Toward a revival of the rail land–bridge between Far East Asia and Europe

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DECLARATION

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1. Introduction

Regional cooperation and globalization is such important element that it becomes the main trend of world trade in 21st century. World trade volume has been steadily over every continent and this has significantly affected the development of container transport. As far as container traffic is concerned, Far East Asia such as Korea, China and Japan is becoming more important due to the changes of its trade structure and high growth in manufacturing output and profits. Especially, for the past ten years, it has consistently maintained a high growth of over 7% which is incredible[1] owing to policy.

The structure of the world trades comprises of the 3 main routes: the Asia-Europe, the Asia-America and the East-West trades. The majority of Asian cargo on from Asia to Europe and America trades occurs in Japan, China, Korea and Taiwan. Container traffic has been increasing about 10% per year for last 20 years and the 50% of world container throughput is handling in this region. However, most containers are being transported by deep sea shipping. In other words, the international shipping industry is responsible for over 90% of the world trade now[2]. There are several reasons. First reason is the economic of scale results from the enlargement of container vessels and M&A (Merger and Acquisitions) among shipping companies. Consequently, they are able to reduce the transportation cost per container. The second one is that handling capacity of the ports in the world has continually upgraded to accommodate bigger ships. Some ports which want to become hub ports are constructing new container ports to secure depth of water and reduce congestion in a port. In addition, they are making efforts to improve their productivity through changing equipment and introducing new technologies such as IT

[1] A soft-landing for China's economic (2005), Samsung Economic Research Institute
[2] http://www.marisec.org/shippingfacts/keyfactsindex.htm

(Information Technology) system and automatic system. However, as a matter of fact, the congestion is still the top issue for ports in spite of these efforts.

Deep sea transport which is potential to play a key role in the world trade has a competitive advantage derived from economies of scale. However, it confronts disadvantages which are long transit time and accessibility compared with other transport modes as modern logistics concept such as door to door service and JIT (Just in time), etc. is paid even more attention by logistics providers. For that reason, railway transport would be a good substitution for deep sea container transport between Europe and Far East Asia in terms of transit time.

Currently, TSR (Trans-Siberian Railway) is providing transcontinental railway transport from three ports of the Russian Far East region, i.e. Vostochny, Nakhodka and Vladivostok to Europe. In addition, TCR (Trans-China Railway), TMR (Trans-Mongol Railway) and TMGR (Trans-Manjuri Railway) are also linked with TSR in order to transport containers between Asia and Europe. TKR (Trans-Korean Railway) could be connected with TCR and TSR in the future. For example, from Busan to Finland, container transport takes approximately 16 days by TSR while 28 days by shipping[3]. Transport cost is also cheaper than deep sea transport. However, railway transport has obstacles to be overcome, like insufficient infra, superstructures and ambiguous related regulation.

3 Source: The survey research on operation situation of rail land-bridge (2004), The Korea transport institute

2. World trade environment

2.1 Major trade environment between Asia and Europe

The world trade reached US$ 7,500 billion in 2005[4]. USA was the most powerful international trader in terms of total trade value. Germany was the largest export country. Vehicles, electronic products and machinery were the major export items. China was the third largest country with export and import trade value. The leading countries in trade volume belong to Eurasia continental except USA. As Germany, France and Netherlands etc. are major trading countries in Europe, on the other hands; China, Japan and Korea are the main export and import countries in Asia.

The developing Asian economics have increased by 6.8% in 2004 and 6.7% in 2005[5]. Asia is a major growing engine over the coming years and will become a main player in the global economy. The yearly trade between Europe and Asia is approximately USD 600 billions.

2.1.1 Republic of Korea (ROK)

The main trading partners of ROK are China, USA, Japan and EU. ROK becomes the EU's fourth largest non-European trade partner while the EU is the second largest exports country for ROK. In 2006, the EU was the largest foreign investor with around 5 billion euro of foreign direct investment into ROK, representing 45% of the total[6]. This means that EU thinks ROK as the crucial trade partner. Especially, the amount of trade between Korea and EU has been steadily increased in the last 10 years. Export grew 14.1 percentages from 2005 to 2006 while import growth increased 11.3

4 WTO (World Trade Organization) annual report 2006
5 http://findarticles.com/p/articles/mi_m0WDP/is_2004_May_17/ai_n6264409/pg_1
6 http://ec.europa.eu/trade/issues/bilateral/countries/korea/index_en.htm

percentages. The table below shows the 10 largest trade partners of ROK in 2006. Germany is the first leading trading partner, include United Kingdom. Korea's main export products are machinery, transport equipment and automotive products while import products are machinery, chemical product and transport equipment.

Table 2.1 Korea and the top 10 Europe

(Unit: US$ thousands)

2006	Export			Import		
Rank	Nation	a mount of trade	the rate of increase	Nation	a mount of trade	the rate of increase
1	Germany	10,056,207	-2.4	Germany	11,364,578	16.3
2	UK	5,635,119	5.5	Russia Federation	4,572,967	16.2
3	Russia Federation	5,179,248	34	France	3,219,385	16.7
4	Italy	4,286,259	-0.2	Netherlands	3,025,709	9.6
5	Spain	3,479,242	21.4	Italy	2,915,557	5
6	Turkey	3,035,803	9.1	UK	2,976,539	-5.5
7	Netherlands	3,609,377	-1	Swiss	1,319,137	12.9
8	France	3,415,467	7.7	Norway	856,728	34.1
9	Poland	2,613,334	122.4	Belgium	939,312	-2.9
10	Belgium	2,186,494	20.3	Sweden	987,830	1.2
	Total Europe	60,282,078	14.1	Total Europe	37,410,197	11.3

Source: KITA (Korea International Trade Association)

2.1.2 China

China surpassed Japan and United Stated in terms of the amount of trade, and became the largest trading partner of Europe. It reached US$ 330.2 billion in 2006. The amount of export reached US$ 215.3 billion, increased by 30% compared with 2005, on the other hands the amount of import came to US$ 114.8 billion, the growth rate of 19.1% compared with 2005. China's primary trading partner is Germany in Europe. The Netherlands, The UK, France and Italy are also critical trade partners with China. The principal trade products are textile and clothing products between China and Europe. China is the EU's largest supplier of textile. On the other hands, The EU is also the largest technology export to China so far. China has imported 18,530 items concerned about technology which involved US$ 80 billion worth of contracts.[7]

Table 2.2 China and the top 10 Europe

(Unit: US$ thousands)

2006	Export			Import		
Rank	Nation	a mount of trade	The rate of increase	Nation	a mount of trade	the rate of increase
1	Germany	40,302,118	23.9	Germany	37,887,522	23.5
2	Netherlands	30,843,165	19.2	Russia	17,538,744	10.4
3	UK	24,158,456	27.3	France	11,288,384	25.2
4	Italy	15,975,430	36.6	Italy	8,605,622	24.1
5	France	13,897,229	19.3	UK	6,510,127	18.1
6	Russia	15,829,325	19.8	Kazakhstan	3,607,171	24.3
7	Spain	11,490,669	36.1	Finland	3,124,366	18.9
8	Belgium	9,908,713	28	Belgium	4,304,180	7.4
9	Poland	3,997,825	53.9	Swiss	4,254,793	9.5
10	Finland	4,958,336	36.7	Netherlands	3,648,267	24.7
	Total Europe	215,371,490	30	Total Europe	114,857,550	19.1

Source: Chinese Ministry of Commerce of the Public Republic of China

2.1.3 Japan

[7] Pre-study : Major origins and destination China-Europe container trade, pp19

As the world's second biggest national economy, Japan is one of the EU's major partners. With a share of 4.1% EU export volume in 2005, Japan was the EU's fifth largest export market after the USA, Switzerland, Russia and China[8]. Imports from EU are mainly in the sectors of agricultural, textile, chemical products and transport materials. The important export items to EU are transport equipment, electric machinery and chemical products. The table 2.3 below shows the 10 largest trade partners in Europe in 2005. Germany became the crucial trade destination as well as United Kingdom and France etc. in Europe.

