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The Nampo-Pyongyang corridor

A strategic area for European investment in DPRK

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Abstract

This paper provides an overview of main problems affecting the development of North Korean regions. It recognizes the importance of transport and logistics as key factors in regional economic growth. A critical overview of main economic areas in terms of market size, industrial specializations, accessibility, and infrastructure provision, concludes that Nampo is the most efficient location for European companies that are willing to use North Korea as a base for producing and exporting their goods. Conclusions are based on recent figures about maritime traffics and hinterland characteristics.

Keywords: *DPRK, Europe, Logistics, North Korea, Regional Development*

Introduction

Several studies have addressed the different characteristics of North Korea's main economic areas. However, their results have remained mostly speculative and somewhat contradicting, due to data shortage. Therefore, most research depends on broad qualitative appreciations and external estimations of North Korea's regional economic performance. Very few works have provided a quantitative regional geography of the country. As for example, Jo and Adler (2002) show the difficulty providing accurate population figures by city and province, but they success in demonstrating key processes of a socialist developing country. They particularly highlight the precedence taken by economic factors over ideological factors, resulting in the formation of Pyongyang primate city, and the deficiency of intra and inter regional balance. One main explanation is that centralized socialist planning finds difficult to sustain its legitimacy and efficiency in a globalized environment where economic factors become dominant. Another set of studies based on international trading vessel movements demonstrated the gradual concentration of the North Korean port system favouring Nampo, the gateway to Pyongyang (Jo and Ducruet, 2006; Ducruet and Jo, 2007). Thus, both urban and port systems illustrate major spatial changes within the country, such as the "shift to the West" of populations and activities during the last two decades, as a result of geopolitical change, uneven accessibility, and overall industrial collapse (Roussin and Ducruet, 2006; Ducruet and Roussin, 2007a).

In order to address whether North Korean economic areas are differently attractive to foreign firms such as European firms, an overview of their main characteristics is provided in the first section. It is believed that European firms have a comparative

advantage over other firms stemming from the absence of political issues between North Korea and Europe (Bridges, 2003). Besides, they can be seen as any potential investor for which location factors are the same than for other companies, in terms of market opportunities and logistics efficiency. Thus, this first section reviews the different economic areas according to their compatibility with global standards of supply chain management. In a second section and from this economic and logistics approach, the most relevant area, Nampo-Pyongyang, is selected and analyzed in terms of land-sea capacity, recent European investments and potential growth.

1. Regional panorama of North Korean logistics

1.1 Performance indicators of main economic areas

One major constraint to addressing the actual state of industrial activities in different parts of North Korea is the fact that only 20% of existing industries are still in operation or in semi-operation. The Soviet model based on heavy industry, the dramatic shortages of energy since the early 1990s, and the increase of defence-related expenditures at a time of diplomatic tensions and trade isolation all have provoked severe wounds to the whole economic system. As a consequence, any estimation of economic performance should not ignore that except Pyongyang and Nampo, most other cities have seen their economic base vanish over time. Cheongjin, a main economic centre of 800,000 inhabitants located in the northeast, has been described by a former UN representative as a 'forest of scrap metal' where the port is rather dormant (Pons, 2006).

The table 1 illustrates the actual and potential inventory of industries in DPRK by main areas. It shows that North Korea offers to investors an interesting mix of various natural resources highly demanded on the world market as uranium, copper or nickel, and an industrial tradition, the north part of Korean peninsula being industrialized since the 1920's. On the manufacturing heritage some new sectors have been introducing during this last decade like tourism or glass. By extension and based on the project announcements and various visits of foreign firms in DPRK since the warming between both Korea in 2000, we can extrapolate which possible industries could be located in the main North Korean industrial areas; Nampo-Pyongyang and Wonsan-Hamheung seemed to have the best and largest potential.

[Insert Table 1 about here]

Therefore, any interpretation of Table 1 should be cautious, as most traditional industries collapse and few new industries have been developed in the recent years. Economic specializations of the different areas may not be regarded as crucial for new developments. In fact, foreign firms shall invest in North Korea whatever the mere traces of past local knowledge and skills. Those are not consistent enough to be considered as valid economic rents (Kaplinski, 2004). Moreover, the two examples of Gaeseong Industrial Park (GIC) and Rajin-Seonbong show that new developments have been taking place without any linkages with formerly existing industries. On the one hand, the South Korean government-based GIC continues to prosper since its start in 2004, even during peak diplomatic tension periods, such as summer 2006 nuclear tests. At the end of 2006, ten thousand North Korean workers were operating in fifteen South

