INSTITUTE OF CHARTERED SHIPBROKERS – LINER TRADES

Session 4

Development of Through Transport Systems - Containers and Intermodal Transport

Hellenic Management Centre – Feb/Mar 2021

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Course Outline

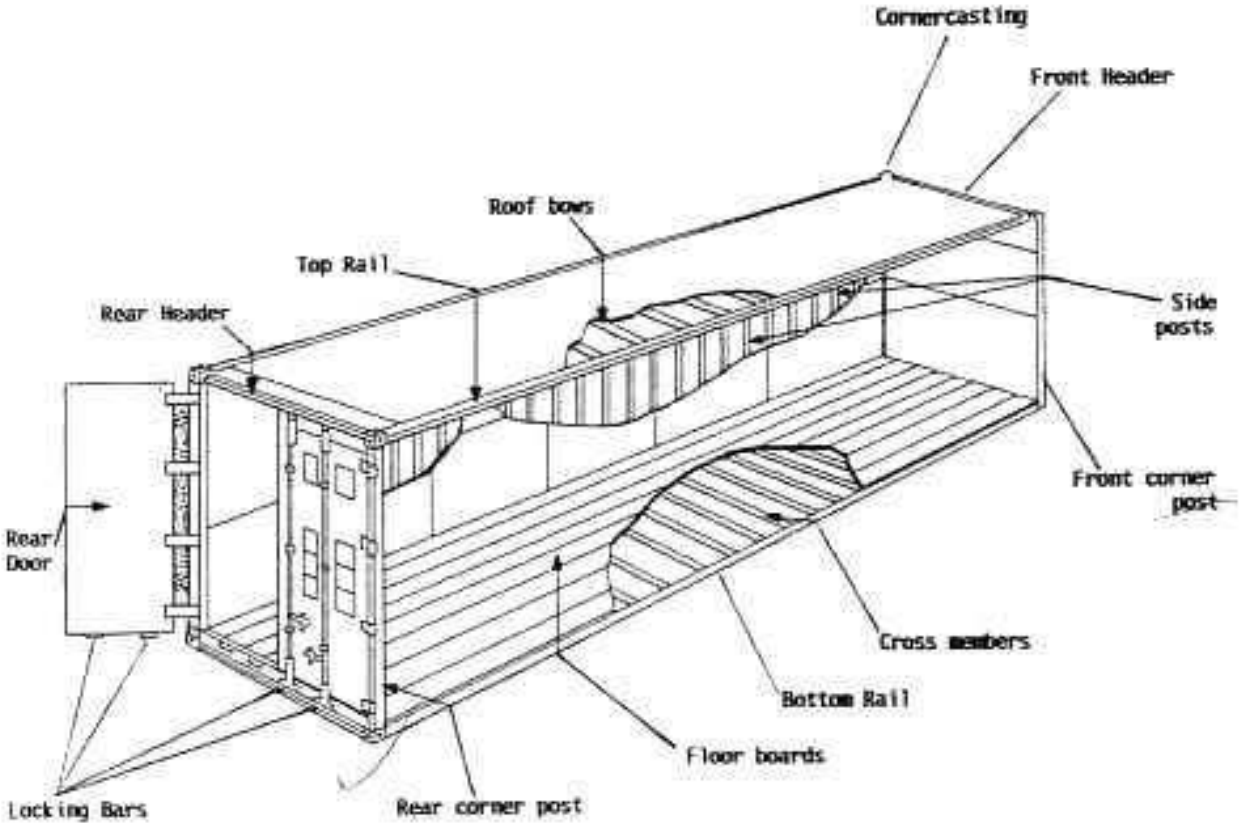
(1) Introduction – Liner Shipping and the Container Revolution
(2) Liner Ships
(3) Ports, Terminals and Cargo Handling
(4) Through transport systems – containers and intermodal transport
(5) Container Lines and their networks – co-operation
(6) Container Lines and their networks – service structures
(7) Types of businesses in the liner sector – structure and organization
(8) Bills of Lading and other contractual documents
(9) Contracts between sellers and buyers
(10) Revenue and Costs in the Liner Business
(11) The Future for Liner/Container shipping

Topics for this session

- Development of the container
- Sizes and types of containers
- Owning and leasing containers
- Management of container fleets
- LCL/FCL, door to door vs port to port
- Inland transport – role of road, rail and barge/short sea services
- Inland depots
- Landbridges

The Container

The Container



Major components of the container:

International Organization for Standardization (ISO)

- Independent non-governmental organisation
- Membership comprises 162 national standards bodies
- Standards to facilitate international trade
- Standards cover, for example
  - Quality management systems (ISO 9001)
  - Design/construction of containers
  - Handling and Securing of Containers
  - Identification and Marking of Containers
  - Container equipment data exchange

Containers – Unique Features

- ISO Standard sizes
  L 20’/40’/45’
  H 4’3”/8’/8’6”/9’6”
  W 8’
  (96% of world fleet)
- Gross weights
  28 to 38 tonnes
- Box construction with standard castings at each corner
- Corner posts can withstand pressures of 96 tonnes
- Individual serial number
- Fixtures for security seals

