The Role of the Korean Peninsula in the Northeast Asian Transportation Network

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1. Introduction

Historically, Korea has been viewed as being on the periphery of Northeast Asia. In the last five decades, the ROK has been isolated because of the political and ideological confrontation between the two Koreas. Nevertheless, the rapidly changing circumstances of the global and regional economy mean that the Korean peninsula now has the opportunity to become the geo-economic center of and gateway to Northeast Asia. Korea has superior air and sea transport linkage to and from major cities in China and Japan, with sufficient planned capacity. In addition, Korea has efficient and profitable air carriers and shipping companies. Consequently, many air- and seaports in China and Japan can be served more conveniently and economically through air and sea transport to and from Korea, compared with alternative linkages. The new Incheon International Airport opened last year and the ROK finished construction work on the missing link of the Gyungui line.

In order for Korea to function as the transport and logistics hub of Northeast Asia, it will have to enhance accessibility to every city of the Northeast Asian region by providing efficient and cost-effective transport infrastructure such as ports, airports, railways, roads, information and communications facilities, and logistics infrastructure, such as warehousing and distribution facilities. In addition, Korea needs to use its geographical merits in cooperation with neighboring countries, not just in competition.

2. Recent Transport Developments on the Korean Peninsula

(1) Air Transport

Last March, Korea opened the new Inchon International Airport, 52 km west of Seoul. The airport was built on reclaimed land on the islands of Yeongjong and Yongyu, 15 km from the city of Incheon. This US$5 billion project, eight years in the making, is considered one of Korea's most ambitious plans to become the premier hub of Northeast Asia through new infrastructure. Over the long term, it is expected to represent a huge engine of direct and indirect economic growth that promises major dividends not only to the ROK but to all of Northeast Asia as well.

The new airport's immediate capacity ranks it second in Asia, ahead of airports serving Tokyo, Shanghai and Osaka, and slightly behind the international airport in Hong Kong. It can handle 170,000 flights annually, and carry 27 million passengers and 1.7 million tons of cargo. Incheon Airport's cargo capacity in the first year could propel it to number six in the world. It currently has two parallel runways, which can handle not only 747s but also the next generation of heavier "flying cruise ships." By 2020 two more runaways will be added, giving the airport an eventual capacity of 100 million passengers annually.

The airport is expected to become a regional leader in terms of cost, time and service efficiency. The average turnaround fee at Incheon Airport is lower than other ports in the region: the fee has been set at US$2800 for Boeing 747-400s, versus US$8,000 at Kansai in Japan, and US$5,000 in Hong Kong. The lower cost is due to the lower cost of construction at Incheon. Perhaps its greatest competitive advantage is its strategic location, at a crossroads for flights within the Northeast Asian region, and those to either North America or Europe. Since it is on the great circle route, it allows for the shortest non-stop air routes to both American and European cities. Even for travel from Sydney, Australia, to London, U.K., flying via Incheon takes two hours less than flying via Singapore. It is likely that this airport will become a good transit node en route to smaller regional airports in China, Japan and Far East Russia. There are some 40 cities of over one million people within a three-and-a-half hour flight of the airport, twenty-six of which are located in China. Incheon Airport, which is free from residential restrictions, can operate around the clock, unlike Seoul's Gimpo Airport, which is prohibited from operating between 11 p.m. and 6 a.m. Moreover, the extra land for expansion will allow Incheon Airport to quadruple its capacity by 2020.

(2) Maritime Transport

Due to the rapid increase in seaborne cargo, major ports in Korea have suffered from a chronic shortage of port facilities since 1987. With the continuous increase of import and export containerized cargo from/to Korea and transshipment container cargo from China and Japan, container traffic volume is forecast to increase from 7.8 million TEU in 1999 to 29 million TEU in 2011. However, container handling capacity at Korean ports was only 5.5 million TEU in 1999. Even if development plans are completed on schedule, the shortage will still amount to 5.5 million TEU in 2011

To solve this problem, the Korean Ministry of Maritime Affairs and Fisheries (MOMAF) established the Systematic Integrated Port Development Plan in 1999, based on long-term nationwide port traffic forecasts and the goal of achieving well-balanced regional growth. The Plan includes each port's network system, a rationalized plan for role-sharing, and the stated function of each port and terminal.

