

The Impact of TKR - TSR  
on South Korea as a Logistics Hub  
in the Northeast Asian Region

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## DECLARATION

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The Impact of TKR (Trans-Korean Railway) –  
TSR (Trans-Siberian Railway) on South Korea  
as a Logistics Hub  
in the Northeast Asian Region

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# 1. Introduction

The port of Busan has performed as Logistics Hub port in Northeast Asia thanks to its geographical advantage and, for a little while, the port has been prosperous due to the rapid economic development of China. However the position of Busan port is threatened by Chinese ports and Japanese ports which are being developed. Especially, China would be the most menacing competitor because a great number of cargos generated from China have been transshipped at the Busan port.

Most trades between Europe and Asia are performed by deep sea shipping via the Suez Canal. Since China and Russia opened their markets more to the West, the economic developments of these countries have had an impact on the world trade. While the economies of these countries are growing more and more, it has been under discussion to exploit Siberia and Northeast provinces of China because these regions are expected to accelerate the two countries' economic development due to the potential resources and strong development possibilities in these regions. However, unfortunately, these regions are geographically isolated, and so it is urgent to develop transport networks in order to support economic activities in the regions. For that reason, it has been deliberated to connect TSR (Trans-Siberian Railway) with TKR (Trans-Korean Railway) in order to obtain new intermodal transport routes between Europe and Northeast Asia and between Northeast Asia and American continent.

Fortunately, South Korea is facing a good chance to make the best use of its geographical advantage once again. Once the complete Eurasian land-bridge is

constructed, South Korea would be able to stand in the center of a new major trunk route (Eurasian land-bridge) between Europe and Northeast Asia and between Northeast Asia and American continent. Although South Korea would not be able to occupy the whole Asian transport market, it would be possible that the great part of Northeast Asian transport market is taken by South Korea.

## **2. Competition among countries in northeast Asia**

South Korea, China and Japan are intensively competing with each other to have hub ports in the region. Several Chinese ports have already overtaken Busan port in terms of throughput and these rapid growths of Chinese ports are not likely to become slowdown soon. Outwardly, Japan could be seemed to remain quietly. Actually, however, the country is stretching itself in order to compete with its opponents.

### **2.1 China**

In 2003, the port of Shanghai overtook Busan port, which used to be the third rank, in terms of throughput. Accelerated foreign investment in the Chinese market after China became a member of the WTO, sharp increase of exports and imports and active investments of Chinese government to make its ports correspond to the rapid growth of Chinese economy would have brought the result to China. What is the worse to other opponents is that these efforts would be continuous.

The efforts of China to develop its ports look like flaming. In case of Chinese major port 'Shanghai', China is constructing a huge new Shanghai port (Yangsan port) in Yangsan island at a great cost (about 600 million US\$). It is expected that this port would be able to attract next generation of container vessels (8,000 TEU class vessels) and handle three times more than the current capability of Busan port. Actually, China seems to expect the port would become the biggest port in the world.

**[Table 2-1] Present situation of Chinese harbors and bays and development plan**

Harbors and bays	Quay (pcs)	Amount to handle	Short-term development plan	Whole development plan
Shanghai	22	8,610	14 quay to 2006	52quay to 2020
Dalian	5	1,500	6 quay to 2007	additional development after 2008
Tianjin	8	2,360	15 quay to 2010	additional development after 2011
Qingdao	8	2,300	7 quay to 2005	additional development after 2006
Tianjin	11	7,610	12 quay to 2007	additional development after 2008

# Source: Gwangyang Bay Area Free Economic Zone Authority, 2004, Expansion of Northeast Asian economic range and crisis of Korean economy, Gwangyang

The amendment of port development laws is accelerating port developments. Chinese ports used to fall behind in terms of efficiency of port operating. However, thanks to the revision of the law, lots of foreign terminal operators can participate in developing and operating Chinese ports with their advanced know-how and capital. As the result of this, Chinese ports could overcome their weaknesses.

## 2.2 Japan

Up to now, Japanese ports facing East Sea do not have enough capability for deep sea liners. Because of this, most of the ports use Busan port as their transshipment port. Therefore, transshipment cargos from Japan have been still tending upwards while transshipment cargos from China have been gradually decreased.

However, the tendency could be changed by present efforts of Japan to develop its ports. In Japan, basically, ports are managed by local autonomous entities and the central government engages in the management and the development of the ports in order to support the local governments. The Japanese central government has been promoting a project for developing its ports as Hub ports. The project contains that Japanese central government will make its ports' processing capacity bigger with allying neighboring ports and develop the allies' hinterland as integrated logistics zones. Furthermore, several local autonomous entities are actively developing their ports which are facing East Sea and Busan port. Especially, Kitakyushu port, which is the closest Japanese port to Busan port, is watching for a chance to capture the cargos which have been transshipped at Busan port.

### 3. The present situation of South Korea

The port of Busan is located on a main truck route (Europe-Singapore-Hong Kong-Kaohsiung-Busan-Kobe-North America). This port has been considered as the major port in Northeast Asia. However, a series of port development projects of China and Japan is threatening the position of Busan port and this port has a lot of problems which have to be solved in order to compete against other competitors.

#### 3.1 Port capacity

Busan port has 6 container terminals and its processing capacity is approximately 4,860,000 TEU. In 2003, this port handled 10,360,000 TEU and this is about two point one times bigger than the port capacity. The rate of vessel backlog also tends to increase. In other words, it can be said that Busan port is suffering from lack of capacity.

**[Table 3-1] Container berth capacity and annual cargo processing capacity of Busan port**

		Jaseongdae	Sinseondae	Gamman	Singamman	Wuam	Gamcheon
Simultaneous Berth Capacity	50000(dwt)	4	4	4	2	-	-
	20000(dwt)	-	-	-	-	1	-
	10000(dwt)	1	1	-	-	-	-
	5000(dwt)	-	-	-	1	2	2
Annual Cargo Processing Capacity (TEU)		1,200,000	1,200,000	1,200,000	650,000	270,000	340,000

# Source: Port of Busan (<http://www.portbusan.or.kr>), 2005

**[Table 3-2] Annual rate of vessel backlog in Busan port**

Unit: %, Number of vessels

	2001	2002	2003	2004 (January ~ October)
Rate of vessel backlog	0.79	1.23	1.40	1.16
Incoming vessels	23,356.00	26,166.00	27,275.00	23,050.00
Vessel backlog	184.00	322.00	381.00	267.00

# Source: Busan Development Institute (<http://www.bdi.re.kr/>), 2004

### **3.2 Inland transport networks and Logistics Park**

According to a research of Busan Metropolitan city (2004), Shanghai port and Kaohsiung port have about 793.2 ha and about 470 ha of Logistics Park each. Unfortunately, the logistics park of Busan port is as much as absent comparing to other competitors in Northeast Asia. For that reason, the construction of Busan Newport is an urgent project in order to obtain a huge logistics park but only several parts would be prepared until 2006. Therefore, until the construction of logistics park is completed (the construction is to completed until 2013), Busan port would not be able to offer sufficient logistics services.

Most cargos are transported by trucks to inland. However, this tendency has caused traffic congestions and an increase of logistics costs because of lack of inland transport networks. For example, the coefficient of utilization of railway is much lower than road transport due to lack of capacity and inefficient operation. In case of coastal navigation, most costal navigation firms are paltry, and so its range of service is too narrow.



**[Table 3-3] Throughput of inland transport modes**

Unit: 10,000 TEU

	Rate (%)	1999	2000	2001	2002
Trucking	<b><u>88.8</u></b>	-	438	446	494
Railway	10.4	59	65	55	58
Costal Shipping	0.8	13	11	11	4.4

# Source: Busan Metropolitan City, April 2004, Policies and strategies for developing Busan, Busan

South Korea has depended on the advantageous geographical position of Busan port and neglected development of the port and inland transport network. A series of port development projects of China and Japan seems to be strong enough to threat the idea of South Korea to become logistics hub country in Northeast Asia. Therefore South Korea has to consider counterplans as soon as possible in order to accomplish its goal.