Korean companies and plans to expand the site are currently examined. On the other hand, Rajin-Seonbong has not prospered due to mismanagement (Ducruet, 2008a). Developers of the zone have selected high-tech industries, casino, and retail instead of using the port as both a catalyst for economies of scale in manufacturing and a remedy to geographical remoteness. Traffic data show that Rajin port has been used intensively for carrying construction materials to build the zone at early developmental stage rather than for trade activities (Jo and Ducruet, 2007). This is being partly recovered as China is willing to improve the connection between Rajin and Jilin province through highway development and the installation of a logistics-free zone at Namyang (Hankyoreh, 2006). China's ambition using Rajin as a gateway to the Pacific is somehow counterbalanced by Russia's strategy to provide the zone with energy in exchange of connecting Rajin to Siberia's oil and gas fields through pipeline and railways (American Shipper, 2008), what confirms the ambivalent position of North Korea towards China and Russia. Despite its more favourable location at the border with China, where approximately 50 to 80 percent of North Korean exports pass, Sinuiju Special Administrative Region (SAR) has not much developed since the appointed manager Yang Bin has been arrested by Chinese authorities after the project has just been launched in 2002. Another reason in the failure of this zone and exposed by DPRK authorities, was the absence of free trade agreement for SAR with China, which completely minimized the competitiveness of Sinuiju. Although a Special Zone at Nampo area is mentioned by the South Korean Ministry of Unification (2005), there is not yet evidence of its realization. However, the example of Nampo shows that a special economic zone is not mandatory for economic development, as 120 Chinese firms have invested in the province in the recent years (Pons, 2004). Nampo and Wonsan are strategic locations and for this reason they have

not been opened officially to free trade. Recent announcements about the free zone project on Bidan and Wihwa islands at the Chinese border near Sinuiju confirm the preference to peripheral locations remote from Pyongyang (Yonhap News, 2007), and more specifically the wish of the authorities to keep Chinese firms, as much as possible, far from the country's heart and less visible for the local population.

Previous attempts to estimate the performance of main economic areas are synthesized in Table 2. Based on the hypothesis of further foreign investment, coastal locations are pointed by Kim (2000) as the most promising areas to matching the Chinese model of Open Cities. The author identifies five desirable factors for motivating investment for South Korean firms:

- coastal city area: economic advantages of water transport
- pre-existing industrial base: experienced workforce despite damaged facilities
- safe investment: areas far from sensitive sites such as military bases
- economic linkages with neighbouring countries: proximity to borders
- personnel attractiveness: educational facilities, skilled labour

According to this framework, factor such as remoteness from military sites does not apply to Gaeseong, a fruitful project near the Demilitarized Zone (DMZ). Also, the proximity to borders or ports, under the control of the Army, has proved wrong for Sinuiju SAR and Rajin-Seonbong FTZ. Of course, it is partly due to the elaboration of this framework prior to the reforms and special zones that take place from 2002. However, it implies that any rigidly objective analysis of North Korean economic areas is not sufficient to understand the current situation. There is more a complex mingling

of different factors with a large share of unexpectedness. As indicated above, usual arguments explaining the demise of Rajin-Seonbong FTZ through geographical remoteness and lack of economic base have largely ignored the importance of ports and the fact that high-tech industries are not likely to grow without a previous developmental stage in the manufacturing / exporting industries sector. Even Silicon Valley in the US has not grown up from nothing but has benefited from already existing military sites where research activities became attractive for regional innovation (Howells, 2005). Thus, any attempt to rationalize investment factors in North Korea based on objective benchmarking remains very limited. There are no inherent qualities of places that turn them into economic centres ‘naturally’, but a set of ongoing processes and strategies varying through space and time.

In order to benchmark the different economic areas, a synthesis of Kim (2000) and Lee (2001) is proposed in Table 2 based on the given scores. As a result, the skilled, abundant, and cheap labour is one of the most important factors to attract investments, and constitutes a very strong advantage of North Korea over other developing Asian countries and notably China (Chabaud-Latour, 2006). Among the different zones, Pyongyang-Nampo is seen as the most promising investment area, as it is well represented in all factors, except raw material provision but this factor stands among the less important elsewhere.

[Insert Table 2 about here]

Based on such estimations of economic performance, what could be the prime location

for European firms willing to invest in North Korea? It seems that besides considerations on existing industries, markets, and development potentials, one main factor that is usually neglected by scholars is the ability of a place to provide efficient logistics. Therefore, a complementary analysis is necessary in order to further estimate how the different economic areas may be attractive for European firms in their global strategy of being inserted in supply chains and realize an export-based activity.

1.2 The diversity of logistics' efficiency

The overall characteristics of the North Korean transport system are very influenced by the Soviet model, with a major importance given to land transport (Table 3). This is explained by specialization in heavy industries, agriculture, and mining, of which the products take the largest share (80%) compared to manufactured goods (Tsuji, 2005). The predominant heavy loads have tended to damage the roads to such extent that without regular management, and in addition to very contrasted natural conditions, about 7% only of the entire road network is paved (Bang, 2004). Without sufficient coal due to the impossibility to restart flooded-mines due to lack of oil, some steam trains dating back to Japanese occupation even use old truck or car tires to fuel the locomotive. Also, short distance goods carriage is ensured by agricultural vehicles, of which animal-led, and also by hands. On the maritime side, no modern container-handling facilities are said to exist in North Korea, but at least containers are regularly handled in Nampo and Rajin ports (Ducruet and Roussin, 2007b), given the announcements in the press about new terminal facilities financed by (or leased to) China (Lloyd's Register, 2006). However, not only North Korean ports have not been much modernized since several