In the master plan, MOMAF divided container port development into three categories: Main Hub Ports, including the ports of Busan and Gwangyang; Feeder Ports, including the ports of Incheon, Ulsan, Pyungtaek, Masan and Pohang; and Multi-Purpose Ports, including the ports of Mokpo, Donghae, Daesan and Gunsan.

Among the plans to develop Korean ports as hubs for Northeast Asian maritime transport, particular emphasis is put on the development of two main container ports: Busan New Port and Gwangyang Port. By 2011, Busan New Port will be built to accommodate 24 berths. Gwangyang Port, which has already developed four berths, will develop twenty-four berths by 2011. In 2000, Busan Port ranked third in the world in terms of container handling due to a large number of transshipments from China. It ranks second in Northeast Asia, slightly ahead of Kaohsiung Port and behind Hong Kong Port. Busan New Port and Gwangyang Port will be constructed as third generation ports equipped with state-of-the-art infrastructure. These ports will provide various logistics and distribution facilities to create value-added services such as finishing processes, packing, inspection, re-labeling, assembly, and so on. In order to meet the updated requirements of the international logistics system, sufficient port areas will be provided for secure integrated cargo distribution centers. In such areas, free trade zones will be established in an effort to give MNCs (Multi-National Corporations) a place to consolidate and centralize their logistics management.

(3) Land Transport

Major projects planned for the Korean railway network include: 1) double-lining to widen narrow tracks, and straightening winding sections, 2) electrification of a major arterial line, and 3) completion of the TCR and the TSR, including the Trans-Korea Railroad. To enhance railway network efficiency, a high-speed train network will be established for long distance transport, shortening the distance between metropolitan areas and non-metropolitan area to two or three hours. Industrial railway lines connecting industrial parks to ports will stimulate industrial and trade activities, ultimately connecting inter-continental railroad networks such as TCR and TSR. In the master plan for the next two decades, the ROK plans to have an X-shaped railway network for the Korean peninsula, with Seoul at the center of the "X" shape. Linkages with continental lines will connect the Gyungbu Line and the Honam Line with the Gyungui Line and the Gyungwon Line. The Dong-Hae Line along the seashore will connect the Pyungla Line in the DPRK with Russia.

The construction of a high-speed railway between Seoul and Busan is expected to play a decisive role in establishing an integrated, unified transport system in Northeast Asia by connecting Japan with China and the Russian Far East. The high-speed railway project commenced in the early 1990s, in response to rapidly increasing demand for passenger and freight transport along the Seoul-Busan Corridor, a socio-economic artery along which 70% of Korean population and production is concentrated. The existing expressway and railway have already reached their saturation points. There was an urgent need to expand new transportation facilities in the Seoul-Busan Corridor because of an expected increase in the traffic volume of passengers and freight. In response, the ROK government decided to build the high-speed railway. In the first phase, the Seoul-Daegu section of the high-speed rail line was constructed, and existing rail lines were electrified along the Daegu-Busan section and in the downtown areas of Daejon and Daegu. In the second phase, the Daegu-Gyongju-Busan section of the high-speed line was constructed. The first phase started in June 1992 and will be finished in April 2004, at which time service will begin. The second phase will last from 2004 to 2010, after which time the whole line will be completed and operating. Stations will be located in Seoul, Southern Seoul, Chonan, Daejon, Daegu, Gyongju, and Busan. After completion of the first phase, it will take 160 minutes from Seoul to Busan. After the final stage, the same trip will take 116 minutes, with maximum speeds of 300km/h. After the first phase, the total length will be 409.8km (Seoul-Chonan-Daejon-Daegu-Busan). The final length will be 412km (Seoul-Chonan-Daejon-Daegu-Gyonju-Busan).