## **4. The prospect of TSR (Trans-Siberian Railway)**

In the bitter international competition among Northeast Asian countries, the efforts to develop Eurasian land-bridge are likely to give South Korea a chance to be in a better position than other competitors. In this chapter, it will be dealt with how the land-bridge would impact on concerned countries.

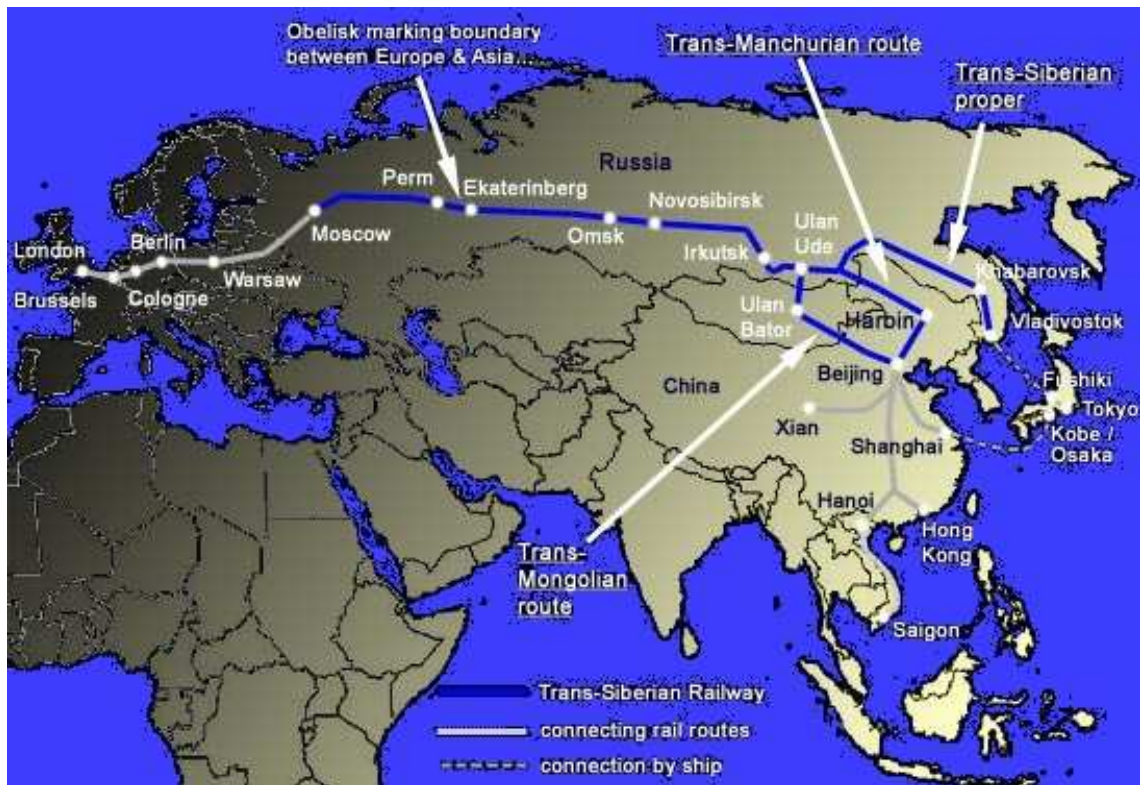
### **4.1 TSR and TKR**

#### **4.1.1 TSR (Trans-Siberian Railway)**

TSR is a transcontinental railway service route between Vostochny (and Nakhodka) and Moscow. All sections are double tracks and renovated for electric locomotives. This railway has been utilized for trades between several regions of Europe and Asia but its transit time, freight rate, reliability and tracking & tracing services do not come up to the marine transport via Suez Canal.

Through TCR (Trans-China Railway), TMGR (Trans-Mongolian Railway) and TMR (Trans-Manchurian Railway), cargos can be also transported from Asia to Europe or vice versa. However, in order to connect the two regions, these routes have to utilize the TSR and cross more borders. Therefore, it can be noticed that the TSR has better efficiency in terms of transit time and freight rate, although its freight distance is a bit longer than others.

[Figure 4-1] Trans-Siberian Railway



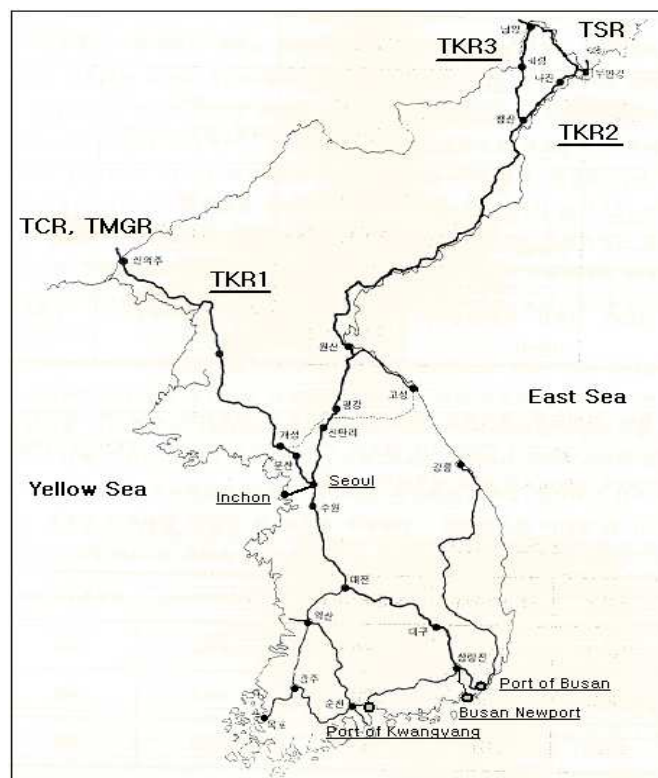
# Source: [www.seat61.com](http://www.seat61.com)

#### 4.1.2 TKR (Trans-Korean Railway)

TKR can be divided by 3 routes: TKR1, TKR2 and TKR3. These routes can be connected with TSR, TCR, TMGR and TMR when these are renovated and restored. In order to connect these lines with the existing transcontinental railway and fully activate the interconnection of TKR-TSR, three corridors (Gyeong-ui, Gyeong-won and Dong-hae lines) should be renovated and restored as soon as possible. (See annex 1)

One of the major problems is that the Korea peninsular has been divided by ideological dispute. Recently, however, these lines are partly under construction by several mutual agreements between North Korea and South Korea, and further ententes for additional development plans are in progress. Russia and Japan are also keen to mediate the agreements to TKR between North Korea and South Korea. Fortunately, all of the countries, especially North Korea, seem to start to realize the potential economic impacts of the interconnection of TKR-TSR. Therefore, the interconnection of TKR and TSR does not seem impossible.

**[Figure 4-2] Locations of TKR1, TKR2 and TKR3**



# Source: Korea Transport Institute

# Remark: Also see annex 1 for more about TKR

## 4.2 The present situation of the TSR

Generally speaking, the trade between Europe and northeast Asia commonly depends on the marine transport via the Suez Canal. However, some parts of the trade utilize the railway transports: i.e. TCR, TMGR, TMR and mainly TSR. In the cases of TMGR, TMR and TCR, the amount of cargos transported via the railways is small. Moreover, it is difficult to obtain the accurate data about their throughput. Therefore, in this paper, these railways will not be dealt with.

In order to figure out the specific gravity of the TSR in the trade, the amount of cargos transported by ships between the two regions will be compared to the throughput of the TSR.

