

A Competitive Environment for Linking the TSR & TKR

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1. Introduction

The Trans-Siberian Railway (TSR) is Russia's main East-West artery, running 9,297km from Vladivostok to Moscow. The line is linked to lines running further west to such European countries as Finland and Poland. In addition, it is connected by means of numerous branch lines to Northeastern China, the DPRK, Mongolia, Kazakhstan and Uzbekistan. Furthermore, via marine routes starting from ports such as Vladivostok and Vostochny, it is linked to such places as the ROK, Japan, the coastal areas of China, and Vietnam. In the first part of this paper, I will provide an overall picture of existing links between the TSR and East Asia.

Since the historic North-South summit meeting held in June 2000, the reconnection and revival of the Trans-Korean Railway (TKR) has been the focus of attention. The purpose of reconnecting the TKR is to establish a new transportation network that covers not just the Korean Peninsula but the whole of Northeast Asia, creating a new Silk Road in the form of a railway linking Asia to Europe. More specifically, the idea currently being promoted is to connect the TKR and the TSR to replace the maritime shipments between the ROK and the Russian Far East that are currently necessary, thereby permitting cargo to be transported by rail all the way from the ROK to Europe. The competitive environment for connecting the TKR and the TSR and using the link for through transportation will be discussed in the latter part of this paper.

2. Current Use of the Trans Siberian Railway To/From East Asian Countries

The three types of route via the TSR that are currently used as international intermodal transportation routes to/from East Asia are as follows:

- i) European Transit: Cargo can be transported from East Asia to Europe (Finland) via ports in the Russian Far East and the TSR, in 16 to 22 days from Busan to Finnish border. Usually, cargo is stored temporarily in Finnish bonded warehouses and is ultimately exported to Russia. Additionally, a container block train from Vostochny to Poland was tested in 2004 by an ROK-based forwarder.
- ii) Central Asian: Cargo can be transported from East Asia to Kazakhstan/Uzbekistan via ports in the Russian Far East and the TSR in about 20 days. In addition, a block

train began operating between Vostochny and Almaty in February 2003, reducing the journey time by about one week.

- iii) Russian Domestic: Cargo can be transported from East Asia via ports in the Russian Far East and the TSR in about 17 days, in the case of Moscow.

In each case, a marine transportation segment provides a link between the Russian port (Vostochny) and ports in East Asian countries, such as Busan, Ulsan, Kwang Yang and Masan in the ROK, Shanghai, Hong Kong, Ningbo and Huangpu in China, and Kobe, Yokohama and Moji in Japan. The service frequency is almost daily from Busan, weekly from Chinese ports, and two services per month from Japanese ports. Each of these routes has competitor routes; consignors make decisions about which routes to use depending on their relative competitiveness in terms of cost, journey time, frequency of service and trustworthiness.

European Transit's biggest competitor is the All Water route. In terms of transit time, the All Water route takes about a month to transport cargo from ports in Japan and the ROK to Finland, which is considerably longer than the 16 to 22 days that the TSR takes. However, the TSR has a weakness in the form of delays at Vostochny Station during the peak season (autumn to winter), due to a shortage of wagons. Transit from Southern China to Finland is faster via the All Water route, due to the shorter sea passage and the longer shipping distance to Vostochny, especially in the peak season.

As freight charges change frequently, reflecting macroeconomic trends, cost competitiveness also varies. Freight charges on the All Water route from East Asia to Finland used to be lower than on the TSR route. The All Water rate to Europe was highest from China, followed by the ROK, and lowest from Japan. However, freight charges on the All Water route increased rapidly from 2002, while the TSR rate remained mostly stable, with only a slight increase. As a result, the through rates for users of the TSR and All Water routes reversed from the ROK and China to Finland around 2003. With regard to the freight charge from Japan, All Water still charges less than the TSR, although the margin is smaller.

Taking account of both the freight rate and the through rate, container shipments from the ROK and Northern China (further north than Shanghai) to Finland use the TSR route, while shipments from Southern China and Japan to Finland use the All Water route at the moment.

The Trans-China Railway (TCR), running between Lianyungan Port (China) and Kazakhstan via the Alashankou-Druzhba border crossing, is a competitor to the Central Asian route. Container block trains run between Lianyugang Port and Alashankou three

