Shipbuilding in Japan and Challenges on Industrial Policy

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Background:

1: Historical Review of shipbuilding industry: How the innovation occurred

2: Present and future situation of Japanese shipbuilding
Historical Review of shipbuilding industry

'0000GT (Completion, Dismantling),
'million GT (World Seaborne Trade)

1940s
The WWII
> Mass production of standardized vessels

1950s
Increase of oil transport, and the 1956 Suez crisis
> Enlargement of vessels

1960s-1970s
Increase of seaborne trade
> Enlargement of vessels

1980s
Oil crisis
> Energy efficient vessels

1990s
MARPOL Double hull tanker, and specialized vessels, such as container vessels, PCC, RORO, Ore bulk carrier

2000s
LNG, eco-friendly vessels

(note) 1. Data Source: Lloyd's Register, United Nations, The Japanese Shipowners' Association
2. Ship Size Coverage: 100 Gross Tonnage and over.
Evolution of ships and its factor 1

Sailing vessel to Steam powered ship
The first steam-powered ship was built in France in 1783

Model of steamship, built in 1784, by Claude de Jouffroy

Italian full-rigged ship Amerigo Vespucci

From wooden hull to iron and steel hull
Aaron Manby, built in 1822 at UK shipyard, was the first iron steamship to go to sea.

WWII and Mass production of standardized vessels

Liberty ships
Eighteen US shipyards built 2,710 Liberty cargo ships between 1941 and 1945

Block construction
Prefabrication of deckhouses, double-bottom sections, stern-frame assemblies and bow units.

Welding
Grinding welding bead, SS George Washington Carver at the Kaiser shipyards
Evolution of ships and its factor 2

Increase of oil transport
Nearly 500 T2 tankers (mainly T2-SE-A1) had been built in the US from 1940 to 1945, and after WWII they were used for commercial purpose.

Length 162m
16,600 DWT
33-70 days per Ship for building

The Suez crisis and the larger scale of transportation
The Suez Crisis of 1956 forced to move oil around the Cape of Good Hope, and larger tankers were more favorable for owners.

In 1958, S.S. Universe Apollo, the worlds first 100,000 ton oil tanker, built in the NBC Kure, Japan

Increase of seaborne trade
Due to the enlarged world trade volume, the size of vessels became larger and the fleet number had been increased.

In 1979, Sea wise Giant, a ULCC supertanker, the longest and the greatest DWT ship ever built, was delivered.

Oil crisis
Due to the oil crisis in 1973 and 1979, more energy efficient ships had been increased.

In 1983, on Harriet-maru, a very energy efficient engine which achieved 50% thermal efficiency, and an advanced exhaust heat recovery system were installed.
Evolution of ships and its factor 3

MARPOL: Double hull tanker, and specialized vessels, such as container vessels, Pure Car Carrier (PCC), Roll on Roll off (RORO), LNG carrier

- In 1989, Exxon Valdez oil spill happened and IMO/MARPOL was amended to make it mandatory for new oil tankers to have double hulls and brought in a phase-in schedule for existing tankers to fit double hulls.

Other factors

- The first practical steamboat was built in 1802, the major engine have been shifted, reciprocating steam engines, steam turbine, and diesel engine.

Container

- ISO standards for containers were published between 1968 and 1970.
- Cargo carrying capacity has been increased rapidly in the 2000s.
- The steadily rising expense of fuel oil has prompted most container lines to adapt a slower, more economical voyage speed of about 21 knots, compared to earlier top speeds of 25 or more knots.
Background:

1: Historical Review of shipbuilding industry: How the innovation occurred

2: Present and future situation of Japanese shipbuilding
New orders by builder country

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Present and future situation of Japanese shipbuilding