**[Table 4-1] Market share of maritime transport and railway transport (TSR) on container market between Europe and South Korea**

Year	Throughput(TEU)		Rate	
	Shipping	TSR	Shipping	TSR
1992	309,804	30,769	91.0%	9.0%
1993	354,711	37,958	90.3%	9.7%
1994	400,200	42,320	90.4%	9.6%
1995	447,793	50,269	89.9%	10.1%
1996	475,335	61,076	88.6%	11.4%
1997	561,028	58,062	90.6%	9.4%
1998	588,128	52,466	91.8%	8.2%
1999	623,258	44,280	93.4%	6.6%
2000	710,689	68,523	91.2%	8.8%
2001	734,927	82,827	89.9%	10.1%
2002	873,594	102,892	89.5%	10.5%

# Source: Korea Container Terminal Authority, Donghae Shipping

# Remark:

- Throughput of maritime transport quoted from 'The change of container flows between South Korea and Europe', Korea Container Terminal Authority, 1992-2002
- Throughput of railway transport (TSR) is data of Donghae Shipping

As can be seen from the above table, in South Korea, the average allotment rate of TSR just took about 9% out of the whole throughput. Although figures are not available for China and Japan, it is generally known that the market share of the railway transport (TSR) would reflect a similar picture. Moreover, in the case of South Korea, only about twenty integrated transport companies utilize TSR and their transport service range are limited to a few territories such as Finland, Moscow and some central Asian territories. In other words, this railway transport is only utilized for the cargos which are needed to be transported to those regions, where the marine transport is not available. Consequently, it can be said that the international trades between Northeast Asia and Europe generally depend on marine transport.

Actually, the transport distance of the route through the TSR is shorter than the marine transport. Nevertheless, the marine transport has two assets which make itself more popular. One is that its transit time is shorter than when you use the TSR. The other one is that its freight rate is lower than the freight rate of transport through the TSR.

**[Table 4-2] Comparison between marine transport and the railway transport (TSR) from Busan port to the major Ports in Europe**

Ports in Europe	Transport distance (km)		Transit time (day)		Freight rate (US\$/TEU)	
	Shipping	TSR	Shipping	TSR	Shipping	TSR
Le Havre	19,330	12,600	24	34~37	1,550	3,100
Rotterdam	19,790	12,230	24	34~37	1,550	3,100
Hamburg	20,360	11,900	26	34~37	1,550	3,100

# Source: Korea Transport Institute, 2004, Analysis and Forecast of Pan-Asia Transportation system, Seoul

In order to transport cargos through TSR from South Korea, firstly, the cargos should be transported by short sea shipping from ports in Korea (Busan) to ports in northeast Russia (Vostochny). When the cargos arrive at the ports in Russia, they should be transshipped to the TSR. The higher freight rate and longer transit time of the routes are mainly caused by these additional handlings. Furthermore, freight rate is more or less directly proportional to freight distance. What makes it worse is that, in reality, shipping companies tend to apply lower freight rates than the declared freight rates. The deployment of ever-larger container ships also makes the rate even lower.

Therefore, at the moment, the TSR does not threaten the existing sea transport because this railway transport does not have any competitive power against the sea transport. Moreover, it does not seem that the railway transport is an alternative between Northeast Asia and Europe because most trades are still dependent on the sea transport and this railway transport is only utilized for the cargos which are needed to be transported to several specific regions where the marine transport is not available.

### 4.3 The prospect of the TSR: interconnection between the TKR and the TSR

At the moment, it is obvious that the TSR does not have competitive power against the existing water route due to its inefficient transport system. Once, however, the TSR is connected with the TKR (Trans-Korean Railway), cargos could be transported from ports in Korea to their destinations (Europe, Russia and so on) directly by trains. On top of that, the freight rate would be lower than not only the existing the TSR route but also the marine transport. Furthermore, the required transit time would also be shorter than the marine transport.

For instance, in South Korea, cargos have to be transported from there origins to port of Busan by inland transport in order to utilize the TSR. Approximately, this costs US \$300. When the cargos arrived at the port, the cargos have to be transported again by ships to Vostochny. This shipping costs about US \$800 to US \$1,000. In total, about US \$1,100 to US \$1,300 has to be paid. However, if once the TSR is connected with the TKR, these additional transports will not be necessary.

**[Table 4-3] Estimation of freight rate and transit time between Europe and the northeast Asian countries**

Unit: US\$, day

Route	Freight rate	Average transit time
Busan port - Ports in Europe(Shipping)	2,280	29
Busan port - Vostochny port - TSR	2,980	30
<b><u>TKR - TSR</u></b>	<b><u>2,020</u></b>	<b><u>25</u></b>



# Source: Nam Ki-chan, 2004, A Scheme for activating the port of Busan toward the development of Asia-Europe rail transport, Busan development institute, Busan

**[Table 4-4] Railway transport comparing to Shipping between Europe and South Korea**

Choice of transport		Distance (km)	Transit time (days)	Freight rate (US\$/TEU)
Railway (Busan-Berlin)	TSR	12,350	19.6	1,280
	TMR	10,950	18.8	
	TMGR	11,250	20.2	
Shipping (Busan-Rotterdam-Berlin)		20,500	34.0	1,340 ~ 1,540

# Source: Ministry of Construction & Transportation, 2004, Political Tasks for Developing Railway Transport, Seoul

Lots of experts and institutes expect that the coefficient of utilization of the TSR will be dramatically increased when this railway is directly connected with the TKR. Several researches estimate the future allotment rate of the TKR-TSR. Although the estimations are more or less different from each other, most of the researches tend to predict the high growth of the throughput of the completed land-bridge (the interconnection of the TKR and the TSR) railway transport system. Table 4-5 shows us one of the estimations of the throughput of the TKR-TSR between Europe and the northeast Asian countries. In the table, the allotment rate of the TKR-TSR railway transport in 2020 (3.57%, 18,303,000t) was expected to be about 3 times bigger than the allotment rate in 2005 (1.24%, 4,079,000t) while the total throughput in 2020 was expected to be about 1.5

times larger than the total throughput in 2005.

**[Table 4-5] Estimation of the throughput between Europe and the northeast Asian countries through TKR-TSR**

(Unit: 1,000t/year)

Origin	Destination	2005			2020		
		TKR-TSR	Total	Rate (TKR-TSR)	TKR-TSR	Total	Rate (TKR-TSR)
Korea	Europe	1,510	26,265	5.75%	6,431	55,921	11.50%
	China	1,213	105,456	1.15%	5,725	248,892	2.30%
	Total	2,723	131,721	6.90%	12,156	304,813	13.80%
Japan	Europe	1,229	47,069	2.61%	4,939	68,902	7.17%
	China	127	151,002	0.08%	1,208	138,479	0.87%
	Total	1,356	198,071	2.70%	6,147	207,381	8.04%
Total		<b><u>4,079</u></b>	329,792	<b><u>1.24%</u></b>	<b><u>18,303</u></b>	512,194	<b><u>3.57%</u></b>

# Source: 'Nam Ki-chan, 2004, A Scheme for activating the port of Busan toward the development of Asia-Europe rail transport, Busan development institute, Busan

## **5. The economic impact of the TKR-TSR**

The Northeast Asian region (particularly Siberia and northeast China) contains a lot of natural resources. However, these regions are geographically isolated and this isolation is a serious obstacle to develop those regions. For the continuous development of these regions, well organized traffic infrastructures are essential factors. The connection of the TSR and the TKR would secure trade routes for the regions. Moreover, the international trades between northeast Asia and Europe would be accelerated in accordance of competitive freight rates and transit time of the TKR-TSR.

### **5.1 The economic impact by northeast countries**

#### **5.1.1 Russia**

Especially for Russia, the connection of the TSR with the TKR3 will offer a new direct transport route to their major export markets in northeast Asia i.e. South Korea and Japan. Especially, this route could promote the international trades between Japan and Russia. 11% of throughput of TSR came from Japan in 2001. According to a research of Mitsui O.S.K. Lines, which monopolize shipping market between Russia and Japan, the ratio was decreased by 6.3% in 2002 and this tendency is likely to be continuous. This rapid decline was caused by higher freight rate than shipping and nonscheduled transportation service. As a matter of fact, Japanese shippers tend to prefer reliable and fixed transportation service in order to pursue the planned inventory management, but

only one Russia could furnish Japanese shippers was fast transportation. Once, however, the TSR is connected with the TKR3, Russia should consolidate its transportation service to make it fully activated. Additionally, this connection would be able to offer much lower freight rate than before.