Container Markings

Owner code

Check Digit

Unique registered number

ISO Size type Code

Inspection certificate (ACEP)
approval for continuous examination programme

Classification Society

Types of Containers

- Standard or Dry Freight, also called GPs
- 20ft x 8ft 6ins high
- 40ft x 8ft 6ins or 9ft 6ins (Hi Cube) high
- 45ft x 9ft 6ins high (Hi Cube)
- Bulk Containers – hatches in the roof, and flap at end to empty
  - For dry bulk cargo, e.g. malted barley
- Open Top – for heavy, bulky or overheight cargo; can be loaded by crane; supplied with a tarpaulin cover (called a 'tilt')
- Half Height Container – for very heavy cargo, where the full cube of a 8ft 6ins high container cannot be used – stow two together in a slot on a ship
  - For metal ingots
- Platforms – for awkwardly shaped/break bulk cargo
- Flat Racks – platforms with ends, so they can be stacked on top of each other
  - Some have collapsible ends, so they can be locked together when moved empty
- Ventilated Containers e.g. for coffee, cocoa beans – they have vents at the top of the side panels
- Tank containers for bulk liquids, including hazardous cargo; generally for specific liquid chemicals
- Refrigerated Containers – refrigeration unit at end away from the door; plugged into electric supply on ship and in terminal; can also use a generator on road/rail transport if needed 20ft x 8ft 6ins; or 40ft x 9ft 6ins (Hi Cube) 20fts represent 5% of the global reefer fleet; there is a very small number of 40ft x 8ft 6ins reefers

- For full specifications, try:
- https://www.hapag-lloyd.com/en/products/fleet/container.html

Container Types (1)

TYPE OF CONTAINER		INTERIOR DIMENSIONS (MM)	DOOR OPENING (MM)
20 FT DRY CONTAINER		L:5880-5895 W:2330-2350 H:2380-2390	W:2330-2340 H:2275-2280
40 FT DRY CONTAINER		L:12024-12032 W:2330-2350 H:2380-2390	W:2330 H:2275-2280
40 FT HIGH CUBE DRY CONTAINER		L:12032 2330-2350 H:2680-2695	W:2330 2340 H:2585 2583
20 FT OPEN TOP CONTAINER		L:5880-5897 W:2330-2350 H:2329-2350	ROOF OPENING W:2200-2230 L:5396-5757
40 FT OPEN TOP CONTAINER		L:12007-12030 W:2330-2350 H:2329-2367	ROOF OPENING W:2190 L:11500-11871

Container Types (2)

20ft Flat rack - collapsible ends upright

40ft Flat rack - collapsible ends folded 42P3

20ft tank container 22T1

20ft bulk container

Half height open top container 48U1

Flexitanks

- Transporting non hazardous liquids
- Food and non food grade
- Up to 24,000 litres
- Wine, Fruit juices, vegetable oils, palm oils, Fructose, Malt Extract, Coconut oils etc.
- Detergents, lubricants, paraffin wax, non hazardous chemicals waterbased paints
- Need to check each product is compatible with the material of the flexitank
- Reduces costs, particularly of empty positioning

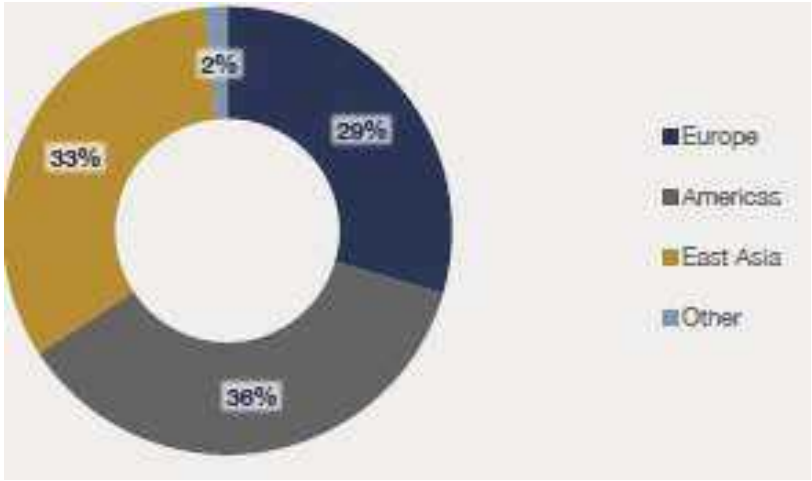
Hangertainers

- System for transporting clothing without folding
- So no pressing needed at destination
- System needed with lining for container, rails to be fitted (without damaging the container)
- Equipment needs to be removed at destination so container can be reused as GP container
- Then equipment sent back to origin for reuse

