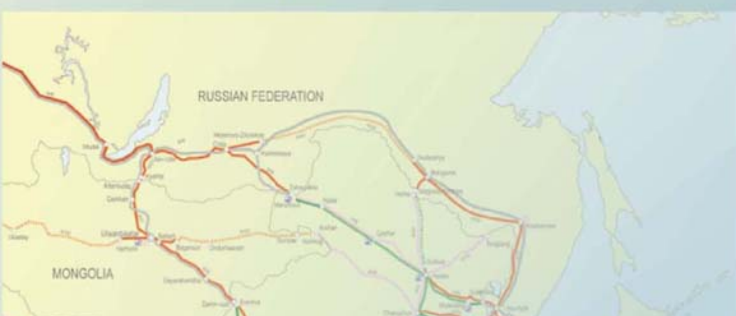
Integrated International Transport and Logistics System for North-East Asia



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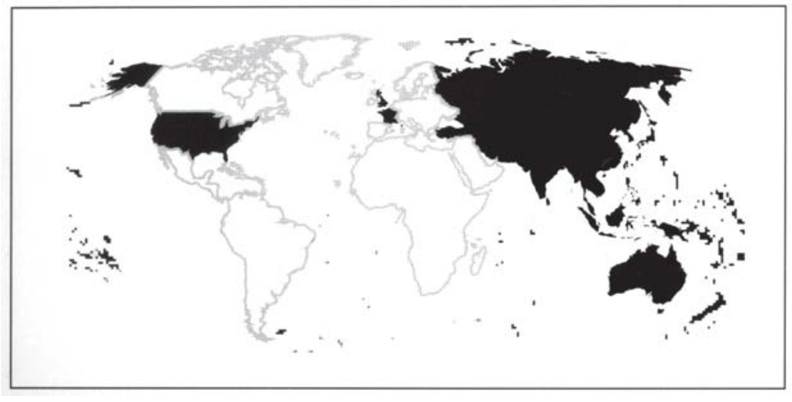

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ECONOMIC AND SOCIAL COMMISSION FOR ASIA AND THE PACIFIC

INTEGRATED INTERNATIONAL TRANSPORT AND LOGISTICS SYSTEM FOR NORTH-EAST ASIA

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ONE: INTRODUCTION

Recent political, economic and social developments in North-East Asia have highlighted the benefit of intensifying regional cooperation. In particular, the emergence of China as an active participant in the world market has substantially changed the size and structure of interregional transactions of commodity and capital in North-East Asia. Furthermore, the Russian Federation is expected to become a more important participant in North-East Asia's economy.

In the current international environment characterized by globalization and regionalization, transport and logistics system integration is a prerequisite for countries to maintain competitiveness and has become a key factor for sustained employment creation and economic growth. The case of the European Union (EU) provides an excellent example of transport integration that supports economic integration. The EU has been seeking to provide an integrated transport and logistics network throughout Europe by eliminating missing links, alleviating bottlenecks and securing interoperability of the network.

Although some of the countries in North-East Asia are the most economically active in the world, the transport and logistics network is neither sufficient nor well integrated at the international level.

In order to assist countries in the subregion in addressing these issues, the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) jointly with the UNDP Tumen Secretariat and in collaboration with participating countries (China, the Democratic People's Republic of Korea, Japan, Mongolia, the Republic of Korea and the Russian Federation) and with assistance of the Korea Transport Institute (KOTI) have initiated a project entitled *Integrated international transport and logistics system for North-East Asia.*

The main purpose of this project is to assist the member countries in North-East Asia in promoting an integrated approach to international transport and logistics planning and policy formulation. The project is focused on the following four areas:

1 formulation of an integrated international transport network in North-East Asia

2 review of existing transport and logistics infrastructure and development plans along the major transport routes in the North-East Asia

3 evaluation of performance of the Network and identification of infrastructure and institutional bottlenecks

4 the development of guidelines and action plans in collaboration with the participating countries for the operationalization and development of the Network.

The project will contribute to the development of a reliable and efficient international transport and logistics system in North-East Asia to improve efficiency, reduce costs and improve the level of services and thereby enhance the competitiveness of products of North-East Asian countries in the world market.

The present study summarizes the major findings of the project and consists of six chapters. Following this introductory chapter, Chapter 2 reviews the existing international transport and logistics facilities in North-East Asia. In Chapter 3, an integrated international transport network is proposed. Chapter 4 evaluates performance and identifies bottlenecks in selected international transport corridors. Chapter 5 discusses the current international transport framework in North-East Asia. Finally, Chapter 6 proposes strategies and actions for the development of the integrated international transport and logistics system for North-East Asia.

TWO: OVERVIEW OF TRANSPORT AND LOGISTICS IN NORTH-EAST ASIA

2.1 ECONOMIC AND TRANSPORTATION TRENDS IN NORTH-EAST ASIA

North-East Asia is an area with potential for future growth and economic cooperation among neighbouring economies. Since the end of the Cold War, economic cooperation between North-East Asian economies has increased very rapidly. The emergence of China and the Russian Federation in the free world market has substantially changed the size and structure of intraregional transactions of commodities and capital in North-East Asia. With Japan on one side as one of the most advanced industrial countries and China on the other side as the largest developing economy, North-East Asia has become an economic region composed of diverse and dynamic economies.

Furthermore, there are many other important factors that can increase economic ties among these countries. Continuing reduction of government controls and regulations on domestic production and foreign trade has forced the globalization of markets and encouraged the growth of trade and capital flows in North-East Asia. With increasing openness toward the import of goods and capital from each other, the economic interdependence of North-East Asian countries will increase in the future. The complementary production structures and factor endowments of North-East Asian countries, in addition to geographical and cultural proximity, will promote closer economic ties in the region.

Table 2-1 illustrates the current economic positions of North-East Asian countries. As of 2004, North-East Asia covers 5.7 per cent of the total world area, and has 25.8 per cent of the total world population. This high population forms an abundant labor pool and a huge intraregional market. Meantime, the combined output of North-East Asia accounts 18.4 per cent of the world GDP and its share of the world's freight transport is over 28 per cent. The trade volume in this region consists of 17.3 per cent (19.0 per cent for export and 15.7 per cent for import) of the world, compared to 39 per cent of the European Union (EU) and 21 per cent of the NAFTA respectively (see Table 2-2). Traditionally, international trade has provided North-East Asian countries with the driving forces of their economic growth.

Japan is the largest economy in the region with $4.3 trillion GDP in 2003, and China is the fastest growing economy with an economic growth rate of 10.2 per cent on average per annum throughout the 1990s (Table 2-3). North-East Asia's share of the world economy will further increase through the economic growth of China and other North-East Asian countries, despite the relative contradiction of the Japanese economy. The existence of all essential factors for economic growth – i.e. abundant labor force and capital, a huge intraregional market and a high level of technology – has resulted in directing international attention to North-East Asia.

Table 2-1 Major indicators of North-East Asia

Country/Region	Area (km^2)	Population (thousands)	GDP (billion US$)	Export (billion US$)	Import (billion US$)
As of	*2004*	*July 2004*	*2003*	*2004*	*2004*
World	510,072,000	6,379,157	36,400	8,880	9,215
North-East Asia* (% share to the world)	28,834,251 (5.7%)	1,644,010 (25.8%)	6,705 (18.4%)	1,597 (18.0%)	1,338 (14.5%)
China	9,596,960	1,298,848	1409	593	561
Democratic People's Republic of Korea	120,540	22,698	18**	1.04*	2.04*
Japan	377,835	127,333	4317	565	455
Mongolia	1,564,116	2,751	1	0.85	1.01
Republic of Korea	99,600.00	48,598	527	254	224
Russian Federation	17,075,200	143,782	433.49	183	95

Sources: Central Intelligence Agency, USA, The World Fact Book 2004 (As of December 7th, 2004); National Statistics Organization, Republic of Korea, www.nso.go.kr (as of December 7th, 2004); United Nations Statistics Division www.unstats/un.org; World Bank www.worldbank.org; WTO, World Trade Report 2005.

Notes: * 2002 Estimated
** GNP is used

Table 2-2 Comparison of North-East Asia with selected major regional areas

Areas	% Share of population to the world	% Share of GDP to the world	% Share of trade to the world	Intra-regional trade dependency* (%)
NAFTA	6.7[a]	33.9[a]	21[b]	22.9[c]
EU	7.1[b]	30.6[b]	39[b]	60.2[c]
North-East Asia	25.8[a]	18.4[b]	17.3[b]	19.4[c]

Sources: Central Intelligence Agency, USA, The World Fact Book 2004 (As of December 7th, 2004); WTO, World Trade Report 2004 (based on 2003 data); IMF, Direction of Trade 2003 (based on 2002 data)

Notes: * Amount of intraregional trade divided by the total amount of trade.
a: as of 2004; b: as of 2003; c: as of 2002.

Table 2-3 Economic growth rates in North-East Asia (unit: %)

Classification	1970 – 1979	1980 – 1989	1990 – 1999	2000-2003
China	5.6	10.0	10.2	8.2
Japan	4.6	3.9	1.0	1.1
Republic of Korea	8.8	9.0	5.4	4.2
The world on average	3.9	3.0	2.3	2.1

Source: Adapted from Chang-Jae Lee, et al., A new strategy for North-East Asian economic cooperation, KIEP, 1999

Interdependence of trade between the countries in North-East Asia has been increasing rapidly. The regionalization is expected to deepen with the increasing intraregional movement of goods and capital (see Table 2-4). The main reason for this expectation is the high level of economic complementariness existing among countries in North-East Asia. While China, for example, has abundant labor forces and a huge market, Japan has a high level of capital and technology. From a perspective of production, if these specialized factors can be combined in an efficient way, this will bring these countries greater economic achievement. In addition, from a perspective of consumption, these three countries can form a complementary market. That is, China can purchase high-tech products from Japan and the latter can be major consumers of labor-intensive Chinese products. In this sense, deepening regionalization can give North-East Asian countries mutual benefits.

The total trade of North-East Asian countries with the world increased from $238.6 billion in 1980 to $1,327.6 billion in 2000 at an average annual growth rate of 8.1 per cent. However, its intraregional trade amount increased from $46.6 billion to $442.9 billion during the same period at an average annual growth rate of 12.1 per cent. The intraregional trade amount of the North-East Asian countries in 1980 was only 19.5 per cent of their trade amount with world, but, in 2000, it increased to 33.4 per cent. Between 1980 and 2000 the Republic of Korea showed an increase in its share of intraregional exports, increasing from 23.3 per cent to 34.6 per cent. Japan also showed an increase from 19.1 per cent to 26.2 per cent. The Chinese share had increased from 49.6 per cent in 1980 to 65.1 per cent in 1990 through its foreign open-door policy but decreased to 42.6 per cent in 2000.

To capture the opportunities of liberalization of trade in the traditional and emerging markets there has to be sustained cooperation among the economies in the region. To a greater degree than Europe and North America, North-East Asia is beset with difficulties arising from political, economic and historical origins.

There have been a series of discussions and suggestions on regional development and infrastructure in North-East Asia. The close link between economic development and infrastructure building has been emphasized in some literature on regional development. Specifically, industrial development and its geographical distribution have direct ties with the availability of transport infrastructure. In North-East Asia, however, regional transport systems are not set up. Regional routes are being operated in most cases through the mutual agreement of related countries, which entail subdivided and thus inefficient small markets. Connection through inland transport systems is very limited except for some railway lines.

Before China and the Russian Federation entered the free market, there was little opportunity for cooperation among the North-East Asian countries on regional development and on transport networks. While policymakers are aware of the benefits of a free market economy and the need for changes in policy, these policy directions have yet to filter down to the provincial and ground level. Regulations at border crossings are still strict and complex. Policy makers still tend to favor domestic industries, and flow channels are limited to designated ports. With the emergence of the regional market, a transportation network for the region as a whole should be formulated and operationalized in order to enhance the cooperation in regional economic development. This would have a substantial impact on market expansion and growth.

Table 2-4 Trade mix of North-East Asian economies (unit: million dollars)

Export	Import	China	Democratic People's Republic of Korea	Japan	Mongolia	Republic of Korea	Russian Federation	North-East Asia	World
China	1980		374	4,032	4	3	228	4,641	18,319
	1990		362	9,210	28	2,268	2,048	13,916	64,500
	2000		451	41,654	111	11.293	2,233	55,742	249,195
Democratic People's Republic of Korea	1980	276		165		1	334	776	1,093
	1990	285		281		0	676	1242	1,818
	2000	37		257		273	3	570	1,413
Japan	1980	5,109	376		4	5,393	2,796	13,678	130.435
	1990	6,145	176		14	17,499	2,563	26,397	287,678
	2000	30,356	207		29	30,703	570	61,865	478,156
Mongolia	1980							0	
	1990							0	
	2000	193		9		2	37	241	410
Republic of Korea	1980	3		3,039			2	3044	17,505
	1990	1,533	1	13,638			519	15691	65,016
	2000	18,455	152	20,466	55		788	39916	171,826
Russian Federation	1980	240	449	1,703		9		2401	31,936
	1990	2,012	1,478	3,064		333		6887	50,284
	2000	5,233	43	2,766	182	972		9196	102,998
North-East Asia	1980	5,628	1199	8,939	8	5,406	3,360	24,540	199,288
	1990	9,975	2017	26,193	42	20,100	5,806	64,133	469,296
	2000	54,274	853	65,152	377	43,243	3,631	167,530	1,003,998

Source: http://www.kotis.net/main/tradedb.html

2.2 TRANSPORT AND LOGISTICS IN NORTH-EAST ASIA

Unlike the EU where member countries are more or less homogeneous in terms of the level of economic development and transport-related infrastructure, North-East Asia consists of countries whose socioeconomic characteristics differ vastly. Japan has the world's second largest economy with a per capita GDP of over $37,400 while China's per capita GDP is still less than $1,000.

As a result of these economic differences, as well as historical differences that have resulted in some modes being more prominent and accessible than others in some areas, transport demand also varies by country. Table 2-5 shows the intercity rail passenger transport trends in North-East Asian countries from 2000 through 2003. Demand in million person-kilometres traveled has remained fairly stagnant in recent years for all North-East Asian countries except China. China also has the highest rail demand among North-East Asian countries.

However, China has the world's largest population and the world's third largest land area. Although China experienced 25 percent more person-kilometres traveled than Japan, for example, it has more than 10 times the population (Table 2-6).

Table 2-5 Rail passenger transport trends (unit: million person-km)

Country	2000	2001	2002	2003
China	453,260	476,680	496,940	478,860
Japan	384,441	385,421	382,236	384,958
Mongolia	1,067	1,062	1,067	–
Republic of Korea	27,788	29,172	28,743	28,379

Sources: National Bureau of Statistics, China, www.stats.gov.cn; Statistics Bureau & Statistics Center, Japan, www.stat.go.jp; National Statistical Office, Mongolia, Mongolian Statistical Yearbook 2003; Ministry of Construction and Transportation, Republic of Korea, Statistics – An Annual Report, www.moct.go.kr

Table 2-6 Rail passenger transport trends, normalized by population (unit: km/person)

Country	2000	2001	2002	2003
China	349	367	383	369
Japan	3,019	3,027	3,002	3,023
Mongolia	443	435	431	–
Republic of Korea	572	600	591	584

Sources: National Bureau of Statistics, China, www.stats.gov.cn; Statistics Bureau & Statistics Center, Japan, www.stat.go.jp; National Statistical Office, Mongolia, Mongolian Statistical Yearbook 2003; Ministry of Construction and Transportation, Republic of Korea, Statistics – An Annual Report, www.moct.go.kr

Table 2-7 shows the rail freight transport trends in North-East Asian countries from 2000 through 2003. Demand in million ton-kilometres traveled has remained relatively constant for Japan and the Republic of Korea. Like passenger rail, China experiences the highest amount of freight ton-kilometres traveled by rail among the North-East Asian countries. The Russian Federation has a similarly high amount of ton-kilometres traveled by rail. The Russian Federation and China, however, have the first and third highest land areas in the world, respectively, and long distances are often required for freight transport.

Table 2-7 Rail freight transport trends (unit: million ton-km)

Country	2000	2001	2002	2003
China	1,366,300	1,457,500	1,565,800	1,724,700
Japan	22,136	22,193	22,131	22,794
Mongolia	4,283	5,288	6,461	–
Republic of Korea	10,803	10,492	10,784	11,057

Sources: National Bureau of Statistics, China, www.stats.gov.cn; Statistics Bureau & Statistics Center, Japan, www.stat.go.jp; National Statistical Office, Mongolia, Mongolian Statistical Yearbook 2003; Ministry of Construction and Transportation, the Republic of Korea, Statistics – An Annual Report, www.moct.go.kr

Transport demand by road also varies widely by country (Table 2-8). Despite having a large land area and over one billion people, China has fewer person-kilometres traveled by road than the Republic of Korea, whereas Japan – with the strongest economy in North-East Asia but a significantly smaller land area and population – has the highest amount of person-kilometres traveled by road. The average Japanese citizen travels significantly more by rail and road than citizens of any other North-East Asian country.

Table 2-8 Road passenger transport trends (Unit: million person-km)

Country	2000	2001	2002	2003
China	66,574	72,071	78,058	76,956
Japan	951,000	954,000	955,000	954,000
Mongolia	364	371	381	–
Republic of Korea	74,572	84,255	77,925	77,349

Sources: National Bureau of Statistics, China, www.stats.gov.cn; Statistics Bureau & Statistics Center, Japan, www.stat.go.jp; National Statistical Office, Mongolia, Mongolian Statistical Yearbook 2003; Ministry of Construction and Transportation, the Republic of Korea, Statistics – An Annual Report, www.moct.go.kr

Notes: Complete data on road person-kilometres traveled were not available for the Russian Federation.

Japan also experiences a high level of ton-kilometres traveled by road-twice as many as the Russian Federation (Table 2-9). Relative to rail, Japan relies heavily on trucks for freight transportation. In China, however, rail dominates freight transportation by land.

Table 2-9 Road freight transport trends (Unit: Million ton-km)

Country	2000	2001	2002	2003
China	61,294	63,304	67,825	70,995
Japan	313,000	313,000	312,000	322,000
Mongolia	126	130	134	-
Republic of Korea	11,412	12,322	13,275	13,006

Sources: National Bureau of Statistics, China, www.stats.gov.cn; Statistics Bureau & Statistics Center, Japan, www.stat.go.jp; National Statistical Office, Mongolia, Mongolian Statistical Yearbook 2003; Ministry of Construction and Transportation, the Republic of Korea, Statistics – An Annual Report, www.moct.go.kr

As the economy in this region has grown rapidly, container traffic and air transport demands also have increased very quickly. Container movements in major North-East Asian ports have shown spectacular growth in most cases, except in ports in Japan. Chinese ports in particular have shown more than a tenfold increase during the 1990-2000 periods (Tables 2-10 and 2-11).

Air transport in North-East Asia has increased in most countries. Both passenger and freight traffic have increased due to rises in income, overseas travel liberalization and the increases in intraregional trade. Although air transport occupies less than 2 per cent in volume, the value of goods transported by air is close to 30 per cent of the total traffic (see Table 2-12). In order to meet the ever-increasing air transport demand, major Asian countries are planning on expanding air transport related facilities.

Table 2-10 Container throughput trends in major North-East Asian ports (unit: 1,000 TEU)

Port	1990	1995	2000	2001	2002	2003	2004
Dalian	131	370	1,011	1,209	1,352	1,670	2,211
Tianjin	286	702	1,708	2,010	2,410	3,015	3,814
Qingdao	135	600	2,120	2,640	3,410	4,239	5,140
Kobe	2,596	1,464	2,266	2,010	1,993	2,046	2,177
Osaka	483	1,159	1,474	1,509	1,515	1,664	2,009
Tokyo	1,555	2,177	2,899	2,536	2,712	3,314	3,358
Yokohama	1,648	2,757	2,317	2,304	2,365	2,505	2,718
Busan	2,348	4,503	7,540	8,073	9,453	10,408	11,430
Gwangyang	-	12	678	887	1,126	1,185	1,320

Source: Containerisation International Yearbook

Table 2-11 Container throughput trends in North-East Asia (unit: 1,000 TEU)

Country	1990	1995	2000	2001	2002	2003	2004
China	1,204	17,232	35,483	44,726	55,717	61,898	74,540
Japan	7,956	10,604	13,621	13,127	13,501	15,055	15,987
Republic of Korea	2,348	4,503	8,530	9,287	11,543	13,050	14,299

Source: Containerization International Yearbook

Table 2-12 Air transport trends in North-East Asia (unit: million person-km, million ton-km)

Country	Passenger				Freight			
	2000	2001	2002	2003	2000	2001	2002	2003
China	90,960	109,140	126,870	126,320	3,900	4,372	5,155	5,790
Japan	176,629	165,621	168,763	157,178	8,312	7,204	7,833	7,958
Mongolia	515	539	661	–	9	10	9	–
Republic of Korea	62,837	84,544	92,175	82,231	7,774	11,327	12,606	11,696

Sources: National Bureau of Statistics, China, www.stats.gov.cn; Statistics Bureau & Statistics Center, Japan, www.stat.go.jp; National Statistical Office, Mongolia, Mongolian Statistical Yearbook 2003; Ministry of Construction and Transportation, the Republic of Korea, Statistics – An Annual Report, www.moct.go.kr

2.3 TRANSPORT AND LOGISTICS INFRASTRUCTURE IN NORTH-EAST ASIA

2.3.1 Existing conditions of transport infrastruture in North-East Asian countries

Transport related infrastructure development and transport and logistics demands differ greatly among the nations in North-East Asia. First of all, the level of motorization is quite different among the North-East Asian countries. The road network is continuously increasing in most North-East Asian countries along with the development of railway in some countries (see Table 2-13). The Russian Far East has the largest railway network of any of the North-East Asian countries with more than 87,000 km. China has more than 71,000 km. Mongolia, with 1,810 km of rail lines, has the smallest network.

China has more than 1.4 million miles of roads, making it the North-East Asian country with the largest road network. It also has the greatest number of express roads. Japan, despite being the fourth largest country in North-East Asia and being considerably smaller than the top three, has nearly 1.2 million miles of road network and the largest number of paved roads. The Democratic People’s Republic of Korea has the smallest road network.

China’s large expanses of inland territory are accessed by 121,557 km of navigable waterways. The Russian Far East has 96,000 of waterway. Mongolia, despite being a large, landlocked country has relatively few navigable waterways. Japan, the Republic of Korea, and the Democratic People’s Republic of Korea all have few navigable waterways. However, these countries are relatively small in land area and either completely or almost completely surround by ocean.

The countries of North-East Asia vary considerably by population and land area. When compared to total population, the Russian Far East still has the most substantial rail network (Table 2-14). The Russian Far East has a relatively small number of people (7.2 million) spread over a considerable land area (6.6 million km^2). A large railway network is required to connect such large expanses, though there are fewer people there. Mongolia has the second highest rail kilometres per capita: despite having the smallest rail network in North-East Asia, it also has the smallest population. China, with the largest population in the world, has only 55 km of rail per million persons.

Table 2-13 Comparison of transport infrastructure in North-East Asian countries

Country	Rail (broad gauge)	Rail (standard gauge)	Rail (narrow gauge)	Express road	Paved road	Non-paved road	Waterways
	km	km	km	km	km	km	km
China	0	68,000	3,600	16,314	297,890	1,088,494	121,557
Democratic People's Republic of Korea	0	5214*	N.A.	0	1,997	29,203***	2,250
Japan	0	3,204	77	6,455	528,016	627,423**	1,770
Mongolia	1,810	0	0	0	1,724	47,526*	580
Republic of Korea	0	3,125*	0	1,996	62,812	22,182	1,608
Russian Federation (Far East)	86,200	0	957#	0	358,833	173,560****	96,000

Notes: * Estimated in 2003 **1998 ***1999 ****2000
Narrow gauge is on Sakhalin Island

The Russian Far East has the most centerline kilometres of roadway per capita, more than four times higher than Mongolia and eight times higher than Japan. It also has nearly 50,000 km of paved road per million persons. Japan has the most centerline kilometres of express road per capita. Despite having the most absolute number of centerline kilometres of roadway of the North-East Asian countries, China has the lowest centerline kilometres of roadway per capita. When compared to population, the Russian Far East has the highest amount of waterways per capita, followed by Mongolia, in part due to their relatively small populations.

Table 2-14 Transport infrastructure per capita in North-East Asian countries

Country	Rail (total)	Express road	Paved road	Non-Paved road	Waterways
	km/million persons	*km/million persons*	*km/million persons*	*km/million persons*	*km/million persons*
China	55	13	229	838	94
Democratic People's Republic of Korea	230	–	88	1,287	99
Japan	26	51	4,147	4,927	14
Mongolia	658	–	627	17,276	211
Republic of Korea	64	41	1,292	456	33
Russian Federation (Far East)	12,105	–	49,838	24,106	13,333

Table 2-15 compares transport infrastructure per land area for each North-East Asian country. Centerline kilometres of infrastructure per land area give an indication of the level of accessibility in a country. The Democratic People's Republic of Korea and the Republic of Korea, with their relatively small land areas, have the highest centerline kilometres of rail per thousand square kilometres of land area. Japan has over 3,000 km of roadway per thousand km^2, making it the most accessible North-East Asian country by car or truck. All the North-East Asian countries except Japan and Mongolia have similar rates of waterway kilometres per land area.

Table 2-15 Transport infrastructure per land area in North-East Asian countries

Country	Rail (total)	Express road	Paved road	Non-paved road	Waterways
	km/thousand km²	*km/thousand km²*	*km/thousand km²*	*km/thousand km²*	*km/thousand km²*
China	7	2	31	113	13
Democratic People's Republic of Korea	43	–	17	242	19
Japan	9	17	1,397	1,661	5
Mongolia	1	–	1	30	0
Republic of Korea	31	20	631	223	16
Russian Federation (Far East)	13	–	54	26	14

2.3.2 Asian Highway and the priority road network

In order to meet the increasing demand for reliable and efficient land transport linkages and services in the Asian Pacific region, the Asian Highway project was initiated to promote the development of international road transport. Under the auspices of UNESCAP, the member countries have adopted the Asian Highway Network of 140,000 km in 32 countries with coordinated alignment, unified standards and signage (see Figure 2-1). The Asian Highway network was formalized through the Intergovernmental Agreement on the Asian Highway Network, which entered into force on 4 July 2005. As of September 2006, the agreement has been signed by 28 countries, of which 20 are Parties to the agreement.

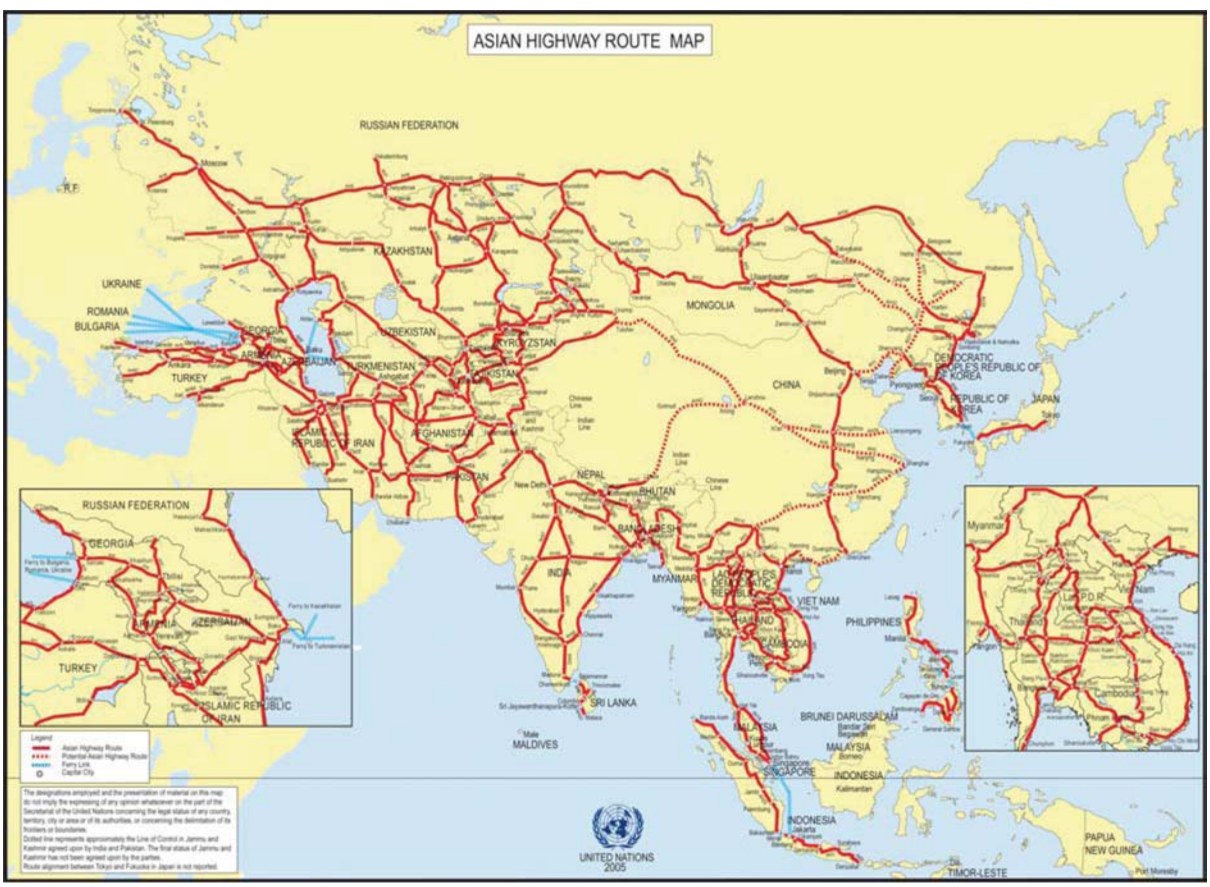

Figure 2-1 Asian Highway network

Recognizing the importance of the Asian Highway and the catalytic role that road transport plays in regional economic growth, the priority road network has been formulated for the North-East Asian region. The purpose of a priority road network is the acceleration of economic and social development in all countries of the subregion and the promotion of greater economic cooperation. Its development would open up opportunities throughout the region. The objective is to develop a road network for the mutual benefit of all countries concerned through national commitments and coordinated development .

2.3.3 Trans-Asian Railway development and North-East Asia

The Trans-Asian Railway originally consisted of a southern corridor going through South-East Asia, Bangladesh, India, the Islamic Republic of Iran, Pakistan and Turkey, but was later expanded under the Asian Land Transport Infrastructure Development (ALTID) project to cover the whole of Asia. It was made possible by a lessening of political tensions between the countries involved, the rapid economic development of China, the possibility of greater economic exchanges with the Democratic People's Republic of Korea and the prospects of accelerated economic development in Mongolia and the Russian Federation. Accordingly, ESCAP concluded a feasibility study on connecting the railways of China, Mongolia, the Russian Federation and the Korean Peninsula with a view to identifying the Trans-Asian Railway routes in the countries concerned. The study also considered route requirements and the border crossing facilitation measures required to assist in organizing efficient container land bridges between Asian and Europe that could compete with shipping services. The Trans-Asian Railway network now comprises of 81,000 km of railways in 28 member countries (see Figure 2-2).

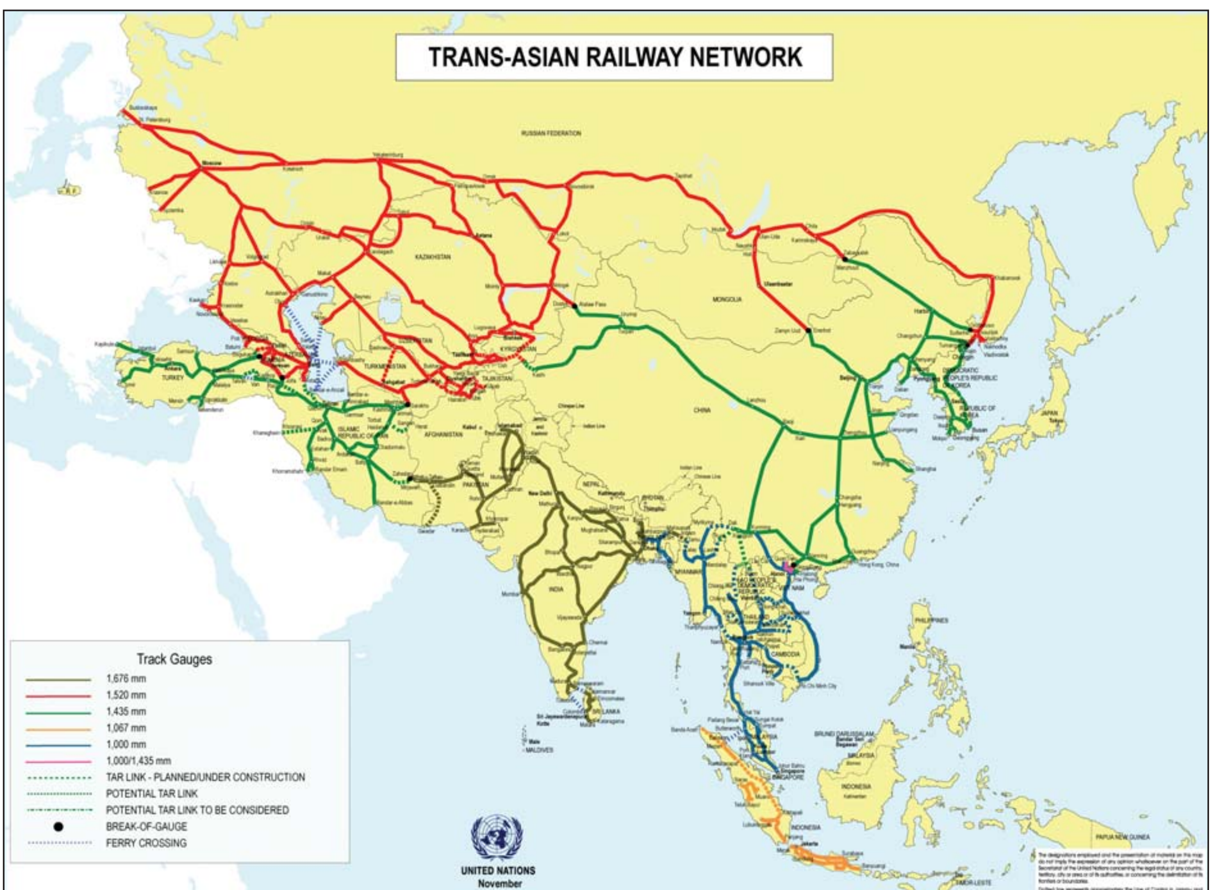

Figure 2-2 Trans-Asian Railway network

The Trans-Asian Railway network has also been formalized through the Intergovernmental Agreement on the Trans-Asian Railway Network. The agreement was adopted by the Commission in its resolution 62/4 of 12 April 2006 with a view to its being opened for signature on 10 November 2006, during the Ministerial Conference on Transport, scheduled to be held in Busan, Republic of Korea, from 6 to 11 November 2006.

The links forming the Trans-Asian Railway network (as well as the Asian Highway network) were identified by the participating countries in accordance with agreed criteria. The link had to fulfil one or more of the following:

- capital to capital link (for international transport)
- connection to main industrial and agricultural centers (link to important origin and destination points)
- connection to major sea and river ports (integration of land and sea transport networks)
- connection to major container terminals and depots (integration of rail and road networks).

Selected Trans-Asian Railway route data received from national experts in each North-East Asian country are provided in the appendix.

2.3.4 Major ports in North-East Asia

Given the physical geography of North-East Asia, ocean transportation is essential, if not unavoidable to access markets. From the early stages of cargo transportation, sea trade routes and rudimentary cargo movement always seems to have existed, regardless of political circumstances. In recent years, transport volumes of intraregional trade have increased significantly because of the reinforcement of economic cooperation in the region, with far more emphasis placed on development of coastal shipping than ocean shipping.

In the North-East Asian subregion, it is generally known that port facilities are quite sufficient in Japan and the Russian Federation relative to their trade volumes. In China and the Republic of Korea, however, even massive port construction has been unable to keep pace with the dramatic increase in maritime traffic.

Faced with serious problems due to lack of infrastructure, countries in North-East Asia have implemented new approaches to port development and management, which were traditionally funded and managed by the public sector. These new ways include deregulation, improvement of foreign direct investment and private sector involvement in ports.

In **China**, where 90 per cent of its trade volume is transported by sea, one can see the bustle of activity from ports dotted along the coastline stretching 18,400 km. At the end of 2002, the number of berths in operation in China totaled 33,600, among which 835 were deep-draft berths.[1] As China's exports and imports of container cargoes increase rapidly, Chinese ports increasingly dominate the rankings of world container port throughput. There were seven Chinese ports included in the top 30 container ports as of 2003 – Shanghai, Shenzhen, Qingdao, Tianjin, Guangzhou, Ningbo and Xiamen.[2] The Port of Dalian, which is located at the southern tip of the Liaodong Peninsula, serves as the gateway to the Northeastern provinces of China. The port is linked to an inland container transport network with dedicated train services to the inner cities of Changchun, Harbin, Shenuang and Yanji, with more than 40 departures every week.

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[1] The Ministry of Communications of the People's Republic of China, *The 2002 Report on China's Shipping Development,* July 2003, p.17.

[2] *Containerisation International*, March 2004, p.85.

In order to meet the increasing demand for port capacity, China has wide range of long-term port development plans supported by the central government budget and foreign direct investment. Emphasis is on the development of container terminals at the major ports including the Yang Shan deep-draft port project, the first phase of which began construction in 2002.[3]

In the **Democratic People's Republic of Korea,** with its heavy dependence on railway transport, road and maritime transport have played only supporting roles in the transport system. It is generally understood that the quality of port facilities in Democratic People's Republic of Korea requires improvement.

There are seven international trade ports in the Democratic People's Republic of Korea, i.e., Nampo, Chongjin, Rajin, Wonsan, Songrim, Haeju and Hungnam.[4] Nampo Port on the west coast is located near to Pyongyang and has a total of nine large berths with a combined length of nearly 2 km. Chongjin Port on the east coast has two main harbour areas: one specializing in coal and iron ore exports, while the other mainly handles imports of general and bulk cargo. With floating and multi-purpose cranes, container handling is available at Chongjin Port.[5] Rajin Port, located at the centre of the Rajin-Sonbong Free Economic and Trade Zone, has 13 berths totaling 2,520 m with the depth of 8-10.6 m. Rajin Port is capable of accommodating ships of the 5,000 to 30,000 ton class. Containers are handled using ordinary wharf cranes.[6]

Japan has established a network of around 1,100 ports including 21 specific important ports (trade ports) and 133 important ports that handle 42.2 per cent (based on ton-km) of domestic cargo and 99.8 per cent of international cargo. National port and harbour policy in Japan provides for planned long-term development of the country's ports in response to changing socioeconomic development and port-related demands. According to the 1996 *Council for Ports and Harbours Report*, in consideration of their significant affect on the country's distribution channels and costs, investment in container terminals has been emphasized due to their contribution to lowering distribution costs. In 1998, new government policy on the development and operation of container terminals, the core of international container distribution, was formulated as a means of reducing usage costs and correcting the high cost structure of the local and national economies.

