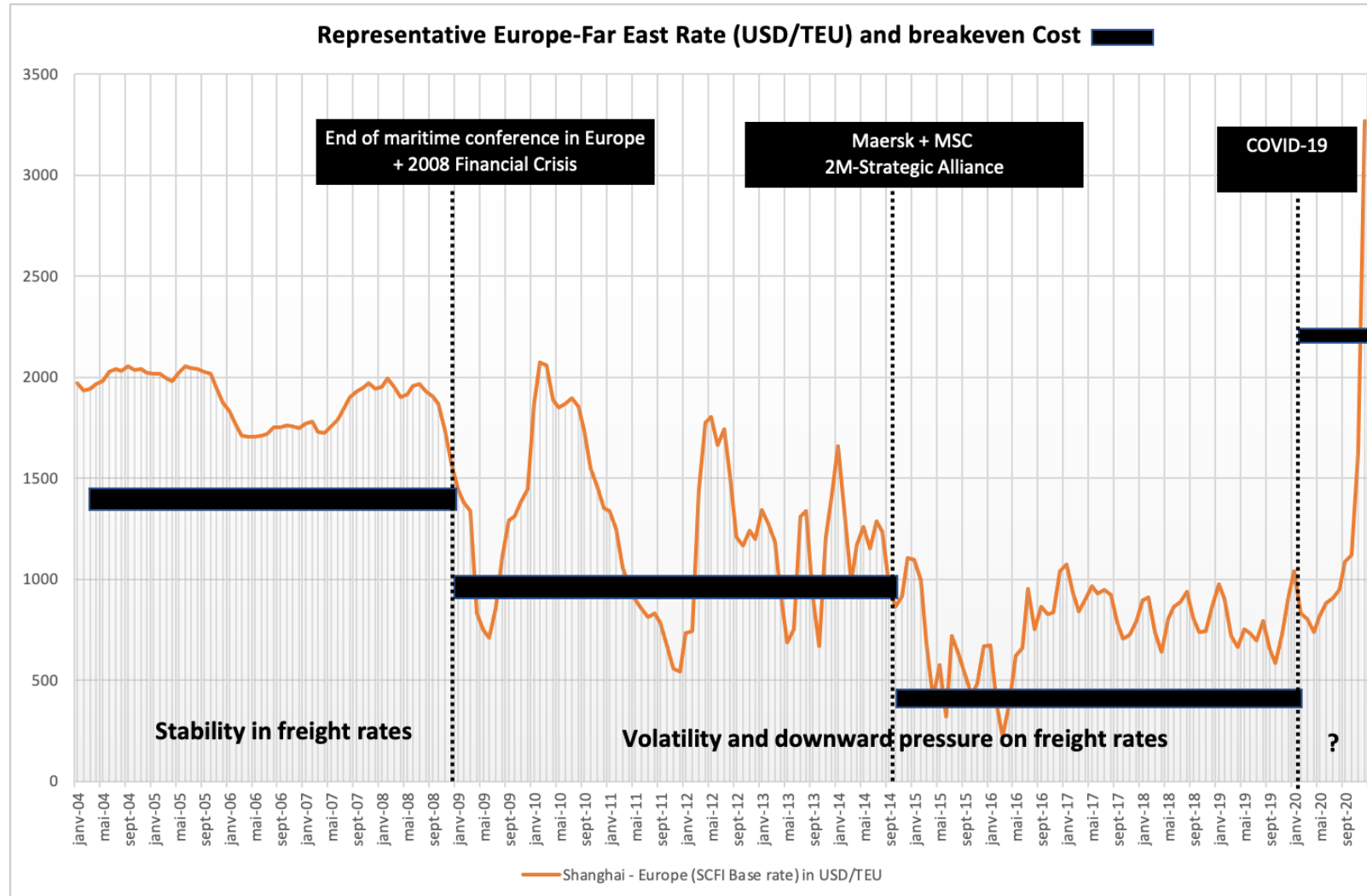


# Liner Shipping, Containerisation and Mega Carriers. What structural changes to be faced by the industry operators?

Prof. Pierre CARIOU

discover  
decode  
design

# 10 years of structural changes (2010-2020)

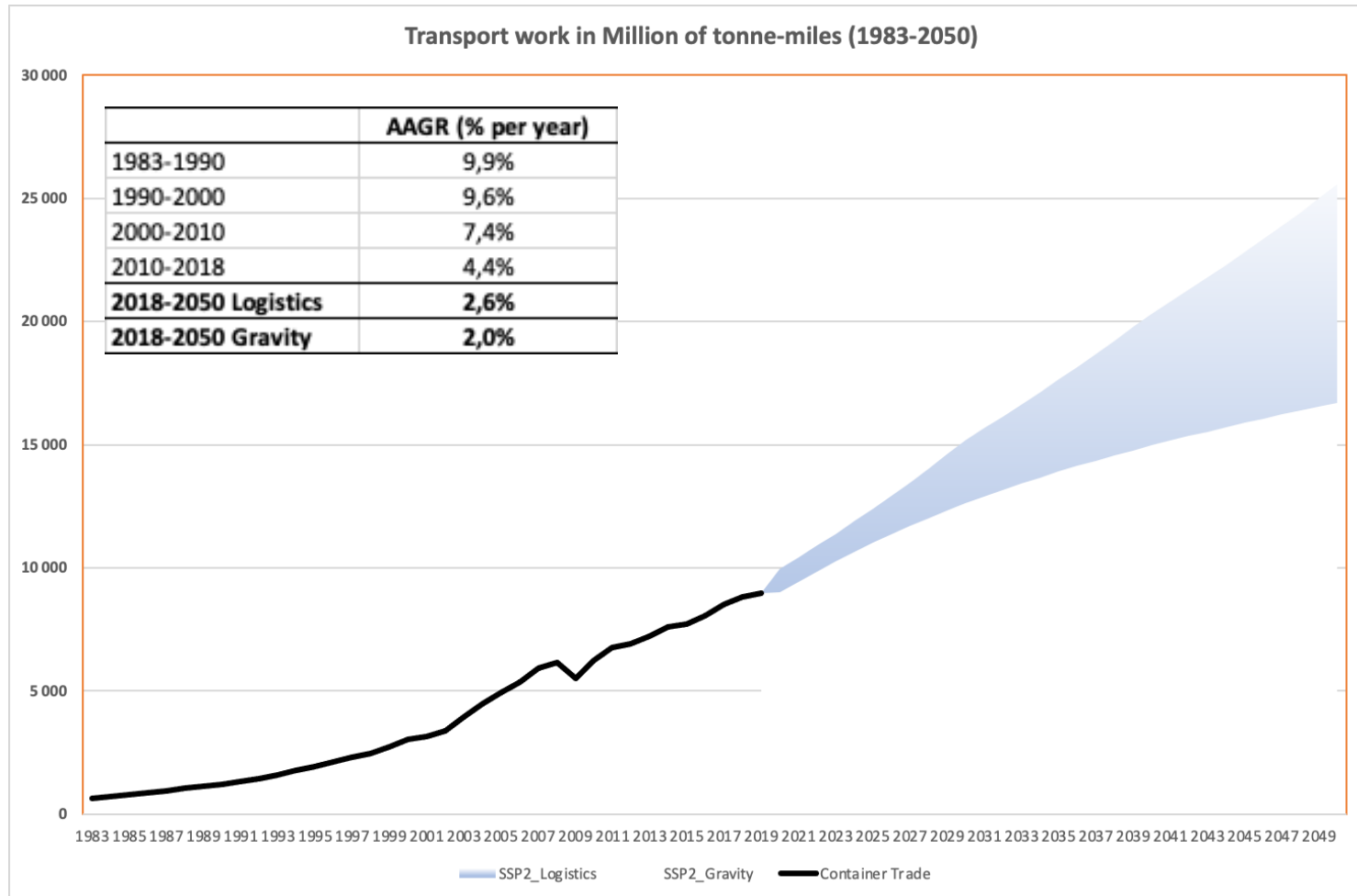


Source: Cariou (2020)

