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Cover photo: The Inner Harbour at Fremantle, with newly-reclaimed land (for port-related activities) being visible in the foreground and with the Patrick container terminal (on the left side) and the DP World container terminal (on the middle-right side) at North Quay (and facing across to the Victoria Quay). The North Quay Rail Terminal can be seen across the centre of the picture, just above the open unbuilt reclaimed land. The stacked containers to the right are within empty container parks. Photo courtesy of Fremantle Port Authority.

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Foreword

Waterline is published by the Bureau of Infrastructure, Transport and Regional Economics (BITRE) and provides information on container movements on both the wharf-side and the landside of five Australian major port terminals: Brisbane, Sydney, Melbourne, Adelaide and Fremantle. This Waterline covers port terminal activity up to the June quarter 2014.

Waterline reports on trends in container handling productivity on the waterfront in Australia as well as the cost of importing and exporting containers. It covers both the unloading of container ships and the transport of containers from container terminals. This Waterline provides the latest data available on stevedoring productivity and landside performance.

This issue of Waterline was prepared in the Infrastructure and Surface Transport Statistics Section by Adam Malarz and Illia Chibaev with contributions from Peter Kain. For further information on this report please phone (02) 6274 6008 or email maritime_stats@infrastructure.gov.au.

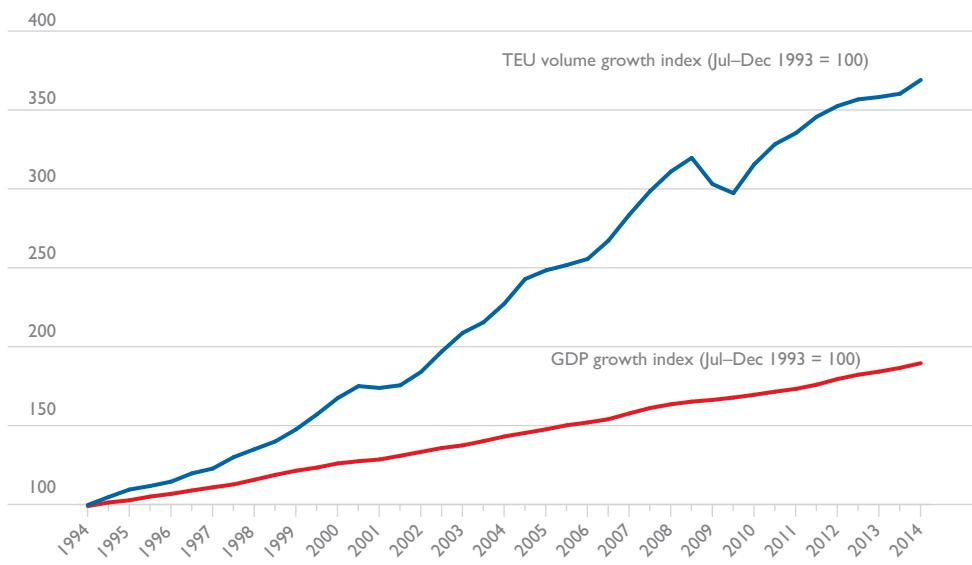
Gary Dolman
Head of Bureau
Bureau of Infrastructure, Transport and Regional Economics
Canberra
January 2015

