, the volume of the containers will

be 1.15-fold increased

Table 18: Comparison of the trade with Russia between ROK and Japan

Unit: million USD

Year	2011	2012	Average
JPN-RUS	23,975	26,033	
ROK-RUS	21,161	22,451	
Share	1.13	1.16	1.15

Source: the Korea International Trade Association.

- Second: 20% of the containers traded via Trans-Siberian Railway in the Russian Far East are converted into those traded via ferry.
  - Ferry routes would be more suitable for delivering containers than Trans-Siberian Railway when price competitiveness of ferry routes is guaranteed.
  - The biggest advantage of ferry routes is that the containers delivered via ferry can arrive on time (punctuality). This means that ferry routes are appropriate for delivering the goods whose stock is low.

- Third: once export of Mongolia's natural resources starts to boom, some of the containers could be delivered via ferry.

Here is the forecast of the containers delivered via Trans-Siberian Railway in the Russian Far East. The forecast is based on the estimated value of the containers delivered via Trans-Siberian Railway made by Korea Maritime Institute (in 2010). The forecast says the volume of the containers delivered via Trans-Siberian Railway will be 520,000 thousand TEU in 2020 and that figure will grow to be 750,000 TEU in 2030.

Table 19: Forecast of the containers traded via TSR in the Russian Far East

Unit: TEU

Year	Vostochny	Vladivostok	Nakhodka	Total
2015	331,883	45,144	36,239	413,266
2016	349,058	47,809	37,071	433,939
2017	366,251	50,477	37,856	454,583
2018	383,092	53,090	38,598	474,780
2019	401,135	55,889	39,302	496,327
2020	418,778	58,627	39,972	517,377
2021	436,774	61,419	40,610	538,803
2022	455,731	64,361	41,220	561,312
2023	474,793	67,319	41,804	583,916
2024	493,452	70,214	42,365	606,030
2025	513,044	73,254	42,903	629,201
2026	533,502	76,428	43,421	653,352
2027	554,968	79,759	43,920	678,648
2028	573,553	82,643	44,402	700,598
2029	593,223	85,695	44,867	723,786
2030	613,840	88,894	45,317	748,051

Most of Mongolia's natural resources are delivered via China and used in China. Once the share of Mongolia's natural resources sold outside China increases in the future, some of Mongolia's natural resources have to be delivered via ferry. Fluorite, zinc ore, molybdenum, copper alloys, and gold are the types of ores which do not require large-scale delivery through specially designated vessels and can be delivered in containers. These types of ores account for only 3.3% of Mongolia's exported natural resources but that figure could grow to be 5% when more of them are containerized. This 5% figure is based on the expectation that the volume of containerized natural resources does not seem to soar.

Table 20: Forecast of Mongolia's natural resources delivered in containers

Unit: TEU

Year	Export (thousand ton)	Third country (10%, ton)	Containerized	Container
2015	26,223	2,622,300	86,227	5,748
2016	28,535	2,853,500	93,830	6,255
2017	30,848	3,084,800	101,436	6,762
2018	33,161	3,316,100	109,041	7,269
2019	35,474	3,547,400	116,647	7,776
2020	37,787	3,778,700	124,253	8,284
2021	40,099	4,009,900	131,855	8,790
2022	42,412	4,241,200	139,461	9,297
2023	44,725	4,472,500	147,066	9,804
2024	47,038	4,703,800	154,672	10,311
2025	49,351	4,935,100	162,278	10,819
2026	51,663	5,166,300	169,880	11,325
2027	53,976	5,397,600	177,486	11,832
2028	56,289	5,628,900	185,092	12,339
2029	58,602	5,860,200	192,697	12,846
2030	60,914	6,091,400	200,300	13,353

The best case scenario of the containers delivered via ferry in Northeast Asia based on the above-mentioned assumption says that as of 2030 180 thousand TEU of containers will be delivered via ferry. 20% of the containers traded via Trans-Siberian Railway in the Russian Far East are estimated to be converted into those traded via ferry.

This is because the containers delivered via ferry expect punctuality first and therefore ferry routes are appropriate for delivering the goods whose stock is low or none, instead of Trans-Siberian Railway.

