Port Development of Singapore

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Director (Engineering & Information Technology)
From Trading Post to Global Hub

Pre-Colonial
- Known as Temasek
- Trading port serving regional network covering the Malay region including Riau Archipelago extending to south China in the 14th Century

1819-1890s
- Colonial trading post
- Free trading area

1900 – 1960s
- Expansion of port
- Export of raw materials from Malaya
- Import for manufacturing & construction industries

1970s-1990s
- Containerisation
- Major transhipment hub

2000s-present
- Developing IMC - ecosystem of maritime services

Maritime Future
- Next generation port

www.globalpsa.com
'Singapore: A Portrait of a Port (PSA)
'Singapore: Silk road of the Sea'
Dr John Miksic

From Trading Post to Global Hub
Global Hub Port and International Maritime Centre – Twin Pillars of Maritime

**GLOBAL HUB PORT**
- Port Operations
- Port Services

**SEA TRANSPORT SECTOR**
- 7% of GDP
- 170,000 employment

Significant linkages and spin-offs to maritime and related economic sectors

**INT’L MARITIME CENTRE**
- Shipping
- Maritime Services

**CHALLENGES & OPPORTUNITIES**

**Cyclical challenges**
e.g., weak trade growth, excess shipping capacity

**Structural shifts**
e.g., rise of mega alliances, intensifying competition from other ports, alternative trade routes

**New opportunities**
e.g., rise of intra-Asia trade flows, shifting patterns in supply chains, new / disruptive technologies
Opportunities for Growth Amidst Structural Shifts Within Global Maritime Industry

Shifting trade flows to Asia

- **EASTBOUND**
  - YOY ↑ 5.0%
- **WESTBOUND**
  - YOY ↑ 3.4%

Far East – Europe & Far East – North America 2016 Container Trade

Shift towards mega-alliances

- **Early 2017**
  - 3M Alliance
  - Ocean 3
  - Gl. Alliance
- **Today**
  - 3M Alliance
  - Ocean Alliance
  - THE Alliance

Increasing competition amongst ports

- Increased port capacity & competition for volumes along the Straits of Malacca and Singapore
- Expansion of gateway ports in Southeast Asian region
- Increased port cooperation between neighbours
- Port of Rotterdam rolls out digitalisation strategy

Increasing container volumes through Singapore

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Increased port cooperation between neighbours
Technology Advancements Driving the Future of Shipping & Ports

- **New Manufacturing Process**
- **Increasing proliferation of mega vessels**
- **Autonomous Vessels**
- **Automated Port**
- **Digital Connectivity**
Transforming the Maritime Industry

Sea Transport ITM

NGP2030

IMC2030

1. Expand and deepen the maritime cluster
2. Strengthen inter-linkages and network effects
3. Develop a vibrant maritime ecosystem and promote digitalisation
4. Develop a multi-skilled maritime workforce with a global mindset
5. Establish Singapore as a global maritime standard bearer
Creating Self-Contained Regions in Singapore

- Self-sufficient regions to support residents' needs and economic growth, while remaining well-connected to one another.
- Unique positioning and vision for each hub.
Intelligent Port

**Digital Platforms**
- Digital platforms for port and maritime services
- Blockchain and cybersecurity for maritime supply chain

**Intelligent Cargo Terminals**
- Digital technologies
- Automation of terminals
- Connected community systems

**Autonomous Systems & Robotics**
- Future-ready Port interfacing with smart/autonomous vessels
- Drones for surveillance, inspections, or delivery of goods to ships

**Smart Harbourcraft**
- Automation of bunker barges, launches, ferry and tug boats
- Remote monitoring & diagnostics and condition-based maintenance

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**Chronology**
- 2017: Semi Automated Cargo Terminal & AGV Trials at PPT
- 2021: Intelligent & Automated Cargo Terminal at Tuas
- 2025: Autonomous Operations in Port
- 2030: Fully Digital Port
Automation to Boost Efficiency

**Next Gen Container Port (PSA)**
- Development of Fleet Management System for 30 AGVs, including 22 full electric AGVs
- Development of automated coning and deconing process using robotics
- Trial-use of UAVs to detect cracks and corrosion in inaccessible areas of cranes

**Next Gen Multipurpose Port (Jurong Port)**
- Test-bedding of first batch of sideloaders to replace forklifts and flatbed trailers
- Development of automated control systems for screw unloaders
- Development of Just-in-Time system to coordinate cargo and lighter information
**Safe and Secure Port**

### Maritime Sense Making System

- Detect anomalies for prohibited area entry, illegal bunkering
- Predict the vessel arrival time more accurately

### Next Gen Vessel Traffic Management Systems

- Predict congestion hotspots
- Detect potential collision
- Assist vessel passage planning for ships

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![Diagram showing various components of Maritime Sense Making System and Next Gen Vessel Traffic Management Systems](image-url)
Efficient Port

JIT Planning & Coordination Systems
- Reduce ship’s waiting time and delays at port
- Optimise resource deployment

Maritime Single Window
- Streamline submission processes
- Allows a seamless and faster port clearance

Container Terminal
Bunkering
ICA
Singapore Customs
Pilotage
Ship Chandler
Garbage Collection

Maritime Single Window
- Single window portal for reporting & submission of all port-related documents for port clearance
- Greater interconnectivity among govt agencies, terminal operators, service and logistics providers

Benefits
- Reduce administrative burden & provide visibility on compliance status
- Increase quality and efficiency of service delivery
Sustainable and Community Oriented Port

Sustainable Port

Air Quality
• use of alternative fuels eg: LNG for harbour craft
• Battery-operated AGVs
• Electric quay cranes and yard cranes

Efficient Energy management
• solar energy
• waste heat recovery

Green Buildings
• green mark certified with eco-friendly features.

Community Oriented Port

• Amenities, visitor centre/gallery,
• Green and open spaces, events, activities to engage the community
• Multiple transportation modes for better connectivity
Visioning Tuas Beyond a Mega Container Port

An integrated facility supporting • Port • Logistics • Solutions

- **Best-in-Class Productivity** • Next-Gen Intelligent Ops and Planning to ensure sustainable high ops performance
- **Complementary Adjacencies** • Close proximity to supporting infrastructure to simplify cargo flow
- **Integration of Supply Chain** • Use of digital platforms (cloud technology) and E+ solutions (block-chain) to allow seamless and secured transfer of information between all parties
For Information