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[Field Research]

Counteractions against Changes of Logistics Environment in Northeast Asia

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Abstract

Purpose – This study investigated competitive counteractions necessary for continuous growth in a rapidly changing logistics environment in Northeast Asia.

Research Design, Data, and Methodology – Using a time series analysis, the study first investigated Northeast Asian trade scale and volume by examining online and offline material from the Ministry of Ocean and Fisheries, Busan Port Authority, and other government agencies. A literature survey was done to investigate the state and prospect of the logistics environment in Northeast Asia including changes in freight volume at major ports in the three Northeast Asian countries.

Result – The results of the study suggest using the Trans-Korean Railroad (TKR), as well as promoting the North Pole and South Pole routes, to compete against changes in trade volume and the logistics environment in Northeast Asia. A SWOT analysis was done to examine the effectiveness of these strategies.

Conclusions – The findings indicate that the TKR impact, using the Busan Port connecting the Trans-China Railway (TCR), the Trans-Siberian (TSR), and the North Pole Route, may be uncertain in practice considering the uncertainty in international politics.

Keywords: North Pole Route, TSR, TCR, TKR, Trans Asia Railroad.

JEL Classifications: F16, L92, N75.

1. Introduction

1.1. Background and Purposes

The Korean ports shall bring transshipment freight in Northeast Asia under rapid growth of the Chinese economy. The Chinese sea ports that were short of logistics facilities for handling of rapidly growing port volume to have shallow water had difficulties at entering into ports to give Korean ports benefits. The transshipment freight of South Korea occupied about 60% of freight to China 75% of which had destination of Shanghai Port and ports in North China such as Qingdao, Dalian and Tianjin. The Chinese government has plan of Ziangjiangkou route to solve problems of shallow water and to expand harbour facilities in order to accommodate rapidly growing harbor freight volume. Since opening in 2005, Yangsan Port constructed gigantic port that could handle as many as 13.6 million containers a year at 16 berths at third term construction work. The port has goal of the largest port in the world with 50 berths by 2020 according to plan of completion of the 5th term construction work to be described to be hub of port logistics in the world.

The Chinese government is expanding facilities of not only Yangsan Port but also major ports in North China.

Yangsan Port that has room of handling capacity after completion of construction work shall handle freight to America and/or Europe at Tianjin, Qingdao and Dalian to fill remaining volume after shipping primary freight in north of Shanghai port and to fill remaining freight and to sail to America and/or Europe:

South Korea had built up logistics hub ports by both Busan Port and Gwangyang Port to tranship freight of China and Japan and to be logistics base in Northeast Asia and to adopt logistics hub strategy in Northeast Asia.

Busan Port operation network has collected and exchanged international shipping information to dredge the New Port and to get rid of Todoseom and to improve logistics environment.

The Chinese ports had grown up rapidly despite Busan Port's great effort, and South Korea had great difficulty at hub port strategy in Northeast Asia based on Busan Port.

This study investigated counteraction for logistics competitiveness to take actions against rapidly changing logistics environ-

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ment in Northeast Asia and to grow up continuously.

1.2. Methodologies

This study investigated South Korea's counteractions against changes of logistics environment in Northeast Asia. The study firstly investigated not only trade scale and trade volume in Northeast Asia to examine online and offline material of Ministry of Ocean and Fisheries, Busan Port Authority and other government agencies by time series analysis. Literature survey was done to investigate state and prospect of logistics environment in Northeast Asia as well as changes of freight volume at major ports in the three countries in Northeast Asia.

The study suggested not only use of the TKR but also promotion of South and North Pole route to take actions against trade scale in Northeast Asia and changes of logistics environment. SWOT was used to investigate effectiveness of the strategy.

2. Subjects at Change of Logistics Environment in Northeast Asia

2.1. Changes of Logistics Environment in Northeast Asia

The logistics environment in Northeast Asia has recently made change:

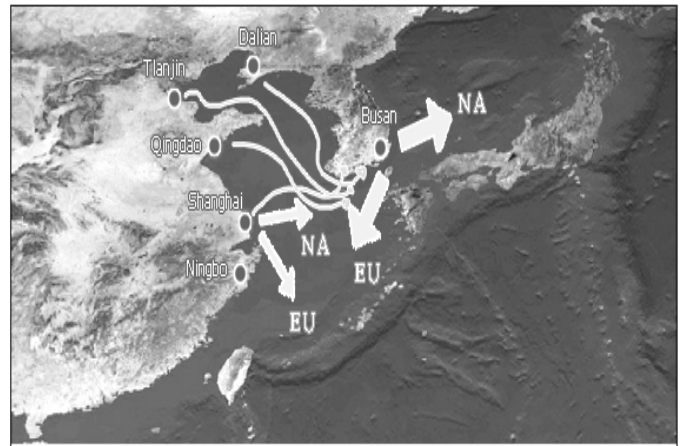
First, since the 1980s, container freight volume at Chinese seaports has grown up more than 25% on average a year. In 2013, container freight volume of 10 major seaports in China accounted for 147 million TEU to be 6.1% up than previous year. The container freight volume at Shanghai Port accounted for 33.617 million TEU 3.3% up than previous year to be the largest container port in the world during consecutive 4 years.

Second, the Chinese Government had developed and supplied port facilities of Yangsan Port of Shanghai Port carefully and ambitiously. The largest number of container freight in the world has entered Shanghai Port. Shanghai Port managed by Shanghai International Port Group (SIPG) consists of two of bulk ports and three of regional container ports.

Third, the Japanese ports were threatened by not only the Chinese ports' challenges but also Hanshin Earthquake in latter half of the 1990s to let Busan Port be hub port in Northeast Asia temporarily and to strengthen control of logistics market in Northeast Asia of the Chinese ports in the 2000s and to weaken Busan Port's competitiveness.

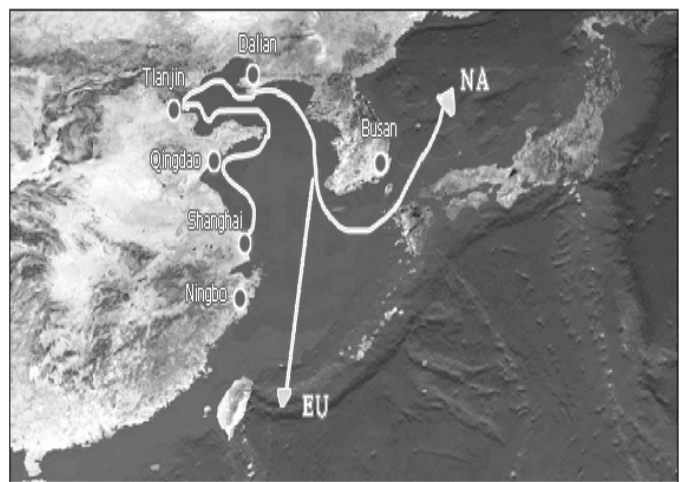
Fourth, world shipping companies and large-scaled ships called the Chinese ports to make change of transshipment environment. Not only Yangsan Port at Shanghai but also major ports in North China have expanded facilities in large scale. The liner market in Northeast Asia is likely to expand direct calling service based on multiple ports to lessen transshipment freight in economic bloc in Northeast Asia.¹⁾

Fifth, China oriented sea routes shall be reorganized. The trunk routes in Northeast Asia shall be developed in four kinds of scenarios in time series after latter half of the 1990s. The change was made by some factors; for instance, rapidly growing container freight volume in China, locomotive of world economy, the Chinese government's development of Yangsan Port at Shanghai and ports in North China, and direct calling at the ports in North China.



<Figure 1> Hub ports in Northeast Asia based on Busan Port (latter half of the 1990s)

In latter half of the 1990s, Busan Port handled freight of three ports in Northeast China to transship at trunk routes between Northeast Asia and North America and between Northeast Asia and Europe according to hub & spokes transshipment model to show Busan Port that was hub port in Northeast Asia (Figure 1).

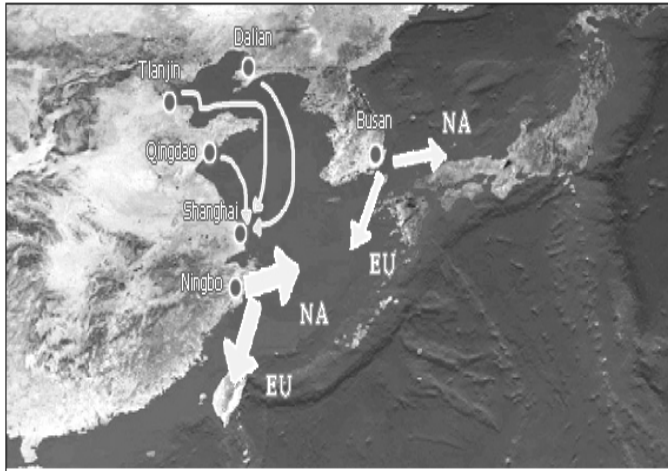


<Figure 2> Command ship's calling at ports in Northeast China (2002~2020)

Since 2000, command ships directly called at ports in Northeast China to have trunk routes in Northeast Asia.