Table 2.3 Japan and the top 10 Europe

(US$ billions)

2005	Export			Import		
Rank	Nation	a mount of trade	the rate of increase	Nation	a mount of trade	the rate of increase
1	Germany	2,058	0.39	Germany	1,968	6.61
2	UK	1,663	2.71	France	941	4.32
3	Netherlands	1,448	0.06	Italy	758	1.61
4	France	856	-5.21	UK	740	2.78
5	Belgium	786	0.76	Russia	638	10.7
6	Italy	632	-9.46	Swiss	557	7.12
7	Spain	561	7.06	Ireland	415	0.97
8	Russia	495	9.18	Denmark	262	-13.25
9	Swiss	238	0.84	Sweden	230	4.82
10	Sweden	216	7.46	Netherlands	235	9.3
	Total Europe	10,894	2.36	Total Europe	7,929	4.25

Source: Japan statistic yearbook 2006

2.2 Container transport

8 European Commission : http://ec.europa.eu/trade/issues/bilateral/countries/japan/index_en.htm

Ocean transport is now responsible for over 90% of the world trade.[9] Without shipping, it is impossible to meet the rapid volume growth in international trade. In another word, long-haul transport containers keep increasing thanks to the sustained growth of containerized cargo between Far East Asia and Europe. Consequently, this current situation will give railway transport an opportunity to develop new services and find niche market for time-sensitive cargo, perishable and high-value items on shorter transit times.

2.2.1 The major container ports

Ocean transport is the main transport mode for international trade. Container throughput is continuously growing in the ports of Far East Asian and the Western Europe. Table2.4 below shows the container traffic trends in major Far East Asian ports. Container movements measured in TEU in major their ports have shown considerable growth in most of the ports, except in Japan.

Especially, all of Chinese ports have gained spectacular growth from 2000 to 2005. They handled 32 million TEU all together, whereas the top 4 Japanese ports and Korean ports handled 11.3 and 13.3 million TEU in 2005. Port of Shanghai in third and Busan in fifth place ranked World's 10 largest ports in terms of container traffic volume in 2005.[10]

Taking into account their rate of economic growth, most Asian ports are expected to have a growing container throughput. This means that the Asians ports could play a key role in national and international economies.

9 http://www.marisec.org/shippingfacts/keyfactsindex.htm
10 Port of Busan annual report (2005)

Table 2.4 Container throughput trends in major north-east Asian ports

(Unit: 1,000TEU)

Port	2000	2001	2002	2003	2004	2005
Dailan	1,011	1,209	1,352	1,670	2,211	2,651
Tianjin	1,708	2,010	2,410	3,015	3,814	4,801
Qingdao	2,120	2,640	3,410	4,239	5,140	6,310
Shanghai	5,612	6,334	8,612	11,283	14,557	18,084
Kobe	2,266	2,010	1,993	2,046	2,177	2,262
Osaka	1,474	1,509	1,515	1,664	2,009	2,490
Tokyo	2,899	2,536	2,712	3,314	3,358	3,759
Yokohama	2,317	2,304	2,365	2,505	2,718	2,878
Busan	7,540	8,073	9,453	10,408	11,430	11,843
Gwangyang	678	887	1,126	1,185	1,320	1,460

Source: Port of Busan annual report

http://www.city.yokohama.jp/me/port/statistics/data/2005/2005annual01_e.xls

http://www.port-of-nagoya.jp/english/about_port.htm

http://www.city.kobe.jp/cityoffice/39/port/data/tokei/ad-18-12-1e.pdf

Table 2.5 below shows container throughput of major container ports in Europe. Rotterdam is the biggest port in Europe in terms of container traffic volumes. Container throughput in Europe had been steadily increased from 2001 to 2006. Rotterdam port handled approximately 9.6 million TEU in 2006, which increased 4.2 percent in comparison with 2005, whereas Hamburg and Antwerp handled about 8.8 and 7 million TEU in 2006. The biggest ports are located in Northern Europe, i.e. Rotterdam, Hamburg, Antwerp and Bremen.

Table 2.5 Container throughput trends in major ports in Europe

(Unit: 1,000 TEU)

Port		2001	2002	2003	2004	2005	2006
1	ROTTERDAM	6,096	6,506	7,144	8,281	9,287	9,690
2	HAMBURG	4,689	5,374	6,138	7,003	8,088	8,862
3	ANTWERPEN	4,218	4,777	5,445	6,064	6,488	7,019
4	BREMEN	2,973	3,032	3,190	3,469	3,744	4,450
5	ALGECIRAS	2,152	2,234	2,517	2,937	3,180	3,245
6	FELIXSTOWE	2,800	2,684	2,482	2,717	2,760	3,080
7	GIOIA TAURO	2,488	3,009	3,081	3,261	3,161	2,938
8	VALENCIA	1,507	1,821	1,993	2,145	2,398	2,610
9	BARCELONA	1,411	1,461	1652	1,916	2,071	2,300
10	LE HAVRE	1,523	1,720	1,977	2,132	2,119	2,130
Total		28,446	32,619	35,619	39,926	43,295	46,321

Source: Port of Hamburg, http://www.hafen-hamburg.org/en/

The Ports in this region have several advantages that help them to attract container traffic. They have a good hinterland connection that is connected by rail, road, inland navigation and SSS (Short Sea Shipping), transport containers from Rotterdam and Antwerp to final destination. It is quite important for exporters and importers to reduce transport costs and delivery time. Another advantage is that EDCs (European Distribution Centers) are located in this region. EDCs can handle all the product customization for the various national markets which range from adding manuals and plugs to different packaging services, they provide customers with value added logistics.

2.1.2 The distribution structure

Increasing container traffic volumes in ports give rise to increasing transport volumes in their hinterlands and this has also brought big huge congestion problem in ports and their hinterlands. Competitive distribution structure provides possibility to offer services like accessibility, reliability and shorter transit time from a port to final destination vise versa.

Table 2.6 Comparison of transport infrastructure in North-East Asian Countries

(Unit: km)

Country	Rail (standard gauge)	Rail (narrow gauge)	Express road	Paved road	Non-paved road	Waterway
China	68,000	3,600	16,314	297,890	1,088,494	121,557
Republic of Korea	3,125	0	1,996	62,812	22,182	1,608
Japan	3,204	77	6,455	528,016	627,423	1,770

Source: Integrated International Transport and Logistics System for North-East Asia, ESCAP

Table 2.6 shows comparison of transport infrastructure in Far East Asian countries. China has 71,600 Km of railways including narrow gauge (1,000 or 1,067 mm), making this region the largest rail network. It also has the largest number of express road and waterways. Japan has the greatest paved road network in this region; on the contrary, it has few waterways. In the case of Korea, it has the smallest transport infrastructure as being relatively small in the territory.

Road and rail freight transport has been future developed in most Asian countries. In China, the main transport mode is railway. In 2003, it handled 1,724,700 million ton-km by railway, whereas it handled 70,995 million ton-km by road. On the other hand, Japan relied heavily on trucks for domestic transport in comparison with rail freight transport. This means the there are huge congestion on the road in Japan.

Table 2.7 Road and Rail freight transport trends

(Unit: Million ton-km)

Country	2000		2001		2002		2003	
	Road	Rail	Road	Rail	Road	Rail	Road	Rail
China	61,294	1,366,300	63,304	1,457,500	67,825	1,565,800	70,995	1,724,700
Republic of Korea	11,412	10,803	12,322	10,492	13,275	10,784	13,006	11,057
Japan	313,000	22,136	313,000	22,193	312,000	22,131	322,000	22,794

Source: Integrated International Transport and Logistics System for North-East Asia, ESCAP

Table 2.8 below shows the current situation of modal split in EU 25. Europe has an excellent transport network and a high quality infrastructure system. Even though they have good hinterland connection and faculties for rail and inland waterways, over 44% of the domestic trade is transported by road. This percentage of the Modal-Split is growing constantly in favor of road transport. There are several reasons why the strong sustained growth of road transport is undoubtedly contributed. The first is a reduction in heavy bulk transport. The two others are the increasing importance of door-to-door and just-in-time service.