At a glance

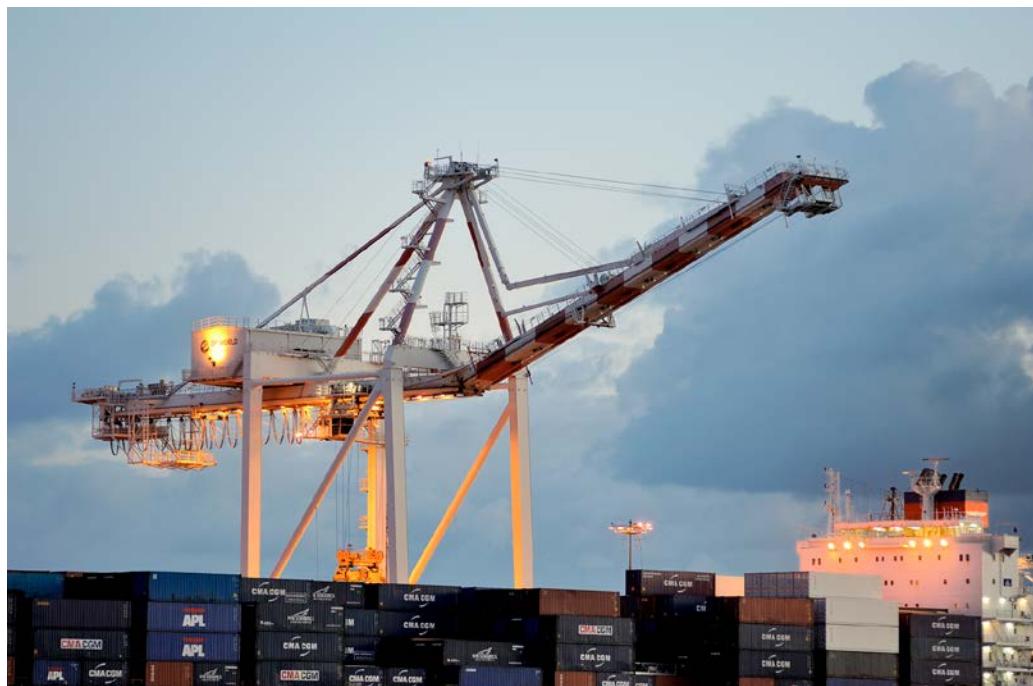
Throughput

- “Whole of port” TEUs exchanged at Australia’s five major container ports increased by 5.2 per cent to a total of 3.3 million TEUs for the period January to June 2014 compared to the previous year. The per cent increase varied by container port: Adelaide increased by 15.3 per cent, Fremantle by 11.0 per cent, Sydney by 5.3 per cent, Melbourne by 3.4 per cent and Brisbane by 2.2 per cent.
- The “whole of container terminal” measure of the *number of ship visits* in five ports increased by 5.4 per cent to 2 028 ship visits in the period January to June 2014 compared to the corresponding period in the previous year.
- There was a substantial increase in the number of larger capacity ships visiting Australia’s container ports in the first half of 2014 compared to the same period in 2013. While the total number of ships visits increased by 5.4 per cent, the number of ships in the range above 50 001 gross tonnes increased by 73 per cent. This increase is visible across all five ports with the biggest growth in ship visits of this size being in Adelaide and Brisbane.
- The “wharf-side of port” measure of the *total number of containers handled* increased by 7.2 per cent. Just under half of these containers were larger; 40 foot containers. This measure counts only containers transported in specialised container ships as reported by the three main stevedoring companies.
- While throughput at container ports in Australia is volatile over the short term, partly due to seasonality, container port throughput over a longer time period is growing faster than GDP. Figure A.1 illustrates that over the period from 1993 to 2014, GDP increased by more than 90 per cent while container throughput grew by more than 270 per cent.

Figure A.1 Growth in container traffic compared to GDP growth (Jul–Dec 1993=100)



Sources: BITRE estimates (2014), ABS (2013a).