Although Northeast Asian countries have the advantage of being connected geographically, because of the political and ideological confrontation between the ROK and the DPRK, the ROK has totally depended on maritime transportation for its trade with China and Russia. However, the North-South Korean Summit in June 2000, which took place in Pyongyang, created a new opportunity for the Korean peninsula to be part of the Northeast Asian integrated transport system. In an agreement with symbolic meaning, the two parties agreed to restore the Kyung-Ui (Seoul-Sinuijoo) Line along the west coast of the Korean peninsula. The line can easily be restored to normal operations by reconnecting 20 km of rail between Munsan, the ROK and Bongdong, the DPRK. Rejoining the old Korean railways will be the first step in connecting the Korean peninsula through the completion of the so-called Trans-Korean Railway (TKR). Upon completion of this line, the new Korean land bridge, starting from the ports of Gwangyang and Busan, can be connected with the trans-continental railways and continue on to Europe or the Middle East. An examination of the comparative distances, times, and costs from Gwangyang/Busan to Rotterdam in Europe shows that the TKR is superior to the existing Eurasian continental railways and all-water services in terms of cost and time. The lengths of missing links are as follows: Gyungui Line, 24km (total length, 486km); Gyungwon Line, 31km (total length, 222km); Gumgangsan Line, 167km (the whole link); and Donghae Line, 145km (total length, 247km). Construction schedules for the other missing links are not decided yet, although basic and detailed plans have already been reviewed.

After national liberation in 1945, the DPRK actively promoted railroad construction in an effort to ensure adequate transportation networks for the successful implementation of its economic plans. In the DPRK, railroads play a dominant role, with trains handling about 60% of all passenger transportation and up to 90% of cargo movement. New railroad networks have been developed both west and east of the Nangrim mountains, traversing the DPRK's many mountainous areas. As of the end of 1997, the combined length of the DPRK's railroads covered

5,214km of track, 98% of which is accounted for by single-track lines. Both standard and narrow gauge tracks are used side-by-side, while only about 20% of railroad ties are concrete. The average speed of the North's fastest track, the Pyongyang-Shinuiju Line, is no more than 60km per hour, while that of the mostly mountainous Pyongyang-Hyesanjin segment is just 22km. The DPRK's railroad networks comprise 10 or so trunk lines and about 90 subsidiary lines. Major lines can be classified into western lines covering the western regions of the Korean peninsula (Pyongui and Pyongbu Lines), eastern lines connecting the eastern area (Pyongra, Kumganasan-Chongnyon and Hambuk Lines), inland lines linking the central areas of the DPRK (Manpo and Paekdusan-Chongnuon Lines), and east lines connecting the western and eastern sectors (Chongnyon-Ichon and Pyongra Lines).

After the Korean War from 1950 to 1953, most construction activities were focused on repairing the damage inflicted on it during the war. From 1961, the Korean government implemented a series of Five Year Economic Development Plans. Road construction was recognized as a basis for economic development and significant investments were allocated for road construction. The first National Expressway, a 29.5km-long 4-lane road connecting Seoul and Incheon, was constructed in 1968 and the Seoul-Busan Expressway, a 428km-long 4-lane road was constructed in 1970. The Korean government established a grid arterial network (i.e., a 7 by 9 arterial grid network), which consists of seven north-south corridors and nine east-west corridors. Upon construction, the government expects to provide equal access roads to every region in the country within a half-day life zone. The government plans to construct approximately 2,300 km of additional highways on a long-term basis. The total length of the national arterial network is 6,160 km, including a total of 1,885km of existing expressway. The West Coast Expressway (total length: 247.4km) was opened in January 2001 and its construction is part of a plan to build highways to serve as an axis of national development. In December 2001, Jungang Expressway (total length: 263km) in the ROK was opened after the missing link between Yeongju and Jecheon was finally constructed.

There are several missing links between the DPRK's and the ROK'S roads, which need to be restored in the long run, including the section connecting the ROK's Seoul-Busan highway to the DPRK's Pyongyang-Gaesong highway, the section between Seoul and Wonsan, and the missing section connecting the DPRK's and the ROK's east coast road. To reconnect the missing section of the Seoul-Pyongyang highway, construction is already underway to build a new 19km-long road between Panmunjom and Gaesong. The section between Anju and Shinuiju (139km) requires the construction of a new four-lane road to complete the highway from Busan to Shinuiju; the section in the ROK and the Pyongyang-Gaeson section are highways. A new road connecting Gansong and Jangjon (49km apart) is necessary, which will enable cars and trucks to travel up to Rajin and Tuman. The section between Jangjon and Wonsan is known to be of highway grade. The section between Wonsan and Tuman is, however, a two-lane road and therefore needs to be expanded into a four-lane road (Kim, W., 2001).