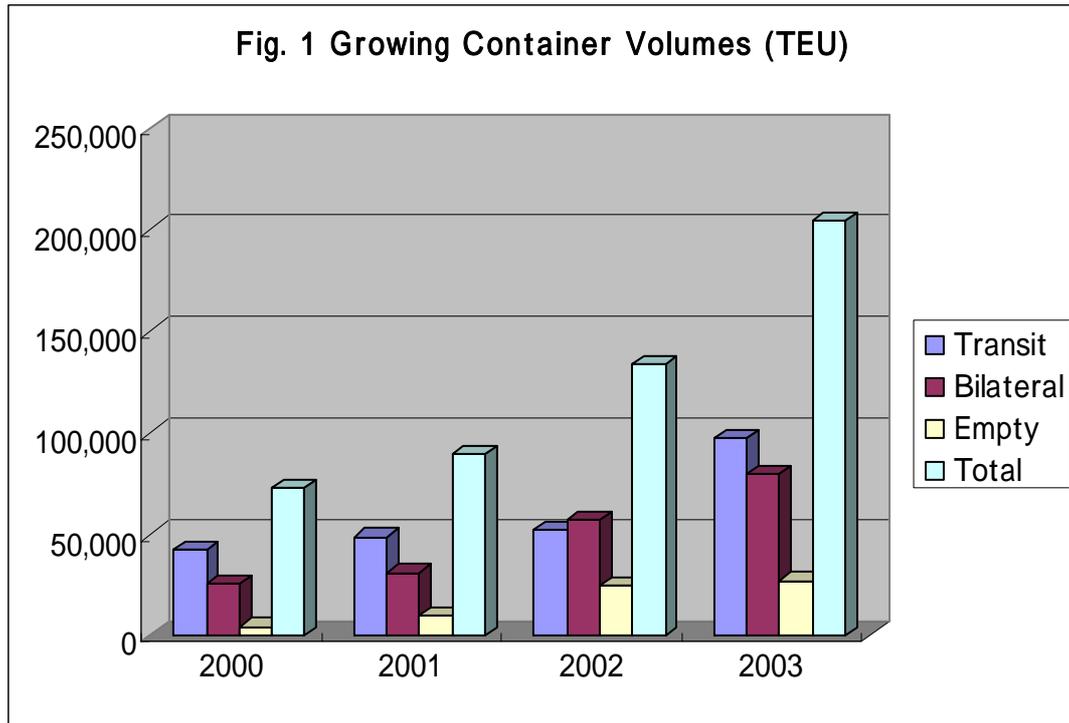
times a week. In addition, container block trains occasionally operate between Tianjin/Qingdao and Alashankou. The TSR and the TCR routes can apparently match each other in terms of cost and journey time. ROK consignors use both routes. However, for cargo originating in Japan, there are frequent shipping services every week to Chinese ports, which is more convenient than the two services per month to the TSR, so many consignors apparently use the TCR. The downside of the TCR is the fact that border-crossing procedures on the Kazakhstan side take several days.

Cargo on the Russian Domestic route is often sent via Finland. From East Asia, it is transported as transit cargo to Finland via All Water or the TSR, with cargo being exported to Russia, such as household electrical goods, being held temporarily in bonded warehouses near the Russian border. After it has been confirmed that the purchaser has paid, a truck is sent from Russia and the cargo is handed over. The main reason for choosing this route is that a lower customs duty is levied on goods entering Russia this way than on those entering the country via ports in the Russian Far East, so it is competitive in terms of cost.¹ Other advantages of this route include the existence of easy-to-use Finnish bonded warehouses and transit railway charges that have been set far lower than those for bilateral cargo.

The total volume of cargo on the TSR using the aforementioned routes has continued to grow steadily over the last few years, increasing from about 70,000 TEU in 2000, to 90,000 TEU in 2001, then to 130,000 TEU in 2002, and about 200,000 TEU in 2003, according to statistics released by VICS (Vostochny International Container Services). In 2004, cargo volumes rose by as much as 47% on the previous year as of September, and the total volume for the year is anticipated to reach 250,000 TEU (Fig. 1).

Factors behind this increase include 1) the steep rise in All Water fares from East Asia to Europe; 2) the boom in the Russian economy and active demand for ROK-produced household electrical goods and China-produced miscellaneous everyday goods; and 3) increased speed and improved service on the TSR route.

¹ Piecing together remarks made by those involved in the business, it seems that, in the case of goods carried from Finland to Russia by Russian transportation companies, the invoices are fiddled and discounts on customs duty are granted.



Source: VICS (Vostochny International Container Services)

Several trends have been visible in TSR container transportation in recent years.

1) A rapid increase in Chinese cargo and a decline in Japanese cargo

It was Japan that blazed a trail in TSR transit transport in the latter half of the 1970s. However, cargo declined in the 1990s, due to lower prices on the competing All Water route, the deterioration in the route's image due to the chaos arising from the collapse of the Soviet Union, and the tendency of Japanese companies to transfer their manufacturing hubs overseas, with efforts to check this fall in cargo volume ultimately proving unsuccessful.

According to the TSIOAJ (Trans-Siberian Intermodal Operators Association of Japan), the transit volume has been declining since reaching the 110,683 TEU mark in 1983; the volume in 2003 was only 2,253 TEU, although this represented a 12.9% rise on the previous year². According to Mitsui O.S.K. Lines, Ltd.³, TSR cargo originating in or destined for Japan declined from 61,271 TEU in 1992 to 8,869 TEU in 2003, with transit cargo accounting for 30%, and bilateral for 70%.

² TSIOJ's data refer to container shipments handled by member companies only.

³ A joint operation between FESCO and Mitsui O.S.K. Lines has a monopoly on the route linking Japanese ports with Vostochny.

