Drewry
Maritime Advisors

Port & Terminal Technology April 2015

aegir
Port Property Advisers

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Ships

Cascading

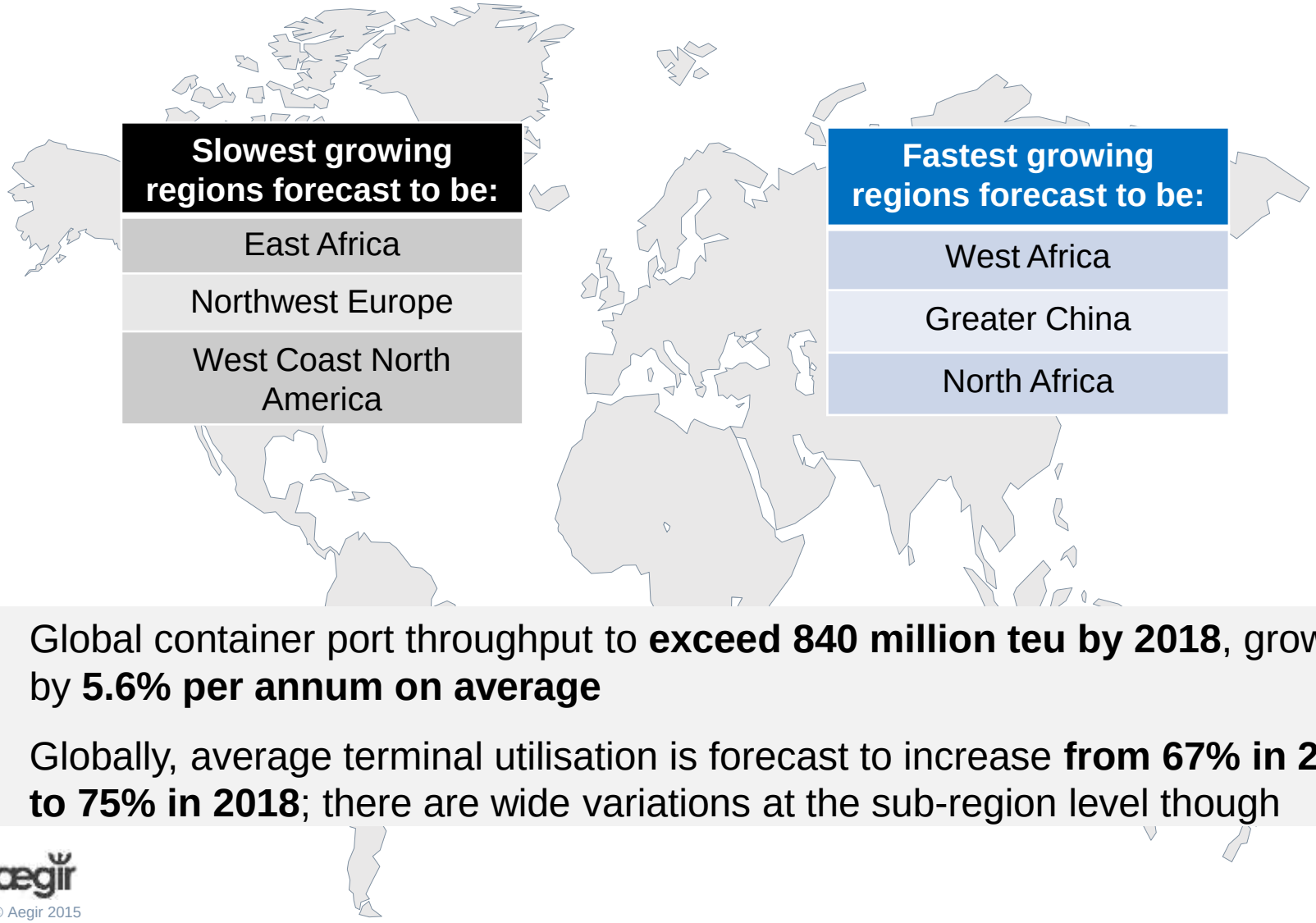
Alliances

Agenda

Demand

Demand and capacity forecasts

- 5 year forecasts of container port demand and capacity for **20 world regions**



- Global container port throughput to **exceed 840 million teu by 2018**, growing by **5.6% per annum on average**
- Globally, average terminal utilisation is forecast to increase **from 67% in 2013 to 75% in 2018**; there are wide variations at the sub-region level though

More transhipment?

Transhipment is a central and critical part of liner shipping operations; bigger ships and alliances increase the need

Hub and spoke

- Connecting mainline and feeder vessels
- Used to serve smaller spoke ports from main hubs

Relay / Interlining

- Mainline to mainline vessel connection
- Used to link together deep sea services at key nodes

Bigger mainline vessels generally mean greater use of transhipment – to fill the ships

Fragmented terminal capacity

Fragmented terminal capacity

Demand for bigger terminals due to consolidated volumes

- Annual volumes per “customer” are increasing - need for bigger terminals in each port and/or bigger ports
- Fragmented terminal capacity – **both physically and in terms of ownership** - is a challenge for many ports e.g. US west coast
- When will rationalisation of assets start to take place?