3. Linkages with the Northeast Asian Transportation System

(1) Growing Transport Demand

In the 1990s, Northeast Asia saw its trade volume with countries in the region increase by leaps and bounds as a result of deepening economic interaction. Most of the region's trade, with the exception of Japan's and Russia's, is intra-regional, though Japan's share of intra-regional has been increasing in recent years. This recent increase in intra-regional trade reflects Japan's transition from its traditional economic dependence on the U.S. and Europe, to an increasingly interdependent relationship with the countries of this region. The most spectacular growth in bilateral trade has occurred between China and Korea. Sino-Korea trade increased from $1 billion in 1986 to $23 billion in 1999. A recent study forecast that both inter-regional trade and intra-regional trade in Northeast Asia will continue to increase at a similar pace in the next century, despite the recent financial crisis, because of the region's excellent human capital resources, high savings and investment rates, and continued market liberalization. Complementary production structures and factor endowments in Northeast Asia, in addition to traditional similarities in terms of values and culture, will help to promote closer economic ties in this region.

Increased intra-regional interaction in Northeast Asia should translate into increased transportation demand and greater prosperity and opportunities for the countries of the region. Therefore, transportation costs may be the most critical factor determining the volume of bilateral trade, given the comparative advantages of the two countries. The concept of a "natural" trading bloc, which refers to the strong tendency of countries to trade with their geographical neighbors, reflects this important economic role played by transportation cost. In particular, transportation delays resulting from a shortage in transportation capacity could, if prohibitively high, reduce the competitiveness of the region as a whole.

China will play the most important role in the shaping of the Northeast Asian transport system. The significance of China's emergence as a major economic power cannot be overemphasized. With its huge area (9.6 million km2) and population (1.2 billion), and its abundant natural resources, China is now the third largest economy in the world. It is expected to become the largest just two decades into the 21st century. Such growth will translate into enormous demand for transport services and facilities.

Furthermore, China's international air travel will accelerate proportionate to its rapid growth in disposable income. According to the World Tourism Organization, China is expected to become the world's top tourist destination, with 130 million visitors annually. In addition, with China set to liberalize overseas travel and join the World Trade Organization, 100 million Chinese are expected to visit other countries. Although domestic aviation in China is still in its infancy, the potential demand for air transport in China is also enormous, considering all indicators related to the growth in air transport demand.

Consequently, in the early 21st century, China will rank among the leading airport countries in the world.

As air traffic tends to grow as fast or even faster than the economy, the rate of growth in container traffic generally outpaces the rate of trade growth, which, in turn, generally surpasses the rate of economic growth. Consequently, the growth in maritime transport demand will be enormous. China's foreign trade growth has been one of the fastest in the world, and will continue to be so in the next couple of decades. About 90% of China's foreign trade is transported by sea. The combination of these factors strongly suggests that there will be an increasing demand for port facilities.

(2) Short-Sea Shipping and the New Backbone Route

The ongoing structural changes in maritime transport will have a significant impact on the current maritime transport system between the Korean peninsula and other Northeast Asian countries.

Due to the rapid growth of intra-regional trade and ongoing technological advances in maritime transport, we will witnesses the growing significance of short-sea shipping (intra-regional shipping) within the Northeast Asian transportation network.[1] Increased short-sea shipping will replace traditional feeder shipping and develop into short-sea liner and bulk distribution and collection systems.

The growing long-term importance of intra-regional trade also affects the prospects of seaports. Intra-regional trade will not largely be served by a limited number of major or hub ports, but by a logical network of regional ports based on logistics and cost considerations. Since intra-regional trade in Northeast Asia is relatively short in terms of distance (200-1,600 nautical miles), the strategic location of a port is more important than the port's capacity to accommodate large vessels or handle large volumes of cargo.