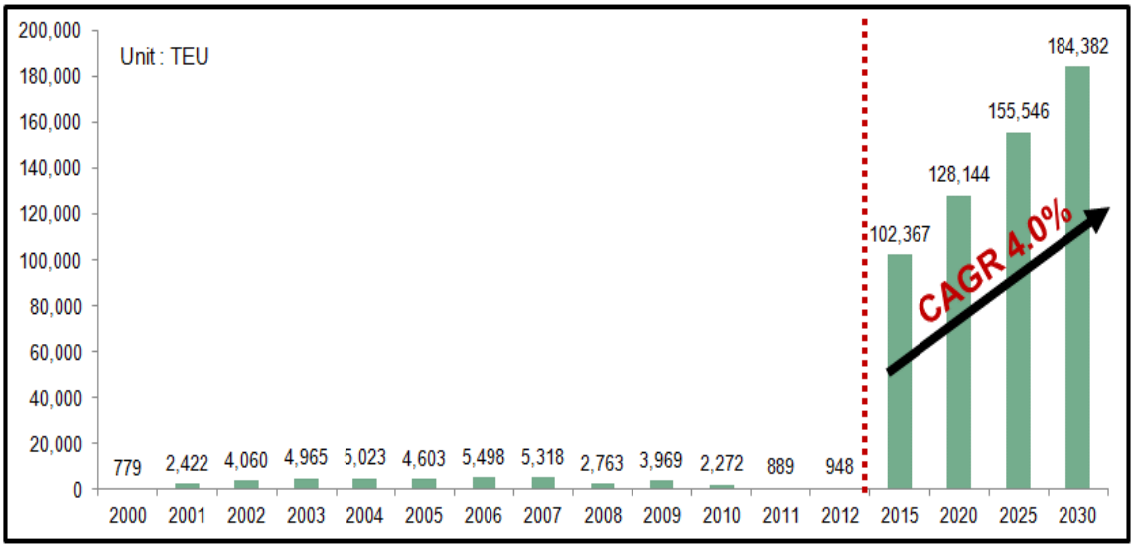
Table 21: Forecast of the containers traded via ferry in NEA (Best case)

Unit: TEU

Year	Base	TSR (Far East)	From TSR	Mongolian natural resources	Best
2015	10,973	413,266	82,653	8,741	102,367
2016	11,198	433,939	86,788	9,512	107,497
2017	11,421	454,583	90,917	10,283	112,621
2018	11,632	474,780	94,956	11,054	117,642
2019	11,853	496,327	99,265	11,825	122,943

Year	Base	TSR (Far East)	From TSR	Mongolian natural resources	Best
2020	12,073	517,377	103,475	12,596	128,144
2021	12,295	538,803	107,761	13,366	133,422
2022	12,525	561,312	112,262	14,137	138,925
2023	12,768	583,916	116,783	14,908	144,459
2024	13,016	606,030	121,206	15,679	149,902
2025	13,256	629,201	125,840	16,450	155,546
2026	13,490	653,352	130,670	17,221	161,381
2027	13,727	678,648	135,730	17,992	167,449
2028	13,967	700,598	140,120	18,763	172,850
2029	14,216	723,786	144,757	19,534	178,507
2030	14,467	748,051	149,610	20,305	184,382

Figure 22: Forecast of containers traded via ferry in NEA (Best case)



Source: KMI.

(2) Used Cars

Optimistic forecast could be possible in accordance with the changes in Russia's import policies and opening of a new ferry route by Japan. Most of the used cars sold in Russia have been imported from Japan; once Russia's import policies for used cars change and the volume of the used cars imported from Japan increases, export of used cars to Russia via ferry is expected to grow.

The volume and type of the trade between Japan and Russia are similar to those between ROK and Russia. Therefore, the volume of the trade between Japan and Russia is calculated into the forecast of the volume of the used cars traded via ferry in Northeast Asia.