Siberia is well-known as a thesaurus of natural resources, such as natural gas, crude oil, a variety of minerals and so on. It is also a clear fact that Russia has exported plenty of natural resources. However, a broad area of Siberia is still remained undeveloped. This land has attracted several countries whose rate of dependence on imports of natural resources is high, such as South Korea and Japan. China, absorbing plenty of natural resources from all around world, is also concerned about developing the undeveloped area. Therefore Russia is looking forward to foreign investment and technical aid in order to develop the untapped area. The endeavor to connect the TKR and the TSR is expected to accelerate these efforts to develop the untapped resources and offer supply routes to the potential customers.

Russia has several ports which adjoin the Pacific: Vostochny, Vladivostok, Nakhodka, Vanino etc. Unfortunately, these ports do not have enough capabilities to directly export Russian home goods into the American market. However, the TKR-TSR would be able to offer Russia an opportunity to push into the American market, because through the TKR-TSR, Russia could utilize Hub ports in South Korea instead of expending time, effort and a large amount of money on developing its ports.

### **5.1.2 China**

China has devoted itself to developing three northeast regions of China: Heilongjiang, Jilin, and Liaoning. The population of these regions is over 100 million and the dimension is about 796 thousand square kilometers. These regions had been one of industrial centers of China and generated one eighth of steel, 40% of crude oil, 25% of automobiles, 30% of vessels, and 50% of material wood. However, these districts have been out of focus of economic development from 1978 and, by reason of this, they have fallen behind other regions. Recently, China concentrates on these districts in order to make these regions a new principle axis developing China.

South Korea, North Korea and China have considered the renovation and restoration of the TKR1. Although the TKR1 cannot be directly connected with the TSR, the TKR1 is linked with the TCR, the TMGR which are connected with the TSR: if these railways are renovated, shippers will be able to get more alternatives. Cargos which are mainly produced from the three regions in China will be likely to flow in ports of South Korea for being exported to Japan and America. Especially to America, extra large vessels should transport these cargos, but the ports of Tianjin and Dalian, neighbouring Chinese ports of the three districts, are not such good ports to call into at the moment. Therefore, transshipping their cargos at Busan port through the TKR1 or short sea shipping would be an effective alternative. Even though the two Chinese ports are being developed for the extra large vessels, the combination of Busan port and the TKR1 could be a strong competitor to the Chinese ports.

[Figure 5-1] Northeast regions of China



# Source: <http://www.asianinfo.org>

### 5.1.3 Japan

The renovation and restoration of the TKR and the connection of the TKR with the TSR mean that Japan has direct transport routes to China, Russia, Mongolia, Korea and even Europe. Although Japan is an economically big country, the country has difficulties to advance into the Eurasian continent, because Japan is an island country. Therefore, Japan hopes that the TKR and the TSR will bring itself a good opportunity to extend

markets.

Several provinces facing East Sea and being located near ports of South Korea have fallen behind other regions: Niigata, Tottori, Kanazawa and etc. Japan expects that TKR and TSR will encourage industrial development of the regions because Japan also predicts that ports in these regions will promote their regional economies.

#### **5.1.4 The Korean peninsula**

Shippers are expecting to export and import at lower rate than existing route with utilizing the TKR-TSR. For instance, when a shipper use the existing route in order to export its goods through the TSR, the shipper have to transport the goods to Busan port by inland transport modes. At the port, additional transshipments happen to send the cargos to Vostochny port. This route costs around US\$ 1,100 to 1,300 per 20ft container. Comparing to this route, the only thing a shipper using the TKR-TSR need to do is to send its goods to the nearest inter-modal terminal (or railway station) and transship the cargos on a wagon. This measure would cost about US\$ 500 to 600 per 20ft container. Therefore, in terms of export to Europe, the shippers would have a competitive price thanks to the reduction of transport costs and this would accelerate trades between South Korea and European countries. Furthermore it is expected that the range of economic cooperation between North Korea and South Korea is expanded more by the interconnection of the TKR-TSR. As a result of this, exports toward Europe would be also expedited thanks to the labor supply from North Korea at low rate.

**[Table 5-1] Estimated freight rate of TKR-TSR comparing to existing route between Seoul and Vostochny**

Route			Freight rate (US\$/TEU)
Seoul	Busan port	Vostochny port ( TSR)	1,100~1,300
Seoul	TKR	Vostochny port ( TSR)	500~600

# Source: Nam Ki-chan, 2004, A Scheme for activating the port of Busan toward the development of Asia-Europe rail transport, Busan development institute, Busan

The United States have been the biggest export market to South Korea even though, these days, the rate of exports to the country tends to decrease due to the expansion of trades with China. Actually, South Korea has high rate of dependence on exports to United States and this means the economics of South Korea could be under the control of economics of the country. South Korea has tried to diversify its export market. For instance, however, the prices of exports to Europe are not low enough to have competitive power because of a long distance and having only one transport mode i.e. marine transport via Suez Canal. However the opening of the TKR-TSR is expected to bring South Korea a chance to extend its market share in Europe.

**[Table 5-2] Major Export markets of South Korea (1980, 1990 and 2002)**

1980			1990			2002		
Rank	Country	%	Rank	Country	%	Rank	Country	%
<b>1</b>	<b>US</b>	<b>27</b>	<b>1</b>	<b>US</b>	<b>30</b>	<b>1</b>	<b>US</b>	<b>20</b>
2	Japan	17	2	Japan	19	2	China	14
3	Hong Kong	5	3	Hong Kong	6	3	Japan	9
4	Saudi Arabia	5	4	Germany	4	4	Hong Kong	6
5	Germany	5	5	Singapore	3	5	Taiwan	4
6	etc	41	6	etc	38	6	etc	47

# Source: Korea International Trade Association (<http://www.kita.net/>), 2005



Frankly speaking, North Korea is in need of economic assistance from foreign countries because the country cannot stand alone economically any more. The opening of TKR is expected to relieve strained relations between North Korea and South Korea because the economical interchange between the two countries would be speeded up and this would open North Korea to foreign investment.

Most importantly, South Korea would be able to an opportunity to become the Logistics Hub country in Northeast Asia because, when the Eurasian land-bridge is opened, the country would be the center of trades between Europe and Northeast Asia and between Northeast Asia and American continent.

## **5.2 Congestion issue in the port of Busan**

At the moment, most major shipping companies prefer the port of Busan to other Korean ports. For reasons of this preference, Busan port has handled a large number of cargos over its appropriate processing capacity. Besides, the cargos which are transshipped in South Korea in order to use the TSR have mostly come to the port. If these tendencies last when the TSR is connected with the TKR, cargos exported from Europe, Russia and northeast Chinese region to United States or Japan will concentrate on the port. Cargos exported from Japan to Europe, China and Russia will also be transshipped at the port of Busan. After all, the port will be confronted with an unexpected intensive congestion.

To give an example, a serious congestion happened at the ports of LA and Long Beach last year. Not a small number of vessels had to wait off-shore for about three to four days. What was worse, it took more than a week to transport the unloaded containers out of the ports. One of the major reasons was cargos from Asian region were concentrated into these two ports. About 70% of cargos from Asia spread to all area of United States through western American ports and these two ports handle about 77% out of the inflow. The reason why a great part of the inflow concentrates into the two ports is that the ports are the best ports to unload cargos. Generally speaking, Los Angeles has a good given condition thanks to its gentle climate and densely populated districts. Furthermore, these two ports are the only places where extra-large vessels can call at.