	Seattle	Tacoma
2013 throughput	1.6m teu	1.9m teu
Number of container terminals in the port	4	5
Number of container terminals with shipping line ownership	4	4

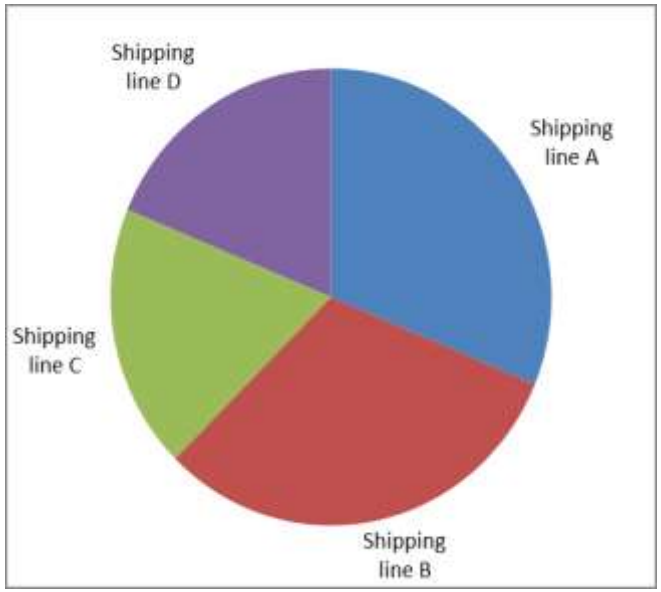
Fragmented capacity means:

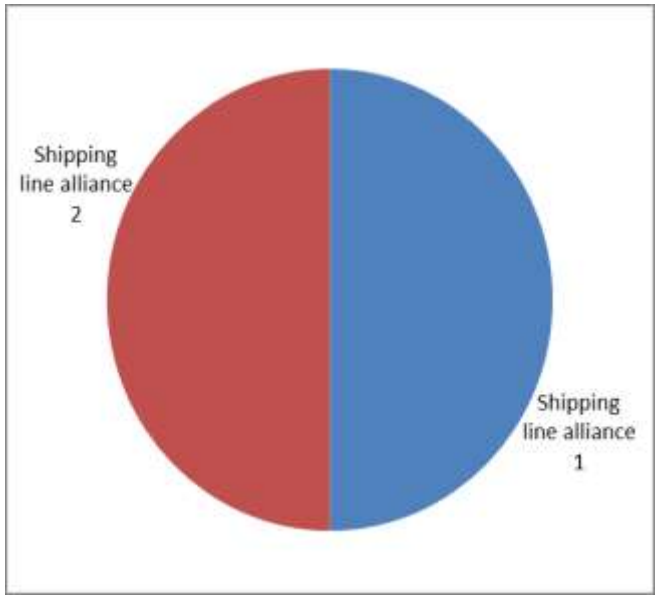
- *Multiple terminal calls in the same port and/or*
- *More inter-terminal transfers*