Another recent noticeable development in the Asian shipping system is that the emergence of mammoth alliances has enabled the number of service routes to increase. This has resulted in a mix between those services that call only at main hub ports and those that call at second-tier hub ports as well. As a result, the importance of second-tier hub ports has increased, meaning that current hub ports may play a somewhat less prominent role than predicted by so-called "hub port economics." With this tendency towards dispersal, container liners' strategies will rely more on the use of multiple, overlapping service strings and less on a hub-and-spoke system through the major regional transshipment nodes.

In the midst of these developments, it seems likely that a new alternative route will be developed, in place of existing inter-regional routes that move through Japanese Pacific hub ports. In other words, the route passing through the Tsugaru Straits, making direct calls at ports in the Yellow Sea and the Korean East Sea (Sea of Japan), will be established as a trans-Northeast Asia "backbone" route, due to continued increases in container volume and a rapid rise in the number of inter-regional services. Therefore, it is doubtful that a centralized regional hub-and-spoke system will develop to serve the whole region. Rather, the conditions in the Yellow Sea and the Korean East Sea (Sea of Japan) may encourage circular routing systems or backtracking systems.

(3) Intermodal Transport

Until recently, political problems have inhibited intra-regional trade by sea-land intermodal transport in this region. However, due to changes in the political and economic environment, such as the reconnection of Korean railways, the regional transport market of the future will be dominated by intermodal transport, where the center of transportation activities and developments will shift from the traditional maritime segment to the inland segments of the system. Consequently, there will be a greater potential shift from the presently dominant seaborne traffic to intermodal traffic in this area. Although substantial benefits would accrue to Northeast Asian countries through intermodal services, at present, unpredictable performance in rail and road transport would offset any gains from short-sea transport. A prerequisite for the development of intermodal transport is the rapid improvement of hinterland connections, because the overland portion is a vital link in door-to-door cargo movement.

It is clear that the transition from a conventional segmented, marine-based transport system to an intermodal transport system arising from enhanced logistics requirements in the region will bring great, visible changes to the character of the transport system in the near future. Ports in the region have maintained identifiable natural hinterlands, delineated by political borders and inland transport networks, which dictated cargo flow within the respective countries. With deeper economic relations and the development of an intermodal transport system, however, shippers everywhere in the region are able to select any ports and any routes, which offer the lowest logistics costs and fastest time. A consequence of the above developments may be an increase in the dynamics of competition among intermodal networks at the national and regional levels, which would enable shippers to enjoy lower transport costs and reduced transit time.

Since the quality and efficiency of intermodal transport is greatly affected by the weakest and most inefficient link in the chain, the infrastructure of each modal segment in Northeast Asian intermodal transport should be upgraded to fulfill the basic requirements of the integrated transport system. Unfortunately, however, the transport network in each country of the region has been designed and developed from a national viewpoint, without considering intermodality, interconnectivity, and interoperability from a region-wide, holistic perspective. It should be noted that the most crucial problem to be solved for the development of an efficient barrier-free intermodal transportation network in Northeast Asia is the elimination

[1] Up-to-the-minute technology such as the Techno Super Liner will play an important role and will form an integral part of short sea shipping. It will help to overcome great disadvantages in speed and punctual delivery, both of which are essential to a modern logistics system.

of barriers to free intermodal connections between sea, road, rail, and air transport.

As the TKR is reconnected, it is expected that some commodities will be transported by railroad through the Korean peninsula, including the following: 1) Japanese and the ROK commodities bound for Europe, the three northeastern provinces of China, the inland areas and the Far East province of Russia, and Central Asia, if economically competitive; 2) raw materials and semi-finished goods from Russia, China, Mongolia and Central Asia for delivery to the ROK and Japan; and 3) commodities exchanged between the ROK and DPRK. Two Chinese scholars, Jin and Pang (2001), believe it is rational to develop direct railway container transport between China and the Korean peninsula, considering the growing transport demand in relation to the enhancement of regional integration. They assert that two lines are tentatively competitive: 1) Busan, Seoul-Pyongyang-Shenyang-Harbin, and 2) Busan, Seoul-Pyongyang-Shenyang-Beijing, Tianjin.