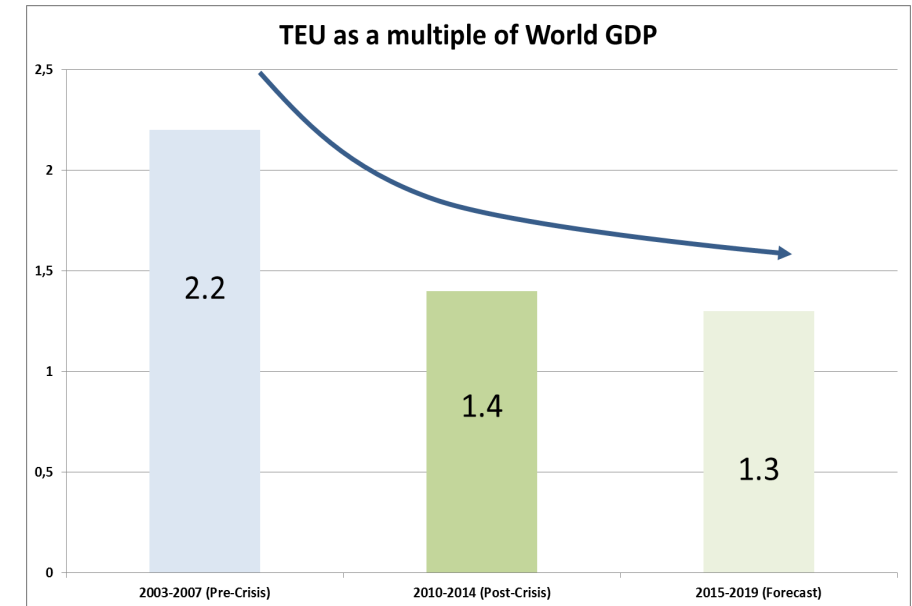
# Presentation outline

1. **Structural change in demand (less and new pattern of trade)**
2. *Structural adjustment from carriers (cost-cutting and strategic alliances)*
3. *Future changes?*

# 1. Structural change in demand



Source: Cariou (2020)



Source: Boston Consulting Group (2015)

# 1. Structural change in demand

## PAST DRIVERS OF GLOBAL TRADE

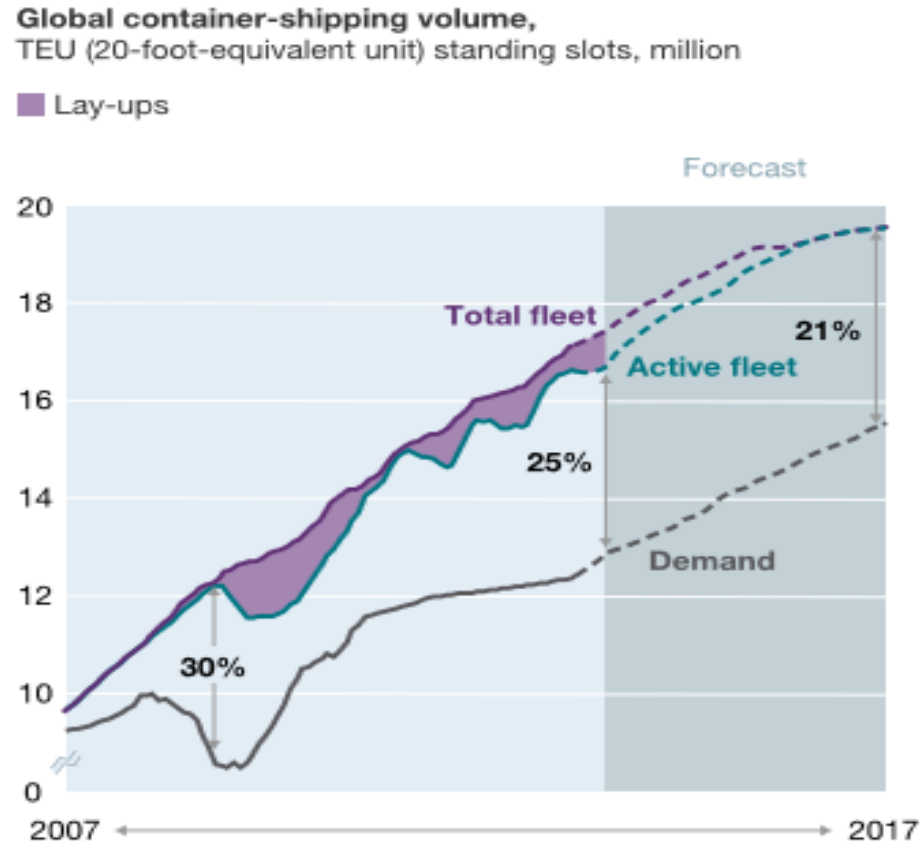
| 1990-2015                      |
|--------------------------------|
| Population growth              |
| Increasing number of consumers |
| Offshoring of production       |
| Lengthening supply chains      |
| Urbanisation                   |
| Fossil fuel-driven growth      |
| Trade-intensive growth         |

## FUTURE DRIVERS OF GLOBAL TRADE

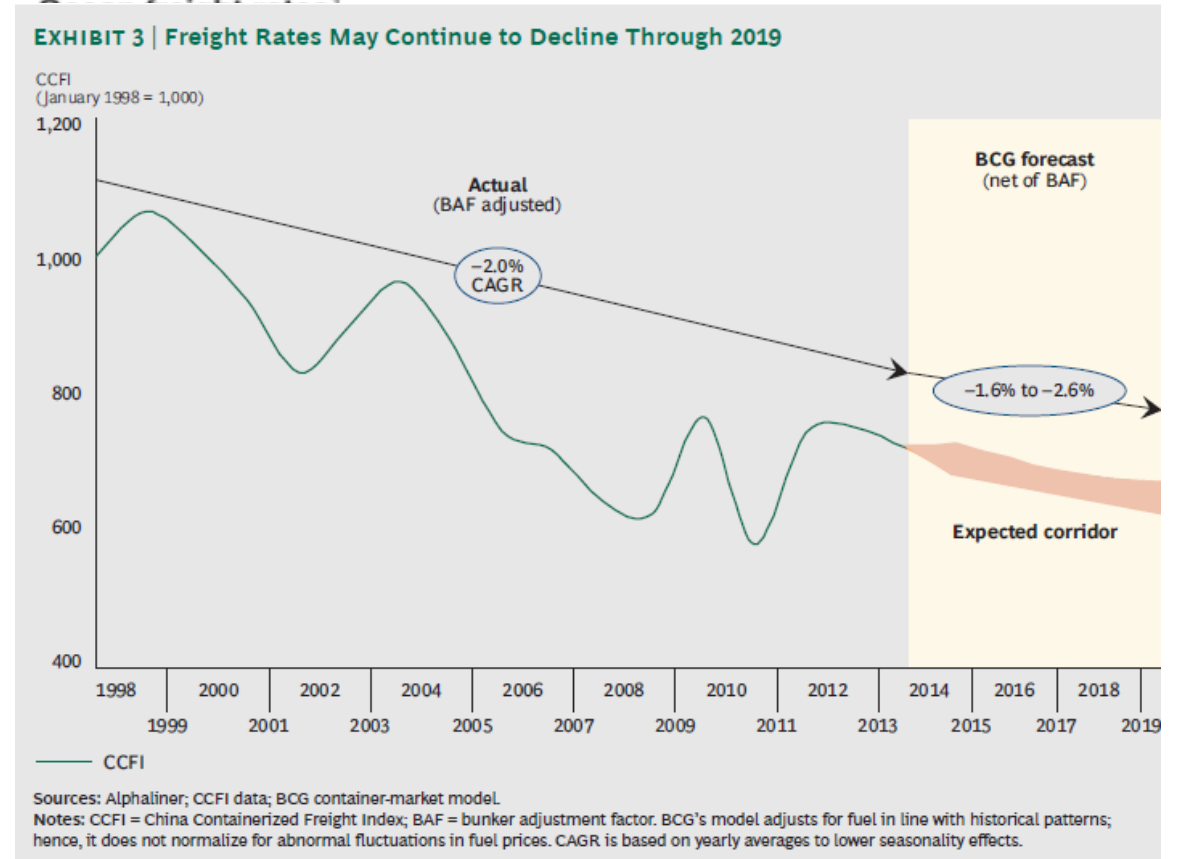
| 2016-2040  |
|--|
| Population growth                                |
| Ageing consumers and changing consumer behaviour |
| Reshoring of production                          |
| Shortening supply chains                         |
| Urbanisation without jobs creates slums          |
| Renewable energy-driven growth                   |
| <b>Reduced trade potential</b>                   |

Source: Danish Ship Finance (2017)

# 1. Structural change in demand



<sup>1</sup>Global average realized rates for trunk lanes.