To this end, Japan is moving towards developing gateway ports and subsidiary gateway ports. Deepwater, high standard international container terminals will be established at gateway ports in Tokyo Bay, Ise Bay, Osaka Bay and Northern Kyushu. These terminals will accommodate post-Panamax container vessels, which will further enhance multi-functioning as international distribution ports. Enhancing these ports will enable them to serve as global shipping channel network hubs, frequently providing port of call services and connecting each port of Japan with the rest of the world. The central ports are to be located in Hokkaido, Nihonkai-Chubu, Eastern Tohoku, Northern Kanto, Suruga Bay Coast and Chugoku. Southern Kyushu and Okinawa will be designated subsidiary gateway ports to complement gateway ports. They will serve as bases for a shipping network that connects Japan with Southeast Asia and other regions exhibiting remarkable growth.[7]

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[3] The Yang Shan deep-draft port project is designed to have 50 container berths that can accommodate the fifth and sixth generation of container vessels with the designed annual throughput capacity of 2.2 million TEU. The first phase of the project is expected to complete and put into operation by the end of 2005. (The Ministry of Communications of the People's Republic of China, *The 2002 Report on China's Shipping Development*, July 2003, p.18.)

[4] Presentation by the Delegation of the Democratic People's Republic of Korea at the Regional Seminar on Commercial Development of Ports as Logistics Centres, 11-12 July 2002, Bangkok.

[5] Lloyd's List, Port of the World 2005.

[6] ERINA, Vision for the Northeast Asia Transportation Corridors, ERINA Booklet, Vol. 1, June 2002.

[7] Ministry of Land, Infrastructure and Transport of Japan, Ports and Harbours in Japan 2002.

Japan is also forging ahead with the Super Hub Port project to compete with other major ports in Asia in terms of cost and service by developing large-scale, integrated terminal systems and taking advantage of information technology (IT). In June 2004, three major ports (Tokyo Bay, Osaka Bay and Ise Bay) met the requirements for designation as super hub ports.[8]

While the **Republic of Korea** has been implementing a long-term port development plan, delays have prevented the timely expansion of port facilities to meet the rapid surge of export and import trade as well as drastic increases in transshipment demand from and to Chinese ports. As of 2002, for example, the total designed capacity of ports in the Republic of Korea was on average only 79 per cent of total demand. Worse is the situation in the case of container cargo. The supply of container handling facilities in Busan Port in 2002 remained around 65 per cent of demand and nearly 30 per cent of container cargo was handled at conventional general cargo berths.[9]

In an effort to realize the nation's vision to play the role as the main logistics hub for North-East Asia, a vigorous port development plan is being pursued to expand the facilities at major ports. The ports of Busan and Gwangyang are to be developed as mega container hub ports and the port of Incheon as a gateway of the Seoul and Incheon metropolitan area, in particular for the trade with China.

Along the coast of the **Russian Federation**, there are a total of 22 large ports and 100 small ports. In the far eastern region of the Russian Federation, the three most important ports are Vladivostok, Nahodka, and Vostochny, which are linked with the Trans Siberian Railway (TSR). Within the region, Nahodka and Vostochny have the single largest port system, which handles mostly container cargo for TSR. The Russian ports in the Far Eastern region have the potential to benefit from possible increase in traffic between North-East Asia and Europe through the TSR. The possibility also exists for Russian ports to handle transit cargo to and from the North-Eastern provinces of China.

2.3.5 Information and communications, and other logistics facilities

In **China**, the companies that operate both container terminals and transport containers have their own information systems (i.e. EDI system). However, subcontractors do not have such sophisticated computerized management systems so they rely on other equipment to connect and communicate with business partners. The equipment provides the location of freight and containers and their status. Some big carriers also have their own GPS and GIS systems to trace their containers and vehicles.

China uses a transport management information system (TMIS). The major ports are able to receive information in advance on arriving containers; and within the next five to ten years they will introduce a multimodal waybill for the transport of containers. In next the five years the railway IT system will connect main ports and customs.

In the **Republic of Korea**, the transport/logistics information system can be divided into the government sector and the private sector. In the government sector, each ministry of government has developed various kinds of the transport/logistics information systems independently. The Port Management Information System (PORTMIS) was developed by the Ministry of Maritime Affairs and Fisheries in 1991 (then known

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8 http://www.mlit.go.jp/kisha/kisha04/11/110723_.html

9 Ministry of Maritime Affairs and Fisheries, Republic of Korea, White Paper 2002-2003 (in Korean).

as the Korea Maritime and Port Administration) to manage ships entering the ports, as well as cargo transport in the port area, port facilities, and port decision making.

The introduction of PORTMIS provided momentum for promoting the information network among relevant government ministries by reducing logistics costs and providing a paperless process. In 1991, the Ministry of Industry and Energy established the Korea Trade Network Company and developed the KTNet (Korea Trade Network) which is controlled by the Customs Administration. Since 1997, KTNet has overseen imports and exports, customs clearance, finance to trading companies, shipping lines, insurance companies and banks. The KTNet, the first EDI system in the Republic of Korea, developed the KEDIFACT by accepting the EDIFACT developed in Europe as an EDI standard.

Apart from developing the KTNet, Ministry of Maritime Affairs and Fisheries developed the KLNet (Korea Logistics Network) jointly with shipping lines and forwarders because the KTNet did not provide services closely related with cargo flow. In order to reduce the time and cost incurred in the process of exporting and importing cargoes, the KLNet provides EDI service to all logistics related firms such as shipping lines, forwarders, transport firms, ICDs (inland container depots), shippers, the Customs Administration and the National Railroad.

In addition, the Ministry of Construction and Transportation has established an integrated logistics network – the KTLOGIS – supported by manufacturing firms, transport firms and warehousing firms. The KTLOGIS completed its first phase development in 1997, the second phase in 2000. The third phase will be completed in 2015. The main services available from the KTLOGIS are the electronic data interchange (EDI), the database system of import and export information (DBsystem), and commercial vehicle operation (CVO), which are provided to parties such as the manufacturing firms, transport firms and warehousing firms.

Since 1997 the PORTMIS has been interconnected with the KLNet through the sharing of the DBsystem. In addition to that, the KLNet is linked with the KTNet and with KTLOGIS by mediating the information.

Information communication technology, especially Internet technology, has developed rapidly recently, with the private sector promoting electronic commerce actively by using Internet networking systems. Most shipping lines, such as the Hyundai Merchant Marine, Hanjin Shipping Lines and Choyang Shipping Lines, provide their customers with information about ship schedules, cargo reservations, cargo tracking systems, notices of cargo arrival and issues of bills of landing via the Net. These private companies are competing with the KLNet, KTNet, KTLOGIS in the area of the electric commerce. Hanjin Shipping Line is allied with Cyber Logitech, the information and communication company, in order to facilitate quick decision making, to increase productivity and to provide inland transport services. Korea Express, Samsung SDS and SK are also operating a logistics information service for their customers and are connecting their network with KTNet, KLNet, KTLOGIS.

The main and difficult issues that have occurred in the process of providing logistics information are the complexity of working processes and the variety of the interested parties. The first problem is the inadequate interconnecting capability of the service providers in collecting and managing the integrated information, which cannot be provided by individual logistics information providers. The second one is the deficiency of the connections among the information network system. The third difficulty lies in the huge differences between the service levels of the information system among the logistics companies.

In order to overcome these problems, the Ministry of Maritime Affairs and Fisheries is going to set up a shipping and Port - Internet Data Center (SPIDC) by 2005. The feasibility of the system is being studied by the Korea Maritime Institute. The construction of the integrated EDI network will include the utilization of XML (Extensible Markup Language), the introduction of an advanced logistics management system, including a cargo tracking system, the development of a standard program to connect the ASP (Application Service Provider) and ERP (Enterprise Resource Planning), and the adoption of the existing logistics information system, which has been used fragmentarily by the each of the private companies (see Table 2-16).

In the **Russian Federation**, the TRANSTELECOM Co. operates optical fibre telecommunication network of 52,000 km. Based on such telecommunication network the Russian Railways (RZD) created a unique information system, which allows real time checking of rolling stock at any of 6,000 railway stations of the Russian Federation. The telecommunication network of RZD is already connected to similar networks of China, Finland, Kazakhstan, Lithuania, Latvia, Mongolia and Ukraine, and provides grounds for common information space for international transport corridors passing through the territory of the Russian Federation.

Development of similar telecommunication networks for various modes of transport is also in progress: the telecommunication network for inland waterways is being formulated; all the major sea ports already use the telecommunication network served by TRANSTELECOM Co.; major airlines created their corporate networks covering subdivisions scattered all over the country; Road transporters formed their telecommunication network. However all these networks serving various transport modes of the transport system of the country are not yet integrated.

To improve information interchange between RZD and its customers a pilot project was launched to introduce electronic waybill (ETRAN). The system greatly simplified the application for transport procedures (terminals were established at more than 5,000 enterprises). An e-signature system with a special certifying centre is also being introduced by RZD and the next step will be for the whole transport system.

Table 2-16 Information system in the Republic of Korea

Services	Type and Description	Current Trends and Development Plans
Commercial Vehicle Operation (CVO)	– Real time tracking service of vehicles and freights – Vehicle operation management – Freight transport arrangement – Cyberspace logistic information – Weather, traffic condition, map information	– Used by 25,000 vehicles (less tha1% of total freight vehicles) – Government will subsidize 50% of the purchasing price of CVO machine to increase the usage of this service.
Electronic Data Interchange (EDI)	– Exchange information by logistic industry using standard electronic text data – PORT-MIS service – KROIS Service	– Government: PORT-MIS (11 type), KROIS (5 type), and KCIS (39 type) – Private: land transport (6 type), sea transport (26 type), foreign exchange (31 type), and insurance (4 type)
Integrated import/export logistic information	– Establish integrated data base that provide information on freight status and location for efficient management of import/export freights – Marine transport track service, air transport track service, and transport statistics service	– Logistic industry can receive import/export logistic information service through the internet at KT-Logis starting April 2000. – Other government agencies also provide information on marine transport, customs, rail transport, seaport terminal (KL-Net), and KT-net.

THREE: FORMULATION OF AN INTEGRATED INTERNATIONAL TRANSPORT AND LOGISTICS SYSTEM FOR NORTH-EAST ASIA

3.1. MAIN PRINCIPLES OF FORMULATIONS OF THE INTEGRATED TRANSPORT AND LOGISTICS NETWORK

3.1.1 Main principles of network formulation

As the network is to provide reliable and efficient intermodal international transport linkages in North-East Asia to facilitate international trade and tourism, its development objective should be to eventually provide a choice of alternative competitive routes to any of major economic centers and ports in North-East Asia from any country of North-East Asia.

The availability of competitive routes will provide each country in North-East Asia with a degree of independence and a real choice in accessing expanding markets. It will also result in lower transport costs and an improved level of transport services.

The main principles of the system formulation are as follows:

a) Maximum possible use of the existing infrastructure.

b) Minimum possible number of routes with particular attention to any possible parallel routes as well as missing links.

c) The system should provide intermodal transport routes to major provincial cities/economic centers, including major railway stations with freight and container yards, inland water terminals, container terminals and airports in the following regions:

- Provinces of Heilongjang, Jilin, Liaoning and Nei Mongol of China
- Democratic People's Republic of Korea
- Japan
- Mongolia
- Republic of Korea
- Far East/Primorsky Territory of Russian Federation
- Tumen River Development Area (TRDA)

d) The system should also include access routes to the following port clusters:

- Dalian (Ports of Dalian, Dandong)
- Tianjin
- Nampo
- Rajin (Ports of Rajin, Sonbong, Cheongjin)
- Hakata (Ports of Hakata, Shimonoseki)

– Kobe (Ports of Kobe, Osaka)
– Niigata (Pots of Niigatam Fushiki)
– Tokyo (Ports of Tokyo, Yokohama)
– Busan (Ports of Busan, Gwangyang)
– Incheon
– Vladivostok (Ports of Vladivostok, Nakhodka, Vostochny)
– Zarubino (Ports of Zarubino and Posjet)

e) The system should eventually meet the requirements of international traffic within the North-East Asian subregion, as well as between North-East Asia and other parts of the world.

f) The system should be designed primarily for efficient transport of ISO and non-ISO containers, which are the main containers used for international trade (Table 3-1).

Table 3-1 Dimensions of ISO and non ISO containers

Freight container designation	External height			External width			External length			Maximum gross weight (tonnes)
	ft	in	mm	ft	in	mm	ft	in	mm	
ISO										
1A	8	00	2,438	8	00	2,438	40	00	12,192	30
1AA	8	06	2,591	8	00	2,438	40	00	12,192	30
1B	8	00	2,438	8	00	2,438	30	00	9,125	25
1BB	8	06	2,591	8	00	2,438	30	00	9,125	25
1C	8	00	2,438	8	00	2,438	20	00	6,058	24
1CC	8	06	2,591	8	00	2,438	20	00	6,058	24
1D	8	00	2,438	8	00	2,438	10	00	2,991	10
Non-ISO										
(1)	9	06	2,896	8	00	2,435	48	00	14,630	35
(1)	9	06	2,896	8	00	2,435	45	00	13,716	35
(1)	9	06	2,896	8	00	2,435	40	00	12,192	35
(1)	9	06	2,896	8	00	2,435	20	00	6,058	35
(2)	9	06	2,896	8	06	2,591	53	00	16,150	35
(2)	9	06	2,896	8	06	2,591	48	00	14,630	35
(2)	9	06	2,896	8	06	2,591	45	00	13,716	35

3.1.2 Main components of the system

To ensure its reliability and efficiency, the transport and logistics system should integrate infrastructure and logistics components in the following composition.

Infrastructure components

- the main port clusters in North-East Asia
- intermodal land transport routes comprising priority road and rail routes in North-East Asia, major

transport nods as well as border crossing facilities
- major container terminals in North-East Asia including ICDs
- information and communication system (ICS) in North-East Asia for international transport
- logistics facilities in North-East Asia.

Logistics components

- provision of a necessary legal framework for international transport through:
  – accession and implementation of relevant international conventions with particular emphasis on the implementation of the ESCAP resolution 48/11 on road and rail transport modes in relation to facilitation measures and the FAL Convention
  – ensuring compatibility with the multilateral agreements already in place and the agreements being formulated by some of the countries such as the members of the Shanghai Cooperation Organization[1]
  – improved bilateral agreements with a wider angle of international and transit transport.
- eventual introduction of multimodal transport with the application of modern e-based information and communication technology

3.2 PROPOSED INTEGRATED INTERNATIONAL TRANSPORT NETWORK IN NORTH-EAST ASIA

As a starting point, the integrated international transport network is proposed as in Figure 3-1. The proposed network is based on previous UNESCAP studies on Trans-Asian Railways and Asian Highways, and in particular recent studies on the priority road network in North-East Asia and integrated shipping and port system in North-East Asia.

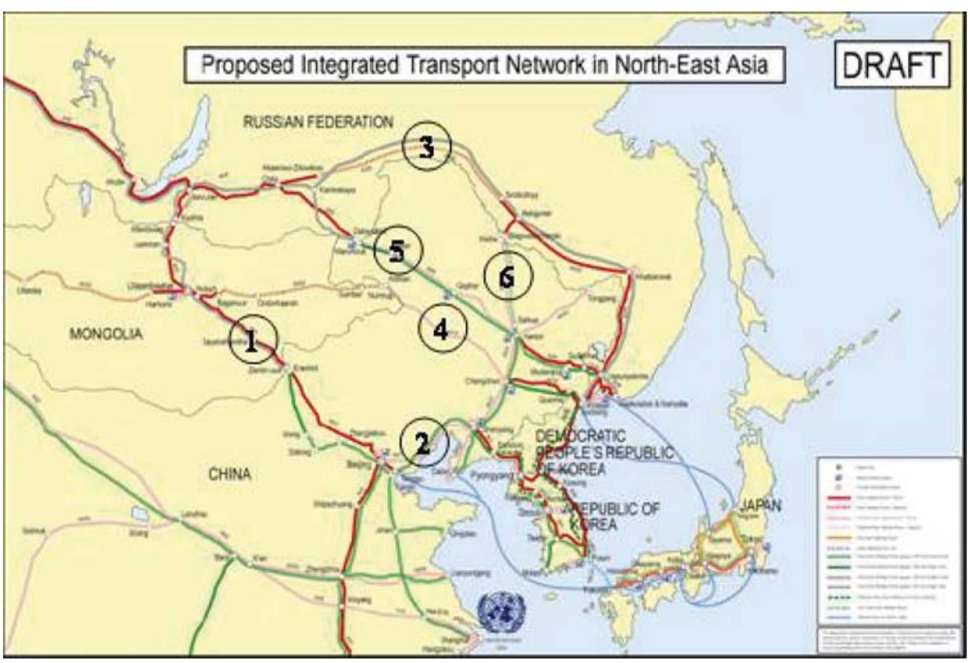


Figure 3-1 Proposed integrated transport network in North-East Asia

[1] China, Kazakhstan, Kyrgyzstan, Russian Federation, Tajikistan and Uzbekistan (Mongolia as observer)

The proposed network was reviewed by national experts of participating countries, i.e., China, the Democratic People's Republic of Korea, Japan, Mongolia, the Republic of Korea and the Russian Federation. The network was also discussed together with the strategy and actions to develop the network at the subregional policy-level expert group meeting (6-10 September 2004, Ulaanbaatar, Mongolia) and subsequently at a series of national workshops in China (10-11 August 2005, Beijing), Monglia (11-12 April 2005, Ulaanbaatar), the Republic of Korea (9-10 June 2005, Busan) and the Russian Federation (18-23 July 2005, Moscow and Vladivostok), which were organized as part of the project activities.

3.3 SELECTED INTERNATIONAL TRANSPORT CORRIDORS FOR ANALYSIS

From this integrated network, six important international transport corridors in North-East Asia are selected as shown in Table 3-2 for further in-depth analysis in the study. These selected corridors include road and railway networks linking neighbouring countries and providing connections to major port clusters in the subregion.

Table 3-2 Selected international transport corridors for analysis

No	Corridor	China	Democratic People's Republic of Korea	Mongolia	Republic of Korea	Russian Federation
1	Tanggu-Tianjin–Beijing–Eranhot – Zamin Uud–Ulaanbaatar–Darkhan–Ulan Ude	Road/Rail/ Port		Road/Rail		Road/Rail
2	Beijing–Shenyang–Dandong–Pyongyang–Seoul–Busan	Road/Rail/ Port	Road/Rail/ Port		Road/Rail/Port	
3	Busan–Pohang–Kosong–Wonsan–Kimchaek–Sonbong–Hasan-Razdolnoye–Ussuriysk–Khabarovsk–Belogorsk–Chita-Ulan Ude		Road/Rail/ Port		Road/Rail/Port	Road/Rail/ Port
4	Rajin/Sonbong–Jilin– Changchun–Ulanhot–Yorshi-Sumber–Ulaanbaatar	Road/Rail	Road/Rail/ Port	Road		
5	Nakhodka/Vladivostok–Ussurisk–Pogranichny–Harbin –Manzhouli–Chita-Ulan Ude	Road/Rail				Road/Rail/ Port
6	Dalian–Shenyang–Changchun–Harbin–Heihe–Blagoveshchensk–Belogorsk	Road/Rail/ Port				Road/Rail

For each corridor, feasible unimodal/intermodal routes along the corridor are suggested as in Table 3-3. Maritime container or ferry service routes are also selected to provide sea links to Japan from the six corridors.

The next chapter of this study provides details of the analysis to evaluate transport performance and to identify major bottlenecks on the major unimodal/intermodal routes along the six international transport corridors. The analysis is based on the cost/time-distance methodology developed by UNESCAP (see Box 3.1).

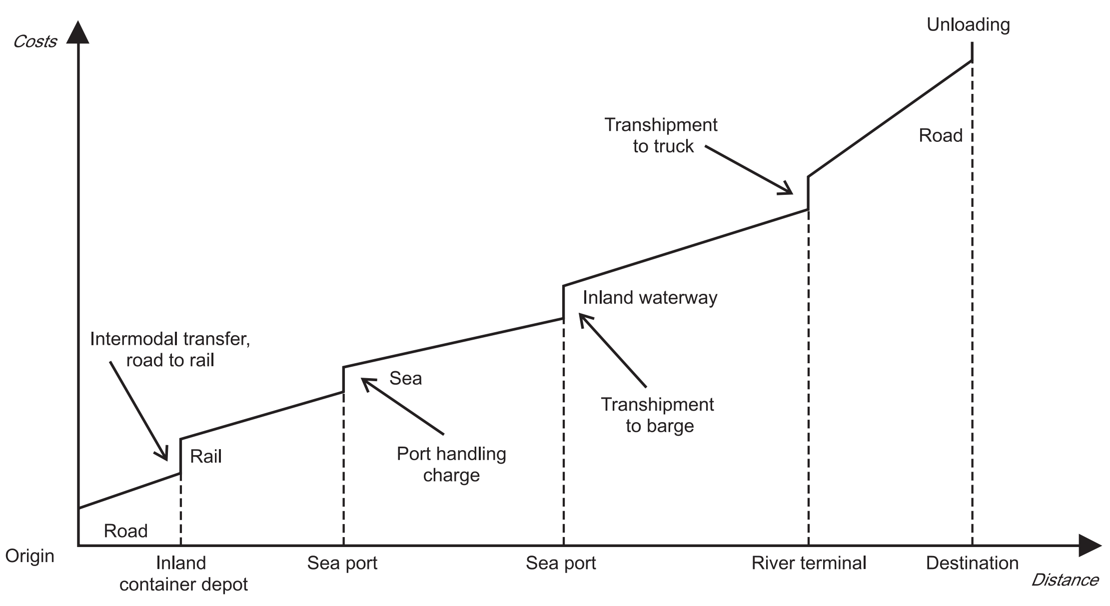
Table 3-3 Suggested unimodal/intermodal routes along the six corridors

No	Unimodal (U) / Intermodal (I) routes	Sea links to Japan
1	U-1.1: Rail route: China – Mongolia – Russian Federation I-1.2: China (road) – Mongolia (rail) – Russian Federation (rail)	Kobe–Tianjin (Container vessel)
2	U-2.1: Rail route: China – Democratic People's Republic of Korea – Republic of Korea I-2.2: China (Road) – Democratic People's Republic of Korea (Rail) – Republic of Korea (Rail) I-2.3: China (Rail) – Democratic People's Republic of Korea (Rail) – Republic of Korea (Road) I-2.4: China (Road) – Democratic People's Republic of Korea (Rail) – Republic of Korea (Road)	Busan–Shimonoseki (Sea Ferry) Shimonoseki–Tokyo (Railway and Road)
3	U-3.1: Rail route: Republic of Korea – Democratic People's Republic of Korea – Russian Federation I-3.2: Republic of Korea (Road) – Democratic People's Republic of Korea (Rail) – Russian Federation (Rail)	Yokohama–Busan (Container vessel)
4	U-4.1: Road route: Democratic People's Republic of Korea –China – Mongolia I-4.2: Democratic People's Republic of Korea (Rail) – China (Road) – Mongolia (Road) I-4.3: Democratic People's Republic of Korea (Rail) – China (Rail) – Mongolia (Road) I-4.4: Democratic People's Republic of Korea (Road) – China (Rail) – Mongolia (Road)	Tokyo–Niigata (Railway and Road) Niigata–Rajin/Sonbong (Container vessel)
5	U-5.1: Rail route: Russian Federation – China – Russian Federation U-5.2: Road route: Russian Federation – China – Russian Federation I-5.3: Russian Federation (Rail) – China (Rail) – Russian Federation (Road) I-5.4: Russian Federation (Rail) – China (Road) – Russian Federation (Road) I-5.5: Russian Federation (Rail) – China (Road) – Russian Federation (Rail) I-5.6: Russian Federation (Road) – China (Rail) – Russian Federation (Rail) I-5.7: Russian Federation (Road) – China (Road) – Russian Federation (Rail) I-5.8: Russian Federation (Road) – China (Rail) – Russian Federation (Road)	Tokyo–Fushiki (Railway and Road) Fushiki–Vladivostok (Sea Ferry)
6	U-6.1: Rail route: China – Russian Federation U-6.2: Road route: China – Russian Federation I-6.3: China (Rail) – Russian Federation (Road) I-6.4: China (Road) – Russian Federation (Rail)	Nagoya–Dalian (Container vessel)

Box 3.1 Cost/time-distance methodology for analysing transport routes

The UNESCAP Time/Cost-Distance methodology is a practical and simple way of illustrating the time and costs involved in the transportation process and identifying inefficiencies and isolating time bottlenecks along a particular route. The methodology is based on the graphical representation of data collected with respect to the cost and time associated with transport process. The vertical axis of the model represents the time and cost incurred while the horizontal axis represents the distance traveled from origin to destination. The methodology enables easy identification of time and cost related barriers along the entire international transport route.

The methodology is based on the premise that the unit costs of transport may vary between modes, with the steepness of the cost/time curves reflecting the actual cost, price or time. At border crossings, ports and inland terminals, delays occur and freight/document-handling charges and other fees are usually levied without any material progress or movement of the goods being made along the transport route. This is represented by a vertical step in the cost curve. The height of the step is proportional to the level of the charge or time delay.



Note: The cost/time-distance methodology has been adapted from A.K.C. Beresford and Dubey R.C., *Handbook on the Management and Operation of Dry Ports* (UNCTAD/RDP/LDC/7) as improved by R. Banamyong in "Multimodal transport corridors in South East Asia: a case study approach", unpublished doctoral dissertation, University of Cardiff, Cardiff Business School, 2000.

FOUR: EVALUATION OF PERFORMANCE AND IDENTIFICATION OF BOTTLENECKS IN SELECTED CORRIDORS

4.1 CORRIDOR 1
TANGGU-TIANJIN-BEIJING-ERANHOT-ZAMIN UUD-ULAANBAATAR-ULAN UDE

4.1.1 Significance

Corridor 1 passes through three countries: China, Mongolia and the Russian Federation. This corridor is especially important to Mongolia. There are two reasons for this. On the one hand, the corridor is meaningful to Mongolia as a land transport route in itself. Mongolia's two neighbouring countries hold a significant position in its economy. In 2005, China and the Russian Federation, the most important trade partners of Mongolia, accounted for 38.5 per cent and 20.4 per cent of Mongolia's total foreign trade volume respectively (Table 4-1).

Table 4-1 Major trade partners of Mongolia

Export	2003		2004		2005	
	million US$	%	million US$	%	million US$	%
World	615.9	100	851.9	100	888.6	100
China	284.2	46.1	407.1	47.8	483.6	54.4
United States	142.9	23.2	152.9	17.9	126.8	14.3
United Kingdom	26.1	4.2	134.0	15.7	41.9	4.7
Russian Federation	41.2	6.7	18.1	2.1	26.1	2.9
Italy	9.1	1.5	17.3	2.0	16.7	1.9
Germany	4.6	0.7	11.5	1.3	15.8	1.8
Republic of Korea	7.5	1.2	7.8	0.9	12.1	1.4
Japan	8.5	1.4	33.5	3.9	5.6	0.6
Australia	34.5	5.6	0.1	0.0	0.3	0.0
Singapore	35.0	5.7	19.9	2.3	0.1	0.0
Imports	2003		2004		2005	
	million US$	%	million US$	%	million US$	%
World	801.4	100	1,011.3	100	1,197.4	100
Russian Federation	265.4	33.1	336.6	33.3	400.4	33.4
China	172.4	21.5	238.2	23.6	318.8	26.6
Japan	63.4	7.9	74.5	7.4	78.5	6.6
Republic of Korea	67.7	8.4	60.9	6.0	70.3	5.9
Germany	38.0	4.7	33.5	3.3	51.3	4.3
United States	23.5	2.9	46.9	4.6	31.7	2.6
Kazakhstan	4.9	0.6	26.6	2.6	29.5	2.5
Singapore	10.4	1.3	14.9	1.5	17.6	1.5
Australia	19.6	2.4	15.5	1.5	10.9	0.9
Hong Kong, China	23.9	3.0	15.4	1.5	7.5	0.6

Source: ADB, Key Indicators 2006: Measuring Policy Effectiveness in Health and Education, 2006

Corridor 1, which extends from Tianjin, one of China's major trade ports, via Beijing and Ulaanbaatar, the capital cities of China and Mongolia, to Ulan Ude, a connecting point to the Trans Siberian Railway (TSR), makes the greatest contribution to Mongolia's economic exchanges with its most important economic partners. Furthermore, most Mongolian cargos being moved to Central Asia or Europe are transported via the combination of Corridor 1 and the TSR.

On the other hand, Corridor 1 has even greater importance as a gateway to the sea for Mongolia, a landlocked country. The transport of cargos to regions other than China, the Russian Federation and Europe has mainly depended on the combination of Corridor 1 and sea transport. As shown in Table 4-1, the economic exchange of Mongolia with countries besides China and the Russian Federation, which account for 45.9 per cent of Mongolia's total foreign trade, also holds a crucial position in its economy. Especially, access to the United States of America, holding 16.2 per cent of the total, and to Japan and the Republic of Korea, together accounting totally for 13.0 per cent, seem especially important. Tianjin Port plays a decisive role as the only main exit for Mongolia to the Yellow Sea and the Pacific.

4.1.2 Current situation and prospects

Port. Tianjin Port, which is situated in north-east China, 137 kilometres from Beijing on the coast of the Bohai Sea, is a key gateway to northern China. As the closest land starting point to the Asia-Europe land bridge, it is on course to become an important link between Europe and North-East Asia. Transshipment volumes with Mongolia, Kazakhstan and other inland countries continue rising. According to ERINA, 4,000 to 5,000 TEU of Mongolia's container freight is handled at Tianjin Port annually.[1] (Table 4-2).

Table 4-2 Regional distribution of container traffic at Tianjin Port (Unit: thousands of TEU)

Regions	1999		2000		2001	
	Amount	%	Amount	%	Amount	%
Japan	391	30.0	379	22.2	356	17.7
Republic of Korea	365	28.0	463	27.1	453	22.5
North America	117	9.0	113	6.6	134	6.7
Europe	130	10.0	211	12.4	260	12.9
Others	299	23.0	542	31.7	808	40.2
Total	**1,302**	**100.0**	**1,708**	**100.0**	**2,011**	**100.0**

Tianjin Port is divided into four areas; (1) Inner River Port Area; (2) North Harbour Area; (3) South Harbour Area; and (4) Bulk Cargo Logistics Center. North Harbour Area is mainly developed for containers and general cargoes while South Harbour Area is a modern port area for coal, coke, oil and petrochemicals. The Inner River Port Area is located at the lower reaches of Heihe River, handling general cargo. Tianjin port is now the third largest port in China after Shanghai and Ningbo. It handled 163 million tons of cargo including 3 million TEU of containers in 2003.

At present Tianjin has eight specialized container berths totaling 2,373 metres, of which four berths of a total length of 1,150 m are operated by CSX Orient Container Terminal.

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[1] ERINA,Vision for the Northeast Asia Transportation Corridors, ERINA, Vol. 1, June 2002.

Table 4-3 Tianjin Port container terminals

Operating Company	Length (m)	Depth (m)	Number of berths × capacity (dwt)	Number of gantry cranes
Tianjin Port Container Terminal Co., Ltd. (TCT)	398 825	12 15.2	1×50,000 3×100,000	4 8
CSX Orient (Tianjin) Container Terminals Co., Ltd. (CSXOT)	1,150	14	4×25,000	8
Total	2,373	12-15.2	8	20

Source: http://www.tctcn.com; http://www.csxot.com

According to the General Development Plan of Tianjin Port, which was jointly reviewed and approved by the Ministry of Communications and Tianjin Municipality, Tianjin Port will be developed into a modern port with multiple functions, including transport arrangements, loading, unloading, warehousing, transshipment to coastal industry, logistics, bonded storage and information services. The plan includes an investment of CNY7 billion to construct a total of ten new container berths during the period from 2004 to 2009. Another CNY1.1 billion will be spent on building a container logistics centre covering 5.4 square kilometres. It is expected that by 2010, the throughput will reach 300 million tons, including 10 million TEU of container cargo.[2]

Railway. From Tianjin Port a multi-track line of around 137km goes to Beijing, and then an additional 501km of double track line goes to Jining via Datong, an additional 501km. It continues to Erenhot via a single-track line of 338km. At the border between China and Mongolia, transshipment is needed because of a gauge difference. Railroad tracks in Mongolia are broad gauge, i.e. 1520mm, while Chinese rail lines use the standard gauge of 1435mm. However, both standard and broad gauge rails are available at the border area between Erenhot and Zamyn Uud. The rest of the Mongolian and Russian sections are composed of broad gauge and single-track railway with a length of nearly 1,400km (Figure 4-1). Table 4-4 lists major segment distances along this rail route.

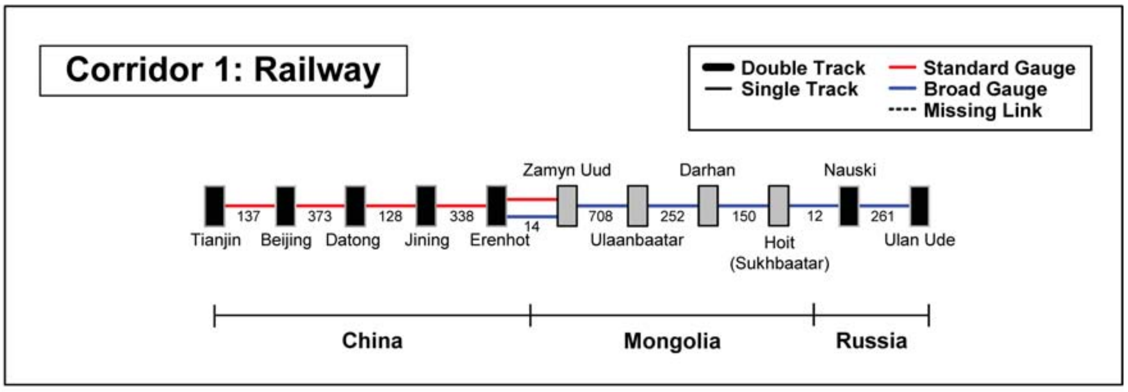

Figure 4-1 Present conditions of railway, Corridor 1

Source: Based on Country reports, ERINA, and Maps produced by UNDP.

[2] http://www.schednet.com/home/index.asp?area=news, 3 November 2004.

Table 4-4 Rail distance between Tanggu to Ulan Ude

Country	From	To	Distance (km)
China	Tianjin	Eranhot	976
Border	Eranhot	Zamin Uud	14
Mongolia	Zamin Uud	Ulaanbaatar	708
	Ulaanbaatar	Hoit(Sukhbaatar)	402
Border	Hoit	Naushki	12*
Russian Federation	Naushki	Ulan Ude	261
Total	(Tianjin-Ulan Ude)		2,373

Note: * estimate

Mongolia, meantime, has an overly high dependency on railway for cargo transportation. Based on tonnage, railway accounted for 86.0 per cent of the total cargo traffic volume in 2002, while road accounted only for 14.0 per cent (Table 4-5). With ton-km based calculation, the dependence on railway reaches to no less than 97.8 per cent. This difference suggests that the railway in Mongolia is used heavily in long-distance cargo transport. Considering Mongolia's vast area and sparse population density, railway seems an adequate mode for long-distance cargo transportation. The present condition of its railway system, however, demands more investment to improve transport time and services. ERINA also mentions the need to introduce reefer containers for dairy products and meat, the main export items for Mongolia.[3]

Table 4-5 Freight traffic volume in Mongolia by mode

Modes	2001				2002			
	1000 tons		million ton-km		1000 tons		million ton-km	
	volume	%	Volume	%	volume	%	volume	%
Railway	10147.7	69.0	5287.9	97.4	11637	86.0	6461.3	97.8
Road	1658.2	11.3	129.5	2.4	1888.7	14.0	133.6	2.0
Inland Waterway	1.7	0.0	0.4	0.0	1.8	0.0	0.5	0.0
Air	2.9	0.0	9.5	0.2	2.4	0.0	9.0	0.1
Total	11810.5	100	5427.3	100	13529.9	100	6604.4	100

Source: National Statistical Office of Mongolia, Mongolian Statistical Yearbook, 2002

Road. Corridor 1 is designated as a North-East Asian section of the Asian Highway by UNESCAP, and provides connections to the Trans Siberian Trunk Highway. The total length of this road route is about 2,163km (Figure 4-2 and Table 4-6).

Paved roads including the Tianjin-Beijing Expressway are available between Tianjin and Jining. The Chinese government plans to upgrade the Beijing-Erenhot section to expressway standards. Roads on the Mongolian side (1,026km) are in poor condition. With the exception of the Ulaanbataar-Altanbulag section (345km) where a motorway is available, most of the Mongolian sections are unpaved.

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[3] ERINA,Vision for the Northeast Asia Transportation Corridors, ERINA Booklet, Vol. 1, June 2002.

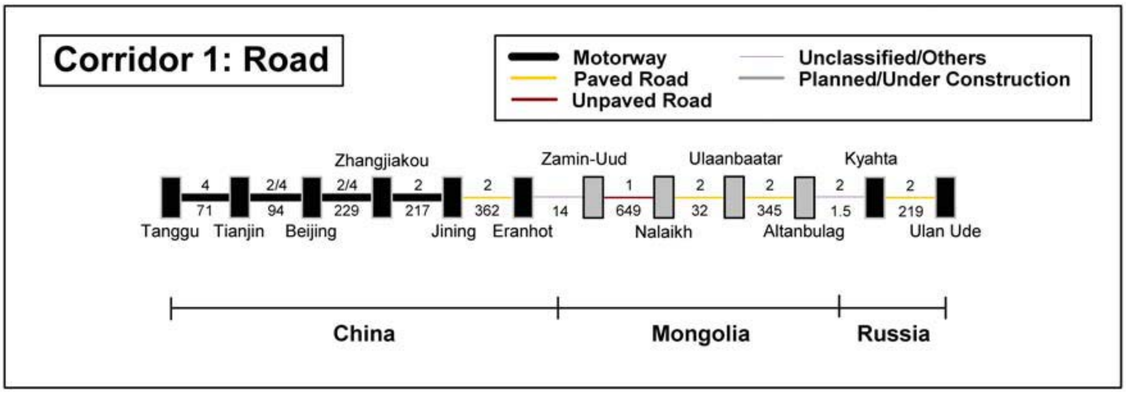

Figure 4-2 Present conditions of road, Corridor 1

Sources: Based on Country reports, ERINA and Maps produced by UNDP

Table 4-6 Road distance between Tanggu and Ulan Ude

Country	From	To	Distance (km)
China	Tianjin	Eranhot	902
Border	Eranhot	Zamin Uud	14
Mongolia	Zamin Uud	Ulaanbaatar	681
	Ulaanbaatar	Altanbulag	345
Border	Altanbulag	Kyahta	1.5
Russian Federation	Kyahta	Ulan Ude	219*
Total (Tianjin-Ulan Ude)			**2,162.5**

Note: *Data from UNESCAP, Asian Highway – The road networks connecting China, Kazakhstan, Mongolia, the Russian Federation and the Korean Peninsula, 2001

Although the railway has a higher priority than road as a freight transport mode, road seems to play a crucial role in passenger transport in Mongolia. Based on the number of passengers, road accounts for 95.9 per cent of the total passenger travels, although this share decreases to 18.1 per cent if passenger-kms are considered rather than the number of passengers (Table 4-7). This huge difference suggests that road takes mainly short distance travels. As Mongolia's top priority route, the road development in this corridor is progressing based on the Medium Term Road Master Plan (MRMP), which was formulated in collaboration with the Asian Development Bank and accepted by the cabinet.