Table 2.8 Modal Split in EU-25

(Unit: %)

	Road	Rail	Inland Water-Ways	Pipe-Lines	Sea	Air
2005	44.2	10.0	3.3	3.4	39.1	0.1
2004	44.1	10.3	3.4	3.4	38.9	0.1
2003	43.4	10.1	3.3	3.5	39.6	0.1
2002	43.6	10.0	3.6	3.5	39.2	0.1
2001	43.1	10.2	3.6	3.7	39.4	0.1
2000	42.9	10.8	3.7	3.6	38.8	0.1
1999	43.4	10.8	3.7	3.7	38.3	0.1
1998	42.9	11.5	3.9	3.8	37.9	0.1
1997	42.0	12.1	3.9	3.7	38.2	0.1
1996	42.3	12.0	3.8	3.9	38.0	0.1
1995	42.1	12.1	3.9	3.8	38.1	0.1

Source: Energy and Transport figure 2006, EU commission, Directorate general for Energy and Transport

Note: 1. Air and Sea – only domestic and intr-EU25 transport

2. Road – national and international haulage by vehicles registered in the EU-25

European roads are saturated with ever-growing numbers of trucks, congestion and pollution problems. Consequently, making full use of existing facilities such as railway and waterway etc. around Europe to transport goods, especially for domestic trade, could help to reduce road congestion and enhance the sustainability development of Europe.

3. Rail Land bridge

Completion of rail land-bridge between Asia and Europe facilitates international trade, economic development and cultural exchange of all countries along the railway. Even though rail transport undergoes a trial to secure goods and passenger transport, it is still competitive in transit time, reliability and stability in international transport.

3.1 Overview of routes of the TAR (Trans-Asian Railway) Northern Corridor

UN ESCAP (United Nations Economic and Social Commission for Asia and the Pacific) have been studying the routes of TAR (Trans-Asian Railway) northern corridor so as to develop reliable and efficient Asia-Europe transport connection.

To facilitate the Trans-Asian railways route, there are some problems to be solved to attract shippers such as break of gauge, border-crossing, customs procedure and minimum average speed etc. shippers. This is because it is hard to uniform the transport policy of countries along the route. For instance, as far as track gauge is concerned, Western Europe, China and Korea have a track gauge of 1,435m; on the other hand, the Russian Federation, Kazakhstan, Mongolian and Belarus have a track gauge of 1,520m. This means that in order to transport cargo between Asia and Europe, they should transfer containers to different wagon or change the bogies at the break-of-gauge points.

Table below 3.1 shows the five core routes which have been adopted by UN ESCAP. Berlin selected final destination out of geographic consideration, the crucial good infrastructure system connected by European rail, road and inland waterways network for pick-up and distribution of cargo.

Table 3.1. The routes of TAR Northern Corridor

	Routes
Route I	Vostochiny (Russia Federation) – Belarus – Poland – Germany
Route II	Lianyungang (China) – Kazakhstan – Russian Federation – Belarus – Poland – Germany
Route III	Tianjin – Mongolia – Russian Federation – Belarus – Poland – Germany
Route Ⅳ-a	Republic of Korea – Namyang (Democratic People's Republic of Korea) – China – Russian Federation – Belarus – Poland – Germany
Route Ⅳ-b	Republic of Korea – Tumangang (Democratic People's Republic of Korea) – Russian Federation – Belarus – Poland – Germany
Route Ⅳ-c	Republic of Korea – Dandong (Democratic People's Republic of Korea) – China – Russian Federation – Belarus – Poland – Germany
Route V-a	Incheon (Republic of Korea) – Chinese port – Route ⅱ or Route ⅲ
Route Ⅴ-b	Busan (Republic of Korea) – Chinese Port or Democratic People's Republic of Korea Port or Russia Port – Route i or Route ii or Route iii

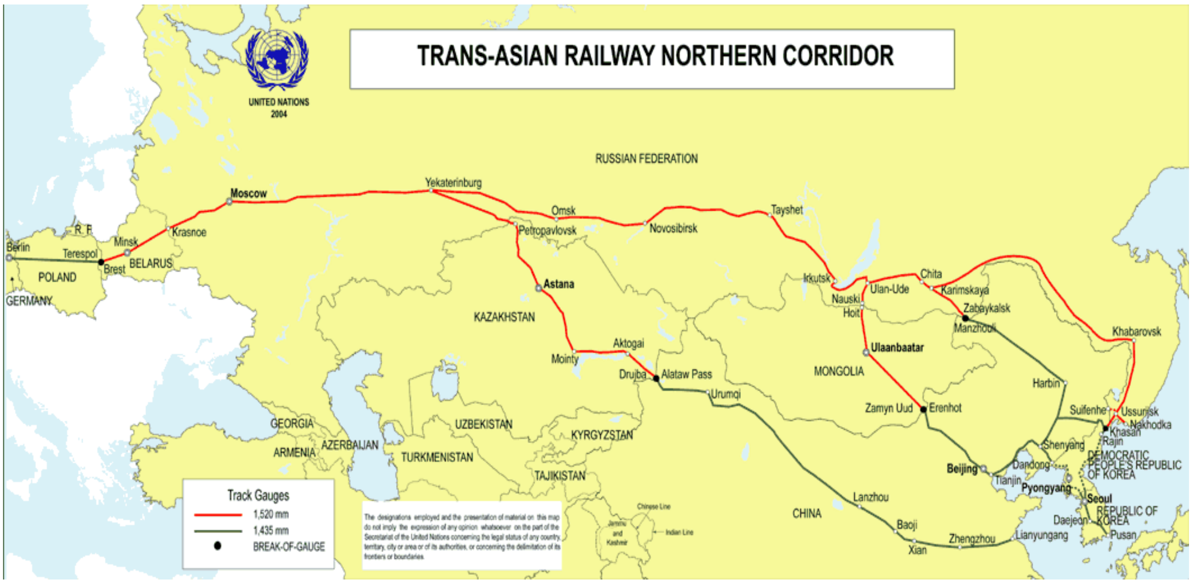
Source: Development of Asia-Europe rail container transport through block-trains, United Nations, 1999

Corridor I, called TSR (Trans-Siberian Railway), starts from port of Vostochny of Russian Far East region and goes through Russian Federation, Belarus and Poland before ending in Germany.

Corridor II starts from port of Lianyungang located in the Eastern China, winds across Kazakhstan, Russian Federation, Belarus and Poland and reach Germany eventually.

Corridor III originates from Tianjin which is one of biggest ports in the north-eastern region of China and goes through Mongolia, Russian Federation, Belarus and Poland before terminating in Germany.

Figure 3.1 Trans-Asian Railway Northern Corridor



Source: http://www.unescap.org/ttdw/common/TIS/TAR/images/tarnc_big.gif

Corridor IV has several variant exits on the way Europe. This route originates from the port of Busan, the biggest port in Republic of Korea, goes across Democratic People's Republic of Korea before reaching one of border points (Namyang, Tumangang and Dandong) with China or Russian Federation and continues to the destination country Germany. It is worthy to note that there were 2 gaps between their railways because of Korean War in 1950. One is the 20km between Munsan (Republic of Korea) to Gaesong (Democratic People's Republic of Korea), the other one is the 31km between Shintanri (Republic of Korea) to Pyonggang (Democratic People's Republic of Korea). Both of them have already been connected since 2006.

Corridor V starts from Busan and Incheon port. This route needs feeder service to ports in China, the DPRK or the Russian Federation to join the corridor i, ii, iii and iv.

Table 3.2 the feature on the route of the Northern Corridor of Trans-Asian railway

Route	Distance (Km)	The number of border-crossing	The number of break of gauge	At Break of gauge point	Electrified/ double track
I	11,600	3	1	Belarus-Poland	Entire way
ii	10,200	5	2	China-Kazakhstan Belarus-Poland	Partial way
iii	9,500	5	2	China-Mongolia Belarus-Poland	Partial way
iv-a	10,950	6	2	China-Russia Belarus-Poland	Partial way
iv-b	12,350	5	2	N.Korea-Russia Belarus-Poland	Partial way
iv-c	11,250	7	2	China-Mongolia Belarus-Poland	Partial way
v -a	11,650	4	2	N.Korea-Russia Belarus-Poland	Entire way
v-b	10,100	5	2	China-Russia Belarus-Poland	Partial way

