Sustainable Transport and Green Logistics in Korea

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**<Education Background>**
- University of Wales, Cardiff (U.K.), MPhil, Ph.D.
- Korea Maritime University, BSc. MSc. Ph.D.

**<Research Background>**
- Shipping Management
- Port Logistics Systems
- Logistics Policy
- Logistics Technology
Battling the Climate Change Worldwide

International efforts to mitigate the climate change

- Rio Summit (1992)
- Kyoto Protocol (1997)
- Bali Roadmap (2007)
- Copenhagen Climate Summit (2009)

What changes need to be made to the logistics sector of Korea?

- Green Logistics System
- Supported by
  - Basic Act on Low Carbon and Green Growth
  - Green Growth Plan for 5years
  - Sustainable Development of Transportation & Logistics Act
  - Basic Logistics Policy Act
Impending Problems in Logistics System

**Phenomenon**

- Lack of linkage between international and domestic logistics
- Road-dependent transportation structure
- Lack of strategies to environment-friendly/green growth
- Decentralization of logistics information and lack of technology development
- Lack of linkage between and integration of logistics bases and transportation methods
- Increased use of metropolitan harbors for exported and imported cargo due to increased trades with China
- Dispersion of policy/research functions

**Problem**

- Isolated logistics system
  - Increase logistics cost
- Delayed transportation and increase cost expected due to future excessive capacity for road.
- Increased environmental cost
  - Urgent need for conversion into environment-friendly logistics system.
- Decreased logistics efficiency following increased time and expense due to unnecessary overlapped connection
- Decreased efficiency/competitiveness due to decentralized logistics systems
  - Transit of exported/imported cargo to Chinese harbors possible
  - Decrease harbor hub function

Intermodal Transport & Green Logistics System
Korea Green House Gas Emissions

Domestic GHG emissions

- 506 million tons in 2005
  - 220% increased compared to 1990
- 716.9 million tons in 2020
  - 316.9% potentially going up compared to 1990
  - 164.5% potentially rising compared to 2001

GHG emissions in transportation

- 98.2 million tons (share: 20%)
GHG emissions: Korea vs. other countries

Transportation Share

- In Korea, transportation sector’s contribution to GHG emissions is less compared to other OECD countries in terms of percentage share.
- However, per energy consumed, transportation sector of Korea produces more greenhouse gases.

Source: SourceOECD

Transportation Share in GHG Emission(2006)

CO2/TOE

Source: SourceOECD
GHG emissions: Korea vs. other countries

- Per person, transportation sector of Korea generates less greenhouse gases than other OECD countries.
- However, per transportation sector’s GDP, transportation sector of Korea produces high level of greenhouse gases.

Short-term Economic Growth and its Effect on GHG emission
2020 Korea GHG Emissions in Transport Sector

- 2020 GHG Emissions for each Mode
  - Private Passenger Vehicles: 66.56%
  - Freight Vehicles: 33.44%

<table>
<thead>
<tr>
<th>Group</th>
<th>Road</th>
<th>Railway</th>
<th>Domestic Marine</th>
<th>Air</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>98,421</td>
<td>1,405</td>
<td>3,424</td>
<td>18,050</td>
<td>121,300</td>
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<tr>
<td>Passenger</td>
<td>64,972</td>
<td>1,072</td>
<td>249</td>
<td>14,440</td>
<td>80,734</td>
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<tr>
<td>Freight</td>
<td>33,449</td>
<td>332</td>
<td>3,174</td>
<td>3,610</td>
<td>40,566</td>
</tr>
</tbody>
</table>

- Major GHG Emission Factor for Transport sector
  - **Road factor**: Passenger(80.5%), Freight (82.5%)
# Korea’s GHG Reduction Target and Scenario

<table>
<thead>
<tr>
<th>Korea’s GHG Reduction Target</th>
<th>Korea’s GHG Reduction Scenarios</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2008. 07 G8 Summit</strong></td>
<td>• Promise to Set Korea’s GHG Reduction Target</td>
</tr>
<tr>
<td><strong>2008. 09 Analysis</strong></td>
<td>• Analyze the GHG emission reduction potential</td>
</tr>
<tr>
<td><strong>2009. 07 G8 Summit</strong></td>
<td>• Announce Korea’s voluntary target-setting on August, 2009</td>
</tr>
<tr>
<td><strong>2009. 08 Announcement</strong></td>
<td>• 3 Scenario Reduction Target • 21%, 27%, 30% from BAU</td>
</tr>
<tr>
<td><strong>2009. 11 Final Announcement</strong></td>
<td>• Final GHG reduction Target • 30% from BAU(2009.11.17)</td>
</tr>
</tbody>
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**Scenario 1**
- (21% ↓ from BAU)
- Cost Effective Policies & Technologies
  - Green-home&building
  - Low carbon & efficient transportation system

**Scenario 2**
- (27% ↓ from BAU)
- Pay the international standards of GHG Reduction cost
  - Reduce Fluoric Gas Usage
  - Hybrid Car
  - Supply of Bio-fuel

