Policy guidelines and action plans for sustainable and resilient port development in Asia and the Pacific

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Multi-functions of Ports and Major shipping routes in the world

Proposing a future port model: 6th Generation Ports as Smart Ports

Understanding of key factors for Smart Ports

Policy guidelines and action plans for short-term projects

(UNESCAP on-going research: “Facilitating Sustainable and Resilient Port Development to Support Sustainable Maritime Connectivity in Asia and The Pacific”)

Multi-functions of Ports

- Node of multimodal transport systems:
  - Sea-River integrated transportation system.
  - Sea-Rail multimodal transport system.
  - Seaport and Dry port (Inland Port) by land and river transport.
- Sustainable connectivity of ports for international trade.
- Enabler of economic growth of national and regional economy.
- Node of value chains in global supply chain system in association with global production lines.
- A port as an organic system, i.e. sustainable and resilient system.
Green actor with pro-active measures to reduce GHG gas emissions in ports (by International Maritime Organisation (IMO) 2020 Sulphur cap regulations, effective from 1 January 2020).

IMO MARPOL VI
IMO INTERVENTION Convention 69
IMO London Convention Protocol 96

GREEN PORT INITIATIVES OF IMO

Green port initiatives aim to reduce air emissions from ships (plus other environmental aspects).
Hub ports and interlining T/S and relaying ports along the main container shipping routes
Position of ASEAN and the Pacific in major shipping routes in the World

Source: Modified Lee (2016, p.60)
Evolution Path to the Fifth Generation Port (5GP) as “Dynamic Customer-Centric Community Ports”

5GP was proposed by Flynn and Lee (2010) and tested by Lee and others in 2010, referring to 1st generation ports to 4th GP by UNCTAD.

Source: Flynn and Lee (2010); Modified by Lee (2015)
Major points to ponder for container port development

- Efficient and competitive port
- Safety Port (natural disasters, terrorist attacks, pandemic)
- Sustainability/Resilience
- Green Port
- Smart Port
- Port/City interface

- How to put all of them into one box together?
- How to integrate/harmonize them together?
Some questions to ponder for container port development

Priority and Causality Issues
between Sustainability/Resilience and Smart Port

Sustainability/Resilience  >  Smart Port
VS
Sustainability/Resilience  <  Smart Port

Questions to ponder:
• Do both have causality to improve port competitiveness?
• Who will be a leading actor to implement both?
• What is the role of a central government in implementing both?
• Which port development policy driver (i.e., Anglo-Saxon, European, and Asian Port Doctrine) will be chosen by central governments?
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<tr>
<th>Aspects</th>
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<th>5GP</th>
<th>6GP</th>
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<td>RFID or other IT applications</td>
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<td>(Port/City interface as an organic whole)</td>
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<td>Immediate response system</td>
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On the definitions of the features and criteria of 5GP and 6GP, see the back-up slides.

Future Port Model: **Sixth Generation Ports (6GP) as Smart Port (2020)**

**SMART PORT (6GP):**
- Applying fusion technology*
- Dynamic Smart-Centric Community Port with economies of flow, economies of connections, and economies of fusion technology

**Dynamic Customer-Centric Community Port (5GP):**
- Integrated to port user’s multi-faceted business requirements & port stakeholder’s needs

**Globalized e-port**
- Global information flow & standards

**SCM port** (bilateral e-ports)
- 2-way flow of information

**Logistics port**
- Multiple port services

**Cargo port**


1. Exploring the Stakeholder’s Different Priority and Needs:

» Role of Central government and Local government (e.g., Port development policy).
» Port authority (e.g., port governance, lease contract).
» Terminal operators’ strategic behavior (pricing & marketing).
» Shipping Liners’ oligopolistic power (*Strategic Alliances*).
» Port users’ needs (e.g., shippers, 3PL/4PL, land/river transport carriers).
» Community (Citizens).
» Legislation of International organizations, e.g., IMO.
Way Ahead for Smart Ports (6th Generation Ports)

2. Analyzing Market Power of Strategic Alliances: the impacts of bigger ships and the oligopolistic power

- **NEW WORLD ALLIANCE**
  - MOL (Japan)
  - APL (USA)
  - NYK (Japan)

- **GRAND ALLIANCE**
  - P&O Nedlloyd (UK/Netherland)
  - Hapag-Lloyd (Germany)
  - NYK (Japan)

- **TRICON**
  - Hanjin (S. Korea)
  - Cho Yang (S. Korea)
  - UASC (UAE)

- **SINO-JAPANESE ALLIANCE**
  - COSCO (China)
  - K Line (Japan)

- **G6**
  - MOL (Japan)
  - APL (USA)
  - NYK (Japan)
  - Hyundai (S. Korea)
  - K Line (Japan)
  - Yang Ming (Taiwan)