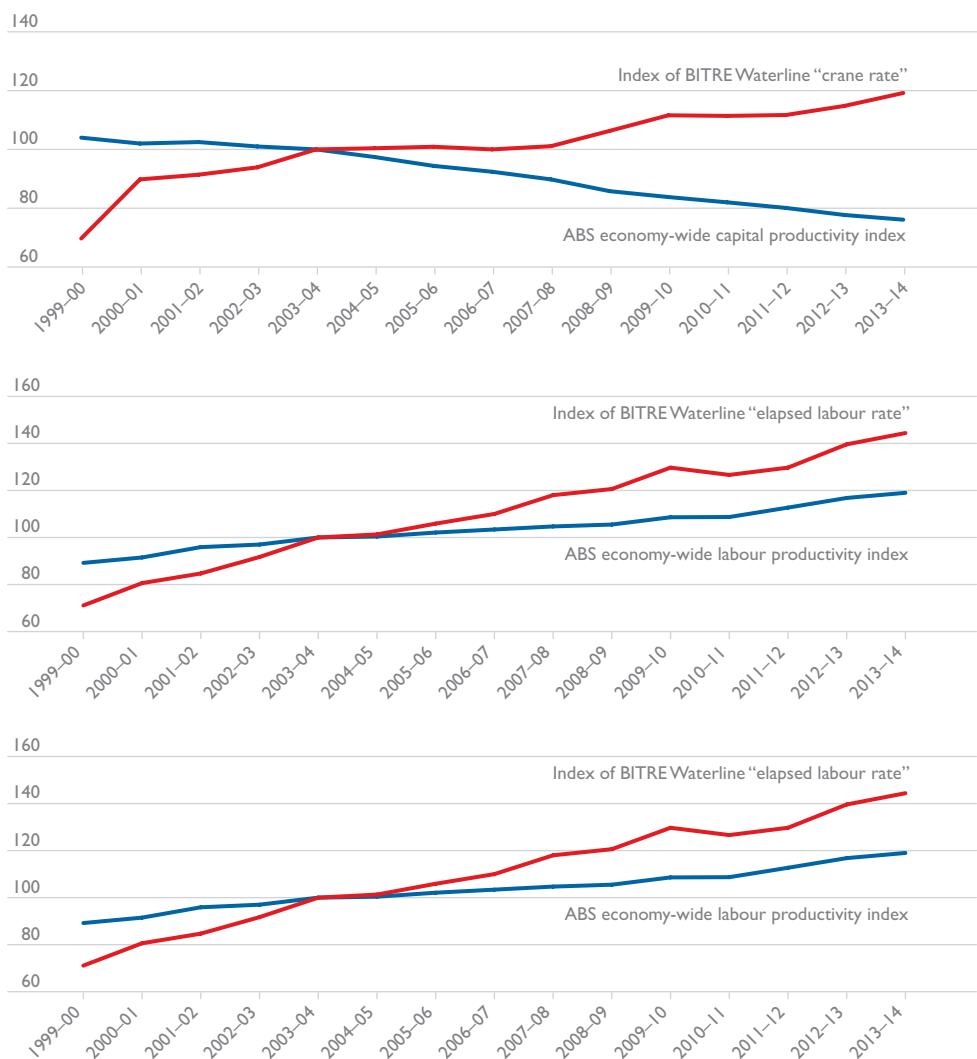


Container crane at Inner Harbour at Fremantle Port – photo courtesy of Fremantle Port Authority.

Productivity

“Wharf-side of port” productivity measures of *crane rate* and *elapsed labour rate* improved by 4 per cent and 4.5 per cent respectively, while the *ship rate* declined 1.6 per cent for January to June 2014 compared to the same period in 2013 (Figure A.2). This can be attributed to a compensating change in the *crane intensity* – the number of cranes working on a vessel on average. In the period January to June 2014 the crane intensity declined by 6% from 1.9 to 1.8 cranes, as compared with the corresponding period in 2013.

Figure A.2 Productivity: Container ports and the rest of the Australian economy



Note: Financial year 2003–04 is used as base year for indexing the time series data.

ABS economy-wide productivity measures relate to 16 selected market sector industries. They are indexes of gross value added per hour worked.

Sources: BITRE estimates (2014), ABS (2014b).

Of note was a sharp decline in wharf-side productivity at the Port of Brisbane. The *crane rate*, *elapsed labour rate* and *ship rate* declined by 3.1 per cent, 18.1 per cent and 14.4 per cent respectively for January to June 2014 compared to the same period in 2013.

“Land-side of port” productivity remained steady or worsened in five ports. *Truck and container turnaround times* increased by 7.5 per cent and 6.4 per cent respectively in the period January to June 2014 compared to the same period in 2013. The only container port which experienced an improvement in these measures was Melbourne where *truck and container turnaround times* declined by 2.6 per cent and 7.4 per cent respectively.