Even though Japanese cargo volumes picked up in 2003, is there any hope that this rise will continue in the future? Some with links to the industry are of the opinion that, if the sharp rise in marine freight fares and the lack of freight space continues, Japanese cargo may well increase. However, marine freight fares between Japan and Europe are still cheaper than fares from China and the ROK, and there is a deep-seated sense that the TSR route is comparatively expensive and unreliable in the field of transit transport. Furthermore, as many Japanese manufacturers of household electrical appliances have moved their production bases overseas, the volume of cargo being transported to Russia from production bases within Japan is limited and it is thought unlikely that the boom experienced in the 1980s will be repeated.

Meanwhile, the ROK made a great leap forward to become a major exporter in the 1990s, surging ahead as the main player in exports of household electrical equipment to Russia, in particular. Consignors in the ROK rate the speed of the TSR route highly compared with to the All Water route. According to shipping companies in the ROK, TSR cargo increased 3.3 times on 1991 levels in the 10 years to 2001.

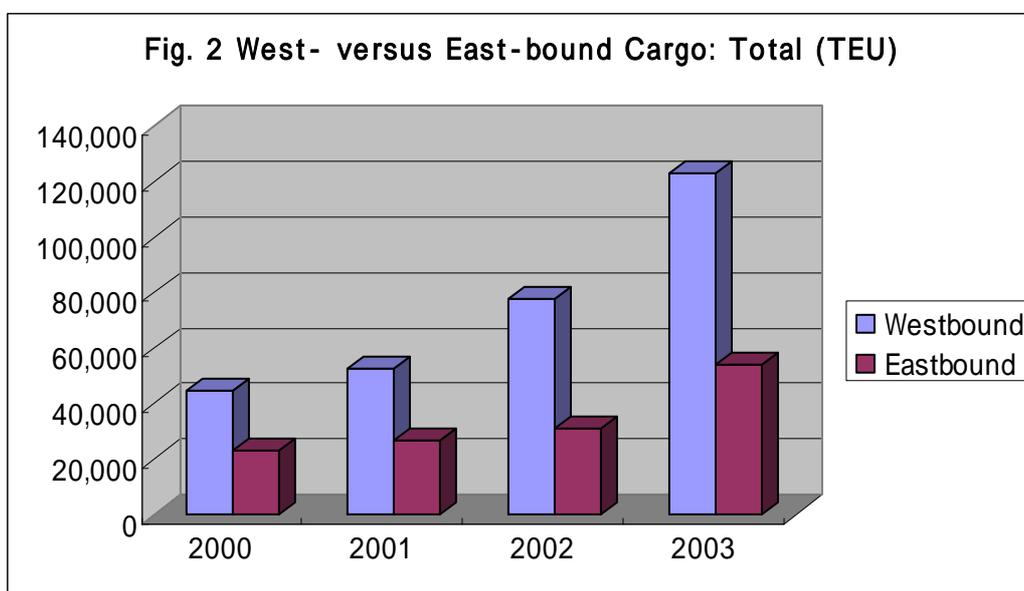
Furthermore, China has emerged as a major exporter to Russia in recent years. Due to the momentum created by the establishment in the autumn of 2000 of a container route linking Shanghai and Ningbo in China with Vostochny, exports to Russia using the TSR have continued to climb sharply. At present, services are also operating on the Hong Kong – Vostochny shipping route. In addition, cargo is carried from a number of Chinese ports to Busan, where it is transshipped and sent to Russia. Cargo from China includes clothing, everyday items and household electrical items produced in ROK companies' factories in China. Products made by Chinese companies are usually exported to Russia directly, while ROK companies' products are shipped to Russia via Finland. Major Korea companies have bonded warehouses in Finland, including LG and Daewoo at Hamina, and Samsung at Kouvola.

It is not possible to obtain statistics that specify the countries of origin and destination of cargo transported along the TSR. Formerly, as only cargo originating in or destined for the ROK or Japan used the TSR and there was no consolidation of cargo, it was possible to obtain statistics for the volume of cargo originating in or destined from the ROK or Japan based on the cargo carried on each ship. However, in recent years, as Chinese cargo sent to Vostochny Port has often been dispatched in transit via Busan, where it is consolidated with cargo from the ROK, it has become impossible to distinguish between cargo from the ROK and cargo from China. Given this situation, if we make estimates based on the information provided by those on the ground, we can see that about 60% of cargo is from the ROK, about 40% from China and about 2%

from Japan. In addition, as many ROK companies have established bases in China, it is anticipated that there will be a reversal in the share of ROK and Chinese cargo in the near future.