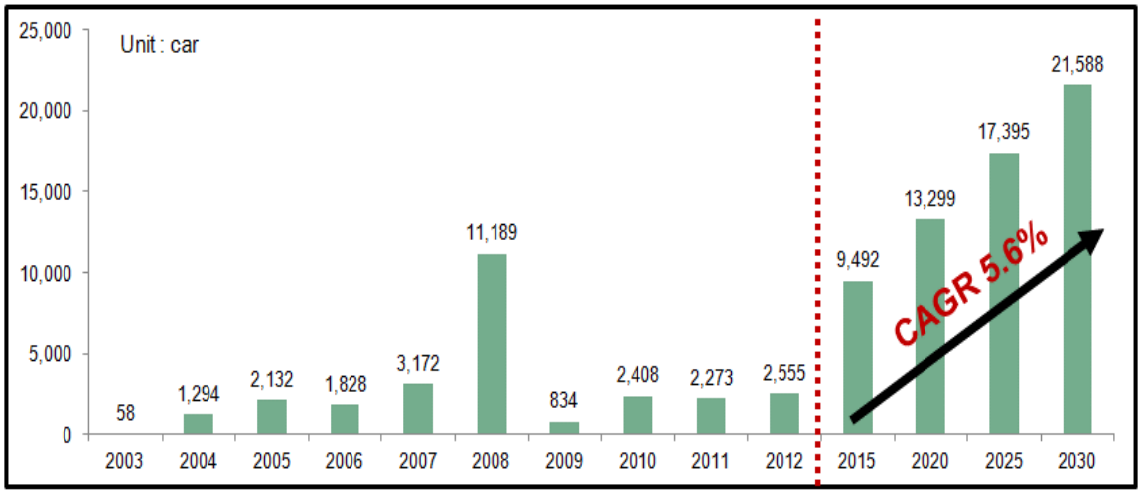
Table 22: Forecast of the volume of the used cars traded via ferry in NEA (Best case)

Unit: piece

Year	Base case		Best case	
	Trade (ROK-RUS)	Used cars	Trade (ROK-RUS) Trade (JPN-RUS)	Used cars

Year	Base case		Best case	
	Trade (ROK-RUS)	Used cars	Trade (ROK-RUS) Trade (JPN-RUS)	Used cars
2015	23,589	4,084	50,627	9,492
2016	25,404	4,447	54,523	10,271
2017	27,206	4,808	58,392	11,045
2018	28,905	5,147	62,037	11,774
2019	30,688	5,504	65,865	12,539
2020	32,458	5,858	69,664	13,299
2021	34,252	6,217	73,514	14,069
2022	36,109	6,588	77,500	14,866
2023	38,064	6,979	81,694	15,705
2024	40,068	7,380	85,996	16,565
2025	42,000	7,766	90,143	17,395
2026	43,888	8,144	94,195	18,205
2027	45,800	8,526	98,299	19,026
2028	47,736	8,913	102,453	19,857
2029	49,740	9,314	106,755	20,717
2030	51,769	9,720	111,110	21,588

Figure 23: Forecast of the volume of the used cars traded via ferry in NEA (Best case)



Source: KMI.

(3) Heavy Equipment

Like the volume of the used cars traded via ferry, once a new ferry route is opened between Japan and Russia, the volume of the heavy equipment traded via ferry is expected to increase.

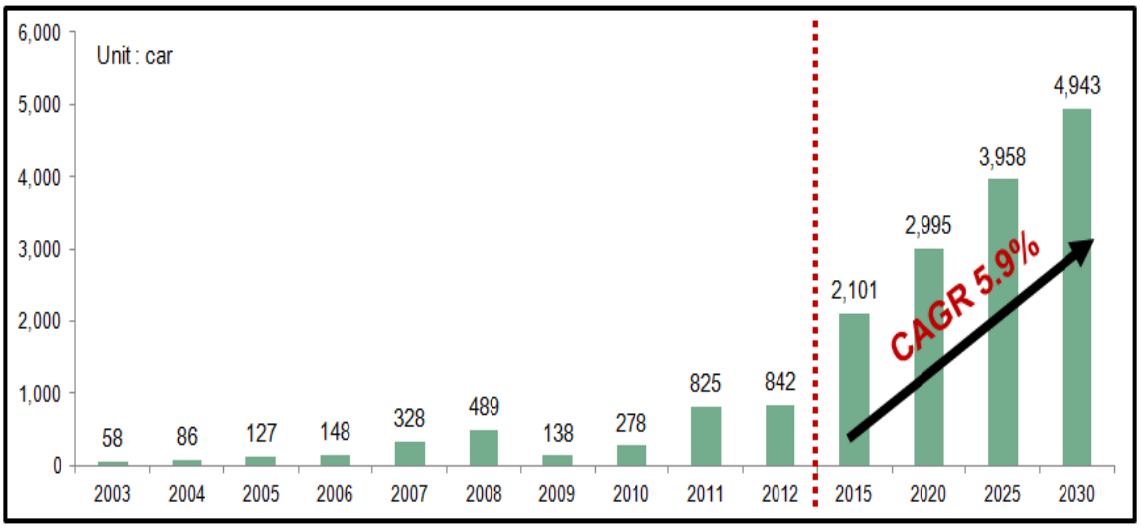
Table 23: Forecast of the volume of the heavy equipment traded via ferry in NEA (Best case)