- **NCKYH-THE GREEN ALLIANCE**
  - COSCO (China)
  - Hanjin (S. Korea)
  - K Line (Japan)
  - Yang Ming (Taiwan)

- **2M ALLIANCE**
  - Maersk Line (Denmark)
  - MSC (Switzerland)
  - CMA-CGM (France)
  - Evergreen (Taiwan)

- **Ocean Three ALLIANCE**
  - CMA-CGM (France)
  - CSCL (China)
  - UASC (UAE)

- **2M ALIANCE**
  - Maersk Line (Denmark)
  - MSC (Switzerland)
  - Hyundai (S. Korea)
  - Ocean ALLIANCE
  - COSCO
  - CSCL (China)
  - OOCL (Hong Kong)
  - CMA-CGM (France)
  - Evergreen (Taiwan)
  - THE ALLIANCE
  - Hapag-Lloyd (Germany)
  - ONE (Japan)
  - Yang Ming (Taiwan)

80% of container carrying capacity of the global carriers (owned and chartered fleet) in 2018.

Choice of Port Development Policy Drivers

» **Anglo-Saxon Doctrine** (Bennathan & Walters, 1979)
  - Market function & laissez-faire transfer all the port construction costs to port users; Port charges are high. No hub container port in UK.

» **Continental (European) Doctrine**
  - Port as a part of the social infrastructure of a region.
  - Port (end) user’s investment with partial subsidy from local government.

*The above two cannot explain remarkable success of port development in Asia.*

- **Asian Port Doctrine** (Lee & Flynn, 2011)
  - Port as social overhead capital and public goods.
  - The leading role of Central government for port infrastructure and connecting transport infrastructure.

- **China, South Korea, & Singapore** followed this doctrine: major hub ports in Asia.
3. Applying Asian Port Doctrine for building Smart Port

A New Paradigm for Port Development Policy

Execution

Economic theory; policy alignment

Economic actor: State as port Operator & Economic Facilitator

Asian Port Pricing

Asian Port Success

Ideology, Rationale & Strategy

• Gerschenkron model
• Infant industry argument
• Public enterprise approach
• Administered pricing

• Cross-subsidization
• National economic security
• SOC and Infrastructure
• National welfare

Geo-political factor

Globalization: Manufacturing centre

Source: Lee and Flynn (2011)
4. Implementing “central government’s positive intervention”

- “Invisible hands” do not always work.
  - Case 1: For example, since Global Financial Crisis in 2008, government subsidy for aviation and shipbuilding industry in Japan, US, and France, of which economies are dominated by market functions.

  - Case 2: COVID-19 pandemic control performance: China vs US/Europe (government failure or market failure?)

- Market Failure vs Government’s positive intervention
5. **Recognizing smart port/city as an organic system.**

- Port/City should go hand in hand for the container port development.
- Port/City should have common platform in the context of SMART, in particular COVID-19 pandemic case.
- Diversification of the container port functions for city community (e.g., waterfront port development, free trade zone, and etc.)
The recommendations, policy guidelines, and action plans for sustainable and resilient port development in Asia and the Pacific are based on the short-term agenda and tasks proposed in the report entitled “Facilitating Sustainable and Resilient Port Development to Support Sustainable Maritime Connectivity in Asia and The Pacific (Phase 1),”

- to improve port infrastructure in the member States.
- to help donor and host countries, private sectors, and UNESCAP make sound and efficient decision on port infrastructure investment, port governance, and port development policy drivers.
An installation of *alternative maritime power (AMP)*

- *AMP* is one of the feasible short-term projects in collaboration with donor countries.
- *AMP* is applicable at initial stage or small and government owned vessels and harbor service vessel.
- Immediate response to **IMO 2020 Sulphur cap regulation** effective from 1 January 2020.

On-line education and training programs development, *considering restriction of people mobility caused by COVID-19 pandemic*

- UNESCAP should play a leading role to develop on-line training and education programs.
- Incentive policy for trainees who complete the program and help deal with skills shortages issues, talent retention and workforce satisfaction.
- A short-term project is feasible short-term project in collaboration with donor countries and UNESCAP.

Life-long learning and training system development at the workforce.

- The on-line training program should **not be just a “one-time” event**.
- A comprehensive and sustainable education program, i.e., tripartite scheme, **GUI* Model**, consisting of
  1) **Government** (in Asia and The Pacific);
  2) **University**, including government think-tanks; and
  3) **Industry**, including shipping, port and logistics companies
- **GUI* model** as ongoing education training system to be developed by UNESCAP in collaboration with donors and the member States.

Note: *GUI means “highly valued” in Chinese pronunciation.*

Positive intervention of central governments in the design, development and implementation of container port development.