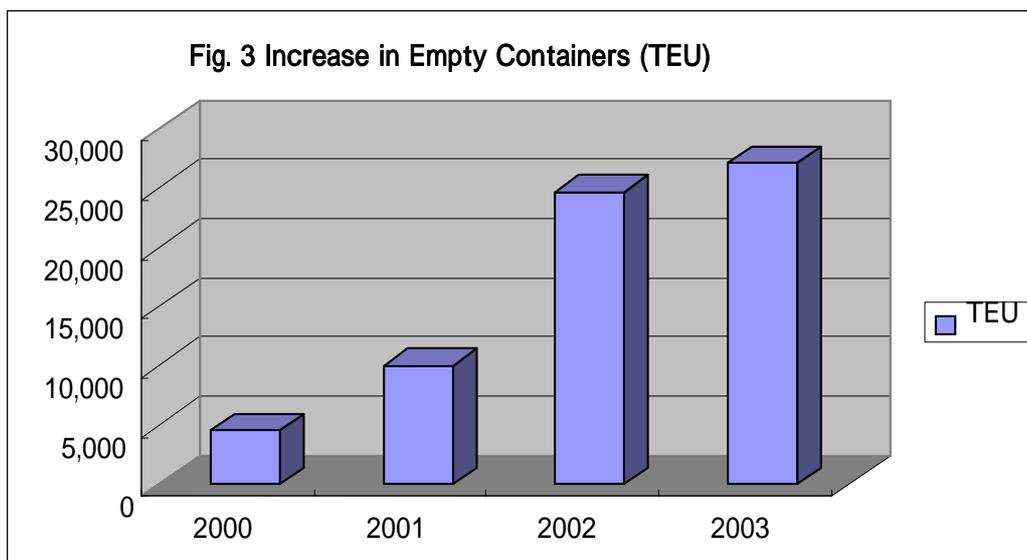
2) An imbalance between westbound and eastbound cargo and an increase in empty containers

In terms of the direction taken by this cargo, both westbound and eastbound cargo volumes are increasing, with the balance between westbound and eastbound cargo standing at 69:31; in other words, westbound cargo, i.e. export cargo from the ROK and China, continues to outstrip import cargo by far (Fig. 2).



Source: VICS

As a result of the lack of eastbound cargo, the volume of empty containers transported is increasing annually and around 27,000 TEU was returned to Vostochny Port by rail in 2003 (Fig. 3). This equates to 13.2% of all cargo transported. The situation looks even worse in 2004. By the end of September 2004, more than 57,000 TEU of empty containers had been returned by rail, which equates to 28% of all cargo transported. It goes without saying that the rise in the transport of empty containers is a burden on ports and railways. Forwarders from the ROK, who have a large volume of their own containers, are trying to generate import cargo, but there are limits to what they can achieve and the transport of empty containers is a thorny issue.



Source: VICS

3) An active approach on the part of the ROK forwarders

The active approach on the part of forwarders in the ROK has played a significant part in the increase in TSR container cargo. Forwarders in the ROK have been creating a business environment that has strengthened the competitiveness of the TSR route. For example, the attempt by multiple shipping companies to become involved in the Busan – Vostochny shipping route succeeded in reducing⁴ marine transport fares by encouraging competition. In addition, the forwarders themselves own containers and reduce the burden on consignors by allowing them to use them. In contrast, Japanese forwarders do not have their own containers, so consignors have to lease containers, which in turn pushes costs up. The ROK's forwarding companies have also taken the initiative opening up new container block train routes, such as Tianjin/Qingdao – Alashankou, and Vostochny – Poland. Furthermore, major ROK forwarders receive bulk discounts on rail transport fees. The ROK's forwarders have been picking up Chinese cargo at such places as Dalian, Tianjin, Qingdao and Hong Kong, transshipping it at Busan and then sending it via the TSR route.

⁴ Originally, Transorient Shipping Co., Ltd. (a joint venture between FESCO and Hyundai Merchant Marine) had a monopoly on the Busan – Vostochny route, but in 2001, other shipping companies were given permission to run services on the route and around five companies decided to take advantage of this. As a result, the marine transport fares for transit cargo fell by 30-35%. In contrast, the joint service run by FESCO and Mitsui O.S.K. Lines still has a monopoly on the Japan – Vostochny route.

There are several issues that must be dealt with in the future with regard to the ROK's and China's use of the TSR, which at present appears to be going smoothly.

1) Transfer of manufacturing sites overseas

At present, the ROK's manufacturers of household electrical appliances are increasingly expanding into China, where labor costs are low and domestic market is large⁵. Manufacturers from the ROK entrust exports from their Chinese plants to forwarders from the ROK, just as in the case of exports from plants within the ROK. According to forwarding companies in the ROK, exports destined for Russia are transported via the TSR route from the ROK and Northern China, but the All Water route has advantages in the case of transport from plants in Southern China. This means that the volume of export cargo originating in the ROK will decrease, and the share of ROK export cargo transported via the TSR route will decline. In the longer term, the ROK may well go down the same path as Japan.

2) Tariff competition versus All Water

At present, the All Water route is booming, but many in the marine transport industry feel that this situation will not continue indefinitely. The history of the marine transport industry has been a cycle in which the number of vessels has been increased when the industry has been experiencing a boom, only to find that there is excess capacity a few years later. In fact, given the current boom, Japan's three major marine transport companies are planning to invest more than trillion yen over the next 4-5 years. It is possible that there will be excess supply by the time these ships have been built, and that marine freight charges will have dropped. If this happens, there is a possibility that the TSR will seem more expensive in comparison. On the other hand, Russian Railways has increased its rates occasionally in the past. For example, it increased transit fares by about 30% in January 2003. It announced a further increase in charges in 2004, citing security reasons. It is feared that charges may be increased further in the future, as the privatization of Russian Railways progresses. Such fare increases may reduce cost competitiveness.