Unit: piece

Year	Base case		Best case	
	Trade (ROK-RUS)	Heavy equipment	Trade (ROK-RUS) Trade (JPN-RUS)	Heavy equipment
2015	23,589	830	50,627	2,101
2016	25,404	915	54,523	2,284

Year	Base case		Best case	
	Trade (ROK-RUS)	Heavy equipment	Trade (ROK-RUS) Trade (JPN-RUS)	Heavy equipment
2017	27,206	1,000	58,392	2,466
2018	28,905	1,080	62,037	2,637
2019	30,688	1,163	65,865	2,817
2020	32,458	1,247	69,664	2,995
2021	34,252	1,331	73,514	3,176
2022	36,109	1,418	77,500	3,364
2023	38,064	1,510	81,694	3,561
2024	40,068	1,604	85,996	3,763
2025	42,000	1,695	90,143	3,958
2026	43,888	1,784	94,195	4,148
2027	45,800	1,874	98,299	4,341
2028	47,736	1,965	102,453	4,536
2029	49,740	2,059	106,755	4,739
2030	51,769	2,154	111,110	4,943

Figure 24: Forecast of the volume of the heavy equipment traded via ferry in NEA (Best case)



Source: KMI.

(4) Bulk Cargoes

Optimistic forecast for bulk cargoes could be possible in accordance with the increase in the volume of the timber traded via ferry and opening of a new ferry route by Japan. Ports in the Russian Far East increase the volume of timber to be dealt with and ferry operators began to deal with more timber. And timber started to be delivered via ferry, though the volume of the delivered timber is still small.

This means that the volume of the timber delivered via ferry will increase. This study supposes that Nakhodka port is going to deal with some of the timber to be delivered via ferry.

And the forecast is made about the volume of the timber dealt with at Nakhodka port. The volume is estimated through time-series analysis and forecast equation is as follows

$$Y = -1B + 05\ln(x) + 7558845$$

The volume of the timber dealt with at Nakhodka port is expected to decrease due to restriction on import.

Table 24: Forecast of the volume of the timber dealt with at Nakhodka port

Unit: ton

Year	2015	2020	2025	2030
Timber	539,123	494,939	464,401	441,040

It is estimated that 10% of the timber to be dealt with at Nakhodka port would be delivered via ferry. This is because more timber is containerized as of today and most of the containerized timber is expected to be delivered by container operators. Ferry routes have also competitive power as they could be useful when delivery should be made as soon as possible and the timber is very expensive and therefore stability in delivery should be guaranteed.

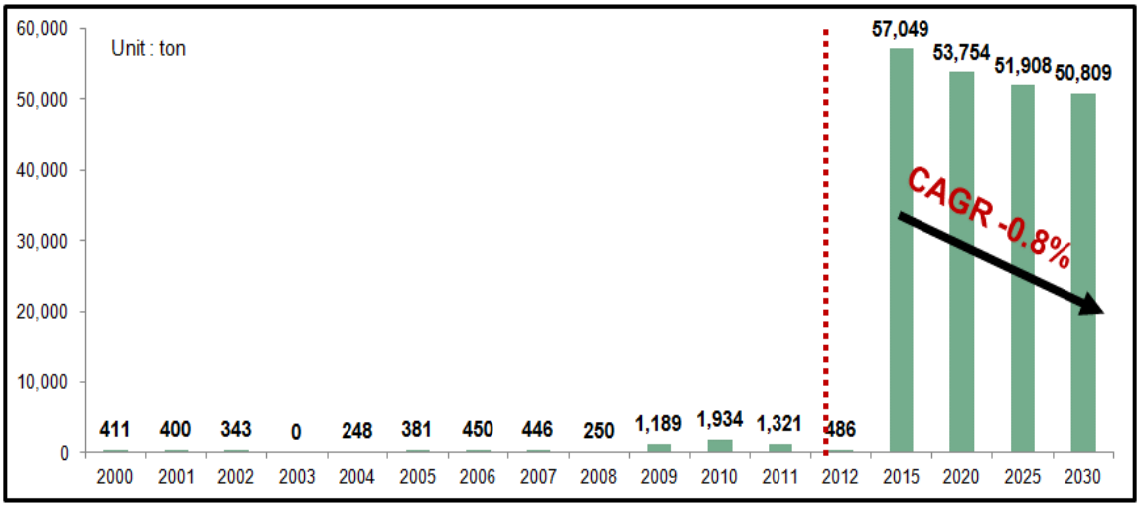
Based on these estimations, the volume of the bulk cargoes delivered via ferry in Northeast Asia is expected to be 53,754 tons in 2020 and 50,809 tons in 2030.