The port of Busan has similar assets. Without doubt, this port is one of the most popular ports in northeast Asian region. Furthermore, Busan port will be the center of all flows of cargos in northeast Asia after the TKR and the TSR are connected. In 2003, the total capacity of Busan port was about 4,940,000 TEU. According to a research of Korea Maritime Institute (Yon-hap news, 30 March 2005), the port would have to handle about 15,100,000 TEU in 2011. Additionally, when the TSR is connected with the TKR, more cargos will be brought into the port, even though some part of estimated volume would move to the TKR-TSR instead of coming into the port. However, it seems almost impossible to expand the physical dimension of the port because of limited space and environmental issues. Therefore, it is not so difficult to be foreseen that the port of Busan and Busan city will be confronted with intense congestion of cargos and mobiles because of numerous cargos concentrating into the port and the

interconnection of the TKR and the TSR will make the situation worse. To make matters worse, this congestion might cause high freight costs and long transit time to shippers. As a result of this condition, the TKR-TSR would lose their competitive advantages and, ultimately, the position as an alternative toward existing all-water route.

## **6. Problems awaiting solutions and objects for activating TKR-TSR**

When the Eurasian land-bridge is completed, South Korea would be the center of trade routes between Europe and North East Asia and between North East Asia and America continent. In other words, the country would be the transshipment point of marine transport and land transport. In some ways, the connection of the TSR and TKR would offer South Korea great opportunities to get an incredibly huge fortune and to become a Logistics Hub country in the northeast Asia. Therefore, in order not to lose those opportunities, the country should guarantee the smooth transshipment and flows of cargos. However, precisely, the country seems not to be ready to grasp the opportunity.

The country has a lot of problems awaiting solutions in order to make the TKR-TSR fully activated and get huge fortune from the interconnection. Most importantly, related sites such as ports and inland terminals should have enough capacity in order to manage dramatically increased cargos smoothly. Also, logistics network should be built all over the country in order to promote smooth inter-modal transport which is one of essential factors to activate the TKR-TSR.

In this chapter, several problems which should be solved and objects will be dealt with. Moreover, several ideas for generating more profit from the TKR-TSR and developing South Korea as an attractive and competitive Logistics Hub country will be proposed.

## 6.1 Feasible solutions to overcome the shortage of capacity of Busan port

### 6.1.1 Busan Newport

Busan Newport has been under construction since 1995. The construction of the port was decided to solve the issues of inveterate cargo backlog in Busan Port in order to function as an international port of cargo transference, also as the gateway to the economic zone of Northeast Asian region.

[Table 6-1] Outline of Busan Newport project

	Overall (1995~2011)	Phase 1 (1995~2008)	Phase 2 (2009~2011)
Project Cost (100 million won)	91,542	55,519	36,023
Project Scale (No. of Vessel Positions)	30	14	16
Processing capacity (10,000 TEU)	804	352	452

# Source: The port of Busan (<http://www.portbusan.or.kr>), 2005

Although several sites are still under construction, after the constructions are all completed, this port will obtain simultaneous berth capacity for 30 vessels (maximum level of up to 50,000 ton vessels) and cargo processing capacity of 8.04 million TEU/year which is about two times bigger than Busan port (4,860,000 TEU/year, Busan Regional Maritime Affairs and Fisheries Office, 2005).

The constructions of two dedicated expressways, a double track railway and entrance railway which connect the new port with its hinterland and existing traffic network are to be completed until 2011. Particularly, after the TKR and TSR are interconnected, these railways would make it possible for the port to offer great inter-modal transport service to its shippers. When these constructions are finished and all berths come into operation, it is expected that not a small number of liners will directly call at the new port instead of Busan port.

[Figure 6-1] The dedicated inland/entrance railway and expressways of Busan Newport



# Source: Busan Regional Maritime Affairs and Fisheries Office (<http://www.pusan.momaf.go.kr/>), 2005

# Remark: The constructions of these three traffic lines are to be completed until 2011 and these lines will be connected with existing traffic network

### 6.1.2 Yangsan ICD (Inland Container Depot)

In 1990s, the port of Busan and Busan city suffered from congestion due to an unexpected steep raise of inflows and outflows of cargos. In order to solve this congestion, Yangsan ICD (Inland Container Depot) opened in 2000 near Busan city. This ICD performs not only stevedoring but also various activities. (See below figure)

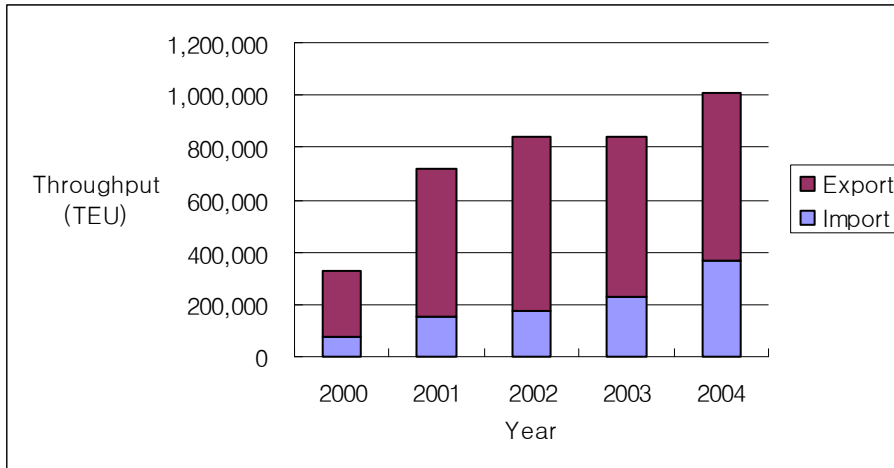
[Figure 6-2] The functions of Yangsan ICD



# Source: Yangsan Inland Container Terminal (<http://www.ysicd.co.kr>), 2005

Only 6 months later from opening the ICD, its total throughput exceeded estimates (144,000 TEU) by about 184,000 TEU, though its dedicated freeway and entrance railway were still under construction. Moreover, the more cargos come into Busan port, the more cargos come into the ICD. In other wards, cargo congestion at the port of Busan has been getting worse and Yangsan ICD has been handling more and more containers which cannot be handled at the port.

**[Graph 6-1] Annual throughput of Yangsan ICD**



# Source: Yangsan Inland Container Terminal (<http://www.ysicd.co.kr>), 2005

Fortunately, according to the operator of Yangsan ICD, the ICD still have plenty of surplus storage capacity and it is possible to extend the capacity thanks to locating in the outskirts of Busan city.

**[Table 6-2] The storage capacity of Yangsan ICD**

	Container Yard	CFS
Storage capacity (Max.)	32,960 TEU	74,380 R/T
Handling capacity (Yearly)	1,412,000 TEU	4,463,000 R/T

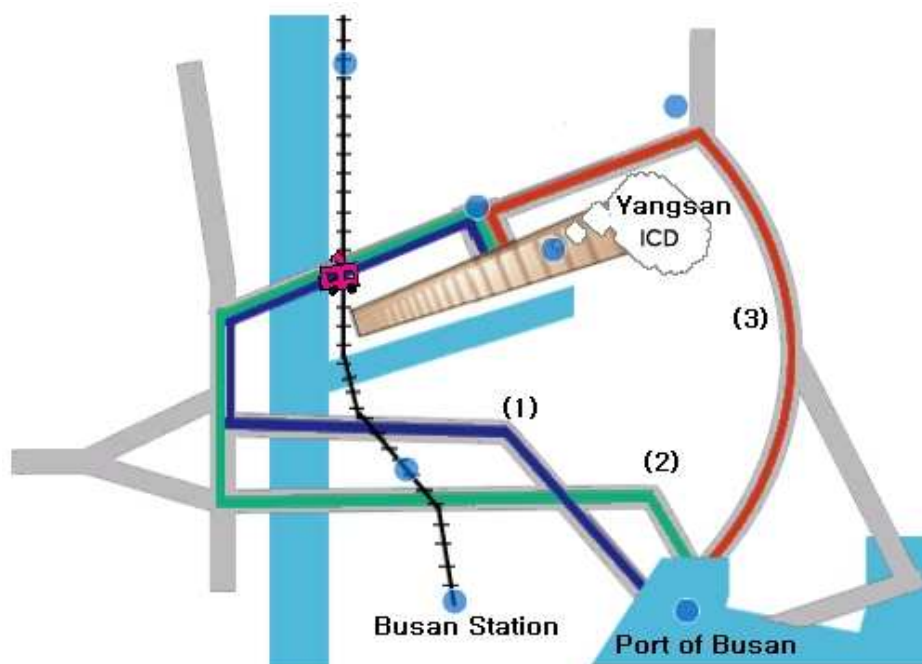
# Source: Yangsan Inland Container Terminal (<http://www.ysicd.co.kr>), 2005

This depot is directly connected with the port of Busan by 1 dedicated freeway and 2 highways. Also, Yangsan ICD is connected with the existing railways by a double track



entrance railway: the construction of the entrance railway was completed in the end of 2004. Hence, this container depot would not only share the burden of Busan port but also play as an inter-modal terminal.