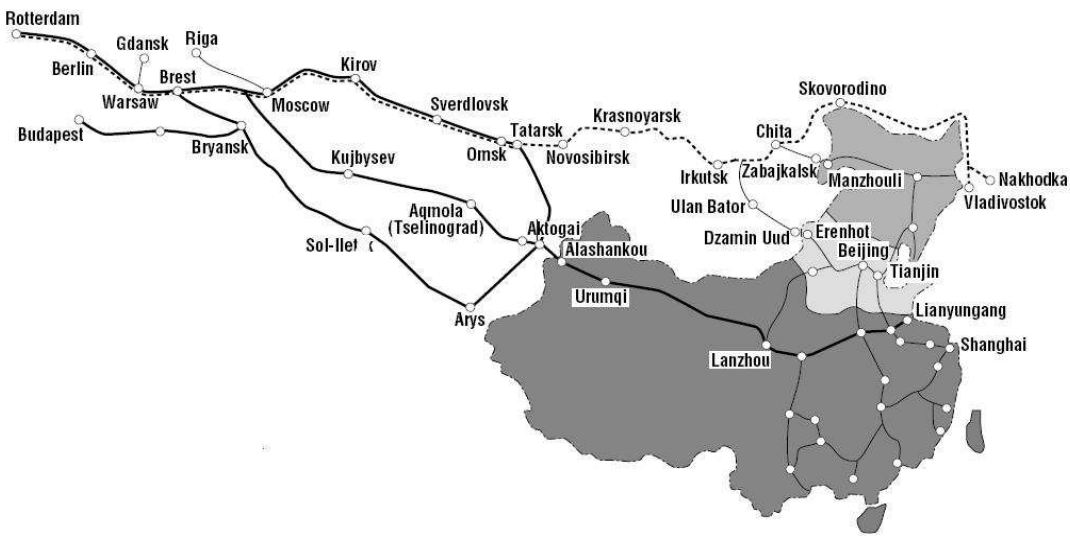
#Source: Development of Asia-Europe rail container transport through block-trains, United Nations, 1999

3.2 TSR, TCR and TKR present situation

3.2.1 TSR (Trans-Siberian Railway)

With its over 9,208 km length, TSR is the longest railway in the world. It runs from Moscow to Vladivostok**.** It links most of Ural, southern-Siberia and the Far East's major cities: Chelyabinsk, Omsk, Novosibirsk, Novokuznetsk, Krasnoyarsk, Irkutsk, Khabarovsk, and Vladivostok. All sections consist of a track gauge of 1,520 mm and double-track, as well as, electrified rails. This means that on the one hand TSR have such a good infrastructure for train service. On the other hand, containers have to be transferred between wagons and the bogies should be changed in order to be connected with Poland, China and Korea railway at the break of gauge point. That is because China, Korea and Poland have the standard gauge of 1,435 mm on the railways.

Figure 3.2 The route of transcontinental railway between Asia and Europe



Source: The New Asia-Europe Land Bridge-Current Situation and Future Prospects (1997.12), Japan railway and Transport review

TSR are connected with 3 transcontinental railways such as TMGR (Trans-Mongolian Railway), TMR (Trans-Manchurian Railway) and TCR (Trans-China Railway) so as to transport containers between Asia and Europe. TMGR is connected at Ulan-Ude. TMR is connected at Chita. TCR links to the TSR at Aktogai in Kazakhstan. (See the Figure 3.2)

3.2.2 TCR (Trans-China Railways)

TCR starts from ports of Eastern China i.e. Lianyungang, Qingdao, Rizhao, which extends 4,131 km before reaching the border of Kazakhstan. It links the major cities of ten provinces: Jiangsu, Shandong, Anhui, Hena, Shanxi, Shanxi, Gansu, Ningxia, Qinghai, Xinjiang, indeed, 400 millions people, which cover 30% of Chinese population, are living along the TCR.[11]

This route had been constructed to transport cargos from China to Europe connecting with TSR since 1956. The missing link between China and Kazakhstan had already reestablished since 1990. Containers have been transported by TCR and TSR from Asia to Europe since 1992.[12]

As far as rail track is concerned, railway tracks in China are in standard gauge, i.e. 1,430 mm while Kazakhstan's rail line use the broad gauge of 1,520 mm. That is why transshipment is needed at the border between China and Kazakhstan because of a gauge difference. Besides, some of sections in Chinese railway are still single track as well as not electrified. As a result, Bottleneck is happening at the border and during the transit. These are the main obstacles in TCR. However, these problems will be able to be resolved by continuous investment in infrastructure.

Compared with all-water route via the Suez Canal, The distance savings by TCR is larger than TSR between Asia and Europe. It is able to save approximately 1,200 km. Since China's economic has been growing for years and China government is willing to

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11 The community of development and the strategic of railway transport in China (2005. 06), monthly transport, Korea

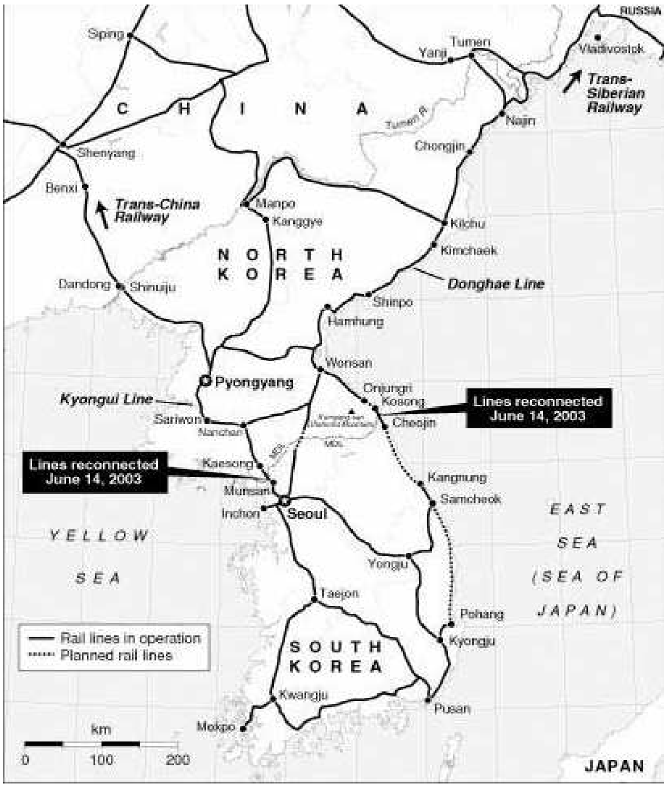
12 Basic research for integration of operation system on TKR-TSR line (2002.08)

continuously invest in railway infrastructure for improvement of facilities and impediment. As a result, TCR is having competitiveness as a substitute route of TSR for trans-continental railway.

3.2.3 TKR (Trans-Korean Railways)

There are three routes in Trans-Korean railway, i.e. Kyongui line, Gyeong-won and Donghae lines. TKR originates the one of major ports of Republic of Korea, i.e. port of Busan or Kwangyang, travels through Democratic People's Republic of Korea and connects with TCR or TSR at the border between DPRK and China or Russia.

Figure 3.3 The major railway network map of South and North Korea



Source: Ministry of construction and transportation (MOCT), Seoul, Korea

There were missing links between NOR and DPRK because of ideological dispute; however, they have already been connected between DMZ (Demilitarized Zone) since 2003. In addition, all section of DPRK's railway falls very far behind, indeed, DPRK's railway not only has a single track but also is not electrified. To facilitate this route, facilities should be improved through economic aid from neighboring countries, i.e. ROK, China, Japan and Russia. To facilitate this route, it is their responsibility to improve infrastructure by economic aid.

Taking trans-continental railway, rail-connection of the TKR is significantly important not only to the Korean peninsula but also to the Far East Asia as one indispensable part of Asian transport system. TKR is expected to cut the transportation cost and improve economic cooperation between Korea and other Far East countries.

3.3 Assessment of Container Traffic through rail land-bridge

Japan utilized TSR to transport wood to Finland in 1958. This was the first transportation between Asia and Europe by TSR. In 1967, TSR provided shippers with the first container transportation between Japan and Switzerland.[13]

Table 3.3 below shows container traffic of ROK and Japan by TSR. Currently, container freight volume has continuously decreased from/to Japan by TSR since 1991. This is because trade volume between Japan and Federation Russia has decreased due to the unfavorable term of trade. In contrast, the trade volume between ROK and

[13] Basic research for integration of operation system on TKR-TSR line (2002.08)

Federation Russia has risen steadily. That is why container freight volume from/to ROK by TSR has increased during the same period.