decades, but also the army – which controls the ports – collects very high entrance fees, resulting in excessive shipping costs and prolonged shipping time (Ahn, 2002). For example, one TEU¹ carried between Incheon, South Korea, and Nampo costs US\$1,000, i.e. as much as a journey to Europe, and takes 24 hours for a round trip of only 100 kilometres (Ahn, 2001). However, since the signature of the inter-Korean agreement (2004), the two ports have launched joint regular shuttle services (Lloyd’s Register, 2005), and the cost as dropped to US\$250, allowing more traffics (Choe et al., 2005).

[Insert Table 3 about here]

Another important aspect of the transport system is its very heterogeneous geographical coverage (Figure 1). Centred upon Pyongyang, the highway network is mostly reflecting militarist and political needs to circulate efficiently along main East-West and North-South axis. In turn, the core region remains protected from borders as it does not connect directly to other neighbours’ highways. Moreover, the conditions of the highways are very unequal. If the highways connecting Pyongyang to Nampo, Gaeseong and North of South Pyongan Province are in quite good state, the highway to join Wonsan is in poor condition due to long, dark and dangerous tunnels along its way, where accidents are frequent between the trucks and other vehicles and pedestrians.

[Insert Figure 1 about here]

Although it appears very well developed, the railway network is in fact poorly efficient,

¹ Twenty-Foot Equivalent Unit, standard measure of container traffics

given the fact that it is approximately 70% electrified (CIA, 2005), and that the country runs out of energy. It has been observed that more generally, electricity spreads from Pyongyang to other provinces through a weekly rotation and in small quantities to minimize shortcuts. This gives a much contrasted regional distribution of domestic transport activities, with 30% around Nampo-Pyongyang, 10% around Sinuiju, 24% between Cheongjin and Rajin-Seonbong, and 17% around Hamheung-Heungnam (Tsuji, 2005). In terms of domestic circulation, there is an increasing separation between East, where several truck accidents are reported due to travel time, delays, lack of gas stations, repair facilities, and dangerous conditions notably along the coast and in the mountains; and West, where most of the operating factories are located. For foreign players, implications are enormous, as companies in North Korea have to spend 40% of their manufacturing costs on logistics (Foster-Carter, 2001).

As a result, foreign companies who want to invest in DPRK must be very careful regarding the location of their investments in order to not lose competitive advantage of the low-cost manpower in logistic cost. Thus, it appears at the term of this section that Nampo-Pyongyang area in the actual condition offer the best logistic solution for European firms, which will mainly use their facilities in North Korea for exportations to other most-advanced Asian countries or Europe. In the next section, we propose to analyze more specifically this area, the Nampo-Pyongyang Corridor (NPC).

2. The case of the Nampo-Pyongyang corridor

2.1 Recent developments around the corridor area

The Nampo-Pyongyang Corridor (NPC) is a plain with some smooth hills delimited by the administrative limits of Pyongyang's province and the agglomeration of Nampo (South Pyongan Province), both cities being only separated of 50 km or 1 hour of driving. With a population of 4.35 millions residents (around 1,500 residents per km², respectively 3,900,000 residents for Pyongyang area and 450,000 for Nampo), 18.5 % of national population, the NPC is the largest human concentration in DPRK and offers to foreign investors an abundant and cheap manpower. The monthly wage of a worker employed in a foreign company on Pyongyang is around 50 EUR (taxes included) and a specialist or a manager could be hired for 100 EUR per month, the NPC's area being the best place in DPRK to find skilled employees due to the location of the key national universities (Kim Chaek University of Technology, Kim Il-Sung University, the University of the Foreign Studies or the Pyongyang University of Science and Technology).

Beside this human factor, the NPC is also quite well connected with the other provinces (highways in good state to join Gaeseong and the north of South Pyongan Province, highway in more critical condition to go to Wonsan, railroads to reach the entire country) and most important for an European firm, NPC is connect to overseas through the port of Nampo for the goods, which is linked by regular service to Dalian port, and the airport of Pyongyang (Sunan international airport) for the sensitive goods and the expatriates, with regular passengers and cargos flies to Beijing.

If the air road service does not show any specific problem except the age of the vessels, port service in Nampo faces two main difficulties. First, the access to Nampo port is

limited by the West Sea barrage which allows only ships under 50,000 DWT² to enter, one time a day. Second difficulty, due to the trend of the containers to disappear in DPRK where they are easily recycling to other uses (storages, offices...), shipping companies ask now that the containers are loaded on board within the 24 hours after the arrival of the vessel. As a result, in order to minimize the transportation cost and to avoid buying its own containers, the port location is more advantageous. However, we can estimate that Nampo port in general is improving its services, but the city remains in very bad conditions, far from Pyongyang's environment. A new container terminal has been recently built there (Lloyd's Register, 2006), probably in order to sustain the trend of growth in container traffics (Figure 2).