1) More intra-trade in Asia shall increase direct calling between ports to be likely to lessen transshipment freight.

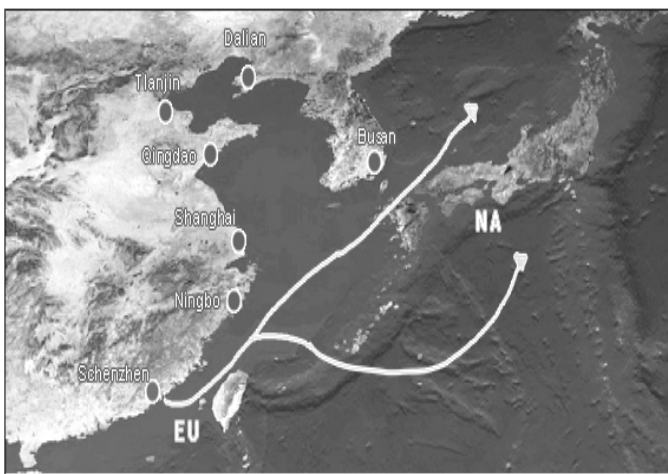
Large-scaled ship's calling at the ports in North China is likely to weaken transshipment by Busan Port. However, Northeast Asia - North America route has been placed at more beneficial place than North China from point of view of up to West Coast of North America to be likely to keep competitiveness of transshipment freight in Japan in the future.



<Figure 3> Shanghai's hub port in Northeast Asia (2020~)

Soyangshan at Shanghai Port shall develop 32 berths until 2020, and thereafter Great Yangsan District shall be developed to have room of handling of rapidly growing container freight volume in China by Northeast Asia sailing route (Figure 3).

Around 2020, Soyangsan District is to be developed to strengthen hub port of Shanghai in Northeast Asia to be likely to play role of transshipment base of freight volume in North China.



<Figure 4> Shuttle Service between South China and North America (2030~)

Since 2030, container freight volume shall increase continuously at Hong Kong, Shenzhen and Shanghai to make gi-

gantic container port clusters to the south of Shanghai and to give shuttle service by using 12,000TEU or more ships with goal of prompt service between South China and West Coast in North America (Figure 4). Container freight handling between Busan Port and ports in South China shall have more gap at time elapse to put into practice from long term point of view.

In 2020, container freight volume in North China above Shanghai is likely to reach 15.5 times that of Busan Port and to create cluster of South China and North China ports and to realize shuttle service pattern with West Coast of North America. Super large-sized command ship is not likely to call Busan Port to decrease transshipment freight volume(Jo, 2009).

2.2. Inauguration of Shipping Conference P3 and Subject of Shipping Business in Korea

The container ports in South Korea has problems under aforementioned logistics environment: First, after latter half of the 1990s, Busan Port had less market share in Northeast Asia to lose competitiveness. Second, Gwangyang Port could not reach take-off stage after activation in the beginning. Third, Shanghai Port has become hub port in Northeast Asia, and direct calling at the ports in North China has been established, and China based routes have been reorganized. Fourth, transshipment freight volume at both Busan Port and Gwangyang Port, in particular, in North China has decreased.

<Table 1> P3 Shipping Companies' Share of Routes

		ship's space(TEU)	Ratio (%)	Weekly service (times)	Number of ships
Asia - North Europe	Maersk	590.769	23.3	5	60
	CMA-CG M	268.860	10.6	3	22
	MSC	293.552	11.6	2	22
	Sub total	1,153.181	45.6	10	104
Asia - the Mediterranean	Maersk	215.893	17.0	4	23
	CMA-CG M	163.302	12.8	4	19
	MSC	315.354	24.8	2	23
	Sub total	694.549	54.6	10	65
Trans Pacific Ocean	Maersk	420.541	14.3	6	55
	CMA-CG M	216.650	7.4	5	30
	MSC	200.365	6.8	5	23
	Sub total	837.556	28.5	16	108
North Europe, America	Maersk	48.696	11.7	3	15
	CMA-CG M	14.676	3.5	1	14
	MSC	80.653	19.4	3	14
	Sub total	144.025	34.6	7	43

Source: Hyundai Economic Research Institute(2014).

A lot of shipping companies in the world have shared routes only or have made alliance at the level of business tie: But, three businesses have shared share of P3 to establish in-

dependent company.

