Essential Factors in Commercializing Arctic Shipping

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Ⅰ. Possibility of the NSR

Ⅱ. The Approaches of Korea, China and Japan

Ⅲ. Challenges of Commercializing Arctic Shipping

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I . Possibility of the NSR
1. Increasing the Number of Shipping via the NSR

- 34 times in 2011, 46 times in 2012, 72 times in 2013,
- Total cargo traffic is 1,260 thousand ton, majority of cargo type is liquid

Source: Shipping and offshore conference in Huston, presentation material, 2013.11, Sung-Woo Lee, KMI
2. Current Situation of Shipping via the NSR

- A study on the analysis of the transit passage used 158 times
  - 11’(41), 12’(46), 13’(71)

- Korea, China and Norway sailed the most national via the NSR (9times), with the exception of Russia

<table>
<thead>
<tr>
<th>Country</th>
<th>Sailing times</th>
<th>Arrival times</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russia</td>
<td>122</td>
<td>99</td>
<td>221(69.6%)</td>
</tr>
<tr>
<td>China</td>
<td>9</td>
<td>16</td>
<td>25(7.9%)</td>
</tr>
<tr>
<td>Korea</td>
<td>9</td>
<td>12</td>
<td>21(6.6%)</td>
</tr>
<tr>
<td>Norway</td>
<td>9</td>
<td>1</td>
<td>10(3.2%)</td>
</tr>
<tr>
<td>U.S.A</td>
<td>4</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sections</th>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cargo type</td>
<td>Gas(7). Jet fuel(2), ballast dspl.(1)</td>
</tr>
<tr>
<td>Departure</td>
<td>Yosu(Porvoo, Finland/2 times), Yosu(Montoir, France/1 time)</td>
</tr>
<tr>
<td>Destination</td>
<td>Incheon(Murmansk/3 times) Daesan(Murmansk/4 times)</td>
</tr>
</tbody>
</table>

Source: quote of Russia-powered icebreaker Company(Rosatomflot), documents
3. Alternative Route ‘Asia and Europe Connected’

- Compared to the SCR, 40% less in distance and total of 10 days
- About 25% decrease in container transportation costs
- Connection to the TSR and inner Siberian logistics networks
- New opportunities by the Circum-Eurasia Route

<table>
<thead>
<tr>
<th></th>
<th>Time</th>
<th>Covering area</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSR</td>
<td>18 days</td>
<td>• East Asia ~ Europe</td>
<td>-</td>
</tr>
<tr>
<td>TSR</td>
<td>16 days</td>
<td>• East Asia~CIS</td>
<td>1M TEU</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• East Asia~Russia</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Baltic~CIS</td>
<td></td>
</tr>
<tr>
<td>SCR</td>
<td>26 days</td>
<td>• Asia ~Europe</td>
<td>-</td>
</tr>
</tbody>
</table>

*Source: S.W.Lee, Benefit of NSR to North Pacific KMI-EWC conference, 2012.8*
4. Cargo Traffic Forecast via NSR

- Bulk throughput in the NSR will increase quickly
- Container cargoes will be big, but commercializing container traffic may need more time

<table>
<thead>
<tr>
<th>Category</th>
<th>Port throughput in NSR</th>
<th>Liquid</th>
<th>Dry</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2015</td>
<td>2020</td>
<td>2030</td>
</tr>
<tr>
<td>Port throughput in NSR</td>
<td>6,570</td>
<td>9,470</td>
<td>12,080</td>
</tr>
<tr>
<td>Liquid</td>
<td>4,140</td>
<td>6,300</td>
<td>6,530</td>
</tr>
<tr>
<td>Dry</td>
<td>2,430</td>
<td>3,100</td>
<td>5,550</td>
</tr>
</tbody>
</table>

- Including costal, transit, im(ex)_port
- Source: Russia Government, Port of Russia 2030, 2012

<table>
<thead>
<tr>
<th>NSR Cost</th>
<th>2015</th>
<th>2020</th>
<th>2025</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>120%</td>
<td>54</td>
<td>425</td>
<td>1,402</td>
<td>3,015</td>
</tr>
<tr>
<td>110%</td>
<td>128</td>
<td>1,017</td>
<td>3,138</td>
<td>6,452</td>
</tr>
<tr>
<td>100%</td>
<td>305</td>
<td>2,168</td>
<td>6,081</td>
<td>12,047</td>
</tr>
<tr>
<td>80%</td>
<td>1,311</td>
<td>6,357</td>
<td>15,193</td>
<td>27,975</td>
</tr>
<tr>
<td>70%</td>
<td>2,185</td>
<td>8,746</td>
<td>19,420</td>
<td>34,731</td>
</tr>
</tbody>
</table>