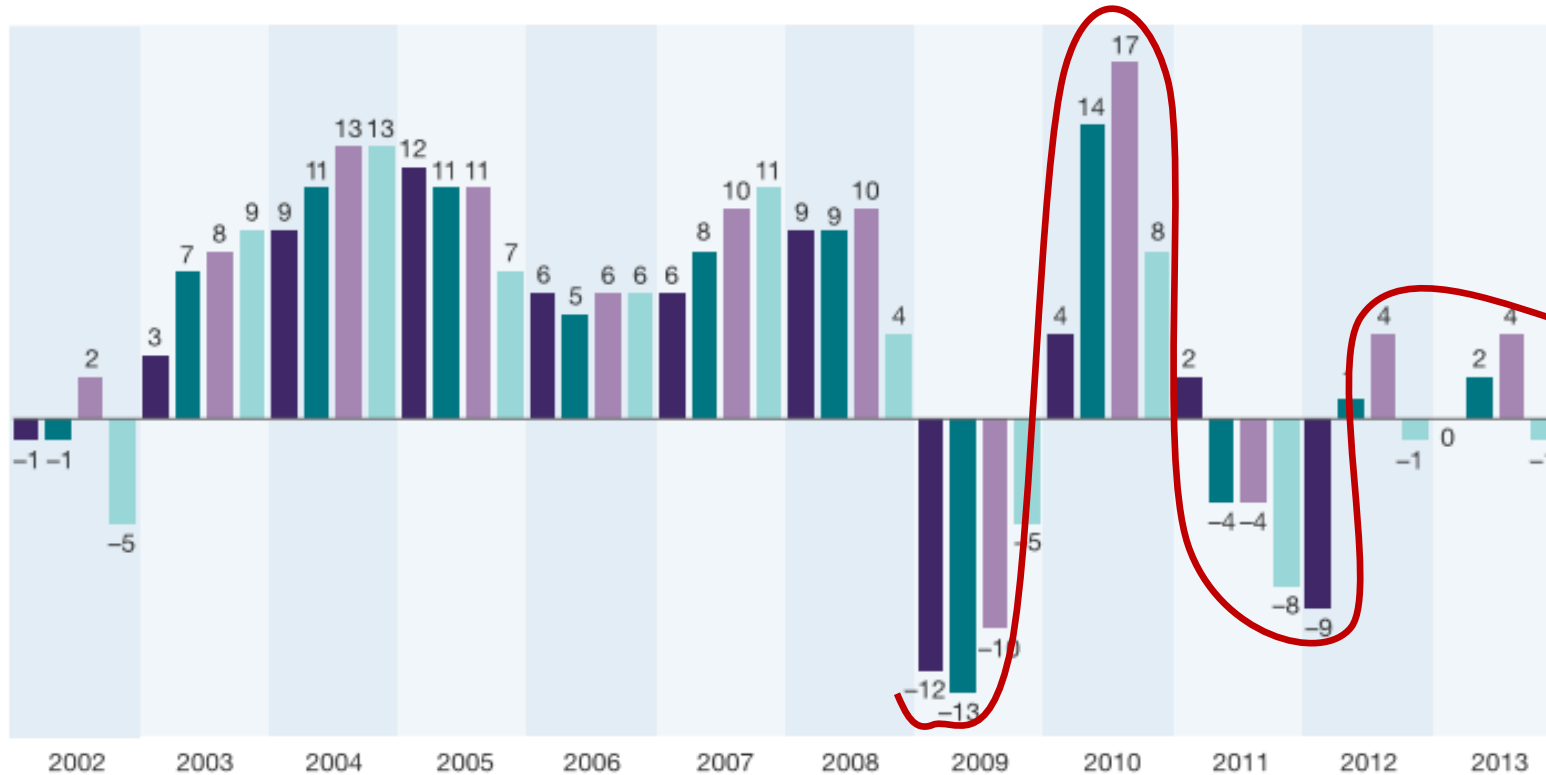


Source: Boston Consulting Group (2015)

# New environment

Industry<sup>1</sup> earnings before interest and tax, 2004–13, %

■ Q1 ■ Q2 ■ Q3 ■ Q4



<sup>1</sup>Includes 14 of the world's largest publicly traded container-shipping companies.

Source: Bloomberg, company quarterly reports

# Presentation outline

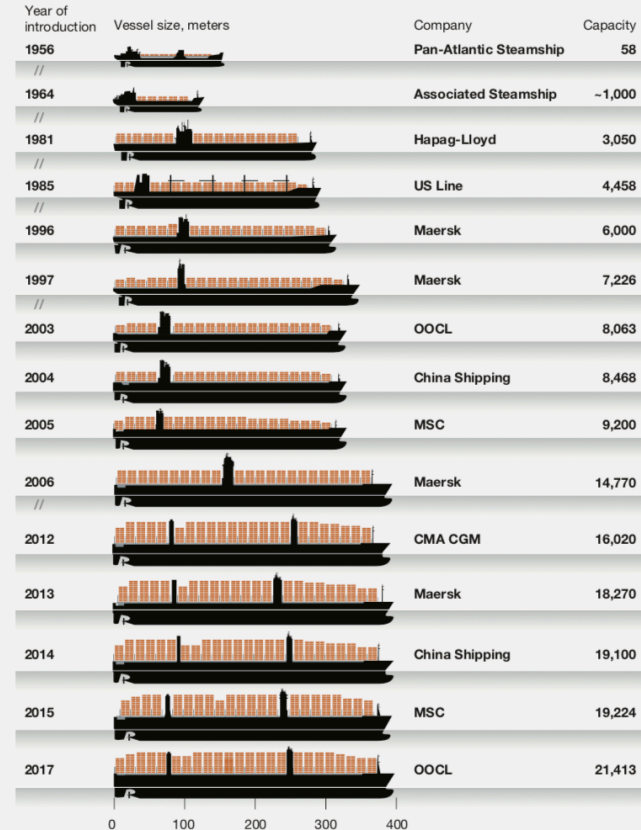
- 1. Structural change in demand (less and new pattern of trade)*
- 2. Structural adjustment from carriers (cost-cutting and strategic alliances)**
- 3. Future changes?*



# A. Cost-cutting strategies = Economies of scale

Exhibit 6 Container-ship capacity has grown massively since the *SS Ideal X*, a converted World War II oil tanker, first sailed, in 1956.

Maximum container-vessel capacity, TEU<sup>1</sup>



<sup>1</sup>Twenty-foot equivalent unit.  
Source: McKinsey analysis

|  |   | Nominal TEU<br>tdw        | LOA<br>m | Breath<br>m | Depth<br>m  | Draft<br>m |
|--|---|---------------------------|----------|-------------|---|------------|
| OOCL HONG KONG<br>6 units in series<br>from May 2017 |    | 21,413 teu<br>191,317 tdw | 399.9    | 58.8        | 32.5  | 16.0       |
|  |   |                           |          |             | Operated by OOCL<br>Built by Samsung H.I.                                     |            |
| MADRID MAERSK<br>11 units in series<br>from Apr 2017 |    | 20,568 teu<br>210,019 tdw | 399.0    | 58.6        | 33.2  | 16.5       |
|  |   |                           |          |             | Operated by Maersk<br>Built by Daewoo (DSME)                                  |            |
| MOL TRIUMPH<br>6 units in series<br>from Mar 2017    |    | 20,170 teu<br>192,672 tdw | 400.0    | 58.8        | 32.8  | 16.0       |
|  |   |                           |          |             | Operated by MOL<br>Built by Samsung H.I.                                      |            |
| BARZAN<br>6 units in series<br>from Apr 2015         |    | 19,870 teu<br>199,744 tdw | 400.0    | 58.6        | 30.6  | 16.0       |
|  |   |                           |          |             | Operated by UASC<br>Built by Hyundai Samho/Hyundai H.I.                       |            |
| MSC OSCAR<br>12 units in series<br>from Jan 2015     |    | 19,224 teu<br>197,362 tdw | 395.4    | 59.0        | 30.3  | 16.0       |
|  |   |                           |          |             | Operated by MSC<br>Built by Daewoo (DSME)                                     |            |
|  |   |                           |          |             | MSC also has in addition 6 units built in Samsung and 2 units at Hyundai H.I. |            |
| CSCL GLOBE<br>5 units in series<br>from Nov 2014     |   | 18,982 teu<br>184,320 tdw | 399.7    | 58.6        | 30.5  | 16.0       |
|  |   |                           |          |             | Operated by COSCO<br>Built by Hyundai H.I.                                    |            |
| Maersk 'EEE'<br>20 units in series<br>from Jun 2013  |  | 18,340 teu<br>194,153 tdw | 399.2    | 59.0        | 30.3  | 16.0       |
|  |   |                           |          |             | Operated by Maersk<br>Built by Daewoo (DSME)                                  |            |