The *median ship turnaround time* improved in all ports except for Adelaide. The largest improvement was in Fremantle where the *median ship turnaround time* declined by 19.4 per cent, followed by Sydney where it declined by 14.9 per cent in January to June 2014 compared to the same period in 2013.

Whole of Container Terminal productivity indicators

Between January to June quarters of 2014:

- Average *lifts per hour ships spent in berth* increased from 40.0 in March quarter to 41.1 in June quarter 2014;
- Average *lifts per stevedore's hour* declined from 42.3 in March quarter to 40.6 in June quarter 2014.

The *average number of lifts per hour of stevedoring operation* is estimated as the number of TEUs exchanged divided by the total number of gross hours a ship was available to stevedores for loading and unloading operations.

Waiting times at container terminals shortened at all ports. The measure of the *per cent of ships waiting in anchorage for more than 2 hours* declined by 26.2 per cent in January to June 2014 compared with the corresponding period of 2013. The average waiting time also declined by 33.2 per cent in this period and averaged 13.3 hours at the five ports.

Time of the day when trucks access container terminals

The total number of available truck timeslots in five ports increased by 11.5 per cent in January to June 2014, as compared with the corresponding period of 2013. Similarly, the number of truck slots used in January to June 2014 was 6.0 per cent higher than a year ago. Usage of off-peak and weekend truck timeslots declined by 3.8 per cent in five ports to 48.8 per cent for January to June 2014 as compared with the corresponding period of 2013.

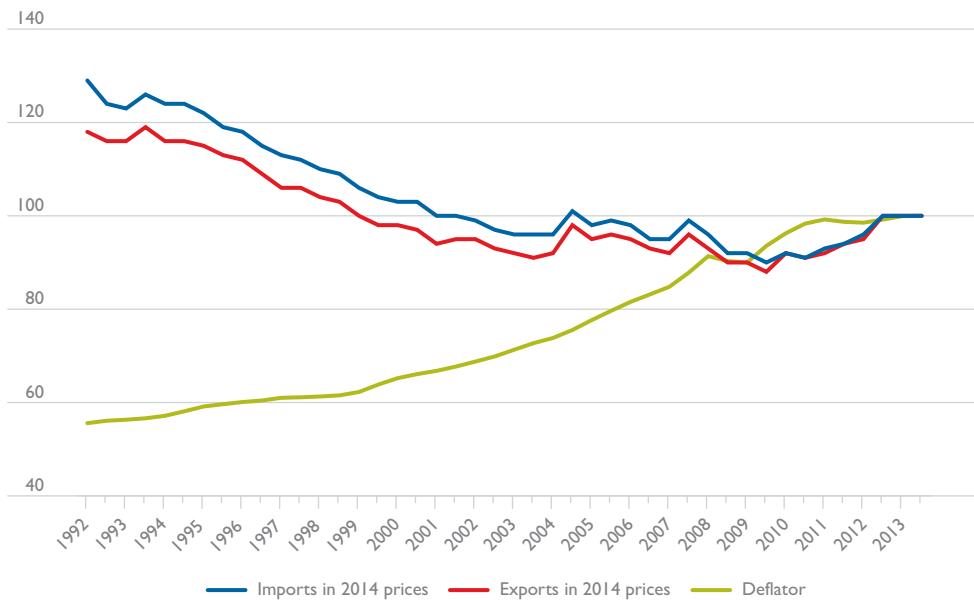
Port-interface cost

Historically, in Australia container handling costs have been declining while the general price level across the economy (measured by the GDP deflator) has been increasing (Figure A.3).

The port interface cost index increased slightly during the period January – June 2014 except for the largest ship category. The movement in costs varied by ship size:

- For small ships (5 000 to 20 000 GT) port interface costs increased by \$8/TEU for imports and by \$5/TEU for exports;
- For medium size ships (35 000 to 40 000 GT) port interface costs increased by \$4/TEU for imports and remained constant for exports;
- For large size ships (50 000 to 55 000 GT) port interface costs increased by \$7/TEU for imports and by \$3/TEU for exports.

Figure A.3 Port interface cost indices compared to the GDP deflator



Notes: PICI data presented in this figure are for 35 000 to 40 000 GT ship category.