3) Improvement of the TCR route

The TCR route, which is the main competitor of the Central Asian route, could well

⁵ For instance, Samsung has built plants in Tianjin, Qingdao and Yantai, LG has built plants in Shenyang, Tianjin, Shanghai, Nanjing and Yantai, and Daewoo has built plants in Tianjin and Yantai.

embark upon efforts to speed up its transport times and improve its level of service. For instance, China Railways has a plan to increase the double-track and electrified sections of the railway between Lianyungang and Alashankou⁶. Additionally, container block trains between Tianjin/Qingdao and Alashankou, have been operated as a short cut.

4) Possible challenge from Mongolia

The Mongolian route, which runs via Tianjin, Ulaanbaatar and Ulan-Ude and links up with the TSR, could become an alternative route as well. If the Mongolian route were used, cargo currently transported to Finland or Moscow via the Tianjin – Busan – Vostochny - TSR route could be transported to its destination faster and via a shorter route. The weakness of this route is that the Mongolian railway is single track.

5) Transport capacity of the TSR

Capacity becomes a problem when the volume of cargo increases. Some are of the opinion that the TSR has a capacity of 200,000 – 300,000 TEU annually, but there is no concrete evidence to support this theory. However, past experience suggests that the pace of transport via this route will slow if the volume of cargo rises sharply. It is pointed out that the shortage in the supply of wagons at Vostochny is one of the reasons for the delay. It is necessary for the Russian side to take action in preparation for a future rise in cargo volume.

6) Will Finland transit continue?

The transport of cargo from East Asia to Russia via Finland has continued for more than a decade, with the aim of avoiding risk. The advantage of transit via Finland is said to be that it is more beneficial in terms of the customs aspects than entering Russia directly via ports in the Russian Far East. Piecing together what has been said by those with links to the industry, it seems that customs officers fiddle the invoices and reduce the amount of customs duty to be paid in the case of Russian trucks crossing the border from Finland to Russia. In addition, Finland has easy-to-use bonded warehouses and there is also the effect of rail transit charges that have been set far lower than the charges for bilateral transport. As a result, the neighboring country of Finland is reaping great economic benefits. However, one cannot guarantee that transport via this artificially circuitous route will continue indefinitely. Those with links to the industry in

⁶ 76.6% of the TCR (4,100km between Lianyungang and Alashankou) is double-track, but only 28.8% is electrified.

Finland are beginning to worry about the future viability of the route. There are those who believe that corrupt customs practices will be abolished if Russia joins the WTO.

3. Possible TKR Routes and Plans for Reconnection

Since the historic North-South summit held in 2000, when the reconnection and revival of the TKR became the focus of attention, both Koreas have been involved in joint efforts to bring the project to fruition. The TKR reconnection project has an important political significance as a symbol of North-South cooperation. In addition, the idea of connecting the TKR and the TSR is being promoted.

Four Trans-Korean railway lines were constructed during the Japanese colonial period: the Gyungui Line (Seoul ~ Sinuiju), the Gyeongwon Line (Seoul ~ Wonsan), the Mt. Gungang Line (Seoul ~ Mt. Gungang) and the Donghae North Line (Samcheok ~ Anpyun). Unfortunately, these lines were severed following the division of the peninsula.

In April 2002, the ROK and DPRK governments agreed to make the reconnection of the Gyungui Line along the west coast the highest priority, with the Donghae North Line along the east coast as the second priority. No agreements have so far been concluded between the ROK and the DPRK regarding the reconnection of the Gyeongwon Line and the Mt. Gungang Line. The factors considered in setting priorities appear to have been the ease and cost of construction, usefulness after completion and military constraints.

I would now like to discuss the current status of each line in terms of their disconnected sections, the progress of construction work and plans for the future.

1) Gyungui Line

The Gyungui Line is a route that runs to the DPRK from Busan in the ROK via Seoul, traveling north along the west coast to Sinuiju and then on to China. Before the Second World War, this corridor was an important transport route linking Japan and Northeastern China, but it had to be severed when the Korean Peninsula was divided in two. However, since the North-South Summit in June 2000, the momentum for reconstructing the Gyungui Line between north and south has increased and railway construction work has taken place on the ROK side. In September 2002, work to clear mines began on the DPRK side, with reconstruction of the lines continuing throughout 2003.

Of the 486km stretch between Seoul and Sinuiju, the 12km between Moonsan and the MDL (Military Demarcation Line) was disconnected before the reconnection project commenced. In 2002, the Gyungui Line was extended northwards from Moonsan to

Dorasan on the ROK side. All that remains to be done in the ROK is constructing 1.8km of track in the DMZ (demilitarized zone). The agreement of the Ministers of Defense of both countries will be needed before this can take place.

Mine clearance work on the DPRK side has been completed, with construction of the 15.3km stretch between Gaesung and the MDL scheduled for completion in 2004. In addition, a four-lane 20 meter-wide highway is due to be constructed in parallel with the Gyungui Line, running between the unification bridge and the MDL (5.1km) on the ROK side.

