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 Heilongjiang, 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 (Ports of Niigata, Niigata, 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

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

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), Mongolia (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>
<thead>
<tr>
<th>No</th>
<th>Corridor</th>
<th>China</th>
<th>Democratic People’s Republic of Korea</th>
<th>Mongolia</th>
<th>Republic of Korea</th>
<th>Russian Federation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tanggu-Tianjin–Beijing–Eranhot–Zamin Uud–Ulaanbaatar–Darkhan–Ulan Ude</td>
<td>Road/Rail/Port</td>
<td>Road/Rail</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Beijing–Shenyang–Dandong–Pyongyang–Seoul–Busan</td>
<td>Road/Rail/Port</td>
<td>Road/Rail</td>
<td>Road/Rail/Port</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Busan–Pohang–Kosong–Wonsan–Kimchaek–Sonbong–Hasan–Razdelnoye–Ussuriyak–Khabarovsk–Belogorsk–Chita–Ulan Ude</td>
<td>Road/Rail/Port</td>
<td>Road/Rail</td>
<td>Road/Rail/Port</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Rajin/Sonbong–Jilin–Changchun–Ulanhot–Yorsh–Sumber–Ulaanbaatar</td>
<td>Road/Rail</td>
<td>Road/Rail</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Nakhodka–Vladivostok–Ussuri–Pogranichny–Harbin–Manzhouli–Chita–Ulan Ude</td>
<td>Road/Rail</td>
<td></td>
<td></td>
<td></td>
<td>Road/Rail/Port</td>
</tr>
<tr>
<td>6</td>
<td>Dalian–Shenyang–Changchun–Harbin–Heihe–Blagovechensk–Belogorsk</td>
<td>Road/Rail/Port</td>
<td></td>
<td></td>
<td></td>
<td>Road/Rail</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>No</th>
<th>Unimodal (U) / Intermodal (I) routes</th>
<th>Sea links to Japan</th>
</tr>
</thead>
</table>
| 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) |
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 (Road)  
I-5.3: Russian Federation (Rail) – China (Rail) – Russian Federation (Rail)  
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.