# Cost-cutting strategies = Economies of scale

## Estimated economies of scale of Maersk's Tripe-E's betw Asia and N Europe

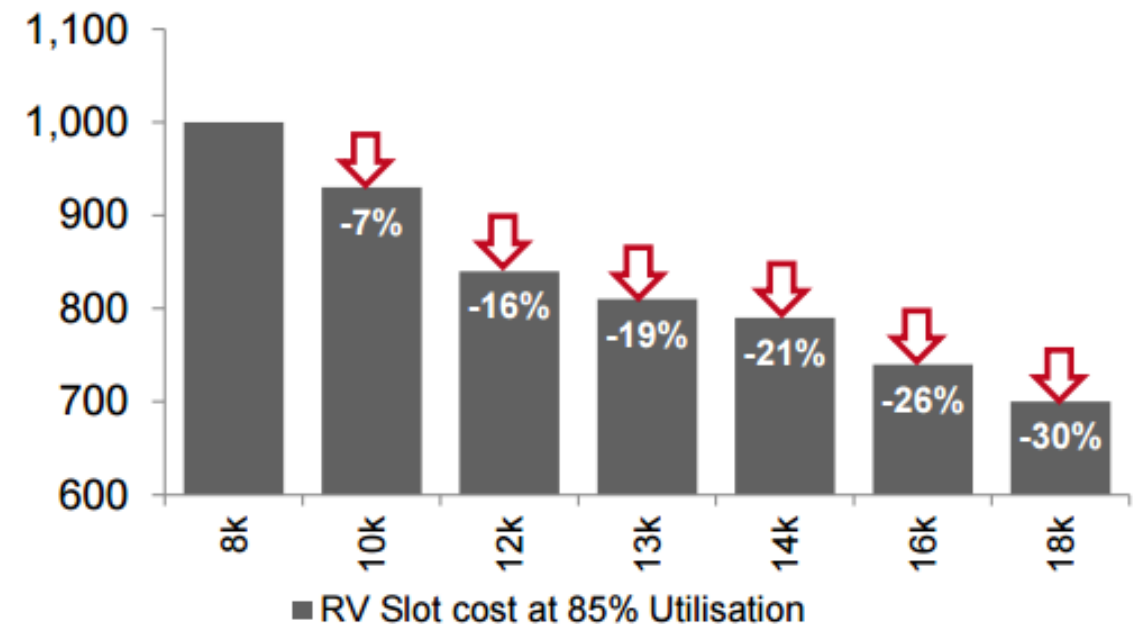
|   | 18,270 teu at<br>20.0 knots WB<br>and 14.6<br>knots EB | 13,100 teu at<br>20.0 knots WB<br>and 14.6<br>knots EB |
|---|--|--|
| Average distance WB (nm)                                      | 11,500   | 11,500   |
| Transit time WB (days)  | 24.0   | 24.0   |
| Average distance EB (nm)                                      | 11,500   | 11,500   |
| Transit time EB (days)  | 32.8   | 32.8   |
| Total fuel cost (excluding diesel) \$                         | 4,336,248  | 4,742,105  |
| Total IFO Fuel (WB) \$/teu carried                            | 209  | 322  |
| Total IFO Fuel cost (EB) \$/teu carried                       | 231  | 348  |
| Total IFO Fuel cost (WB+EB) \$/teu carried                    | 218  | 333  |
| Ship operating costs/day (\$)                                 | 18,000   | 14,500   |
| WB voyage time (days)   | 42   | 42   |
| WB ship operating costs (\$)                                  | 756,000  | 609,000  |
| WB ship operating costs per teu(\$)                           | 64   | 72   |
| EB voyage time (days)   | 42   | 42   |
| EB ship operating costs (\$)                                  | 756,000  | 609,000  |
| EB ship operating costs per teu (\$)                          | 94   | 106  |
| Total ship operating cost (WB+EB)                             | 1,512,000  | 1,218,000  |
| Total ship operating cost (WB+EB) \$/teu carried              | 76   | 85   |
| Total WB IFO Fuel and ship operating cost/teu carried         | 273  | 394  |
| Total EB IFO Fuel and ship operating cost/teu carried         | 326  | 454  |
| Total IFO Fuel and ship operating cost (WB+EB) \$/teu carried | 294  | 418  |

↓ 34%

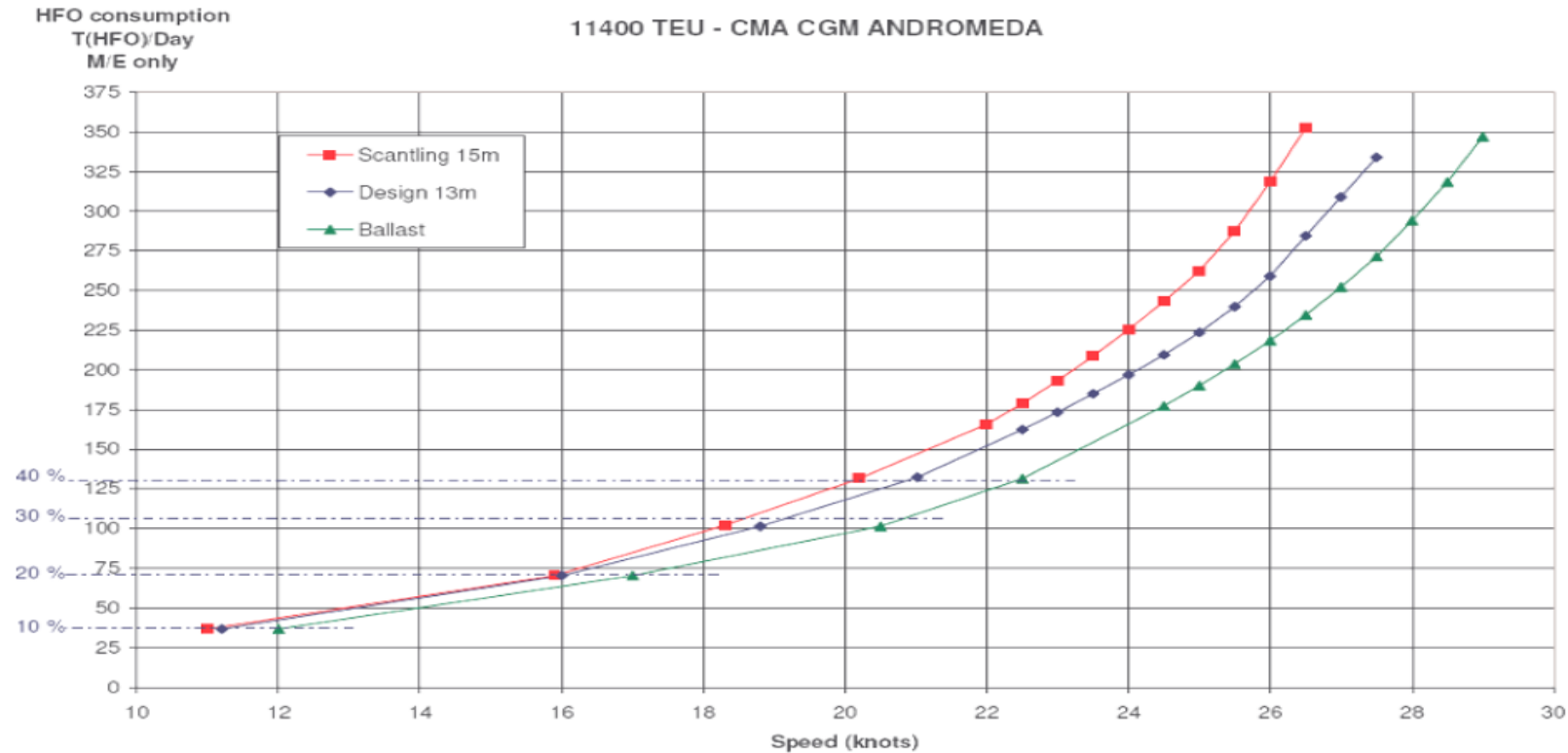
↓ 11%

↓ 30%

## Savings in slot cost per teu indexed to 8k teu vessel



# B. Cost-cutting strategies = Slow steaming




Typical fuel consumption curve for 11400Teu vessel, CMA CGM

Ton-mile fuel consumption is approximately a square function of speed  
i.e. 10% reduction in speed  $\approx$  19% reduction in fuel consumption ( $1 - 0.9^2$ )

Source: CMA CGM (2015) & Cariou (2020)

**Reduce over-capacity  
& downward pressure on freight rates**

Table 4.4 The slow steaming cost advantage Asia-N Europe trade



|  | 8 ships  |          |          | 9 ships  |          |          | 10 ships |          |          |
|--|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Service Fundamentals                                 |          |          |          |          |          |          |          |          |          |
| Round Voyage Distance (Miles)                        | 21,000   |          |          | 21,000   |          |          | 21,000   |          |          |
| Speed (Knots)  | 24.0     |          |          | 20.1     |          |          | 17.3     |          |          |
| Sea Days   | 38.5     |          |          | 43.5     |          |          | 50.5     |          |          |
| Port & Canal Days                                    | 19.5     |          |          | 19.5     |          |          | 19.5     |          |          |
| Round Voyage (days)                                  | 58.0     |          |          | 63.0     |          |          | 70.0     |          |          |
| Nominal Capacity                                     | 8,000    | 10,000   | 12,000   | 8,000    | 10,000   | 12,000   | 8,000    | 10,000   | 12,000   |
| Fuel Consumption (tpd)                               | 215      | 221      | 257      | 128      | 130      | 151      | 81       | 83       | 96       |
| Ship Cost per day (long term time charter)           | \$48,500 | \$53,000 | \$57,500 | \$48,500 | \$53,000 | \$57,500 | \$48,500 | \$53,000 | \$57,500 |
| Estimated Voyage Costs per Round Trip (US\$ million) |          |          |          |          |          |          |          |          |          |
| Fuel price per tonne (Q3 2010, Rotterdam)            | \$441    | \$441    | \$441    | \$441    | \$441    | \$441    | \$441    | \$441    | \$441    |
| Fuel*  | 3.48     | 3.56     | 4.14     | 2.42     | 2.49     | 2.90     | 1.80     | 1.85     | 2.14     |
| Ship Cost  | 2.72     | 2.97     | 3.22     | 3.06     | 3.34     | 3.62     | 3.40     | 3.71     | 4.03     |
| Port & Canal Costs                                   | 1.40     | 1.66     | 1.90     | 1.40     | 1.66     | 1.90     | 1.40     | 1.66     | 1.90     |
| Total  | 7.68     | 8.19     | 9.26     | 6.87     | 7.49     | 8.42     | 6.60     | 7.22     | 8.06     |
| Annual Total (52 round voyages pa)                   | 394      | 426      | 481      | 357      | 390      | 438      | 343      | 375      | 419      |
| Annual Saving v 8 ships                              |          |          |          | 37       | 36       | 44       | 51       | 50       | 62       |