- Source: S.W.Lee, Benefit of NSR to North Pacific KMI-EWC conference, 2012.8
II. The Approaches of Korea, China and Japan
1. Potential of Northeast Asia

- **Main Resource Consumptions of Northeast Asia**

**Oil Consumption**
- China: 10%
- Japan: 5%
- Korea: 3%
- World: 82%

**Natural Gas Consumption**
- China: 82%
- Japan: 3%
- Korea: 10%
- World: 5%

**Coal Consumption**
- China: 4,151 million tonnes
- Japan: 202 million tonnes
- Korea: 138 million tonnes
- World: 5,181 million tonnes

**Iron ore Consumption**
- China: 1,913 million tonnes
- Japan: 1,009 million tonnes
- Korea: 128 million tonnes
- World: 65 million tonnes

**Source:**
- Oil Consumption: eia.gov
- Natural Gas Consumption: eia.gov
- Coal Consumption: eia.gov
- Iron ore Consumption: worldsteel.org
2. Approach of Korea

• **Korea’s Major Efforts So Far**
  - Dasan Science Research Station (2002)
  - Ad hoc Observer in the AC (2008)
  - Research Ice-Breaker ARAON (2009)
  - 1st Commercial NSR Transit Shipping (2009, Ulsan-Rotterdam)
  - Arctic Shipping and Cargo Traffic Forecast (2011, 2012)
  - Arctic Conference on the NSR (2011)
  - North Pacific Arctic Conference 2012-2016
  - Domestic Arctic Ocean Policy Forum (2012, 2013)
  - Setting as a National Agenda (2013)
  - Permanent Observer in the AC (2013)
  - Arctic Policy Framework Plan (2013)
  - 1st Pilot Shipping by Nationality Shipping Co. (2013.10)
2. Approach of Korea

• Establishment of the 1st Arctic Policy Master Plan as an action plan of the APFP in the end of 2013
  - Participation in AC WGs
  - Joint research centers with Arctic states
  - Arctic Dasan Scientific Research Station
  - Arctic research consortium
  - Cooperation with IMO, IASC, PAG, FAO, ARHC etc.
  - Informal 1.5 track cooperation
  - Test navigation by domestic shipping companies
  - Information service capacity building
  - Shipbuilding technology R&D
  - Arctic infrastructure development

• Cooperation with Arctic States and Non-Arctic States
  - MOU for Port Development in Asia between Russia and Korea
    * In Far East Asia and the Arctic Ocean (in 2014)
  - MOU for Shipping and Arctic utilization between Norway & Korea
    * Shipping agreement, Utilization of the NSR, Green Shipping (in 2012)
  - On discussing co-research in the Arctic during the CJK Ministerial Meeting
  - Establishing the NPARC seminar among CJK (18-19th, Mar, 2014)
    * To encourage regional interdisciplinary research on the emerging challenges & opportunities in the Arctic
    * To communicate and share regional research outcomes for capacity building
3. Approach of China

• **China’s attention about the Arctic from Environmental studies to Resource and Security on the Arctic Sea**
  - China is asserting resource development in international waters and right of passage on the NSR since its economic value is increasing in the Arctic.

• **China is Strengthening Diplomacy between the Arctic States**
  - Chinese companies will invest $219 million to GreenLand’s infrastructure, such as airport, port facility, etc.
  - In 2012, China established its Embassy in Reykjavik, Iceland
  - In April 2013, China made a FTA with Iceland

• **Cooperation with Arctic States and Non-arctic States**
  - Cooperation for Arctic Development, Exploration between China and U.S.A, Canada, etc.
  - MoU for Arctic studies cooperation between China and Korea, Finland, etc.
4. Approach of Japan

• **Japan was the first to research the Arctic among the Northeast Asian States**
  - In the 1980s, Japan started research on the Arctic Sea Route.
  - Japan established research institutes for Arctic’s studies, such as the Arctic Science Station in Svalbard, Norway, Japan Marine Science and Technology Center (JAMSTEC), Japan Consortium for Arctic Environmental Research (JCAR), etc.