The completion of work on the railway and the road on both sides of the divide should make trade quicker and easier, with cargo traveling overland, rather than using marine transportation, as is the case at present. North-South trade was worth \$724.217 million in 2003, an increase of 12.9% on the 2002 level. Trade between the two countries takes place on four regular and irregular shipping routes, including the Incheon – Nampo route and the Busan – Rajin route. The cost of marine transport between Incheon and Nampo is about \$720/TEU, but it is estimated that this would fall to \$200/TEU if the Gyungui Line were used, and the journey time is also expected to decrease considerably. The most immediate use for the Gyungui Line could be the transport of industrial materials between the ROK and the planned Gaesung Industrial Park.

Furthermore, there is potential for the Gyungui Line to be used for trade between the ROK and Northeastern China, providing an alternative to the marine transport on which the ROK is currently dependent.

2) Gyeongwon Line

Initially, several routes linking Seoul and Wonsan were proposed. These included the reconstruction of the Gyeongwon Line, the use of the Gyungui and the Pyongra (Pyongyang – Rajin) lines, and a line branching off from the Gyungui Line. Russian experts have carried out field studies into some of these options,⁷ but it was agreed in April 2002 that the reconnection of the Gyeongwon Line would be assigned a low priority, mainly due to the presence of military facilities along the Gyeongwon Line on the DPRK side. Instead, it was agreed in April 2002 that the Donghae Line between north and south should be connected.

31km of the 222km Gyeongwon Line between Seoul and Wonsan is disconnected:

⁷ According to a media source in the ROK (JoonAng Ilbo, April 8, 2002), Russia and the DPRK conducted a joint study of the 700km between Tumangang, Wonsan and Pyonggang, concluding that 130 tunnels and 742 bridges require immediate repair work and estimating the total cost of repair work at \$2.2 billion.

16.2km between Shintanri and the MDL on the ROK side, and 14.8km between Pyonggang and the MDL on the DPRK side.

3) Mt. Gumgang Line

On the Mt. Gumgang Line, the sections between Chulwon and the MDL (32.5km) on the ROK side, and Naegumgang and the MDL (84.1km) on the DPRK side are disconnected. The ROK side has drawn up a plan for construction work, but there are no plans to reconnect this line at present.

4) Donghae North Line

The line is disconnected between Cheojin and the MDL (9.0km) on the ROK side, and between Onjungri and the MDL (18.5km) on the DPRK side. The ROK is planning to construct a single-track line on its own side.

The DPRK side appeared to have finished clearing mines by the end of 2003, and construction work is expected to be completed on both sides by the end of 2004. Furthermore, the ROK is planning to extend the line southward as far as Busan. More specifically, the Donghae North Line will be extended from Cheojin to Gangnung (127km), with the Donghae Central Line being constructed between Samcheok and Pohan (171km) by 2010. Along with the existing sections, these new sections of track will permit direct rail transportation from Busan to Russia via Gangnung and Wonsan.

Even assuming that the entire Donghae Line is completed, it is thought unlikely that it will carry many passengers or much cargo between North and South, due to the geographical conditions. It could, however, be used for international transportation.

Firstly, a route linking the ROK with China's Jilin Province, via Chongjin and Rajin in the DPRK section of the Tumen River area, is conceivable. Yanbian Prefecture, in the east of Jilin Province, is home to many ethnic Koreans and many ROK companies have established bases there. At present, a marine route is used for transporting cargo between the ROK and Yanbian, but it would be possible to transport it overland if this route were completed.

The second possibility is that of connecting the ROK with Russia's Primorsky Territory. There is potential for the connection of the Donghae Line with the TSR. This will be discussed later.

Disconnected Sections of the TKR

Route	Disconnected sections	Distance	Progress
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		(km)	
Gyungui Line (Seoul~Sinuiju)	ROK: Dorasan~MDL	1.8	Completed
	DPRK: Gaesung~MDL	15.3	Under construction
Gyeongwon Line (Seoul~Wonsan)	ROK: Shintanri~MDL	16.2	
	DPRK: Pyonggang~MDL	14.8	
Mt. Gumgang Line (Seoul~Mt. Gumgang)	ROK: Chulwon~MDL	32.5	
	DPRK:Naegumgang~MDL	84.1	
Donghae North Line (Samcheok~Anpyun)	ROK: Cheojin~MDL	9.0	Under construction
	ROK: Cheojin~Gangnung	127.0	Under construction
	DPRK: Onjungri~MDL	18.5	Planned
Donghae Central Line (Samcheok~Pohan)	ROK: Samcheok~Pohan	171.0	Planned

4. Linking the TKR and the TSR

Now let us consider the potential for and profitability of linking the TKR, upon which work has already started, and the TSR.

There are four possible routes. The first three use the Gyungui Line and China's railways, while the fourth uses the Donghae Line.