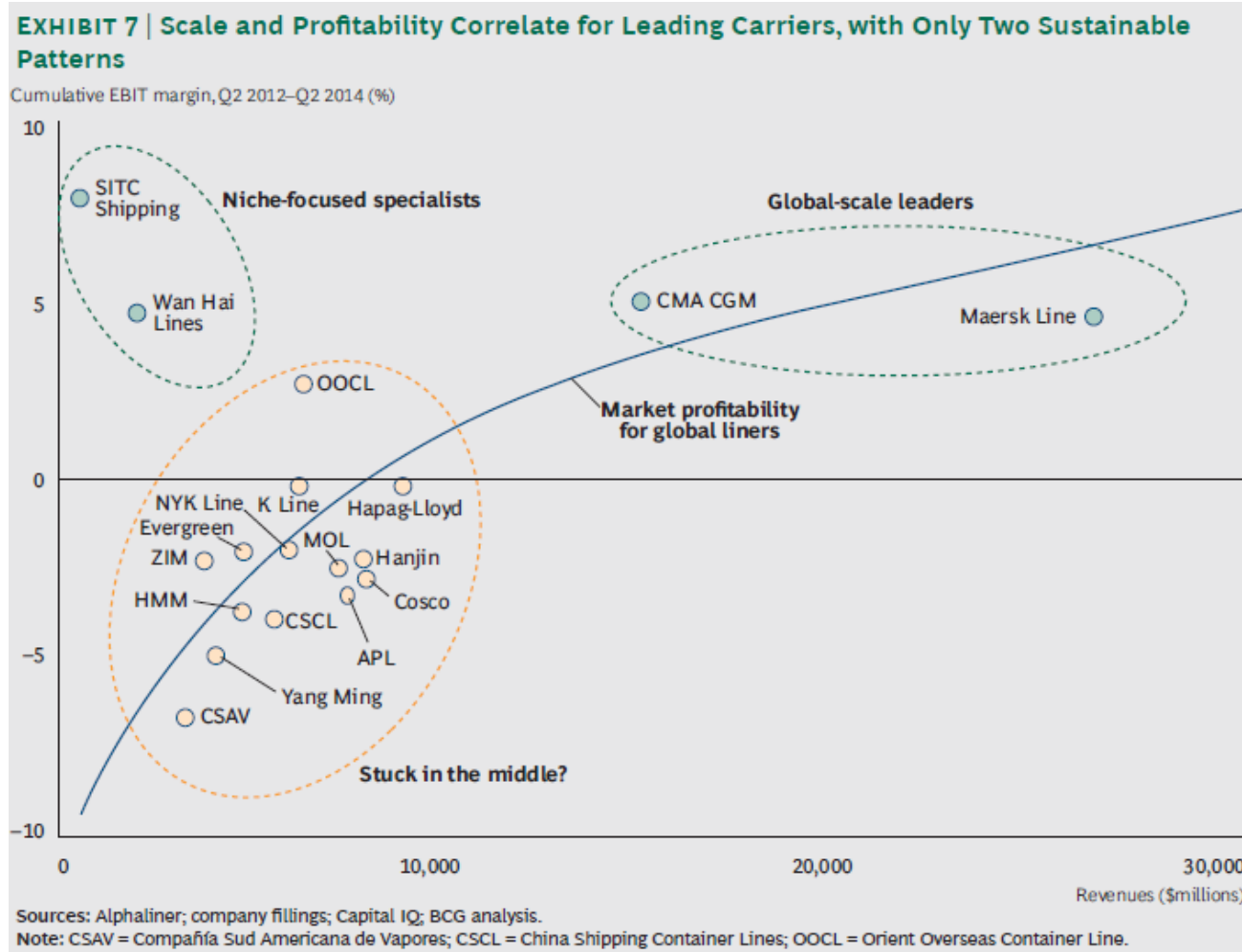
\* Excludes MDO costs

Source: Drewry Research

**Reduce unit cost**

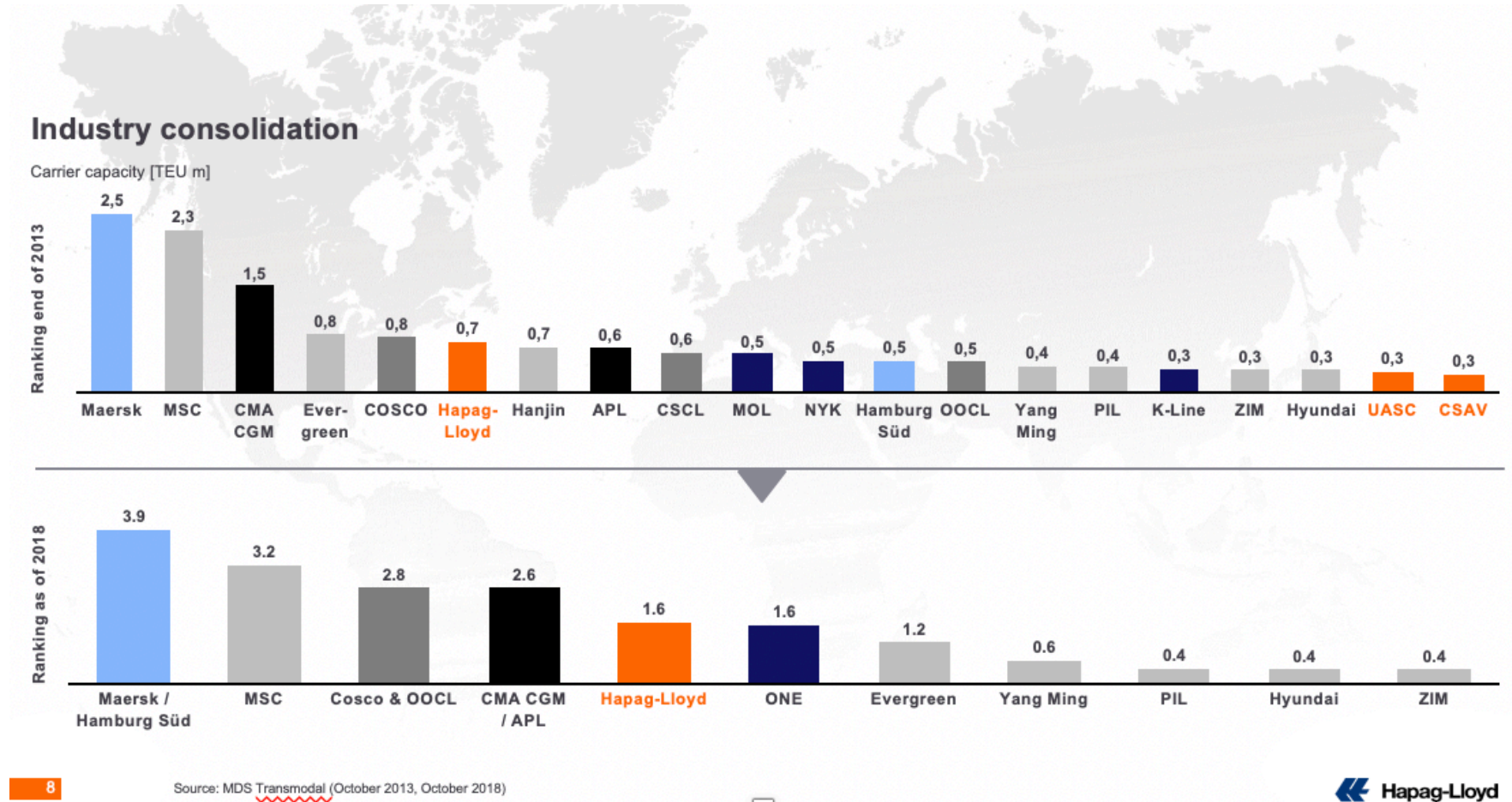
Source: Drewry Shipping Consultant (2015)