4. The Korean Peninsula in the Northeast Asia Transportation System

If we understand transport developments in Northeast Asia, in which the ROK is part of the integrated Northeast Asian transport system, we can expect important structural changes with respect to the existing flow of goods and people, which will have a direct impact on transport patterns.

The restructuring of transportation systems in Northeast Asia and the development of new transportation linkages will completely change the existing geographical pattern which has been a major factor in the planning and development of infrastructural arenas. Maritime transport in this area is expected to settle into a pattern in which small-and medium-sized vessels call directly at local ports where local traffic demands exist. The rapid development of air transport in Northeast Asia will mean a diminishing role for major airports in population centers. The functioning of better highway and railway networks will speed up the development of remote and outlying local points. A major implication drawn from these prospects is that improvements in transportation systems will contribute significantly to making human settlements and the location of industries more evenly distributed in Northeast Asia, by providing peripheral areas of the region with easier access to seaports, airports, and road and rail networks. The anticipated dispersal of economic activities resulting from the enhanced role of transportation will replace the previous spatial patterns for regional development systems in Northeast Asia with local systems, which will enhance the internationalization of small-and medium-sized cities.

When railroad networks are reestablished and in operation across the Korean peninsula, the accruing freight revenue will mean economic benefits for all the countries involved: the DPRK and the ROK, China and Russia. Grishin (2000) indicates that the forecast undertaken by experts shows that even using modern container-carrying ships on the deep sea route to Central Europe will not be competitive compared to the railway route, since the deep sea route is almost twice as long. Russia is likely to support the reconnection of the TKR, as it would bring substantial benefits to Russia. In the event that commodity volumes grow, the Ministry of Railway Transport of Russia plans to introduce additional modern rolling stock and upgrade the tracks. Furthermore, the Ministry will introduce computer-based traffic control systems, or "Automated Container Utilization Control Systems," which can cover cargo tracking, cargo security and provide information. Thus, Grishin (2000) points out that Russian Railways are ready to carry cargo from the Pacific region to Europe and back, while ensuring speediness, punctuality, and cargo security, and tracking information along the whole route, from the Pacific to Scandinavia and other parts of Europe, or the Black Sea.

A report published by ESCAP in 1999 indicates that railroad transportation costs will be lower in that railroad costs between Busan and Berlin are $1,280/TEU, while maritime transportation costs are $1,340 to $1,540/TEU. It also states that railroad travel takes twenty days, while by ship it takes thirty-four days. According to this report, rail transportation is competitive in terms of both travel times and transportation cost. Through the reconnection of the TKR and the TSR, Russia expects to see increased economic development in its Far Eastern regions. The transportation network will provide the ability to extract natural resources in Siberia and connect to industrial areas in Northeast Asia. Grishin (2000) stresses that the starting station or terminus of the TSR should be Busan or Gwangyang Port, instead of one in Russia, since both ports are international hub ports for containers. Russia is actively seeking to connect the TKR and TSR with the Gyungwon Line, as well as with the Gyungui Line.

Jin and Pang (2001)'s viewpoints represent China's perspectives on the TKR:

The comparative study of the cost of marine transport and direct railway transport indicates that it is reasonable to develop direct railway transport between the Korean Peninsula, Northeast China and North China, and the advantage of direct railway transport between the ROK and China via the DPRK is quite probably to be extended to Northwest China (for instance, a Seoul-Xi'an direct linkage). However, there is no advantage for East China and South China compared to marine transport and marine-railway coordinated chain transportation. The cost of direct railway transport is generally 40-50% less than marine-railway chain transport. Assuming the boundary transaction charges were US$100, the direct railway transport also remains competitive in the transport market of the Northeast China-Korea peninsula region. It is estimated that to transport a container from Seoul to Beijing, including boundary transaction charges, the cost of direct railway transport will be over 20% lower than that of marine-railway chain transport.... Reconnection of the TKR will be beneficial to the development of regional economic cooperation in Northeast China. The constitution of international transportation linkages has been accompanying the process of globalization featured with global industrial shift and the growing influence of telecommunications on spatial structure. The limitations of insufficient construction and the organization of regional

infrastructure to advance regional integration have become more and more apparent...