Table 4-7 Passenger traffic volume in Mongolia by mode

Modes	2001				2002			
	million passengers		million passenger-km		million passengers		million passenger-km	
	volume	%	volume	%	volume	%	volume	%
Railway	4.1	4.2	1062.2	53.9	4	3.8	1066.5	50.6
Road	94.1	95.5	371.1	18.8	101.4	95.9	380.6	18.1
Air	0.3	0.3	538.9	27.3	0.3	0.3	661.2	31.4
Total	98.5	100.0	1972.2	100.0	105.7	100.0	2108.3	100.0

Source: National Statistical Office of Mongolia, Mongolian Statistical Yearbook, 2002

4.1.3 Transport cost and time analysis

Based on a survey completed by national experts in each country, the cost and time to transport goods from Tianjin Port to Ulan Ude is reflected in Table 4-8[4]. Using this set of data, travel time and distance relationships of the road and rail transport along the Corridor 1 between Tianjin Port and Ulan Ude are presented in a graphical form in Figures 4-3 and 4-4.

Table 4-8 Transportation cost and time from Tianjin Port to Ulan Ude

	Road			Rail			Road/Rail
	Cost	Transit Time (hours)		Cost	Transit Time (hours)		Cost
	($/TEU)	Min	Max	($/TEU)	Min	Max	($/TEU)
Tianjin Port	77.8	10	20	77.8	10	20	77.8
Tianjin-Eranhot	690	14	29	168.6[1]	23	40	168.6
Eranhot-Zamin Uud (Border)	250	24	120	120	12	24	120
Zamin Uud-Ulaanbaatar	95.2	14.8	15.5	150	48	72	95.2
Ulaanbaatar -Altanbulag/Hoit	48.2	4.4	5	85[2]	48[2]	72[2]	48.2
Altanbulag/Hoit-Kyahta/Naushki (Border)	250[3]	5min	10min	120[3]	12	24	120
Kyahta/Naushki -Ulan Ude	160[4]	3.7[5]	7.3[5]	26.1[6]	4.4[5]	8.7[5]	26.1
Total (Tianjin-Ulan Ude)	**1,571.2**	**71**	**197**	**747.5**	**157.4**	**260.7**	**655.9**
$/km	**0.66**			**0.35**			**0.29**

Notes:
1. The cost reported by expert from China is significantly different from ESCAP data ($500).
2. Estimate based on the cost and transit time of Zamin Uud-Ulaanbaatar
3. Estimates based on the cost of Eranhot-Zamin Uud
4. Average trucking charge (15ton) between Moscow-Vladimir (228km) and Moscow-Tver (209km)
5. Estimates based on maximum speed (60km/h) and minimum speed (30km/h)
6. The cost assumed at $0.1 per km

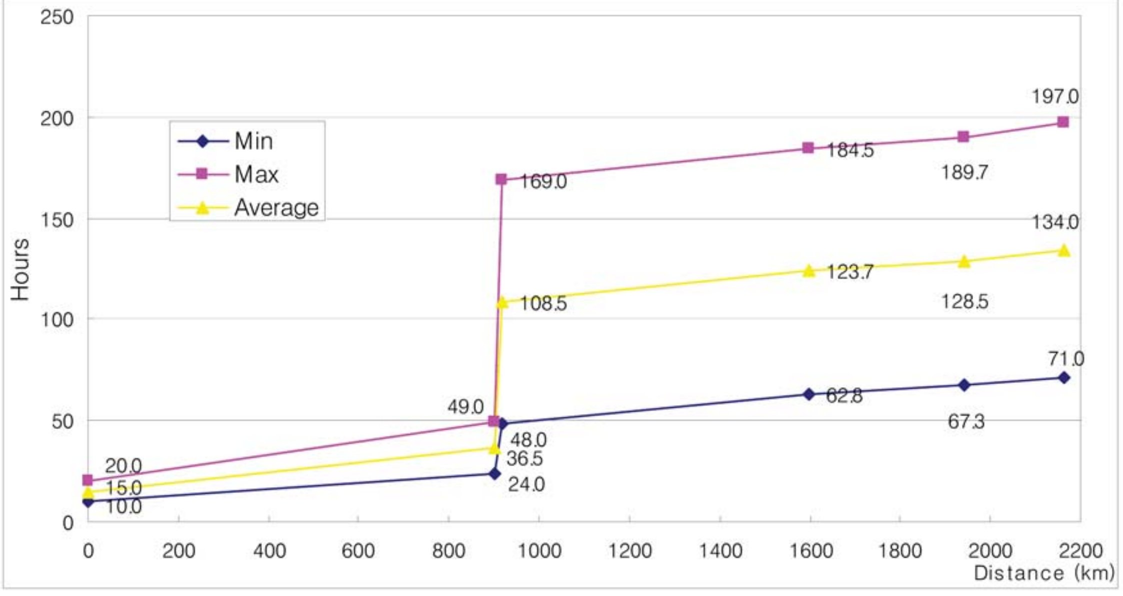

Figure 4-3 Tianjin-Ulan Ude transit time (road)

[4] The cost and time analysis in this chapter are based on the data provided by national experts unless otherwise stated.

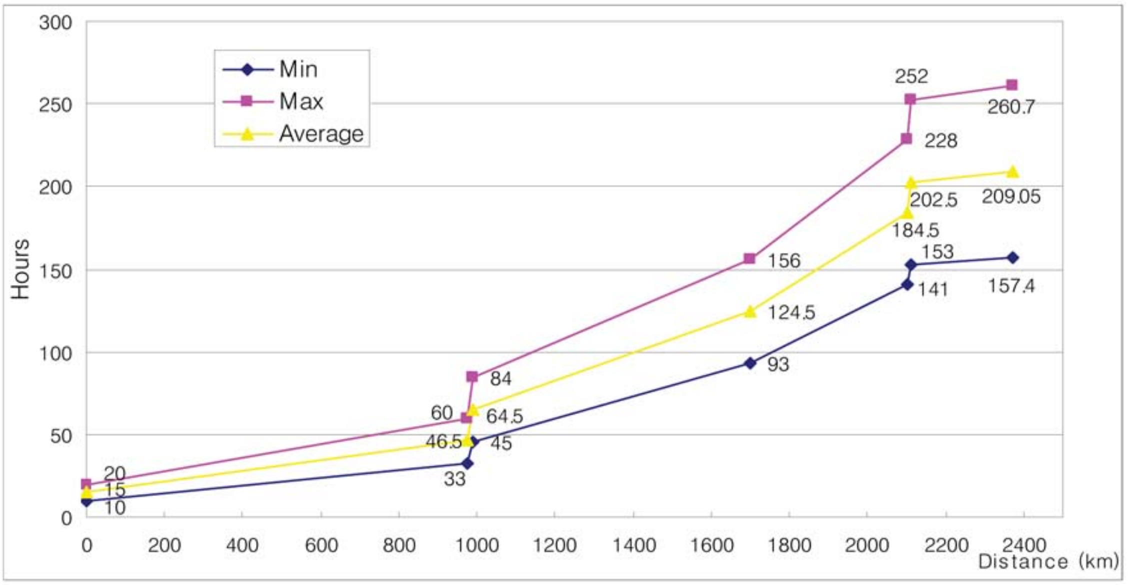

Figure 4-4 Tianjin-Ulan Ude transit time (rail)

Figure 4-5 shows the cost-distance relationship in Corridor 1 by transport mode. The total cost to transport between Tianjin and Ulan Ude by road is about $1,571 (for 2,162.5km) and $747 (for 2,373km) with rail. Theoretically, without considering additional cost for transshipment, the total cost can be reduced to $656 if the road and the rail transport can be combined, i.e., rail transport in China, road transport in Mongolia between Zamin Uud and Altanbulag/Hoit and rail transport between Altanbulag/Hoit and Ulan Ude. Figure 4-6 represents the transport cost breakdown of the this road and rail combined option. Border crossing charges represent about 24 per cent of the total cost, while road and rail transport represent 28 per cent and 33 per cent respectively.

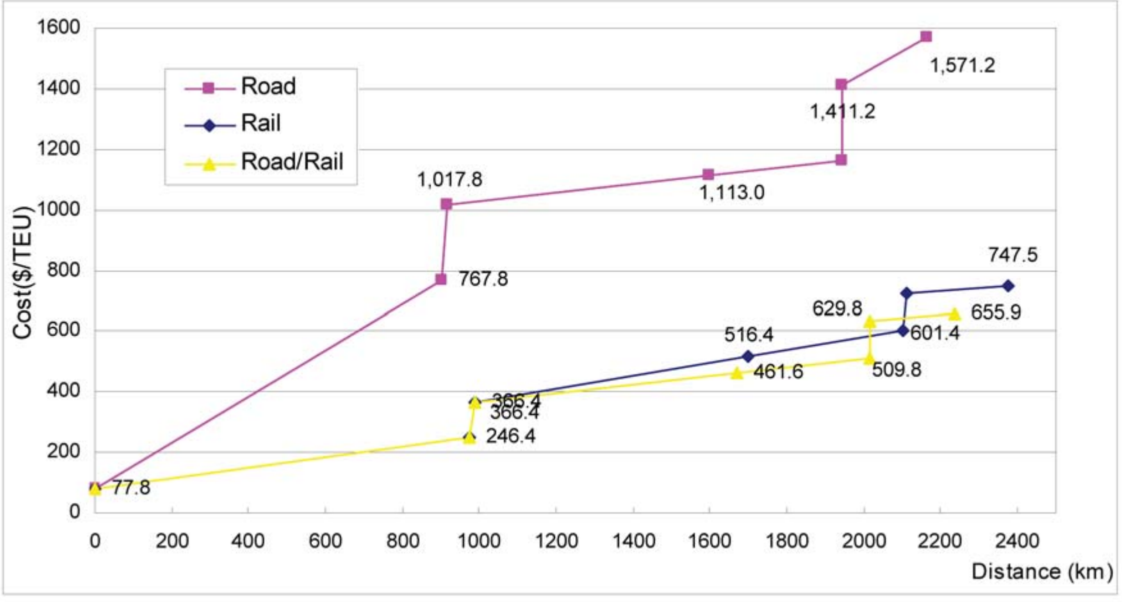

Figure 4-5 Cost-distance (Tianjin-Ulan Ude)

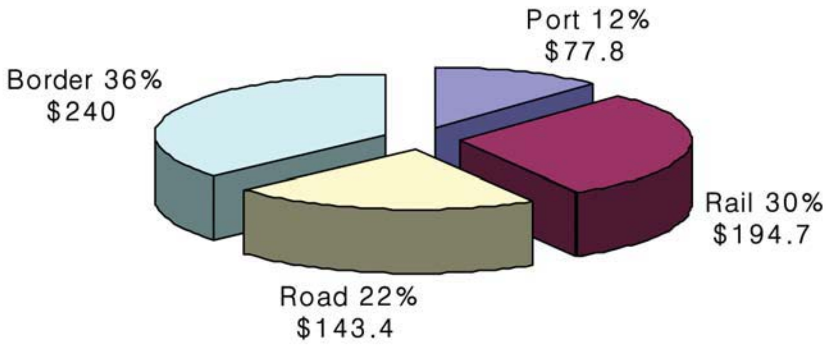

Figure 4-6 Cost breakdowns (road & rail combined)

Routes to consider

Rail route: China-Mongolia-Russian Federation

Intermodal route: China(road)-Mongolia(rail)-Russian Federation(rail)

This combination, however, can be operational only after road infrastructure in Mongolia is upgraded. Possible routes that can be considered presently include (1) unimodal transport entirely by rail and (2) intermodal route with transport in China by road and Mongolia and the Russian Federation by rail. Tables 4-8A, 4-8B and 4-8C, which are all derived from Table 4-8, show tabular information for transport cost and time for these routes, as well as additional cost and time for providing a sea transport connection to Japan with Corridor 1.

Table 4-8A Rail route (U-1.1) from Tianjin Port to Ulan Ude

	Rail		
	Cost	**Transit Time (hours)**	
	($/TEU)	**Min**	**Max**
Tianjin Port	77.8	10	20
Tianjin-Eranhot	168.6	23	40
Eranhot-Zamin Uud (Border)	120	12	24
Zamin Uud-Ulaanbaatar	150	48	72
Ulaanbaatar -Altanbulag/Hoit	85	48	72
Altanbulag/Hoit-Kyahta/Naushki (Border)	120	12	24
Kyahta/Naushki -Ulan Ude	26.1	4.4	8.7
Total (Tianjin-Ulan Ude)	**747.5**	**157.4**	**260.7**
$/km	**0.35**		

Table 4-8B Intermodal route (I-1.2) from Tianjin Port to Ulan Ude

	Road + Rail			Road/Rail
	Cost	Transit Time(hours)		
	($/TEU)	Min	Max	
Tianjin Port	77.8	10	20	-
Tianjin-Eranhot	690	14	29	Road
Eranhot-Zamin Uud (Border)	250	24	120	Road
Zamin Uud-Ulaanbaatar	150	48	72	Rail
Ulaanbaatar -Altanbulag/Hoit	85	48	72	Rail
Altanbulag/Hoit-Kyahta/Naushki (Border)	120	12	24	Rail
Kyahta/Naushki -Ulan Ude	26.1	4.4	8.7	Rail
Total (Tianjin-Ulan Ude)	**1,398.9**	**160.4**	**345.7**	
$/km	**0.61**			

Table 4-8C Transportation cost and time from Kobe Port to Ulan Ude

	Road			Rail			Road/Rail
	Cost	Transit Time (hours)		Cost	Transit Time (hours)		Cost
	($/TEU)	Min	Max	($/TEU)	Min	Max	($/TEU)
Kobe Port	182	NA	NA	182	NA	NA	182
Kobe-Tianjin	929	50[1]	50[1]	929	50[1]	50[1]	929
Tianjin Port	77.8	10	20	77.8	10	20	77.8
Tianjin-Eranhot	690	14	29	168.6	23	40	168.6
Eranhot-Zamin Uud (Border)	250	24	120	120	12	24	120
Zamin Uud-Ulaanbaatar	95.2	14.8	15.5	150	48	72	95.2
Ulaanbaatar -Altanbulag/Hoit	48.2	4.4	5	85	48	72	48.2
Altanbulag/Hoit-Kyahta/Naushki (Border)	250	5min	10min	120	12	24	120
Kyahta/Naushki -Ulan Ude	160	3.7	7.3	26.1	4.4	8.7	26.1
Total (Kobe-Ulan Ude)	**2,682.2**	**-**	**-**	**1,858.5**	**-**	**-**	**1,766.9**
$/km	**-**			**-**			**-**

Note: 1. Average transit time

4.2 CORRIDOR 2 BUSAN-SEOUL-PYEONGYANG-SHENYANG-BEIJING-ZENGZHOU

4.2.1 Significance

Corridor 2 connects the Republic of Korea with China via the Democratic People's Republic of Korea and can be connected to Japan through sea links. This corridor connects Beijing, Seoul and Tokyo (BESETO) metropolitan areas, which is perhaps the most important economic growth axis in North-East Asia (Figure 4-7). Those regions have played the most crucial role in their national economies as well as in socio-political fields. Each metropolitan area holds 7.9 per cent, 46.3 per cent and 26.3 per cent of each country's total population, and accounts for 12.7 per cent, 47.1 per cent, and 30.5 per cent of each country's GDP respectively (Table 4-9).

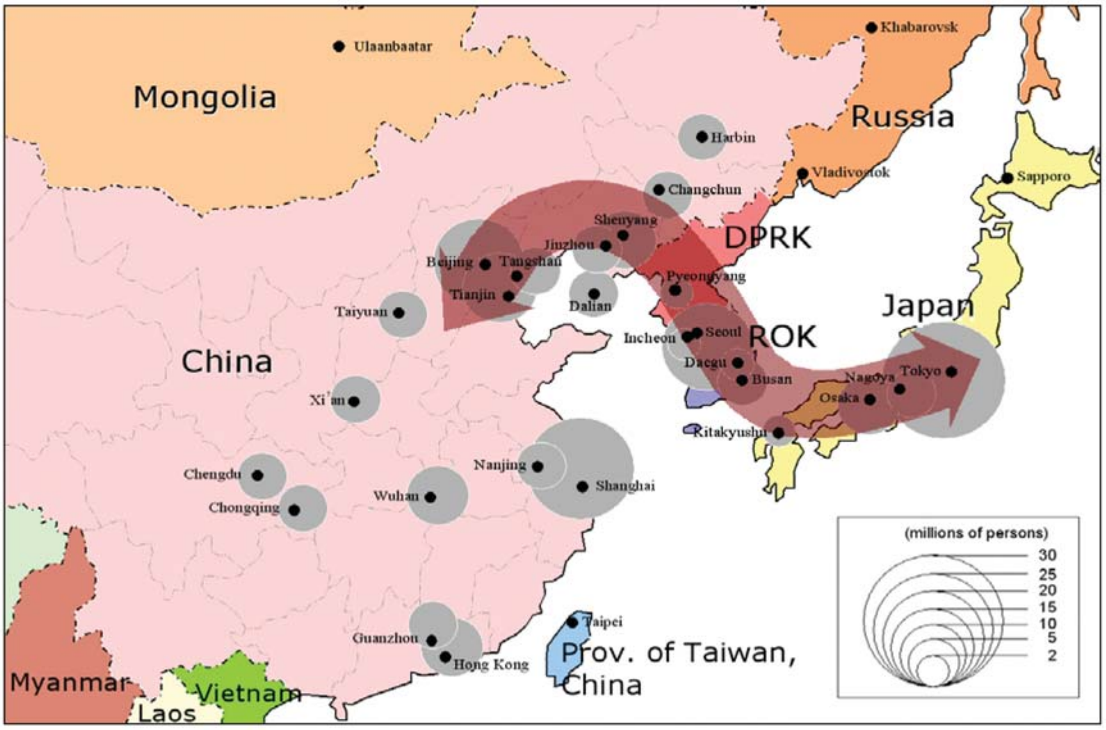

Figure 4-7 BESETO corridor

Source: Adopted from Kim, Won Bae et al, Building Infrastructure for the Facilitation of Economic Cooperation in Northeast Asia in the 21st Century: Focusing on Land Transport Linkages between Korea and China, KRIHS Special Reports No. 3, Korea Research Institute for Human Settlements, 2003.

Table 4-9 Major indicators of three metropolitan areas in the BESETO corridor

Indicators	Population		Gross Regional Domestic Product	
	(thousands)	% Share*	(million US$)	% Share*
Greater Beijing	99,125	7.9	125,226	12.7
Beijing	12,245	1.0	26,263	2.7
Tianjin	9,405	0.7	17,514	1.8
Hebei Province	64,580	5.1	55,186	5.6
Seoul Metropolitan Area	21,354	46.3	191,538	47.1
Seoul	9,895	21.4	87,065	21.4
Incheon	2,475	5.4	19,450	4.8
Gyeonggi Province	8,984	19.5	85,023	20.9
Greater Tokyo	33,418	26.3	1,446,408	30.5
Tokyo	12,064	9.5	603,498	12.7
Chiba Prefecture	5,926	4.7	231,503	4.9
Kanagawa Prefecture	8,490	6.7	335,303	7.1
Saitama Prefecture	6,938	5.5	276,014	5.8

Sources: Korea National Statistical Office (http://www.nso.go.kr); Statistics Bureau of Japan (http://www.stat.go.jp); National Bureau of Statistics of China (http://www.stats.gov.cn)

Note: * % share to each country

In total, the BESETO corridor forms a huge intraregional market composed of population of over 150 million and with a GDP of over US$1.7 trillion, even if other metropolitan areas within the corridor – e.g., Shenyang, Busan and Osaka – are counted out. Needless to say, these areas have been growth poles for national development, and have produced most of North-East Asia's transport and logistics demands. This trend is expected to continue or even strengthen.

Corridor 2 can support transport and logistics demands created along the BESETO corridor. In particular, Corridor 2 may be able to provide China and the Republic of Korea with a highly competitive trade corridor via inland transport connections, although this route is also expected to share part of the logistics demands of Japan's southern regions for trade with northern China. According to Kim, land transport via railway is judged to have enough economic efficiency, particularly in terms of time, to compete with sea transport between Seoul and Shenyang/Beijing (Table 4-10).[5] Corridor 2 via railway, especially, seems to have a high comparative advantage in the section between Seoul and Shenyang. More than 55 per cent of the total transport time by sea can be saved by using railway, while the transport cost gap between the two modes is relatively trivial. It is estimated that Corridor 2 will take charge of about 15 per cent of the cargo volume between Seoul and Beijing, and 40 to 50 per cent of that between Seoul and Shenyang.

Table 4-10 Estimation of transport cost between Seoul and Shenyang/Beijing by mode

Route	*Sea*	*Railway*	*Road*
Seoul – Shenyang			
Distance (km)	957 (533+424*)	769	822
Time (hours)	23 (17.5+5.5*)	9.5	8.5
Cost (Korean Won/ton)	14,000 ($13.5)	19,000 ($18.3)	61,000 ($58.6)
Seoul – Beijing			
Distance (km)	1,013 (852+161*)	1,608	1,361
Time (hours)	30.5 (28.5+2.0*)	20.5	14.0
Cost (Korean Won/ton)	10,000 ($9.6)	39,000 ($37.5)	101,000 ($97.1)

Sources: Kim, Gyeong-Seok. (1998). 'A study on measures for direct land transport within Republic of Korea and the Democratic People's Republic of Korea and Korean reunification'. Seoul, the Republic of Korea: The Ministry of Unification.

Notes: * Railway is assumed as a supportive mode for short distance movement.
1. Basic units for transport time: Road 100km/h, Railway 80km/h, Sea 30km/h.
2. Basic unites for transport cost: Road 74.07 Won ($0.0712)/km(ton, Railway 24.2 Won ($0.0233)/km(ton, Sea 7.48 Won($0.0072)/km(ton. (US$ 1=1,040 Won)

4.2.2 Current situation and prospects

Ports. This corridor starts from two major seaports of the Republic of Korea, Busan and Gwangyang. As of 2003, Busan, the largest seaport of the Republic of Korea, handled 10.4 million TEU, 78.9 per cent of total container cargo volumes for the Republic of Korea, being ranked the fifth in the world container port league. Although its share remains high, dependency on Busan Port has gradually decreased from 88.2 per cent in 1998 since the opening of Gwangyang Port. Most of the cargos handled at Busan Port are from

3 Kim, Gyeong-Seok (1998), A study on measures for direct land transport within Republic of Korea and the Democratic People's Republic of Korea and Korean reunification, Seoul, the Republic of Korea: The Ministry of Unification.

or toward foreign countries. In 2003, the share of international cargos reached 98.8 per cent, which shows that Busan is essentially an international seaport (Table 4-11). The share of transshipment cargo in Busan Port has rapidly increased from 20.6 per cent in 1998 to 40.9 per cent in 2003, which is an important factor influencing container handling volumes at Busan Port. This also shows the potential of Busan as a regional hub port.

Table 4-11 Structure of container freight handled at Busan Port

Region	1999		2000		2001		2002		2003	
	TEU	%	TEU	%	TEU	%	TEU	%	TEU	%
Total	6,439,589	100	7,540,387	100	8,072,814	100	9,453,356	100	10,407,809	100
Import	2,271,997	35.3	2,483,753	32.9	2,496,764	30.9	2,729,332	28.9	3,029,020	29.1
Export	2,406,194	37.4	2,551,162	33.8	2,513,877	31.1	2,792,399	29.5	3,005,983	28.9
Trans-shipment	1,632,473	25.4	2,389,956	31.7	2,942,983	36.5	3,887,457	41.1	4,251,076	40.9
Domestic	128,925	2.0	115,516	1.5	119,190	1.5	44,168	0.5	121,730	1.2

Source: Korea Container Terminal Authority

The most popular partner region of Busan Port has been North-East Asia. In 2003, container cargos from/toward North-East Asia accounted for 45.6 per cent of the total foreign trade container cargos handled at Busan Port (Table 4-12). Busan New Port is under construction in Gadok Island, around 60km west of Busan. When completed with investment of $7.7 billion, Busan New Port will be equipped with 30 container berths (25 main line berths and 5 feeder berths) of a total length 9,950m with an annual capacity of 8.04 million TEU. The first three berths are scheduled to start operation in 2006.

Table 4-12 Regional distribution of container freight handled at Busan Port

Region	1999		2000		2001		2002		2003	
	TEU	%	TEU	%	TEU	%	TEU	%	TEU	%
World	6,310,664	100	7,424,871	100	7,953,624	100	9,409,188	100	10,286,079	100
North-East Asia	2,534,143	40.2	3,071,837	41.4	3,544,006	44.6	4,302,066	45.7	4,688,720	45.6
North America	1,455,069	23.1	1,651,386	22.2	1,711,706	21.5	1,998,273	21.2	2,209,392	21.5
Southeast Asia	599,533	9.5	654,665	8.8	825,525	10.4	896,101	9.5	921,287	9.0
Europe	690,481	10.9	710,689	9.6	734,927	9.2	873,594	9.3	922,384	9.0
Others	1,031,438	16.3	1,336,294	18.0	1,137,460	14.3	1,339,154	14.2	1,544,296	14.9

Source: Korea Container Terminal Authority
Note: Domestic container cargos are excluded.

Gwangyang Port, the second largest container seaport of the Republic of Korea, started its container operation in July 1998. The container throughput at Gwangyang Port reached 1 million TEU in 2002, after four years of operation, and 1.18 million TEU in 2003. Nearly 30 per cent of total container throughput at the Gwangyang Port is transshipment containers mainly to and from China. Since 1999, the most frequent origin or destination of containers handled in Gwangyang Port has been North-East Asia, whose share of total international cargos has doubled from 28.8 per cent in 1999 to 59.0 per cent in 2003 (Table 4-13). This trend is expected to be continued or deepened with the rapid expansion of the Republic of Korea's economic exchange with China.

Table 4-13 Structure of container freight handled at Gwangyang Port

Region	1999		2000		2001		2002		2003	
	TEU	%	TEU	%	TEU	%	TEU	%	TEU	%
Total	417,344	100	642,230	100	855,310	100	1,080,333	100	1,184,842	100
Import	206,304	49.4	282,886	44.0	319,450	37.3	346,024	32.0	387,180	32.7
Export	181,015	43.4	268,312	41.8	326,001	38.1	372,047	34.4	415,492	35.1
Transshipment	28,080	6.7	64,129	10.0	165,727	19.4	314,355	29.1	343,888	29.0
Domestic	1,945	0.5	26,903	4.2	44,132	5.2	47,907	4.4	38,282	3.2

Source: Korea Container Terminal Authority

Table 4-14 Regional distribution of container freight handled at Gwangyang Port

Region	1999		2000		2001		2002		2003	
	TEU	%	TEU	%	TEU	%	TEU	%	TEU	%
World	415,394	100.0	615,324	100.0	811,174	100.0	1,032,426	100.0	1,146,560	100.0
North-East Asia	119,765	28.8	217,217	35.3	386,315	47.6	615,149	59.6	676,327	59.0
North America	112,272	27.0	178,266	29.0	213,927	26.4	222,287	21.5	256,096	22.3
Southeast Asia	68,954	16.6	153,008	24.9	136,706	16.9	89,844	8.7	123,178	10.7
Europe	90,260	21.7	35,431	5.8	26,590	3.3	33,808	3.3	17,521	1.5
Others	24,143	5.8	31,402	5.1	47,636	5.9	71,338	6.9	73,438	6.5

Source: Korea Container Terminal Authority
Note: Domestic container cargos are excluded

Gwangyang container terminal is currently equipped with four 20,000 dwt-class and eight 50,000 dwt-class container berths (length 3,700m, depth 12-15m), which were constructed during the first and second phases of the port development plan. The third and fourth phases are under way to build 21 container berths with a total length of 7,350m until 2011. When completed, the Gwangyang Port will have 33 container berths with a handling capacity of 9.33 million TEU every year. To keep up with a global trend of increase in container ship sizes, four berths scheduled for 2006 (phase 3-1) will be able to accommodate vessels up to 12,000 TEU and three berths scheduled for 2008 (phase 3-2) are to be constructed as automated container terminals (ACT).

Railway. Corridor 2 spreads over three countries – the Republic of Korea, the Democratic People's Republic of Korea and China. At present, this route is not in operation because of missing links between the Republic of Korea and the Democratic People's Republic of Korea. However, as the Republic of Korea and the Democratic People's Republic of Korea agreed to the reconnection of railways and roads after the two Koreas' summit meeting of 2000, this route has attracted public attention as a major subregional corridor. The reconnection of railway seems crucial, because railway is advantageous for long-distance transport, environmentally sound, and preferred by the Government of the Democratic People's Republic of Korea.

As of July, 2003, Republic of Korea's sections of Corridor 2's missing links had already been restored, but sections of the Democratic People's Republic of Korea still remained at a standstill. For Corridor 2 to work, the 13.8km section between the Demilitarized Zone (DMZ) and Gaeseong should be recovered (Figure 4-8).

However, even if the missing links are restored, bottlenecks need to be dealt with in order to increase the total efficiency of the corridor. The railway is the most important transport mode in the Democratic People's Republic of Korea and accounts for 60 per cent of the total passenger transport and 90 per cent of the total cargo transport. Most of the railway sections consist of single tracks, and inadequate facilities and a shortage of electricity supply affect normal operations. Railways in the Democratic People's Republic of Korea's section along the Corridor 2 also has similar constraints. Although electrification has been completed, much work has to be done to ensure the its operation as a major international transport corridor.

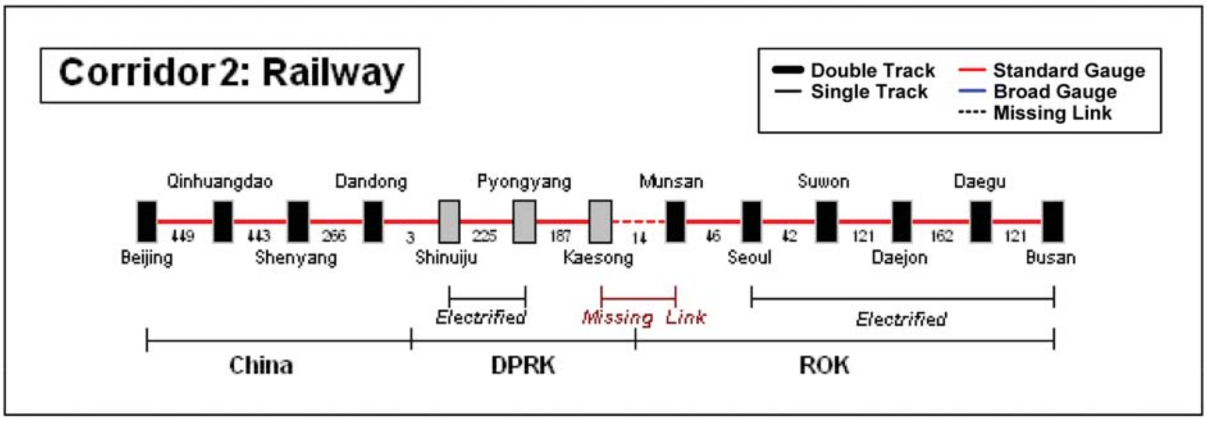

Figure 4-8 Present conditions of railway, Corridor 2

Sources: Based on Country reports, ERINA and Maps produced by UNDP

Until the mid-1990s, the Republic of Korea had not made significant investment in improving its railway infrastructure. As a result, railway facilities became decrepit and unable to provide a high level of service. As of 1999, the ratio of double-tracked sections was no higher than 28 per cent; and just 18 per cent of the total railway network were electrified, which became a main reason for the low average train speed of between 50km/h and 100km/h, and the railway's low cargo transport share of 15.8 per cent[6]. However, the government of the Republic of Korea is striving to relieve this problem with national railway projects. Those projects include the upgrade of existing railways and the construction of new high-speed railway lines. The first high-speed railway line was opened between Seoul and Busan in 2004.

Much of China's section of the Corridor 2 also experiences traffic demands surpassing its traffic capacity. In particular, the section between Shenyang and Dandong, just 31.3 per cent of which is double-tracked[7], needs to be electrified and entirely double-tracked.

Distance and characteristics data were collected from national experts in each country (except the Democratic People's Republic of Korea). Based on their report, the total railway length of this route is about 2,077km[8] with the standard track gauge of 1,435mm. The rail between Busan and Munsan stretches about 490km with double and multi-track, although the line between Munsan and Seoul has only single track. A single-track electrified line runs from Pyongyang to Shinuiju for the distance of 225km. At Shinuiju, the railway is linked to Dandong in China by a bridge over the Yalu River. The total railway length from

[6] Korea Railroad Corporation (http://www.korail.go.kr/100th/year/c.html).

[7] Total length of Dandong-Shenyang railway is 283km, of which 88.6km is double-tracked.

[8] Democratic People's Republic of Korea's railway distance is gathered from other sources.

Dandong to Beijing is 1,158km with single track from Dandong to Shenyang and double track from Shenyang to Beijing (Table 4-15).

Table 4-15 Rail distance between Busan and Beijing

Country	From	To	Distance (km)
Republic of Korea	Busan Seoul	Seoul Munsan	444.5 46.0
Border	Munsan	Gaesung	13.8
Democratic People's Republic of Korea	Gaesung	Pyongyang	187
	Pyongyang	Shinuiju	225
Border	Shinuiju	Dandong	3.1
China	Dandong Shenyang	Shenyang Beijing	266 892
Total (Busan-Beijing)			**2,077.4**

Road. As with the railway, a missing link between the Democratic People's Republic of Korea and the Republic of Korea hinders the road of Corridor 2 from activation. At present, the section between Panmunjeom and Gaeseong is also disconnected. The two countries have agreed to the reconnection of the missing link, though no work has been done towards its realization yet (Figure 4-9).

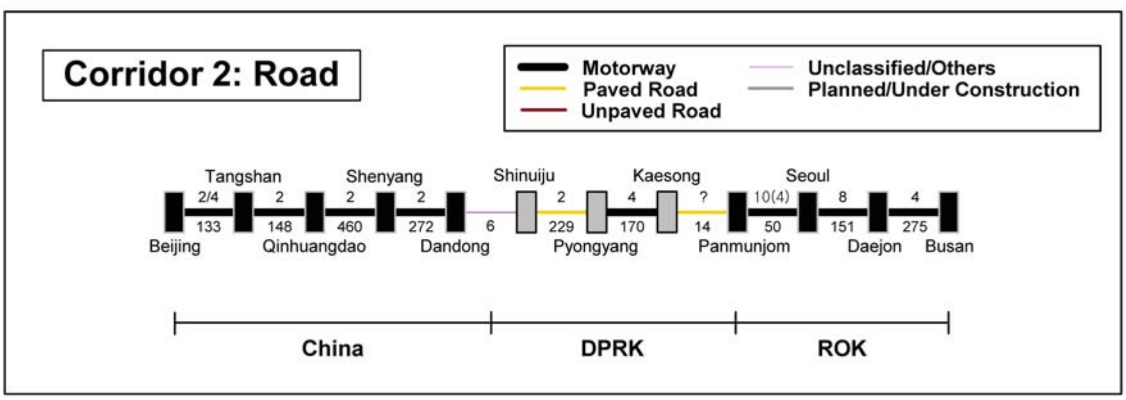

Figure 4-9 Present conditions of road, Corridor 2

Sources: Based on Country reports, ERINA and Maps produced by UNDP.

The road condition in the Republic of Korea is relatively good with the total length of 86,989km, 2,659km of which are at expressway standards, as of 2002 and 74.5 per cent of which are paved, as of 1999. Corridor 2 covers Gyeongbu and Honam Expressways. Gyeongbu Expressway, which connects Seoul with Busan, has been playing the most crucial role as the first expressway and amain artery in Republic of Korea's transportation. All sections of the expressway are composed of four, six, or eight lanes, and its total length is 417km. Some of the sections are reported as chronically congested. Honam Expressway, on the other hand, is an important transport axis which connects Gwangyang with Daejeon. All sections consist of four lanes and its total length is 249km.

The Democratic People's Republic of Korea considers road as a complementary transport mode to railway. The total length of the road network is about 34,000km, and the pavement rate is 8.1 per cent and some 30 per cent of all roads are narrow paths with a width of 2.4m or less, through which cars cannot move. Some expressways of 661km have six lanes or more. In the Democratic People's Republic of Korea's section of Corridor 2, both a four lane expressway (7m wide) and a Grade A road line (4.9 to 7.3m wide), paved with asphalt and concrete, pass between Gaeseong and Anju, to which Shineuiju is connected through a concrete-paved Grade A road. Despite the road conditions, the Gaeseong-Shineuiju section, one of the most important transport corridors for the Democratic People's Republic of Korea, does not seem to have serious difficulties in vehicle movement. The total length is about 400km and the road is capable of carrying most types of vehicles.

In China's section of Corridor 2, expressways exist from Shenyang through Beijing to Zhengzhou. This expressway line forms a backbone of China's 5(7 national trunk highway system. The section between Dandong and Shenyang, which is used as one of the Democratic People's Republic of Korea's main trade windows to China, is connected through a Grade A highway. This line has two to four lanes designed for travel speeds of 50km/hour, except for the section between Qinhuangdao and Beijing (where the design speed is 80km/hour). The average annual daily traffic (AADT) of China's section of Corridor 2 is about 35,000 vehicles and the segment has average degree of congestion (Table 4-16.)

Table 4-16 Road distance between Busan and Beijing

Country	From	To	Distance (km)
Republic of Korea	Busan Seoul	Seoul Panmunjum	425.5 49.8
Border	Panmunjum	Gaesung	13.8
Democratic People's Republic of Korea	Gaesung	Pyongyang	170.0
	Pyongyang	Shinuiju	228.8
Border	Shinuiju	Dandong	6
China	Dandong Shenyang	Shenyang Beijing	272 741
Total (Busan-Beijing)			**1,906.9**

4.2.3 Transport cost and time

Table 4-17 shows the cost and time to transport a container from Busan Port in the Republic of Korea to Beijing in China. The data were provided by national experts of each country; however, for the Democratic People's Republic of Korea, which has not yet reported its information, estimates based on other sources were used. Using this set of data, travel time and distance relationships of the road and rail transport along the Corridor 2 between Busan Port and Beijing are presented in a graphical form in Figures 4-10 and 4-11.