# C. Cost-cutting strategies = M&A + Strategic alliances





# Main M&A



# Main Strategic Alliances

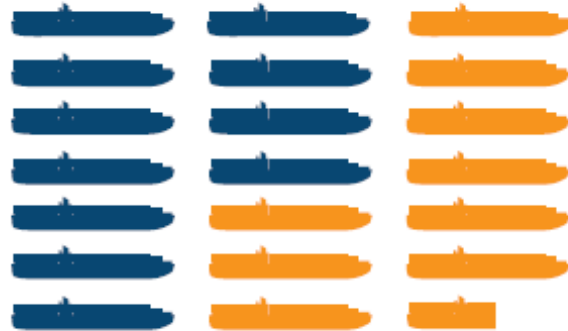
| 1995  | 2000   | 2010   | 2015   | 2020  |
|---|--|--|--|---|
| <b>GLOBALE ALLIANCE</b><br>OOCL (Hong Kong)<br>MOL (Japan)<br>APL (USA)   | <b>NEW WORLD ALLIANCE</b><br>MOL (Japan)<br>APL/NOL  | <b>NEW WORLD ALLIANCE</b><br>MOL (Japan)<br>APL (USA)<br>Hyunday (South Korea)                                   | <b>G6</b><br>MOL (Japan)<br>APL (USA)<br>Hyunday (South Korea)<br>Hapag-Lloyd (Germany)<br>NYK (Japan)           | <b>THE ALLIANCE</b><br>ONE (Japan)<br>Hapag-Lloyd (Germany)<br>Yang Ming (Taiwan)                         |
| <b>GRAND ALLIANCE</b><br>P&O (UK)<br>Hapag-Lloyd (Germany)<br>NYK (Japan) | <b>GRAND ALLIANCE</b><br>P&O/Nedlloyd (UK/Netherlands)<br>Hapag-Lloyd (Germany)<br>NYK (Japan) | <b>GRAND ALLIANCE</b><br>Hapag-Lloyd (Germany)<br>NYK (Japan)<br>OOCL (Hong Kong)                                | <b>CKYH-THE GREEN ALLIANCE</b><br>COSCON (China)<br>Hanjin (South Korea)<br>K Line (Japan)<br>Yang Ming (Taiwan) | <b>2M ALLIANCE</b><br>Maersk Line (Denmark)<br>MSC (Switzerland/Italy)<br>Hyunday (South Korea)           |
| <b>MAERSK/SEALAND ALLIANCE</b><br>Maersk Line (Denmark)<br>SeaLand (USA)  | <b>TRICON</b><br>Hanjin (S. Korea)<br>Cho Yang (South Korea)<br>UASC (UAE)                     | <b>CKYH-THE GREEN ALLIANCE</b><br>COSCON (China)<br>Hanjin (South Korea)<br>K Line (Japan)<br>Yang Ming (Taiwan) | <b>2M ALLIANCE</b><br>Maersk Line (Denmark)<br>MSC (Switzerland/Italy)   | <b>Ocean ALLIANCE</b><br>CMA-CGM (France)<br>COSCO/CSCL (China)<br>Evergreen (Taiwan)<br>OOCL (Hong Kong) |
| <b>TRICON</b><br>DSR-Senator (Germany)<br>Cho Yang (South Korea)          | <b>SINO-JAPANESE ALLIANCE</b><br>COSCON (China)<br>K Line (Japan)                              |  | <b>Ocean Three ALLIANCE</b><br>CMA-CGM (France)<br>CSCL (China)<br>UASC (UAE)                                    |   |

Source: Cariou (2020)

## THE 2M ALLIANCE

### Breakdown of fleet

Maersk MSC 10 vessels



185 vessels  
2.1 million teu

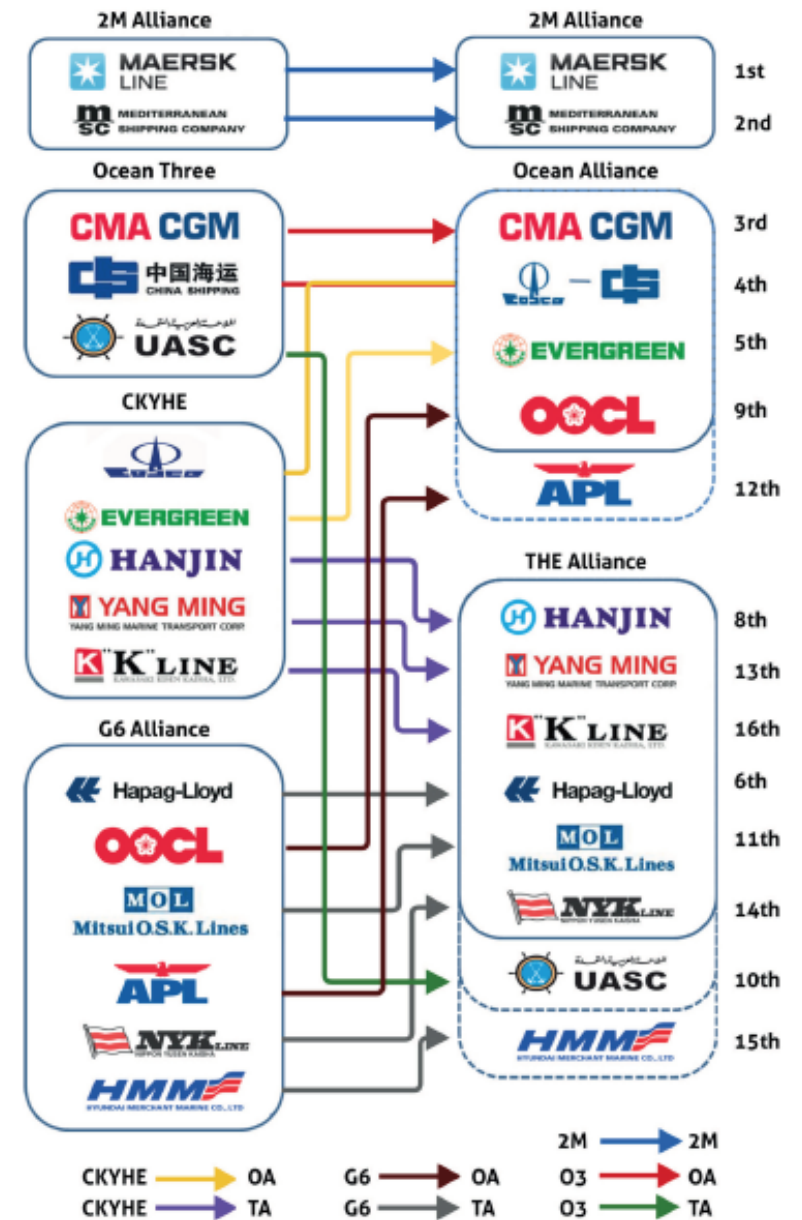
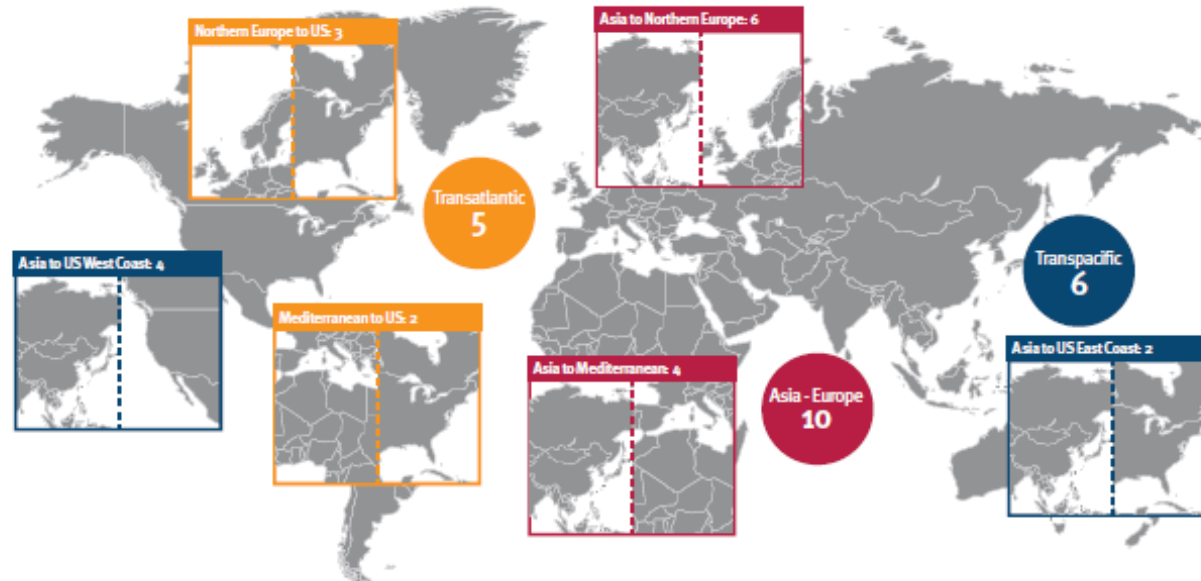
MAERSK  
110 vessels  
1.2m teu