Table 25: Forecast of the volume of the bulk cargoes traded via ferry in NEA (Best case)

Unit: ton

	Base case		Best case				
	Trade (ROK-RUS)	Bulk cargoes	Trade (ROK-RUS) Trade (JPN-RUS)	Bulk cargoes	Timber (Nakhodka)	Timber (ferry)	Total
2015	23,589	1,541	50,627	3,137	539,123	53,912	57,049
2016	25,404	1,648	54,523	3,366	528,586	52,859	56,225
2017	27,206	1,755	58,392	3,595	519,055	51,906	55,500
2018	28,905	1,855	62,037	3,810	510,354	51,035	54,845
2019	30,688	1,960	65,865	4,036	502,350	50,235	54,271
2020	32,458	2,065	69,664	4,260	494,939	49,494	53,754
2021	34,252	2,171	73,514	4,487	488,040	48,804	53,291
2022	36,109	2,280	77,500	4,722	481,586	48,159	52,881
2023	38,064	2,395	81,694	4,970	475,524	47,552	52,522
2024	40,068	2,514	85,996	5,223	469,808	46,981	52,204
2025	42,000	2,628	90,143	5,468	464,401	46,440	51,908
2026	43,888	2,739	94,195	5,707	459,272	45,927	51,634
2027	45,800	2,852	98,299	5,949	454,393	45,439	51,389
2028	47,736	2,966	102,453	6,194	449,741	44,974	51,168
2029	49,740	3,084	106,755	6,448	445,296	44,530	50,978
2030	51,769	3,204	111,110	6,705	441,040	44,104	50,809

Figure 25: Forecast of the volume of the bulk cargoes traded via ferry in NEA (Best case)



Source: KMI.

Chapter 5 Measures to Boost Sea-Land Transport in GTR

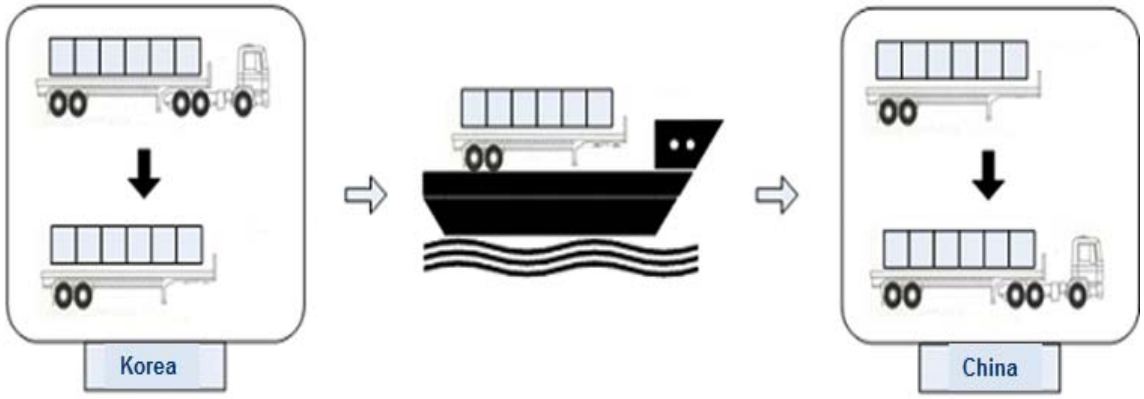
5.1 Sea-Land Multimodal Transport in the Yellow Sea Region

A best practice of the sea-land multimodal transport in the Northeast Asia Region is mutual access of trailer chassis between ROK and China.