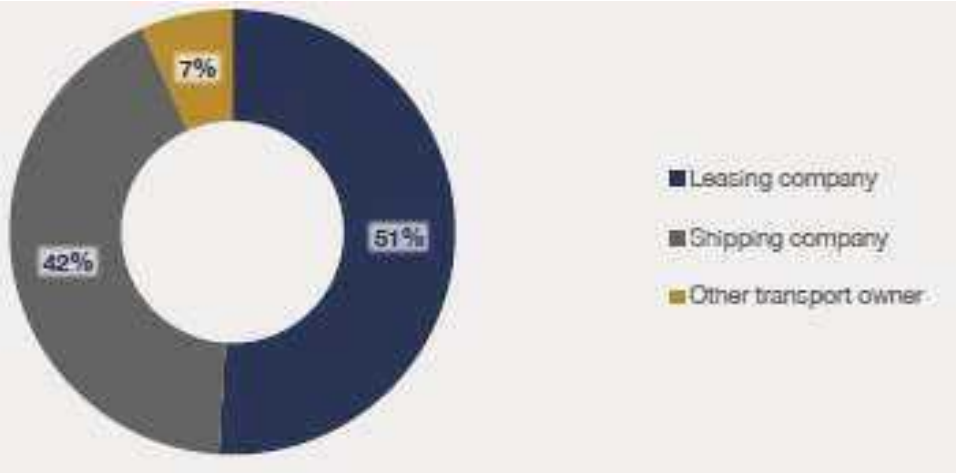
World Container Population 2019

World container fleet
41.1m TEU
26.6m units

Breakdown by Geographical Ownership (teu)



Breakdown by Container Ownership (teu)

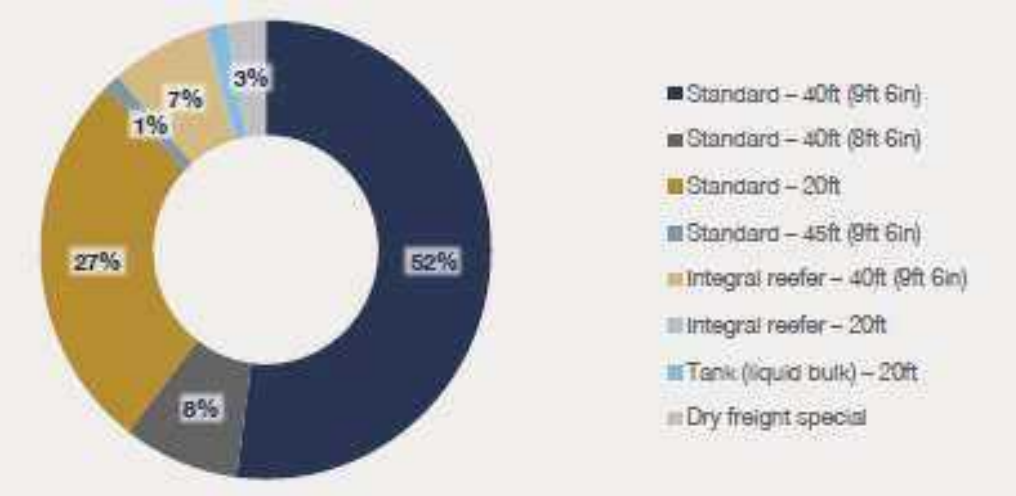


Source: Drewry Maritime Research

World Container Population 2019

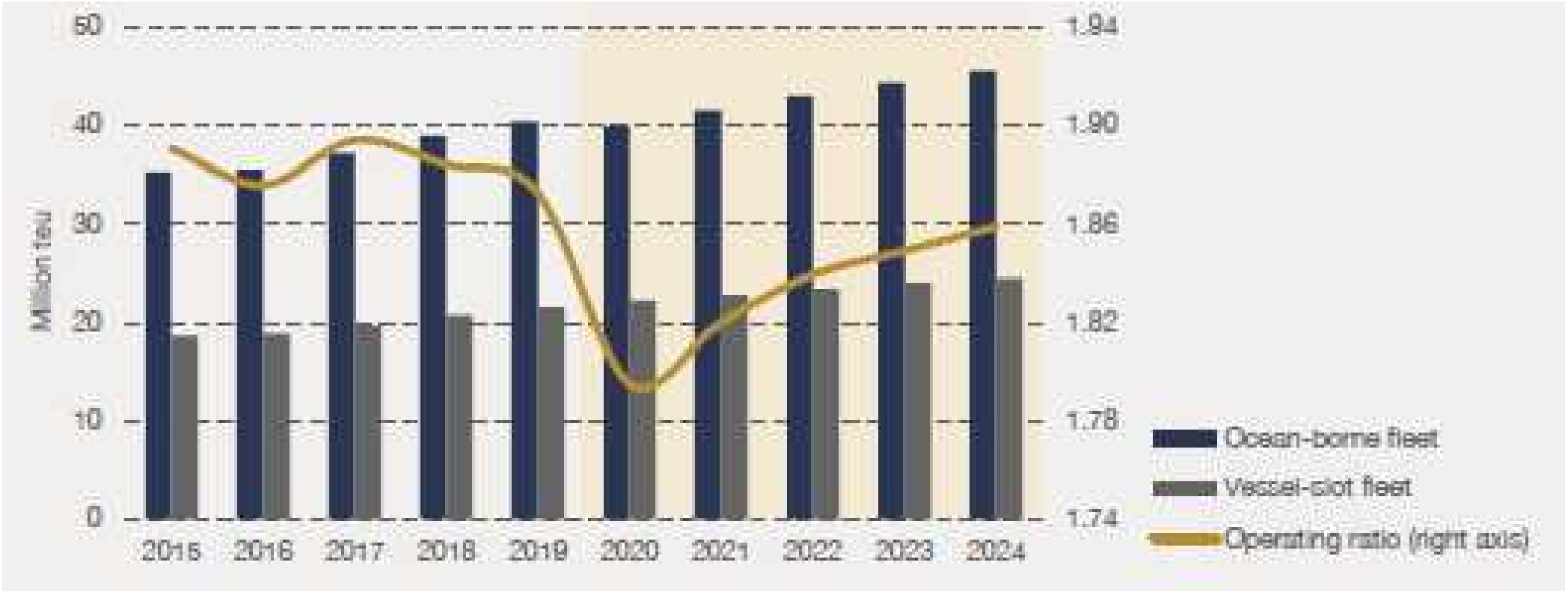
World Container Fleet by Size (teu)