55%  
Total capacity

45%  
Total capacity

MSC  
75 vessels  
0.9m teu

### Total number of strings

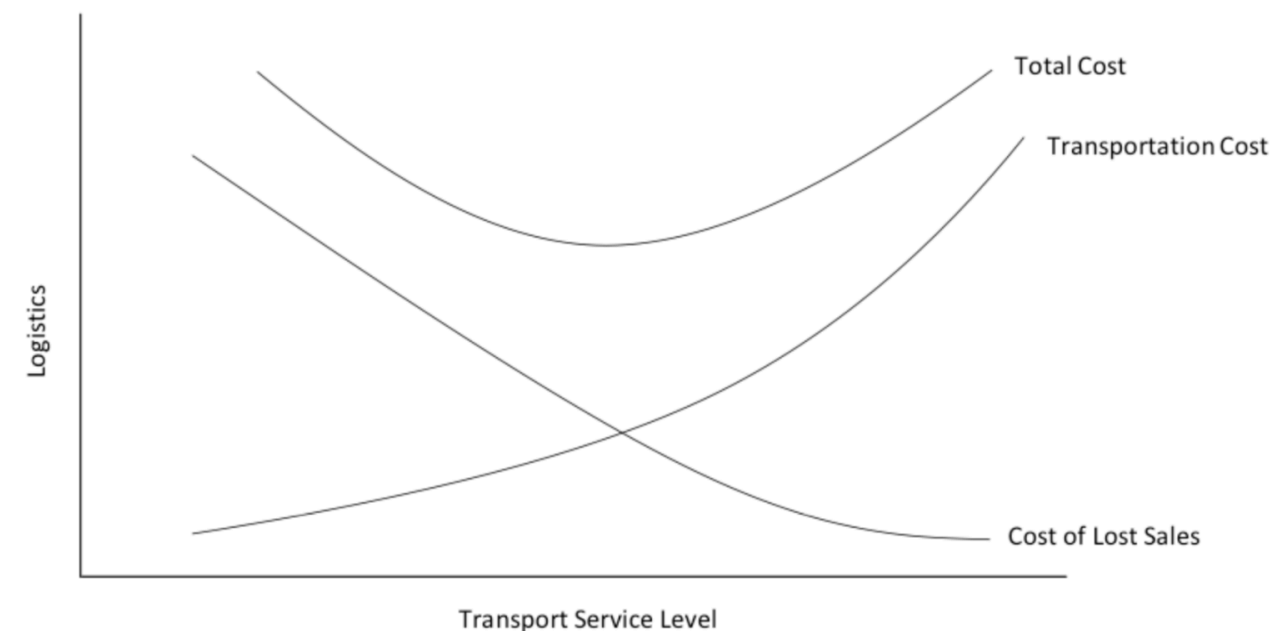




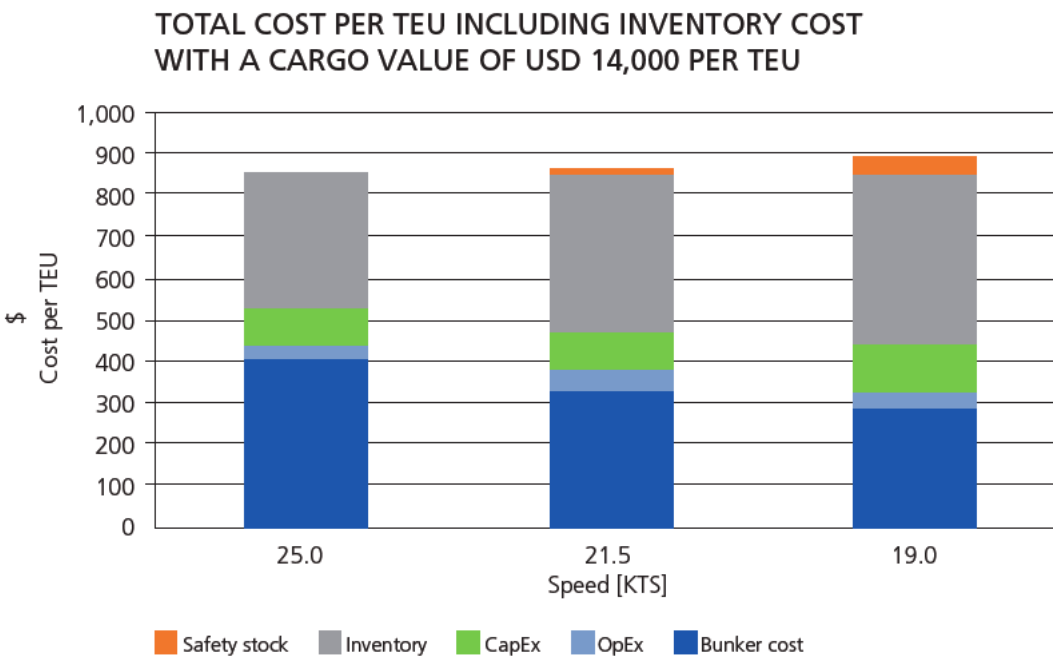
# Presentation outline

1. *Structural change in demand (less and new pattern of trade)*
2. *Structural adjustment from carriers (cost-cutting and strategic alliances)*
3. **Future changes?**

# Balance cost-service quality?



The General Relationship of the Cost of Lost Sales to Transportation Cost

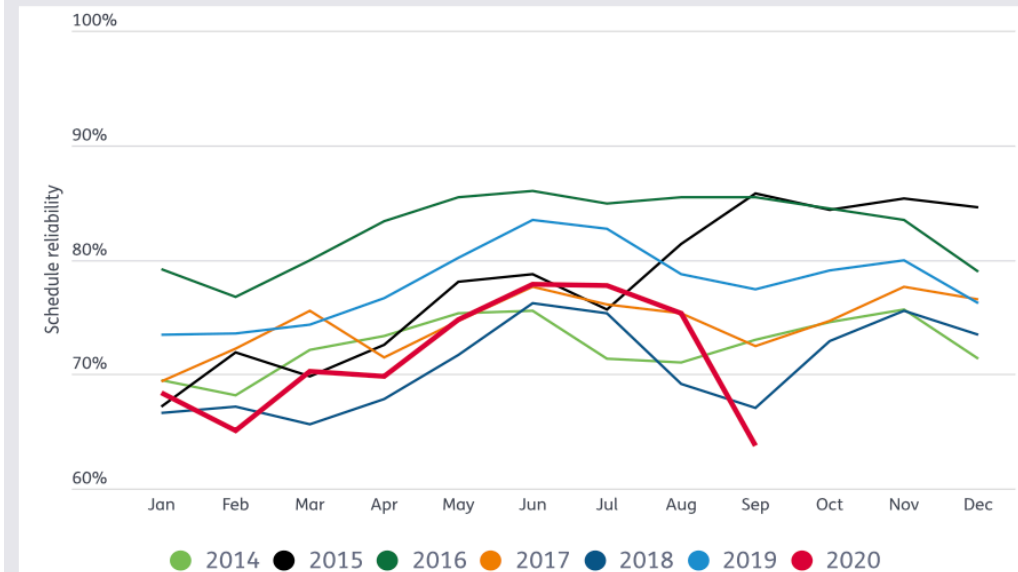


» Figure 2: The average cost per TEU at 25 knots (8 ships), 21.5 knots (9 ships) and 19 knots (10 ships), including the shipper's inventory cost at a cargo value of USD 14,000 per TEU. For SS inventory only, the change from full speed is included.

Source: DNV (2012)

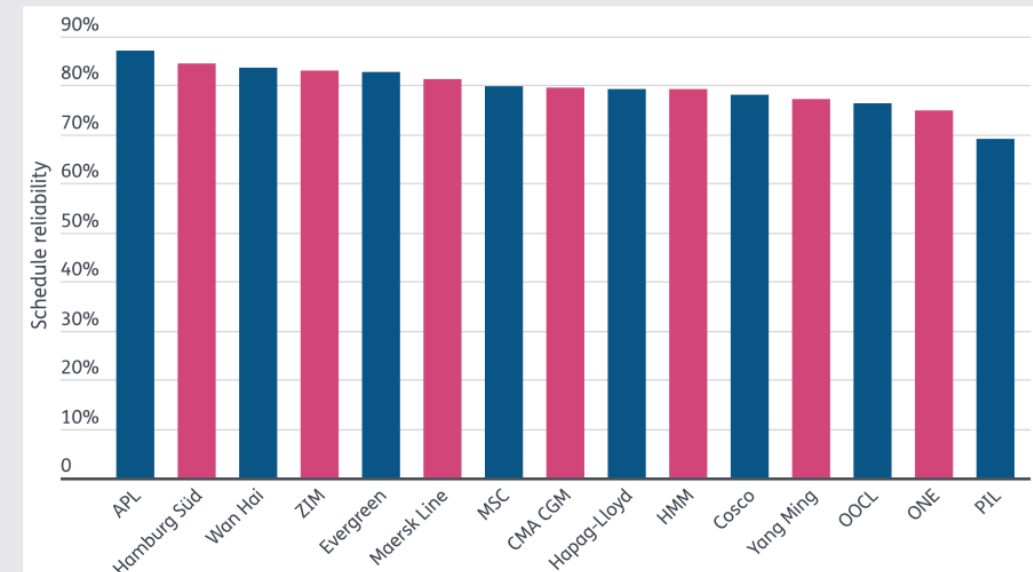
# Balance cost-service quality?