Also, total traffic has been relatively stable along the last 20 years, except following the USSR's collapse (1991-1996). Between 1997 and 2001, the growth is mostly based on aid imports, while the growth from 2002 is more based on trade. This last trend is both explained by recent investments in the NPC and the betterment of inter-Korean relationships since 2000, reflected in their maritime agreement of 2005 (Ducruet and Roussin, 2007c). Notably, the cost of carrying one container on the Incheon-Nampo route has reduced fourfold after the agreement, as it is a main artery carrying 90% of inter-Korean sea trade.

[Insert Figure 2 about here]

As we can see on figure 3, the NPC has been relatively well developed by the

² Deadweight Tonnage (DWT) represents the volume of the ship used for the carriage of goods

authorities during these last decades. A 6 lanes road of 46 km follows the river Daedong and a large 10 lanes highway of 44 km has been constructed later in 2000 lining more quickly Pyongyang and its port. Railways network is also widely extended with a main line between the both cities and several branches joining key industrial complexes; this area being one of the main industrial district of DPRK with 2 mines, and 5 complexes specialized in mechanic and heavy industries, mostly still in operations.

Another important element in this area is the comparatively less lack of energy hitting it. Indeed, due to its political and economical key position, the NPC is privileged compare to other provinces and does not suffer of one-day-a-week shortcut. Factories located there can expect a better energy supply than in the entire country. In the same way and because of the same factors, diesel oil and gasoline are easier to find into NPC's area. As a matter of fact, Pyongyang and its nearby areas represented 50 % of the gasoline national consumption and 70 % of diesel consumption (Source: internal report).

[Insert Figure 3 about here]

As a result, most recent and main investments in DPRK (outside of mining sector) have been located on the NPC. Among them we can quote the Daean Friendship Glass Factory opened in 2006 in cooperation with the Chinese authorities. Equipments have been supplied by China, DPRK's army has built the facilities before to transfer it to the Cabinet (in DPRK, main factorises are under the control of the cabinet and smaller ones under the control of municipalities). To pay back this investment of US\$24 million, DPRK has to buy raw material and energy from China. Following the same model, two

other news factories have been inaugurated recently: a ceramics plant (with Italian origin equipments) and a synthetic painting industrial unit on Kiyang, near the Kumsong Tractor Complex. Also, the recent strategy of the Egyptian firm Orascom (cement) using Nampo as an export gateway reflects the importance of this region for North Korea's internationalization³.

At last, we can quote the case of the Dae-an-Meccamidi (TM) joint-venture Company, an example of French-North Korean cooperation located on Dae-an and specialized in production of hydraulic power plant generator. TM has been created in 2004 in order to re-launch the national electricity production through a large program of small and medium hydraulic power plants covering the entire country. Authorities have estimated that this solution was better than the construction of new large power plant using oil for instance which needs to import oil, to update the aged local power grid and to damage the air environment. TM is now employing around 100 workers on the Dae-an Heavy Machine Complex's site and plans to produce 1 to 50 M Watts hydraulic power generators. They have the ambition to open a R&D centre in the coming years, the North Korean factory should start the exportations when the local hydraulic power plants program will be achieved. To proceed to the JV, the French partner has been agreed to bring its technology, management skill and cash, the North Korean side

³ Orascom Construction Industries, the Egyptian cement producer and construction group, announced a \$115m investment in a cement plant in North Korea. The deal with state-owned Pyongyang Myongdang Trading Corporation will see OCI take a 50 per cent stake in Sangwon Cement, which owns and operates the closest cement plant to Pyongyang. The increased capital will be used to modernise, rehabilitate and upgrade the plant's capacity to 3m tonnes a year. OCI's investment will also be used to invest in ready-mix concrete, distribution, related mining operations and a dedicated hydroelectric power station near the plant (Source: Griggs and Fidler, 2007).

employees, building, mining concession and cash.

This example shows that because DPRK's key-industries are located into NPC, it is easier to find there more solid and potential partners for JV than in the other North Korean provinces, and that at this early stage of North Korean economic opening it is more efficient to be geographically close to the authorities, situated in Pyongyang.

2.2 Potentials for further European investments

According to the North Korean regulation on foreign investments, foreigners have several options to open business. The most used is a joint venture company between an overseas partner and a local partner. Because of the local hard currency shortage, the North Korean part usually brings into the joint company, lands, buildings, vehicles and manpower. The foreign partner carries cash, machines, and technology or raw materials. In the case of strategic JV company, authorities can provide special guarantees or advantages like mining concession, tax reduction or favourable legislation.

However and since the reform program launched in 2002, foreign investors are now able to be owner at 100 % of their investment, except for the land which remains the exclusive property of the State. Nevertheless, due to the complexity of the local administration and in order to get a better access to skilled manpower, commodities supply or more efficient distribution channel, it is still more efficient to choose the JV business model's option.

As this stage, an alternative business model could be selected by European investors worried by the cultural gap between them and their local partner. This other solution is a tripartite joint company associating a European firm, with South Korean and North Korean partners.