• **Japan launched the Arctic Task Force (ATF)**
  - Japan is highly interested in the Arctic issues, since the Arctic Ocean is reported to have potentials such as opening new shipping routes and developing natural resources, impacting global warming, etc.

• **Permanent Observers in the Arctic Council with Korea and China**
  - In May 2013, Japan obtained Permanent Observer status with Korea and China
  - Japan is conscious of competition on Arctic studies because of Korea and China’s interest in the Arctic in recent years.
  - Japan made an attempt at scientific technique cooperation with Russia.
III. Challenges of Commercializing Arctic Shipping
1. Operational Difficulties of Icebreakers

- **The inadequacy of the icebreaker supply**
  - 10 icebreakers are located in the north pacific Arctic. But only 7 icebreakers are operate and Russia is just 3 icebreakers operate

- **All Nuclear power plant ships have been made in Russia**

### Present condition of Icebreaker possession

<table>
<thead>
<tr>
<th>Country</th>
<th>In the world</th>
<th>In Arctic available (total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russia</td>
<td>37</td>
<td>3(5)</td>
</tr>
<tr>
<td>Sweden</td>
<td>7</td>
<td>1(1)</td>
</tr>
<tr>
<td>Finland</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Canada</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>USA</td>
<td>5</td>
<td>1(2)</td>
</tr>
<tr>
<td>Denmark</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>Others</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>78</td>
<td>7(10)</td>
</tr>
</tbody>
</table>

2. Imbalance of Cargo Volume

- **A large cargo volume towards the east, but less volume in the west**
  - Most of the Liquid bulk cargo move to the east due to import energy sources
  - In 2013 the liquid cargo volume is doubled more than the other cargo volume

### Cargo Volume through NSR

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid</td>
<td>26</td>
<td>894,079</td>
<td>31</td>
<td>911,867</td>
</tr>
<tr>
<td>Bulk</td>
<td>6</td>
<td>359,201</td>
<td>4</td>
<td>276,939</td>
</tr>
<tr>
<td>LNG</td>
<td>1</td>
<td>8,265</td>
<td>1</td>
<td>66,868</td>
</tr>
<tr>
<td>General cargo</td>
<td>-</td>
<td>-</td>
<td>13</td>
<td>100,223</td>
</tr>
<tr>
<td>Ballasting</td>
<td>6</td>
<td>-</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Reposition</td>
<td>7</td>
<td>-</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>46</strong></td>
<td><strong>1,261,545</strong></td>
<td><strong>71</strong></td>
<td><strong>1,355,897</strong></td>
</tr>
</tbody>
</table>

(Unit: ton)

Source: Center of high north logistics
3. Problem and Uncertainty of High Tariffs

- **High ice breaking service fee (1,048 rub/t)**
  - All ships passing through the NSR are required to pay ice-breaking service fees imposed by Russia
  - The fee has been double charged for both the cargo type (Bulk/ Liquid) & the sailing route
- **Additional cost is also required (operating fee, charterage and so on)**
4. Poor Conditions and lack of accessibility of Infrastructure

- **A lack of logistic infrastructure**
  - Icebreakers are worn out. They need to be replaced with new icebreakers
  - A lack of airplanes for cargo and logistics enterprise in the NSR

- **Especially when the port Infrastructure is in poor condition**
  - Ports in the Arctic cannot provide inter – port services
  - Draft limitation make ports and harbors inaccessible for larger cargo ships sailing on the NSR

- **A lack of communication infrastructure**
  - Extensive hydrographic surveying, in particular the coastal areas.
  - Better real –time information concerning the operational environment.
  - Support of navigation as well as better communication in light of the increasing destination and trans Arctic traffic on the NSR

- **A lack of accessibility from hinterland**
  - Accessibility is most important to accumulate and concentrate cargoes
  - The ports of Arctic is mostly lack of accessibility of hinterland because of harsh environment and big investment
5. A Lack of Punctuality in Arctic Shipping

- **Punctuality is a key factor for commercializing Arctic shipping**
  - The lack of schedule reliability and highly variable transit times along the Arctic shipping routes represent major obstacles to the development of Arctic shipping (Humpert and Raspotnik, 2012).
  - The Factors are important and a major issue given that Reliability, Punctuality, and Predictability are currently afflicted.
  - The reason: the punctuality of Arctic shipping cannot be recognized, poor marine environment such as Arctic ice conditions, frequent snowstorm, etc.