Los Angeles-Long Beach
G6 vessels use five different terminals

Fragmented terminal capacity

Cargo volumes

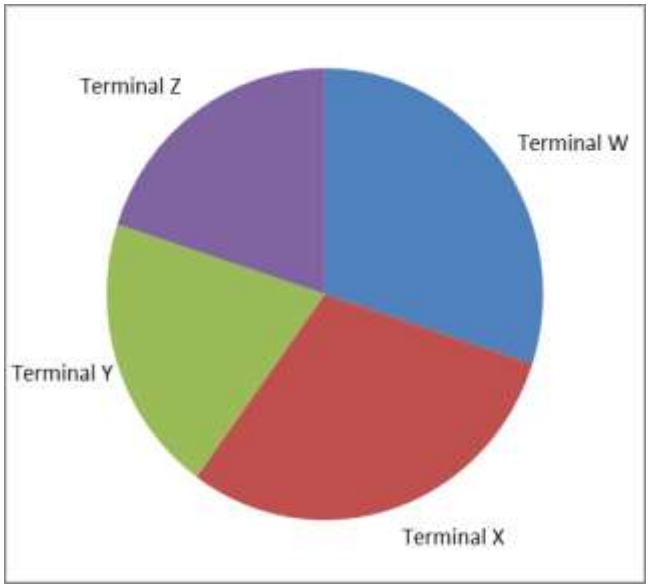




The old days

The new world

Terminal capacity



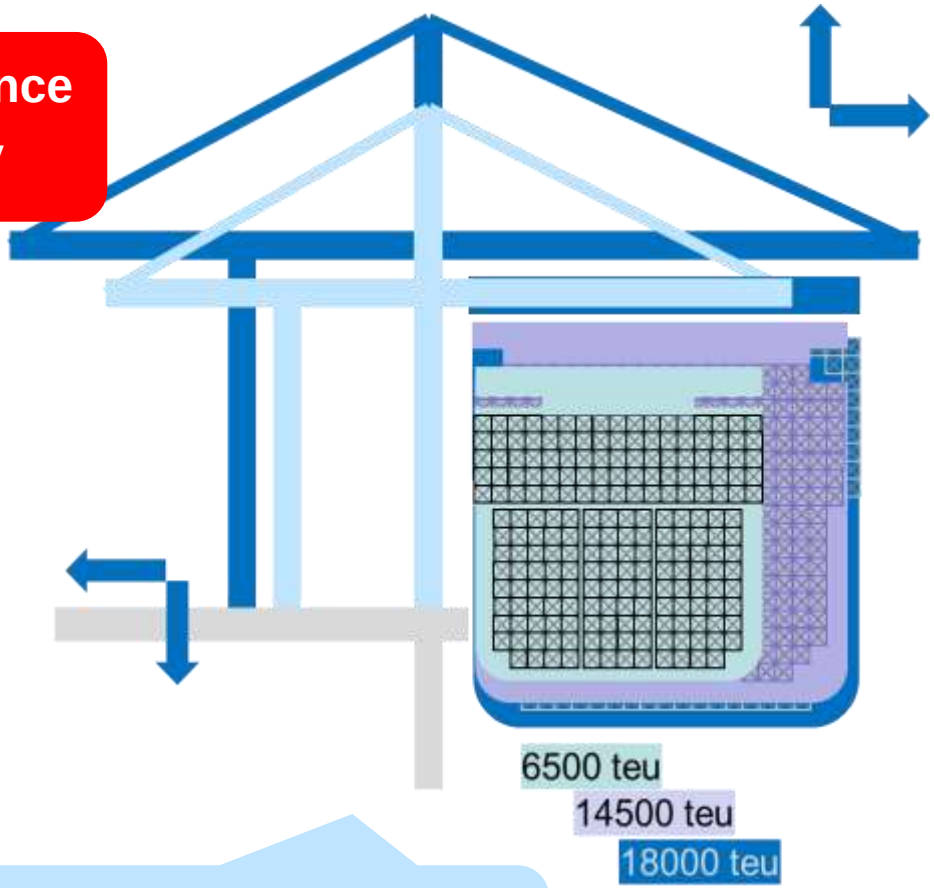
Equipment and infrastructure

Equipment and infrastructure

Bigger ships mean investment in equipment, infrastructure…..and systems

- Larger (and more) cranes
- Longer berths
- Deeper berths
- Deeper approach channels
- Greater air draft
- Higher crane and berth productivity
- And a yard/landside operation …… and inland links …..capable of coping……

Leads to obsolescence of some capacity



Are shipping lines prepared to pay for these enhanced requirements?

Traditional ports out of the game?

Ever larger ships are still accessing ports with navigational restrictions

Maersk Line 18,000 teu vessel in Antwerp

MSC 16,000 teu vessel behind the locks in Antwerp

CMA CGM 16,000 teu vessels call Hamburg

China Shipping 19,000 teu vessel called Hamburg

Traditional ports out of the game?

Ever larger ships are still accessing ports with navigational restrictions

Maersk Lavras (300m LOA, 45m beam, 7,450 teu)

Large vessels in Itajai, Brazil

MSC Loretta (300m LOA, 40m beam, 6,750 teu)

Hamburg Sud 9,800 teu vessel in draft restricted Buenos Aires (at terminal using mobile harbour cranes)

Traditional ports out of the game?

Numerous ports in north-south and secondary trade lanes currently receiving calls by ships of 8-10,000 teu in size

Don't forget:
It's all about the cargo!

Latin America	Black Sea
Buenaventura	Constanza
Buenos Aires	Ilychevsk
Callao	Odessa
Coronel	
Iquique	**Adriatic**
Itajai	Koper
Itapoa	Rijeka
Montevideo	Trieste
Navegantes	
Paranagua	**Africa**
Rio Grande	Cape Town
Salvador	Coega (Ngqura)
San Antonio	Durban
San Vicente	Port Elizabeth
Santos	Port Louis
Sepetiba	

