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Martin Stopford, Capital Link, Tokyo 14 May 2019
Coming to terms with the next era for shipping and shipbuilding

Dr Martin Stopford, President Clarkson Research
The next era for shipping and shipbuilding – Martin Stopford

SEVEN ISSUES TO COVER

ISSUE 1: The shipping market- still struggling
ISSUE 2: Market fundamentals - looking better
ISSUE 3: Strategies for reducing carbon emissions:-
A. Cargo – lower growth
B. Ships - slower speed etc
C. Shipbuilding – lower carbon power & systems
D. Companies – future transport factories
Part 1: The shipping market – still struggling

Freight rates and prices remain “stuck in a rut”, and the market is still struggling
The Clarksea index shows the average earnings of tankers, bulkers, containerships & gas.

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The market is stuck in a rut.

Clarksea Index
12 month average $11,239/day, 25% below 29 year trend

29 year average
$15,230/day

12 month moving average in arrears
Cycle status in 12 markets: last 12 months as % seven year trend

- Chart shows average earnings in last 12 months as a % of average earnings in last 7 years (April 2012 to April 2019)
- Bulk carriers are above the 7 year trend (but only just)
- Tankers below trend
- Gas market now well below trend

Data to 29 April 2019

Container
Gas
Offshore
Chemical Tanker
Handymax
Panamax
Capesize
Cl Prod
Aframax
Suezmax
VLCC 1990s

Containers 22%
Gas -54%
Offshore -40%
Chemical -13%

Bulkers 15% above trend!
Tankers -21% below trend

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Part 2: Market fundamentals looking better

The world economy is caught up in long running developments in both supply and demand
World seaborne trade 1963-2019 – recently slow but steady

Seaborne cargo consists of many commodities

\[ y = 1712.4e^{0.0346x} \]

Growth trend 1963-2019 was 3.4%

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World sea trade 1963-2019 – about 2.8% in 2019

Growth positive (about 2-3% pa) but slow

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Shipbuilding production at a more sustainable level

- Peak 10: 36 m GT
- 2011 Peak 12: 103.2 M Gt

Half peak output
World fleet growth - about 2.6% in 2019 & 1.8% in 2020

Period of negative growth 1982-1987 when the fleet declined due to heavy scrapping and low ordering.
Shipping market balance – 25% surplus (but tied up slow steaming!)

Bars show surplus (+) & shortage (-) capacity as % of the fleet.

Dark red line shows fleet capacity in billion dwt (left axis).

Light blue line shows demand in billion dwt (right axis).

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Part 3: Strategies for reducing carbon emissions

The ship’s emissions have become the industry’s most pressing challenge.
“IMO’s vision is to reduce GHG emissions from international shipping. Emissions should peak as soon as possible and fall by at least 50% by 2050 compared to 2008. At the same time, the industry should pursue efforts towards phasing out GHG emissions entirely".
In 1840, when shipping relied on the wind for power, Sea Trade was about 20 mill tonnes.
World Sea Trade 1 AD to 2017 AD

TODAY TRADE IS 600 TIMES BIGGER THAN IN 1840

12 Billion tonnes in 2018 moved by 60,000 ships, made possible by fossil fuels

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Fossil fuel engines made this possible ... this is the Emma Maersk’s Engine

- Thanks to fossil fuel, this engine generates 109,000 HP (82 MW)
- It does the work of about 3 million people (working 8 hour shifts)
- If people powered the Emma Maersk they would need a town the size of Athens to live in
- They would eat about 9 billion calories a day (3,000 tonnes of grain)!
- Every tonne of bunkers produces 3.3 tonnes of carbon
- Where else can we get so much concentrated energy without the carbon?

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How could we realize the IMO’s vision of a 50% cut by 2050?

**Strategy 1: Less cargo**: Transport less cargo by changing trading patterns, transport policies, pricing and better information systems.

**Strategy 2: Slow down**: Cut carbon emissions/ship km by slowing down to 10 knots; using bigger ships; better designs; retrofitting for safe operation at slow speeds etc.

**Strategy 3: Zero carbon power**: develop new propulsion systems. Electric fuel cells look the best bet for volume and performance

**Strategy 4: Organization**: Make strategies 1-3 possible by a complete re-think of the industry’s organization and personnel.
World cargo fleet CO2 Emissions – 4 steps to a 50% reduction

“Do nothing” Scenario based on 3.2% cargo growth, 14 knots, produces 3,000 Mt of emissions in 2050

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World cargo fleet CO2 Emissions – 4 steps to a 50% reduction

30% CARBON SAVING

Steps:
1. 14 knots, 3.2% pa cargo
2. 14 knots, 2.2% pa cargo

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Step 1: 14 knots, 3.2% pa cargo
Step 2: 14 knots, 2.2% pa cargo
Step 3: 10 knots, 2.2% pa cargo

Fleet emissions million tonnes CO2

World cargo fleet CO2 Emissions – 4 steps to a 50% reduction

Fleet emissions million tonnes CO2

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World cargo fleet CO2 Emissions – 4 steps to a 50% reduction

Step 1: 14 knots, 3.2% pa cargo
Step 2: 14 knots, 2.2% pa cargo
Step 3: 10 knots, 2.2% pa cargo
Step 4: Half fleet zero carbon

Fleet emissions million tonnes CO2

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3A: CARGO strategy – reduce growth & improve logistics with better information

Develop better information about cargo “carbon footprint” and more develop B2B integrated through transport services.
Cargo 1: Seaborne trade 3.4% growth trend – cut growth to 2%?