Table 3.3 Evolution of container transport by TSR

(Unit: TEU)

		1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Japan	Trade	25,990	13,380	13,569	10,474	8,124	8,678	6,693	5,068	4,926	-
	Transit	55,576	44,129	31,008	16,337	8,997	8,487	8,035	7,287	7,770	-
	Total	81,566	57,509	44,577	26,811	17,121	17,165	14,728	12,355	12,696	-
Korea	Trade	10,644	18,628	25,253	29,814	32,885	34,302	36,409	41,168	29,685	30,882
	Transit	15,004	10,838	12,705	12,982	17,760	26,731	21,653	11,298	14,373	27,807
	Total	25,648	29,466	37,958	42,796	50,645	61,033	58,062	52,466	44,058	58,689
	Total	107,214	86,975	82,535	69,607	67,766	78,198	72,790	64,821	56,754	-

Source: The Revitalization of TSR and economic cooperation between ROK and Russian Federation

Table 3.4 below shows container throughput originating from Far-East Asia at port of Vostochny. ROK and China's containers carried through TSR have continuously increased. In 2001, China was bigger than Japan in container traffic for the first time. In addition, it is expected that China's cargo volume by using TSR will steadily increase in the future when China economic growth is sustained. However, transit volume by TSR has not been larger than trade volume between Asia and Federation Russia. This means that whether TSR could revive depends not only on improving competitiveness but also increasing transit volume.

Table3.4 Container throughput in Vostochny port

(Unit: TEU)

	ROK	Japan	China	The others	Total
2000	61,282	10,344	928	147	72,701
2001	69,198	9,765	10,864	90	89,917

Source: Basic research for integration of operation system on TKR-TSR line (2002.08)

3.4 Obstacle trans-continental railway service

To revitalize trans-continental railway service, there are several following obstacles to be overcome, i.e. trade imbalance, insufficient facilities and break of gauge etc. Actually, not easy to solve these problems, it will take lots of time as well as undergoing trial and error. Besides, it needs tremendous money to improve infrastructure. Above all relative countries have to understand each other and make a concession.

3.4.1 Trade imbalance

The trade imbalance is one of the biggest problems between Asia and Europe. It is quite difficult to solve this problem. Basically, this results from the different industrial structures between them and container's demand considerably varies with seasons. As a result, logistics providers make it very difficult to collect and use empty containers. This means shippers or freight forwards have to take additional cost as well as require a great deal of labor. Consequently, even though there are considerable advantages like transit time and transport cost, they would prefer deep sea transport instead of railway.

3.4.2 Insufficient facilities

TSR, TCR and TKR have no sufficient railway infrastructure and port facility so that they provide customers with transport service without incontinency. Of course, TSR have such a good infrastructure like double-track and electrified rails along this route. However, the starting point of TSR is Vostochny port which does not have enough facilities like yard capacity, berths and handling equipment etc. To utilize TSR, containers which belong to Korea, Japan and China should be transported to Vostochny port which is starting point of TSR. However, Vostochny port does not has enough facility like yard capacity, berths and handling equipment etc. That is why congestion is happening all the time in port.

As far as TCR is concerned, a part section in TCR is still single track and non-electrified rails, so that it has capacity and speed problems. Actually, it is even difficult for China's railway to transport the domestic containers between China's port and final destination. For this reason, some of containers from/to Europe are transported to Federation Russian's port, even though TCR is much more competitive than TSR regarding to distance and accessibility between China and Europe. However, it is possible TCR in the future to substitute an alternative railway for TSR owing to steady the China government's efforts in order to improve facility. As a result, cooperation and competition between TSR and TCR will improve the quality of rail service.

TKR has already settled one of problems which were the missing links between ROK and DPRK, but there are still more obstacles to overcome. The DPRK's section of TKR is lacked behind ROK in facility which consists of single track and non-electrified rails. It is quite different for train speed between them, which seems to be inefficient to transport containers.

3.4.3 Break of gauge

Break of gauge exits at border in trans-continental railway, because rail gauge varies from country to coutnry. The Federation Russia, Belarus, Kazakhstan and Mongol have a broad gauge (1,520 mm); on the other hand, Korea, China, Poland and Europe have a standard gauge (1,430 mm). For this reason, transshipment has to take place at border.

To solve this issue, it involves either operating with only one set of wagons and changing the bogies at the break of gauge points or operating with two sets of wagons of different gauge and transferring the containers from one set to the other (UN ESCAP, 1999). Now, each country does not have equipment and facility to transshipment. As a result, it takes additional time to transship at break of gauge points. To be connected between TSR and TCR, TSR and TKR in the future, moreover, it is necessary to develop well-designed facility and efficient equipment in order to reduce the transshipment time.

3.4.4 Border crossing and CIQ formalities

The exiting customs and border formalities are considerable complex. Those are the main impediment to the quick movement of containers. As table 3.5 shows, each operation is the main reasons of delays at border points. Border-point operation can be divided into two parts. The first is the railway operation, which are made up change of locomotive, change of crew, braking sheet and technical inspection for acceptance of wagons etc. The second is operations by other administration, which are made up customs inspection, sanitary inspection and security checks.

In fact, border cross and CIQ formalities are considerably complex. If it is possible to simplify the following procedure, this transport mode could have competitiveness in terms of transit time. For instance, the relaxation of customs procedures between European countries has reduced time to 30%[14].

Table 3.5 Border-point operation

Railway operation (each item may not be applicable between all railway)	**Operations by other administrations**
- Change of locomotive - Change of crew - Braking sheet - Technical inspection for acceptance of wagons - Safety inspection for dangerous goods - Train consist - Labeling of wagons - Change of real light	- Customs inspection - Sanitary inspection - Security checks (border police)

Source: UN, UCTAD (1999)

3.4.5 Strong competitor

Shipping companies have continuously been trying to sustain the dominant market power of international transport. Horizontal and vertical integration by Alliances, M&A

[14] Source: UN, UCTAD (1999), p56

and a penetration into other links of logistics chain are one way for shipping lines to reduce unit costs with more collective bargain power against suppliers. By horizontal integration, the merger and acquisition see more economic of scales, increased network coverage, reduced freight rate, and more market control. By vertical integration like a penetration into other links of logistics chain, shipping companies offer one-stop transport and value-added logistics service to shippers. For all these reasons, it is more difficult for trans-continental railway to secure enough traffic flow against shipping industry.

3.4.6 Low lever service

To attract shippers, the most important factors related to modern logistics are reliability, punctuality and frequency. Now, if it were not for war, strike and God act, the deep water transport would provide this kind of service. Indeed, shippers are willing to utilize this kind of transport mode. That is why shipping companies make it easy to secure enough cargo.

Taking into account train schedule of TSR, on the other hand, this does not give shippers reliability, punctuality and frequency. For instance, the train schedule of TSR depends on shipping schedule from Busan and Japan. Basically, shipping lines offer customers shipping service from Busan to Vostochny at 7 to 11 days interval and from Japan to Vostochny at 8 to 18 days interval. Train is suppose to start next day after containers are discharged at port, but train does not start until loading containers up to 60 % of train capacity.[15]

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[15] Basic research for integration of operation system on TKR-TSR line (2002.08)

4. Comparing transport conditions between rail and deep water transportation

Currently, the crucial container transport route is the existing ocean route from/to Asia and Europe. Compared with other transport routes, i.e. railway and airway, it is obvious that the exiting water route will be sustaining the strong transport competition due to horizontal and vertical integration, infra and superstructure investment and service improvement. On the other hand, railway route has good conditions to compete with water route in terms of transit time and transport distance. Table below 4.1 shows transit time by sea.

Table 4.1. Comparison with railway and sea route from Busan to Europe

Classification	Distance(1,000Km)	Time(days)	Cost(1,000US$)
Railway transport	12.4	18	1.2
Sea transport	19.2	26	1.4
The effect of reduced cost	-6.8	-8	-0.2

Source: The survey research on operation situation of rail land-bridge (2004), The Korea transport institute

As table 4.1 shows, for instance, it takes about 18 days and costs about US$ 1,400 between Busan and Europe by sea and the transit distance is approximately 19,200 km via Suez Canal. On the other hand, however, it takes about only 18 days and costs about US$ 1,200 between them by utilizing TSR via port of Vostochny. Namely, this route can not only reduce transit time at least 8 days but also save the cost about US$ 200.

Table 4.2 Comparison with railway and sea route from Busan to Finland

Classification	Distance(1,000Km)	Time(day)	Cost(1,000USD)
Railway transport	10.9	12.5	1.2
Sea transport	22.8	28.0	1.8
The effect of reduced cost	-11.9	-15.5	-0.6

Source: The survey research on operation situation of rail land-bridge (2004), The Korea transport institute

As table 4.2 shows, normally, the route between Busan to Finland is considerably competitive. Compared with sea transport, railways transport is even shorter and faster. Taking into account on Distance, transit time and Cost, it can save 12,000 km, 15.5 days and 600 US$. It is obvious that this route has a considerable competitiveness and enough possibility to substitute to sea route in the future.