Breakdown of Maritime Containers by type



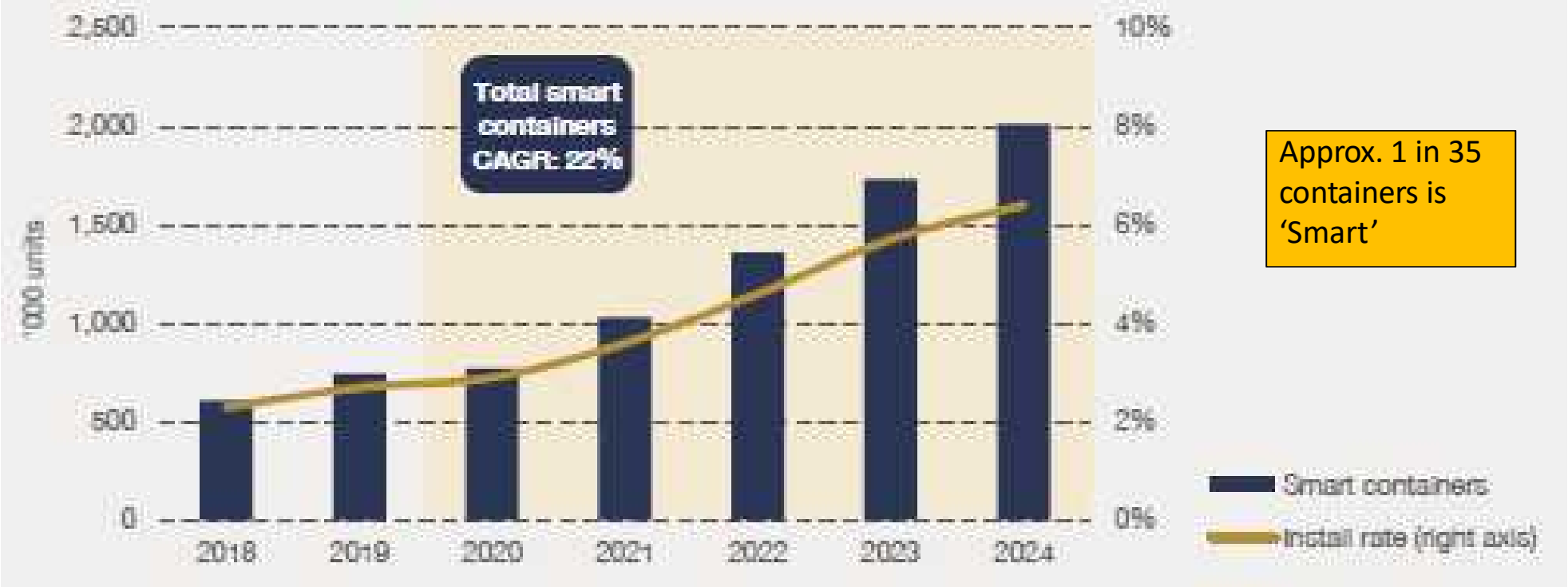
Source: Drewry Maritime Research

Container to Vessel Slot Ratio



Source: Drewry Maritime Research

Global Fleet of Smart Containers



Approx. 1 in 35 containers is 'Smart'

A container becomes smart when fitted with an electronic device which is able to transmit information and alerts about its location or the condition of its cargo via mobile technology