5.1.1 Sea-Land Multimodal Freight Vehicle Transport between ROK and China

Based on the Agreement between the Government of the People's Republic of China and the Government of the Republic of Korea on Sea-Land Multimodal Freight Vehicle Transport and its Protocol, ROK and China started mutual access of trailer chassis between ROK's Incheon port and China's Weihai port. According to the Agreement, "Sea-Land Multimodal Freight Vehicle Transportation" means transportation by freight vehicles of the two countries between the ports, zones or along transportation routes agreed upon by the Parties after being shipped by vessels. Mutual access of trailer chassis is the first step for the implementation of the Agreement. According to the Protocol of the Agreement, "trailer chassis" (hereinafter referred to as a "trailer") is a non-powered freight vehicle that satisfies the technical standards of and requirements for operation on the roads of the Parties in the condition required by its country of origin.

Figure 26: Mode of sea-land multimodal transportation using trailer chassis



Source: KMI.

Here are the advantages of mutual access of trailer chassis between ROK and China:

- First, relatively stable time required since the ferry is scheduled by passenger transport;
- Second, loading and unloading time can be saved since the towed trailer operation system uses trailers for roadway, and provides door-to-door transport service; and

– Third, stability of goods is provided since loading and unloading processes can be deleted (e.g. good for electronics or precision instruments)

There are 15 car ferry routes (11 roll-on/roll-off) between ROK and China run by 13 operators. Average sailing availability is two to three times a week. As of 2010, mutual access of trailer chassis is available at three ROK ports (Incheon, Pyeongtaek, and Gunsan) and six Chinese ports (Weihai, Qingdao, Rizhao, Longyan, Shidao, and Yantai) and seven ROK-China routes (Incheon-Weihai, Incheon-Qingdao, Incheon-Shidao, Pyeongtaek-Longahn, Pyeongtaek-Weihai, Pyeongtaek-Rizhao, and Gunsan-Shidao). As of late January 2014, 554 trailer chassis are participating in one way mutual access.

Table 26: List of car ferry routes between ROK and China

Route	Operator	Gross tonnage	Capacity	Sailing availability	Date of construction (nationality)	Opening date of the route
Incheon/Weihai (238 miles,440㎞) roll-on/roll-off	Weidong Ferry Co., Ltd. (Joint company between ROK and China)	26,463	Passengers: 731 Cargoes: 280TEU	3 times a week (14H)	'90. 5 (Panama)	'90. 9
Incheon/Quingdao (338 miles, 625㎞) roll-on/roll-off	"	29,554	Passengers: 660 Cargoes: 325TEU	3 times a week (16H)	'97. 2 (Panama)	'93. 5
Incheon/Shidao (220 miles, 407㎞) roll-on/roll-off	Rongcheng Hwadong Ferry Co., Ltd. (Joint company between ROK and China)	19,534	Passengers: 1,000 Cargoes: 253TEU	3 times a week (14H)	'88. 6 (Panama)	'02. 7
Pyeongtaek/Rongcheng (210 miles, 388㎞) roll-on/roll-off	Rongcheng Dalong Ferry Co., Ltd. (Joint company between ROK and China)	25,151	Passengers: 720 Cargoes: 220TEU	3 times a week (13H)	'89. 3 (Panama)	'01.10
Pyeongtaek/Weihai (240 miles, 443㎞) roll-on/roll-off	Jiaodong Ferry Co., Ltd. (Joint company between ROK and China)	24,112	Passengers: 750 Cargoes: 214TEU	3 times a week (14H)	'91. 3 (Panama)	'09. 6
Pyeongtaek/Rizhao (380 miles, 701㎞) roll-on/roll-off	Rizhao Haitong Ferry Co., Ltd. (Joint company between ROK and China)	24,946	Passengers: 640 Cargoes: 230TEU	3 times a week (19H)	'92. 6 (Panama)	'11. 2
Gunsan/Shidao (210 miles, 389㎞) roll-on/roll-off	Shidao International Ferry (Joint company between ROK and China)	17,022	Passengers: 750 Cargoes: 203TEU	3 times a week (12H)	'89. 7 (ROK)	'08. 4
Incheon/Lianyungang (393 miles, 727㎞) Lo-Lo	Lianyungang C-K Ferry Co., Ltd. (Joint company between ROK and China)	16,071	Passengers: 392 Cargoes: 293TEU	2 times a week (24H)	'95. 8 (China)	'04.12