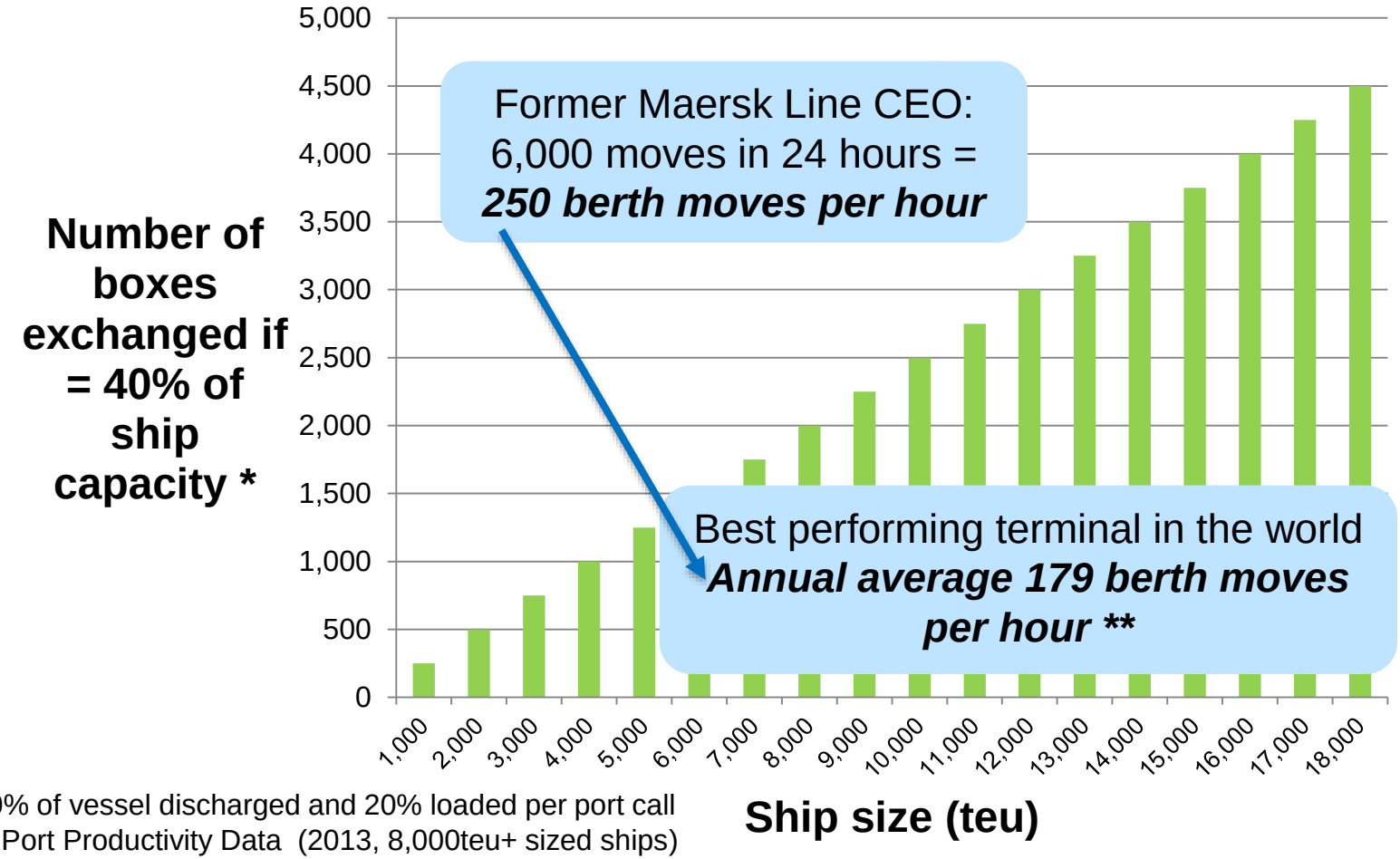
Source: Drewry Route Capacity Database

Agenda

Handling speeds

Vessel call volumes and handling speeds

Size of exchanges per vessel call get very large very quickly



* i.e. 20% of vessel discharged and 20% loaded per port call
** JOC Port Productivity Data (2013, 8,000teu+ sized ships)

Vessel call volumes and handling speeds

Crane intensity/berth productivity is a commercial as well as an operational issue

Operational factors	Commercial factors
• **How the ship is stowed for the port in question** • **Size of the container exchange per vessel call**	• Speed of turnaround required or guaranteed • Flexibility, availability and cost of dock labour (and their normal hours of working)

What level of productivity does the shipping line want (they may not want the fastest) and

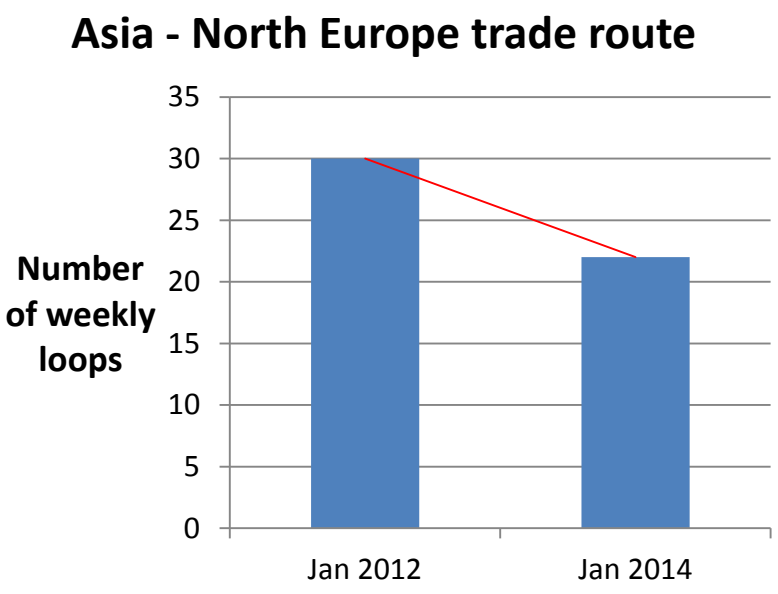
are they prepared to pay for it?

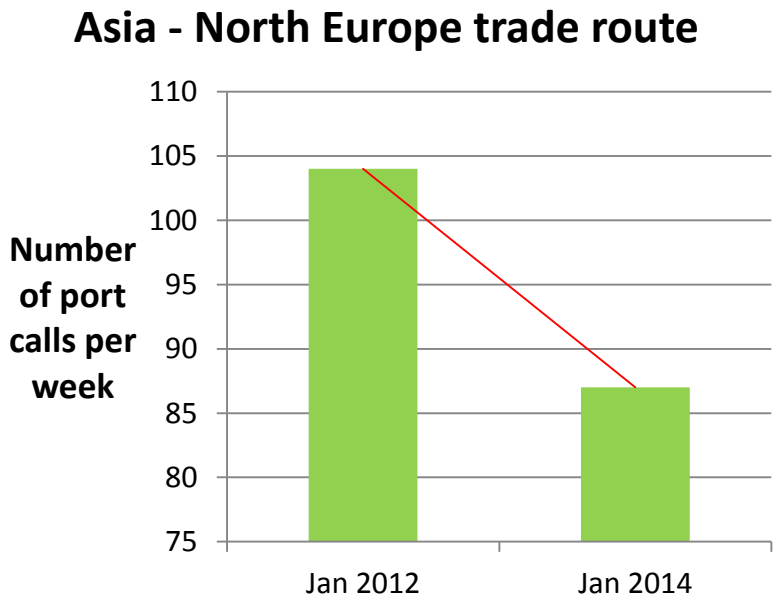
Demand peaks

Changing nature of demand

Same overall volume, same list of ports of call……. but greater peaks

- Typically the same number of ports called at per loop, but less frequently





Changing nature of demand

Same overall volume, same list of ports of call……. but greater peaks

- Fewer port calls by bigger ships = greater peaks and troughs at terminals (shipside and landside)

ECT website: 28 October 2014

"Last weekend, the *Thalassa Pistis* of Evergreen Line called at the ECT Delta Terminal where the ship set a new record for ECT and for the Port of Rotterdam: during its visit to the terminal, 10,557 containers were handled"

"On the vessel a berth productivity of more than 150 container moves per hour was achieved"

Even with this very good handling speed, the vessel was still in port for nearly 3 days

Changing nature of demand

To peak or not to peak?

Before

3,000 boxes

3,000 boxes

MONDAY

After

6,000 boxes

Changing nature of demand

To peak or not to peak?