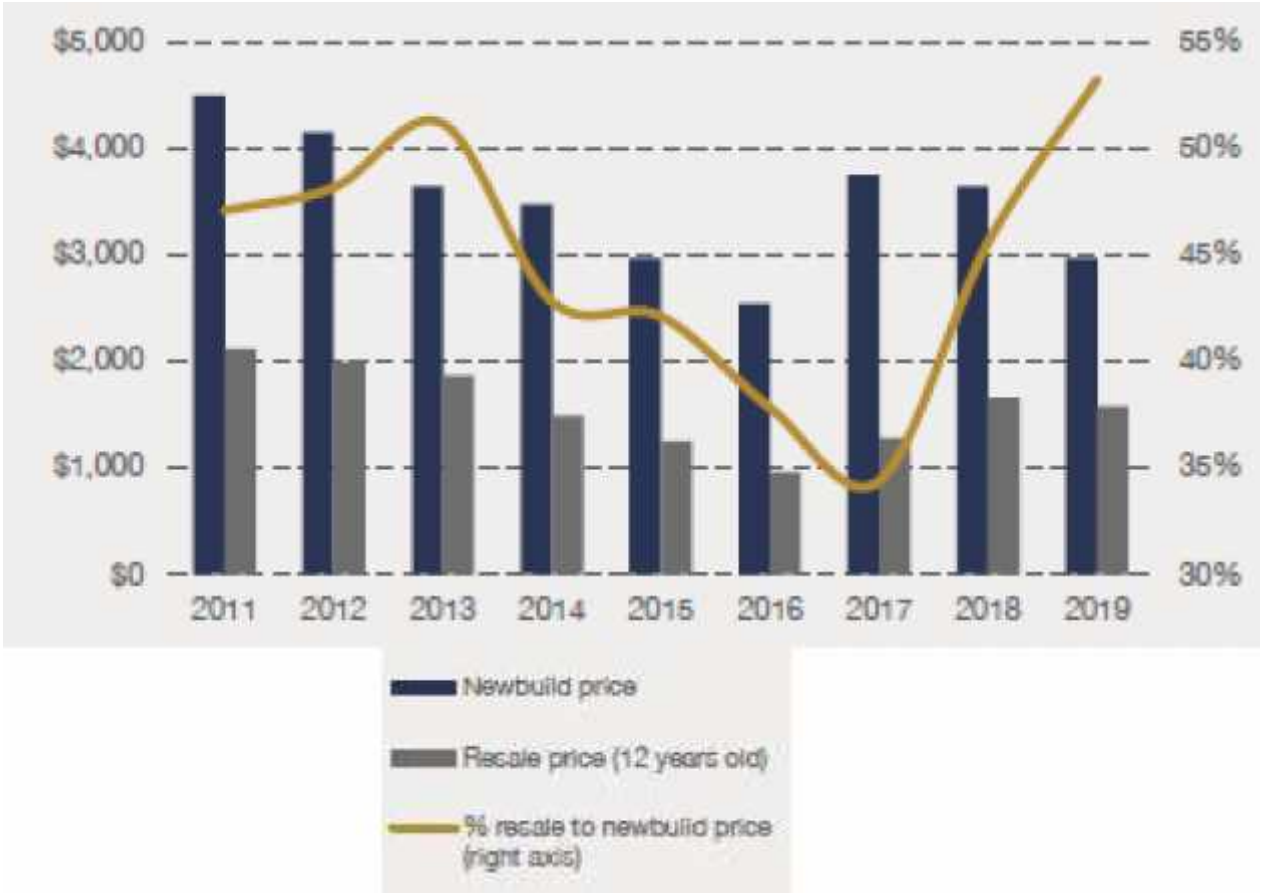
Source: Drewry Maritime Research

Price of containers (2018)

	Ex factory price (US$)
20ft Standard	2,150
40ft Standard	3,450
40ft High Cube	3,650
20ft Reefer	13,000
40ft Reefer	16,150

Source: Drewry Maritime Research
Data as at year end 2018

Resale price vs new price after 12 years (40ft Hi Cube)



Examples of Second Use:

- Local retail stores requiring temporary storage
- Construction companies storing tools and materials
- Factories
- Local traders and trucking companies (particularly in India and China)

Source: Drewry Maritime Research

CONTAINER MANAGEMENT SYSTEMS

Container Management

Objective:

To supply the right container at the right place at the right time to meet customer requirements

Also – ‘ at lowest possible cost’!

Balance to be struck between costs incurred and meeting all customer requirements

Container Management

Functions

- Determine fleet size
- Owning vs Leasing
- Inventory Control – track the containers
- Stock planning – vital role of forecasting
- Maintenance and Repair
- CSC compliance

Container Management

Fleet Size

- Forecast container volumes by type
- Container turntime
- Seasonality
- Safety Margin

Determining Fleet Size

ROUND TRIP OF A CONTAINER	days	Notes		
Empty available in Hong Kong	10	may be extra time under repair		
Under Export Load Hong kong	7			
At Sea Hong to Southampton	28			
Under Import Load at terminal	5			
Loaded Transport to Manchester	2			
Empty available at Manchester	7	may be extra time under repair		
Under Export Load Manchester to Southampton	2			
Export Load at Terminal	5			
At Sea Southampton to Hong Kong	28			
Under Import Load in Hong Kong	7			
Empty Available in Hong Kong		completes the cycle		
TOTAL	**101**			
How many trips per year?	365/101	equals	3.6	
In order to move 10,000 loaded moves per annum in the dominant direction				
we need	10,000 divided by 3.6 containers			
equals	2,767	containers		

Fleet Size - Issues

- Different container types
- Seasonality
- Not all containers are loaded in both directions
- Safety Stocks – set on standard or actual?
- How much extra stock do we hold to cover
  - Operational disruption
  - Unforecast demand??