Figure 8: Global schedule reliability



Source: Sea-Intelligence

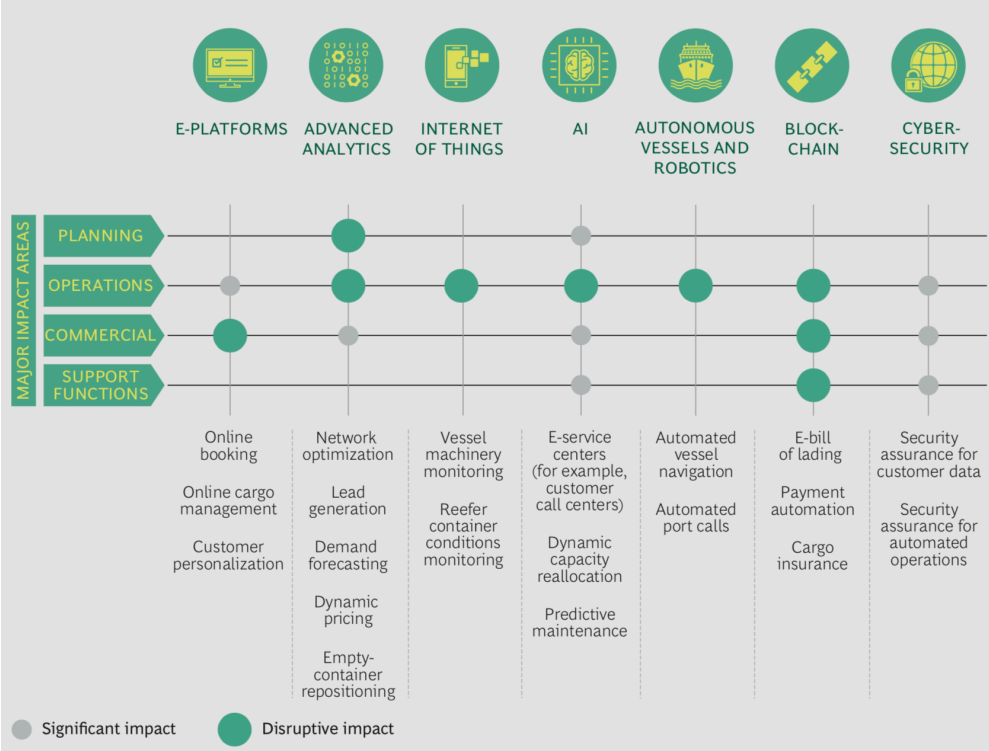
Figure 9: Global top 15 carrier ranking (August 2020)



Source: Sea-Intelligence

# Balance cost-service quality: Digitalization + logistic integration...

EXHIBIT 2 | Seven Digital Trends Will Transform Container Shipping



## Cascading costs

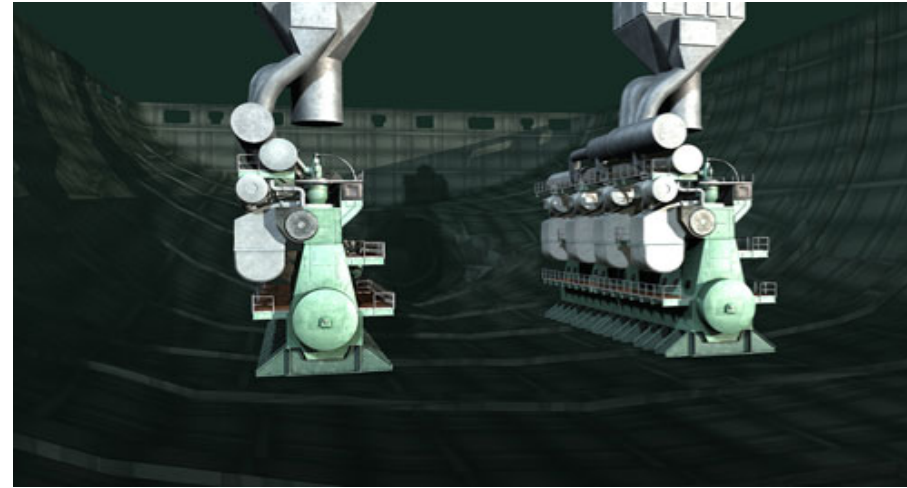
Logistics services worldwide, by sector, 2014, \$bn



Source: Boston Consulting Group

Economist.com

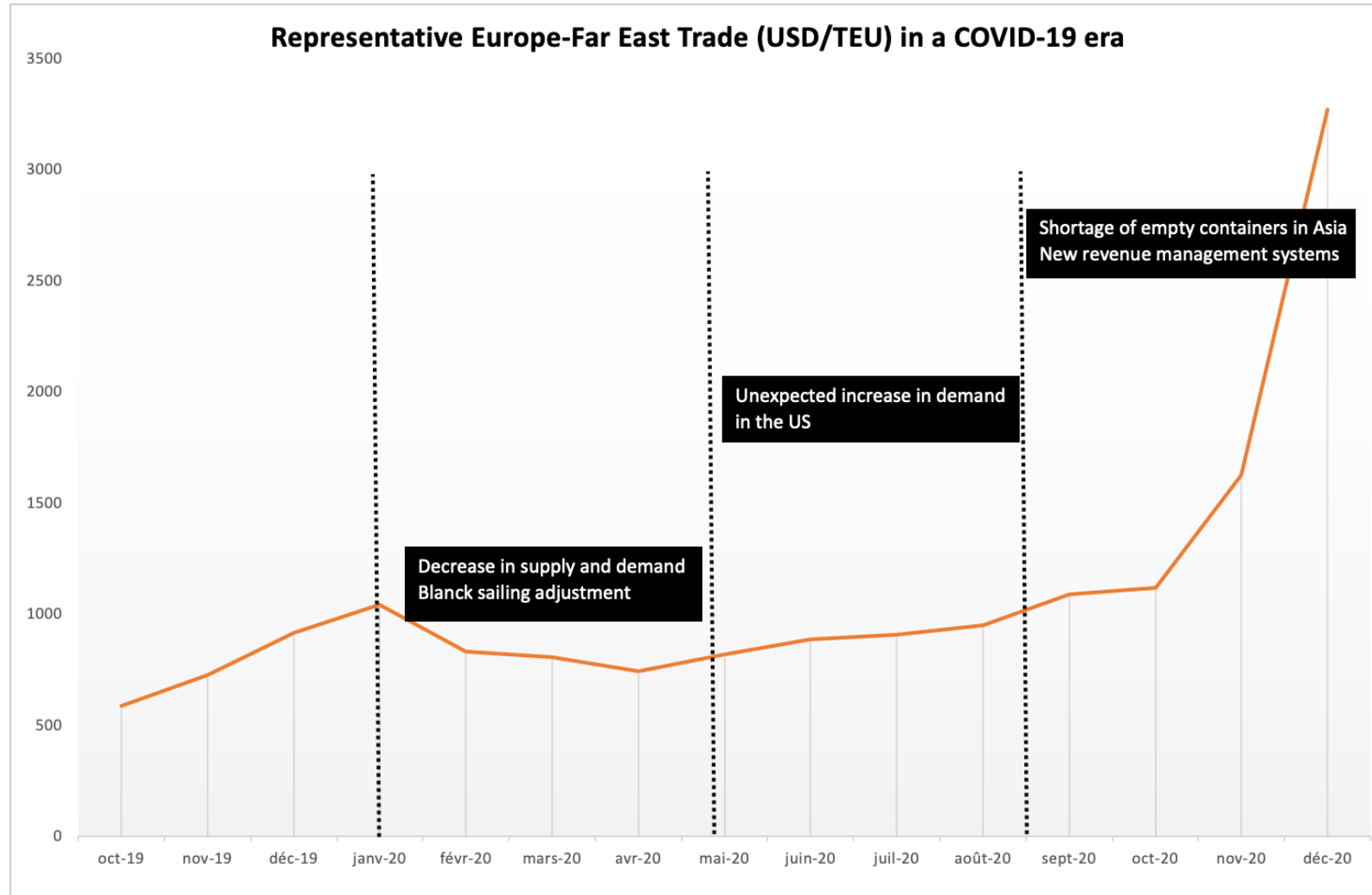
# Balance cost-service quality: Environment



Triple E with:

- Design speed at 23 kt instead of 25 kt and 65-70 megawatts instead of 80.
- 6 Propeller instead of 4, slower rotation and smaller diameter of 9.8 m. instead of 9.6 m.

# ...but with which purpose: Need for new regulation?



Source: Cariou (2020)

Thank you for your attention

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