P3 had total ship's space (loading capacity) of 2.6 million TEU (1 TEU is equivalent to one of 20' container) to occupy 15.3% of total marine freight volume in the world. P3 has owned as many as 255 ships. P3 shall do business at Asia-Europe route, Pacific Ocean and Atlantic Ocean from 2nd quarter, 2015.

<Table 2> World shipping companies' ranking

Ranking	Name of shipping company	Nationality	ship's space(TEU)	Number of ships
1	Maersk	Denmark	2,606,666	564
2	MSC	France	2,399,096	480
3	CMA-CGM	Switzerland	1,500,946	422
4	Ever Green	Taiwan	876,013	200
5	COSCO	China	766,094	154
6	Hapag Lloyd AG	Germany	737,767	152
7	APL	Singapore	652,603	122
8	Hanjin Shipping	South Korea	611,785	109
9	China Shipping (CSCL)	China	592,668	130
10	MOL	Japan	553,027	112
11	NYK	Japan	475,167	106
12	Hamburg Sud	Germany	473,313	106
13	OOCL	Hong Kong	455,796	87
14	Yangbing Shipping	Taiwan	384,320	87
15	Hyundai Merchant Maritime	South Korea	364,136	61

Source: Korea Maritime Research Institute(2009).

1st to 3rd ranking shipping company in the world had established independent corporation to control European shipping companies when global shipping companies' leadership had been recently transferred from Europe to Asia. Currently, P3 has share of 40.7% of Asia - Europe route to be the highest at same business world. A concerned person said that three shipping companies including Maersk have done dull business of 1 to 2 routes to be likely to supplement the disadvantages at inauguration of P3 and to employ large-scaled ships at all of other routes than Asia - Mediterranean route and raise share quickly.

Experts thought that P3 made small sized shipping companies lose share to suffer from less income at lowering of freight charge.

3. Use of Eurasia Railroads at Changes of Logistics Environment in Northeast Asia

South Korea shall take actions to succeed in logistics hub strategy in Northeast Asia at rapid changes of logistics environment:

First, selection and concentration strategy shall be used ac-

cording to priority of port development. South Korea is not allowed to develop all of the ports by using limited money and time that are discussed to be hub ports in Northeast Asia, and is to develop ports by giving priority to domestic port priority considering rapid changes of international logistics environment.

Second, not only Gwangyang Port but also Busan Port shall share roles to establish an integrated system. Both ports system has been kept for political purpose of balanced development of regions at rapid change of international logistics environment, and it shall reexamine international competitiveness under current unproductive and fierce competition system.

Third, ports shall be developed in time from point of view of comprehensive logistics system. The container pier facilities oriented development policy had been adopted to have efficiency of freight handling, ship's berthing and other harbour functions so far: Ports shall be developed to let Korean ports be logistics base under changes of international logistics environment to connect container pier facilities, port hinterland and inland transportation.

Fourth, various kinds of incentive system shall be used to bring transshipment freight. Solving of shortage of port facilities does not make Korean ports be hub ports in Northeast Asia. The port freight shall increase continuously. Under changes of international logistics environment, port freight volume relies upon international shipping companies' calling at Korean ports. International shipping companies' ships that call Korean ports shall call the ports continuously to increase frequency of calling and to let new shipping companies' ships call Korean ports.

Fifth, the TKR that connects North Korean railroad, South Korean railroad, the TSR and the TCR shall be opened as soon as possible to make use of North Pole route that is thought to be new route. Busan Port shall be developed to be logistics base in Northeast Asia. This chapter has described connection of Trans-Korean Railroad with the TCR and the TSR, and higher competitiveness of Busan Port by using the TSR and the TCR.