- Standing committee presided by Presidents and/or Prime Ministers
- The members comprising of representatives of relevant government departments, domain experts, and representative of city council/port authorities,
- A one-stop service system to mitigate potential conflicts and reduce the red tape imposed by rigid and/or redundant regulations.

A better understanding of port pricing mechanism

- Understanding of port pricing mechanism helps increase port performance and port competitiveness without extra port infrastructure investment.
- Training staff to learn knowledge of port financing scheme and market behavior global terminal operators, and liner carriers.
- For example, cross-subsidization is effective pricing tool to solve conflicts between old terminal and new terminal and to find alternative way to build new terminals.
Conditions given – Needs – Prerequisites – Inputs (CNPI) Strategy for container port development.

- We should carefully ascertain the socio-economic-political system in a host country well in advance of the port infrastructure investment.

- The member States should support and encourage research to examine the status-quo, bottlenecks, and problems faced by their container ports, i.e., from the perspective of port financing user (a host country).

Post-auding system of the container port development

- Have the functions of the port worked as well as planned?
- Has the port contributed to meeting the benefits and needs the country expected?
- How much has the port contributed to achieving economic benefits from the port development?
Building **Total port operation system (TOS) which is tailored for small medium-sized ports:**

- Two main functions that most small medium-sized container ports should provide are *operation planning for optimization and real-time operation control*.
- Identify and explore *the port efficiency problems* in collaboration with UNESCAP and expert group.
- Increasing port efficiency and performance by developing *tailored terminal operation systems* for small-medium sized ports.
- It is better to apply **TOS and Single Window System** for the same port to maximize synergy effects between the two systems.

*We should carefully ascertain the socio-economic-political system in a host country well in advance of the proposed short-term projects as well as port infrastructure investment.*
References


Back-up slides
## Evolution Path to the Sixth Generation Ports (6GP) as Smart Port

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<tr>
<td>Service</td>
<td>Service quality</td>
<td>Reliability</td>
<td>Productive, quality and reliable services provided for port users, minimizing their uncertainty</td>
<td>Reliable service as agreed and announced, which is provided for port users, minimizing their service uncertainty</td>
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<td></td>
<td></td>
<td>Efficiency</td>
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<td>Technology</td>
<td>Communicatio system</td>
<td>Single window system</td>
<td>Development of single window system integrating port MIS and logistics EDI network system using Information technology, and Nano-technology and Bio-technology</td>
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<td>Applications</td>
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<td>Smart port technology platform</td>
<td>Application level of AI, Blockchain, smart computing, big data</td>
<td>Port establishes smart port platform to utilize AI and Blockchain platform and applies them to port functions in association with port service users; the technologies are permeated into the platform in the context of smartness. Digital transportation in shipping and port communities.</td>
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<td>Symbiosis of port and city (Port/City interface as an organic whole)</td>
<td>Coordination of port &amp; city development; Integrated and harmonized cooperation</td>
<td>Port and public authorities coordinate port and city development for sustainability</td>
<td>Port and public authorities coordinate port and city development for sustainability. Smart ecosystem having extension of smart space from the port to the larger community, i.e. port/city interface, which should be treated as an organic whole - as a network, as a linked system.</td>
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<tr>
<td>Resilient system</td>
<td>Immediate response team</td>
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<td>Resilient system with immediate response team, regular training, professional manpower and proactive actions responding to risks and accidents (including natural disasters and pandemic disease like COVID-19) at the port in terms of operator’s responsiveness</td>
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<tr>
<td>Green environment</td>
<td>Integrated development</td>
<td>Integrated development of technical system to reduce gas emission and pollution with incentive pricing system</td>
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<td>Green port development</td>
<td>Friendly environment which means the sustainable measures will benefit the port city</td>
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<td>Maritime cluster management</td>
<td>Creative financial incentives and social infrastructure to attract ship owners and cargoes by creating jobs and value-added in the port city and adjacent cities</td>
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<td><strong>Hub</strong></td>
<td>Globalized hub link</td>
<td>Port infrastructure</td>
<td>Accommodating mega carriers without any technical limitation to improve port efficiency</td>
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<td>Port connections</td>
<td>Connectivity to other ports including feeder service with major carriers’ callings</td>
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<td>Logistics hub</td>
<td>Inland connections and Value-added function</td>
<td>Logistics chain for high value-added in association with free trade zone or logistics complex</td>
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<td>Governance system for a smart port</td>
<td>Leading player’s status</td>
<td>This is concerned with who is a leading player initiating to establish the platform of a smart port and govern it: private sector or public sector (local government or central government).</td>
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<td>Governance level among stakeholders in a smart port platform</td>
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