Of course, transit distance, time and cost are different depending on corridors. As table 4.3 shows, to be specific, the corridor originating from Busan to Hamburg via TCR is the best way to reduce transit distance. Despite the fact that it is the shortest way, it takes about 28 days to Hamburg. This is because there are several cross borders and break of gauges points along this corridor, in addition, it is not enough for China railway infrastructure to provide trans-continental railway service. Even it is very difficult to handle with domestic cargo between port and final destination, i.e. heavy congestion is happening to China's railway in all the time. Consequently, it needs additional time to pass through mainland China as well as these points. For these reasons, most shippers and freight forwards in Korea, Japan and China prefer TSR to TCR or the other routes.

Table 4.3 Distance, tariff and transit time per corridor by intermodal transport

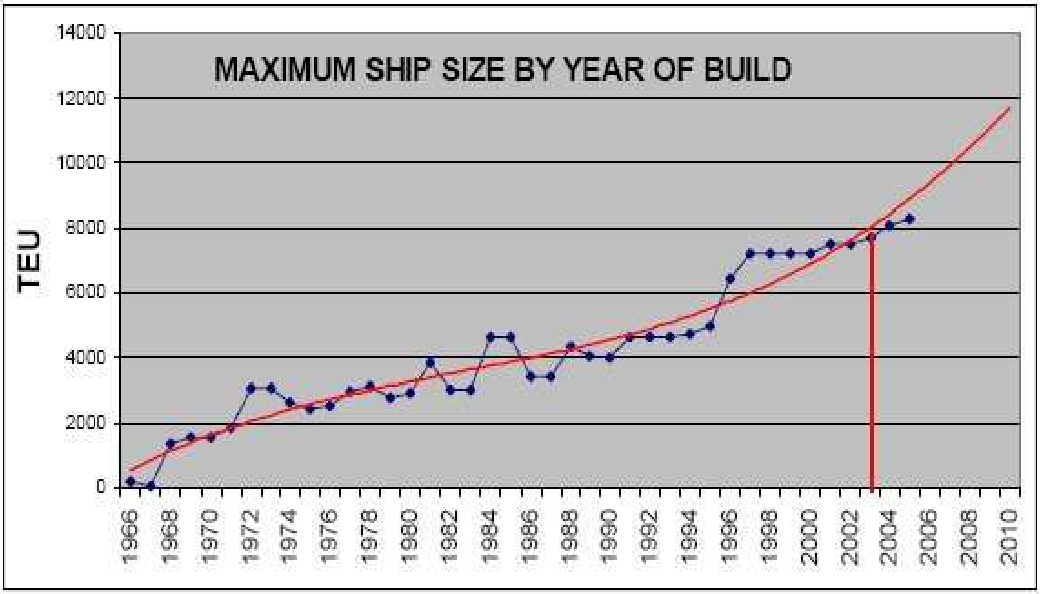
Corridor	Distance (Km)	Tariff (US$/TEU)	Transit Time (days)
Busan-Vostochny-Krasnoye-Brest-Hamburg	12,360	1,192	18
Busan-Khasan-Krasnoye-Brest-Hamburg	13,005	889	19
Busan-Lianyungang-Druzhba-Presnogor-Brest-Hamburg	12,002	3,405	28
Busan-Lianyungang-Zabaikalsk-Kransnoye-Brest-Hamburg	12,561	2,025	26

Source: International railway operation research, 2001, Korean railroad

Recently, shipping companies have been making an effort to reduce transit time and transport cost as well as to improve operating efficiency and productivity. Container vessels are getting bigger and faster as well, this trend will be continued. Figure below 4.1 shows the evolution of vessel size. For example, Maersk Line has launched the bigger vessel, the Emma Maersk which has the capacity of approximately 13,000 TEUs. Moreover, post-panamax ships have the speed of 24~26 knot/h. According to LR (Lloyd's Register) research, a move from a 4,800 TEU vessels to 11,800 TEU vessels yields per TEU cost saving of 39 per cent.[16] Consequently, shipping companies can reduce operation cost and fuel consumption and improve operating efficiency and productivity.

[16] http://www.jamports.com/shipping.dti?page=news&id=1213&PHPSESSID=ea4ecb914943f6ede8cd51057b40f47e

Figure 4.1 The evolution of container vessels



Source: http://www.solentwaters.co.uk

10 years ago, it normally took 26 days from Hong Kong to Rotterdam by sea 10 years ago, however, it takes 19~21 days recently. Between Singapore and Rotterdam, it took 22 days, however, it takes only 16~19 days owing to the advance in shipbuilding technology. It is expected that this trend keeps up in the future. This means that the advantages on transit time and cost by rail transport have been reduced.

As long as coordinated scheduling is applied between railways and cooperative agreements are developed between the customs administrations, it is possible to reduce transit time. In spite of competitive improvement in maritime industry, railway transport can sufficiently compete with deep sea transport. In a word, trans-continental railways could be more attractive route than sea routes between Asia and Europe.

As far as the level of service is concerned, shipping industry is even better than railway transport. Indeed, the level of shipping service, such as reliability, punctuality and accessibility, is getting better on account of its well-designed operating system, shipbuilding technology and the intense competition among shipping companies. Unlike shipping transport, the level of railway service is getting worse and worse. Railway companies can not afford to provide frequent train service to shippers. This is largely due to the fact that Cargo by using trans-continental railway is not as much as block train service is provided. This is caught in vicious circle in railway industry. As a result, shippers tend to prefer deep sea transport to railway transport between Asia and Europe.

5. The method on revival of rail land-bridge from/to Asia and Europe

5.1 The solutions for overcoming obstacles

As mentioned in chapter 4, there are several following obstacles of rail land-bridge.

- Trade imbalance
- Insufficient facilities
- Break of gauge
- Border crossing and CIQ (Customs, Immigration and Quarantine)
- Strong competitor
- low level service

These are settled as the top priority for its revival. As far as trade imbalance is concerned, logistics providers are suffering from the collection of empty containers. Compared with sea route, this is more serious. It costs a great deal for shippers to collect empty containers. In addition, after export, it is difficult for shippers to track empty containers and the loss of them takes place after transportation from time to time. To solve this problem, first of all, tracking and tracing system has to be developed to find their location between freight forwards and transport operator. Second, there is much room for consideration to lower the transport cost of empty container. Lastly, the free of empty container rental cost has to be considered when export takes places from Europe to Asia, i.e. East Bound.

When it comes to insufficient facilities, this gives rise to problem like delay. There is no proper alternative beside steady investment. In addition, it will take a quite long time to make the competitive transport mode and need lots of investment for improvement. In particular, TCR and TKR have bad infrastructure such as single track, non-electrified rail, and insufficient handling equipment for transshipment at boarder. In other words, it is necessary that they consist of double tracks and electrified rail along the whole railway to improve the transit speed. If investment is not enough, loan would have to be considered from World Bank such as IBRD (International Bank for Reconstruction and Development) and IDA (International Development Association). Ample funds are such a crucial factor that government or community could sustain the driving force on the improvement of facilities.

Break-of-gauge points add delays, cost and inconvenience to traffic. Regarding a break-of-gauge, there are two ways to solve this problem. First, as mentioned above the insufficient infrastructure problem, railway companies or governments have to improve their facilities and equipment to transship from one train to another at break-of-gauge point. Once there are sufficient transshipment equipment, facilities and skillful laborers, railway companies can get higher productivity as well as reduce delay. Second, developing variable gauge axle is another way. This technology is used to allow railway vehicles to pass from one train operator's rail gauge to another different gauge. For instance, such a system is in use to allow the running of trains between Spain and France. That is because Spain has a 1,688 mm gauge but France has a 1,430 mm gauge. In addition, Finland, Sweden and The Federation Russia are searching together to apply to this kind of system in TSR.