**[Figure 6-3] Connections between Yangsan ICD and the port of Busan**



# Source: Yangsan Inland Container Terminal (<http://www.ysicd.co.kr>), 2005

# Remark: Classification and distances from the Port of Busan as follows

- (1) Dedicated freeway (31km from the port of Busan)
- (2) The first highway (33km)
- (3) The second highway (38km)

### **6.1.3 Decentralizing inflows and outflows of cargos**

At the moment, most cargos concentrate on the port of Busan regardless of their destinations. If this tendency continues, this concentration will hinder the smooth operation of the port when the TKR-TSR is activated.

In order to avoid the concentration of cargos into the port of Busan, inflows and outflows of cargos should be decentralized fundamentally. In case of import from China to South Korea or vice versa, the cargos should come and go out through the TKR1 or Yellow Seaside ports (Incheon, Pyeongtaek, Gunsan and etc.) by short sea shipping not only through the port of Busan. In 2000, imported goods from China and Japan through the port of Busan took 57% (1,407,487 TEU) out of total imported cargos (2,483,753 TEU) through the port. Besides, 69.3% (974,670 TEU) of the imported goods were distributed to Seoul. Although these include imported cargos from Japan, it can be judged that lots of cargos were imported from China through the Busan port because, at that time, the imports from China were 18,454,540 thousand US\$ (imports from Japan were 20,466,016 thousand US\$). (Busan Port Authority) In brief, most cargos tend to concentrate into Busan port even though the cargos' destinations are not Busan regions.

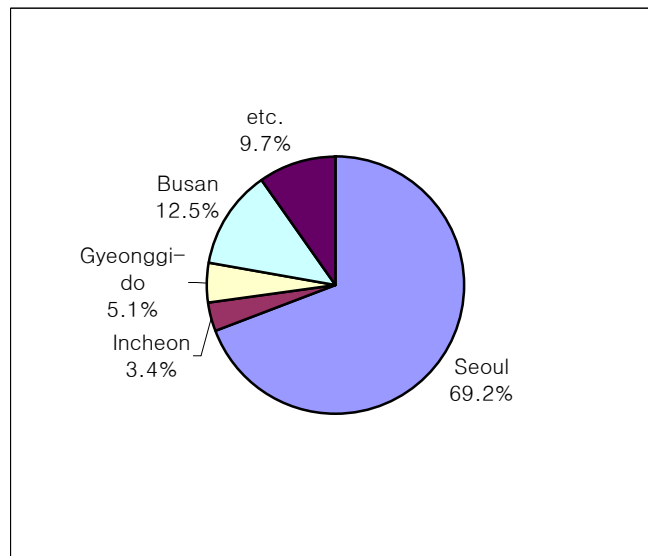
**[Table 6-3] Geographical distribution of imported container cargos from China and Japan**

Unit: TEU

	Yellow Sea			Korea Strait			East Sea	Total
	Incheon	Pyeongtaek	Gunsan	Gwangyang	<b>Busan</b>	Masan	Ulsan	
<b>Seoul</b>	103,360	5	465	121,844	<b>974,670</b>	3,594	18,275	<b>1,222,213</b>
Incheon	47,887	0	570	2,609	<b>48,319</b>	4	3	99,392
Gyeong-gi Do	13,175	0	27	3,003	<b>71,558</b>	97	3,326	91,186
Busan	3,534	0	292	3,365	<b>175,960</b>	16	2,590	185,757
etc.	4,623	0	465	9,828	<b>136,980</b>	6,082	6,278	164,256
<b>Total</b>	<b>172,579</b>	<b>5</b>	<b>1,819</b>	<b>140,649</b>	<b>1,407,487</b>	<b>9,793</b>	<b>30,472</b>	<b>1,762,804</b>

# Source: Nam Ki-chan, 2004, A Scheme for activating the port of Busan toward the development of Asia-Europe rail transport, Busan development institute, Busan

**[Graph 6-2] Geographical distribution of container cargos imported through Busan port from China and Japan**



# Source: Nam Ki-chan, 2004, A Scheme for activating the port of Busan toward the development of Asia-Europe rail transport, Busan development institute, Busan

Although, the port of Busan is the most attractive port in South Korea to shippers, this tendency has brought the concentration of cargos into the port as well as the increase of unnecessary logistics costs due to the transport costs from Busan to Seoul.

Accordingly, in order to avoid the concentration of cargos into the port of Busan and reduce the unnecessary logistics costs, the flows of cargos should be decentralized to other ports and TKRs. Furthermore, in other cases, if cargos do not have to come and go out through the port of Busan, these cargos also should utilize other alternatives.

**[Figure 6-4] One example for decentralization of cargo flows**



# Remark: This picture proposes several new transport routes for inflows from China.

Apparently, the throughput of Busan port could be seemed to be declined when cargos are decentralized to other ports and TKRs. In fact, however, this decentralization of

cargos will encourage the port of Busan to concentrate on deep sea shipping more. Besides, shippers who export to South Korea or import from the country would be able to utilize more efficient transport routes. As a result of the decentralization of cargo flows, ultimately, the competitive power of South Korea as a Logistics Hub country would be improved.

In order to induce shippers to utilize other alternatives, firstly, renovation and development of other ports will be needed. The port of Pyeongtaek is located near Seoul. Besides, this port is just 451 km distant from Dalian port and 583 km distant from Qingdao port. Therefore, it is possible to be said that this port occupies a favorable position in terms of trades between China and South Korea. However, investments in this port have been not enough to develop the port. In comparison with other ports, the ports of Busan and Gwangyang will have 30 and 33 berths each until 2011 but Pyeongtaek port will have just 4 berths. Due to the shortage of investment, the port of Pyeongtaek is not able to take advantage of its geographical features. In result, shippers have to go to the two other ports with paying extra transport expenses.

**[Table 6-4] The amount of investment in the ports of South Korea**

Unit: A million won (South Korean Currency)

	Busan	Gwangyang	Pyeongtaek
2003	39,000	25,900	7,100
2004	43,000	27,000	7,850

# Source: The port of Pyeongtaek, degraded to the third rate, Segye press, March 2005

Secondly, hinterland networks should be consolidated in order to distribute or gather cargos smoothly from a logistics zone to others. To do so, logistics zones should be built in proper locations and have proper capacities to accommodate cargos. Moreover, these zones also should be connected with well-organized transport corridors.

## **6.2 Activating Inter-modal transport: building well-organized hinterland networks**

### **6.2.1 Development of hinterland networks: Enhancing accessibilities among logistics zones**

Well-organized hinterland networks would be one of the crucial factors for smooth operations of the TKR-TSR. Well-organized transport corridors and the good accessibility to the corridors are important factors in order to build well-organized hinterland networks. Although, for instance, the capacity of a port is large enough to accommodate all of import and export cargos, as long as the movement of cargos into or out of port is not smooth, ports will face with the congestion of cargos and, ultimately, the whole hinterland networks will be collapsed.