Japanese Shipbuilding

Energy-saving ships

Competitive advantage in a wide range of products

Any types of ships

Offshore segments

Towards new and growing markets

Offshore wind energy

Installation and maintenance

Logistics hub

LNG Shuttle tanker

LNG carrier

Pure Car Carrier

Bulk Carrier

Traditional Line-up

Offshore
segments

Pure Car Carrier

Oil Tanker

Container Ship

LNG carrier
Japan’s maritime technologies cover wide areas, however…

Marine equipment

Green ship (energy saving technologies)

Marine research vessels and AUVs

FPSO, Offshore support vessel, LNG Tank

High Speed Vessel

Large Floating Offshore Structure (Mega Float)
Stagnating ship prices

![Graph showing trends in ship prices for different types of ships over time]
Japanese yen has been weakening against US dollar since the end of 2013. **Now is a good opportunity to buy Japanese high-quality eco-ships and energy-saving products!**

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**Exchange rate**

![Graph showing exchange rates between Yen/Dollar and Won/Dollar over calendar years 2000 to 2014.](attachment:graph.png)

- **101 Yen/Dollar (2014.5)**
- **1,027 Won/Dollar (2014.5)**

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Japanese yen has been weakening against US dollar since the end of 2013. **Now is a good opportunity to buy Japanese high-quality eco-ships and energy-saving products!**
Advantages and Challenges

1: Advantage

Eco-ships for all range of products

2: Challenges

1) Human resource development

2) Re-entry into offshore segments
Environment surrounding Eco ships and Energy saving products

Japan has taken a initiative in developing IMO regulations on CO₂ emission from ships

New IMO regulations adopted in 2011
- **Phase 0** 2013 ~ 14
- **Phase 1** 2015 ~ 19
- **Phase 2** 2020 ~ 24
- **Phase 3** 2025 ~

New ships shall meet the EEDI* requirement which will become stringent in phases until 2025.

(*) Energy Efficiency Design Index

Crude oil prices will rise due to increasing demand in developing countries and other reasons.

Growing demand for eco-ships and energy-saving products:

NOTE: Eco means both ecological and economical.
Japan’s Business and Government Initiative

➢ To meet the EEDI requirements in advance, Japanese industries have endeavored and been successful to develop new energy-saving technologies.
➢ Such technologies cover a variety of factors to generate considerable effects collectively.

Examples of Japanese industries’ research and development

- **Waste Heat Recovery System**
  - Waste heat recovery system

- **Next-generation Operational System**
  - Weather routing system

- **New Type Propulsion**
  - Conventional
  - New
  - High efficiency propeller
  - Air bubbles along hull

- **Propulsion**

- **Hull**

- **Engine**

- **Operation**

- **Reduction of Friction Resistance**
Japanese Advanced Eco-Ships

Achieving significant improvement of energy efficiency

**IBIS WIND**
(Sanoyas Holdings Corporation)

**Clipper Excalibur**
(Mitsui Engineering & Shipbuilding Co., Ltd.)

“SAYAENDO”
a series of new type LNG vessels
(Mitsubishi Heavy Industries CO., LTD.)

![CO2 Reduction per cargo unit: approx. 25%](chart.png)

- 100 (Conventional)
- 85 (With UST)
- 78 (With improved hull form)
- 75 (With improved wind resistance)
Japanese energy-saving products

**Engine**

- **UEC Eco-Engine**
  (Mitsubishi Heavy Industries marine machinery & engine CO., LTD.)

- **Dual fuel engine 6EY26DF**
  (YANMAR CO., LTD.)

- **Dual fuel engine DE28DF / MD36DF**
  (DAIHATSU DIESEL MFG.CO., LTD.)

**Paints**

- **A-LF-Sea**
  *-Ultra low Friction Underwater Coating System-*
  (NIPPON PAINT MARINE COATINGS., LTD.)

- **SEAFLO NEO SLZ**
  (CHUGOKU MAEINE PAINRS, LTD)

**Realization of ultra low friction.**

**Others**

- **GPX PROPELLER**
  (NAKASHIMA PROPELLER CO., LTD.)