- European side provides cash, technologies, strategic management skills; commercial debouches in Europe, and its flag. DPRK is willing to have cordial relationship with Europe in order to counterbalance the Tokyo-Washington axis and the too much influent China. As a result, European firms benefit of a quite welcome environment by Pyongyang and a better protection of their interest.
- The South Korean side, associated with the European partner in a joint company under the UE flag, brings cash, technologies, its dynamism, commercial opportunities on South Korean market, and pragmatic management come from its cultural knowledge and its geographical proximity.
- At last and like in regular JV business model, the North Korean side brings natural and human resources.

If this formula is not without confer some concerns regarding political issue or communication between 3 parties, we can object that a European presence in this deal can moderate the inter-Korean passion being keep advantages of the Korean partners. After to have exanimate where to invest and how to invest, a last question is in which sector is it possible to invest in NPC?

First of all, an industrial implantation into NPC must be focus on exportation to

European market or South Korean market (Chinese and Japanese markets in mid-term). Due to its low cost country characteristics and its easy access to various natural resources, steel and metallurgic activities, mechanic industries, automotive spares parts production (and in mid-term assembly), garments and shoes industries could be established there. Local manpower is ever qualified in these sectors and logistic system can support these activities. This is also facilitated by the proximity of Nampo to major load centres such as Dalian, Incheon, Busan, Singapore, Hong Kong, Osaka-Kobe, Yokohama, which connect to the world's busiest maritime lanes. Figure 4 represents 93% of Nampo's direct maritime connections, together with the recent weight of those pivotal ports in terms of direct calls for container lines. It shows the already existing linkages and the high potential for Nampo to get connected to international markets via neighbouring ports (Ducruet and Roussin, 2007d; Ducruet et al., 2008; Ducruet, 2008b).

Secondly and as we previously explained, demand has started to grow up into NPC's area, with around 20 % of the households earning more than 100 EUR per month. This population is composed of high ranking people in the administration or army, specialists (engineers in IT, mining or construction industries, translators...), companies managers and of various traders and businessmen who launched their own business (restaurants, transportation) or who are importing goods from overseas (mainly China). Largely represented on Pyongyang and also on Nampo, this population is demanding better services (taxi, banking, gas stations), improved public services (transport, waste treatment, water treatment and supply) understanding the idea that should be paid, and start to have a positive impact on construction and logistic industries. On all these sectors, European expertise is strong, world well-know and will

not suffer of the local American or Japanese competitions like the Chinese firms are now using DPRK to be even more competitive.

[Insert Figure 4 about here]

Conclusion

To invest in DPRK is a bet, a risky adventure seen from Europe, but from a Northeast Asian perspective it is a new frontier of business development, illustrated by the intense movement of Chinese companies in North Korea (around 130 companies have activities there), and the proactive involvement South Korean companies and authorities in the development of Gaeseong industrial complex and Geumgang Mountain tour. As a result, European firms should have a more rational vision of North Korea and see all the advantages that they can take from this country ready to open economic cooperation with Europe: low-cost and relatively well educated manpower, large panel of natural resources, and strategic location between South Korea, Japan, Eastern Russia and China. The purpose of this paper has been to show that nowadays and for European interests, the Nampo-Pyongyang Corridor offers the best alternative between risk and safety, compare to other areas in North Korea. However, we can not forget that European Commission has opened FTA negotiations with South Korea and if we refer to the Korean-USA FTA case, the question of nationality of goods produced in Gaeseong Industrial Complex (GIC) will be put on the table. If European Union is agreed to include GIC in the FTA agreement, Gaeseong area could also become an interesting target for European investors focus on exportations, but with Damocles sword of any cooling in the inter-Korean dialogue process.

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Table 1: Overview of economic activities in main economic areas of North Korea

	Traditional industries	Recent industries	Potential industries	Natural resources
Pyongyang – Nampo	Machinery, steel, electric, electronic, shipbuilding, cement, fertilizer, textile, clothing	Glass, chemicals, construction materials, automotive	Precision chemical, food and beverage, plastic and rubber, automotive spare parts and assembly	Coal, gold, iron ore, silver, zinc
Wonsan – Hamheung	Chemical, machinery, non-steel metal, cement, shipbuilding	-	Automobile, steel, non-ferrous metal, petrochemical, plastic and rubber, precision chemicals, chemical fertilizer, food and beverage, clothing, glass	Tungsten, zinc
Sinuiju	Machinery, metal, chemical, textile, paper, pulp	Sinuiju SAR (2002)	Precision chemicals, plastic and rubber, clothing, food and beverage, wood, glass	-
Rajin – Seonbong	Non-steel metal, petrochemical, coal	Construction, logistics, real estate, retailing, tourism, transport [Rajin-Seonbong Free-Trade Zone, 1991]	Wood, paper, pulp	Uranium, coal
Gaeseong – Haeju	Cement, fertilizer, textile, agriculture, marine products	Manufacturing [Gaeseong Industrial Park, 2004]	Electric, electronics, clothing, food and beverage	Graphite, molybdenum
Cheongjin – Gimchaek	Steel, metal, machinery, automobile, shipbuilding, equipollent, rubber	-	Non-ferrous metal, electric products	Coal, cobalt, copper, graphite, iron ore, lead, magnesite, nickel