Before

3,000 boxes

3,000 boxes

MONDAY

THURSDAY

After

6,000 boxes

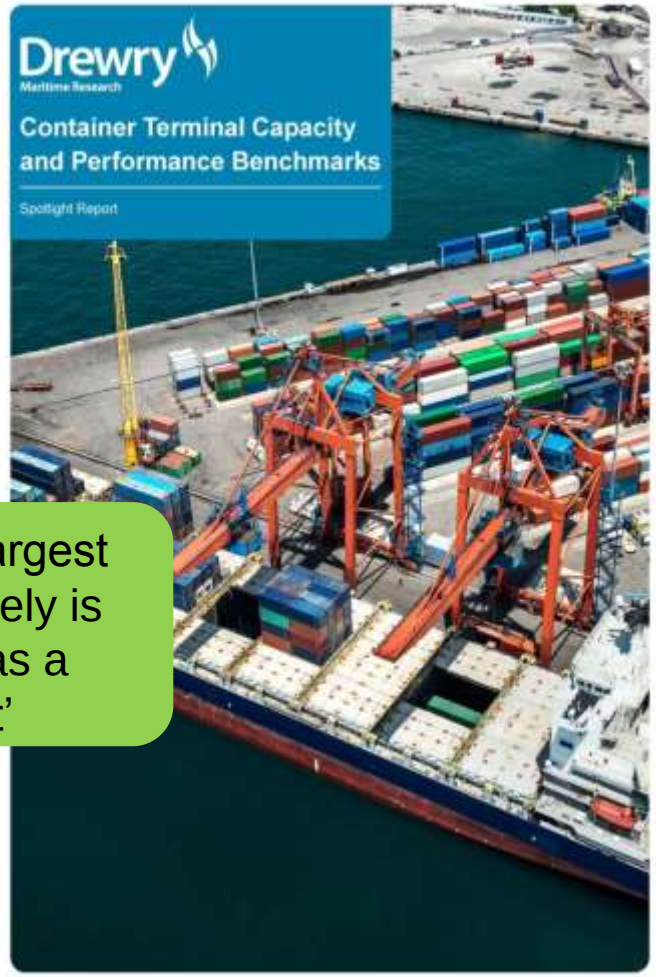
And what if the ships are off-schedule too?

Intensity of asset use

Terminal industry performance

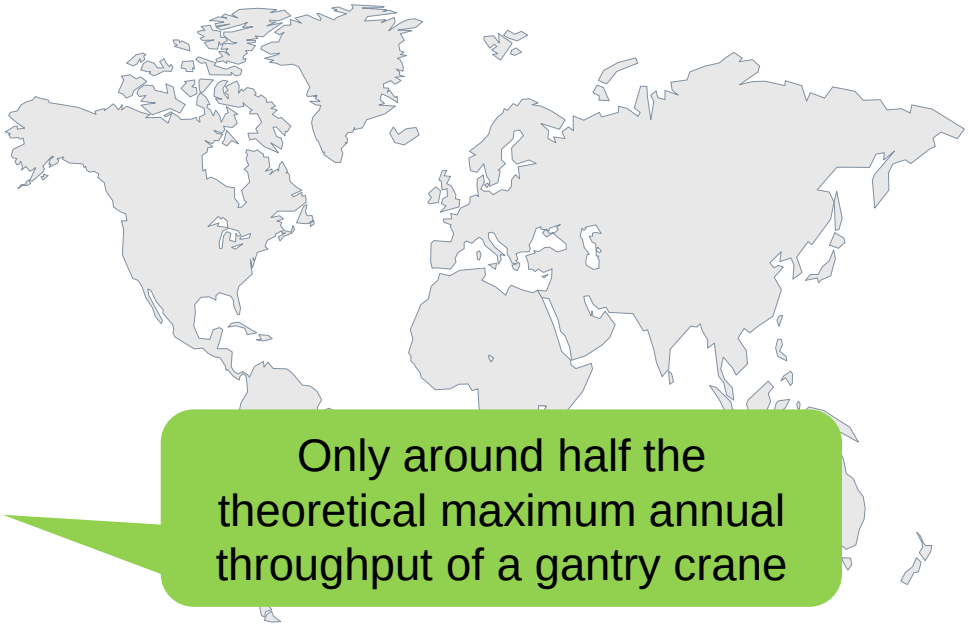
- ✓ Actual performance of a sample of around 500 terminals worldwide, each with a throughput of > 200,000 teu per annum
- ✓ The analyses reflect the most important - and expensive - infrastructure and equipment assets
- ✓ Covers the three key aspects of container terminals:
  - ✓ Quay line
  - ✓ Yard
  - ✓ Ship-to-shore gantry cranes
- ✓ Deliberately distinct from typical service level related measures such as crane moves per hour

Yet, port authorities' largest asset – property – rarely is taken into account as a 'performing asset'