Table 4-17 Cost and time for transport from Busan Port to Beijing

	Road			Rail			Road/Rail
	Cost	Transit Time (hours)		Cost	Transit Time (hours)		Cost
	($/TEU)	Min	Max	($/TEU)	Min	Max	($/TEU)
Busan Port	75	10	20	75	10	20	75
Busan-Panmunjum/Munsan	480	5.1	8	135	7	10	135
Panmunjum/Munsan-Gaesung (Border)	420[1]	4.3[1]	28.3[1]	420[1]	4.3[1]	28.3[1]	420
Gaesung-Shinuiju	199.4[2]	11.5[3]	22.9[3]	82.4[4]	10.3[3]	20.6[3]	82.4
Shinuiju-Dandong (Border)	40	1	12	40	7	12	40
Dandong-Beijing	810	15	30	205	17	26	205
Total (Busan-Beijing)	**2,024.4**	**46.9**	**121.2**	**957.4**	**55.6**	**116.9**	**957.4**
$/km	**1.06**			**0.46**			**0.46**

Notes:
1. Data based on the cost and transit time of road distance between Paju and Gaesung from Hyundai-Asan Co. Ltd.
2. The cost assumed by $0.5 per km
3. Estimate based on maximum speed (40km/h) and minimum speed (20km/h) in Democratic People's Republic of Korea
4. The cost assumed at $0.2 per km

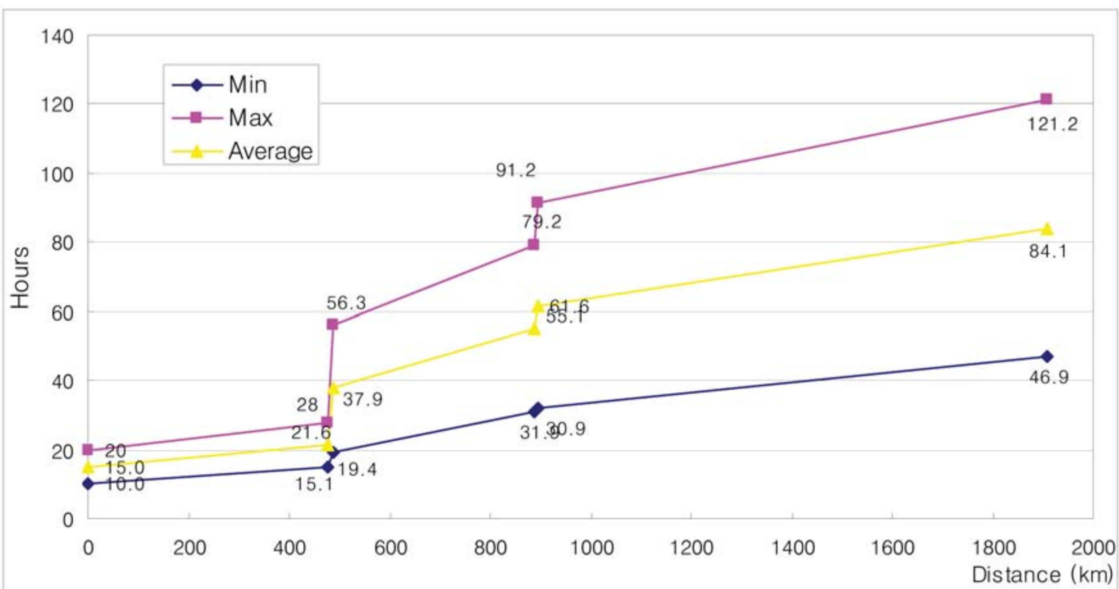

Figure 4-10 Busan-Beijing transit time (road)

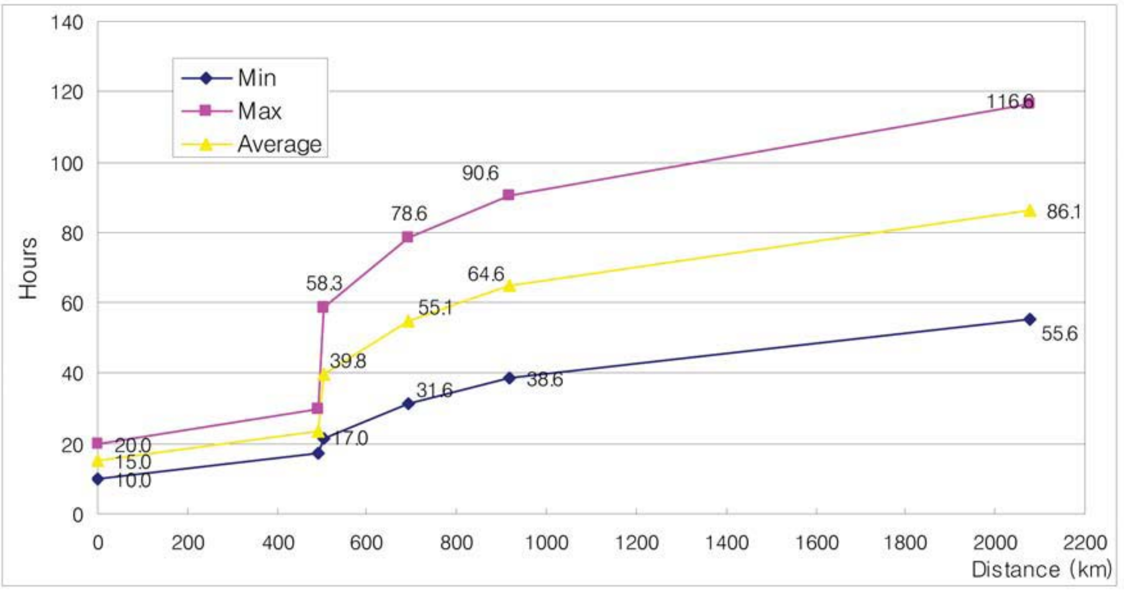

Figure 4-11 Busan-Beijing transit time (rail)

Figure 4-12 shows the cost-distance relationship in Corridor 2 by transport mode. The total cost to transport from Busan to Beijing by road is estimated $2,024 per TEU (for 1,907km) and $957 per TEU (for 2,077km) with rail. Unimodal option by rail transport for the whole journey provides the lowest transport costs.

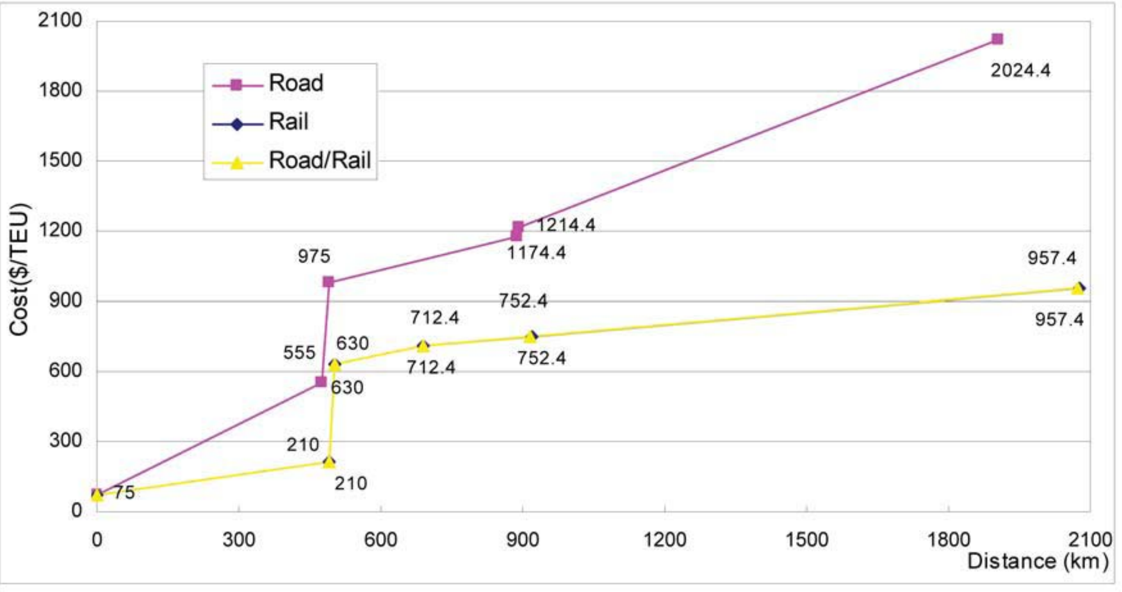

Figure 4-12 Cost-distance (Busan-Beijing)

Routes to consider

- Rail route: China-Democratic People's Republic of Korea-Republic of Korea
- Intermodal route 1: China (road)-Democratic People's Republic of Korea (rail)-Republic of Korea (rail)
- Intermodal route 2: China (rail)-Democratic People's Republic of Korea (rail)-Republic of Korea (road)
- Intermodal route 3: China (road)-Democratic People's Republic of Korea (rail)-Republic of Korea (road)

In addition to this all-rail alternative, three intermodal routes can be considered in view of existing situation of the Corridor 2. Tables 4-17A to 4-17E, which are all derived from Table 4-17, show tabular information for transport cost and time for these routes, as well as additional cost and time for providing sea transport connection to Japan with Corridor 2.

Table 4-17A Rail route (U-2.1) from Busan Port to Beijing

	Rail		
	Cost	Transit Time (hours)	
	($/TEU)	Min	Max
Busan Port	75	10	20
Busan-Panmunjum/Munsan	135	7	10
Panmunjum/Munsan-Gaesung (Border)	420	4.3	28.3
Gaesung-Shinuiju	82.4	10.3	20.6
Shinuiju-Dandong(Border)	40	7	12
Dandong-Beijing	205	17	26
Total (Busan-Beijing)	**957.4**	**55.6**	**116.9**
$/km	**0.46**		

Table 4-17B Intermodal route (I-2.2) from Busan Port to Beijing

	Road + Rail			Road/Rail
	Cost	Transit Time (hours)		
	($/TEU)	Min	Max	
Busan Port	75	10	20	-
Busan-Panmunjum/Munsan	480	5.1	8	Road
Panmunjum/Munsan-Gaesung (Border)	420	4.3	28.3	Road
Gaesung-Shinuiju	82.4	10.3	20.6	Rail
Shinuiju-Dandong (Border)	40	7	12	Rail
Dandong-Beijing	205	17	26	Rail
Total (Busan-Beijing)	**1,302.4**	**53.7**	**114.9**	
$/km	**0.63**			

Table 4-17C Intermodal route (I-2.3) from Busan Port to Beijing

	Road + Rail			Road/Rail
	Cost	Transit Time (hours)		
	($/TEU)	Min	Max	
Busan Port	75	10	20	-
Busan-Panmunjum/Munsan	135	7	10	Rail
Panmunjum/Munsan-Gaesung (Border)	420	4.3	28.3	Rail
Gaesung-Shinuiju	82.4	10.3	20.6	Rail
Shinuiju-Dandong (Border)	40	1	12	Road
Dandong-Beijing	810	15	30	Road
Total (Busan-Beijing)	**1,562.4**	**47.6**	**120.9**	
$/km	**0.81**			

Table 4-17D Intermodal route (I-2.4) from Busan Port to Beijing

	Road + Rail			Road/Rail
	Cost	Transit Time (hours)		
	($/TEU)	Min	Max	
Busan Port	75	10	20	-
Busan-Panmunjum/Munsan	480	5.1	8	Road
Panmunjum/Munsan-Gaesung (Border)	420	4.3	28.3	Road
Gaesung-Shinuiju	82.4	10.3	20.6	Rail
Shinuiju-Dandong (Border)	40	1	12	Road
Dandong-Beijing	810	15	30	Road
Total (Busan-Beijing)	**1,907.4**	**45.7**	**118.9**	
$/km	**0.99**			

Table 4-17E Cost and time for transport from Tokyo to Beijing

	Road			Rail			Road/Rail
	Cost	Transit Time (hours)		Cost	Transit Time (hours)		Cost
	($/TEU)	Min	Max	($/TEU)	Min	Max	($/TEU)
Tokyo-Hakata Port	439	18[1]	18[1]	2,273	72[1]	72[1]	439
Hakata Port	242	NA	NA	242	NA	NA	242
Hakata Port-Busan Port	470	13.5[1]	13.5[1]	470	13.5[1]	13.5[1]	470
Busan Port	75	10	20	75	10	20	75
Busan-Panmunjum/Munsan	480	5.1	8	135	7	10	135
Panmunjum/Munsan-Gaesung (Border)	420	4.3	28.3	420	4.3	28.3	420
Gaesung-Shinuiju	199.4	11.5	22.9	82.4	10.3	20.6	82.4
Shinuiju-Dandong(Border)	40	1	12	40	7	12	40
Dandong-Beijing	810	15	30	205	17	26	205
Total (Tokyo-Beijing)	**3,175.4**	**-**	**-**	**3,942.4**	**-**	**-**	**2,108.4**
$/km	-			-			-

Note: 1. Average transit time

4.3 CORRIDOR 3 BUSAN-POHANG-KOSONG-WONSAN-KIMCHAEK-SONBONG-RAZDOLNOYE-USSURIYSK-KHABAROVSK-BELOGORSK-CHITA-ULAN UDE

4.3.1 Significance

Corridor 3 runs up the eastern side of the Korean Peninsula from Busan, as far as the Rajin-Sonbong Economic and Trade Zone in the Democratic People's Republic of Korea, and then crosses the Russian border into the Khasan area to join with the Siberian Land Bridge (SLB) transportation corridor. As with Corridor 2, this corridor is not yet functioning because of missing link between the Democratic People's Republic of Korea and the Republic of Korea. In addition to promoting cargo transportation between the Democratic People's Republic of Korea and the Republic of Korea, the development of this corridor would secure an overland transportation route from the Republic of Korea and the Russian Far East. Furthermore, by connecting up with the SLB corridor, the corridor would diversify transportation routes from East Asia to Europe.

4.3.2 Current situation and prospects

Railway. It is hoped that this corridor will provide an overland link between the Republic of Korea and the Russian Federation through the Democratic People's Republic of Korea. All of the railway sections in the Korean Peninsula along this corridor are single track with a standard track gauge of 1,435mm, while the Russian Federation has broad gauge (1,520mm) double track, except for the track between Hasan and Baranovsky. Both standard and broad gauge rails are available for 50km between Rajin/Sonbong in the Democratic People's Republic of Korea and Hasan in the Russian Federation. The total length of this rail route is about 5,242km. Table 4-18 lists major segment distances along this rail route.

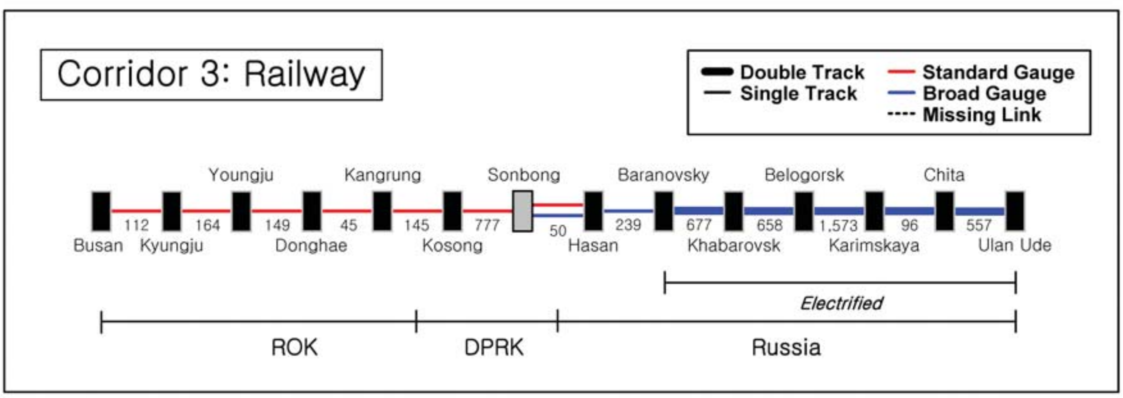

Figure 4-13 Present conditions of rail, Corridor 3

Sources: Based on Country reports, ERINA and Maps produced by UNDP

Table 4-18 Rail distance between Busan and Ulan Ude

Country	From	To	Distance (km)
Republic of Korea	Busan Kyongju	Kyongju Kangnung	112.3 357.3
Border	Kangnung	Kosong	145
Democratic People's Republic of Korea	Kosong	Wonsan	117[1]
	Wonsan	Rajin/Sonbong	660[1,2]
Border	Rajin/Sonbong	Hasan	50[3]
Russian Federation	Hasan Ussuriysk Khabarovsk Belogorsk Chita	Ussuriysk Khabarovsk Belogorsk Chita Ulan Ude	262 654 658 1,669 557
Total (Busan-Ulan Ude)			**5,241.6**

Notes: 1. Data from KOTI ' Plan for an Comprehensive Transport System of Korean Peninsula in Preparation for Unification(1998)'
2. Distance between Wonsan and Rajin
3. Distance between Rajin and Hasan

Road. The physical road conditions in the Korean Peninsula being the same as described above for Corridor 2, the main issue in this corridor is the lack of connectivity between the Democratic People's Republic of Korea and the Republic of Korea. Priority therefore needs to be given to pursuing the established transportation agreement by the two Koreas to enable this corridor to function. On the Republic of Korea side, a well paved ordinary road exists from Busan to Gangnung along the eastern coastline of the Korean Peninsula. In the Democratic People's Republic of Korea, however, while the road from Kumgangsan to Wonsan is a highway, the road from Wonsan to Rajin/Sonbong is understood to be unpaved. The total length of the Democratic People's Republic of Korea's road section of Corridor 3 from Kosong to Rajin/Sonbong is about 650km. Of this 650km, 198km are paved and in fair condition, while the remaining section needs to be upgraded (Table 4-19).

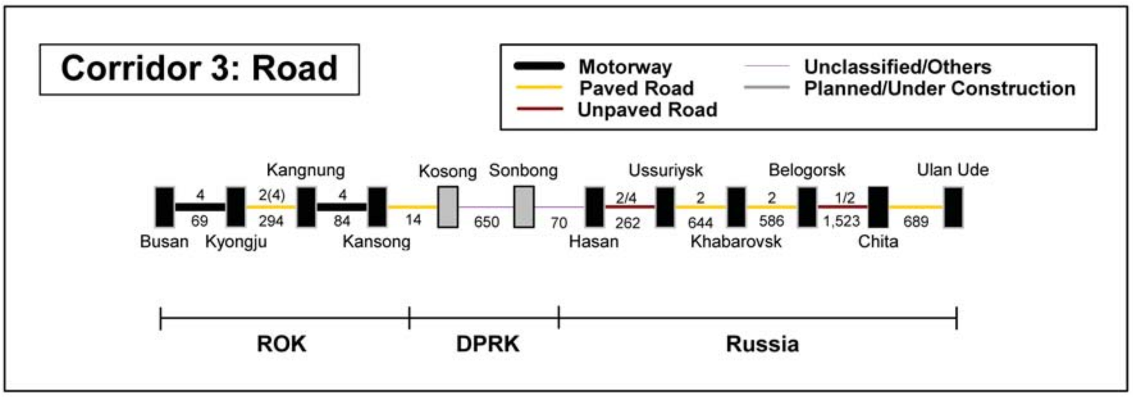

Figure 4-14 Present conditions of road, Corridor 3

Sources: Based on Country reports, ERINA and Maps produced by UNDP

Table 4-19 Road distance between Busan and Ulan Ude

Country	From	To	Distance (km)
Republic of Korea	Busan	Kyongju	68.7
	Kyongju	Kangnung	293.9
	Kangnung	Kansong	83.9
Border	Kansong	Kosong	14.2
Democratic People's Republic of Korea	Kosong Wonsan Kimchaek	Wonsan Kimchaek Sonbong	650[1]
Border	Sonbong	Hasan	50[2]
Russian Federation	Hasan	Ussuriysk	262
	Ussuriysk	Khabarovsk	644
	Khabarovsk	Belogorsk	586
	Belogorsk	Chita	1,523
	Chita	Ulan Ude	689[3]
Total (Busan-Ulan Ude)			**4,864.7**

Notes: 1. Data from UNESCAP, Priority Road Network in North-East Asia, 2002
2. Rail Distance between Rajin and Hasan
3. Estimate based on difference between Moscow-Chita and Moscow-Ulan Ude distance

4.3.3 Transport cost and time

Table 4-20 shows the cost and time required to transport a container from Busan Port in the Republic of Korea to Ulan Ude in the Russian Federation along the Corridor 3.

Table 4-20 Cost and time for transport from Busan Port to Ulan Ude

	Road			Rail			Road/Rail
	Cost	Transit Time (hours)		Cost	Transit Time (hours)		Cost
	($/TEU)	Min	Max	($/TEU)	Min	Max	($/TEU)
Busan Port	75	10	20	75	10	20	75
Busan-Kansung/Kangnung	358	4	7	150	4.8	6.8	150
Kansung/Kangnung-Kosong (Border)	600[1]	5[1]	29[1]	NA	NA	NA	600
Kosong-Sonbong	325[2]	16.3[3]	32.5[3]	196	8.3	11.5	196
Sonbong-Hasan (Border)	218[4]	1[4]	3[4]	218[4]	1[4]	3[4]	218
Hasan-Ulan Ude	2,003[5]	61.7[6]	123.5[6]	636	47.5	94	636
Total (Busan-Kansung) (Busan-Ulanude)	**433.0 3,579.0**	**14 144.0**	**27 215.0**	**225**	**14.8**	**26.8**	**225.0 1,875.0**
$/km	**0.74**			**-**			**0.36**

Notes: 1. Data based on the cost and transit time of road distance between Sokcho and Gumgangsan from Hyundai-Asan Co. Ltd.
2. The cost assumed at $0.5 per km
3. Estimates based on maximum speed (40km/h) and minimum speed (20km/h) in Democratic People's Republic of Korea
4. Estimate based on the cost and transit time of Wonjong-Quanhe
5. Average trucking charge (15ton) between Moscow-Ust-Kamenogorsk (3,775km) and Moscow-Novosibirsk (3,785km)
6. Estimates based on them in and max transit time using maximum speed (60km/h) and minimum speed (30km/h)

The data for Table 4-20 were provided by national experts of each country; however, for the Democratic People's Republic of Korea, which has not yet reported its information, the study team made estimates based on other sources available. Using this set of data, travel time and distance relationships of the road and rail transport between Busan Port and Ulan Ude are presented in a graphical form in Figures 4-15 and 4-16.

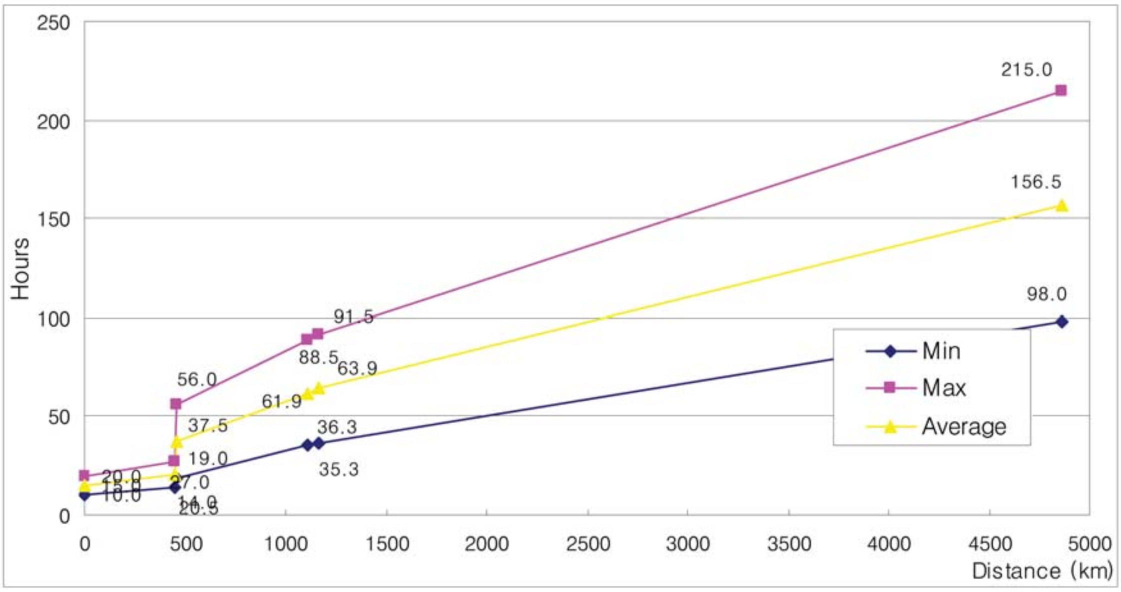

Figure 4-15 Busan-Ulan Ude transit time (road)

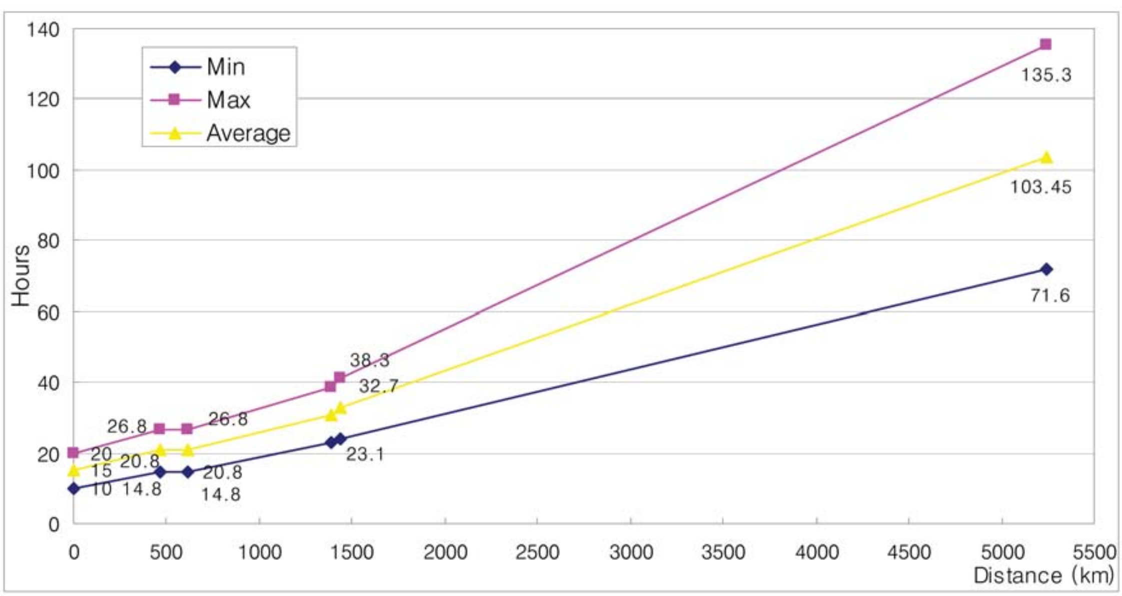

Figure 4-16 Busan-Ulan Ude transit time (rail)

Figure 4-17 shows the cost-distance relationship in Corridor 3 by transport mode. For the section in the Republic of Korea, the cost of road transport is about $433 per TEU and the rail cost is about $225 per TEU. In Russian Federation, for transporting containers from Hasan to Ulan Ude (3,800km), it is estimated that rail transport costs about $636 per TEU, compared to $2,003 per TEU by road. Estimates for the Democratic People's Republic of Korea's section are based on the values of the Republic of Korea. Using rail transportation for the entire route seems to provide the lowest transport cost. However, due to the missing link of 145km between Gangnung and Kosong crossing the border between the two Koreas, an all-rail option along the Corridor 2 is currently not feasible.

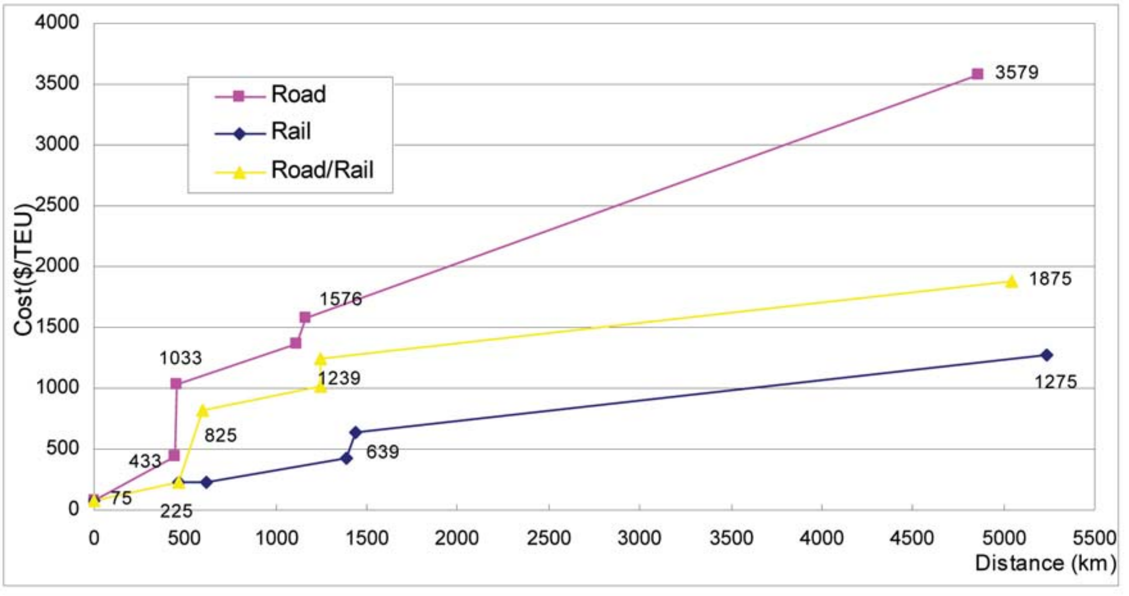

Figure 4-17 Cost-distance (Busan-Ulan Ude)

Routes to consider

- Rail route: Republic of Korea-Democratic People's Republic of Korea-Russian Federation
- Intermodal route: Republic of Korea(road)-Democratic People's Republic of Korea(rail)-Russian Federation(rail)

In view of the fact that railway is the priority mode of transport in the Democratic People's Republic of Korea and that railway is a preferred transport mode for such a long distance as Corridor 3, an all-rail transport alternative is considered a suitable option. In addition, since the major part of the missing link of rail tracks between Gangnung and Kosong is on the side of the Republic of Korea, intermodal options that could be considered as part of the current situation in Corridor 2 are limited to the combination of road transport in the Republic of Korea and rail transport for the other segments. Tables 4-20A and 4-20B, which are derived from Table 4-20, show tabular information for transport cost and time for these two optional routes, and 4-20C presents the additional costs and time for providing a sea transport connection to Japan with Corridor 3.

Table 4-20A Rail route (I-3.1) from Busan Port to Ulan Ude

	Rail		
	Cost	Transit Time (hours)	
	($/TEU)	Min	Max
Busan Port	75	10	20
Busan-Kansung/Kangnung	150	4.8	6.8
Kansung/Kangnung-Kosong (Border)	NA[1]	NA[1]	NA[1]
Kosong-Sonbong	196	8.3	11.5
Sonbong-Hasan (Border)	218	1	3
Hasan-Ulan Ude	636	47.5	94
Total **(Busan-Kansung)** **(Busan-Ulanude)**	**225** -	**14.8** -	**26.8** -
$/km			

Notes: 1. Missing link

Table 4-20B Intermodal route (I-3.2) from Busan Port to Ulan Ude

	Road + Rail			Road/Rail
	Cost	Transit Time (hours)		
	($/TEU)	Min	Max	
Busan Port	75	10	20	-
Busan-Kansung/Kangnung	358	4	7	Road
Kansung/Kangnung-Kosong (Border)	600	5	29	Road
Kosong-Sonbong	196	8.3	11.5	Rail
Sonbong-Hasan (Border)	218	1	3	Rail
Hasan-Ulan Ude	636	47.5	94	Rail
Total **(Busan-Kansung)** **(Busan-Ulanude)**	**433** **2,083.0**	**14** **75.8**	**27** **164.5**	
$/km	**0.41**			

Table 4-20C Cost and time for transport from Yokohama Port to Ulan Ude

	Road			Rail			Road/Rail
	Cost	Transit Time (hours)		Cost	Transit Time (hours)		Cost
	($/TEU)	Min	Max	($/TEU)	Min	Max	($/TEU)
Yokohama Port	168	NA	NA	168	NA	NA	168
Yokohama Port-Busan Port	430	72	98	430	72	98	430
Busan Port	75	10	20	75	10	20	75
Busan-Kansung/Kangnung	358	4	7	150	4.8	6.8	150
Kansung/Kangnung-Kosong (Border)	600	5	29	NA	NA	NA	600
Kosong-Sonbong	325	16.3	32.5	196	8.3	11.5	196
Sonbong-Hasan (Border)	218	1	3	218	1	3	218
Hasan-Ulan Ude	2,003	61.7	123.5	636	47.5	94	636
Total (Yokohama-Ulan Ude)	**4,177.0**	-	-	-	-	-	**2,473.0**
$/km	-			-			-

4.4 CORRIDOR 4
RAJIN/SONBONG - JILIN - CHANGCHUN - ULANHOT - SUMBER -ULAANBAATAR

4.4.1 Significance

Corridor 4 provides Mongolia and China with a main exit to the East Sea (Japan Sea) and the Pacific. Although this corridor is defined in this study to start from Rajin/Sonbong in the Democratic People's Republic of Korea, it also has a branch starting from Zarubino/Posiet in the Russian Federation as an alternative exit to the sea. As this corridor spreads over four countries, it can be activated and made efficient only with cooperation among countries. Although some progress has been achieved through the Tumen River Area Development Programme since the early 1990s, much remain to be done to facilitate trade and transport along bordering areas of China, the Democratic People's Republic of Korea and the Russian Federation.

Corridor 4 provides a cheaper and less time consuming transport option than available at present for the trade of the Chinese north-eastern three provinces (CNETP), i.e., Liaoning, Jilin and Heilongjiang, with the Republic of Korea and Japan. For example, most of the freight between Hunchun and Busan is currently transported via Dalian, which involves a long distance (2,300km) and travel time (6 to 11 days) as well as high transport cost of $1,400 to $1,900 per TEU (Table 4-21). However, if Corridor 4 becomes operational, the total distance would be significantly reduced to 927km, transport time to 2.5 days, and cost to about $1,200 to $1,300 per TEU.

Table 4-21 Comparison of routes in Corridors 4 and 2: Hunchun-Busan

Items	*Corridor 2*		*Corridor 4*
Land	Hunchun-Dalian (Road)	Hunchun-Dalian (Rail)	Hunchun-Rajin (Road)
Distance (km)	about 1,300	1,296	93
Time (days)	4-5	10	0.5
Cost (US$/TEU)	1,300	800	600-700
Sea	Dalian-Busan	Dalian-Busan	Rajin-Busan
Distance (km)	about 1,000	about 1,000	834
Time (days)	2	2	2
Cost (US$/TEU)	600	600	600
Total	(Road-Sea)	(Railway-Sea)	(Road-Sea)
Distance (km)	2,300	2,300	927
Time (days)	6-7	8-11	2.5
Cost (US$/TEU)	1,900	1,400	1,200-1,300

Notes:
1. In the case of Land, customs clearance procedures and transshipment happened by the difference of railway gauges, etc. are considered for the estimation of transport time and cost.
2. In the case of Sea, time and cost for shipment at each stopover port are considered.

Corridor 4 also greatly curtails the transport cost and time between the CNETP and Japan. At present, most of the traffic between the CNETP and Japan relies mainly on Corridor 2, using railway transport to Dalian Port and then sea transport to Japan. For example, container transport between Changchun and Niigata using this Dalian route combination of rail and sea transport requires 17-20 days (for 1,940km) and $1,270 per TEU (Table 4-22). Corridor 4, on the other hand, is expected to serve as a more economical corridor for trade between CNETP and Japan. If the Rajin route is used, transport distance from Changchun to Niigata will be reduced to 1,624km, and time and cost also come down to 8 to 11 days and $1,000 per TEU. If the traffic goes through Zarubino Port instead of Rajin Port, Corridor 4 is expected to provide even more cost reduction with a similar level of transport time. In consequence, with the operationalization of Corridor 4, it is expected that trade between CNETP and Japan could enjoy savings of around 50 per cent and 25 per cent of present total transport time and cost, respectively.

Table 4-22 Comparison of routes in Corridors 4 and 2: Changchun-Niigata

Items	*Corridor 2*	*Corridor 4*	
Land: Railway	Changchun-Dalian	Changchun-Zarubino	Changchun-Rajin
Distance (km)	702	673	694
Time (days)	6-9	5-8	5-8
Cost (US$/TEU)	320	420	500
Sea	Dalian-Niigata	Zarubino-Niigata	Rajin-Niigata
Distance (km)	1,940	880	930
Time (days)	11	3	3
Cost (US$/TEU)	950	500	500
Total			
Distance (km)	**2,642**	**1,553**	**1,624**
Time (days)	**17-20**	**8-11**	**8-11**
Cost (US$/TEU)	**1,270**	**920**	**1,000**

Notes:
1. In the case of land, customs clearance procedures and transshipment happened by the difference of railway gauges, etc. are considered for the estimation of transport time and cost.
2. In the case of sea, time and cost for shipment at each stopover port are considered.
3. It is assumed that one day is spent for shipment at each stopover port.
4. 18 tons are calculated into one TEU.

4.4.2 Current situation and prospects

Ports. Rajin Port, a free trade seaport of the Democratic People's Republic of Korea located at the centre of the Rajin-Sonbong Free Economic and Trade Zone, has 13 berths totalling 2,520m with the depth of 8-10.6m. Rajin Port is capable of accommodating ships of the 5,000 to 30,000 ton class. Containers are handled using ordinary wharf cranes[9]. It is generally known that two Russian ports, Zarubino and Posiet, are not in a good condition for container transport. Wharves are not well maintained and loading/unloading and storage facilities also require improvements.

9 ERINA, Vision for the Northeast Asia Transportation Corridors, ERINA Booklet, Vol. 1, June 2002.

Railway. All railway sections in China and the Democratic People's Republic of Korea of Corridor 4 consist of non-electrified, standard gauge, single-track railway. The Zarubino/Posiet branch route of this corridor involves broad gauge rail tracks in the section of the Russian Federation. However, both standard and broad gauge tracks are available between Kraskino and Hunchun, where dual gauge rail tracks were constructed in 1999 (ERINA 2002). Currently no rail tracks exist in Mongolia's section of Corridor 4. The total railway length from Rajin to Sumber at the Mongolian border with China is 1,213km (Table 4-23).

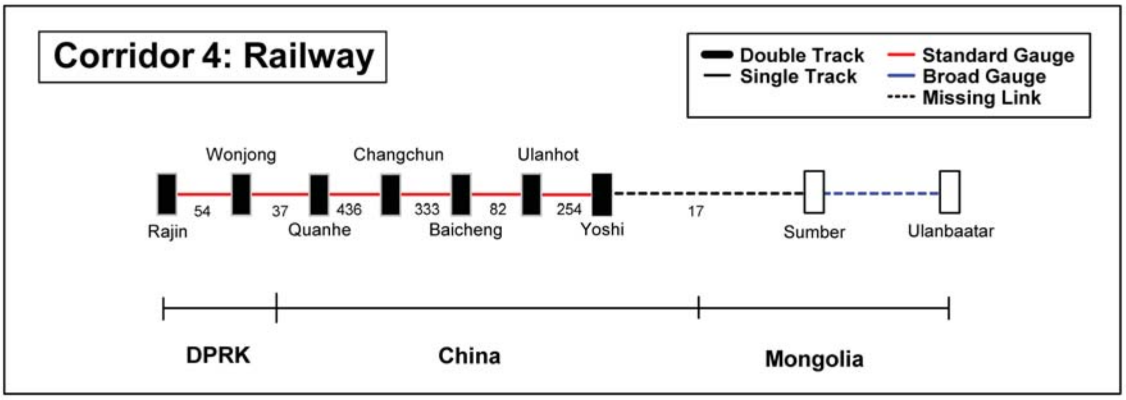

Figure 4-18 Present conditions of railway, Corridor 4

Sources: Based on Country reports, ERINA and Maps produced by UNDP

Table 4-23 Rail distance between Rajin/Sonbong and Ulaanbaatar

Country	From	To	Distance (km)
Democratic People's Republic of Korea	Rajin	Wonjong	54[1]
Border	Wonjong	Quanhe	37
China	Quanhe Changchun	Changchun Yorshi	436 669
Border	Yorshi	Sumber	17
Mongolia	Sumber	Ulaanbaatar	NA[2]
Total (Rajin-Ulaanbaatar)			

Notes: 1. Data from UNDP ' Democratic People's Republic of Korea: Rajin-Wonjong Road Project, Prefeasibility Study Report (2001)'
2. Missing link

Road. The Chinese sections of roads in Corridor 4 are in relatively good condition. At present, paved road is available between Ulanhot and Hunchun (Class III or higher), and the Chinese government has a plan to construct an expressway for the Hunchun-Changchun section. The Hunchun-Kraskino section is concrete-paved and 9-12m wide (Class III). The section from Zarubino and Posiet to Kraskino is partly paved, and a new road was completed for the Quanhe-Hunchun section in 2000 (ERINA 2002). In the Rajin route, the 46km section between Sonbong and Wonjeong is frequently mentioned as a bottleneck area with the most urgent need for improvement (Kim et al. 2003; Lee et al. 2001; ERINA 2002; PADECO 1999). It is understood that this section is not paved, and container trucks have difficulties in transporting through this road, especially in a bad weather. The Democratic People's Republic of Korea plans to construct an expressway for the section and further progress of the plan requires funding.