Sources: compiled from Lee (2001) and various sources

Table 2: Benchmarking main economic areas of North Korea

	Pyongyang - Nampo	Wonsan - Hamheung	Sinuiju	Rajin – Seonbong	Gaeseong - Haeju	Total
Openness	3	2	3	3	1	12
Development potential	3	2	3	2	1	11
Labour quality / quantity	3	2	2	1	2	10
Social Overhead Capital	3	2	2	1	2	10
Market	3	2	2	1	2	10
Landward linkages	2	2	3	2	1	10
Industrial base	3	3	2	1	1	9
Land	2	2	1	1	2	8
Agglomeration effect	3	2	1	1	1	8
Raw material	1	2	1	2	1	7
Total	26	21	20	15	14	

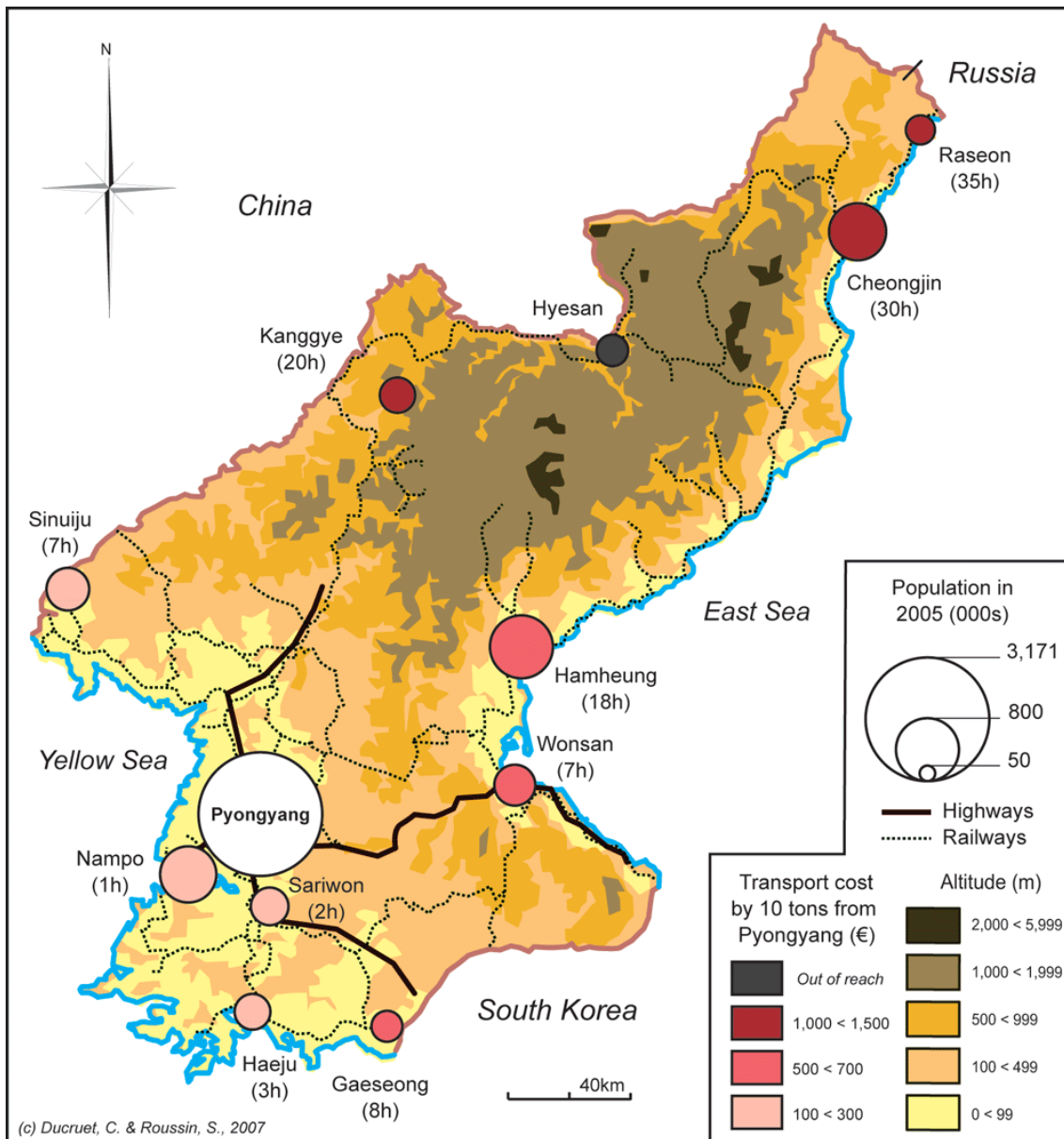
Sources: adapted from Kim, 2000 and Lee, 2001