Global container terminals: Key asset performance metrics

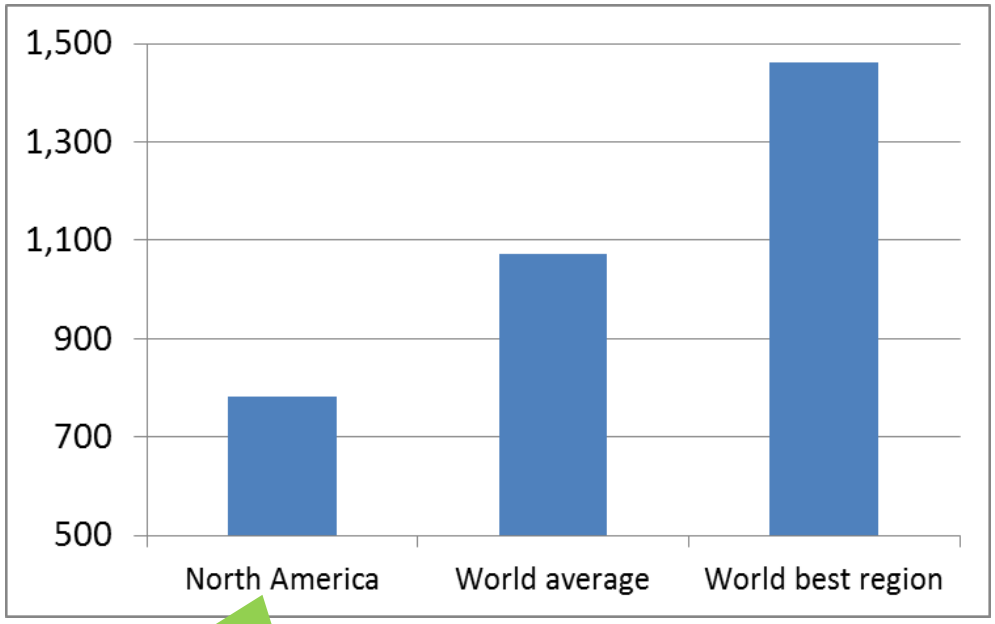
Performance measure	Global average (2013)
Teu per metre of quay p.a.	1,072
Teu per hectare p.a.	24,791
Teu per gantry crane p.a.	123,489



- On all three measures, terminals in Asia and the Middle East generally achieved higher figures than the world averages
- The difference is most marked in teu per hectare where the highest performing regions saw up to 70% more than the world averages
- Regions which achieved lower figures than the world averages included North America and parts of Europe

Key asset performance metrics – Regional variations

Teu per metre of quay, 2013



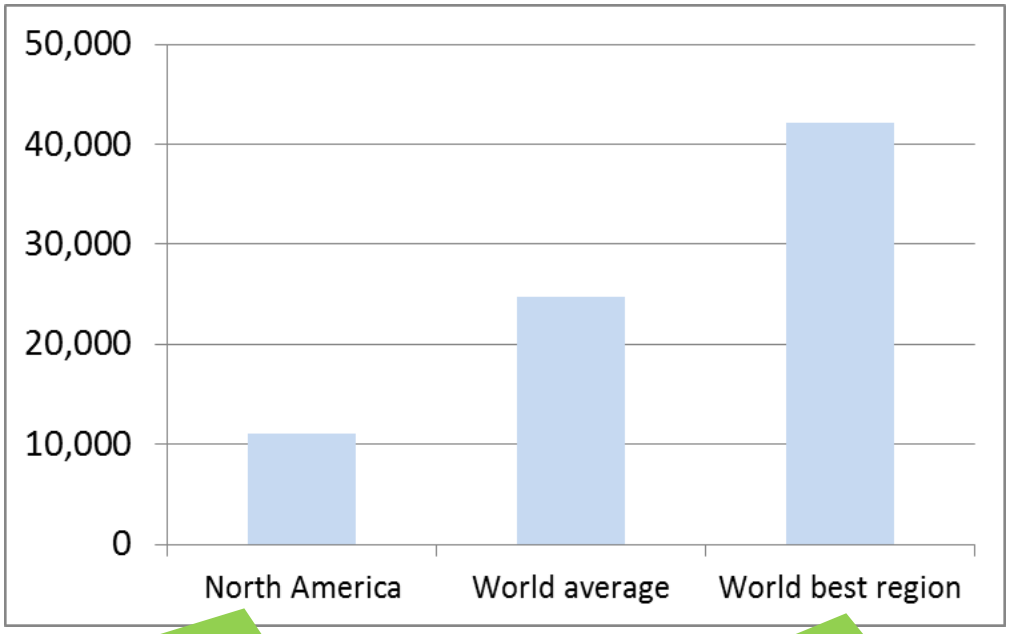
North America is one of the lowest figures, along with several other regions

World best region is 36% higher than world average

Key asset performance metrics – Regional variations

Bigger ships = higher productivity per hectare (ha) and more land;
8k teu requires 40 ha, 12.5k teu ≈ 65 ha

Teu per hectare, 2013

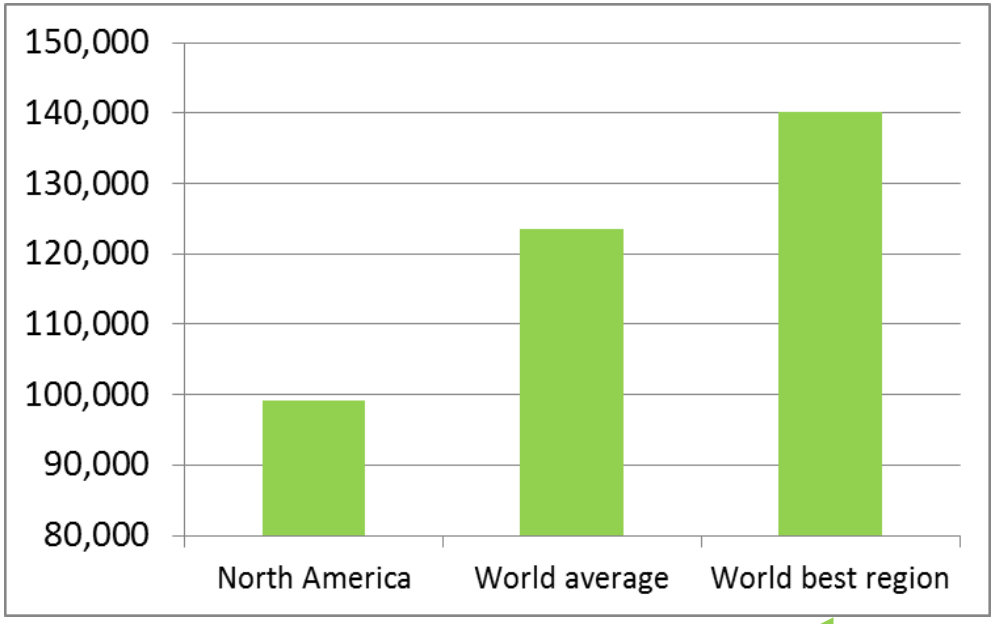


North America has the lowest figure of any region

World best region is 70% higher than world average

Key asset performance metrics – Regional variations

Teu per gantry crane, 2013



World best region is only 14% higher than world average

Global container terminals: Key asset performance metrics

There are a number of reasons for performance differences:

- **Terminal size**: The performance of large terminals is markedly higher than small ones
- Average terminal size in Asia and Europe is much higher than in places such as Africa or South America, or indeed North America
- **Traffic type**: The performance of transhipment terminals is markedly higher than gateway ones
- Reasons include:
  - Larger vessel sizes and container exchanges per call
  - Lower container dwell times
  - Most transhipment terminals are much larger than most gateway ones

Global container terminals: Key asset performance metrics

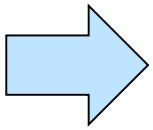
- Choice of **yard equipment** naturally has a strong bearing on teu per hectare, and many Asian terminals have high density RTG and RMG systems
- Terminals with smaller throughputs have a greater tendency to use low density yard stacking equipment, and those with higher throughputs use denser yard stacking solutions

Automation

Geographical range spreading

Countries with at least one container terminal with significant equipment automation technology deployed (or planned)

10 years ago
Australia
Germany
Netherlands
Singapore
UK



Today
Australia
Belgium
China
Germany
Japan
Netherlands
Singapore
South Korea
Spain
Taiwan
UAE
UK
USA

Impact of Unions?

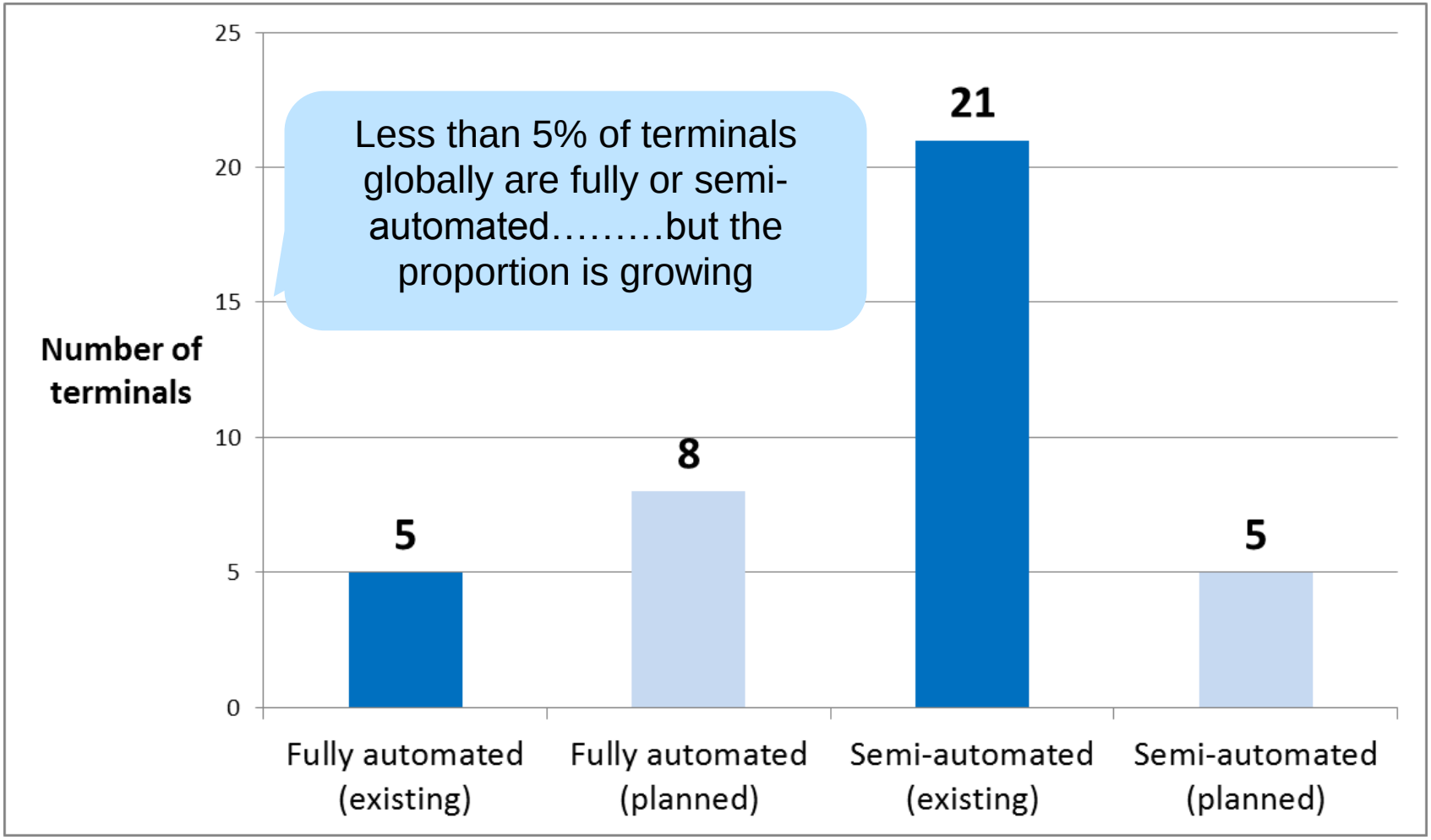
Low wage economy

Low wage economy

Picking up pace

Small number but growing

Existing and planned fully and semi-automated container terminals



Agenda

Port authority's environment? It's a jungle out there!