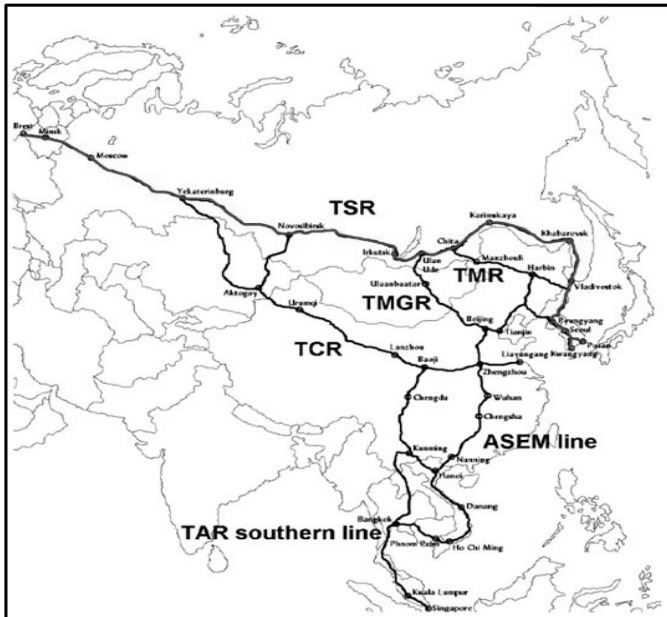
3.1. How to use the TSR

3.1.1. Value of the TSR

The TSR connecting Moscow in Europe with Vladivostok in Asia has length of 9,466km more than 20 times Gyeongbu Line in South Korea to be close to one fourth of earth circumference and to as many as 59 transit stations and to have 7 time zones and to be longest railroad in the world. The TSR started to construct in 1891 and completed construction in 1916 twenty five year later, and had developed Siberia that was the largest natural resources reserve in the world.

Inflow of the population has accelerated to construct large towns along the railway and to open colleges, libraries and theatres and so on and make cultural revolution: During the Second World War, a lot of factories and cultural institutions and organizations in Moscow and Leningrad in Europe moved to Siberia along the railway to have great influence upon modernization in the region. The TSR links Ural Zone, the largest

industrial area, and Kuznets Coal Mining, and petroleum and natural gas field in the north with Europe to be industrial trunk in Russia. Immediately after World War Two, all of current railroad lines started to electrify.



<Figure 5> Map of Eurasia Railroad

3.1.2. Background and Expected Effects of the TSR

The TSR passes through spacious and wide land from the Pacific Ocean to the east to the Baltic Sea to the west to be the longest single railway system in the world. The TSR connecting Moscow in Europe with Vladivostok in Asia has length of 9,466km more than 20 times Gyeongbu Line in South Korea to be close to one fourth of earth circumference and to as many as 59 transit stations and to have as many as 154,242,400 passengers and to transport freight of 100 million tons and to have 7 time zones and to be longest railroad in the world.

The recovery construction work of Gyeongui Line between both Korea gave Siberian fever to foreign business world, construction, resources, tourism and other industries in South Korea. By taking geographical advantage of hub in Northeast Asia connecting Eurasia Continent, the Korean Peninsula has become logistics base. Not only Gyeongui Line but also Gyeongwonseon connects the TSR to have influence upon industries in Korea: The connection with the TSR can save logistics expenses remarkably in costs and time to increase export payability and to get petroleum, natural gas and other resources in stable way and to raise trade with Europe and improve dependence upon the United States.

3.1.3. Use of the TSR

The TSR connects Russia east to west to be axis of integrated transportation network. The TSR linking both Moscow

and Vladivostok with length of 9,288km connects Ural, Siberia, Far East, Baltic Sea, Black Sea and ports in Pacific Ocean to be main transportation network in Russia.

In Russia, the TSR has played important role at industrialization. The TSR has shared 45% of railroad transportation in Russia to play an important role at railroad network in Russia, and more than 80% of Russian industries have been crowded at the places where the TSR passes through, and 65% of coal production, 20% of petroleum processing, more than 25% of wood processing have been done at the places where the TSR passes through.

The TSR has been used to transport not only transit freight but also export/ import freight by container from Asian and Pacific regions such as South Korea, China and Japan, and transit transportation has been done mainly by Asian and Pacific Ocean region - Finland - Asian and Pacific region line. These days, Russia has accomplished good economic growth based on rich natural resources to invest money into shipping, harbour and inland logistics infrastructure facilities. Russia that is hub in Eurasia has taken such an action to be likely to give great opportunity to logistics businesses in South Korea(Kwon, 2001a).

3.1.3.1. Economic Cooperation between South Korea and Russia

At the time of Cold War, Russia did not almost no economic exchange with South Korea despite geographically close advantage.

South Korea seemed not to exchange information permanently with USSR that was main country in the Communist Bloc. In the 1980s, Gorbachev adopted Perestroika policy to announce reformation and opening to give possibility of diplomatic relations with South Korea. In 1990 when Yeltsin took power, South Korea made diplomatic relations with Russia(Hong, 2013). In 1992 immediately after diplomatic with Russia, South Korea's export to Russia recorded 118 million dollars, and import from Russia did 74.8 million dollars to increase trade constantly: In 2012, 20 years later, South Korea's export to Russia recorded 11.1 billion dollars, and import from Russia did 11.4 billion dollars to be 50 times up. Currently, economic cooperation between both countries has expanded scale and areas continuously. In 2008, South Korea announced strategic partnership with Russia. Korean Trade Investment Promotion Agency (KOTRA) forecasted that South Korea's trade with Russia shall reach 100 billion dollars in 2030. At the moment, South Korea has imported petroleum, naphtha, bituminous coal, natural gas, aluminium and energy related products from Russia.