The crossing border and CIQ formalities are quite complex, which is one of the main reasons of delay when containers are arrived at frontier. In terms of cross border issue, two major conventions and the Organization of Railway Cooperation (OSShD) regulate the movements of cargo along transcontinental railway. Two major conventions are the COTIF (Convention Concerning the International Transport of Goods by Rail) convention and the SMGS (Agreement on International Goods Transport by Rail) agreement. COTIF is so-called CIM consignment note which most of European countries joined, on the other hand, the Russian Federation, China, Belarus and DPRK belong to SMGS. Namely, Europe and the other countries joined different international conventions.

As a result, using different document and language for trade bring out delay. For these reason, OSShD will have to play a key role to coordinate them. In addition, the introduction of TIR carnet which is used to allow containers and bulk cargo to cross border with minimize customs formalities between the Russian Federation and Europe has to be considered in related countries.

From Korea and Japan to China's port or the Federation Russia, containers are transported by shipping in order to utilize transcontinental railway, i.e. intermodal transportation. The connecting system plays an important role in terms of transit time. The departure time of train can not be punctual at port. This is because the operating system of TSR and TCR lags behind and train does not start until loading containers up to 60 % of train capacity etc.

Table 5.1 Container train schedule of TSR (1998. 12)

Train number	Corridor	Transit time	Frequency
1260	Moscow-Novosibirsk-Krasnojarsk	110 hr 28 min	1/week
1264	Moscow-Ekaterinburg-Omsk-Irkutsk	49 hr 33 min 77 hr 10 min 132 hr 35 min	5/week
1262	Moscow-Krasnojarsk	110 hr 10 min	2/week
1010	Moscow-Ekaterinburg-Novosibirsk	88 hr	1/week
1250	Moscow-Irkutsk	135 hr	2/week
1217	Novosibirsk-Moscow	51 hr 48 min	1/week
1218	Moscow-Novorosiysk	-	Nonscheduled
1215	Kalingrad-Moscow	53 hr	Nonscheduled
1207	Berlin-Moscow(East-Wind)	72 hr 15 min	Nonscheduled
1201	Nakhodka-Buslovskaya	272 hr 57 min	1~2/week
1202	Buslovskaya-Nakhodka	285 hr 15 min	1~2/week
1229	Nakhodka-Brest	291 hr 34 min	Nonscheduled
1230	Brest-Nakhodka	285 hr 16 min	Nonscheduled
1205	Budapest-Moscow	46 hr 20 min	1/week

Source: Basic research for integration of operation system on TKR-TSR line (2002.08)

Table above 5.1 shows container train schedule of TSR. There are some non-scheduled trains which make it difficult for freight forwards and shippers to set schedule. In addition, some of trains are not container block trains but mixed cargo-freight train (timber, car, mineral and crude oil etc.). In contrast, deep water shipping provides shipper with transport service on a schedule. As a matter of fact, there are not container block trains operating from port of Vostochiny and Lianyungang to destination by time running schedule until now. That is why shippers prefer shipping to railway. Consequently, container block train has to be serviced for reliability and punctuality as soon as possible

Tracking and tracing containers is one of the main issues among shippers and freight forwarders, through which they can not only enhance visibility but also save costs. Shippers really want to know where their containers are going to and how their containers are. Unfortunately, trans-continental railway has not provided this kind of service to them owing to inefficient operations management and insufficient infrastructure. This is one of reason why Japan's shippers mind using railway transport. To improve this, train carriers need to benchmark their strong competitor, i.e. shipping industry.

A modern container shipping lines are not only running much elaborated IT systems but also introducing the latest IT technology, such as EDI (Electronic Data Interchange), RFID (Radio Frequency Identification) and GPS (Global Positioning System), that store detailed container information of all of the containers that were loaded on a particular container vessel. As a consequence, if shippers are able to track the seagoing vessel, shippers will be also perfectly able to track the cargo.

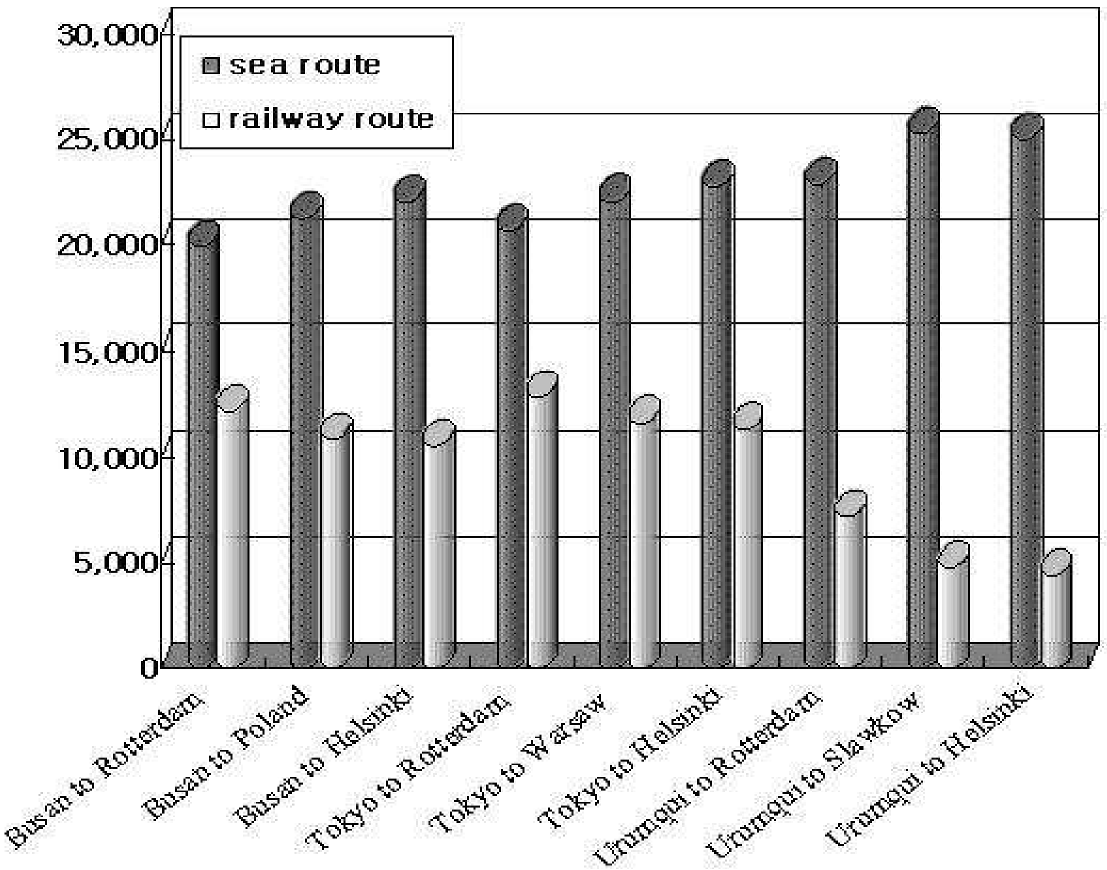
5.2 Market segmentation

A majority of cargo is transported by deep sea mode between Far East Asia and Europe. For this reason, cargo has to transship another mode, i.e. road, railway, inland navigation and short ship in order to delivery from port to final destination. Road transport can be considered as convenient transport mode in terms of accessibility. In other words, road mode provides them with door-to-door service, besides; they can utilize this mode whenever it is required without schedule. On the other hand, this leads to huge congestion and car accident near port area and big city. In addition, comparison with the other modes, this is even more expensive as well as brings out the most serious air pollutions.

To solve these problems, government and community are not only investing tremendous budget to improve the infrastructure of other modes but also making the new transport policy to facilitate them. For instance, EU established a policy like TEN-T (Trans-European Transport Networks) for highly efficient transport network in Europe. As a result, these would considerably favor the revival of rail land-bridge between Far East Asia and Europe.

Figure below 5.1 shows the distance of deep sea water route and railway route between Far East Asia to Europe. From the above figure, it can be seen that the distance saving by using railway route is at maximum for Eastern Europe and Scandinavia Peninsula. In other words, transcontinental railway should first attract those region's shippers to revitalize service as securing sustainable container throughput is very important to offer block train service.

Figure 5.1 Distance of sea route and railway route between Far East Asia and Europe



Source: calculated and compiled from:

1. China as an intermodal link between the Far East and Europe
2. Pre-study: Major origins and destinations China-Europe container trade
3. Netpas Distance

Especially, the importers and exporters from the North-western China have to transport cargo to port by using railway or road, which is quite long journey. Taking into accounting transit time and cost, it is very inefficient. It is highly possible for Shippers in this region to become customers of transcontinental railway. Of course, most of the main economic development zones are located in coastline. The North-western China has enormous development potential owing to abundant natural resource and China government support.