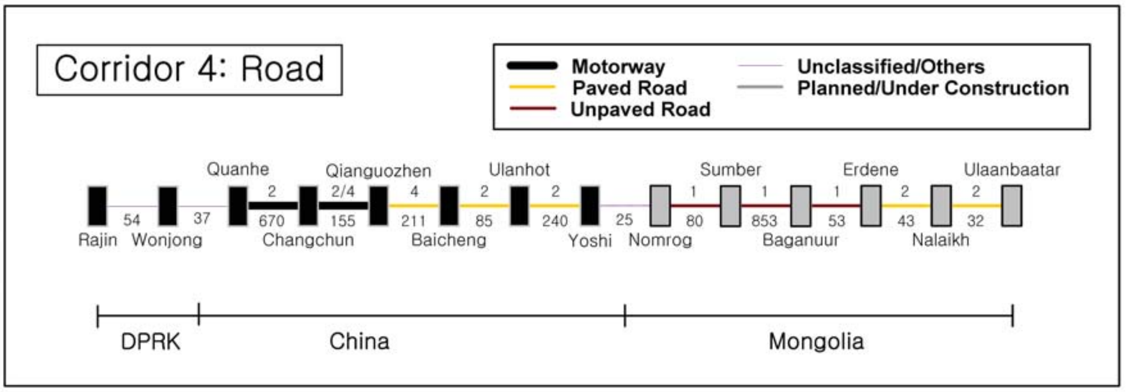

Figure 4-19 Present conditions of road, Corridor 4

Sources: Based on Country reports, ERINA and Maps produced by UNDP

At present, only 11.9 per cent (1,317.6km) of the total Mongolian road network (11,063km) is paved (Road Department of Mongolia 2001). Despite this low pavement ratio in general, the Mongolian government has a strong will to improve the Sumber-Ulaanbaishint section in particular as a major horizontal transport axis of Mongolia, as a long-term plan to develop the so called 'Millennium Road'. ESCAP has also classified this section as a part of the Asian Highway's North-East Asian section. If this road is completed, Corridor 4, with a road network of 2,500km, is also expected to perform as a transcontinental corridor which extends from Far Eastern Asia via Central Asia to Europe (Table 4-24).

Table 4-24 Road distance between Rajin/Sonbong and Ulaanbaatar

Country	From	To	Distance (km)
Democratic People's Republic of Korea	Rajin	Wonjong	54[1]
Border	Wonjong	Quanhe	37
China	Quanhe Chanchun	Chanchun Yorshi	670 691
Border	Yorshi	Nomrog	25
Mongolia	Nomrog	Sumber	80
	Sumber	Ulaanbaatar	981
Total (Rajin-Ulaanbaatar)			**2,538**

Note: 1. Data from UNDP, Democratic People's Republic of Korea: Rajin-Wonjong Road Project, Prefeasibility Study Report , 2001

4.4.3 Transport cost and time

Table 4-25 shows the estimated cost and time to transport a container from Rajin Port in the Democratic People's Republic of Korea to Ulaanbaatar in Mongolia along Corridor 4. It should be noted that only limited data and information were available for this corridor; therefore, analysis was based on rough estimates.

Table 4-25 Cost and time for transport from Rajin/Sonbong Port to Ulaanbaatar

	Road			Rail			Road/Rail
	Cost	Transit Time (hours)		Cost	Transit Time (hours)		Cost
	($/TEU)	Min	Max	($/TEU)	Min	Max	($/TEU)
Rajin Port	180	48	96	180	48	96	180
Rajin-Wonjong	27[1]	1.4[2]	2.7[2]	10.8[3]	1.4[2]	2.7[2]	10.8
Wonjong-Quanhe (Border)	218	1	3	218	1	3	218
Quanhe-Changchun	490	9.5	19	78	12	23	78
Changchun-Yorshi	500	12	24	120	14	26	120
Yorshi-Sumber (Border)	16.1	1.9	4.2	5	1	2	5
Sumber-Ulaanbaatar	135.4	19	25	NA[4]	NA[4]	NA[4]	135.4
Total (Rajin-Ulaanbaatar) (Rajin-Yorshi)	**1,566.5 1,415.0**	**92.8 71.9**	**173.9 144.7**	**- 606.8**	**- 76.4**	**- 150.7**	**747.2 606.8**
$/km	**0.62**			**-**			**0.34**

Notes:
1. The cost assumed at $0.5 per km
2. Estimates based on maximum speed (40km/h) and minimum speed (20km/h) in Democratic People's Republic of Korea
3. The cost assumed at $0.2 per km
4. Missing link

Figures 4-20 and 4-21 present the relationships between travel time and distance of the road transport from Rajin Port to Ulaanbaatar and rail transport from Rajin Port to Sumber, respectively.

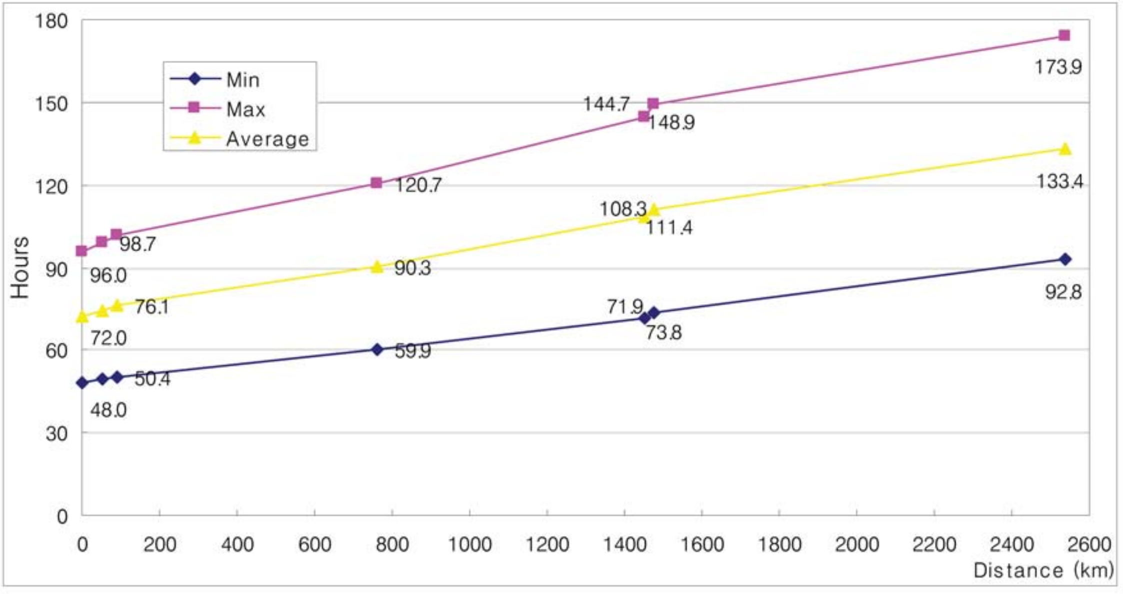

Figure 4-20 Rajin-Ulaanbaatar transit time (road)

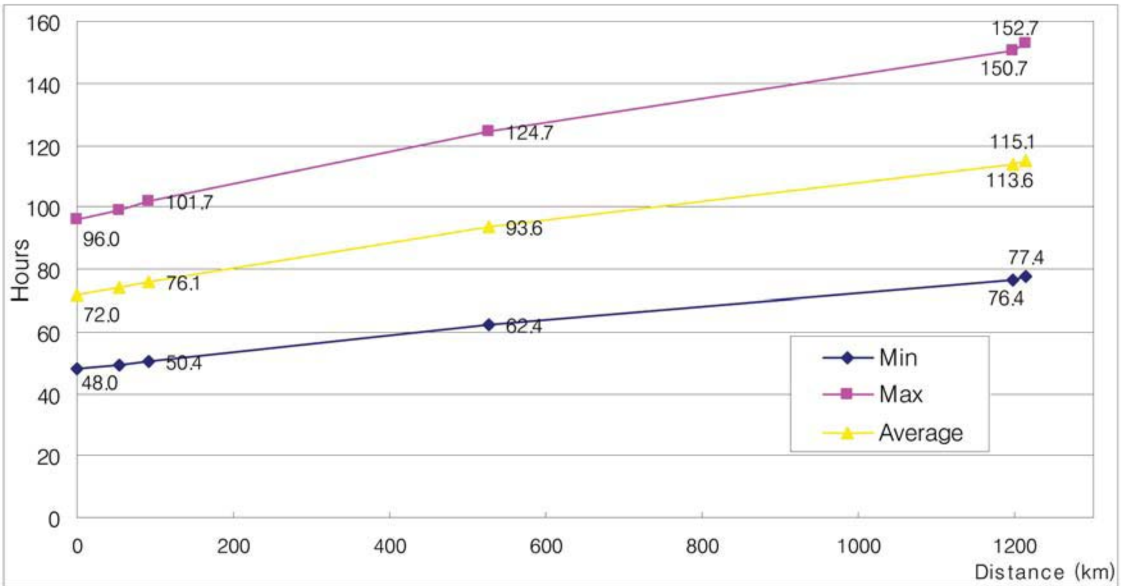

Figure 4-21 Rajin-Ulaanbaatar transit time (rail)

Figure 4-22 shows the cost-distance relationship in Corridor 4 by transport mode. In view of the extended length of this corridor, railway apparently provides the cheaper transport. In China's section, for example, the estimated cost of transporting containers from Quanhe to Yorshi by rail (1,105km) is about $198 per TEU, compared to $990 per TEU by road.

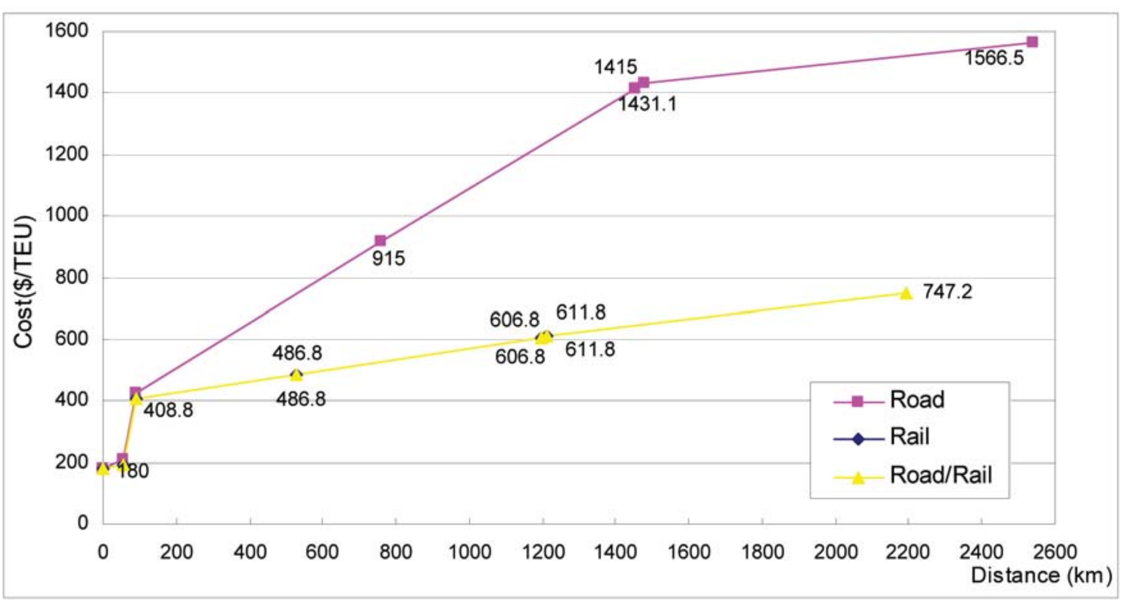

Figure 4-22 Cost-distance (Rajin-Ulaanbaatar)

Routes to consider

- Road route: Democratic People's Republic of Korea-China-Mongolia
- Intermodal route 1: Democratic People's Republic of Korea (rail)-China (road)-Mongolia (road)
- Intermodal route 2: Democratic People's Republic of Korea (rail)-China (rail)-Mongolia (road)
- Intermodal route 3: Democratic People's Republic of Korea (road)-China (rail)-Mongolia (road)

Intermodal routes that can be considered currently in terms of Corridor 4 are limited to the combination of road and rail transport only in China and the Democratic People's Republic of Korea. Tables 4-25A through 4-25D are derived from Table 4-25 to show tabular information for transport cost and time for these two optional routes, and 4-25E presents additional cost and time for providing a sea transport connection to Japan with Corridor 4.

Table 4-25A Road route (U-4.1) from Rajin/Sonbong Port to Ulaanbaatar

	Road		
	Cost	Transit Time (hours)	
	($/TEU)	Min	Max
Rajin Port	180	48	96
Rajin-Wonjong	27	1.4	2.7
Wonjong-Quanhe (Border)	218	1	3
Quanhe- Changchun	490	9.5	19
Changchun-Yorshi	500	12	24
Yorshi-Sumber (Border)	16.1	1.9	4.2
Sumber- Ulaanbaatar	135.4	19	25
Total (Rajin-Ulaanbaatar)	**1,566.5**	**92.8**	**173.9**
$/km	**0.62**		

Table 4-25B Intermodal route (I-4.2) from Rajin/Sonbong Port to Ulaanbaatar

	Road + Rail			Road/Rail
	Cost	Transit Time (hours)		
	($/TEU)	Min	Max	
Rajin Port	180	48	96	-
Rajin-Wonjong	10.8	1.4	2.7	Rail
Wonjong-Quanhe(Border)	218	1	3	Rail
Quanhe- Changchun	490	9.5	19	Road
Changchun-Yorshi	500	12	24	Road
Yorshi-Sumber (Border)	16.1	1.9	4.2	Road
Sumber- Ulaanbaatar	135.4	19	25	Road
Total (Rajin-Ulaanbaatar)	**1,550.3**	**92.8**	**173.9**	
$/km	**0.61**			

Table 4-25C Intermodal route (I-4.3) from Rajin/Sonbong Port to Ulaanbaatar

	Road + Rail			Road/Rail
	Cost	Transit Time (hours)		
	($/TEU)	Min	Max	
Rajin Port	180	48	96	-
Rajin-Wonjong	10.8	1.4	2.7	Rail
Wonjong-Quanhe (Border)	218	1	3	Rail
Quanhe- Changchun	78	12	23	Rail
Changchun-Yorshi	120	14	26	Rail
Yorshi-Sumber (Border)	5	1	2	Rail
Sumber- Ulaanbaatar	135.4	19	25	Road
Total (Rajin-Ulaanbaatar)	**747.2**	**96.4**	**177.7**	
$/km	**0.34**			

Table 4-25D Intermodal route (I-4.4) from Rajin/Sonbong Port to Ulaanbaatar

	Road + Rail			Road/Rail
	Cost	Transit Time (hours)		
	($/TEU)	Min	Max	
Rajin Port	180	48	96	-
Rajin-Wonjong	27	1.4	2.7	Road
Wonjong-Quanhe(Border)	218	1	3	Road
Quanhe- Changchun	78	12	23	Rail
Changchun-Yorshi	120	14	26	Rail
Yorshi-Sumber (Border)	5	1	2	Rail
Sumber- Ulaanbaatar	135.4	19	25	Road
Total (Rajin-Ulaanbaatar)	**763.4**	**96.4**	**177.7**	
$/km	**0.35**			

Table 4-25E Cost and time for transport from Tokyo to Ulaanbaatar

	Road			Rail			Road/Rail
	Cost	Transit Time (hours)		Cost	Transit Time (hours)		Cost
	($/TEU)	Min	Max	($/TEU)	Min	Max	($/TEU)
Tokyo-Niigata Port	1,114	5[1]	5[1]	714	48[1]	48[1]	714
Niigata Port	136	NA	NA	136	NA	NA	136
Niigata Port-Rajin Port	850	48[1]	48[1]	850	48[1]	48[1]	850
Rajin Port	180	48	96	180	48	96	180
Rajin-Wonjong	27	1.4	2.7	10.8	1.4	2.7	10.8
Wonjong-Quanhe (Border)	218	1	3	218	1	3	218
Quanhe- Changchun	490	9.5	19	78	12	23	78
Changchun-Yorshi	500	12	24	120	14	26	120
Yorshi-Sumber (Border)	16.1	1.9	4.2	5	1	2	5
Sumber- Ulaanbaatar	135.4	19	25	NA	NA	NA	135.4
Total (Tokyo-Ulaanbaatar)	**3,666.5**	-	-	-	-	-	**2,447.2**
$/km	-			-			-

Note: 1. Average transit time

4.5 CORRIDOR 5 NAKHODKA/VLADIVOSTOK-USSURISK-POGRANICHNY-HARBIN-MANZHOULI-CHITA-ULAN UDE

4.5.1 Significance

Corridor 5 is another major corridor through which the Chinese north-eastern provinces can connect to the East Sea (Japan Sea) and the Pacific. This corridor extends from Nakhodka, Vostochny and Vladivostok, via Harbin, the largest city of the Heilongjiang Province, and finally links up with the TSR in Karymskaya and Chita.

Corridor 5, together with Corridor 4 mentioned earlier, seems reasonable as an alternative to Corridor 6 (Figure 4-23). These two corridors cannot only disperse traffic demands loaded on Corridor 6 but also serve as more economically efficient transport corridors enabling a great degree of transport time and cost reduction. Take, for example, the transport between Harbin and Niigata, and between Suifenhe and Niigata. At present, containers are mainly transported through a combination of Corridor 6 and sea transport. It takes 18 to 21 days for transporting 2,884km from Harbin to Niigata and costs $1,340 per TEU, and 21 to 25 days and $1,510 per TEU for 3,432km from Suifenhe to Niigata (Table 4-26). However, a combination of Corridor 5 and sea transport needs no more than 13 days and $1,190 per TEU from Harbin to Niigata (1,812km), and at most seven days and $1,020 per TEU from Suifenhe to Niigata (1,264km), saving 40 to 60 per cent of transport time and 10 to 30 per cent of transport costs.

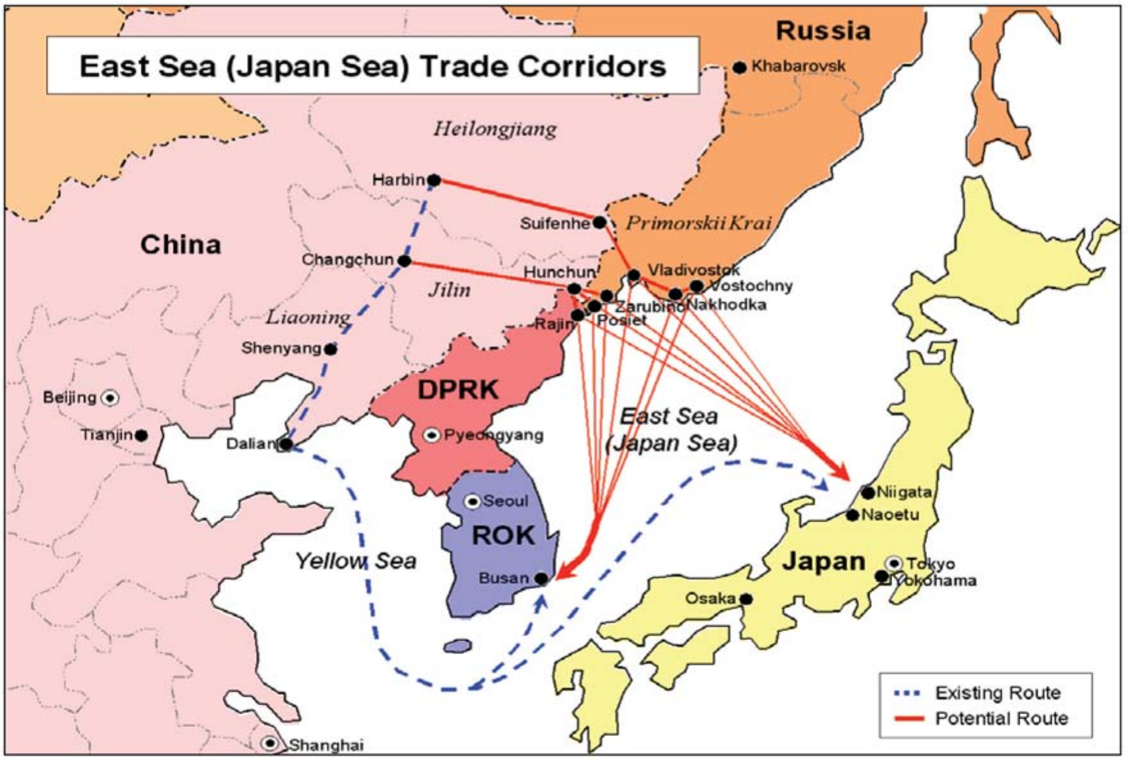

Figure 4-23 Potential East Trade Corridor utilizing Corridor 4 and Corridor 5

Source: Adopted from MOT of Japan (recited from Kim, Won Bae et al, Building Infrastructure for the Facilitation of Economic Cooperation in Northeast Asia in the 21st Century: Focusing on Land Transport Linkages between Korea and China, KRIHS Special Reports No. 3, Korea Research Institute for Human Settlements, 2003)

Table 4-26 Comparison of routes in Corridors 5 and 6: Harbin/Suifenhe-Niigata

Items	*Corridor 6*	*Corridor 5*	*Corridor 6*	*Corridor 5*
Land: Railway	Harbin-Dalian	Harbin-Vostochny	Suifenhe-Dalian	Suifenhe-Vostochny
Distance (km)	944	1,032	1,492	484
Time (days)	7-10	6-10	10-14	2-4
Cost (US$/TEU)	390	690	560	520
Sea	Dalian-Niigata	Vostochny-Niigata	Dalian-Niigata	Vostochny-Niigata
Distance (km)	1,940	780	1,940	780
Time (days)	11	3	11	3
Cost (US$/TEU)	950	500	950	500
Total				
Distance (km)	2,884	1,812	3,432	1,264
Time (days)	18-21	9-13	21-25	5-7
Cost (US$/TEU)	1,340	1,190	1,510	1,020

Notes:
1. In the case of Land, customs clearance procedures and transshipment happened by the difference of railway gauges, etc. are considered for the estimation of transport time and cost.
2. In the case of sea, time and cost for shipment at each stopover port are considered.
3. It is assumed that one day is spent for shipment at each stopover port.
4. 18 tons are calculated into one TEU.

4.5.2 Current situation and prospects

Ports. Corridor 5 includes three Russian ports: Nakhodka, Vladivostok and Vostochny. These ports have been mainly used as starting points for the TSR. In particular, Vostochny Port, the principal container port in the Far Eastern region of the Russian Federation, handles most of container cargos for the TSR. JSC Vostochny Port operates two general cargo/container berths (length 675m, depth 13.5m). Vostochny Port International Container Terminal is operated by Vostochny International Container Services (VICS), which is a Joint Venture of Vostochny Port, P&O Ports and CSX World Terminals. VICS operates two general cargo/container berths (length 672m, depth 12.5m) with a total capacity of approximately 400,000 containers per annum.[10] Container throughput of VICS was 134 thousand TEU in 2002, which was well below capacity. Vladivostok Port, with two container berths (lengths 320m, depth 11.6m), handled 85,800 TEU of containers in 2002. Some containers are also handled at the port of Nakhodka, although detailed statistics are not available.

Railway. Broad gauge rails are in use on the Russian side of the corridor. Electrified, double-track railways are available between the three ports and Ussuriysk, and non-electrified, single-track railway for the sections from Ussuriysk to Grodekovo and from Manzhouli to Karymskaya. Contrary to the Russian Federation, China uses standard gauge track, and therefore break-of-gauge operation is needed at the borders between the two countries. Dual gauge tracks are installed at the border area between Grodekovo in the Russian Federation and Suifenhe in China. Non-electrified, double-track rails are in operation for the section from Mudanjiang to Hailar, while the remaining sections in China are composed of non-electrified, single track rails.

The total length of the railway network along Corridor 5 is 2,968km from Nakhodka and Ulan Ude and the distance from Vladivostok to Ulan Ude is 2,809km (Table 4-27).

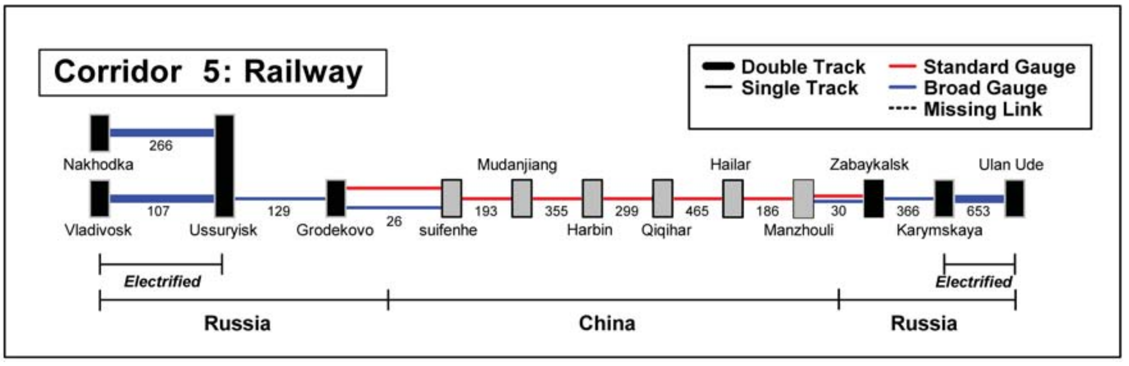

Figure 4-24 Present conditions of railway, Corridor 5

Sources: Based on Country reports, ERINA and Maps produced by UNDP

[10] http://www.vics.ru/scripts/issue.dll?lang=eng&idm=1

Table 4-27 Rail distance between Nakhodka and Ulan Ude

Country	From	To	Distance (km)
Russian Federation	Vladivostok Nakhodka	Grodekovo Grodekovo	236 395
Border	Grodekovo	Suifenhe	26
China	Suifenhe	Manzhouli	1,498
Border	Manzhouli	Zabaykalsk	30[1]
Russian Federation	Zabaykalsk	Ulan Ude	1,019
Total (Vladivostok-Ulan Ude) (Nakhodka-Ulan Ude)			**2,809 2,968**

Note: 1. Data from road distance between Manzhouli-Zabaykalsk

Road. Available information suggests that the road condition of Corridor 5 is relatively favorable even for cargo traffic, in general. However, the utilization of road transport in Corridor 5 is considered very low. No more than 9 per cent of the total freight moving through Corridor 5 chooses road, which corresponds to just 10 per cent of the total capacity of the road transport.

The entire Russian section consists of paved two lane roads, through which container cargo can pass without any difficulties. Although the Grodekovo-Suifenhe section partially includes unpaved roads, they do not produce any serious problems for cargo transport. An expressway is available from Suifenhe via Harbin to Arun Qi. The Chinese government plans to extend this expressway line to Manzhouli. At present, National Highway 301 passes from Arun Qi to Manzhouli (ERINA 2002). ESCAP designated the section between Nakhodka and Harbin as a subregional Asian Highway route, and the section between Harbin and Chita as an international Asian Highway route.

By road the distance between Nakhodka and Ulan Ude is 3,218km and the distance between Vladivostok and Ulan Ude is 3,049km, about 240km longer than the distance by rail (Table 4-28).

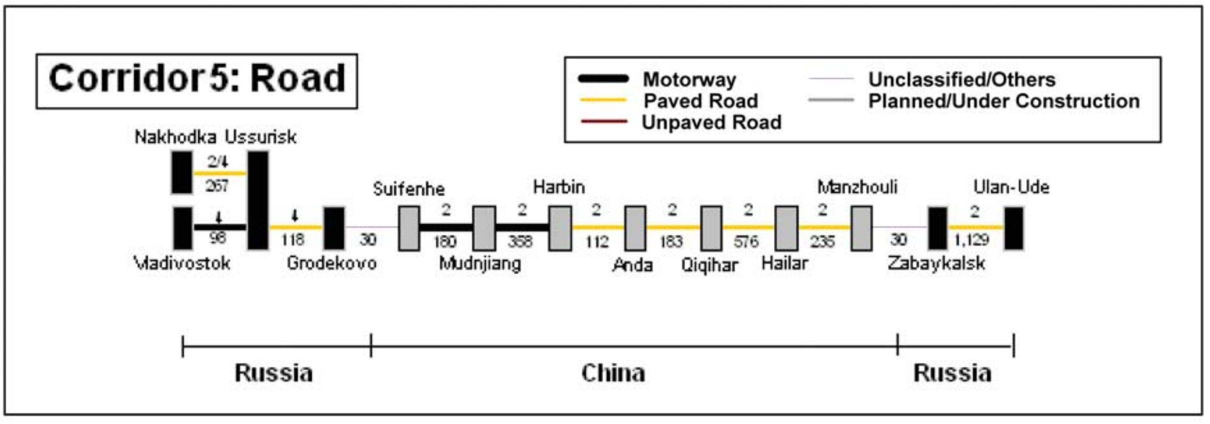

Figure 4-25 Present conditions of road, Corridor 5

Sources: Based on Country reports, ERINA and Maps produced by UNDP

Table 4-28 Road distance between Nakhodka and Ulan Ude

Country	From	To	Distance (km)
Russian Federation	Nakhodka	Grodekovo	385
	Vladivostok	Grodekovo	216
Border	Grodekovo	Suifenhe	30
China	Suifenhe	Manzhouli	1,644
Border	Manzhouli	Zabaykalsk	30
Russian Federation	Zabaykalsk	Ulan Ude	1,129
Total (Nakhodka-Ulan Ude) **(Vladivostok-Ulan Ude)**			**3,218** **3,049**

4.5.3 Transport cost and time

Table 4-29 shows the cost and time to transport a container from Vladivostok port to Ulan Ude in the Russian Federation via the Suifenhe-Manzhouli section in China along Corridor 5. Figures 4-26 and 4-27 present the relationships between travel time and the distance of road transport from Nakhodka and Valdivostok Port to Ulan Ude, respectively.

Table 4-29 Cost and time for transport from Nakhodka/Vladivostok Port to Ulan Ude

	Road			Rail			Road/Rail
	Cost	Transit Time (hours)		Cost	Transit Time (hours)		Cost
	($/TEU)	Min	Max	($/TEU)	Min	Max	($/TEU)
Nakhodka Port	100[1]	1[2]	2[2]	100[1]	1[2]	2[2]	100
Vladivostok Port	80	1	2	80	1	2	80
Nakhodka-Grodekovo	279.5[3]	6.4[4]	12.8[4]	154	5.3	8.5	154
Vladivostok-Grodekovo	160[5]	3.6[4]	7.2[4]	100	3.5	5.5	100
Grodekovo-Suifenhe (Border)	100	1	24	100	12	24	100
Suifenhe-Manzhouli	1100	24	48	227.2	24	35	227.2
Manzhouli-Zabaykalsk (Border)	100[6]	1[6]	24[6]	100[6]	12[6]	24[6]	100
Zabaykalsk-Ulan Ude	633.5[7]	18.8[4]	37.6[4]	353	12.6	27.5	353
Total **(Nakhodka-Ulan Ude)** **(Vladivostok-Ulan Ude)**	**2,313.0** **2,173.5**	**52.2** **49.4**	**148.4** **142.8**	**1,034.2** **960.2**	**66.9** **65.1**	**121.0** **118.0**	**1,034.2** **960.2**
$/km **(Nakhodka-Ulan Ude)** **(Vladivostok-Ulan Ude)**	**0.72** **0.71**			**0.35** **0.34**			**0.35** **0.34**

Notes:
1. Data from Nakhodka port
2. Data from Vladivostok port
3. Average trucking charge (15ton) between Moscow-Gorokhovech (382km) and Moscow-Kostroma (381km)
4. Estimates based on maximum speed (60km/h) and minimum speed (30km/h)
5. Average trucking charge (15ton) between Moscow-Vladimir (228km) and Moscow-Tver (209km)
6. Estimate based on the cost and transit time of Grodekovo-Suifenhe
7. Average trucking charge (15ton) between Moscow-Novocherkask (1,108km) and Moscow-Samara (1,131km)

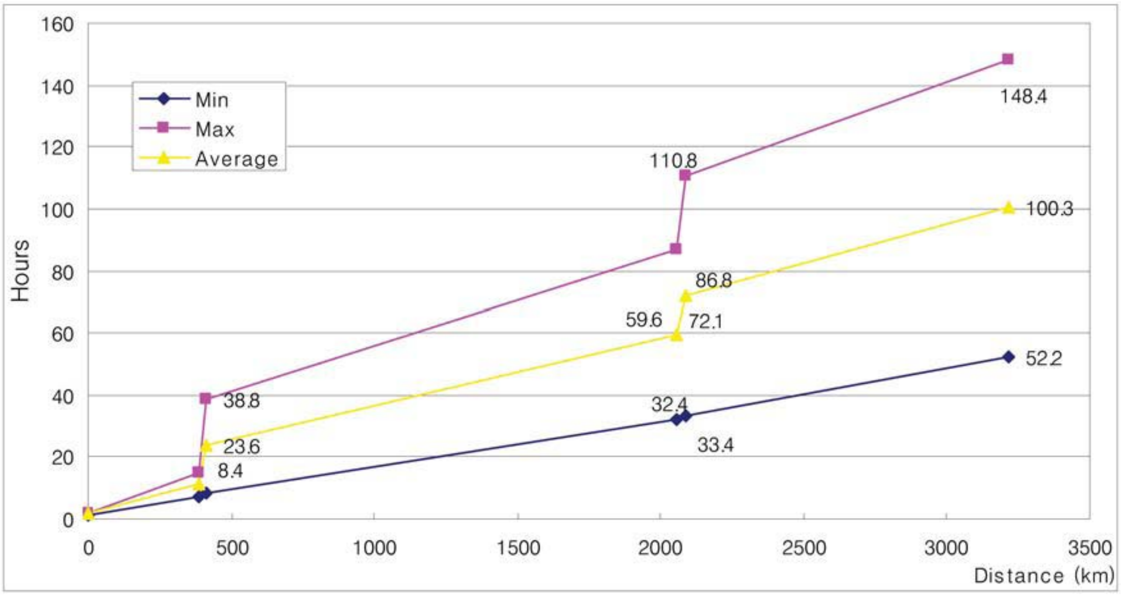

Figure 4-26 Nakhodka-Ulan Ude transit time (road)

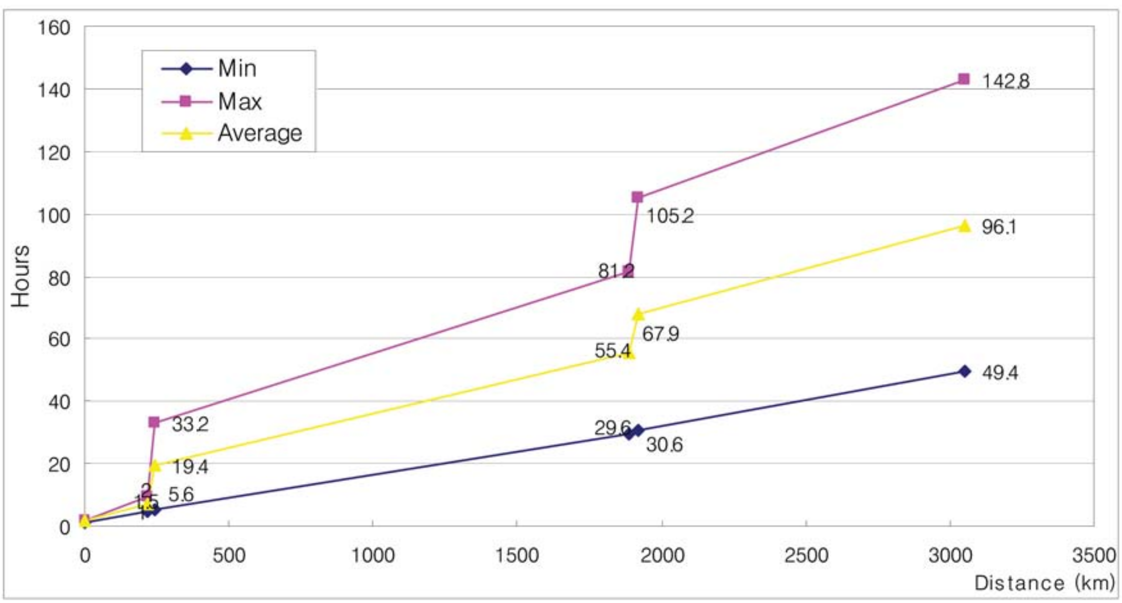

Figure 4-27 Vladivostok-Ulan Ude transit time (road)

Figures 4-28 and 4-29 present the time-distance relationships of the rail transport of the same routes.