Route	Operator	Gross tonnage	Capacity	Sailing availability	Date of construction (nationality)	Opening date of the route
Incheon/Yantai (267 miles, 494㎞) Lo-Lo	Yantai C&K Ferry Co., Ltd. (Joint company between ROK and China)	16,071	Passengers: 392 Cargoes: 293TEU	3 times a week (15H)	'96. 3 (Panama)	'00.10
Incheon/Yingkou (420 miles, 778㎞) Lo-Lo	Pan Korea Yingkou Ferry (Joint company between ROK and China)	12,304	Passengers: 394 Cargoes: 228TEU	2 times a week (22H)	'96.5 (Panama)	'03. 1
Incheon/Qinhuangdao (400 miles, 740㎞) Lo-Lo	Qinin Ferry Co., Ltd. (Joint company between ROK and China)	12,304	Passengers: 348 Cargoes: 228TEU	2 times a week (23H)	'95.11 (China)	'04. 4
Pyeongtaek/Lianyungang (400 miles, 740㎞) roll-on/roll-off	Lianyungang C-K Ferry Co., Ltd. (Joint company between ROK and China)	14,991	Passengers: 668 Cargoes: 192TEU	2 times a week (21H)	'88. 8 (ROK)	'07.11
Incheon/Tianjin (460 miles, 852㎞) roll-on/roll-off	Jinchon Ferry Co., Ltd. (Joint company between ROK and China)	26,463	Passengers: 800 Cargoes: 274TEU	2 times a week (25H)	'90. 2 (Panama)	'91.12
Incheon/Dalian (292 miles, 540㎞) roll-on/roll-off	Dain Ferry (Joint company between ROK and China)	12,365	Passengers: 555 Cargoes: 140TEU	3 times a week (17H)	'88. 7 (ROK)	'95.10
Incheon/Dandong (284 miles, 526㎞) roll-on/roll-off	Dandong International Ferry Co., Ltd. (Joint company between ROK and China)	16,445	Passengers: 800 Cargoes: 160TEU	3 times a week (14H)	'95. 6 (Panama)	'98. 7

Note: Incheon-Tianjin route and Pyeongtaek-Rizhao route are temporarily closed since March 2013 and May 2013 respectively due to managerial disputes between joint operators.

5.1.2 Problems with the “Sea-Land Multimodal Freight Vehicle Transportation” between ROK and China

The number of ports where mutual access of trailer chassis is available is limited and the scope within which mutual access of trailer chassis is available in a port is also limited. As a result, the performance of the sea-land multimodal freight vehicle transportation between ROK and China has been poor.

About ten times of mutual access of trailer chassis occur on three of the seven ROK-China routes (Incheon-Weihai, Incheon-Qingdao, and Pyeongtaek-Rizhao) and no access occur on the rest routes. Out of the 554 trailer chassis, only seven are from China.

Here are the problems with the multimodal transport between ROK and China.

First, restriction upon the number of ports where mutual access of trailer chassis is available and the scope within which mutual access of trailer chassis is available. ROK has no limitation upon

mutual access of Chinese trailer chassis in ROK ports. But mutual access of ROK trailer chassis is only available in Shandong Province, not in Jiangsu Province and Shanxi Province where many ROK companies are in operation.

Second, empty containers. Live fish and stone are ROK's major import items from China and semiconductors and electronic appliances are China's major import items from ROK. This means most of the containers which contain import items are returned empty.

Third, in ROK, operators should apply for taking out trailers seven days before to a registration office and application is not accepted when less than seven days are left, which leads to delay in loading and unloading of cargoes. Whenever operators want to take out trailers, they should visit a customs office and a registration office, which results in extra fees and time.

Fourth, many cargo owners and international cargo forwarders don't know much about the multimodal transport between ROK and China and therefore they don't participate in the transport.

Fifth, a new business model oriented to the multimodal transport doesn't exist.

5.2 Measures to Boost the Sea-Land Multimodal Transport in GTR

Ferry routes in GTR are not widely used compared to the car ferry routes between ROK and China. This is because size of the economy and economic development of Russia and members of the Commonwealth of Independent States are smaller and slower than those of China.

Nonetheless, ferry routes in GTR are expected to have huge potential for development in the future. Continuous development of the infrastructure and the economy through Greater Tumen Initiative are expected to increase the potential for the multimodal transport via ferry. This study would like to propose the followings measures to facilitate the multimodal transport via ferry in Northeast Asia.

5.2.1 Reducing Cost through Support from Local Government

Ferry service charges in this region are very high as a ferry operator has a monopoly on its ferry route. Normally, ferry route where the trade volume is low is heavily charged.