3.1.3.2. New Market Opportunity

Freight volume at Russian ports has increased continuously to be likely to reach 650 million ton in 2015.

The Russian Government plans to build up large-scaled terminals for 70,000 DWT class container ship at Murmansk, Kaliningard, Vostochny, Ust-Luga and Taman. The Russian Government has made effort to modernize transportation and logistics infrastructure of the port to seek for efficiency. Russian

ports that had suffered from demurrage and accumulation of the freight because of retarded facilities and excess demand are likely to give Korean enterprises various kinds of business opportunities(Shippers' journal, 2014).

The Russian ports are said to be short of stevedore equipment, information technology, forwarding system, freight handling system and combined transport system. Both countries may establish joint venture of feeder shipping company for Northeast Asia. South Korea's cooperation of shipping with Russia may give a lot of business opportunities concerning sailing of North Pole route that has been given attention very much(Shippers' journal, 2014).

3.1.4. Prospects and Development of the TSR

The TSR has not been used than before. The TSR shall be used more to put potential into practice and to forecast prospect of the TSR depending upon each program. Each program may be forecast depending upon the TSR:

3.1.4.1. Improvement of Market Conditions

To develop the TSR, transportation market shall be opened to manage in stable way and to have demand, supply and competition conditions in the market, Regulations shall be alleviated or removed to satisfy the commercial conditions. In the United States, since market regulation was removed in the 1980s, trans-continent railroad was developed very much. The regulations on the TSR shall be alleviated to be likely to develop services of the TSR that has been weakened same as the United States did. Not only customs clearance but also passage inspection procedures shall be simplified to standardize and to increase shippers' use of the TSR. The freight charge system shall be made to adjust freight charge of each country considering difference of transportation costs depending upon countries. The freight transportation by trans continent railroad shall develop multimodal transportation cost system of all kinds of transportation including transportation by sea, transportation by train and trucking.

3.1.4.2. Cooperation with Russia

Forwarding agents shall have point of view that develops 'Eurasia comprehensive service system(Oh & Park, 2010). When TCR, TMR(Trans-Manjulian Railway), TMGR(Trans-Mongolian Railway) and TKR are actively used, the TSR shall elevate its position: So, viewpoint on pan-continent is needed. Europe has promoted pan Asia transportation network, and Asia is likely to promote pan Asia transportation network as well. So, the TSR shall play an important role at connection between European transportation network and Asian transportation network.

3.1.4.3. International Cooperation Policy

The TSR can be important railroad of Eurasia container transportation when it connects Korea, Russia, China and Japan at discussion between countries to run block train regularly by trans continent railroad and to find out effective ways. The

countries along trans continent railroads shall cooperate each other to establish cooperation body and to unify export and import systems and standardize logistics to open an integrated market in Northeast Asia in preparation for increase of trade.

3.2. The TCR

3.2.1. What is the TCR?

The TCR firstly transports freight by sea from South Korea, Japan, Hong Kong and Southeast Asian countries to Lianyungang, Jiangsu Province, and then by train from eastern terminal of inland transportation east to west in the Chinese continent to connection with Russian railroad, and converts into Russian railroad to transport up to Rotterdam Netherlands via Poland and Germany. The plan was made in February 1982 when China-USSR railroad freight transport agreement was made in Beijing, and railroad freight for either China or Europe passes through Russian and USSR territory. The Eurasia Continental's TCR extension plan supplements existing railroad network from Lianyungang Jiangsu Province to Lanzhou Gansu Province, and from Lanzhou to Uromchi Xinjiang Kanas and to lay new railroad up to border between China and Russia and to connect existing Russian railroad (Turkman-Siberia).