Jin and Pang (2001) also say that the development of land transport between China and the Korean Peninsula will enhance regional linkages greatly, reducing physical obstacles to transport integration in Northeast Asia. China expects this process to help the related industry to make big advances in technology development and strengthen international competitiveness. Furthermore, the existing domestic railway and the Trans-China/Europe Railway can possibly be linked.

When an ESCAP report about the Trans-Asian Railway Network was published in 1992, the DPRK insisted that the origin of the railway should be located in the DPRK. Since then, the DPRK has undergone economic depression and changed its stance. Currently, the DPRK expects that it will reap profits amounting to US$7.2 million by 2005, once the TSR and TKR are connected in the near future. The plan has limitations because connecting the TSR and TKR will require a huge amount of investment to modernize and electrify the existing railway system. As the DPRK is highly dependent on the railway system for its basic infrastructure, modernizing and improving the railway system will be a necessary step toward a better economy. Moreover, even though Japan is the only nation in Northeast Asia not connected by land transportation, Japan will benefit from interregional trade effects through the use of intermodal transportation, including the TKR, if economically competitive.

Passenger traffic between China and the ROK is increasing rapidly, a phenomenon that affects maritime and air transportation. Incheon International Airport and several ports can be used for tourists in the short term. In the long term, other international airports, as well as an HSR and rapid railway network to China via the DPRK, or starting from Japan, will play a key role in transporting passengers. In this case, another interregional railway network can be operated along with the European Railway Network and the Trans-Asian Network in Southeast Asia.

The proposal, based on Japan's concept of a "Greater East Asia Co-Prosperity Sphere", formulated before World War II, is to build a rail tunnel under the Korea Straits connecting Busan, the ROK with Shimonoseki, Japan, with a rail link through Pyongyang, the DPRK to Vladivostok and Shenyang. This concept suggests the potential of the Korean peninsula as a bridge from Japan to Northern China and the Russian Far East. However, many scholars and politicians in Korea disagree on this project, indicating that it could reduce the role of ports in Busan and ultimately have an adverse effect on the Korean economy; in fact, even in Japan, most scholars do not support this project and the Japanese government is reluctant to invest due to the government deficit.

5. Conclusions

The Korean peninsula is now in a situation in which it can become the logistics center of Northeast Asia. Previously, we covered each country's positive aspects and noticed that there are many obstacles and difficulties that stand in the way of the Korean Peninsula becoming a logistics hub. To find solutions to these problems, we must look at problems with the viewpoints of users, providers, and society.

If the regional transportation system in Northeast Asia is to be integrated, the railway must first be strengthened, as it is the weakest link. The existence of various railroad gauges, missing links, technical incompatibility, and bottlenecks at border crossings are critical problems in integrating railway networks in the region. The development of the Trans-Northeast Asian Railway Network will be regarded as the most important step towards the realization of an integrated regional transportation system. For operators, privatization in each Northeast Asian country's rail industry may generate difficulties in contracts and negotiations; however, contracts can be easily concluded as companies rely on profit maximization, without being sensitive to political situations.

There are some limitations in the assumptions contained in recently published reports. Travel times for maritime transportation are getting shorter thanks to advanced technologies and efficient operations. Maritime transportation is effective in transporting extremely large quantities. Travel times, costs, and convenience in crossing borders are major factors influencing shippers and users when they decide to ship freight by railway. Transport costs between Busan and Berlin are competitive because Russia sets a special rate, $0.03/km for the 9,900km of the journey that passes through Russia, which is about 80% of the total distance. If Russia raises the cost and border-crossing costs rise, then the TKR and TSR may not be competitive. Another possible obstacle is that super-ships (10,000TEU, currently 6,000TEU) could be introduced between Northeast Asian and European ports.

Capacities and speed on the TKR are another problem. Korea expects that the passenger transport capacity of the Seoul-Busan corridor after a second stage of HSR will increase by up to 2.6 times (daily passenger transport capacity will increase to 520,000 passengers from 200,000 passengers), freight transport capacity will increase by up to 8.6 times higher than before (from 350,000 containers per year to 3,000,000). Expected capacities are based on a strong assumption that the existing Gyungbu Line will be solely used for freight transport, which is rather unreasonable because passengers will demand various types of services, not just on the HSR. To overcome capacity limits along the Gyungbu corridor, a new beltway-type railway near the Seoul Metropolitan Area will be required.