Container Management

Own vs Lease

- Benefits of owning
  - Cheaper in the long run (if you have the capital!)
  - Control of specification
  - Logo on the container
- Benefits of leasing
  - Avoids capex
  - Flexibility (unwanted boxes can be offhired subject to lease terms – additional boxes at short notice)
  - Can be used to reduce imbalance costs (see next slide)

Container Management

Types of Leases

- 'Finance' lease
  - Long term agreement – may be option to purchase at end of the lease
- Long Term Lease
  - Typically 1 – 5 years
  - Fixed number of containers
  - Normally no provision for early return of the container
- Short Term Lease
  - Minimal commitment – say 90 days
  - High daily rate
  - Subject to availability
- Master Lease
  - Typically 1 – 3 years
  - Minimum volume commitment, but containers can be on/off hired – total number of containers can exceed the minimum
  - Schedule of allowed pick up/drop off locations with charges/credits

Container Management

Balancing Container Supply and Demand

- Surplus and deficit locations
- Ways to balance
  - One way leases (in and out)
  - On hire/off hire leased containers
  - Use a different container type?
  - Imbalance empty containers (usually most costly)
- Incentivise commercial organisation to secure bookings which minimise empty repositioning cost (Yield Management)

Container Management

Balancing Container Supply and Demand- Global Picture

	Imbalance by Region (2015)			
	IN	OUT	Surplus/ (Deficit)	Imbalance (%)
	TEU '000	TEU '000	TEU '000	
Far East	22,458	50,133	-27,675	55.2%
North America	26,127	14,553	11,574	44.3%
Europe	23,146	19,765	3,381	14.6%
Middle East	10,301	3,436	6,865	66.6%
South Asia	5,837	5,550	287	4.9%
Latin America	6,953	5,894	1,059	15.2%
Africa	5,640	3,189	2,451	43.5%
Australasia	4,139	2,081	2,058	49.7%
Total	104,601	104,601	0	

Container Management

Location Stock Planning

FORECASTING STOCK AT A LOCATION (units)	CONTAINER TYPE:		40ft GP
	BALANCE	ADD	SUBTRACT
Standard Safety Stock	**400**		
Opening Stock - Available	500		
WEEK 1			
Add: Imports unpacked		100	
Add: Under Repair returned to Available		20	
Add: Imbalance containers arrived (ex vessel: xxx)		100	
Add: Lease container pick up		50	
Less: Exports allocated/packed			400
BALANCE - end WEEK 1	**370**		
WEEK 2			
Add: Imports unpacked		100	
Add: Under Repair returned to Available		20	
Add: Imbalance containers arrived	(none currently planned)		
Add: Lease container pick up		50	
Less: Exports allocated/packed			500
Less: Empties requiring repair			20
BALANCE - end WEEK 2	**20**		

Container Management

Maintenance and Repair of Containers + Sale of Life Expired Containers

- Cleaning may be required after cargo discharge
- Assess damage and organise repair
- Recover costs where possible from 3rd parties
- Criteria for disposing of damaged/life expired containers
- Containers are typically used for 12 – 15 years, but may last up to 20 years
- Containers can be sold for ‘second use’ (non maritime)

Container Management

Container Safety Convention (CSC)

- IMO Convention (1972)
- Covers:
  - Structural requirements for containers
  - Requirement for regular safety inspections
- CSC Safety Approval plate shows that design was approved by a competent authority
- Two systems of safety inspections
  - A periodic examination, no less than 5 years after built and then at least every 30 months
  - An approved continuous examination programme (ACEP), based on audit of the owner/operator's routine inspection procedures
- A plate either gives the date of next inspection, or the ACEP approval number
- Most owners/operators use the ACEP scheme

Intermodal Transport

INTERMODAL TRANSPORT

- **Road**
- **Rail**
- **Barge**
- **Short Sea Feeders**
- **Role of ICDs (Inland Container/Clearance Depots)**