- **Necessity of infrastructure on Arctic shipping traffic system**
  - In 18 September 2008, the Russia government approved the Russia Arctic Area Development Plan 2020. However, it lacks the Definite Plan for the Punctuality of Arctic shipping.
6. Insufficiency in the Disaster and Safety System

- **The Search and Rescue (SAR) situation in the Arctic is limited**

- SAR is particularly challenging in the Arctic due to the remoteness and long distances that are involved in responding to emergencies, as well as cold temperatures and sea ice conditions.

- There is also a lack of adequate shore side infrastructure & communications to support and sustain a SAR response of any significant magnitude.

- This includes lack of sufficient food, lodging and medical facilities.
6. Insufficiency in the Disaster and Safety System

- **Aeronautical and Maritime Search and Rescue in the Arctic**
  - The Arctic Council’s 2011 agreement on developing a joint SAR framework for the eight Arctic states is important.
  - In it, all Arctic states are committed coordinate assistance to those in distress and to cooperate with each other in SAR operations.
  - The Arctic states agreed upon their respective areas of SAR responsibility and on promoting the establishment, operation and maintenance of an adequate and effective SAR capability within their areas of responsibility.

Source: gCaptain.com
7. The Necessity of Protection on the Environment

• **High Risk on Arctic Oil Pollution**
  - The Arctic's extreme weather and freezing temperatures, its remote location and the presence of moving sea ice severely increases the risks of oil drilling, complicate logistics and present unparalleled difficulties for any clean-up operation (GreenPeace)
  - Scientists indicated that oil spilled in Arctic waters may prevail for more than 50 years before the natural elimination processes makes it disappear

• **Agreement Cooperation on Marine Oil Pollution Preparedness and Response in the Arctic (2013)**
  - The objective of this Agreement is to strengthen cooperation, coordination and mutual assistance among the Parties on oil pollution preparedness and response in the Arctic in order to protect the marine environment from pollution by oil

Source: GreenPeace
8. The Necessity to Protect any Association on the Arctic Human

- **The System for the Participation of the Arctic Human & Indigenous People**
  - It is important to conserve the Traditions and Customs of the Arctic Human & Indigenous Peoples to understand the Arctic & Arctic’s Science
  - In 1996, the Arctic Council accepted the Association of Indigenous Minorities of the North, Siberia & the Far East of the Russian Federation
  - This announcement guaranteed the Participation of Indigenous Peoples of the Arctic, such as the Arctic economy-Society Development, Sustainable Arctic Development, Health, Cultural Welfare, etc

*Source: Arbour L, Parkinson A, Kulig JC., Human health at the ends of the earth (2010)*
IV. Implications
1. Suggestions

- The commercializing arctic shipping has essential factors as follows

  - Icebreaker Supply
    (The inadequacy of the icebreaker supply)

    - Effective system to use icebreakers
    - Build icebreakers using foreign capital

  - Europe-Asia Cargo
    (imbalance)

    - Find other cargo categories
    - Find different biz model
    - Improvement of accessibility
    - Development of Port cities

  - Cargo Tariff
    (Expensive)

    - Setting comprehensive cargo tariff for the commercial use
    - Establishing arctic development bank

  - Infrastructure of Arctic
    (A lack of infrastructure)

    - Establishing arctic development bank
    - Constructing logistics system on the multi-government cooperation
1. Suggestions

- **Punctuality of Arctic Shipping (Uncertainty)**
- **Disaster and Safety System (Adverse Natural Condition and Lack of Infrastructure)**
- **Protection of Environment (Increasing High Risk)**
- **Association of Arctic Human (Need more Association of Arctic Human)**

**Construct port infrastructure**
- **Stability of Navigation**
- **Plentiful cargoes**

**Understand Arctic natural condition**
- **Construct safety system by law**
- **Sharing system of Arctic information**

**Establish the environmental protection laws**
- **Set the protecting environment system**

**Guarantee of human right**
- **Making communication channel between user and indigenous people**
2. Concluding Remarks

- For commercializing arctic shipping, we need to solve or establish the essential factors.

- In short term, we focus on stability of navigation, predictability and environmental stability.

- In mid term, we focus on economic feasibility based on advanced technology, logistics infrastructure and urbanization.

- Especially, establishment of Arctic governance system, comprehensive law and multi-development organization(bank) is essential for sustainable use of NSR.
THANK YOU

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