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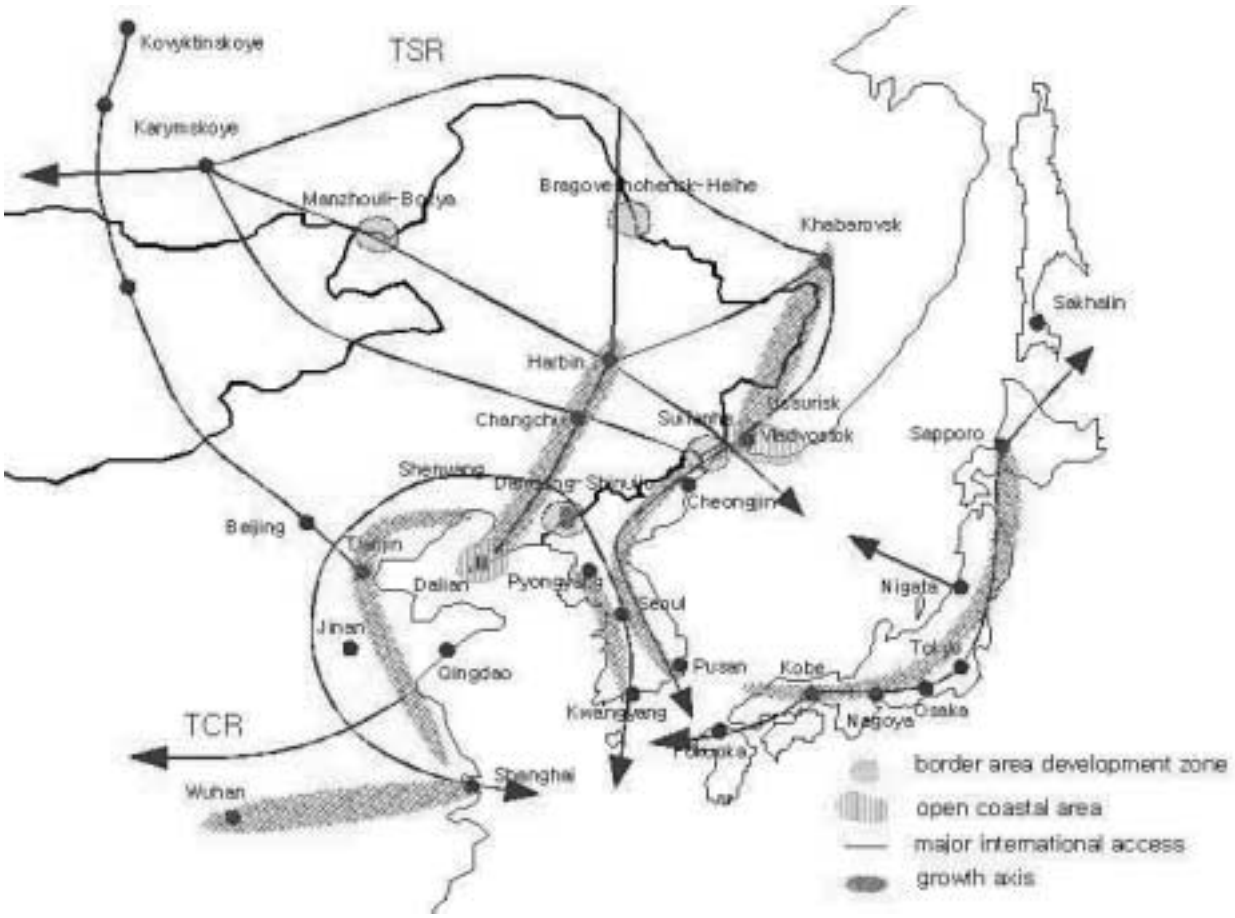

Figure. Long-term Development Concepts for Northeast Asia, W. Kim et al. (1998)