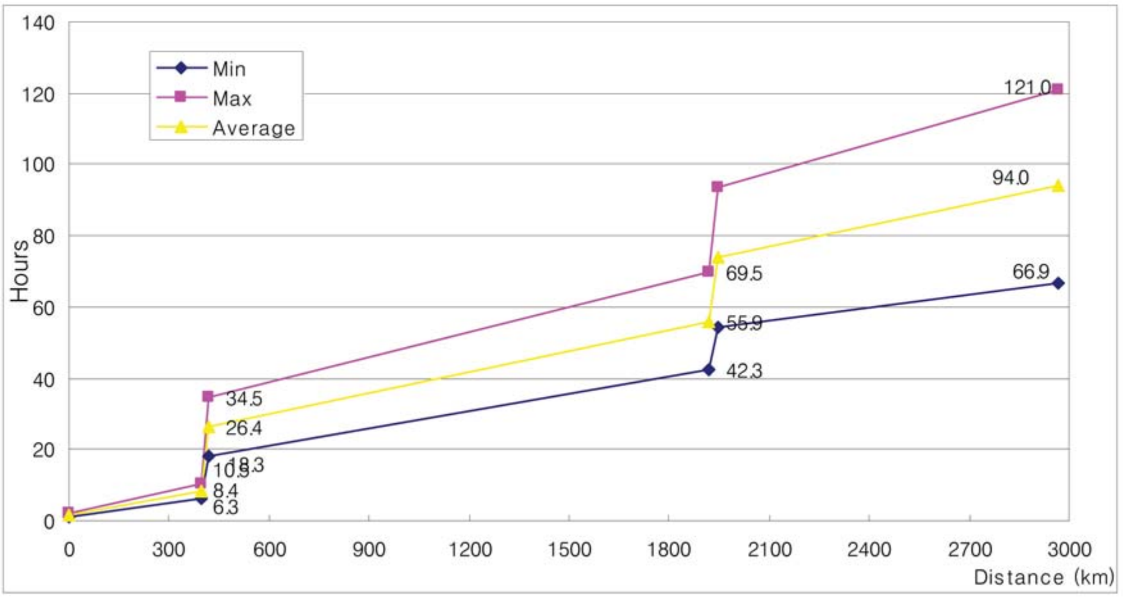

Figure 4-28 Nakhodka-Ulan Ude transit time (rail)

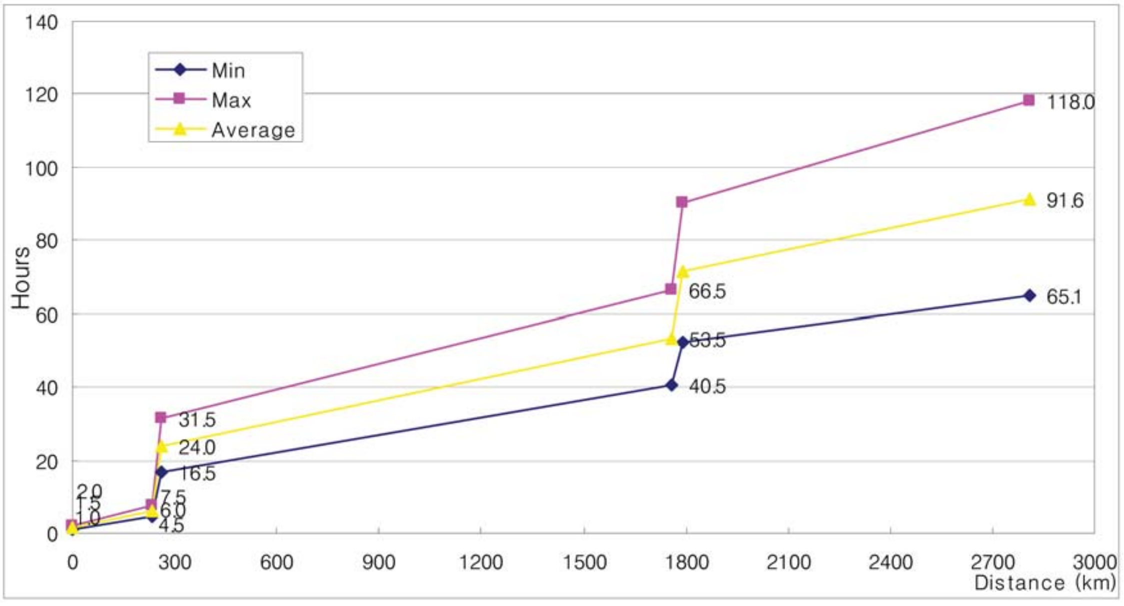

Figure 4-29 Vladivostok-Ulan Ude transit time (rail)

Figures 4-30 and 4-31 show the cost-distance relationships in Corridor 5 by transport mode. In view of the extended length of this corridor, using rail transportation for the entire route results in the lowest transport cost of $1,034 from Nakhodka and $960 from Vladvostok. The road transport cost in China's section is about $1,100 per TEU and takes between 24 hours to 48 hours. Rail transport is significantly cheaper, costing only $227 for the entire section of 1,498km. In the Russian Federation, the rail cost between Nakhodka and Godekovo is about $154 per TEU and $353 per TEU between Zabaykalsk and Ulan Ude.

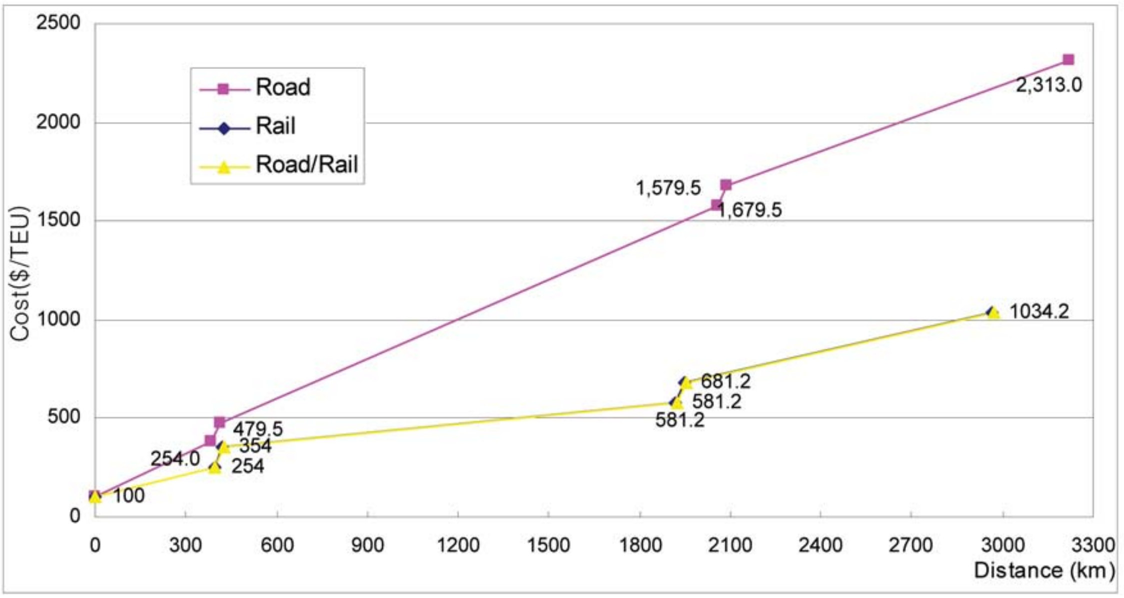

Figure 4-30 Cost-distance (Nakhodka-Ulan Ude)

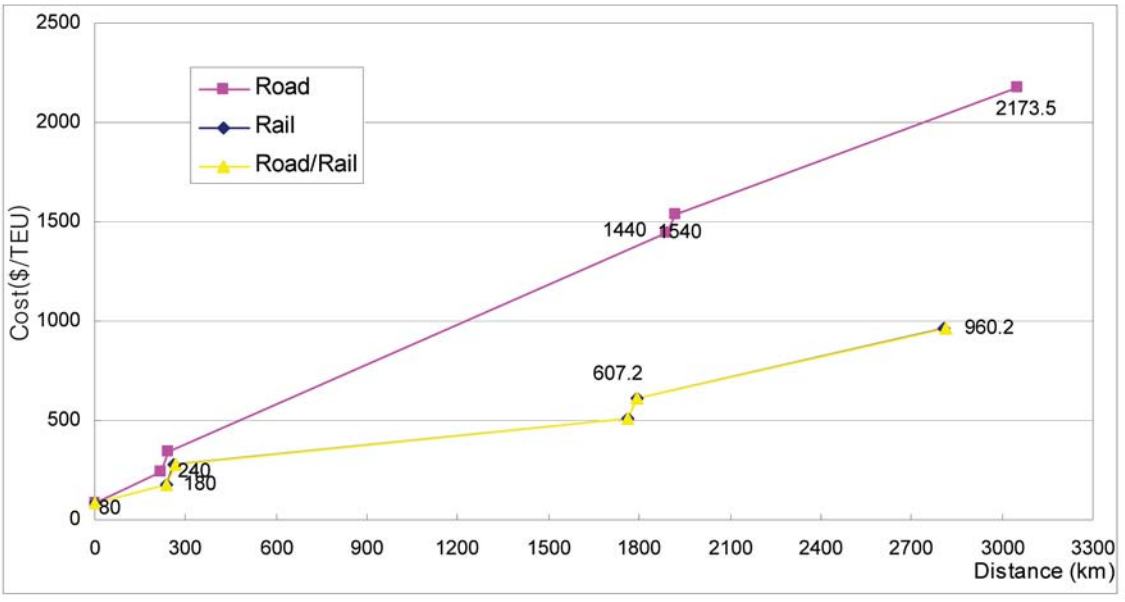

Figure 4-31 Cost-distance (Vladivostok-Ulan Ude)

Routes to consider

- Rail route: Russian Federation-China-Russian Federation
- Road route: Russian Federation-China-Russian Federation
- Intermodal route 1: Russian Federation(rail)-China(rail)-Russian Federation(road)
- Intermodal route 2: Russian Federation(rail)-China(road)-Russian Federation(road)
- Intermodal route 3: Russian Federation(rail)-China(road)-Russian Federation(rail)
- Intermodal route 4: Russian Federation(road)-China(rail)-Russian Federation(rail)
- Intermodal route 5: Russian Federation(road)-China(road)-Russian Federation(rail)
- Intermodal route 6: Russian Federation(road)-China(rail)-Russian Federation(road)

In view of relatively good condition of the rail as well as the road along Corridor 5, all possible combination of rail and road for different sections can be considered for intermodal route analysis. Tables 4-29A through 4-29H are derived from Table 4-29 to show tabular information for transport cost and time for these alternative routes. Table 4-29I presents additional cost and time for providing a sea transport connection to Japan with Corridor 5.

Table 4-29A Rail route (U-5.1) from Nakhodka/Vladivostok Port to Ulan Ude

	Rail		
	Cost	**Transit Time (hours)**	
	($/TEU)	**Min**	**Max**
Nakhodka Port	100	1	2
Vladivostok Port	80	1	2
Nakhodka-Grodekovo	154	5.3	8.5
Vladivostok-Grodekovo	100	3.5	5.5
Grodekovo-Suifenhe (Border)	100	12	24
Suifenhe-Manzhouli	227.2	24	35
Manzhouli-Zabaykalsk (Border)	100	12	24
Zabaykalsk-Ulan Ude	353	12.6	27.5
Total **(Nakhodka-Ulan Ude)** **(Vladivostok-Ulan Ude)**	 **1,034.2** **960.2**	 **66.9** **65.1**	 **121.0** **118.0**
$/km **(Nakhodka-Ulan Ude)** **(Vladivostok-Ulan Ude)**	 **0.35** **0.34**		

Table 4-29B Road route (U-5.2) from Nakhodka/Vladivostok Port to Ulan Ude

	Road		
	Cost	**Transit Time (hours)**	
	($/TEU)	**Min**	**Max**
Nakhodka Port	100	1	2
Vladivostok Port	80	1	2
Nakhodka-Grodekovo	279.5	6.4	12.8
Vladivostok-Grodekovo	160	3.6	7.2
Grodekovo-Suifenhe (Border)	100	1	24
Suifenhe-Manzhouli	1100	24	48
Manzhouli-Zabaykalsk (Border)	100	1	24
Zabaykalsk-Ulan Ude	633.5	18.8	37.6
Total **(Nakhodka-Ulan Ude)** **(Vladivostok-Ulan Ude)**	 **2,313.0** **2,173.5**	 **52.2** **49.4**	 **148.4** **142.8**
$/km **(Nakhodka-Ulan Ude)** **(Vladivostok-Ulan Ude)**	 **0.72** **0.71**		

Table 4-29C Intermodal route (I-5.3) from Nakhodka/Vladivostok Port to Ulan Ude

	Road + Rail			Road/Rail
	Cost	Transit Time (hours)		
	($/TEU)	Min	Max	
Nakhodka Port	100	1	2	-
Vladivostok Port	80	1	2	-
Nakhodka-Grodekovo	154	5.3	8.5	Rail
Vladivostok-Grodekovo	100	3.5	5.5	Rail
Grodekovo-Suifenhe (Border)	100	12	24	Rail
Suifenhe-Manzhouli	227.2	24	35	Rail
Manzhouli-Zabaykalsk (Border)	100	1	24	Road
Zabaykalsk-Ulan Ude	633.5	18.8	37.6	Road
Total **(Nakhodka-Ulan Ude)** **(Vladivostok-Ulan Ude)**	 **1,314.7** **1,240.7**	 **62.1** **60.3**	 **131.1** **128.1**	
$/km **(Nakhodka-Ulan Ude)** **(Vladivostok-Ulan Ude)**	 **0.43** **0.43**			

Table 4-29D Intermodal route (I-5.4) from Nakhodka/Vladivostok Port to Ulan Ude

	Road + Rail			Road/Rail
	Cost	Transit Time (hours)		
	($/TEU)	Min	Max	
Nakhodka Port	100	1	2	-
Vladivostok Port	80	1	2	-
Nakhodka-Grodekovo	154	5.3	8.5	Rail
Vladivostok-Grodekovo	100	3.5	5.5	Rail
Grodekovo-Suifenhe (Border)	100	1	24	Road
Suifenhe-Manzhouli	1100	24	48	Road
Manzhouli-Zabaykalsk (Border)	100	1	24	Road
Zabaykalsk-Ulan Ude	633.5	18.8	37.6	Road
Total **(Nakhodka-Ulan Ude)** **(Vladivostok-Ulan Ude)**	 **2,187.5** **2,113.5**	 **51.1** **49.3**	 **144.1** **141.1**	
$/km **(Nakhodka-Ulan Ude)** **(Vladivostok-Ulan Ude)**	 **0.68** **0.69**			

Table 4-29E Intermodal route (I-5.5) from Nakhodka/Vladivostok Port to Ulan Ude

	Road + Rail			Road/Rail
	Cost	Transit Time (hours)		
	($/TEU)	Min	Max	
Nakhodka Port	100	1	2	-
Vladivostok Port	80	1	2	-
Nakhodka-Grodekovo	154	5.3	8.5	Rail
Vladivostok-Grodekovo	100	3.5	5.5	Rail
Grodekovo-Suifenhe (Border)	100	12	24	Rail
Suifenhe-Manzhouli	1100	24	48	Road
Manzhouli-Zabaykalsk (Border)	100	1	24	Road
Zabaykalsk-Ulan Ude	353	12.6	27.5	Rail
Total **(Nakhodka-Ulan Ude)** **(Vladivostok-Ulan Ude)**	**1,907.0** **1,833.0**	**55.9** **54.1**	**134.0** **131.0**	
$/km **(Nakhodka-Ulan Ude)** **(Vladivostok-Ulan Ude)**	**0.61** **0.62**			

Table 4-29F Intermodal route (I-5.6) from Nakhodka/Vladivostok Port to Ulan Ude

	Road + Rail			Road/Rail
	Cost	Transit Time (hours)		
	($/TEU)	Min	Max	
Nakhodka Port	100	1	2	-
Vladivostok Port	80	1	2	-
Nakhodka-Grodekovo	279.5	6.4	12.8	Road
Vladivostok-Grodekovo	160	3.6	7.2	Road
Grodekovo-Suifenhe (Border)	100	1	24	Road
Suifenhe-Manzhouli	227.2	24	35	Rail
Manzhouli-Zabaykalsk (Border)	100	12	24	Rail
Zabaykalsk-Ulan Ude	353	12.6	27.5	Rail
Total **(Nakhodka-Ulan Ude)** **(Vladivostok-Ulan Ude)**	**1,159.7** **1,020.2**	**57.0** **54.2**	**125.3** **119.7**	
$/km **(Nakhodka-Ulan Ude)** **(Vladivostok-Ulan Ude)**	**0.39** **0.37**			

Table 4-29G Intermodal route (I-5.7) from Nakhodka/Vladivostok Port to Ulan Ude

	Road + Rail			Road/Rail
	Cost	Transit Time (hours)		
	($/TEU)	Min	Max	
Nakhodka Port	100	1	2	-
Vladivostok Port	80	1	2	-
Nakhodka-Grodekovo	279.5	6.4	12.8	Road
Vladivostok-Grodekovo	160	3.6	7.2	Road
Grodekovo-Suifenhe (Border)	100	1	24	Road
Suifenhe-Manzhouli	1100	24	48	Road
Manzhouli-Zabaykalsk (Border)	100	1	24	Road
Zabaykalsk-Ulan Ude	353	12.6	27.5	Rail
Total (Nakhodka-Ulan Ude) (Vladivostok-Ulan Ude)	**2,032.5 1,893.0**	**46.0 43.2**	**138.3 132.7**	
$/km (Nakhodka-Ulan Ude) (Vladivostok-Ulan Ude)	**0.65 0.64**			

Table 4-29H Intermodal route (I-5.8) from Nakhodka/Vladivostok Port to Ulan Ude

	Road + Rail			Road/Rail
	Cost	Transit Time (hours)		
	($/TEU)	Min	Max	
Nakhodka Port	100	1	2	-
Vladivostok Port	80	1	2	-
Nakhodka-Grodekovo	279.5	6.4	12.8	Road
Vladivostok-Grodekovo	160	3.6	7.2	Road
Grodekovo-Suifenhe (Border)	100	1	24	Road
Suifenhe-Manzhouli	227.2	24	35	Rail
Manzhouli-Zabaykalsk (Border)	100	1	24	Road
Zabaykalsk-Ulan Ude	633.5	18.8	37.6	Road
Total (Nakhodka-Ulan Ude) (Vladivostok-Ulan Ude)	**1,440.2 1,300.7**	**52.2 49.4**	**135.4 139.8**	
$/km (Nakhodka-Ulan Ude) (Vladivostok-Ulan Ude)	**0.47 0.45**			

Table 4-29I Cost and time for transport from Tokyo to Ulan Ude

	Road			Rail			Road/Rail
	Cost	Transit Time (hours)		Cost	Transit Time (hours)		Cost
	($/TEU)	Min	Max	($/TEU)	Min	Max	($/TEU)
Tokyo-Fushiki-Toyama Port	1,291	6[1]	6[1]	NA	NA	NA	1,291
Fushiki-Toyama Port	279	NA	NA	279	NA	NA	279
Fushiki-Toyama Port-Nakhodaka/Vladivostok Port[2]	872	240[1]	240[1]	872	240[1]	240[1]	872
Nakhodka Port	100	1	2	100	1	2	100
Vladivostok Port	80	1	2	80	1	2	80
Nakhodka-Grodekovo	279.5	6.4	12.8	154	5.3	8.5	154
Vladivostok-Grodekovo	160	3.6	7.2	100	3.5	5.5	100
Grodekovo-Suifenhe (Border)	100	1	24	100	12	24	100
Suifenhe-Manzhouli	1100	24	48	227.2	24	35	227.2
Manzhouli-Zabaykalsk (Border)	100	1	24	100	12	24	100
Zabaykalsk-Ulan Ude	633.5	18.8	37.6	353	12.6	27.5	353
Total (Tokyo-Nakhodka-Ulan Ude) (Tokyo-Vladivostok-Ulan Ude)	**4,775.0 4,615.0**	- -	- -	- -	- -	- -	**3,476.2 3,402.2**
$/km	-			-			-

Notes: 1. Average transit time
2. Data from Fushiki-Toyama port-Vostochny port

4.6 CORRIDOR 6 DALIAN-SHENYANG-CHANGCHUN-HARBIN-HEIHE-BLAGOVESHCHENSK-BELOGORSK

4.6.1 Significance

Corridor 6 crosses the Chinese North-Eastern Three Provinces (CNETP) and further connects by sea transport through Dalian Port with Japan and the Republic of Korea. Japan and the Republic of Korea play a crucial role in CNETP's economy. Those two countries have already become not only major investors but also the most important trade partners for the CNETP. A number of Japanese and Korean companies have established factories in the CNETP, which are producing various manufactured goods. In most cases, these factories specialize in the assembly process and parts and components for finished products are imported from Japan and the Republic of Korea. This is one factor which has led to the increase of logistics and transport demands in those regions. In addition, CNETPs' abundant human resources, who can speak Japanese and Korean, are expected to play a crucial role in attracting more and more companies from those two countries. Economic exchange and cooperation between CNETP and Japan and the Republic of Korea is expected to strengthen further in the future.

As of 2002, the CNETP held 8.3 per cent of China's total population, and 11.1 per cent of GDP. In other words, CNETP has a huge market backed up by a population of more than 100 million and great growth potential driven by a gross regional domestic product (GRDP) of more than $100 billion. This has resulted in the region being attractive to foreign investors (Table 4-30).

In addition, the CNETP composes the Bohai economic circle with the Greater Beijing region (Beijing, Tianjin and Hebei Provinces). The Bohai region is one of the three major economic areas in China with the Zhu River Delta (Shenzhen, Guangzhou and Hongkong) and the Chiang River Delta (Shanghai) (Figure 4-32).

In this sense, it does not seem unreasonable to expect that the CNETP will become another important growth axis of North-East Asia. Herein lies the significance of Corridor 6, which can support transport demands for this region.

Table 4-30 Major indicators of Chinese North-East three provinces, 2002

Regions	Population		Gross Regional Domestic Product	
	(10 thousands)	% Share	(100 million Yuan)	% Share
North-East Three Provinces	10,715	8.3	11,586.5	11.1
Liaoning	4,203	3.3	5,458.2	5.2
Jilin	2,699	2.1	2,246.1	2.1
Heilongjiang	3,813	3.0	3,882.2	3.7
China Total	1,28,453	100.0	104,790.6	100.0

Source: Statistical Yearbook of China, www.ststs.gov.cn

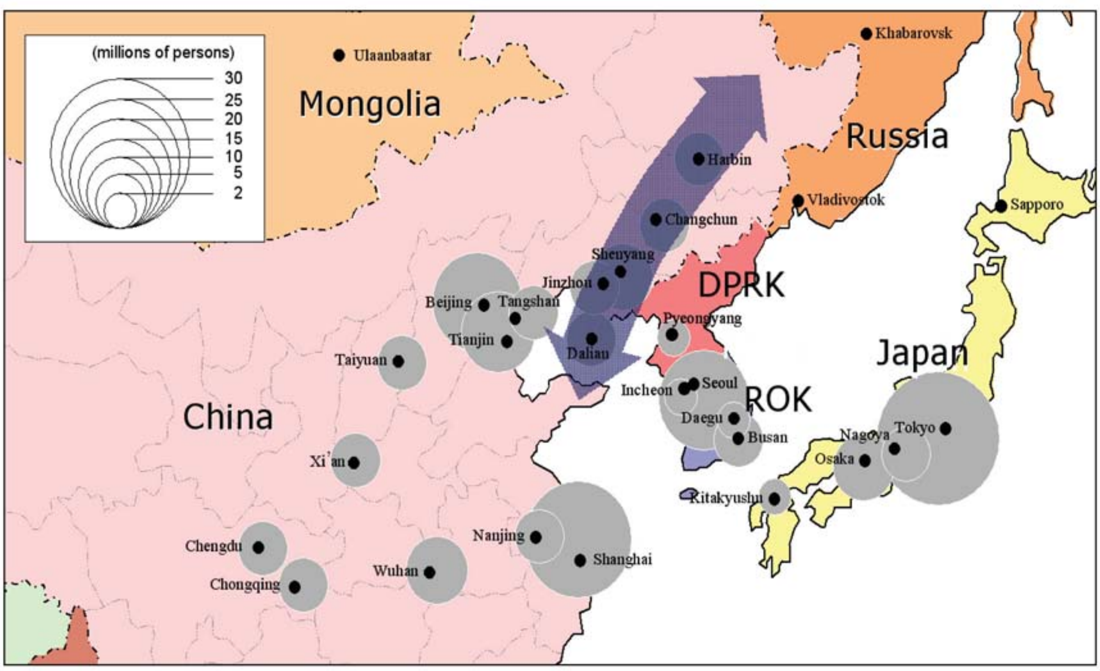

Figure 4-32 Dalian-Harbin axis

4.6.2 Current situation and prospects

Ports. The Port of Dalian, which is located at the southern tip of the Liaodong Peninsula, serves as the gateway to north-eastern provinces of China. The port is linked to an inland container transport network with dedicated train services to the inner cities of Changchun, Harbin, Shenuang and Yanji with more than 40 departures every week. Dalian Port handles 85 per cent of the total export cargos produced in CNETP. Around 80 per cent of the container freight handled at the port is from the Dalian area, 10 per cent from the Shenyang area, and the other 10 per cent from the Changchun and Harbin area.

Container operation at the Dalian Port involves two terminals, both operated by PSA Corporation in a joint venture with the port authority. Dalian Dagang Container Terminal (DDCT) handles mainly domestic and coastal cargoes and has an annual handling capacity of 400,000 TEU. Dalian Container Terminal (DCT), located in Dalian Jinzhou Economic Development Zone, has five container berths totaling 1,500m with the capacity to handle 1.8 million TEU of international container cargoes annually. Container throughput at Dalian Port was recorded as 1.67 million TEU in 2003.

The Port of Dalian is stepping up its development in a bid to become the international shipping centre for North-East Asia. Dalian Port plans to invest CNY$27 billion on new and improved port facilities by 2010. By 2010, total throughput will increase to 200 million tons and container throughput to 6 million TEU.

Railway. Electrification of rail on the Dalian-Harbin line was completed in November 2001, where container trains are in operation (ERINA 2002). Double tracks are available from Dalian to Suihua, and single tracks from Suihua to Heihe in China. Russian Federation's rail in this corridor is run by diesel on a single track. There is a missing link of 85km at the border area between Heihe in China and Blagoveschensk in the Russian Federation. Since the track gauge is different between China and the Russian Federation, connecting the missing link needs to consider dual gauges at the border. By rail, the total length of this corridor is 1,795km (Figure 4-33 and Table 4-31).

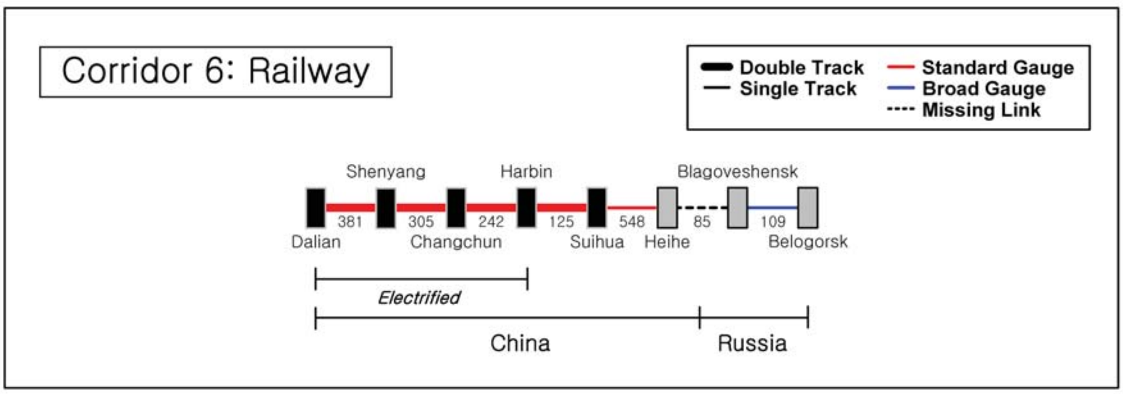

Figure 4-33 Present conditions of railway, Corridor 6

Sources: Based on Country reports, ERINA and Maps produced by UNDP

Table 4-31 Rail distance between Dalian and Belogorsk

Country	From	To	Distance (km)
China	Dalian Changchun	Changchun Heihe	686 915
Border	Heihe	Blagoveschensk	85
Russian Federation	Blagoveschensk	Belogorsk	109
Total (Dalian-Belogorsk)			**1,795**

Road. Road development in China's north-eastern provinces is progressing at a tremendous rate. For example, by 2002 a new expressway had been constructed between Dalian and Harbin. The Dalian to Shenyang section was completed in 1990; the Shenyang to Siping section in 1994; the Siping to Changchun section in 1998; and Changchun to Harbin section in 2002 (ERINA 2002). The average travel time has also been reduced significantly with the new highway systems. It takes about 11.5 hours, on average, to travel from Dalian to Harbin, a distance of 914km. The road beyond Harbin is paved up to the Bei'an region with a design speed of 60km/hour. However the section from Bei'an to Heihe is not paved. The average travel time from Harbin to the border of the Russian Federation, a distance of 604km, is about 11 hours[11]. The total road distance of Corridor 6 is 1,712km, slightly shorter than the rail distance (Figure 4-34 and Table 4-32).

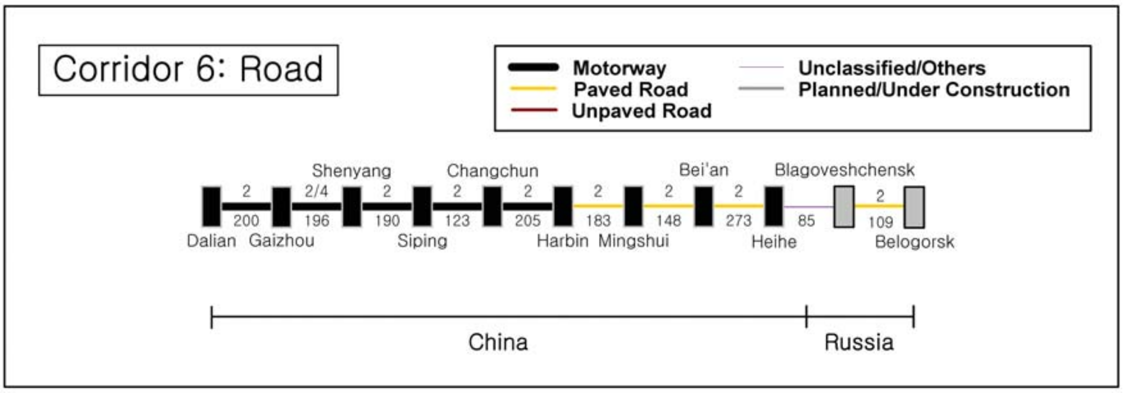

Figure 4-34 Present conditions of road, Corridor 6

Sources: Based on Country reports, ERINA and Maps produced by UNDP

Table 4-32 Road distance between Dalian and Belogorsk

Country	From	To	Distance (km)
China	Dalian Changchun	Changchun Heihe	709 809
Border	Heihe	Blagoveschensk	85[1]
Russian Federation	Blagoveschensk	Belogorsk	109
Total (Dalian-Belogorsk)			1,712

Note: 1. Data from rail distance between Heihe and Blagoveschensk

4.6.3 Transport cost and time

The cost and time to transport goods from Dalian port to Belogorsk is outlined in Table 4-33.

[11] This travel time is significantly lower than 26 to 51 hours for the section from Dalian to Heihe in Table 4-34, based on the data provided by the national expert in China.

Table 4-33 Cost and time for transport from Dalian to Belogorsk

	Road			Rail			Road/Rail
	Cost	Transit Time (hours)		Cost	Transit Time (hours)		Cost
	($/TEU)	Min	Max	($/TEU)	Min	Max	($/TEU)
Dalian Port	80	15	30	80	15	30	80
Dalian-Changchun	500	12	24	104[1]	10	14	104
Changchun-Heihe	620	14	27	139[1]	17	24	139
Heihe-Blagoveschensk (Border)	85[2]	4.3[3]	8.5[3]	85[2]	4.3[3]	8.5[3]	85
Blagoveschensk-Belogorsk	110[4]	1.8[5]	3.6[5]	10.9[6]	1.8[5]	3.6[5]	10.9
Total **(Dalian-Belogorsk)**	1,395	47.1	93.1	418.9	48.1	80.1	418.9
$/km	0.81			0.23			

Notes:
1. The costs reported by Chinese expert are updated with ESCAP data using cost per kilometre conversion
2. The cost assumed by $1.0 per km at border crossing
3. Estimates based on maximum speed (20km/h) and minimum speed (10km/h) at border crossing
4. Average trucking charge (15ton) of distance (120km) between Moscow and Dmitrov
5. Estimates based on the maximum speed (60km/h) and minimum speed (30km/h)
6. The cost assumed at $0.1 per km in the Russian Federation

Figures 4-35 and 4-36 present the time-distance relationships of road and rail transport in Corridor 6, from Dalian to Belogorsk.

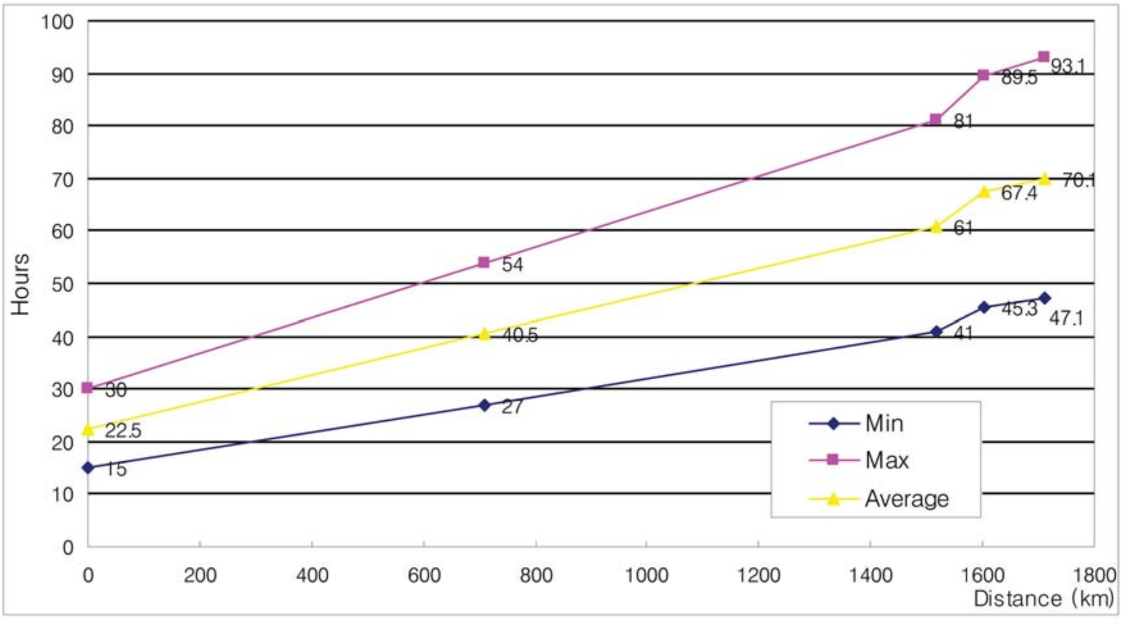

Figure 4-35 Dalian-Belogorsk transit time (road)

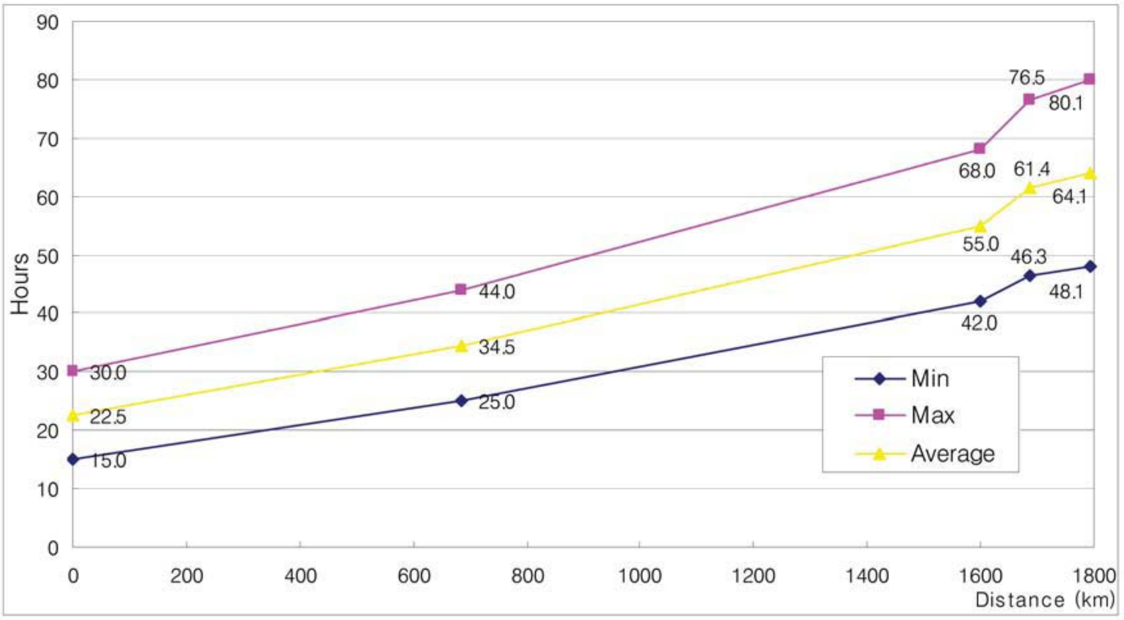

Figure 4-36 Dalian-Belogorsk transit time (rail)

Figure 4-37 shows the cost-distance relationships for different transport modes in the corridor. The total cost to transport containers between Dalian and Heihe by road is about $1,200 per TEU (for 1,518km) and $323 per TEU (for 1,601km) with rail.

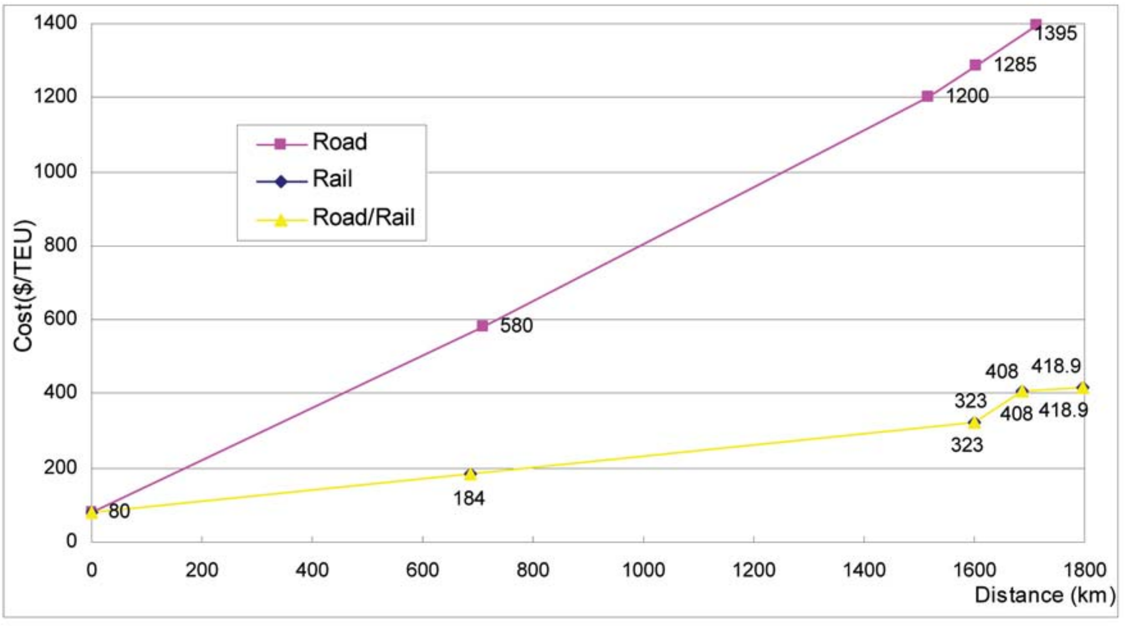

Figure 4-37 Cost-distance (Dalian-Belogorsk)

Routes to consider

1) Rail route: China-Russian Federation
2) Road route: China-Russian Federation
3) Intermodal route 1: China(rail)-Russian Federation(road)
4) Intermodal route 2: China(road)-Russian Federation(rail)

Using rail transport for the entire route seems to provide the lowest transport cost. However, due to the missing link of 85km between Heihe and Blagoveschensk crossing the border between China and the Russian Federation, an all-rail option along Corridor 6 is currently not feasible. Other alternative intermodal routes as well as an all-road route can be considered for analysis. Tables 4-33A through 4-33D, which are derived from Table 4-33, show tabular information for transport cost and time for these alternative routes. Table 4-33E presents additional cost and time for providing a sea transport connection to Japan with Corridor 6.