- **VTI Turbochargers**
  (Mitsubishi Heavy Industries marine machinery & engine CO., LTD.)
Japan is back: Recovery in Japanese shipbuilding

JPY/USD exchange rate and export contracts received by Japanese shipyards

Yen appreciation
Yen depreciation
“Abenomics” effect
“Lehman Shock” effect
Recovery

World shipbuilding completions

CHINA
KOREA
JAPAN

Source: Clarkson Research Service

Green Growth adopted at OECD MCM meeting

OECD: Organisation for Economy, Cooperation and Development

Declaration on Green Growth
Adopted at the Meeting of the Council at Ministerial Level on 25 June 2009

Towards Green Growth report (2011)

“Green growth” means fostering economic growth and development while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies.

- Air and water pollution
- Climate change
- Water scarcity
- Resource bottlenecks
- Biodiversity loss

etc…
At the OECD Working Party on Shipbuilding (WP6), Japan proposed to modify the SSU* in view of allowing more flexible export credit financings for ships that have superior environmental performance (Green Ships), and the concept was generally accepted. Currently, the definition of the Green Ships to which more favorable financial terms and conditions are applied is under the discussion in the OECD WP6.

Proposal by Japan

Scope of the Green Ships

- 20% improvement from EEDI*1 requirement
- 20% improvement from NOx Tier II Control*2 level
- AND

Terms & conditions

- Max. repayment term: 12 years → 18 years
- Min. down payment: 20% → 15%

*1) Energy Efficiency Design Index to be certified in accordance with MARPOL Annex VI
*2) NOx emission to be certified in accordance with MARPOL Annex VI and NOX Technical Code

Sector Understanding on Export Credits for Ships (SSU)

- The SSU is an annex to the “Arrangement on Officially Supported Export Credits”, which provides financial terms and conditions to be applied to export credit financings. The SSU is applied to export credits for ships.
- The export credits in accordance with the SSU are considered to be complying with the WTO Agreement on Subsidies and Countervailing Measures. (Safe Haven of the WTO ASCM)
Advantages and Challenges

1: Advantage

Eco-ships for all range of products

2: Challenges

1) Human resource development

2) Re-entry into offshore segments
Challenge: Shortage of Human Resources for Shipbuilding industry

Challenges

1. Securing the number of skilled production workers
2. Improving work environment
3. Fostering sophisticated human resource development
1. Securing the number of skilled production workers

• On the job training (Regional joint implementation) to learn wide range practical skill
• Cooperation with academic institution (internship)

2. Improving work environment – especially for women workers –

(1) Developing power-assist-suits for handling heavy load goods
(2) Formulating the guidelines regarding safe working environment for women and senior workers

3. Fostering sophisticated human resource development

Utilization of 3D virtual reality techniques for task simulator, which has been developed in other industries
Advantages and Challenges

1: Advantage
   Eco-ships for all range of products

2: Challenges
   1) Human resource development
   2) Re-entry into offshore segments
Number of offshore drilling structures completed and oil prices
(Total of drill ship, semi-submersible, jack-up rig)

Trend of offshore drilling structures and oil prices

Era of a booming ocean development

Dominated by Korea, China and Singapore

Crude oil prices (US$/barrel)

No.

USA
Japan
South Korea
Singapore
China
Brazil
その他

Crude oil prices (US$/barrel)


Oil crisis

2003 Iraqi war

No.

2013

Oil crisis of 2003

No.

Number of offshore drilling structures completed and oil prices
(Total of drill ship, semi-submersible, jack-up rig)

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### SWOT analysis for Japan’s shipbuilding industry

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Cooperation with foreign countries by utilizing technologies and production management of Japan
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Japan's business and government initiatives in Brazil

**Public and private sectors work together** to facilitate Brazilian offshore development.

### Direct investment in the shipyards in Brazil
Japanese shipbuilders have recently invested in Brazilian shipyards and are working on ship building in Brazil.