Intermodalism

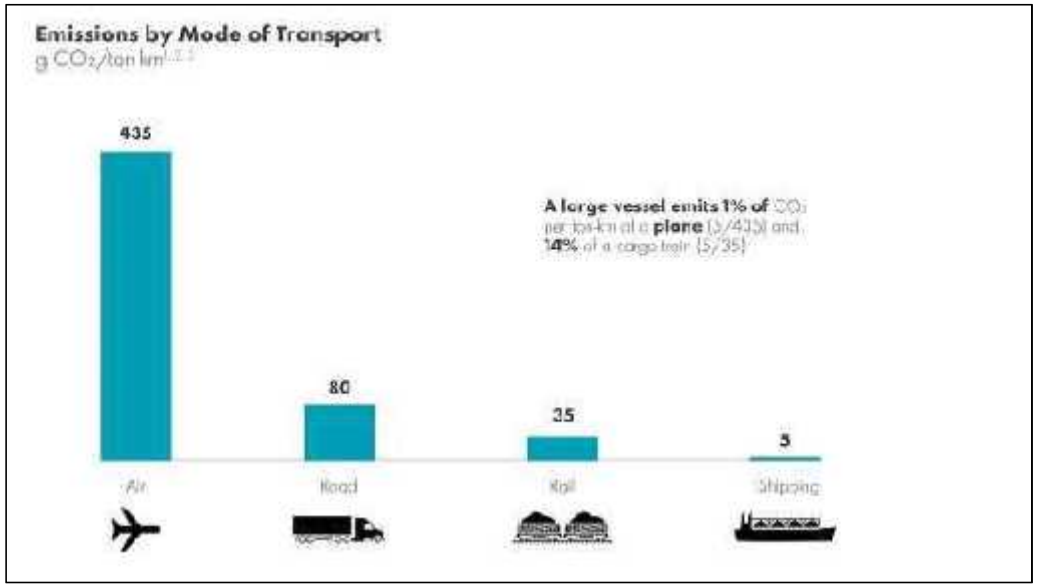
“Intermodal freight transport is a system for transporting goods, particularly over long distances and across international borders, which uses a combination of two or more individual modes (road/rail/sea), to achieve the most economic, efficient and environmentally friendly delivery of loads to their destination”

Source: David Lowe, Transport Writer

Terminology of Intermodal Transport

- FCL (Full Container Load) vs LCL (Less than Container Load)
- Carrier Haulage vs Merchant Haulage
- Port to Port, CY(Container Yard) to CY, or Door to Door
- Dry Port/ICD (Inland Clearance Depot)
- Groupage/Consolidation

Modal Choice for Port to Door Transport



- Road vs Rail vs Barge vs Short Sea Feeder
- Cost
- Transit Time
- Reliability
- Carbon Footprint

Problem Issues

- Inadequate highway infrastructure
- Limitations on operational working hours in urban areas
- Driver’s working hours
- Factory receiving/collection times
- Heavy highway congestion
- CO_2 emissions

Trucks Awaiting Terminal Handling

High Street Congestion

Container Train (UK)

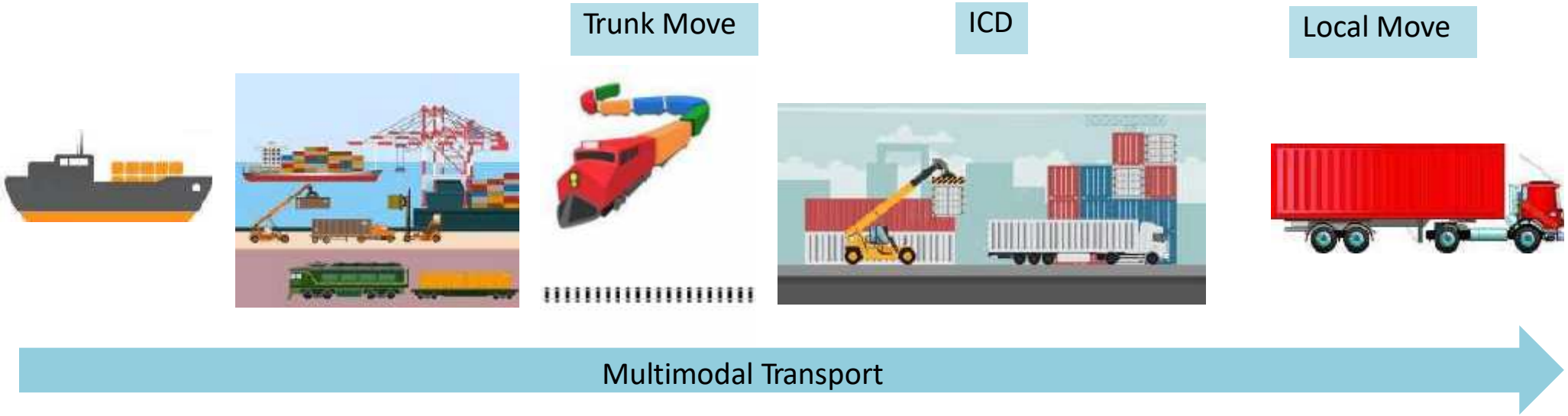
Double-Stack Rail Services

River Barge Systems

The role of Inland Container Depots (ICDs)

(also called Inland Clearance Depots/Dry Ports)

- Modal inland transfer points
- Customs clearance facilities available
- Good road and rail connections
- Close to commercial centres of cargo
- Optimise location for transfer between trunk and local movements
- Packing and unpacking of LCL/consolidation containers
- Storage/supply of empty containers + cleaning/maintenance and repair
- Also used to remove congestion from ports