Table 3: Estimated modal split in 1989 and 2005

	Railways	Roads	Sea	Air
1989	73.8	18.3	7.9	0.0
2005	70.0	17.0	10.0	3.0

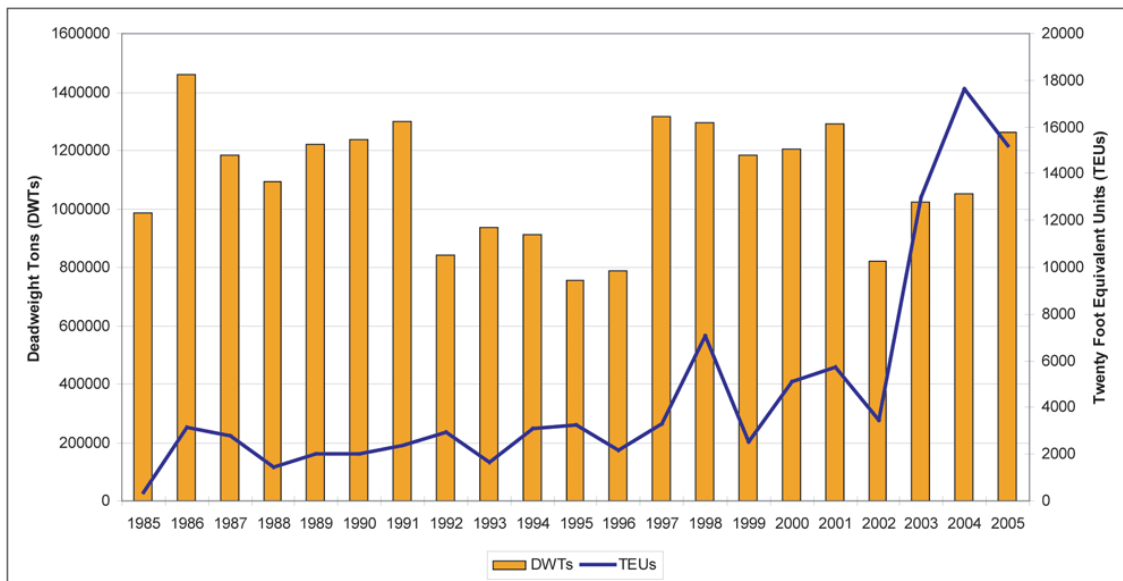
Sources: Tsuji, 2000; Roussin and Ducruet, 2006

Figure 1: The North Korean transport system and truck accessibility of main cities



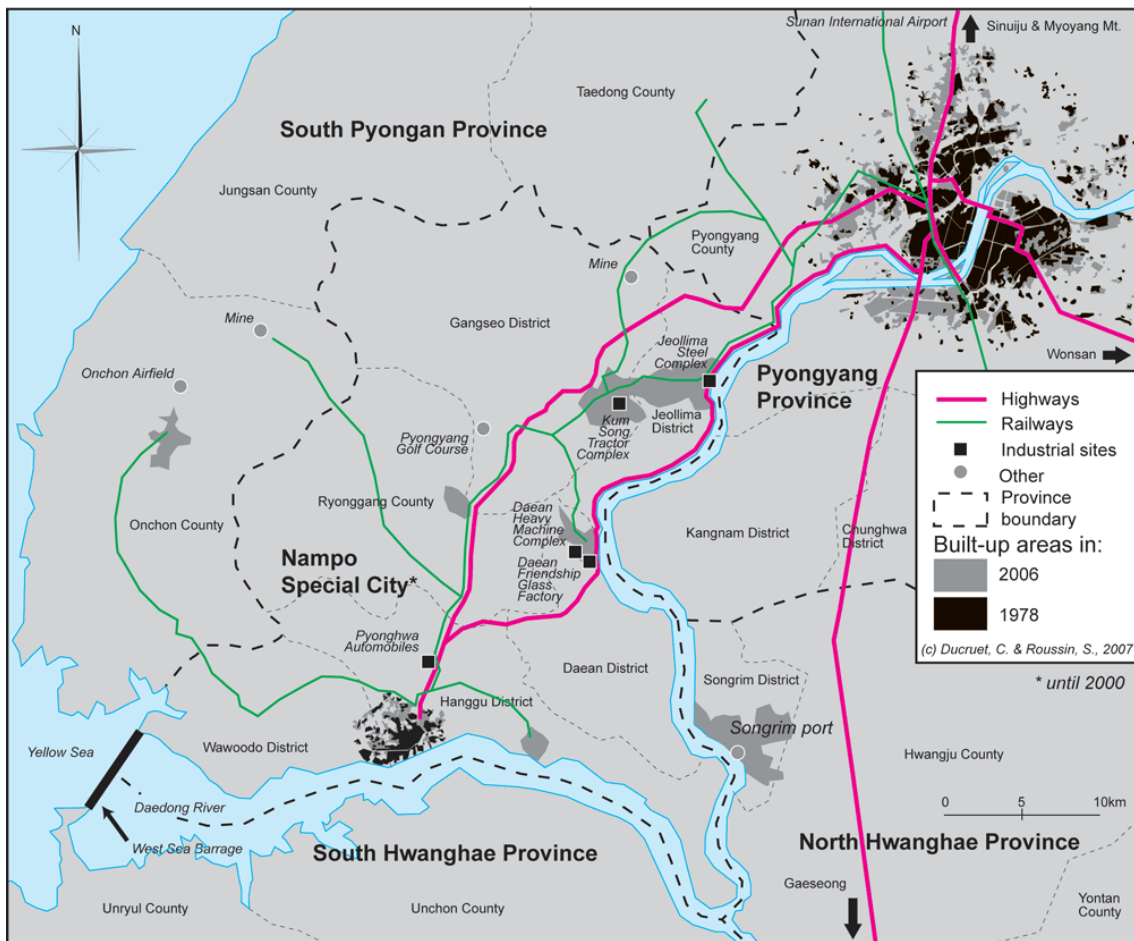
Sources: SERIC COREE, 2005; Korea Research Institute for Human Settlements