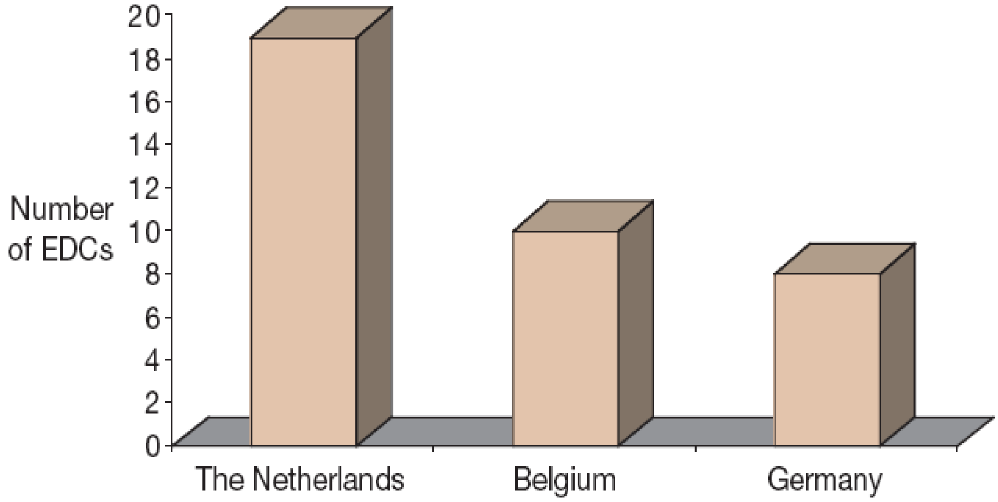
Securing potential customers is very important so that trans-continental railway compete with deep water shipping. For this, railway transport providers should not only have a good strategic but also meet customers' needs to attract them. For instance, railway carriers deserve to consider the introduction of volume incentive and Just-in-time support system. This means that customers who transport lots of cargo by using railway adopts lower transport cost and if containers do not arrive at destination on time, it would be properly compensated to shippers depending on delay time.

5.3 The usage of exiting distribution structure

When containers arrive at rail terminal, transport service providers have to consider how to cost-effectively delivery to final destination. For this, they need to ultimately use the exiting distribution centers which have a good hinterland connection, infra and superstructure. They allow a retail location to stock vast numbers of products without incurring an explosion in transportation costs. They also reduce delivery time and improve higher service level to customers. In the consequence, it is one of the most efficient ways to approach the final destination.

As Figure 5.2 above shows, Existing EDCs (European Distribution Centers) are located in Northern Europe. In general, the most preferred country is the Netherlands, with Belgium in second and Germany in third place. This is because these countries are close to the major demand markets, have good transport infrastructures and have access to two large international sea ports which are Rotterdam port and Antwerp port to handle large overseas flows.

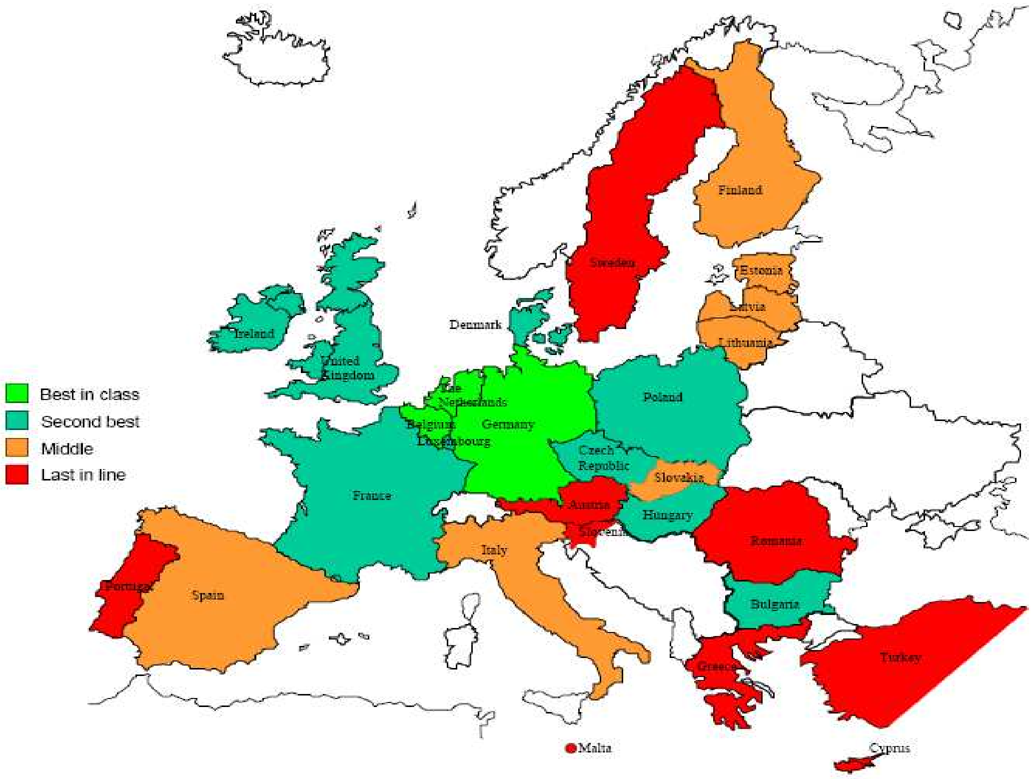
Figure 5.2 The share of total distribution center in EU per country



Source: Europe’s Most Wanted Distribution Center Locations (2006), Capgemini

The new EDCs (European Distribution Centers) are under construction in Eastern Europe owing to the trend of EU enlargement. Figure 5.3 below shows the preferred EDC location roadmap of Europe. This trend gives Eastern Europe, i.e. Poland and Czech Republic new opportunities to have a strong logistics industry. They have a good location to operate EDC. It is expected to be a railway hub based on Eastern European market. In addition, Germany is also a good alternative as inland railway hub to cover for both Western Europe and Eastern Europe.

Figure 5.3 the preferred EDC location roadmap of Europe



Source: EU enlargement, European Distribution centres on the move

6. Conclusion

Nowadays, global economies are continuously growing thanks to China economic development which is one of the main reasons. Besides, most of countries are trying to speed up their economic advances and look for new driving force from abroad for sustainable development.

For these reasons, world trade volume is steadily growing from one continent to another and this significantly affects the development of container transport. Between Far East Asia and Europe, trade volume is also continuously growing. However, 80% of world wide container throughput is transported by deep sea route. In fact, huge congestion is now happening in some ports as they don't have sufficient infra and superstructure; in addition, containers have to be transported again by road, railway or inland navigation from port to final destination from port to final destination, which leads to the increase of total logistics cost.

Owing to those, transcontinental railway transport is increasingly becoming an important transport mode as a good alternative of deep sea shipping. On the one hand, there are several advantages such as distance saving, transit time and the strong growth potential etc, on the other hands, there are also several disadvantages such as insufficient facility, trade imbalance, break of gauge, the complex of border crossing and CIQ formalities and the low level of service etc.

To make railway transport a more attractive mode, railway carriers have to do their best to improve the level of service quality such as reliability, punctuality, visibility and frequency. They should deserve to consider the introduction of block train service and tracking and tracing system, etc. Such those solutions provide transcontinental railway with a very valuable and sustainable competitive advantage. Through those, it is much easier for shippers to manage the whole logistics flow.

The distance saving by using railway route is at maximum for Eastern Europe and Scandinavia Peninsula compared with Western Europe. This means that trans-continental railway should consider the top priority to attract those region's shippers for securing sustainable container volume. They would considerably favor railway transport between Far East Asia and Eastern Europe as they could reduce transit time and inland transport cost. In addition, the existing distribution centers in Europe need to be ultimately used to delivery final destination as they have a good hinterland connection, infra and superstructure. In the consequence, it is one of the most efficient ways to approach the final destination.

In short, it is quite difficult for rail land bridge to revitalize. In fact, it will take lots of time as well as undergo trial and error. Besides, it will need tremendous investment. Above all things, concerned countries will have to understand each other and make a concession. Consequently, continental railway will be the most important mode between Far East and Europe in the future.

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