<Table 3> Distance by transportation route(based on Yokohama - Rotterdam)

	Transportation route	Distance (km)
1	Use of the TCR	About 11,000
2	Use of the TSR	13,000
3	Transit in North America	20,200
4	Sea route (via Suez Cannel)	20,800
5	Sea route (via Panama Cannel)	23,000
6	Sea route (via Cape Town)	27,000

Source: Korea Institute for International Economic Policy (2013)

<Table 4> Line Extension and track gauge at each section of the TCR (Unit: Km)

Country	Section	Extension (km)	Track gauge (mm)
In China	Lianyungang ↔ Lanzhou	1,766	1,435
	Lanzhou ↔ Uromchi	1,902	1,435
	Uromchi ↔ Arasankou	460	1,435
	Sub total	4,128	-
Out of China	Druzhba ↔ Moscow	4,621 ¹ , 4,224 ²	1,520
Grand total		8,749 ¹ , 8,352 ²	-

* Note: ¹ Connection with the TSR at Novosibirsk

² Connection with the TSR at Tatarsk

Source: Lee & Kim(2007).

In July 1990 when the TCR started to transport freight temporarily between Xinjiang Uyghur autonomous region, the Chinese Government announced the Act on Boarder Passage and Transportation Control, for instance, line of international

container transportation passing through the Chinese border, ports, operation agencies, expenses, customs house, animal and plant quarantine, hygienic quarantine, and regulations on goods control and so on.

3.2.2. Historical Background and Expected Effects of the TCR

The TCR with length of 12,971 km starts from Lianyungang China to run through Moscow, Russia and Berlin, Germany and to arrive at Rotterdam Netherlands.

The TCR runs below than Siberia in latitude to be free from damage of the liquid freight and/or freight being weak at low temperature than the TSR has. The TCR has shorter length by about 1,200km than the TSR has. The TCR saves transportation cost by 20% or more than the TSR does and shortens transportation time by 4 to 5 days than the TSR does.

3.2.3. Use of the TCR

Since 1876 when the first railroad was laid in China, the TCR has taken the lead in the Chinese transportation to be national economy's artery, and had low share of railroad transportation by the year of 2000 at rapid development of remaining transportations: Since 2003, the railroad transportation has increased in accordance with mid-to-long term railroad network expansion plan owing to not only railroad development strategy but also rapid growth of the Chinese economy.

In 2004, the TCR recorded railroad operating distance of 74,400km, number of passenger transported of 1.12 billion persons, freight transported of 2.49 billion ton3), number of the employees of 2.28 million persons, number of rolling stock of 567,134 stocks, coach car of 40,487 cars, and locomotives of 16,320. Trans china railroad in China includes the TCR, the TMR and the TMGR of which the TCR has been mostly used to start from Lianyungang in China and to reach Europe through Uromchi and Druzhba, Khazakstan. The TCR pulls about 40 cars a time to transport up to 80TEU.

The freight from South Korea, Japan and Southeast Asia has inexpensive freight charge to shorten transportation time owing to near distance and to increase TCR freight and to be main transportation route of Central Asian freight.

3.2.4. Forecast and Promotion of the TCR

3.2.4.1. More Trade in Northeast Asia

Last 30 years, Northeast Asia has recorded rapid growth of economy and trade than remaining regions in the world to increase trade between Northeast Asian countries and with European countries and to increase freight volume in Asian countries 15% a year last 10 years.

In particular, trade in Northeast Asia has been done actively: Ratio of Japan's export to Northeast Asia recorded 29.2% in 1986 to be about 40% in the 1990s, and ratio of South Korea's export to Northeast Asia exceeded 40% owing to export to China and ASEAN countries. At the end of 1990s, annual growth rate between Asia and Europe recorded about 20%, and South Korea recorded annual growth of 24 to 25%.

3.2.4.2. Connection of the trans-Korean Railway

These days, ground-breaking ceremony of disconnected section to the south of Gyeongju, and connection of Gyeongwonseon and Geumgangsaneon has been actively discussed. The Trans-Korean railway does not require transportation by sea up to Lianyungang to make use of the TCR and to let shippers in Far East save time and costs. Busan Port that has suffered from shortage of capacity shall relocate container freight to solve many problems, and to let Busan Port and Gwangyang Port be hub ports in Northeast Asia and to help create logistics hub country in the Korean Peninsula.

These days, the TCR has become important at active trade in Northeast Asia to be given the largest benefit at running of trans Korean railway. By taking advantage of the TKR in the near future, South Korea shall strengthen logistics center in Northeast Asia, for which North Korean and South Korean railroad shall be connected and trans Asia railroad shall be developed. The TCR that is to be influenced the most at the TKR running shall be used systematically.