Data plotted in this figure are constant 2014 prices; January–June 2014 is the base period for both the GDP deflator and PICI.

Sources: BITRE estimates (2014).



Wharfside container terminal operations at Inner Harbour at Fremantle Port – photo courtesy of Fremantle Port Authority.

Abbreviations and terms

ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
BITRE	Bureau of Infrastructure, Transport and Regional Economics
DP World	Dubai Ports World
Five ports	Refers to the aggregation of the following major container terminals at the five mainland capital city ports: <ul style="list-style-type: none">• Fisherman Island (Brisbane),• Brotherson Dock, at Port Botany (Sydney),• Swanson Dock (Melbourne),• Flinders Adelaide Terminal at Outer Harbor/ Pelican Point (Adelaide); and• North Quay in the “Inner Harbour” on the Swan River (Fremantle)
GT	Gross Tonnage, formerly known as Gross Registered Tonnage (GRT)
Infrastructure	Department of Infrastructure and Regional Development
n.a.	Not applicable
Mins	minutes
Pbm	Per berth metre
PICI	Port Interface Cost Index
Qtr	Quarter
TAS	Trucks appointments system (used by Hutchison Ports Australia to schedule trucks at a container terminal). Similar to the VBS system which is used by DP World and Patrick
TEU	Twenty-foot equivalent unit
TTT	Truck turnaround time
UCC	Unitized Cellular Container ship; a type of specialised container ship
VBS	Vehicle Booking System (used by DP World and Patrick to schedule trucks at a container terminal). Similar to the TAS system which is used by Hutchison Ports Australia

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- stevedoring companies: DP World, Flinders Adelaide Container Company, Hutchison Ports Australia, and Patrick
- individual port authorities and corporations: Port of Brisbane Pty Ltd, Port Authority of New South Wales, NSW Ports, Port of Melbourne Corporation, Port of Adelaide, and Fremantle Port Authority
- Ports Australia
- shipping lines
- customs brokers
- road transport operators
- pilot, tug and mooring operators.

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CHAPTER I

Measures of container terminal throughput

Overview

Chapter I of Waterline presents in a consolidated format all container port throughput indicators. The indicators are in three groups—wharf-side, landside and whole of container terminal.

There are four wharf-side quarterly throughput indicators (previously reported in Chapter 2 of Waterline):

- I.1 UCC ships handled, as reported by stevedores
- I.2 Total containers handled by stevedores
- I.3 Total TEUs handled by stevedores
- I.4 40-foot containers as per cent of all containers handled.

There are eleven landside quarterly throughput indicators:

- I.5 Number of trucks used in VBS/TAS operations
- I.6 Total number of containers transported by trucks and rail
- I.7 Total number of containers transported by trucks
- I.8 Number of containers by rail
- I.9 Total number of TEUs transported by trucks and rail
- I.10 Total number of TEUs transported by trucks
- I.11 Number of TEUs by rail.

At the whole of container terminal level, using data from port authorities, there are two quarterly throughput indicators:

- I.12 Total number of container ship visits, as reported by Port Authorities
- I.13 40-foot containers as per cent of all containers exchanged.

At the whole of port level, using data from port authorities, there are seven six-monthly throughput indicators:

- 1.14 Total cargo throughput
- 1.15 Non-containerised general cargo throughput
- 1.16 Total number of TEUs exchanged
- 1.17 Number of TEUs: Full import
- 1.18 Number of TEUs: Empty import
- 1.19 Number of TEUs: Full export
- 1.20 Number of TEUs: Empty export.

Indicators of these three groups are presented separately for Brisbane, Sydney, Melbourne, Adelaide and Fremantle, as well as for the five ports as a whole.

Container terminal

The movement of containers from/to the container ship takes place on a wharf or pier known as a container terminal. Unlike a traditional wharf, a container terminal needs a large area adjoining the wharf for storing containers. The containers are placed in stacks of two, three or more and are kept there until they are moved away by truck or train for unloaded containers, or loaded onto a ship, from the container terminal. While in the terminal, the containers are the responsibility of a stevedoring company.