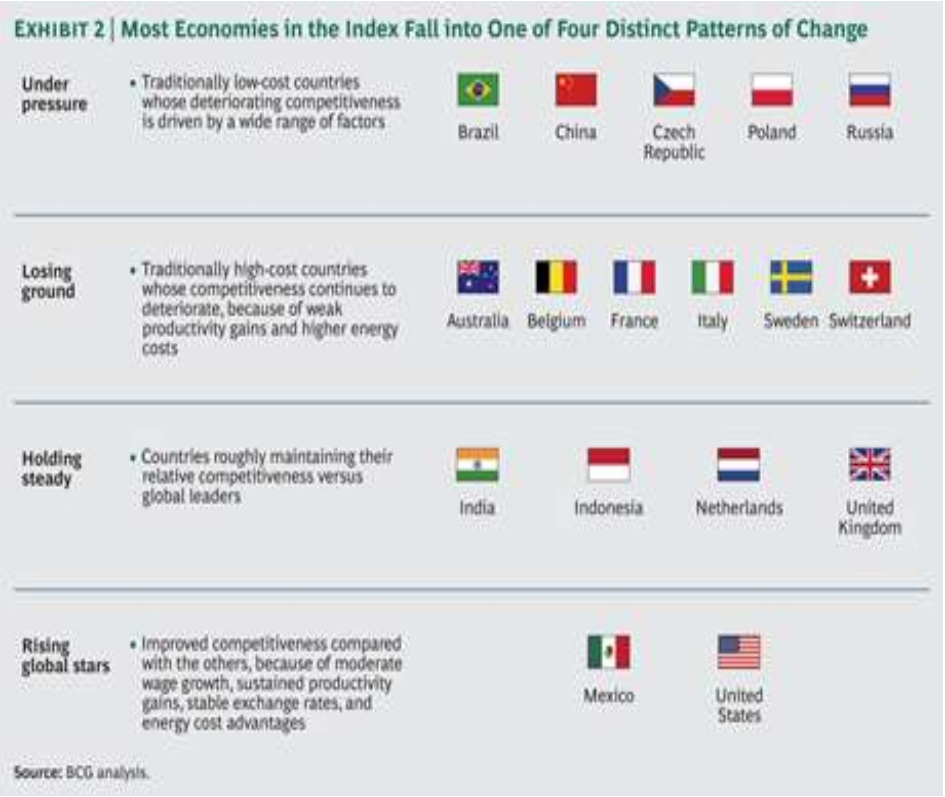
- Government's running deficits, budgets do not support entitlements = aggressive hunt for revenues: ports easy targets
- Port authority corporate ownership/structure easily allows them to be used as 'banks' for 'economic development' rather than be run as businesses or landlords
- City demand for urban waterfront (economic obsolescence)
- Capital for port expansion and modernization has far outpaced government's ability to properly fund port infrastructure now
- PA's increasingly held accountable for self financing and profitability
- Port property values, their high barriers to entry, the aforementioned and more clearly indicate that in most cases ports subsidise their users, tenants and clients – how long can this last?

Ports – nodes in ever expanding/integrating global supply chain

- Supply/logistics chains increasingly controlled by global shipping lines, 3PL's
- Present supply chain weak link - ports' and their inability to process more throughput faster
- Property at, near and related to ports and through supply/logistics/growth poles key to addressing these issues
- Competition today between regions (eg, NAFTA and ASEAN) and Global Cities; not between ports but between supply and logistics chains
- It is all about delivering the fastest, cheapest and deepest supply route for clients – ports need to take the leadership role – the nexus – on transport side (versus logistics), to facilitate more efficient supply chains

Example: dramatic shift in cost and supply chain competitiveness = changing global production strategies*

- Low cost manufacturing centre perceptions out of date
- BCG study: China, Brazil, Russia, Czech Rep no longer < expensive than US
- China's manufacturing cost – 6% > than Mexico
- Mexican labour 13% less expensive than China, adjusted for productivity
- Rising manufacturing Global Stars: US & Mexico



Boston Consulting Group: The Shifting Economics of Global Manufacturing: how cost competitiveness is changing worldwide (2014)

Agenda

Conclusions

- Important distinction between service and asset intensity related performance measures
- Asset performance shows wide variation depending on location, terminal size and traffic type
- Terminal automation is high profile, even though its deployment, for now, is relatively limited
- Average 5.6% p.a. demand growth over next 5 years and increase in average terminal utilisation levels; significant regional variations though
- Fragmented terminal capacity - a significant issue
- Demand peaks caused by bigger ships - a serious challenge

Conclusions

Bigger ships + Same berth productivity = Longer port stays

Bigger ships are squeezing into restricted ports because “cargo is king”

Bigger ships + cascading + bigger alliances = huge implications for all ports and terminals

Port authorities under increasing pressure to financially perform by shareholders ie, governments

Port property as an asset class will underpin future financial engineering at ports

It is all about achieving economies of scale – on sea and on land!

Providing comprehensive maritime and port property intelligence service and advice
Unique expertise of shipping, port and property senior executives and knowledge base

Aegir services include:	*Drewry services include:*
Port Property 'highest and best use'	Maritime research and publications
PP lease structuring	Bespoke consultancy
PP valuations, income analysis	Investment advisory
PP asset management plans	Maritime equity research
PP development/investment advice	World Container Index

Thank you!

Drewry was founded in 1970 as a provider of independent information and advice to the global maritime industry. Since then we have worked with over 4,000 clients in more than 100 countries.

Aegir was founded in 2003 and is the pioneer port property consultancy meeting the unique real estate challenges of the ports and maritime industries worldwide.

Drewry and Aegir:
Bridging the gap between the maritime, ports, logistics and property industries.

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