Here is an example, the severe congestion of the ports of LA and Long Beach was mainly caused by shortage of capacity of the ports. However, that was not the only main cause. At that time, railway service couldn't supply enough labor power and didn't have enough numbers of locomotives and goods wagons to transport cargos to other logistics zones. As a result of this, the railway couldn't handle cargos on schedule and the cargos were piled up not only in the railway terminal but also in the container yards of the ports. It is important to have enough labor power, locomotives and wagons without any doubt. However, especially for South Korea, more urgent thing seems to be constructing infrastructure. Actually, South Korean key logistics sites (such as ports, ICDs and integrated freight terminals) do not have well organized traffic networks among the key

sites or within their own logistics zones. According to an announcement of Ministry of Construction and Transportation (Seoul Economy press, 19<sup>th</sup> of September 2004), only a few ports, integrated freight terminals and Inland Container Terminals are linked with railways. Moreover, although they are linked with railways, even some of the sites do not have entrance railways. This lack of accessibility to the existing railways causes additional handlings and declines the efficiency of transport by train. After all, this bad accessibility would be a serious problem which interferes with activating the TKR-TSR. Therefore, this lack of accessibility should be regarded as an urgent problem. In order to provide well organized railway network and skip these additional handlings, the unconnected sections have to be connected with existing railways as soon as possible. Furthermore, in order to activate the Eurasian land-bridge (TKR-TSR), the hinterland networks in South Korea also should be harmonized with other future hinterland networks somewhere in China, Russia and even Europe.

**[Table 6-5] Unconnected sections with existing railways**

<b>Site</b>	<b>Section (distance)</b>
Busan port	Busan-jin station ~ Busan port
Busan Newport	Entrance railway (8.0km)
Gwangyang port	Entrance railway (7.5km)
Uiwang ICD	Entrance railway (14.5km)
Yangsan ICD	Entrance railway (4.5km, by 2004, 12)

# Source: Nineteen entrance railways of key logistics sites will be constructed, Seoul Economy press (<http://economy.hankooki.com>), 19 September 2004

# Remark: These sites are closely related with TKR-TSR in this paper and the data quoted from the article.



### **6.2.2 Building unconnected and superannuated sections of Gyeong-ui line, Gyeong-won line and Dong-hae (East Sea) line**

Three missing lines are needed to be renovated or restored in order to build complete Eurasian land-bridge (TKR-TSR). Gyeong-ui line (TKR1) is to be connected with the TSR via the TCR. Gyeong-won line and Dong-hae line will directly connect Seoul and Busan with the TSR and the TMR via the TKR2 and the TKR3. (See annex 1)

Most sections of Dong-hae line are located under the Military Demarcation Line, which divides the Korea Peninsular into two countries. Especially, without being connected with northern part of the TKR3 or the TSR, this line would bring economic development to East seaside provinces. Furthermore, this line would be able to give shippers a direct route to the port of Busan without passing through Seoul when they utilize the TSR.

Both sides of Korea concluded a convention and the agreements have been partially fulfilled though the both sides are divided by an ideological quarrel. However, the progresses of the constructions are not rapid. There might be a variety of problems but the main reason seems a matter of 'money'. So far, it seems that South Korean government is not fully understood the importance of the Eurasian land-bridge.

**[Table 6-6] Missing sections of TKR**

Unit: km

	Gyeong-ui	Gyeong-won	Dong-hae
Total	20	32.6	145
South Korea side	12	17.8	127
North Korea side	8	14.8	18

# Source: Ministry of Construction & Transportation, September 2000, Gyeong-ui Line, Seoul

### 6.2.3 Double track and electric railways

In general, electric locomotives do not generate pollutants. Moreover, these locomotives have better pulling capacity and faster speed than diesel locomotives. Double track railways are also needed to enhance capacity of railway transport. In case of TSR, all sections are double track railways and renovated for electric locomotives. However, in case of South Korea, most sections are single tracks and only diesel locomotives can run on the rails excepting a few main lines. What is worse is that it was predicted that the needs for railway transport will exceed the limit of capacity by 2019.

**[Table 6-7] Present situation of South Korean railways**

	1997	1998	1999	2000	2001	2003
Service Range (km)	3,118.3	3,124.7	3,118.6	3,123.0	3,125.3	3,140.0
Double track lines (%)	28.9	28.8	29.9	30.1	32.1	32.3
Electric lines (%)	21.2	21.2	21.3	21.4	21.4	21.7

# Source: Ministry of Construction & Transportation, 2004, Political Tasks for Developing Railway Transport, Seoul

South Korean government's public investment in infrastructure has been centralized in extending road network and its capacity. Even though this is not the fundamental measure to manage rapid increase of traffic, the government has underestimated the importance of developing railway networks. This is mainly caused by partial assessment measure to invest in the infrastructure. As a result of this matter, the facilities and service level of the railways have fallen behind roads.

In order to enhance the speed and capacity of railway transport, the appropriate amount of investment should be allotted to the railways. When, therefore, investment programs in traffic infrastructures are formulated, the importance and urgency of developing railways should be reflected. Also, the partial assessment measures should be reformed.

**[Table 6-8] The amount of investment in railways in comparison with roads in**

**South Korea**

Unit: 100 million won (South Korean currency)

Year	Investment in railways			Investment in roads		
	Ordinary Railways	High-Speed railways	Total	Motorways	Highways	Total
1995	4,435	3,276	<b>7,711</b>	9,944	18,844	<b>28,788</b>
1997	6,850	5,396	<b>12,246</b>	12,595	32,615	<b>45,210</b>
1999	8,173	5,620	<b>13,793</b>	22,068	42,590	<b>64,658</b>
2003	20,028	6,483	<b>26,511</b>	21,648	45,631	<b>67,279</b>

# Source: Ministry of Construction & Transportation, 2004, Political Tasks for Developing Railway Transport, Seoul

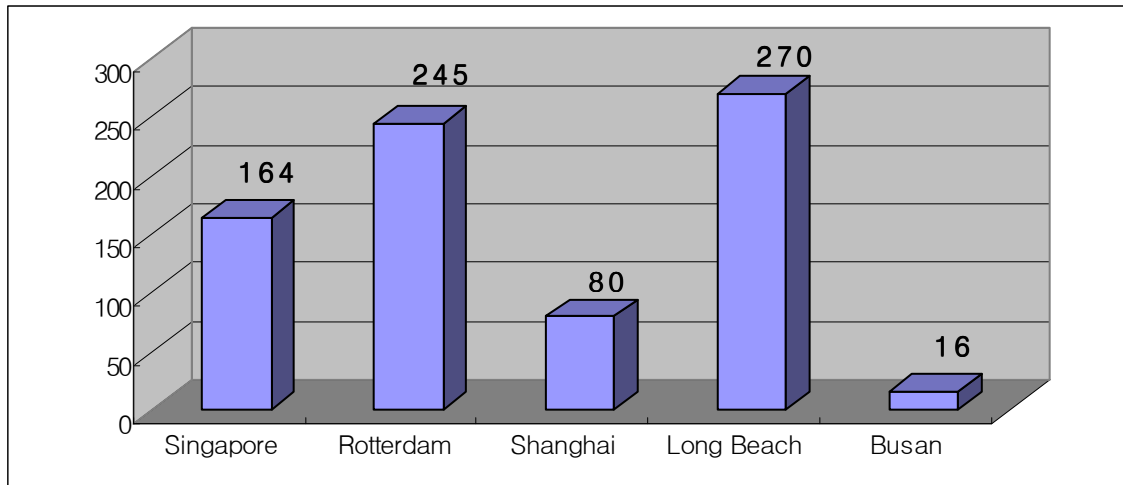
### **6.3 Developing and encouraging port related value added industries**

When South Korea has an ability to offer inter-modal transport service without a hitch and enough capacity to accommodate cargos, which would be increased when the TSR is connected with the TKR, the country would be able to obtain a lot of fortune. However, in order to make the TKR-TSR more profitable, the country should not forget another important thing.