Stevedoring

The term stevedore can refer to a company which manages the operation of loading or unloading a ship. In Australia the people who work on the waterfront are referred to as waterside workers or stevedores. A stevedoring company typically owns equipment used in the loading or discharging operation and hires labour for that purpose. A stevedoring company also may contract with a terminal owner to manage all terminal operations. Many large container ship operators have established in-house stevedoring operations to handle cargo at their own terminals and to provide stevedoring services to other container carriers. In Australia, there are three major stevedoring companies: Patrick, Dubai Ports World and Hutchison Ports Australia.

Wharf-side throughput measures

Measures of throughput at the wharf-side relate only to containers moved by stevedoring companies from/to UCC ships at the container terminals.

Indicator 1.1 UCC ships handled, as reported by stevedores

Only fully cellular ships, or Unitized Cellular Container (UCC) ships, are included in this indicator. Normally these purpose built container ships are equipped with 40-foot cell guides below deck as a minimum requirement.

Indicator 1.2 Total containers handled

This is the total number of containers lifted on/off UCC ships. These counts are not standardised to account for different container sizes. Thus one 20-foot container and one 40-foot container are counted as two containers.

Indicator 1.3 Total TEUs handled

This indicator is derived from the total containers handled, taking into account different sizes of containers.

TEU stands for “Twenty-foot equivalent unit”, a universally recognised measure of containers which converts containers of different sizes into standardised twenty-foot units. For example, a 20-foot container equals one TEU, and a 40-foot container is converted to two TEUs.

Indicator 1.4 40-foot container as per cent of all containers handled

This is the number of 40-foot containers as a percentage of all containers handled.

Landside throughput measures

Indicator 1.5 Number of trucks used in VBS/TAS operations

This is the count of trucks processed through either the vehicle booking system (VBS) or the truck appointments system (TAS). This count excludes trucks that perform bulk runs of empty containers between the container parks and container terminals. This indicator counts trucks on a round trip. That is, a truck entering a container terminal and the same truck exiting the container terminal is counted as one truck.

Indicator 1.6 Total number of containers transported by trucks and rail

This indicator includes the total number of containers transported in all modes on the landside, either by trucks or by rail. Counts of containers in this indicator are further broken down into Indicator 1.7 (containers moved by trucks) and Indicator 1.8 (containers moved by rail).

Indicator 1.7 Total number of containers transported by trucks

This indicator includes the total number of containers transported by trucks including VBS/TAS trucks and bulk runs trucks. This indicator is computed using a combination of data from stevedores and from port authorities.

Indicator 1.8 Number of containers by rail

This indicator counts the total number of containers carried by rail in or out of a container terminal, and is based on data provided by each container port authority. This indicator includes containers processed at “on dock” and those handled through “near dock” rail sidings. “On dock” refers to situations where the rail siding is on dock in a container terminal. In contrast, “near dock” rail sidings are in the neighbourhood of the container terminal but not on the dock.

Indicator I.9 Total number of TEUs transported by trucks and rail

This indicator includes the total number of TEUs transported by VBS/TAS trucks, bulk run trucks, and by rail. Counts of TEUs in this indicator are further broken down into Indicator I.10 (TEUs moved by trucks) and Indicator I.11 (TEUs moved by rail).

Indicator I.10 Total number of TEUs transported by trucks

This indicator includes the total number of TEUs transported by trucks including VBS/TAS trucks and bulk runs trucks. This indicator is computed using a combination of data from stevedores and from port authorities.

Indicator I.11 Number of TEUs by rail

This is a count of the total number of TEUs carried by rail in or out of a container terminal based on data provided by each container port authority. This indicator includes TEUs processed at “on dock” and those handled through “near dock” rail sidings. “On dock” refers to situations where the rail siding is on dock in a container terminal. In contrast, “near dock” rail sidings are in the neighbourhood of the container terminal but not on the dock.

Whole of container terminal throughput

Indicator I.12 Total number of container ship visits

This is a count of all UCC ships that visited and exchanged containers at the container terminal. Table I.7 summarises ship visits by size of ship and by container port.