Table 4-33A Rail route (U-6.1) from Dalian Port to Belogorsk

	Rail		
	Cost	Transit Time (hours)	
	($/TEU)	Min	Max
Dalian Port	80	15	30
Dalian-Changchun	104	10	14
Changchun-Heihe	139	17	24
Heihe-Blagoveschensk (Border)	85	4.3	8.5
Blagoveschensk-Belogorsk	10.9	1.8	3.6
Total (Dalian-Belogorsk)	**418.9**	**48.1**	**80.1**
$/km	**0.23**		

Table 4-33B Road route (U-6.2) from Dalian Port to Belogorsk

	Road		
	Cost	Transit Time (hours)	
	($/TEU)	Min	Max
Dalian Port	80	15	30
Dalian-Changchun	500	12	24
Changchun-Heihe	620	14	27
Heihe-Blagoveschensk (Border)	85	4.3	8.5
Blagoveschensk-Belogorsk	110	1.8	3.6
Total (Dalian-Belogorsk)	**1,395**	**47.1**	**93.1**
$/km	**0.81**		

Table 4-33C Intermodal route (I-6.3) from Dalian Port to Belogorsk

	Road + Rail			Road/Rail
	Cost	Transit Time (hours)		
	($/TEU)	Min	Max	
Dalian Port	80	15	30	-
Dalian-Changchun	104	10	14	Rail
Changchun-Heihe	139	17	24	Rail
Heihe-Blagoveschensk (Border)	85	4.3	4.3	Road
Blagoveschensk-Belogorsk	110	1.8	3.6	Road
Total (Dalian-Belogorsk)	**518**	**48.1**	**75.9**	
$/km	**0.29**			

Table 4-33D Intermodal route (I-6.4) from Dalian Port to Belogorsk

	Road + Rail			Road/Rail
	Cost	Transit Time (hours)		
	($/TEU)	Min	Max	
Dalian Port	80	15	30	-
Dalian-Changchun	500	12	24	Road
Changchun-Heihe	620	14	27	Road
Heihe-Blagoveschensk (Border)	85	4.3	8.5	Rail
Blagoveschensk-Belogorsk	10.9	1.8	3.6	Rail
Total (Dalian-Belogorsk)	**1,295.9**	**47.1**	**93.1**	
$/km	**0.76**			

Table 4-33E Cost and time for transport from Nagoya Port to Belogorsk

	Road			Rail			Road/Rail
	Cost	Transit Time (hours)		Cost	Transit Time (hours)		Cost
	($/TEU)	Min	Max	($/TEU)	Min	Max	($/TEU)
Nagoya Port	234	NA	NA	234	NA	NA	234
Nagoya Port-Dalian Port	182	72	168	182	72	168	182
Dalian Port	80	15	30	80	15	30	80
Dalian-Changchun	500	12	24	104	10	14	104
Changchun-Heihe	620	14	27	139	17	24	139
Heihe-Blagoveschensk (Border)	85	4.3	8.5	85	4.3	8.5	85
Blagoveschensk-Belogorsk	110	1.8	3.6	10.9	1.8	3.6	10.9
Total (Nagoya-Belogorsk)	**1,811**	**-**	**-**	**834.9**	**-**	**-**	**834.9**
$/km	-			-			-

FIVE: INTERNATIONAL LEGAL FRAMEWORK FOR TRANSPORT IN NORTH-EAST ASIA

5.1 INTERNATIONAL CONVENTIONS

International conventions related to transport are essential in facilitating the movement of goods, especially at border crossings, by reducing procedures and formalities and thus time required. In Europe, UNECE Inland Transport Committee, since its creation in 1947, has been a framework for intergovernmental cooperation and concerted action to facilitate international transport. Within the framework of the Committee, there are now 55 international agreements and conventions which provide the international legal and technical framework for the development of international road, rail, inland waterway and combined transport in the UNECE region. These international legal instruments address a wide array of transport issues including coherent international infrastructure networks, uniform and simplified border crossing procedures and uniform rules and regulations aimed at ensuring a high level of efficiency, safety and environmental protection in transport. While these legal instruments are important to all European countries, they are also applied by a large number of countries outside the UNECE region.[1]

Since 1992, UNESCAP has played an active role in demonstrating the benefits of accession by the Asian countries to seven UNECE transport conventions. The main vehicle for UNESCAP in this role is resolution 48/11 of 23 April 1992. The seven international conventions covered by resolution 48/11 are listed in Table 5-1 below, which also indicates the status of each country in North-East Asia with respect to accession.

Table 5-1 Status of North-East Asian countries' accession or being party to the international conventions listed in UNESCAP resolution 48/11(as of July 2006)

Country or area	Convention on Road Traffic (1968)	Convention on Road Signs and Signals (1968)	Customs Convention on the International Transport of Goods under Cover of TIR Carnets (1975)	Customs Convention on the Temporary Importation of Commercial Road Vehicles (1956)	Customs Convention on Containers (1972)	International Convention on the Harmonization of Frontier Control of Goods (1982)	Convention on the Contract for the International Carriage of Goods by Road (CMR) (1956)
China					x		
Democratic People's Republic of Korea							
Mongolia	o	o	o				o
Republic of Korea	s	s	x		x		
Russian Federation	x	x	x		x	x	x
Japan						..	..

Notes: Two dots (..) indicate that data are not applicable.
x – party/acceded
o – acceded after adoption of resolution 48/11
s – signature

[1] Full texts of the 55 UNECE transport conventions and their status of accession are available from UNECE website, http://www.unece.org/trans/conventn/legalinst.html.

While some progress has been made so far, the achievement is uneven. Of the six countries in the North-East Asian region, as of July 2006, the Russian Federation has acceded to six out of the seven conventions. This performance is followed by Mongolia which has acceded to four conventions. China and the Republic of Korea have acceded only to one and two conventions of the seven conventions respectively while Democratic People's Republic of Korea and Japan have acceded to none. The International Convention on the Harmonization of Frontier Control of Goods (1982) has thus far only been accepted by the Russian Federation, and no country in North-East Asia has acceded to Customs Convention on the Temporary Importation of Commercial Road Vehicles (1956).

This disparity in accession to the international conventions can lead to a number of negative consequences. One of these is the lack of territorial continuity of conventions caused by the non-accession by one or more states located between contracting parties. Because the provision of a convention can be invoked only when the states on both sides of the border are party to the convention, the need for widespread accession cannot be overemphasized. Lack of territorial continuity caused by the non-accession of states located between contracting parties can disrupt the application of the convention. For example, the Customs Convention on Containers (1972), which has been acceded by China, the Republic of Korea and the Russian Federation and the TIR Convention (1975) acceded by Mongolia, the Republic of Korea and the Russian Federation can be taken as cases in point in North-East Asia.

Accession to different versions of conventions is likely also to undermine facilitation objectives. For instance, although Japan has not joined any of international transport conventions listed in the UNESCAP resolution 48/11, it has acceded to some of their old versions, i.e., Convention on Road Traffic (1949), TIR Convention (1959) and Customs Convention on Containers (1956). The Republic of Korea also acceded to the Convention on Road Traffic (1949), while it remains as a signatory of the new version of the convention (1968).

The boxes below offer a brief introduction to the seven conventions recommended by resolution 48/11:

Box 5.1 Convention on Road Traffic

CONVENTION ON ROAD TRAFFIC

(Vienna, 8 November 1968)

1 Purpose of the Convention is to facilitate international road traffic and to increase road safety through the adoption of uniform traffic rules.

2 Major obligations of Contracting Parties are:

2.1 To take appropriate measures in accordance with national legal procedures, i.e., publication in the national public law journal and modification, if needed, of national laws, regulations and administrative instructions in line with the provision of the Convention

2.2 To take appropriate measures to ensure that the rules of the road conform in substance to the provisions of the Convention.

2.3 To take appropriate measures to ensure that the rules concerning the technical requirements to be satisfied by motor vehicles and trailers conform to the Convention.

2.4 To admit to the territories in international traffic motor vehicles, trailers, etc., which fulfils the conditions laid down in the Convention and whose drivers fulfil the conditions laid down in the Convention.

2.5 To communicate to any other Contracting Party which requests the information necessary to determine the identity of the person in whose name a motor vehicle or a trailer is registered if the vehicle has been involved in an accident.

2.6 To ensure that any measures which Contracting Party have taken or may take either unilaterally or under bilateral or multilateral agreements to facilitate international road traffic conform to the object of the Convention.

3 The Convention entered into force in May 1977 (As of July 2006, 36 Signatories and 63 Parties)

Box 5.2 Convention on Road Signs and Signals

CONVENTION ON ROAD SIGNS AND SIGNALS

(Vienna, 8 November 1968)

1 Purposes of the Convention are to facilitate international road traffic and to increase road safety by keeping uniformity of road signs, signals and symbols and of road markings.

2 Major obligations of Contracting Parties are:

2.1 To take appropriate measures in accordance with national legal procedures, i.e., publication in the national public law journal and modification, if needed, of national laws, regulations and administrative instructions in line with the provision of the Convention

2.2 To accept the system of road signs, signals and symbols and road markings described in the Convention and to undertake to adopt it as soon as possible.

2.3 To undertake to replace or supplement, not later than four years from the date of entry, any sign, symbol, etc., which is used with a different meaning from that assigned to in the Convention.

2.4 To undertake to replace, within fifteen years from the date of entry, any sign, symbol, etc., which does not conform to the system prescribed in the Convention.

2.5 To limit number of types of sign and marking they adopt to what is strictly necessary, although the Contracting Parties are not required to adopt all the types of sign and marking prescribed in the Convention.

3 The Convention entered into force in June 1978 (As of July 2006, 35 Signatories and 53 Parties)

Box 5.3 Customs Convention on the Int'l Transport of Goods Under Cover of TIR Carnets

CUSTOMS CONVENTION ON THE INTERNATIONAL TRANSPORT OF GOODS UNDER COVER OF TIR CARNETS

(TIR Convention)

(Geneva, 14 November 1975)

1 Purpose of the Convention is to facilitate the international carriage of goods by road vehicle by simplifying and harmonizing administrative formalities in the field of international transport, in particular at frontiers.

2 The TIR Convention cannot be operational simply by accession. The International Customs Transit System established by the Convention operates on the basis of shared responsibilities between governments, transport operators, national guaranteeing associations, the International Transport Union (IRU) which issues the TIR Carnets, as well as a system of international insurance and re-insurance.

3 Major obligations of Contracting Parties include:

3.1 Obligations of Governments

(i) To accept the Convention in accordance with national law (i.e., publication in the national public law journal)

(ii) To take legal and administrative measures to authorize the operation of national guaranteeing organizations.

(iii) To authorize persons to utilize TIR Carnets

(iv) To publish the list of the Customs offices of departure, Customs offices en route and Customs offices of destination approved for accomplishing TIR operations.

(v) To provide training of Customs officials in the operation of TIR Customs procedures

(vi) To esrablish or designate an authority responsible for the approval of road vehicles and containers

(vii) To deposit required documentation and information with the TIR Executive Board (TIRExB)

3.2 Obligations of national guaranteeing associations

(i) To conclude a contract (agreement) of commitment with the national Customs authoritues

(ii) To conclude a written agreement on the functioning of the international guarantee system with an international organization (at present the International Road Transport Union (IRU) is managing the only existing international guarantee system)

(iii) To conclude a declaration of commitment with the transport operator requesting TIR Carnets

(iv) To issue TIR Carnets to approved transport operators

(v) To transmit to the competent national authority of required documentation and information

3.3 Obligations of transport operators

(i) To conclude a declaration of commitment with the national guaranteeing association

(ii) To procure a certificate of approval for road vehicles and containers to be delivered by competent national inspection authorities

(iii) To mount the TIR plate on road vehicles and containers

4 The Convention entered into force in March 1978 (As of July 2006, 16 Signatories and 66 Parties)

Box 5.4 Customs Convention on the Temporary Importation of Commercial Road Vehicles

CUSTOMS CONVENTION ON THE TEMPORARY IMPORTATION OF COMMERCIAL ROAD VEHICLES

(Geneva, 18 May 1956)

1 Purpose of the Convention is to apply provisions similar to that of the Customs Convention on the Temporary Importation of Private Road Vehicles (New York, 4 June 1954), so far as possible, to the temporary importation of commercial road vehicles and, in particular, to provide for the use, for those vehicles, of the Customs documents prescribed for private road vehicles in order to facilitate international movement of goods.

2 Major obligations of Contracting Parties include:

2.1 To take appropriate measures in accordance with national legal procedures, i.e., publication in the national public law journal and modification, if needed, of national laws, regulations and administrative instructions in line with the provision of the Convention

2.2 To grant temporary admission without payment of import duties and import taxes and free of import prohibitions and restrictions, subject to re-exportation and to the other conditions laid in the Convention, to vehicles imported and used in international road traffic for commercial use.

2.3 To allow the driver and other member of the crew of the vehicle to import temporarily a reasonable quantity of personal effects.

2.4 To admit the fuel in the ordinary supply tanks of vehicles without payment of import duties and import taxes and free of import prohibitions and restrictions.

2.5 To admit component parts for the repair of particular vehicle already temporarily imported without payment of import duties and import taxes and free of import prohibitions and restrictions.

2.6 To endeavour not to introduce Customs procedures which might have the effect of impeding the development of international commercial road traffic.

2.7 To endeavour to place Customs offices and posts close together and to keep them open during the same hours in order to expedite Customs procedures contiguous.

3 The Convention entered into force in April 1959 (As of July 2006, 12 Signatories and 40 Parties)

Box 5.5 Customs Convention on Containers

CUSTOMS CONVENTION ON CONTAINERS

(Geneva, 2 December 1972)

1 Purpose of the Convention is to develop and facilitate international carriage by container.

2 Major obligations of Contracting Parties include:

2.1 To take appropriate measures in accordance with national legal procedures, i.e., publication in the national public law journal and modification, if needed, of national laws, regulations and administrative instructions in line with the provision of the Convention

2.2 To grant temporary admission to containers fulfilling the requirements laid down in the Convention, whether loaded with goods or not, which shall be re-exported within three months (with possible extension) from the date of importation.

2.3 To grant temporary admission to accessories and equipment of temporary admitted containers.

2.4 To communicate to one another, on request, the information necessary for implementing the provisions of the Convention, and more particularly information relating to the approval of containers and to the technical characteristics of their design.

2.5 To provide training of Customs officials in the operation of the Convention

3 The Convention entered into force in December 1975 (As of July 2006, 15 Signatories and 34 Partes)

Box 5.6 International Convention on the Harmonization of Frontier Controls of Goods

INTERNATIONAL CONVENTION ON THE HARMONIZATION OF FRONTIER CONTROLS OF GOODS

(Geneva, 21 October 1982)

1 Purpose of the Convention is to facilitate the international movement of goods by reducing the requirements for completing formalities as well as the number and duration of controls, in particular by national and international co-ordination of control procedures and of their methods of application.

2 Major obligations of Contracting Parties include:

2.1 To take appropriate measures in accordance with national legal procedures, i.e., publication in the national public law journal and modification, if needed, of national laws, regulations and administrative instructions in line with the provision of the Convention

2.2 To undertake, to the extent possible, to organize in a harmonized manner the intervention of the Customs services and the other control services.

2.3 To ensure that the control services operate satisfactorily by providing a sufficient number of qualified personnel, equipment and facilities suitable for inspection, and official instructions to officers.

2.4 To co-operate with other Contracting Parties and to seek necessary co-operation from the competent international bodies.

2.5 To take appropriate measures whenever a common inland frontier is crossed to facilitate the passage of the goods.

2.6 To provide, whenever possible, simple and speedy treatment for goods in transit, especially for those ravelling under cover of an international Customs transit procedure, taking into account the situation of the land-locked countries.

2.7 To provide training of Customs officials in the operation of the Convention

3 The Convention entered into force in October 1985 (As of July 2006, 13 Signatories and 48 Parties)

Box 5.7 Convention on the Contract for the International Carriage of Goods by Road

CONVENTION ON THE CONTRACT FOR THE INTERNATIONAL CARRIAGE OF GOODS BY ROAD (CMR)

(Geneva, 19 May 1956)

1 Purpose of the Convention is to standardize the conditions governing the contract for the international carriage of goods by road, particularly with respect to the documents used for such carriage and to the carrier's liability.

2 Major obligation of the Contracting Parties is:

2.1 To take appropriate measures in accordance with national legal procedures, i.e., publication in the national public law journal and modification, if needed, of national laws, regulations and administrative instructions in line with the provision of the Convention

2.2 To ensure that the Convention is applied to every contract for the carriage of goods by road in vehicles for reward, when the place of taking over of the goods and the place designated for delivery, as specified in the contract, are situated in two different countries, of which at least one is a Contracting Party.

2.3 To provide training of judicial officials in the operation of the Convention

3 The Convention entered into force in July 1961 (As of July 2006, 9 Signatories and 49 Parties)

5.1.1 China

China has acceded only to the Customs Convention on Containers (1972) out of seven international conventions regarding road and rail transport listed in the UNESCAP resolution 48/11. Other international conventions in the sphere of the transport ratified by China include:

- Agreement concerning the Establishing of Global Technical Regulations for Wheeled Vehicles, Equipment and Parts which can be fitted and / or be used on Wheeled Vehicles, 1998
- United Nations Convention on International Multimodal Transport of Goods, 1980
- Uniform Rules for a Combined Transportation Document, 1973
- UNCTAD/ICC Rules for Multimodal Transport Documents, 1991
- Convention on Facilitation of International Maritime Traffic (FAL Convention), 1965
- Convention on the Law of the Sea, 1982.

China has also acceded to the World Customs Organization (WCO) conventions of importance to transit transport.

- International Convention on the Simplification and Harmonization of Customs Procedures, 1999
- International Convention on the Harmonized Commodity Description and Coding System, 1988

5.1.2 Democratic People's Republic of Korea

The Democratic People's Republic of Korea has not joined any of UNECE transport agreements and conventions including those listed in the UNESCAP resolution 48/11. In the maritime transport area, however, Democratic People's Republic of Korea acceded to many of the IMO (International Maritime Organization) conventions including Convention on Facilitation of International Maritime Traffic (1965). Democratic People's Republic of Korea has also signed the Convention on the Law of the Sea (1982), but is yet to ratify.

5.1.3 Japan

While Japan has not joined any of international conventions regarding road and rail transport listed in the UNESCAP resolution 48/11, it has acceded eight UNECE transport conventions, some of which are old versions of the conventions recommended by the UNESCAP resolution 48/11 as marked * on the list below.

- Convention on Road Traffic, 1949 *
- Agreement concerning the Adoption of Uniform Technical Prescriptions for Wheeled Vehicles, Equipment and Parts which can be fitted and /or be used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these Prescriptions, 1958
- Agreement concerning the Establishing of Global Technical Regulations for Wheeled Vehicles, Equipment and Parts which can be fitted and / or be used on Wheeled Vehicles, 1998
- Convention concerning Customs Facilities for Touring, 1954
- Additional Protocol to the Convention concerning Customs Facilities for Touring, relating to the importation of tourist publicity documents and material, 1954
- Customs Convention on the Temporary Importation of Private Road Vehicles, 1954
- Customs Convention on the International Transport of Goods under Cover of TIR Carnets (TIR Convention), 1959 *

- Customs Convention on Containers, 1956 *
- International Convention on the Simplification and Harmonization of Customs Procedures, 1999
- International Convention on the Harmonized Commodity Description and Coding System, 1988.

Japan has also acceded to the Convention and Statute on Freedom of Transit (Barcelona Transit Convention, 1921) and the Convention on the Law of the Sea (1982) and to most IMO conventions including the FAL Convention (1965).

5.1.4 Mongolia

Mongolia is the only country in North-East Asia that took actions following the adoption of the UNESCAP resolution 48/11 and acceded four of the seven conventions, but has not acceded to any of other UNECE transport agreements and conventions.

Mongolia has also acceded to Convention on Transit Trade of Landlocked States (New York Transit Convention, 1965) and Convention on the Law of the Sea (1982) and to many of IMO conventions but not to the FAL Convention.

5.1.5 Republic of Korea

The Republic of Korea has acceded to two of seven international conventions listed in the UNESCAP resolution 48/11, i.e., Customs Convention on the International Transport of Goods under Cover of TIR Carnets (TIR Convention, 1975) and Customs Convention on Containers (1972). While the Republic of Korea has been a signatory of the Convention on Road Traffic (1968) and the Convention on Road Signs and Signals (1968), it acceded to the old version of the Convention on Road Traffic (1949).

Other UNECE transport conventions and WCO conventions acceded by the Republic of Korea include:

- Agreement concerning the Adoption of Uniform Technical Prescriptions for Wheeled Vehicles, Equipment and Parts which can be fitted and /or be used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these Prescriptions, 1958
- Agreement concerning the Establishing of Global Technical Regulations for Wheeled Vehicles, Equipment and Parts which can be fitted and / or be used on Wheeled Vehicles, 1998
- International Convention on the Simplification and Harmonization of Customs Procedures, 1999
- International Convention on the Harmonized Commodity Description and Coding System, 1988.

The Republic of Korea has also acceded to the Convention on the Law of the Sea (1982) and to major IMO conventions including the FAL Convention (1965).

5.1.6 Russian Federation

The Russian Federation has acceded to six out of the seven conventions recommended by the UNESCAP resolution 48/11, except the Customs Convention on the Temporary Importation of Commercial Road Vehicles (1956), to which no country in North-East Asia has acceded.

The Russian Federation has also acceded to many of other transport conventions of UNECE, IMO and WCO including:

- European Agreement on Main International Traffic Arteries (AGR), 1975
- European Agreement on Main International Railway Lines (AGC), 1985
- European Agreement on Important International Combined Transport Lines and Related Installations (AGTC), 1991
- European Agreement on Main Inland Waterways of International Importance (AGN), 1996
- European Agreement supplementing the Convention on Road Traffic (1968), 1971
- European Agreement supplementing the Convention on Road Signs and Signals (1968), 1971
- Protocol on Road Markings, Additional to the European Agreement supplementing the Convention on Road Signs and Signals, 1973
- Agreement concerning the Adoption of Uniform Technical Prescriptions for Wheeled Vehicles, Equipment and Parts which can be fitted and /or be used on Wheeled Vehicles and the Conditions for Reciprocal Recognition of Approvals Granted on the Basis of these Prescriptions, 1958
- Agreement concerning the Adoption of Uniform Conditions for Periodical Technical Inspections of Wheeled Vehicles and the Reciprocal Recognition of Such Inspections, 1997
- Agreement concerning the Establishing of Global Technical Regulations for Wheeled Vehicles, Equipment and Parts which can be fitted and / or be used on Wheeled Vehicles, 1998
- European Agreement Concerning the Work of Crews of Vehicles Engaged in International Road Transport (AETR), 1970
- Convention on the Contract for the International Carriage of Goods by Road (CMR), 1956
- Convention relating to the Unification of Certain Rules concerning Collisions in Inland Navigation, 1960
- Convention on the Measurement of Inland Navigation Vessels, 1966
- Convention relating to the Limitation of the Liability of Owners of Inland Navigation Vessels (CLN), 1973
- Convention on the Contract for the International Carriage of Passengers and Luggage by Inland Waterway (CVN), 1976
- Convention concerning Customs Facilities for Touring, 1954
- Additional Protocol to the Convention concerning Customs Facilities for Touring, relating to the importation of tourist publicity documents and material, 1954
- Customs Convention on the Temporary Importation of Private Road Vehicles, 1954
- International Convention on the Harmonization of Frontier Controls of Goods, 1982
- European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR), 1957
- Protocol amending article 1 (a), article 14 (1) and article 14 (3) (b) of the European Agreement of 30 September 1957 concerning the International Carriage of Dangerous Goods by Road (ADR), 1993
- European Agreement Concerning the International Carriage of Dangerous Goods by Inland Waterway (ADN), 2000
- Agreement on the International Carriage of Perishable Foodstuffs and on the Special Equipment to be Used for such Carriage (ATP), 1970
- Convention on Transit Trade of Landlocked States (New York Transit Convention), 1965
- Convention on Facilitation of International Maritime Traffic, 1965
- International Convention on the Harmonized Commodity Description and Coding System, 1988.

5.2 BILATERAL AND MULTILATERAL TRANSPORT AGREEMENTS

Bilateral or multilateral agreements govern transport by road, rail or both at the borders and border stations between countries. This section summarizes major bilateral and multilateral transport agreements ratified by countries in North-East Asia.

5.2.1 China

China has established bilateral agreements in the transport area with neighbouring countries, including maritime transport agreements with all countries in North-East Asia.

- Agreement on Maritime Transport Between the People's Republic of China and Japan, 1975.
- Agreement Between the Government of the People's Republic of China and the Government of the Mongolian People's Republic on the Access to and from the Sea and Transport by Mongolia through China's Territory, 1991.
- Agreement on Maritime Transport between the Government of the People's Republic of China and the Government of the Republic of Korea, 1993.
- Agreement Between the Government of the People's Republic of China and the Federal Government of Russia on Maritime Transport Cooperation, 1993.
- Agreement Between the Government of the People's Republic of China and the Government of the Democratic People's Republic of Korea on Maritime Transport, 2002.
- International Road Transport Agreement between the People's Republic of China and Mongolia, 1991
- Agreement on the Transit Freight from China to Mongolia, 1991,

Multilateral/subregional agreements

China has participated in the negotiation of the following three subregional transport agreements:

- Agreement between and among the Governments of the Kingdom of Cambodia, the People's Republic of China, the Lao People's Democratic Republic, the Union of Myanmar, the Kingdom of Thailand and the Socialist Republic of Viet Nam, for Facilitation of Cross-Border Transport of Goods and People (GMS Cross-Border Transport Agreement), signed in 1999 and expected to be fully implemented in 2007/2008.
- Draft Agreement between the Governments of the Shanghai Cooperation Organization Member States on Facilitation of International Road Transport
- Draft Transit Traffic Agreement between the Governments of the People's Republic of China, Mongolia and the Russian Federation.

5.2.2 Japan

Japan signed bilateral shipping agreements with China in 1975 and container shipping services on the China-Japan route started in 1976. China and Japan have been holding annual high-level bilateral consultation meetings on transport since 2004.

Japan has also participated in high-level bilateral consultations on transport and logistics with the Republic of Korea (in 2000, 2002 and 2004).

5.2.3 Mongolia

Mongolia has concluded many bilateral transport agreements with the China, the Republic of Ukraine, the Republic of Turkey, Russian Federation and the Republic of Belarus and pays special attention in their implementation.

Road transport

- International Road Transport Agreement with China,1991
- International Road Transport Agreement with Ukraine, 1995
- International Road Transport Agreement with the Russian Federation,1996
- International Road Transport Agreement with Turkey, 2002
- International Road Transport Agreement with Belarus, 2003
- International Road Transport Agreement with Kyrgyzstan,2004
- International Road Transport Agreement with Kazakhstan, 2004.

Railway transport

- The Agreement on the Transit Freight from the Russian Federation to Mongolia, 1991
- The Agreement on the Transit Freight from China to Mongolia, 1991

Mongolia has participated in negotiation of a trilateral agreement in North-East Asia – Draft Transit Traffic Agreement between the Governments of the People's Republic of China, Mongolia and the Russian Federation.

5.2.4 Republic of Korea

Until 1996 the shipping and port policies of Korea had been controlled by the government. Neither foreign nor Korean shipping companies could enter the shipping market without the government's permission. Upon joining the OECD in 1996, Korea opened the shipping market and abolished a number of restrictions. Following this deregulation, the shipping and port industry of Korea has been considerably liberalized.

At the present time, Korea recognizes the Convention on a Code of Conduct for Liner Conferences (UNCTAD Liner Code), which entered into effect in 1983, and has established shipping agreements with 16 countries, including China, Germany, the United Kingdom and the United States (Table 5-2), which have been granted most favoured nation treatment.

The Korean Government is trying to establish shipping agreements with additional countries – the Russian Federation, Islamic Republic of Iran, Latvia, Egypt.

Table 5-2 The status of shipping agreements with the Republic of Korea

	Country	Date of Signature	Effective Date	Remark
Signature/ Effective	United States	28 November 1956	7 November 1957	Treaty of friendship
	Germany	9 April 1965	30 December 1970	Protocol
	Denmark	9 January 1980	11 January 1980	
	Singapore	26 May 1981	26 May 1981	
	Pakistan	3 March 1984	1 April 1984	
	Norway	17 September 1984	17 September 1984	
	Malaysia	21 July 1988	23 September 1988	
	Nigeria	17 August 1989	4 October 1990	
	China	27 May 1993	26 June 1993	Annual meeting
	Netherlands	15 June 1993	1 December 1995	
	United Kingdom	11 August 1994	10 July 1995	
	Viet Nam	13 April 1995	11 November 1996	
	Thailand	13 May 2002	28 August 2002	
	Israel	9 October 2002	31 August 2004	
	Algeria	9 December 2003	27 April 2006	
	Bulgaria	16 June 2005	24 November 2005	
	Ukraine	20 October 2005		
	Greece	16 May 2006	4 September 2006	
Provisional Signature	Senegal	9 July 1985		
	Cyprus	7 January 2003		
	Moroco	23 April 2003		
	Russian Federation	July 2004		
	Islamic Republic of Iran	11 September 2004		

Source: Ministry of Maritime Affairs and Fisheries of the Republic of Korea

5.2.5 Russian Federation

The **major bilateral agreements** in the sphere of the transport ratified by the Russian Federation are:

- Agreement Between the Government of the People's Republic of China and the Federal Government of Russia on Maritime Transport Cooperation, 1993
- Agreement between the Government of the Russian Federation and the Government of the Azerbaijan Republic about the International Automobile Communication, 2001
- Agreement between the Government of the Russian Federation and the Government of Republic of Albania about Sea Transport, 1996
- Agreement between the Government of the Russian Federation and the Government of Republic of Slovenia about Cooperation in the Sphere of Sea Transport, 2002
- Agreement between the Government of the Russian Federation and the Government of the United States of America on Sea Transport, 2001
- Agreement between the Government of the Russian Federation and the Government of Republic Belarus about Principles of Cooperation and Conditions of Mutual Relations in the Sphere of Transport, 1992
- Agreement between the Government of the Russian Federation and the Government of the Latvian Republic about principles of cooperation and conditions of mutual relations in the sphere of transport, 1995
- Agreement between the Government of the Russian Federation and the Government of the Portuguese Republic about the international automobile communication, 1994
- Agreement between the Government of the Russian Federation and the Government of Ireland about the International Automobile Communication, 1994
- Agreement on the International Transport Corridor 'the North - the South', 2000

- Agreement between the Government of the Russian Federation and the Government of Republic Panama about Merchant Navigation, 2003
- International Road Transport Agreement between the Government of the Russian Federation and the Government of the Republic of Mongolia,1996
- The Agreement on the Railway Transit Freight from Russian Federation to Mongolia, 1991.

The **major trilateral agreements** in the sphere of the transport ratified by the Russian Federation include Agreement between Ministry of Railways of the Russian Federation, the Ministry of Transport, Mails and Telecommunications of Slovak Republic and the Ministry of Transport of Ukraine about the International Railway Cargo Message between the Russian Federation, Slovak Republic and Ukraine and Transit Messages on Railways of these States, 1999

The Russian Federation has also participated in the negotiation of the following two subregional agreements: Draft Agreement between the Governments of the Shanghai Cooperation Organization Member States on Facilitation of International Road Transport and Draft Transit Traffic Agreement between the Governments of the People's Republic of China, Mongolia and the Russian Federation.

SIX: PROPOSED STRATEGY AND ACTIONS FOR THE DEVELOPMENT OF THE INTEGRATED INTERNATIONAL TRANSPORT AND LOGISTICS SYSTEM FOR NORTH-EAST ASIA[1]

6.1 ISSUES IDENTIFIED

6.1.1 Infrastructure planning and development

In North-East Asia, unimodal transport infrastructure developments such as ports or airports are at times pursued vigorously. While goods move in and out of the ports by road or rail, intermodal linkages where the road and rail converge with inland container depots, and linkages to the inner hinterlands and major economic centers within the country and with neighbouring countries are often inadequate. Missing road sections and linkages can be found in several parts of North-East Asia. These infrastructure-related problems act as an impediment to the efficient flow of freight and increase logistics-related costs and thus impair the economic competitiveness of the region.

6.1.2 Logistics and facilitation

Efficient movements of goods and services are often impaired by institutional barriers such as complex border crossing, inadequate transit documentation and procedures. Customs-related delays and complexities are also a major reason for increased cost and time in international freight transportation. Efficient border crossing of freight is important to the economic integration among countries in a region. These uncertainties, when introduced into logistics systems become costly, especially in industries where deliveries have been planned to arrive on a just-in-time basis.

Issues relating to the facilitation of goods and services have traditionally been incorporated in bilateral agreements between countries. As goods begin to move along international transport corridors, the need for harmonization of laws and processes amongst a larger group of countries becomes clear. Slow progress is being made in the implementation of UNESCAP resolution 48/11 on road and rail transport modes in relation to facilitation measures, which recommended that countries in the region should consider the accession to seven international conventions in relation to transport facilitation. Along with the move towards accession of international conventions, there has also been a move at the subregional level to develop trilateral and multilateral agreements on transport within the sub region as an interim measure. Countries in North-East Asia are also party to some of these agreements.

In this context the initiative of the countries of the Shanghai Cooperation Agreement (including China and the Russian Federation) to formulate a multilateral agreement on international road transport is of particular interest to North-East Asian countries as it may later be logical to extend the geographical scope of the application of this agreement. The agreement, which is being formulated with the assistance of UNESCAP, makes provision for the accession to the international conventions and takes into account the provisions of other multilateral agreements amongst ECO countries along important transport corridors linking Asia with Europe.

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[1] Adopted by the Subregional Policy-level Expert Group Meeting on Integrated International Transport and Logistics System for North-East Asia on 8 September 2004 in Ulaanbaatar, Mongolia.

6.2 STRATEGY AND PROPOSED ACTIONS

In order to develop and improve transport integration and intermodal connectivity and promote logistics and transport facilitation in North-East Asia with a view to facilitating regional and international trade, the following strategy and actions are proposed:

6.2.1 Strategy

Main principles. The strategy is based on further promotion of cooperation among the countries in North-East Asia at national, subregional and regional levels for the mutual benefits of the countries, maximum possible use of existing infrastructure, and the joint investment among the countries and free flow of capital.

Main components of the strategy. The strategy consists of the following components:

- Improvement of transport integration and intermodal connectivity
- Promotion of logistics and transport facilitation
- Implementation mechanism (national, subregional and regional levels).

6.2.2 Proposed actions

To improve transport integration and intermodal connectivity:

- Adopt the proposed integrated international transport and logistics network for North-East Asia with its mix of major routes and corridors (appropriate roads, railways and waterways), with connection to major sea ports and with intermodal interfaces such as ICDs, freight terminals and distribution centres; and border crossings, as a subset of the Asian Highway and the proposed Trans Asian Railway or other arrangements.
- Formulate early the Trans Korean Railway as part of the Trans Asian Railway, which will contribute to the completion of the missing links and facilitate trade between countries in North-East Asia.
- Identify and remove bottlenecks on routes of the network to improve their efficiency. Particularly, attention should be given to transport of all types (ISO and non-ISO) of containers.
- Examine the prospect of establishing dry ports as a trigger for economic development.[2]
- Review and update the network, considering also further possible sea links between Japan and continental North-East Asia.
- Operationalize the networks within the near future by restoring missing links and improving conditions of related infrastructure and identify and prioritize infrastructure development requirements.
- Promote coordinated efforts to improve transport and logistics infrastructure along the network.
- Develop and maintain a database on traffic volumes (total volume in tones as well as containers in TEU) along the routes and border-crossings.
- Implement capacity building programmes for policymakers to raise awareness of the integrated approach to transport and logistics planning and implementation.

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[2] Revision to "Study possibility of setting up free ports to facilitate economic development" was suggested by the National Workshop on Integrated International Transport and Logistics System for North-East Asia for the Russian Federation (Part II) held in Vladivostok from 22 to 23 July 2005.

To promote logistics and transport facilitation:

- Simplify and harmonize transport and trade procedures and documentation particularly related to border-crossings along the selected transport routes, and consider unification of such procedures and documentation.
- Promote the accession and implementation of international conventions on transport facilitation including UNESCAP resolution 48/11.
- Strengthen the position of transport and logistics intermediaries including freight forwarders, MTOs and logistics service providers.
- Carry out a study on role of ICT in transport facilitation and logistics with the development of guidelines for the ICT application in North-East Asia.
- Develop and enhance the capacity and skills of policymakers on issues relating to transport facilitation including the international conventions and multilateral agreements on transport facilitation.
- Develop the capacity and skills of industry in order that they can provide multimodal transport and logistics services to the trade.

6.3 IMPLEMENTATION MECHANISM

To ensure the sustainable implementation of the strategies and action plan at the national, subregional and regional levels the following implementation mechanisms are proposed.

6.3.1 National level

At the national level, it is recommended that national trade and transport facilitation committees be established or the competent authority in charge of transport establish a suitable mechanism at the highest possible level, with participation of all stakeholders from different ministries, authorities or associations from both the public and private sectors. The committees (or equivalent bodies) should have clear terms of reference and the assistance of an interdisciplinary working group to be able to undertake, amongst others, the following:

- Analyze the trade and transport markets to determine possible traffic volume in tonnes as well as number of containers (TEU) for the transport corridors under consideration.
- Prioritize the routes and identify the infrastructure requirements including intermodal connections along the network.
- Harmonize/coordinate the interactions between different parties from the public and private sectors.
- Collect relevant data and manage the database.
- Undertake route analysis applying the UNESCAP cost /time distance model to identify and address physical and non-physical bottlenecks.
- Conduct studies with regard to the accession and implementation of international/regional transport agreements and evaluation of national transport and logistics performance.
- Further develop national action plans which could include facilitating competition, ensuring good connections between roads and ports and integrating unimodal ICT systems.
- Support research and information exchange relating to integrated logistics and freight transportation.

6.3.2 Subregional level

At the subregional level, it is proposed that the UNDP Tumen Secretariat act as coordinator to develop/ operationalize the Network, ensuring close cooperation with participating countries and other related organizations, particularly UNESCAP, World Bank, ADB, ERINA and OSJD to undertake the following:

- Review the progress of the development of the Network.
- Organize annual meetings between North-East Asian countries, including meetings of national trade and transport facilitation committees (or equivalent bodies) to harmonize/coordinate policies on transport and logistics development, to exchange best practices on transport and logistics planning and facilitation, to evaluate progress and determine annual actions.
- Undertake a study on bilateral, trilateral agreements in place amongst countries in North-East Asia in order to study and consider the possibility of a unified agreement covering different aspects of transport.
- Consider ways of unifying the technical standards applicable with regard to transport infrastructure.
- Initiate resource mobilization for infrastructure development/improvement and in order to operationalize the Network.
- Enhance subregional cooperation by providing a neutral forum to identify constraints and balance conflicting interests/priorities.

6.3.3 Regional level

At the regional level:

- UNESCAP to collaborate with the UNDP Tumen Secretariat to consider ways in which the integrated transport network of North-East Asia could be linked with the transport networks of other subregions particularly moving west to markets in Europe and South Asia.
- UNESCAP to coordinate the analysis of trade and transport markets and traffic volume to be undertaken by countries at the national level and to undertake study at a subregional and regional levels to provide countries with traffic forecast on the identified routes.
- UNESCAP to identify best practices in transport facilitation with results to be exchanged among the countries.
- Within the context of the Asian Highway and Trans Asian Railway, UNESCAP to help North East Asian countries to prioritize investment needs, showcasing such requirements at meetings attended by major donors and provide an opportunity for them to see how the investment needs could fit into their plans.
- UNESCAP also to consider ways in which the integrated transport network of North-East Asia could be used as a model for the development of integrated transport networks in other regions.
- UNESCAP to provide a regional forum where the trade and transport facilitation committees of the countries in North-East Asia could discuss common issues with trade and transport facilitation committees of other subregions along specific transport routes.
- UNESCAP to assist trade and transport facilitation committees to undertake the route analysis using the UNESCAP time/cost-distance model.
- UNESCAP to assist the North-East Asian countries to raise awareness and to enhance capacity and skills of policymakers on issues relating to transport facilitation including the international conventions and multilateral agreements on transport facilitation.
- UNESCAP and the UNDP Tumen River Secretariat also to assist countries in North-East Asia to network with other sub regions and implement the sustainable programme of capacity building and skills development in freight forwarding, multimodal transport and logistics for policymakers and the industry that is being developed by the UNESCAP Secretariat.