Generally speaking, the profit generated from port related industries is one of crucial driving forces of developing not only regional economies but also national economies. If the rate of dependence on seaborne trade is high, such as South Korea, the importance of the profit is much higher. The port of Busan has been one of global major ports and handled plenty of cargos. However its benefit from port related value added industries has been ill matched with its enormous throughput. This is mainly caused by the undeveloped port related industries due to industrial development policies concerning port development only. The port of Busan would be the center of international trades between Northeast Asia and Europe or between Eurasian continent and American continent, when the TSR is interconnected with the TKR. However, if the industries are still fallen behind at that time, it would be difficult to get good enough profit to develop national economies from the TKR-TSR.

**[Graph 6-3] Comparison of profit from port related industries with other global major ports**

Unit: 100 million US\$



# Source: Heo Yun-su, April 2004, A scheme for activating port related industries, Busan Development Institute, Busan

## **7. Conclusion**

In recent years, China has achieved remarkable economic development and the port of Busan could enjoy the boom of transshipment cargos thanks to the Chinese rapid economic development. However, China is trying to deviate from the tendency to depend on Busan port with developing its own ports. It cannot be convinced that it will not be repeated that Busan port took the position of Japanese ports in the past between China and South Korea. To make the situation more miserable, Japan is also trying to regain the past position of its ports as the Hub ports in Northeast Asia.

The Busan port and Busan city is already suffering from a number of cargos which exceed the processing capacity of Busan port. Although the Busan Newport is under construction to handle the overflow of cargos and to offer integrated logistics services to shippers, it is not certain that the new port would be able to maintain the position of Busan port. It might not be easy for South Korea to compete against other rivals in the future without an extraordinary plan.

The construction of complete Eurasian land-bridge has been mapped out for a long time. These days, the conception seems to become animated while Russia and China squeezing out ideas to develop their Northeastern provinces. Russia and China are not the only countries which are concerned about the development of the land-bridge because this transport route can accelerate the international trades between Europe and Northeast Asian countries.

In order to make the Eurasian land-bridge complete, the TSR should be connected with the TKR even though there are lots of other problems. Someone might say that the connection will not be realized because the Korea peninsula is still divided into two countries and they are still opposed to each other. However, fortunately, North Korea seems to realize that they can not stand alone according to their recent changes. Actually, the two countries have interchanged not a small number of economic exchanges and the renovation and restoration of the TKR is already in progress. Discussions for further projects are also going on. Moreover, several neighboring countries, such as Russia, China and Japan, are trying to mediate between the two countries for the interconnection of the TKR and the TSR. Therefore the interconnection of the TSR and the TKR would not be impossible.

It is not the only task, which South Korea has to do, to renovate the TKR. After the TSR is connected with the TKR, the transport through the interconnected railway should be activated. In order to activate the complete land-bridge, South Korea should renovate its own transport networks beforehand, especially railways. Also, South Korea should secure the big enough processing capacity of its ports to avoid congestion due to cargos which is likely to be increased by the TKR-TSR. Additionally, logistics industries, especially port related industries, should be activated to earn high profit from the complete Eurasian land-bridge. This profit would be essentially important for South Korea, which does not have large domestic market and depends on export, to develop its economy.

South Korea is still located in a good position to become the Logistics Hub country in Northeast Asia and Eurasian land-bridge would promote the efforts of South Korea to become the Hub country. However, if South Korea does not work on positive attitude, the country would lose the opportunities and concede its competitors the position of Logistics Hub country.



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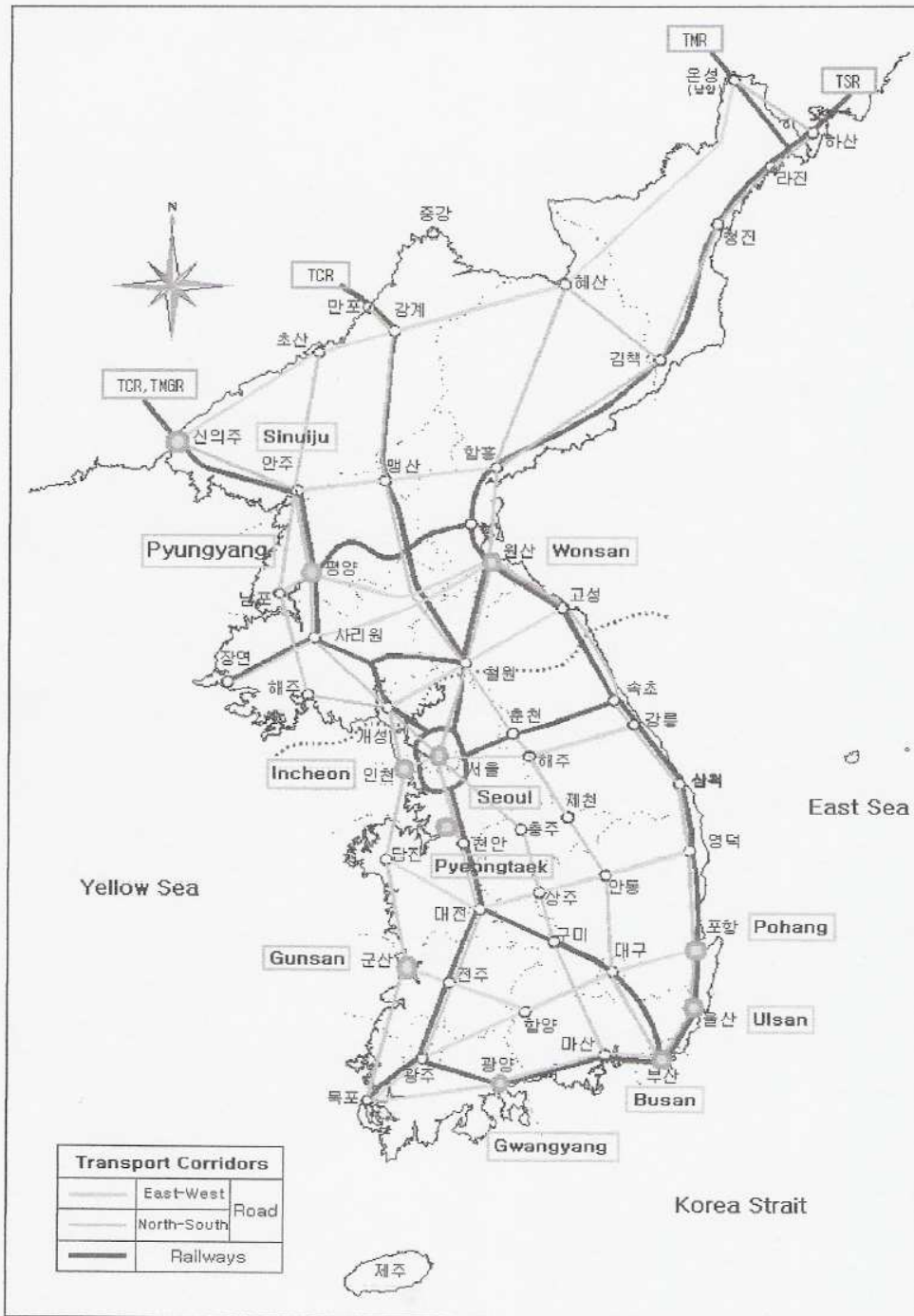
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[Annex 1] Plan of traffic networks



# Source: A plan of constructing traffic networks (2000~2019), MOCT, December 1999

# Remark: Gyeong-ui line (Seoul – Pyungyang – Sinuiju – TCR, TMGR), Gyeong-won line (Seoul – Wonsan – TSR, TMR) and Dong-hae line