As seen in the cases of ferry routes between ROK and China, however, ferry charges were high at first but, as the number of passengers and containers on a ferry route increases, container charges start to drop and then ferry charges also start to decline. Though operators are obtain less profit, the trade volume and passengers are increases continuously.

This means that, though ferry charges are still high as the volume of the cargoes traded is still low, ferry charges should be lowered to increase the volume. The problem is that rise in oil price means the share of oil price in operating expenses also raises, which leads to increase in ferry charges. However, lowering ferry charges through efficient management of ferries is essential to boost the use of ferries. For reducing cost, the role of local government of each country is very important. It needs to expand some incentives for inducing cargo and passengers. In case of local government in west side of ROK such as Incheon, Pyeongtaek that have ferry service route, they support volume incentive and subsidy per TEU, etc.

Boosting ferry service promoting local economy in most regions, because of ferry ships can move

cargo and passengers. In case of ROK-China ferry service, most of cities were small when it begins ferry service. But now those cities in China have changed big city such as Qingdao or past growing city such as Lianyungang.

5.2.2. Correcting in/out Balance Problems

As we've already seen in the above-mentioned data, ferry routes in Northeast Asia have lopsided in/out balance. This means most of the cargoes contain the items exported to Russia and few or none of them contain the items exported from Russia, China and CIS.

Therefore, market players should co-operate one another to deliver containers jointly as a means to collect empty containers. This means cargoes imported to ROK and Japan should be delivered jointly to decrease the number of empty containers.

For this purpose, a joint logistics company funded by ROK, Japan, and China could be taken into consideration. For joint delivery, business information of the relevant companies should be shared. This is virtually impossible, however, unless the companies agree to form a joint firm. Therefore, like several ferry operators jointly formed by ROK and China, a ferry operator jointly funded by nations is worth considering.

5.2.3 Establish a Regional International Logistics Information Platform

Lack of data availability and impediments in information exchange are an issue in Greater Tumen Region. To ensure smoother planning and agile decision making, it is important to establish a regional international logistics information platform.

The platform should not only encourage and facilitate data exchange, but also set standards for promotion of mutual information exchange and information gathering, to create inter-connectivity by having information system on logistics with participation of all cooperating countries.

5.2.4 Establishing a Dedicated Facility

Most of the ports in the Russian Far East are in poor condition or frequently visited by container operators, which means there's not enough space for ferry ships to regularly call at. The biggest advantage of ferry service compare to container shipping liners is punctuality and safety. In this point of view, ferries should arrive on time safely in order to boost ferry service.

Therefore, a new dedicated ferry terminal should be built in the Russian Far East. This is because most of the ports in the Russian Far East don't have advanced facilities to prevent delays in processing cargoes and to load and unload cargoes safely, unlike those in ROK, Japan, and China which take up the biggest share of the trade in the Far East.

5.2.5 Developing New Types of Bulk Cargoes

Ferries mostly delivered containers in the past but now deliver various types of bulk cargoes to meet diversified demands for trade. This means that new types of bulk cargoes would be delivered in the future. Ferry companies in this region are developing a new business model to deliver timber logged from the Russian Far East. Greater Tumen Region owns many kinds of natural resources,

especially ore and forests. This means, there is much opportunities that can induce and move bulk or break-bulk cargoes as well as containers. The problem is how to make business model and to increase the size of cargo volume. The small size of natural resource is now transport by using ferry ships. But it is difficult to increase profitability of the ferry companies with those quantities.

Therefore, ferry companies should stay alert to finding new items to be delivered via ferry and governments should assist them by revising exiting regulations or establishing new ones which allow new types of cargoes to be loaded and unloaded at ports. This means that governments also should find out which types of cargoes could be delivered via ferry and provide regulatory support in terms of business models to ferry companies.

5.5.6 Assisting Businesses in Expanding into Russia and Three Province of North-East China

The reason why ferry routes between ROK and China became robust in a short period of time was that ROK companies aggressively expanded into China. The more the number of ROK companies in China increases, the more the volume of cargoes delivered between the two nations surged as the companies import more raw materials and export more finished products.

Therefore, vitalization of ferry routes in the Russian Far East requires more Northeast Asian companies in the Russian Far East and North-East China as well as Russia’s Far Eastern development projects. For these purposes, obstacles in the way of more investment by foreign companies should be found out first and then phased out. In addition, more incentives should be given to foreign investors and less control of foreign exchange trade should be guaranteed.

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