LANDBRIDGES

- Alternatives to all water routes
- Can be Sea – Land – Sea, or
- Sea – Land

- Shorten distances
- Faster transit times (due to shorter distances/higher speed on land)
- Generally higher rates/costs to pay for shorter transit times (but reverse was true of Trans Siberian Landbridge in 1970s/80s – low cost/long transit times)

- BUT
- Higher risk of delays due to extra transfers

US Intermodal Services - Land Bridges

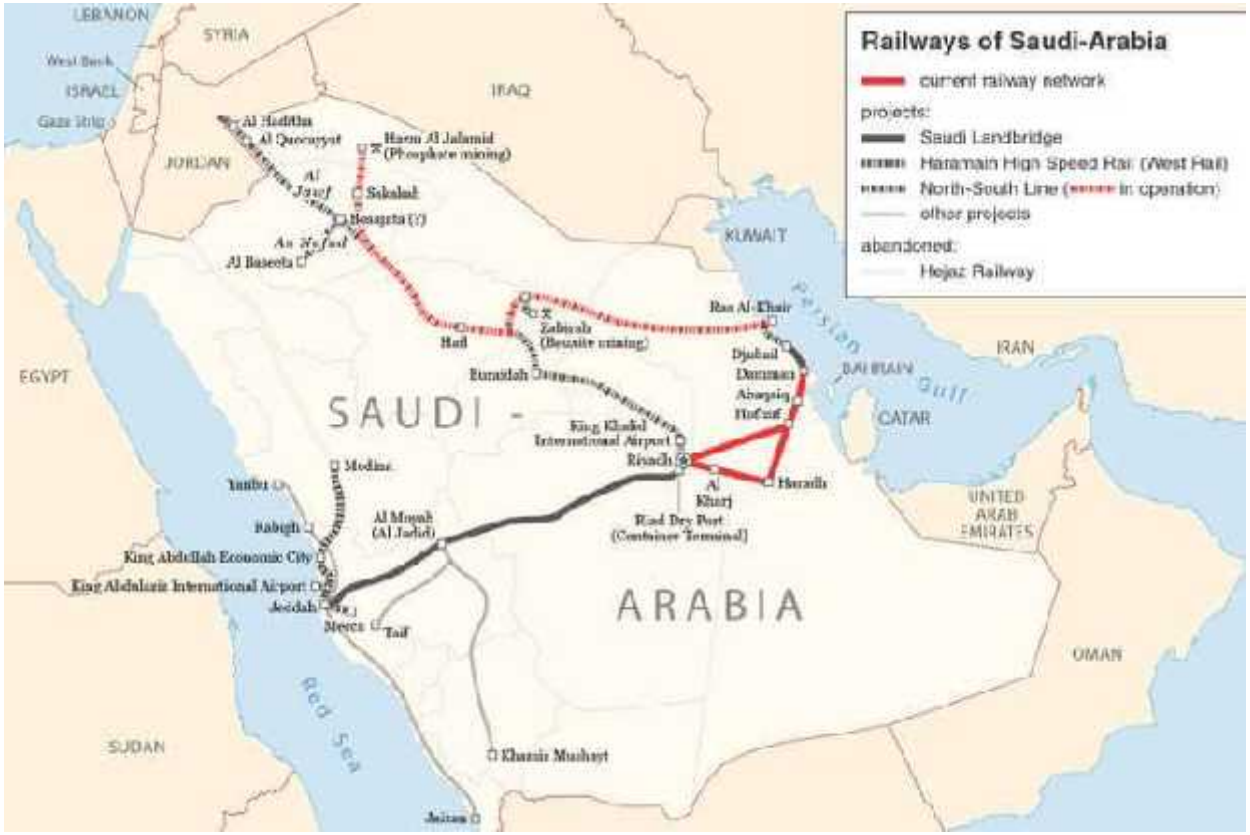
New Silk Road Routes from China to Europe

Deutsche Bahn reported:
400 trains China – Germany in 2015
30,000 containers in 2015 – plans to increase to 100,000 pa

New Silk Road Routes from China to Europe

BBC reported:
First direct train from China to UK in January 2017
Transit = 2 weeks
Cargo = clothes, bags, and other household items
Service passes through Kazakhstan, Russia, Belarus, Poland, Germany Belgium and France
Different rail gauges, so containers have to be reloaded

Saudi Arabia Land Bridge



Announced in 2008, but construction on new track from Jeddah to Riyadh not yet started (according to Railway Gazette)

Other uses for containers!

Question from Past Exam Papers

Describe the role of container leasing companies and the type of leases offered to carriers. What are the advantages and disadvantages between owning and leasing containers for the carrier? Briefly describe the key features of TWO of the following equipment types and give an example of cargo carried in each:

(a) Ventilated containers

(b) Open Top containers

(c) Flat rack containers or platforms

(d) Tank containers

(e) Temperature controlled containers

(May 2019 Q7)