Possible Routes Linking the TKR and the TSR

Name	Route	Distance (km)	Transshipment point
Manzhouli/ Zabaikalsk	Sinuiju ~ Dandong ~ Shenyang ~ Harbin ~ Manzhouli ~ Zabaikalsk ~ Chita ~ TSR	8,437 (Dandong~ Moscow)	Manzhouli/ Zabaikalsk
Mongolia	Sinuiju ~ Dandong ~ Shenyang ~ Beijing ~ Erenhot ~ Zamyin-Uud ~ Ulaanbaatar ~ Naushki ~ Ulan-Ude ~ TSR	9,007 (Dandong~ Moscow)	Erenhot/ Zamyin-Uud
TCR	Sinuiju ~ Dandong ~ Shenyang ~ Beijing ~ Zhenzhou ~ Alashankou ~ Druzhba ~ Kazakhstan ~ Russia ~ TSR	9,735 (Dandong~ Moscow)	Alashankou/ Druzhba
Tumangang/ Khasan	Wonsan ~ Rajin ~ Tumangang ~ Khasan ~ Ussuriysk ~ TSR	9,437 (Khasan~	Tumangang/ Khasan

		Moscow)	
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1) Manzhouli/Zabaikalsk route

This route acts as an extension to the Gyungui Line, connecting the Korean Peninsula and the TSR via Northeast China. Starting from Sinuiju, the northern end of Gyungui Line, and passing through Dandong, Shenyang, Harbin and Manzhouli, before crossing the border to Russia, the route meets the TSR at Chita. The distance is 8,437km from Dandong to Moscow or 9,382km from Busan to Moscow. This route is the shortest of the four options, but has the following drawbacks:

- i) Transshipment is required at the Manzhouli/Zabaikalsk border crossing due to the gauge difference between China and Russia. The existing transshipment station can be used, but the border station is often crowded.
- ii) The route uses the Chinese railway for about 1,800km. Some sections are crowded, such as Shenyang ~ Harbin, and it will be necessary to obtain the cooperation of Chinese Railways before container block trains can be run.
- iii) The route crosses two national borders – DPRK/China and China/Russia – as well as the frontier between the two Koreas.

2) Mongolia route

This route runs through China and Mongolia, from Sinuiju to Ulan-Ude, passing through Dandong, Shenyang, Beijing, Erenhot, Zamyn-Uud, Ulaanbaatar and Naushki. The total distance is 9,007km between Dandong and Moscow, or 9,952km between Busan and Moscow. This route is about 500km longer than the Manzhouli/Zabaikalsk route, and the following factors should be taken into consideration:

- i) Transshipment is required at the Erenhot/Zamyn-Uud border crossing, due to the gauge difference between China and Mongolia. There is a modern transshipment station at the border, which is used for the container block trains that run between Tianjin and Ulaanbaatar.
- ii) This route passes through one of the most crowded sections of the Chinese railway, between Beijing and Shenyang. It will be necessary to obtain the cooperation of Chinese Railways before container block trains can be run.
- iii) Mongolia has only single-track railway lines.
- iv) The route crosses three national borders, as well the frontier between the two Koreas.

3) TCR route

This route runs from Sinuiju to the TSR via Dandong, Shenyang, Beijing, Zhenzhou, Alashankou, Druzhba, and either Lokot or Petropavlovsk. The estimated total distance is 9,735km between Dandong and Moscow, or 10,680km from Busan to Moscow. The total distance will depend on the specific routes taken in Kazakhstan and China. This route is the longest of the three that use the Gyungui Line and has many drawbacks:

- i) Transshipment is required between Alashankou and Druzhba due to the gauge difference between China and Kazakhstan. This border crossing is notorious for time-consuming CIQ procedures.
- ii) The route uses the Chinese railway for about 6,000km, so it will be necessary to obtain the cooperation of Chinese Railways before container block trains can be run. There is concern that railway tariffs may rise due to the long distance involved.
- iii) The route crosses three national borders, raising concerns about efficiency in border-crossing procedures.

4) Tumangang/Khasan route

This route connects the east coast of the Korean Peninsula with the Russian Far East via Rajin, Tumangang, Khasan and Ussuriysk by rail, without once requiring cargo to be loaded onto a ship. The total distance is 9,437km from Khasan to Moscow, or 10,737km from Busan to Moscow. Although the total length is longer than the three routes that use the Gyungui Line, the route may have the edge on them, in that it does not transit China or Mongolia. In fact, Russian Railways has great expectations for this route because, if cargo could be sent from the ROK by rail via the DPRK, marine transport fees would not be required and it would be possible to make it more price competitive than the current route, which combines marine and TSR elements. However, many problems are likely to be encountered in developing this route:

- i) Transshipment is required at Tumangang/Khasan border due to the gauge difference between the DPRK and Russia and a transshipment station would have to be constructed for this purpose.
- ii) The DPRK's domestic railways, especially the Pyongra Line, which passes along the east coast, are extremely dilapidated single-track lines, so a vast amount of investment would be required before block trains could run on them. The Pyongra Line contains many tunnels, bridges and steep curves.
- iii) About 800km of this route runs through the DPRK, so transit fees for cargo from the ROK would have to be paid to the relevant authority in the DPRK. In addition, the trains would have to travel some 500km within the ROK from Busan, thereby

pushing up rail transport costs.

- iv) It would be necessary to construct new railway facilities on the ROK side, as mentioned before.

5. Obstacles to Continental Linkage

Let us now look at common problems affecting the possible routes.

1) Railway conditions and power shortages in the DPRK

One potential obstacle to all four routes is the fact that North Korea's railways are beset by technical problems that could prevent container block trains being run.