### Development of human resources in shipbuilding sector
- In June 2013, JICA project on technical cooperation in the shipbuilding human resource development was adopted.
- The project will start within 2014.
  
  JICA: Japan International Cooperation Agency

### Promotion of marine machinery and equipment industry
Government support to the Japan’s machinery and equipment industry to overcome their technological challenge in the offshore market.

### Offshore development in Brazil

### Coping with the local content issues
In December 2012, Nippon Kaiji Kyokai do Brasil LTDA (ClassNK in Brazil) was authorized by ANP as a certifying organization of the local content.

### Specific projects in Brazil’s offshore development
Japanese maritime industries may contribute to the offshore development in Brazil through technology-based projects such as **Logistics Hub**.

### Continuous private-public discussions between Brazil and Japan
Roundtable meetings
In order to assist the Japanese industries to enhance their opportunities in the offshore market, MLIT is providing financial assistance for their technological development. (2013-2017) (Budget: 11.2 million USD in 2013-2014)

Promotion of marine machinery and equipment industry

Cargo loading & offloading system
Storage
- Highly reliable LNG tank
- Cargo loading & offloading system between floating structures

Engine
- High-capacity power generation system
- High-capacity motor

Control system
- High-accuracy dynamic positioning system
- Mooring equipment

plumbing
- High efficiency valve for preventing backward flow

- Mooring equipment
JOIN* will back up the financing of projects by holding a considerable portion of the equity of SPC. This equity finance scheme can improve bankability of the project.

* JOIN: Japan Overseas Infrastructure Investment Corporation for Transport & Urban Development
* The law to establish this agency was adopted by the National Diet in Feb 2014. JOIN established on 20th October 2014.
How the funding by the new agency will work

**Scope of funding**

- Projects, to be supported by the new agency, need to be relevant to overseas transport* or urban/regional development.
  * ”Transport” includes not only “traditional” sea transport such as the operation of LNG vessels and container vessels, but also offshore projects such as the operation of FPSO, FLNG, PSV, and AHTS*.
- Co-funding with the JBIC loan is possible

**Where the funding can go**

- Owning/O&M SPC of the FPSO / FLNG
- Owning/O&M SPC of the LNG vessels
- Owning/O&M SPC of the PSV/AHTS

*FPSO: Floating Production, Storage and Offloading system
FLNG: Floating Liquefied Natural Gas
PSV: Platform Supply Vessel
AHTS: Anchor Handling Tug Supply

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**Example of Finance structure**

- **Owing/O&M SPC**
  - **Debt**
  - **Equity**
  - **Charter contract & O&M contract**

- **NEW Agency**
- **Japanese companies**
- **Other Japanese banks**
- **JBIC***
- **The other banks**
  - **NEXI**

*JBIC; Japan Bank for International Cooperation
**NEXI; Nippon Export and Investment Insurance

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*Foreign oil/gas company

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**The other banks**

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**foreign oil/gas company**
Shipbuilding industry in Japan has been recovering its international competitiveness, and will achieve further growth by:

- taking an advantages of eco-ship technologies (reduce fuel consumption and CO2) and other environmental technologies (NOx, SOx reduction etc)
- fostering and ensuring human resources for sustainable growth
- Promoting re-entry into offshore market to capture a growing market in maritime sector
MLIT assists the industry to achieve the above, and through such efforts, MLIT would like to achieve:

- Safer and more efficient maritime transport, which will assist the world economic growth

- Mitigation of climate change and other environmental problems (air pollution, ballast water, ship recycling)

- Assisting the sustainable development of other growing countries (Asia, Pacific, Africa, etc.) – various ODA projects including island-to-island transport, river transport, patrol boats.
MLIT’s policies are formulated and implemented in close cooperation with KIKAN-ROREN (Japan Federation of Basic Industry Workers’ Unions).

We look forward to cooperation with the members of IndustriALL Global Union, Shipbuilding and Shipbreaking Committee.

Thank you for your attention.