Sea Trade grew at 3.3% between 1965 and 2018.

If 3.3% trend continues, shipping will transport over 30 billion tonnes in 2050.

Cargo shippers must be involved.
Tax on bunkers best method.

2.2% growth cuts trade by 10 billion tonnes & carbon by 1 billion tonnes.
Develop regional short sea trade, supported by B2B commerce

Cargo companies should develop trading systems which are less reliant on long distance transport using the low carbon transport option (for example short sea shipping in preference to air, road or rail)
3B: The SHIP – slow speed and fine tune and apply available technology

Information and monitoring are key (MRV)
1: For the first time the fuel costs more than the ship

Based on Aframax tanker, 1 year TC rate and bunker cost at 50 TPD, 14.5 KTS, Rotterdam 380cst

In 2004 the daily cost of an Aframax tanker was 3X cost of bunkers

NOW BUNKERS COST MORE THAN SHIP SO SHIPS ARE SLOW STEAMING

Aframax 1 year timecharter rate in $/day

$000 PER DAY Bunker cost $ TC rate

Bunker cost in $/day

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Ship 2: Surplus capacity and slow steaming raise “market-balance” issues

Shows “Shadow” surplus tonnage and the proportion laid up

“Shadow” Surplus – tonnage in excess of the dwt of ships needed to carry trade at full speed

“Shadow” surplus is soaked up by slow steaming today (roughly 25% fleet)

Is this “real” surplus or a new market variable?

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Permanent ‘shadow surplus’?

Shows “Shadow” surplus tonnage and the proportion laid up

"Shadow" surplus is soaked up by slow steaming today (roughly 25% fleet)

If ships slow down even more how will the market manage a permanent “shadow surplus”?

Is this “real” surplus or a new market variable?

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A radical review in design methods is needed to integrate on board systems, achieving more efficient transport, lower emissions and greater safety.
How will ship design and construction develop in future?

50 Years change in car technology – “Modern BMW is a computer on wheels” (The Economist 17th Oct 2018)
How might shipbuilders develop the next generation of ships?

**Propulsion plant.**
- Dual fuel diesel
- Diesel electric
- Battery & fuel cell
- Fusion??

**Auxiliary power**
- Common interfaces
- Power management systems

**Auxiliary machinery**
- Digital protocols and direct systems support from suppliers in integrated system

**Ballast & trim**
- Integrated digital management systems covering all operating components

**Navigation**
- Navigation on network with ability to view on shore as well as ship (e.g. Sperry system)

**Cargo handling**
- Autonomous cargo handling systems driven by cargo management software sharing key data between ship & shore

**IT & comms**
- Ship systems managed across the fleet by company IT department rolling out upgrades & providing global support

**Maintenance**
- Condition based systems managed across fleet, with telematics using standard protocols

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The shipbuilding scenario 2018-2050 – mix of diesel & zero carbon ships

1. Slowing down to 10 knots boosts shipbuilding demand by about 30%
2. Heavy replacement of the 2008 bubble ships
3. New demand for hydrogen/electric ships etc

Shipbuilding deliveries scenario
Shipbuilding competition – new construction methods will be crucial

[Graph showing percentage of GRT launches in various countries over years]

- **1. Frame First Construction on Berth**
- **2. Hull Block Construction Method (HBCM)**
- **3. Pre-Outfitting Blocks Prior to Erection**
- **4. Zone-Outfitting Blocks with Sub-Assemblies**
- **5. Develop Integrated Ship-Systems**

Gradual switch from system-by-system to zone-by-zone construction

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A radical review in design methods is needed to integrate onboard systems, operating as transport factories.

PART 3D: COMPANIES – new information based organizations
Change 2: Transport chain should be integrated using digital technology

Company Systems:
1. Process management
2. STQ monitoring
3. Messaging system
4. Intranet & dashboards
5. Fleet maintenance
6. LPWAN & APIs

1. SHIP TEAMS
1. Navigation
2. Operations
3. Comms.

2. TECHNICAL TEAMS
1. Technical support
2. Maintenance systems
3. Regulatory reports
4. Fleet performance
5. Personnel management

3. SYSTEMS TEAMS
1. Support systems
2. Process systems
3. Automation
4. Build apps
5. Manage stats

6. SHIPBUILDERS & EQUIPMENT SUPPLIERS

5. CUSTOMERS WITH CARGO SYSTEMS

7. PORTS & THROUGH TRANSPORT

Warehouse (on cloud?)

ship servers managing data, apps & comms

DATA READY SHIPS
Conclusions

1. We are facing unprecedented change in the maritime industry.

2. The goals are zero carbon shipping and developing the amazing logistics digital technology is already providing to businesses on land.

3. Cargo interests, shipowners and shipbuilders must all play a part.

4. Financiers will play a crucial part in enabling change.

5. Some of the architects of the next era in shipping are sitting here in this hall.

6. This is a once in a lifetime challenge – we must make it work.
Disclaimer

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