Figure 2: Evolution of traffics at Nampo port, 1985-2005



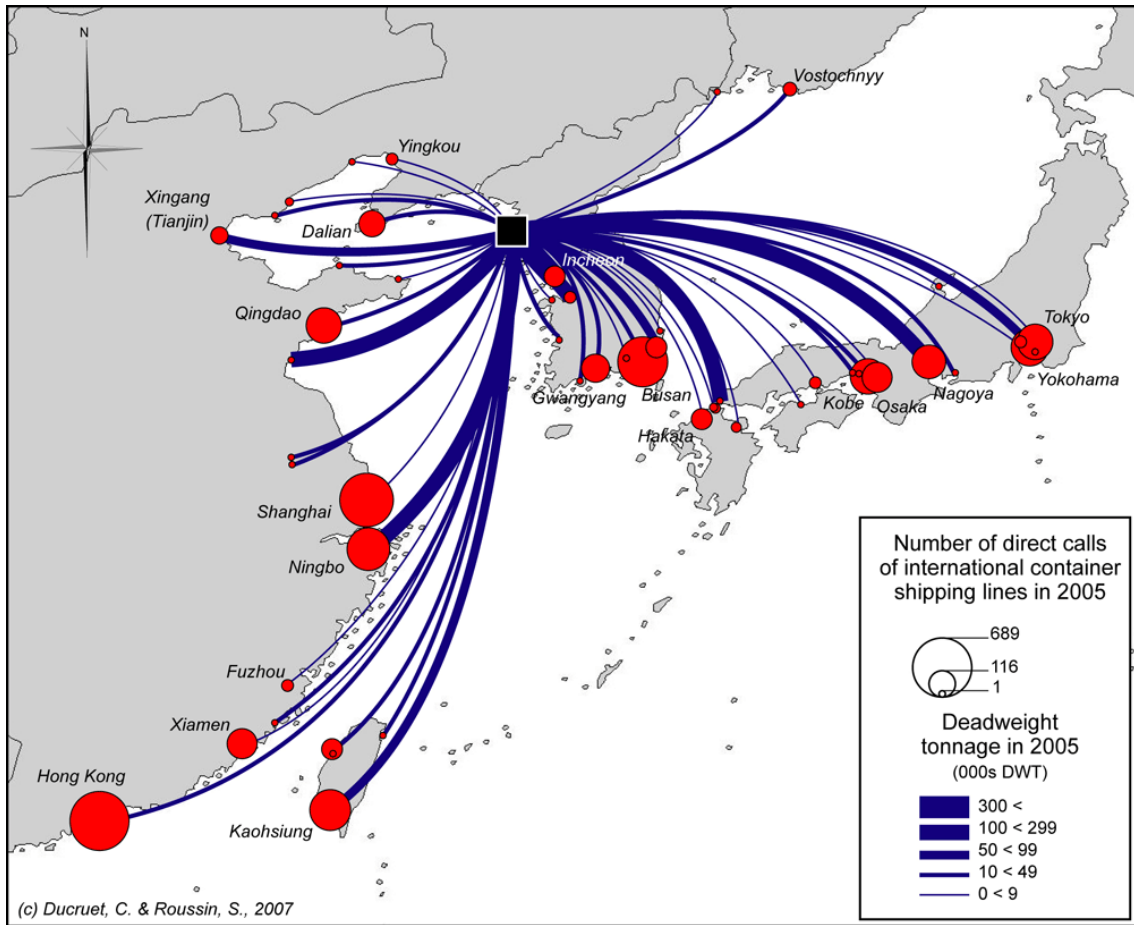
Sources: *Lloyd's Marine Intelligence Unit*

Figure 3: Overview of the Nampo-Pyongyang corridor



Sources: authors

Figure 4: Direct maritime linkages of Nampo port



Sources: Lloyd's Marine Intelligence Unit ; Containerisation International