**Scenario 3**
- (30% ↓ from BAU)
- The toughest adoption level set for the developing countries
  - Green Car: Electric & Hybrid car
  - Cutting edge & High efficient Product

2020 Korea GHG Reduction Target in Logistics Sector

Transport Sector: 33~37% ↓ from BAU

- Logistics Part: 7 mil CO₂ ton
- Private Passenger and Public Transit Part: 14.5 mil CO₂ ton
- Green Car, Bio-Fuel Supply, High Standard on Fuel Efficiency: 27 mil CO₂ ton

Total: 569 million CO₂ ton (30% ↓ from BAU)
Logistics activities & Green logistics

Environmental Cost in Logistics

- Investigate external cost impact on logistics
  - Climate change
  - Air pollution
  - Noise
  - Vibration

Green logistics

Definition
- Improves corporate value, considering ripple effect associated with environment, in the process of logistics activities.
- Considers both environment and corporate management at the same time.

Expected Effect
- Green Supply Chain, along with reduction in logistics cost as following downturn in energy consumption
Area of green logistics

General logistics

Providing materials

Raw materials acquisition → Inbound logistics → Transformation → Outbound logistics → Marketing → After-sales service

Discharge of environmental pollutants

Reverse logistics:
Reduction, Reuse, Recycle
Policy direction:
Green Logistics & Enhancement of Efficiency

- Corporate logistics cost & Environmental cost
  - Focusing on environmental strategies VS. Enhancing logistics efficiency & Reducing cost
    - Thought: Highlighting green logistics, focused on improvement of corporate image ➔ Causing the increase in corporate logistics costs

- Focus: Improving logistics from the environmental perspectives
  - Reducing environmental burden ➔ Raising economic efficiency ➔ Establishing green logistics system
  - Coming up with logistics strategies to deal with Green Supply Chain
    - Rationalizing stock, Enhancing green efficiency and Making space allocation efficient
  - Transforming the logistics industry into the high-valued industry of knowledge and service
Green Logistics Projects

- Modal-Shift
  - Railway Freight Transport
  - Domestic Marine Freight Transport

- Collaborative Green Logistics System & Logistics Infrastructure
  - Expansion of 3PL Service
    - Establishment of Regional Logistics Infrastructure + Collaborative Logistic system
  - High Freight Load Factor Service

- Green Logistics Facility and Vehicle/Equipment
  - Green Freight Vehicle
  - Green Logistics Technologies and Information system
Intermodal Freight Transport - Modal Shift

Activating Rail Freight

Current Status & Future Prospect
- Rail in domestic volume of freight transportation amounted to 42 million tones, 2.6% in transportation share. (2021, 60 million-ton)
- According to Ministry of Land, Transportation and Marine time affair, rail (53% as of late 2007) and double-track line (43%) will rise up to 73.1% and 64% by 2015 respectively

SERVICE
- Diverse express delivery service
- Public freight sector to Private business
- Providing Integrated Freight transport services
  - Rail&Sea&Rail

SUPPORT
- Reviewing financial support for Modal Shift cases from truck to eco-friendly ones
- Developing DMT(dual mode trailer) system for stimulating railroad logistics
- Developing technologies to raise efficiency in loading and unloading
Intermodal Freight Transport - Modal Shift

Activating Maritime Freight

Current Status & Future Prospect

• As of 2005, marine transportation in domestic freight transportation amounted to 114 million tons, 7.1% in transportation share.
• In 2021, it will transport 195 million tons, accounting for 8.4% in transportation share, 1.3 % increased from 2005

SERIVICE

• Developing Coastal Shipping Service for inland transportation
  • Establishing delivery service for items (JIT)
  • Short-and-long distance service considering regional item
  • Integrated Freight Transport service

SUPPORT

• Expanding financial support
  • Expanding oil subsidies and making an exception of corporate and income taxes to coastal ship in order to promote coast shipping
  • Supporting to help develop eco-friendly ships
  • Offering incentives in exchange of feeder service of coastal containers
  • Developing technologies to raise efficiency in loading and unloading
Collaborative Green Logistics System

Effect
- Logistics cost reduction
- Seamless supply of logistics service and maintenance

Support Plan
- Collaborative integrated cargo terminal
- Collaborative logistics facilities
- Improvement in delivery efficiency:
  Vehicle Routing and Fleet Management
- Growing 3PL industry

Implementing Collaborative delivery, shuttle delivery, and distribution in line with logistics facilities

Advancement in Fleet Management

Collaborative Logistics

Collaborative Delivery system
Collaborative Storage
Collaborative Information Processing
Logistics Infrastructure-IFT