<Table 5> Extension and Facilities of the Tans-Korean Railway
(Unit: Km)

Name of the line	Section in South Korea	Section unconnected	Section in North Korea	Total extension
TKR1	491 Busan~Seoul~Munsan	20 Munsan~Gaeseong	434 Gaeseong~Pyeongongyang~Shinuiju	945
TKR2	533 Busan~Seoul~Shintanri	31 Shintanri~Pyeonggang	749 Pyeonggang~Cheongcheon~Dumangang	1,313
TKR3	533 Busan~Seoul~Shintanri	31 Shintanri~Pyeonggang	790 Pyeonggang~Hoiyeong~Nammyang	1,354

Source: Kwon (2001b).

The TKR may elevate inland transportation competitiveness remarkably from point of view of time and costs, and the TCR may be given the largest benefit.

To be logistics center in Northeast Asia, North Korea and South Korea shall connect railroad to make use of the TCR as much as possible by systematic plan.

4. Conclusion

South Korea has opened logistics hub ports in Northeast Asia based on Busan Port and Gwangyang Port to transship freight with destination of China and Japan and to be logistics base in Northeast Asia by strategy. Busan Port Authority has made every effort to bring foreign shipping companies' transshipment freight. By taking geographical advantages, Busan Port Authority

had done on-the-spot marketing 10 times every year to bring freight with destination of North China and West Coast of Japan. Busan Port Authority built up port operating network to collect and exchange international shipping information and to put hazardous matter shed and to dredge the New Port and to remove Todoseom and improve logistics environment. Nonetheless, Busan Port had great difficulty at promotion of hub port strategy in Northeast Asia because rapid growth of the Chinese ports. This study investigated South Korea's counteractions against changes of logistics environment in Northeast Asia. The study investigated trade scale and container freight volume in Northeast Asia to examine online and off line material of the Ministry of Ocean and Fisheries, Busan Port Authority and other government agencies by time series analysis. The study investigated changes of freight volume of the ports in the three countries in Northeast Asia by the literatures. The study suggested use of the TKR as well as promotion of North Pole and South Pole route to take actions against changes of trade volume and logistics environment in Northeast Asia, and SWOT analysis was done to examine effectiveness of the strategies. South Korea shall be logistics hub in Northeast Asia at rapid change of logistics environment in Northeast Asia:

First, port development shall be given priority to select and concentrate. All of the ports cannot be developed to be hub ports in Northeast Asia with limited capital and time and to develop according to port development priority considering changes of international logistics environment.

Second, not only Gwangyang Port but also Busan Port shall share roles to establish an integrated system. Both ports system has been used in the name of balanced development between regions to examine international competitiveness carefully under current unproductive and fierce competition system.

Third, ports shall be developed in time from point of view of comprehensive logistics system. The container port facilities and equipment oriented policy has been used until now to keep efficiency of freight handling and ship's berthing: South Korean ports shall be logistics base under international logistics environment changed to develop ports that connect container port facilities, background base and inland transportation systems.

Fourth, various kinds of incentive systems shall be used to bring transshipment freight. Solving of shortage of port facilities does not make Korean ports be hub ports in Northeast Asia. Port freight volume shall increase continuously. Increase of port freight volume depends upon international shipping company ships' calling at Korean ports. The ships shall call at Korean ports continuously to increase calling frequency, and new shipping company's ships also call at Korean ports. Incentive systems for world shipping companies shall be used to do public relations.

Fifth, connection between trans Korean Railroad and the TSR links both Asia and Europe beyond link with North Korea, South Korea and Russia. South Korea is to be given opportunity and challenge. The connection of railroads has been discussed to research for a long time not to do business. The connection shall give both Korea economic advantages to save logistics expenses and to do tourism business and to give enormous eco-

nomic advantages and to strengthen economic cooperation between Russia and Korea and to do economic cooperation in Northeast Asia. The TKR that connects the TCR shall make great change to open new silk road. The Chinese government has promoted new silk road economic bloc with new railroad to open railroad between Xian and Hamburg and between Yiwu Shi, Zhejiang and Madrid Spain to let not only China but also Russia compete in diplomacy: So, South Korea shall make use of diplomatic approach to open new logistics base based on Busan Port.

Sixth, North Pole Route shall be commercially used step by step. International legal systems on the route shall be kept in order to discuss proper fare of passage and to develop base port and to develop ships and plants and to establish cooperative system between Korea and Russia for the use of the route. Seamen training program for North Pole Route sailing shall be made to join the Arctic Ocean ports development and to make policy and develop North Pole Route in connection with resources development. International cooperation for the use of the Arctic Ocean is needed to establish an integrated research institute of the Arctic Ocean at the government level and to establish system and use plan.

In this study, trans-Korean Railroad based on Busan Port that connects the TCR, the TSR and North Pole Route may be uncertain in practice considering uncertainty of international politics.

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