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APPENDICES:

SUMMARY OF COUNTRY REPORTS [1]

[1] Data for Democratic People's Republic of Korea were compiled from various sourses.

I. PORT INFORMATION

A. Ports of China

Name of Ports	Port Capacity (2001)						Throughput (2001)		Port Connectivity Road/Rail/Inland Water/Airport
	No. of Berths	Quay Length (m)	Storage Area (Thousand m^2)		Handling Capacity (or Capacity utilization in %)		Total (Million ton)	Container (Million TEU)	
			Open	Covered	Total (Million ton)	Container (Million TEU)			
Dalian	55	11,233	716	319	100.4	1.13	110.33	1.209	Dalian Airport
Tianjin (Xingang)	57	11,672	1,142	309	113.7	1.98	113.7	2.011	Tianjin Airport (35 km); Railway available inside the port area.
Yantai	21	3,456	33	24	21.9	0.12	17.74		Yantai Airport (30 km)
Qingdao	40	8,001	513	67	104	2.62	103.98	2.638	Qingdao Airport; 7.4 km of railroad running directly to main wharves
Lianyungang	20	4,096	413	52	30.6	0.16	30.59		Railroad links to 11 provinces
Shanghai	86	14,219			221	6.34	221.02	6.330	Hongqiao International Airport (30 km)
Ningbo	40	6050	550	110	128.5	1.16	126.58	1.213	Lishe Airport; Hangzhou-Ningbo railroad

B. Ports of the Democratic People's Republic of Korea

Name of Ports	Port Capacity (2001)						Throughput(2001)		Port Connectivity Road/Rail/Inland Water/Airport
	No. of Berths	Quay Length (m)	Storage Area (Thousand m^2)		Handling Capacity		Total (1,000 ton)	Container (1,000 TEU)	
			Open	Covered	Total (1,000 ton)	Container (1,000 TEU)			
Chungjin	18	2,695			8,000				
Nampo	11	1,694			8,300				
Heungnam	9	2,061			4,500				
Rajin	15	2,448	177	130	3,000			4.9 (2000)	
Haeju	4	1,305			2,400				
Sunbong	3	456			2,000				
Wonsan	3	470			3,600				
Songlim	3	400			1,600				

C. Ports of Japan

Name of Ports	Port Capacity (2001)						Throughput		Port Connectivity Road/Rail/Inland Water/Airport
	No, of Berths (Ferry/ Container)	Quay Length (m)	Storage Area (Thousand ㎡)		Handling Capacity		Ferry/ Container (Million ton)	Container (Million TEU)	
			Open	Covered	Total (Million ton)	Container (Million TEU)			
Kobe (Ferry)	3	697	65	n.a.	n.a.	n.a.	16.9	----	Good
Hakata (Ferry)	2	371	61	n.a.	n.a.	n.a.	0.25	----	Good
Yokohama (Container)	23	6,040	1,968	n.a.	n.a.	n.a.	34.7	2.25	Good
Niigata (Container)	2	535	170	n.a.	n.a.	n.a.	1.25	0.10	Good
Fushiki-Toyama (Container)	1	280	88	n.a.	n.a.	n.a.	0.47	0.04	Good
Nagoya (Container)	14	3,720	1,210	n.a.	n.a.	n.a.	32.0	1.74	Good

D. Ports of the Republic of Korea

Name of Ports	Port Capacity (2001)						Throughput (2001)		Port Connectivity Road/Rail/Inland Water/Airport
	No. of Berths	Quay Length (m)	Storage Area (Thousand m^2)		Handling Capacity		Total (1,000 ton)	Container (1,000 TEU)	
			Open	Covered	Total (1,000 ton)	Container (1,000 TEU)			
Incheon	76	10,802	1,847	62	61,515	747	120,680	663	Kimpo airport (32 km); Incheon international Airport (45 km); Dong Incheon Station (1.5 km)
Busan	113	21,854	1,797	72	102,375	3,828	149,661	8,073	Kimhae Airport (17 km)
Gwangyang	63	13,590	848	7	89,424	960	140,954	887	

E. Ports of the Russian Federation

Name of Ports	Port Capacity (2001)						Throughput (2001)		Port Connectivity Road/Rail/Inland Water/Airport
	Quant. of Berths	Quay Length (m)	Storage Area (thousand m^2)		Handling Capacity		Total (million ton)	Container (million TEU)	
			Open	Covered	Total (million ton)	Container (million TEU)			
Vladivostok	15*	2968	137.7	58.7	6.05	0.056	6.0	0.082	Vladivostok Airport (100 km); Railway connected to TSR
Nakhodka	18	2962.3	214.8	173.9	4.86	0.004	8.0	-	27 km of rail track in the port connecting to TSR
Vostochny	16	3718	378.4	100.0	16.51	0.08	19.5	0.32	Vladivostok Airport (250 km); Starting point of TSR
Vanino	19	2789	153.8	20.27	5.65	0.021	14.3	0.036	
Shakhtersk (Sakhalin)	4	290	13.3	-	0.379	-	1.3	-	

II. CONTAINER TERMINALS AND ICDS

A. Container terminals of China

Name of ICD or Cargo Terminal	Location (indicate route concerned)	Area (m^2)	Handling and Storage Capacity	Possibility of handing 20 foot and 40 foot container	Connecting Roads	Connecting Rail lines	Nearest ports (name + distance)	Nearest airports (name + distance)	Nearest major cities (names + distance)
Beijing	Route 1	N/A		20 foot and 40 foot	11		Tianjin 183	Capital 45	Tianjin 137km
Shenyang	Route 2	N/A		20foot and 40 foot	7		Dalian 413	Taoxian 38	Fushun 47
Changchun	Route 4	N/A		20foot and 40 foot	5		Dalian 718	Changchun28	Jilin 128
Jilin	Route 4	N/A		20foot and 40 foot	4		Dalian 946		changchun 128
Mudanjiag	Route 5	N/A		20foot and 40 foot	5		Dalian 1283		Tumen 248
Harbin	Route 5	N/A		20foot and 40 foot	8		Dalian 928	Harbin 37	Changchun242
Qiqihar	Route 5	N/A		20foot and 40 foot	4		Dalian 1267		daqin 68
Manzhouli	Route 5	N/A		20foot and 40 foot	2		Dalian 1878		Yakeshi 268

B. Container terminals or cargo terminals of Japan

Name of Cargo Terminal	Location	Area(㎡)	Handling and Storage Capacity	Equipment (Possibility of handling 20' and 40' containers)	Connecting Roads	Connecting Rails	Distance from nearest Port, Airport and City
Okayama Prefecture Truck Terminal	Okayama City	104,263	2,230ton/day	No crane to lift up/down the 20' and 40'	good	good	Vicinity
Hiroshima City West Truck Terminal	Hiroshima City	52,550	2,700ton/day	No crane to lift up/down the 20' and 40'	good	good	Vicinity
Keihin Truck Terminal	Tokyo Metropolitan city	242,068	12,000ton/day	No crane to lift up/down the 20' and 40'	good	good	Vicinity

Note: Cargo Terminal is situated in outskirt of a large city to avoid passages of large truck inside the city as much as possible and functions as transshipment site where domestic cargo carried by large inter-large cities trucks is sorted or classified by destined area and reloaded onto smaller trucks entering into the inside. The reverse case is possible. Cargo Terminal does not deal with custom clearance. It has not railway track usually in the precinct.

C. Container terminals of the Republic of Korea

Name of ICD or Cargo Terminal	Location	Area (m^2)	Handling and Storage Capacity	Equipment (Possibility of handing 20' and 40' containers)	Connecting Roads	Connecting Rails	Distance from nearest Port (km)	Distance from nearest Airport (km)	Distance from nearest City (km)
Uiwang ICD 1	Gyunggido Uiwang si	483,321	1 million TEU		Express Route 1	Gyungbu line	Incheon	Incheon	Seoul 39km
Uiwang ICD 2	‘	255,072	553,000 TEU		Express Route 1	Gyungbu line	Incheon	Incheon	Seoul 39km
Yangsan ICD	Kyungnam Yangsan si	951,940	1.14 million TEU		Express Route 1	Gyungbu line	Kimhae	Kimhae	Busan

D. Container terminals of the Russian Federation

Name of ICD or Cargo Terminal	Location (indicate route concerned)	Area (m^2)	Handling and Storage Capacity	Possibility of handing 20 foot and 40 foot container	Connecting Roads	Connecting Rail lines	Nearest ports (name + distance)	Nearest airports (name + distance)	Nearest major cities (names + distance)
Забайкальск (Chabaikalsk)	Route 5		100/		+	+			Chita
Находка – Восточная (Nahoska-Vostochny)	Route 5		350/		+	+	Vostochny		Vladivostok
Владивосток (Vladivostok)	Route 5		270/		+	+	Vladivostok		Vladivostok

III. INFRASTRUCTURE ALONG THE SELECTED CORRIDORS

A. Corridor 1 (Tanggu-Tianjin-Beijing-Eranhot-Zamin Uud-Ulaanbaatar-Ulan Ude)

1. Road

Sections		Total Length (km)	No. of Lanes	Paved or Unpaved	Condition of Route	Design Speed (km/hour)	Average Travel Time	AADT (2001)	Degree of Congestion	Possibility of Carrying containers
Route Start	End Point									
CHINA										
Tanggu	Tianjin	87	4	P	fair	80	1.2	12500	2	yes
Tianjin	Beijing	94	2/4	P	fair	80	1.3	8500	2	yes
Beijing	Xuanhua	195	2/4	P	fair	80	2.5	12000	2	yes
Xuanhua	Zhangjiakou	34	4	P	good	80	0.6	11000	2	yes
Zhangjiakou	Jining	217	2	P	fair	60	3.5	3500	3	yes
Jining	Saihan Tal	240	2	P	fair	80	3.5	300	5	yes
Saihan Tal	Eranhot (Border)	122	2	P	fair	60	2	500	5	yes
MONGOLIA										
Zamin-uud	Ulaanuul	121	1	U	3	-	161 min	243	5	Yes
Ulaanuul	Saynshand	98	1	U	3	-	130 min	243	5	Yes
Saynshand	Airag	124	1	U	3	-	165 min	135	5	Yes
Airag	Choir	105	1	U	3	-	140 min	120	5	Yes
Choir	Maanit	129	1	U	3	-	172 min	120	5	Yes
Maanit	Nalaikh	72	1	U	3	-	96 min	150	5	Yes
Nalaikh	Ulaanbaatar	32	2	P	1	80	25 min	1728	5	Yes
Ulaanbaatar	Ulaanbaatar **Checkpoint 22**	19	2	P	1	80	14 min	1362	5	Yes
Ulaanbaatar **Checkpoint 22**	Bayanchandmani	48	2	P	1	80	36 min	1362	5	Yes
Bayanchandmani	Baruunharaa	87	2	P	1	80	65 min	857	5	Yes

Sections		Total Length (km)	No. of Lanes	Paved or Unpaved	Condition of Route	Design Speed (km/hour)	Average Travel Time	AADT (2001)	Degree of Congestion	Possibility of Carrying containers
Route Start	End Point									
Baruunharaa	Darkhan	71	2	P	1	80	55 min	857	5	Yes
Darkhan	Orkhon	53	2	P	1	80	40 min	506	5	Yes
Orkhon	Sukhbaatar	43	2	P	1	80	35 min	506	5	Yes
Sukhbaatar	Altanbulag (AH)	24	2	P	1	80	20 min	608	5	Yes
RUSSIAN FEDERATION										
Kyahta	Ulan Ude	-	-	-	-	-	-	-	-	-

2. Rail

From (Station name)	To (Station name)	Distance (km)	No. of Tracks	Track gauge (mm)	Traction mode	Siding length
CHINA						
Tianjin	Beijing	137	MT(3)	1,435	DIESEL	NO STASTISTICS
Beijing	Datong	373	DT	1,435	DIESEL	NO STASTISTICS
Datong	Jining	128	DT	1,435	DIESEL	NO STASTISTICS
Jining	Erenhot	338	ST	1,435	DIESEL	NO STASTISTICS
MONGOLIA						
Zamyn Uud	Ulaanbaatar	708	ST	1,520	Diesel	32,3
Ulaanbaatar	Darhan	252	ST	1,520	Diesel	19,3
Darhan	Hoit	150	ST	1,520	Diesel	5,9
RUSSIAN FEDERATION						
Naushki	Ulan Ude	261	ST	1,520	Diesel	NO STASTISTICS

3. Development Plans (Road)

Sections		Major measures planned	Forecast AADT (2006 and 2011)	Possibility of carrying containers (2006 and 2011)	Investment Amounts (US$ or Local currency)	Time frame to complete
Route Start	End Point					
CHINA						
Tanggu	Tianjin	(101 KM) 4/anes of express way	25000 - 40000	yes		completed
Tianjin	Beijing	(44 KM) 4/anes of express way	25000 - 40000	yes		completed
Beijing	Zhangjiakou	(148 KM) 4/anes of express way	15000 - 25000	yes		completed
MONGOLIA						
Nalaikh	Choir	To complete construction of paved road with 7 m width carriageway by Second Road Development Project /No.1700-MON/ under the loan, Asian Development Bank in 2004. Road length is 200 km.	2006 – 472 veh/day 2011- 734 veh/day	2006-294 trk/day 2011- 448 trk/day	25 mil US$	3 years
Choir	Zamiin Uud	To complete the Feasibility Study of this road in 2004 under ADB's technical assistance and start the construction work in 2007. (448 km)	2006- 402 veh/day 2011-1046 veh/day	2006- 229 trk/day 2011- 321 trk/day	67.2 mil US$	5 years

4. Development Plans (Rail)

From (Station name)	To (Station name)	Distance (km)	No. of Tracks	Traction mode	Improved possibility of transit of containers	Investment Amounts	Brief description of measures and time frame to complete
CHINA							
Tianjin	Beijing	137	MT	Electric	YES		High Speed Railway 2008
Beijing	Datong	373	DT	Electric	YES		Improve Speed 2008
Datong	Jining	128	DT	Electric	YES		Improve Speed 2008
Jining	Erenhot	338	ST	Diesel	YES	1 Billion RMB	Part DT, Improve Speed 2008
MONGOLIA							
Naushki	Sukhbaatar	30	1	Diesel	Improvement of the passing capacity	100 million tugrugs	The extension of Hoit siding's track has been made on July 2003.
Tolgoit	Ulaanbaatar	7	1	Diesel	Improvement of the passing capacity	500 million tugrugs	The industrial line is being constructed and opened on October 2003.
Ulaanbaatar	Choir-Sainshand	247	1	Diesel	Improvement of the passing capacity	250 million tugrugs	The track extension works are being made on Bayan8 Choir and Shivee-Ovoo

B. Corridor 2 (Beijing-Shenyang-Dandong-Pyongyang-Seoul-Busan)

1. Road

Sections		Total Length (km)	No. of Lanes	Paved or Unpaved	Condition of Route	Design Speed (km/hour)	Average Travel Time	AADT (2001)	Degree of Congestion	Possibility of carrying containers
Route Start	End Point									
CHINA										
Beijing	Tangshan	133	2/4	P	good	80	1.8	13000	2	yes
Tangshan	Qinhuangdao	148	2	P	fair	80	2	5500	3	yes
Qinhuangdao	Suiizhong	83	2	P	fair	50	2	4500	3	yes
Suiizhong	Goubangzi	177	2	P	fair	50	3.5	5000	3	yes
Goubangzi	Shenyang	200	2	P	fair	50	4	4000	3	yes
Shenyang	Dandong (Border)	272	2	P	fair	50	6	3000	3	yes
Democratic People's Republic of Korea[1]										
Shinuiju	Pyongyang	228.8	2	P (83km)	Fair	80	3		4	yes
Pyongyang	Kaesong	170	4	P	good	100	2		3	yes
Kaesong	Panmunjom	6.2								
Republic of Korea										
Panmunjom	Seoul	49.8	10 (4)	P	Good	90	30min	38,300	5	Y
Seoul	Daejon	151.0	8	P	Good	100	2hrs.	178,179	2	Y
Daejon	Busan	274.5	4	P	Good	100	3hrs. 30min	68,553	3	Y
JAPAN										
Hakata Port	Tokyo(Expressway)	1110	4-6	P	Good	80-120	18	205,588-414,840	4	Y
Hakata Port	Tokyo(Ordinary Road)	1200	4	P	Good	60-80	33		4	20ft:Y 40ft:Y (*)

[1] Democratic People's Republic of Korea's data are based on the report from Ahn etc. (2001, 2002)

2. Rail

From(Station name)	To(Station name)	Distance (km)	No. of Tracks	Track gauge(mm)	Traction mode	Siding length
CHINA						
Beijing	Qinhuangdao	449	DT	1,435	Diesel	
Qinhuangdao	Shenyang	443	DT	1,435	Diesel	
Shenyang	Dandong	266	ST	1,435	Diesel	
Democratic People's Republic of Korea[1]						
Shinuiju	Pyongyang	225	ST		Electric	
Pyongyang	Kaesong	187	ST		Electric	
Republic of Korea						
Munsan	Seoul	46	ST	1,435	Diesel	
Seoul	Suwon	41.5	MT	1,435	Electric	
Suwon	Daejon	120.6	DT	1,435	Electric	
Daejon	Daegu	161.8	DT	1,435	Electric	
Daegu	Busan	120.6	DT	1,435	Electric	
JAPAN						
Fukuoka Cargo Station	Tokyo Cargo Station	1184	2	1067	Electricity	n.a.

[1] Democratic People's Republic of Korea's data are based on the report from Ahn etc. (2001, 2002)

3. Development Plans (Road)

Sections		Major measures planned	Forecast AADT (2006 and 2011)	Possibility of carrying containers (2006 and 2011)	Investment Amounts (US$ or Local currency)	Time frame to complete
Route Start	End Point					
CHINA						
Beijing	Shenyang	(658 KM) 4 lanes of express way	20000 – 35000	yes		completed
Shenyang	Dandong	(208 KM) 4 lanes of express way	15000 - 25000	yes		completed
Republic of Korea						
Crossing Border	Panmunjeom	National Route 1 (5.5 km)			87.3 billion won	
Munsan	Seoul				570 billion won	7 yrs

4. Development Plans (Rail)

From (Station name)	To (Station name)	Distance (km)	No. of Tracks	Traction mode	Improved possibility of transit of containers	Investment Amounts (US$ or Local currency)	Brief description of measures and time frame to complete
CHINA							
Beijing	Qinhuangdao	449	DT	ELC.	YES	3.9 B. RMB	Improve Speed 2008
Qinhuangdao	Shenyang	443	DT	ELC.	YES	3.7 B. RMB	Improve Speed 2008
REPUBLIC OF KOREA							
Munsan	Border	12.0	ST			66.3 billion won	85% complete
Munsan	Yongsan		DT				From ST to DT Complete in 2006
Shintanri	Border	16.2	ST			86.6 billion won	

From (Station name)	To (Station name)	Distance (km)	No. of Tracks	Traction mode	Improved possibility of transit of containers	Investment Amounts (US$ or Local currency)	Brief description of measures and time frame to complete
Chulwon	Border	32.5	ST			250.4 billion won	
Suwon	Cheonan	55.6	DT	Electric		1072 billion won	From ST to DT and Electric ('90~'03)
Cheonan	Chochiwon	32.7	ST	Electric		107.1 billion won	Convert to Electric ('99~'03)
Chochiwon	Daegu	158.0	ST	Electric		549.1 billion won	Convert to Electric ('02~'09)
Seoul	Pusan	444.5	ST	High Speed Electric	2.8times (from 390,000TEU to 3,000,000 TEU)	7966 billion won	High Speed Rail (reduce travel time to about 2hrs) ('92~'04)

C. Corridor 3 (Busan-Pohang-Kosong-Wonsan-Kimchaek-Sonbong-Razdolnoye-Ussuriysk-Khabarovsk-Belogorsk-Chita)

1 Road

Sections		Total Length (km)	No. of Lanes	Paved or Unpaved	Condition of Route	Design Speed (km/hour)	Average Travel Time	AADT (2001)	Degree of Congestion	Possibility of carrying containers
Route Start	End Point									
REPUBLIC OF KOREA										
Busan	Kyongju	68.7	4	P	Good	100	1hr. 5min	61,638	3	Y
Kyongju	Kangnung	293.9	2 (4)	P	Good	60	5 hrs.	8,843	5	Y
Kangnung	Kansong	83.9	4	P	Good	80	1hr.	18,037	5	Y
DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA										
Kosong	Wonsan									
Wonsan	Kimchaek									
Kimchaek	Chongjin									
Chongjin	Sonbong									
	Total	650[1]		P (198km)	fair					
RUSSIAN FEDERATION										
No Report										

[1] Data from UNESCAP 'Priority Road Network in North-East Asia'

2. Rail

From (Station name)	To (Station name)	Distance (km)	No. of Tracks	Track gauge	Traction mode	Siding length
Republic of Korea						
Busan	Kyungju	112.3	ST	1,435		
Kyungju	Youngchon	37.6	ST	1,435		
Youngchon	Youngju	126.1	ST	1,435		
Youngju	Choram	87	ST	1,435		
Choram	Donghae	61.5	ST	1,435		
Donghae	Kangrung	45.1	ST	1,435		
Kangrung	Kosong	124.2	ST	1,435		
Democratic People's Republic of Korea						
RUSSIAN FEDERATION						
Hasan	Baranovsky	239	ST	1,520	Diesel	
Baranovsky	Ussuryisk	23	DT	1,520	Electric	
Ussuryisk	Khabarovsk	654	DT	1,520	Electric	
Khabarovsk	Belogorsk	658	DT	1,520	Electric	
Belogorsk	Bamovskaya	592	DT	1,520	Electric	
Bamovskaya	Karimskaya	981	DT	1,520	Electric	
Karimskaya	Chita	96	DT	1,520	Electric	
Chita	Ulan Ude	557	DT	1,520	Electric	

3. Development Plans (Road)

Sections		Major measures planned	Forecast AADT (2006 and 2011)	Possibility of carrying containers (2006 and 2011)	Investment Amounts (US$ or Local currency)	Time frame to complete
Route Start	End Point					
REPUBLIC OF KOREA						
Busan	Ulsan	40 km	62000 (2004), 81000 (2009)	2006, 2011	680 billion won	2006
Ulsan	Pohang			2011		2009
Pohang	Kosong					2019

4. Development Plans (Rail)

From	To	Distance (km)	No. of Tracks	Traction mode	Improved possibility of transit of containers	Investment Amounts (US$ or Local currency)	Brief description of measures and time frame to complete
REPUBLIC OF KOREA							
Kangreung	Border	127	ST			1,727 billion won	Construction plan complete
Donghae	Kangreung	45.1	ST	Electric		47.4 billion won	Convert to Electric ('01~'04)
Pohang	Samchuck	171.3	DT	Electric		2,695 billion won	From ST to DT and Electric ('02~'14)
Ulsan	Pohang	73.2	DT	Electric		2,059 billion won	From ST to DT and Electric ('03~'10)
RUSSIAN FEDERATION							
Hasan Baranovsky	Baranovsky Ulan Ude	239 3561	ST DT	Diesel Electric	Plans of Ministry of Railways of the Russian Federation provide during the period till 2010 to carry out reconstruction of separate sites of a direction, second-order construction of the bridge through r. Amur at Khabarovsk, and also reconstruction and modernization zh.d. Stations Hasan with construction of the container terminal.		

D. Corridor 4 (Rajin/Sonbong-Jilin- Changchun-Ulanhot-Sumber-Ulaanbaatar)

1. Road

Sections		Total Length (km)	No. of Lanes	Paved or Unpaved	Condition of Route	Design Speed (km/hour)	Average Travel Time	AADT	Degree of Congestion	Possibility of Carrying containers
Route Start	End Point									
CHINA										
Quanhe (Border of Democratic People's Republic of Korea)	Hunchun	59	2	P	fair	40	1.5	2500	4	yes
Hunchun	Yanji	118	2	P	fair	40	3	2500	4	yes
Yanji	Dunhua	148	2	P	fair	50	3	2200	4	yes
Dunhua	Jilin	225	2	P	fair	50	4	1500	4	yes
Jilin	Changchun	120	2	P	fair	80	1.5	3000	3	yes
Changchun	Qianguozhen	155	2/4	P	good	80	2	4500	3	yes
Qianguozhen	Baicheng	211	4	P	good	80	3	3000	4	yes
Baicheng	Ulanhot	85	2	P	fair	60	1.5	2000	4	yes
Ulanhot	Arshan	230	2	P	fair	50	4.5	1000	5	yes
Arshan	Border of Mongolia	10	2	P	fair	50	0.3	1000	5	yes
MONGOLIA										
Nomrog (Border) with China)	Sumber	80	1	U	3	-	106 min	65	5	Yes
Sumber	Choybalsan	324	1	U	3	-	432 min	78	5	Yes
Choybalsan	Bayan-ovoo	192	1	U	3	-	256 min	185	5	Yes
Bayan-ovoo	Ondorhaan	130	1	U	3	-	173 min	185	5	Yes
Ondorhaan	Jalgalthaan	93	1	U	3	-	124 min	186	5	Yes

Sections		Total Length (km)	No. of Lanes	Paved or Unpaved	Condition of Route	Design Speed (km/hour)	Average Travel Time	AADT	Degree of Congestion	Possibility of Carrying containers
Route Start	End Point									
Jalgalthaan	Baganuur	114	1	U	3	-	152 min	239	5	Yes
Baganuur	Erdene	53	1	P	1	80	45 min	322	5	Yes
Erdene	Nalaikh	43	2	P	1	80	30 min	771	5	Yes
Nalaikh	Ulaanbaatar	32	2	P	1	80	25 min	1965	5	Yes
JAPAN										
Niigata Port	Tokyo(Expressway)	330	4-6	P	Good	80-120	5	182,577	3	Yes
Niigata Port	Tokyo(Ordinary Road)	350	4	P	Good	60-80	8		4	Yes

2. Rail

From(Station name)	To(Station name)	Distance (km)	No. of Tracks	Track gauge	Traction mode	Siding length
Democratic People's Republic of Korea						
CHINA						
Tumen	Jilin	403	ST	1,435	DIESEL	
Jilin	Changchun	128	ST	1,435	DIESEL	
Changchun	Baicheng	333	ST	1,435	DIESEL	
Baicheng	Ulanhot	82	ST	1,435	DIESEL	
Ulanhot	Yirxie	254	ST	1,435	DIESEL	
MONGOLIA						
JAPAN						
Niigata Cargo Station	Tokyo Cargo Station	347	2	1067	Electricity	n.a.

3. Development Plans (Road)

Sections		Major measures planned	Forecast AADT (2006 and 2011)	Possibility of carrying containers (2006 and 2011)	Investment Amounts (US$ or Local currency)	Time frame to complete
Route Start	End Point					
Republic of Korea						
Jilin	Changchun	(84KM) 4 lanes of expressway	15000 – 23000	yes		completed
Baganuur	Ondorkhaan	To start Detailed Design of this road in 2004 under the Japanese technical assistance and to start construction work in 2005 and complete construction in 2008 under loan. Feasibility Study of road completed in 2002 under Technical assistance of Japanese Government.(228km)	2006-599veh/day 2011 – 832 veh/day	2006 – 192 trk/day 2011-269 trk/day	45.4 mln US$	3 years

4. Development Plans (Rail)

From	To	Distance (km)	No. of Tracks	Traction mode	Improved possibility of transit of containers	Investment Amounts (US$ or Local currency)	Brief description of measures and time frame to complete
CHINA							
Tumen	Jilin	403	ST	ELC.	YES	3.3 B RMB	Improve Speed , Enlarge Capacity 2010
Jilin	Changchun	128	ST	ELC.	YES		

E. Corridor 5 (Nakhodka/Vladivostok -Ussurisk-Pogranichny-Harbin-Manzhouli-Chita-Ulan Ude)

1. Road

Sections		Total Length (km)	No. of Lanes	Paved or Unpaved	Condition of Route	Design Speed (km/hour)	Average Travel Time	AADT	Degree of Congestion	Possibility of carrying containers
Route Start	End Point									
RUSSIAN FEDERATION										
No Report										
CHINA										
Suifenhe (Border of Russian Federation)	Mudanjiang	180	2	P	fair	80	2.3	2200	4	yes
Mudanjiang	Harbin	358	2	P	fair	60	6	1800	4	yes
Harbin	Anda	112	2	P	fair	80	1.5	2300	4	yes
Anda	Qiqihar	183	2	P	fair	60	3	2000	4	yes
Qiqihar	Hailar	576	2	P	fair	50	11	1500	4	yes
Hailar	Manzhouli (Border of Russian Federation)	235	2	P	fair	50	5	900	5	yes
RUSSIAN FEDERATION										
No Report										
JAPAN										
FushikiToyama Port	Osaka (Expressway)	380	4-6	P	Good	80-120	6	136,481-247,988	3	Y
FushikiToyama Port	Osaka (Ordinary Road)	400	4	P	Good	60-80	9		4	20ft:Y 40ft:Y (*)

2. Rail

From (Station name)	To (Station name)	Distance (km)	No. of Tracks	Track gauge	Traction mode	Siding length
RUSSIAN FEDERATION						
Nakhodka	Uglovaya	164	DT	1,520	Electric	
Vladivostok	Uglovaya	33	DT	1,520	Electric	
Uglovaya	Baranovsky	56	DT	1,520	Electric	
Baranovsky	Ussuryisk	23	DT	1,520	Electric	
Ussuryisk	Grodekovo	118	ST	1,520	Diesel	
CHINA						
Suifenhe	Mudanjiang	193	ST	1,435	DIESEL	
Mudanjiang	Harbin	355	DT	1,435	DIESEL	
Harbin	Qiqihar	299	DT	1,435	DIESEL	
Qiqihar	Yakeshi	383	DT	1,435	DIESEL	
Yakeshi	Hailar	82	DT	1,435	DIESEL	
Hailar	Manzhouli	186	ST	1,435	DIESEL	
RUSSIAN FEDERATION						
Zabaykalsk	Karymskaya	366	ST	1,520	Diesel	
Karymskaya	Ulan Ude	653	DT	1,520	Electric	

3. Development Plans (Road)

Sections		Major measures planned	Forecast AADT (2006 and 2011)	Possibility of carrying containers (2006 and 2011)	Investment Amounts (US$ or Local currency)	Time frame to complete
Route Start	End Point					
CHINA						
Harbin	Anda	(130 KM) 4/anes of expressway	20000 - 28000	yes		completed

4. Development Plans (Rail)

From	To	Distance (km)	No. of Tracks	Traction mode	Improved possibility of transit of containers	Investment Amounts (US$ or Local currency)	Brief description of measures and time frame to complete
CHINA							
Suifenhe	Mudanjiang	193	ST	Diesel	YES	0.6 B RMB	Improve Speed , Enlarge Capacity 2010
Mudanjiang	Harbin	355	DT	Diesel	YES		
Hailar	Manzhouli	186	ST		YES	1.9 B RMB	DT Imp.Spd , Enl. Cap. 2010
RUSSIAN FEDERATION							
Nakhodka	Ussuryisk	243	DT	Electric	Reconstruction and modernization zh.d is provided. The stations serving ports the Find and Vladivostok, zh.d.stantsii Grodekovo with construction of the container terminal, amplification of throughput of site Karymskaja Zabajkalsk with construction of the second ways with the further electrification, development of station Zabajkalsk		
Vladivostok	Ussuryisk	112	DT	Electric			
Ussuryisk	Grodekovo	118	ST	Diesel			
Zabaykalsk	Karymskaya	366	ST	Diesel			
Karymskaya	Ulan Ude	653	DT	Electric			

F. Corridor 6: Dalian-Shenyang-Changchun-Harbin-Heihe-Blagoveshchensk- Belogorsk

1. Road

Sections		Total Length (km)	No. of Lanes	Paved or Unpaved	Condition of Route	Design Speed (km/hour)	Average Travel Time	AADT	Degree of Congestion	Possibility of carrying containers
Route Start	End Point									
CHINA										
Dalian	Gaizhou	200	2	P	fair	80	2.5	5000	3	yes
Gaizhou	Shenyang	196	2/4	P	fair	80	2.5	14000	3	yes
Shenyang	Siping	190	2	P	fair	80	2.5	4500	3	yes
Siping	Changchun	123	2	P	fair	80	1.5	6000	3	yes
Changchun	Harbin	205	2	P	fair	80	2.5	5500	3	yes
Harbin	Mingshui	183	2	P	fair	60	3	3000	4	yes
Mingshui	Bei'an	148	2	P	fair	60	2.5	1400	4	yes
Bei'an	Heihe (Border of Russian Federation)	273	2	U	fair	50	5.5	1100	4	yes

2. Rail

From	To	Distance (km)	No. of Tracks	Track gauge	Traction mode	Siding length
CHINA						
Dalian	Shenyang	381	DT	1,435	Electrification	
Shenyang	Changchun	305	DT	1,435	Electrification	
Changchun	Harbin	242	DT	1,435	Electrification	
Harbin	Suihua	125	DT	1,435	DIESEL	
Suihua	Heihe	548	ST	1,435	DIESEL	
RUSSIAN FEDERATION						
Blagoveshensk	Belogorsk	109	ST	1,520	Diesel	

3. Development Plans (Road)

Sections		Major measures planned	Forecast AADT (2006 and 2011)	Possibility of carrying containers (2006 and 2011)	Investment Amounts (US$ or Local currency)	Time frame to complete
Route Start	End Point					
CHINA						
Dalian	Shenyang	(375 KM) 4/anes of expressway	30000 – 50000	yes		completed
Shenyang	Changchun	(297 KM) 4/anes of expressway	23000 – 32000	yes		completed
Changchun	Harbin	(230 KM) 4/anes of expressway	20000 - 28000	yes		completed

4. Development Plans (Rail)

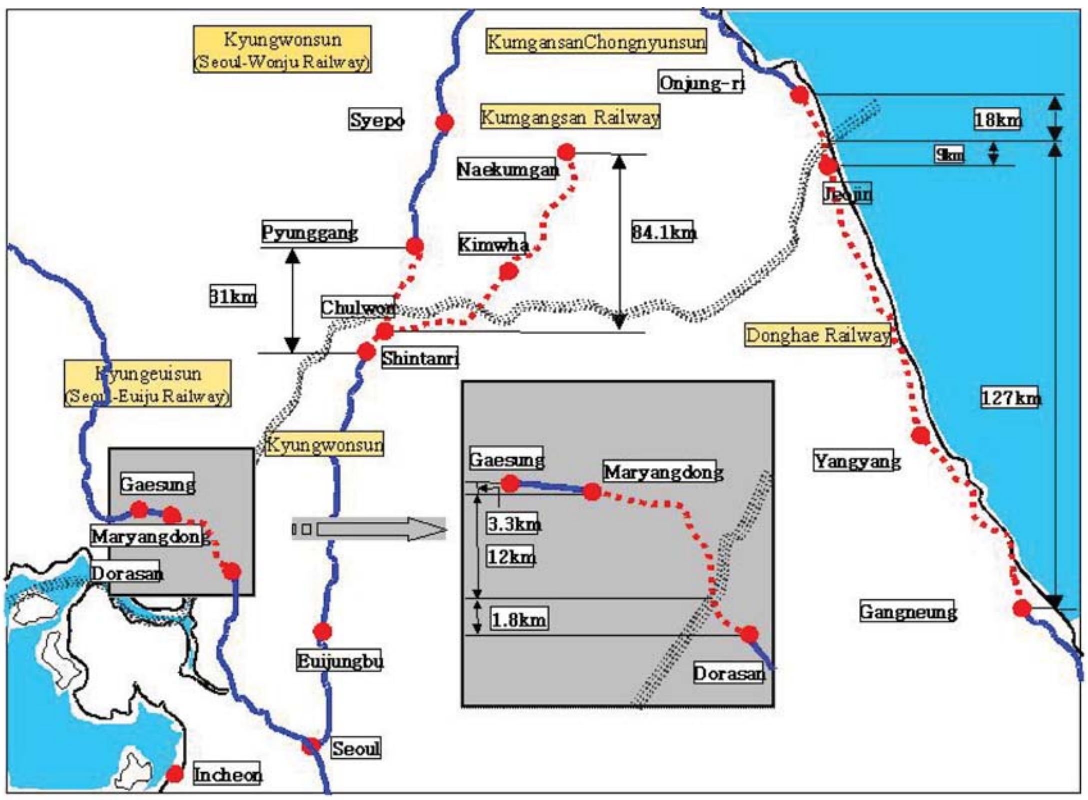
From	To	Distance (km)	No. of Tracks	Traction mode	Improved possibility of transit of containers	Investment Amounts (US$ or Local currency)	Brief description of measures and time frame to complete
CHINA							
Harbin	Suihua	125	DT	DES	YES	1.1 B RMB	DT Imp.Spd , Enl. Cap. 2010
RUSSIAN FEDERATION							
Blagoveshensk	Belogorsk	109	109	Diesel			The nearest years Ministry of Railways of the Russian Federation construction zh.d is not provided. Stations Blagoveshchensk.

IV. MISSING LINKS IN THE KOREAN PENINSULA

A. Missing Rail Links in the Korean Peninsula

Rail Lines	Missing Links	Length(km)
Kyungeuisun (Seoul - Shineuiju)	Republic of Korea: South Limit - DMZ Democratic People's Republic of Korea: DMZ - Gaesung	1.8 12.0
Kyungwonsun (Seoul - Wonsan)	Republic of Korea: Shintanri - DMZ Democratic People's Republic of Korea: DMZ - Pyunggang	16.2 14.8
Gumgangsansun (Seoul - gumgangsan)	Republic of Korea: Chulwon - DMZ Democratic People's Republic of Korea: DMZ - Naegumgang	32.5 84.1
Donghaesun (Gangneung - Anbyun)	Republic of Korea: Gangneung - DMZ Democratic People's Republic of Korea: DMZ - Onjungri	127.0 18.0

B. Missing Railway Links in the Korean Peninsula



C. Missing Road Links in the Korean Peninsula

Roads	Missing Links	Progress
National road #1	Panmunjum - Gaesung	Road pavement to Panmunjum completed
National road #3	Chulwon - Pyunggang	Expansion to Yunchon completed
National road #5	Whachon - Pyunggang	Pavement to Gumgok completed
National road #7	Gansung - Jangjun	Expansion to Gansung under construction
National road #31	Yanggu - Baekhyunri	Pavement to Imdang completed
National road #43	Shinchulwon - Geundong	Construction to Gimwha under construction

D. Kyungeui and Donghae Rail and Road Connections

Links	Mode	Capacity	Connecting Points	Distance(km)
Kyungeuisun Line (Seoul-Shineuiju)	Rail	Single track	Gaesung Station - Dorasan Station	17.1
	Road	4 Lane	Gaesunggondan - Dorasan Station	8.8
Donghaesun Line	Rail	Single track	Onjungri - Jeojin	27.5
	Road	2 Lane	Gosung - Songhyunri	14.2
	Temporary Road	2 Lane	Gosung - DMZ	1.5

E. Kyungeui and Donghae Rail and Road Connections