- 5 Regional Integrated Freight Terminals (IFT)
  - Current Status
  - Meaning
    - Efficiency in joint logistics system and distribution and standardizing logistics
    - Provide logistics information customized for suppliers and consumers
  - Expected Effect
    - Reducing logistics cost and GHG emission thanks to efficient freight collection, mass & intermodal transportation and loadage improvement
    - Reducing the number of trucks on road in cities thanks to decrease in private trucks use and intensive connection to alternative transporting mode & sharing of transportation
    - Reducing energy consumption by saving lands where logistics facilities
Green Logistics POLICIES

- Incentive Policy
  - Green Logistics Corporate (management) Certification
- Pricing Policy
  - Green Logistics Business Partnership
  - Transport Pricing Policy; Private Vehicle tax, Road use tax, Oil tax, Congestion tax, etc
  - Energy Negotiated (or Voluntary) Agreement
- Obligation Policy
  - High Standard on Fuel Efficiency for Road Freight Vehicle
Impending Challenges for Green Logistics in 2010

Support for Transferring into Green Logistics
- Special treatments such as financial subsidies and loans
- Modal-Shift agreement for rail and maritime freight
- Equipments for the intermodal freight transport

Integrated National Information Network
- Establishing integrated information center of national logistics
- Establishing logistics base of information system

R&D Project Support
- Low carbon emission transporting and operating equipment
- Green logistics facilities and vehicles
- Safety and security

Incentive Policy
- Green logistics certification program
- Incentive program for green logistics project
- Green logistics business partnership meeting
Structure of Certification System

System Structure

- Green Logistics Corporate (management) Certification
- Green Logistics Business Partnership Project

Corporate Certification

- Establish guidelines for management, implementation, operation and education for reduction of
  - Greenhouse gas emission
  - Energy consumption
  - Air pollutant and contaminants
- Submit how they put the guidelines into practice.

Partnership Project

- Build cooperation between cargo owner and logistics company >> New GL project
- Suggest business partnership project
  - Effect on Greenhouse gas reduction
  - New or Social investment Project
  - Ripple Effect
Problem vs. Improvement Direction

**Problem**
- Awareness of certification system
- Superficial System
- Lack of professional man power
- Lack of linkage to other domestic environment-related certification systems

**Improvement**
- Establish as supporting policy rather than restricting regulation
- Establish easy and simple certification system
- Practical certification system and Active Promotion
- Linkage to existing systems
Green Logistics Certification System

- **Reorganization for green logistics system**
  - Environmental directives, implementation mechanism and employee training regarding environment

- **Monitoring System**

- **Introducing low emission car**
  - Goal and response setting for low emission car and diesel car suitable for the latest regulation / Fuel management

- **Eco-drive**
  - Quantitative goal setting for fuel efficiency
  - Implementation system for eco-drive / Idling Stop
  - Low carbon emission equipment supply

- **Vehicle Check**
  - Carrying out check and repair based on the eco-friendly standard, along with implementation for check and repair schedule/proper and legal check and repair process based on car condition

- **Preventing, handling and recycling scrapped vehicles and tire, wastes**

- **Green logistics projects**
  - Modal Shifts, Collaborative shipping, Consolidating logistics hubs, Efficient trucking

- **Green logistics facilities & equipment**
Support Mechanism

Support for Certification Program

- **Short-term >> Administrative Support**
  - Consider relief in construction regulation for development of logistics facility in Seoul metropolitan area
  - Grant priority to logistics facility building and construction authority

- **Long-term >> Financial Benefit**
  - Practical tax benefit and financial advantage
  - Plan to expand tax support by linking to similar certification systems in related authorities

Support for Project

- **Direct Financial Aid by Government (Subsidy)**
  - **Short-term**
    - Implement survey/research and trial project using the budget of the Ministry of Land, Transport and Maritime Affair
  - **Long-term**
    - Expand subsidy by using green growth fund based on the Act of Green Growth
Automated Container Transport System (AUTOCON®)

- No CO2 emission green transport system using Linear Induction Motor (LIM)
- An infinite loop of a sequence of container wagons, like a conveyor system
- Simple and cheap infrastructure is available since the live load of the AutoCon is 1/3 of the normal railway system
- Unit-load system of ISO container
- High efficient non-stop system using only the inertia and the mechanical principle
- Solar power self generating system
- Unmanned automated cargo handling system
- High-stack storage system
Automated Container Transport System (AUTOCON®)

- **(Background)** Total container throughput of Busan port in 2011 is estimated as 16.09 million TEU and the ex/import cargo volume occupies almost half of them (7.61 million TEU). Among the ex/import cargo volume through the Busan port, the cargo flow on the Seoul-Busan Axis-bound for Seoul metropolitan area, Chungcheong Province, Gyeongbuk Province - takes up 38 million TEU per year.
- **(Travel Benefits)** A new highway construction cost: US$ 8.06 billion
- **(Energy Benefits)** Fuel saving of the container trucks US$ 200 million/yr
- **(GHG Saving)** 1.1% level of the roads, 11.2% level of the railways
  * AutoCon 2.84 CO2(g/ton kilometer), Road 264.2 CO2(g/ton kilometer), Railway 25.4 CO2(g/ton kilometer)
Q & A
Thank you!