The DPRK's railway system lags far behind that of the ROK in terms of double-track rails and automatic signaling systems, although a greater proportion of the railway in the DPRK is electrified than in its southern neighbor. The DPRK uses an electric traction system (DC3kv), while the ROK combines a different type of electric system (AC25kv) with diesel locomotives, so some means of switching between these two systems would be required when connecting the railways of the two countries.

Furthermore, the DPRK's domestic rail network consists of extremely dilapidated single-track lines, so a vast amount of investment would be required before block trains could run on them. The question is who will provide the financial assistance that the DPRK requires in order to upgrade its railways. Another question is whether the railway upgrade project for transporting ROK cargo will be assigned a high priority in the economic rehabilitation of the DPRK.

In addition, although the railway is electrified, the DPRK's trains often come to a standstill due to power shortages. This fundamental stumbling block must be solved before block trains can run through the DPRK.

Comparison of the Railway Systems of the ROK and the DPRK (2002)

	ROK	DPRK
Total length of track	3,129	5,214
% Double-track	32.1	3
% Electrified	21.4	79
% Automatic signal system	27.4	1.2
Traction method	Electric (AC25kv) or Diesel	Electric (DC3kv)

Source: Korea Railway Research Institute

2) Different gauges

Two different types of gauge are used for railways in the region, making transshipment necessary wherever these two types meet. Formerly Soviet countries (Russia, Central Asian states, etc.), Mongolia and Finland use broad gauge (1,520mm) rails, while China, the Korean Peninsula and Europe (other than Finland) use standard gauge (1,435mm). Therefore, transshipment occurs at the borders between China and Russia, China and Kazakhstan, and the DPRK and Russia. Transshipment is time-consuming as well as costly in most cases.

3) Border crossing

With regard to the soft aspects of border crossing as well, there are many borders that are inefficient in terms of procedures (CIQ) and the time required to complete them. In particular, in Russia and Kazakhstan, there are problems with the efficiency of border-crossing and customs inspection procedures.

Generally speaking, the greater the number of discontinuous points, the lower the efficiency of multi-modal transportation.

4) Cooperation with neighboring countries

International cooperation is necessary in linking the railways of adjacent countries. China's cooperation is particularly important in the three possible routes using the Gyungui Line, since busy sections of its railways would need to be used. Furthermore, collaboration with Mongolia is necessary in the Mongolia route, while Kazakhstan's cooperation is key in the TCR route.

5) Economic competitiveness

The success of these four overland routes connecting the TKR and TSR will depend on whether the new routes would be economically competitive with such existing routes as All Water or the combined marine and TSR route.

Some people assume that, if cargo could be sent from the ROK by rail without once loading it onto a ship, marine transport fees would not be required and the route could be made more price competitive than the current combined marine and TSR transport system. However, the overland routes have to cover long distances. In particular, the TCR route will run along Chinese Railway's track for 6,000km. What kind of fee will have to be paid to China Railway? Similarly, the railway authorities of Kazakhstan, Mongolia and the DPRK could charge fees for the transit of block trains. The higher these fees,

the less competitive the route will be.

If the construction costs for the DPRK section were financed by banks and had to be repaid from future revenue from container transportation, additional fees will be charged for each container.

Another question is how much Russian Railways would charge for using the shorter section of the TSR in the cases of the three routes that use the Gyungui Line. Unless its charges were much lower than the current transit fee applied from Vostochny, the three routes would not be competitive. In order to obtain a realistic idea of through rates, a consultative team incorporating representatives of each railway authority should be established.

6) Future volume estimates

Estimates of future volume are another factor that will need to be examined. As seen before, ROK companies are relocating their production sites to China and other Asian and European countries. If this continues, the number of containers shipped from the ROK will decrease. Container shipments from China to Russia/Finland are unlikely to use the TKR.

7) Opposition from the maritime industry

In the combined marine and TSR route used at present, maritime industries such as shipping companies and ports have important roles, both in the ROK and the Russian Far East. In other words, the existing route generates many jobs as well as high profits in East Asia, including the Russian Far East. Were the marine section of inter-modal transportation to be replaced by rail transport, profits in the maritime industry would be slashed, resulting in massive job losses. Vostochny Port, for instance, might lose its major container business. It is highly likely that these industries, as well as the governments of the areas in which they are based, including Primorsky Territory, would take political action to defend their livelihoods. It is unlikely that Moscow would be able to ignore the anguished appeals of even the further-flung regions of the country.

6. Conclusions

- 1) The proposed overland routes connecting the TKR and the TSR pose many problems. It is necessary to conduct thorough studies of the technical and economic difficulties. The highest priority has to be assigned to a survey of the condition of railway infrastructure in the DPRK; this should be conducted by a multilateral team of experts.

- 2) Thorough estimates of future volume must be carried out. If ROK companies continue relocating their manufacturing plants overseas, there is a possibility that the TKR will not be an important route to Russia.
- 3) International cooperation with China, Mongolia and Kazakhstan is necessary in order to make plans for the overland routes that function as an extension of the Gyungui Line.
- 4) An improvement in the political and economic environment of the DPRK is a prerequisite for connecting the TKR and the TSR, especially if foreign financial assistance is to be sought for improving the country's railway infrastructure.
- 5) Russia and the ROK cannot ignore the impact that improved cross-border rail links would have on their maritime industries.