Indicator I.13 Total number of containers (lifts) exchanged

This indicator is estimated using Indicator I.4 (percentage of 40-foot containers) and total number of TEUs exchanged reported by ports.

Whole of port throughput

Indicator I.14 Total cargo throughput

This is the weight, measured in tonnes, of all container and non-container general cargoes that passed through the port.

Indicator I.15 Non-containerised general cargo throughput

This is the weight of non-container general cargoes processed through a port. Non-container general cargo refers to break bulk commodities including machinery, iron and steel products, timber, paper and timber products and other general cargoes. It does not include bulk cargoes.

Indicator I.16 Total number of TEUs exchanged

This is a count of TEUs, exchanged through the port. This count is further broken down into Indicators I.17 to I.20.

Indicator I.17 Full import TEUs

This is a count of full containers in TEUs imported (unloaded) at the port.

Indicator I.18 Empty import TEUs

This is a count of empty containers in TEUs imported (unloaded) at the port.

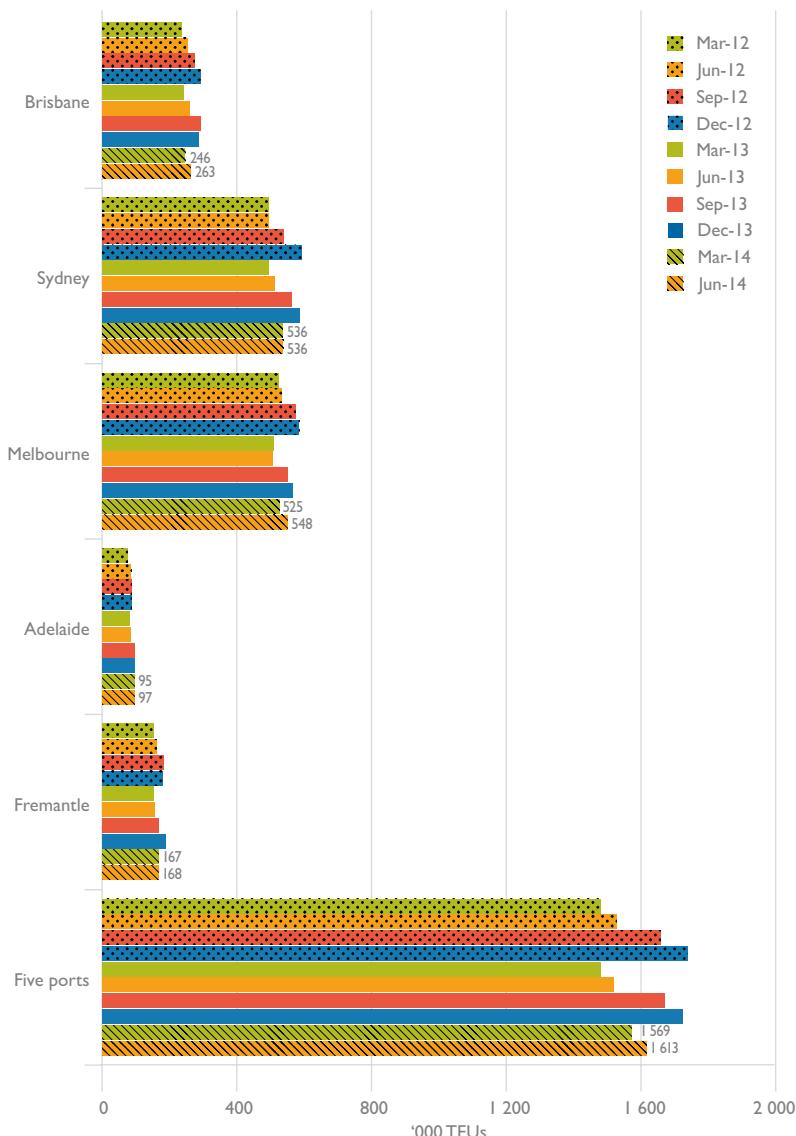
Indicator I.19 Full export TEUs

This is a count of full containers in TEUs exported (loaded) at the port.

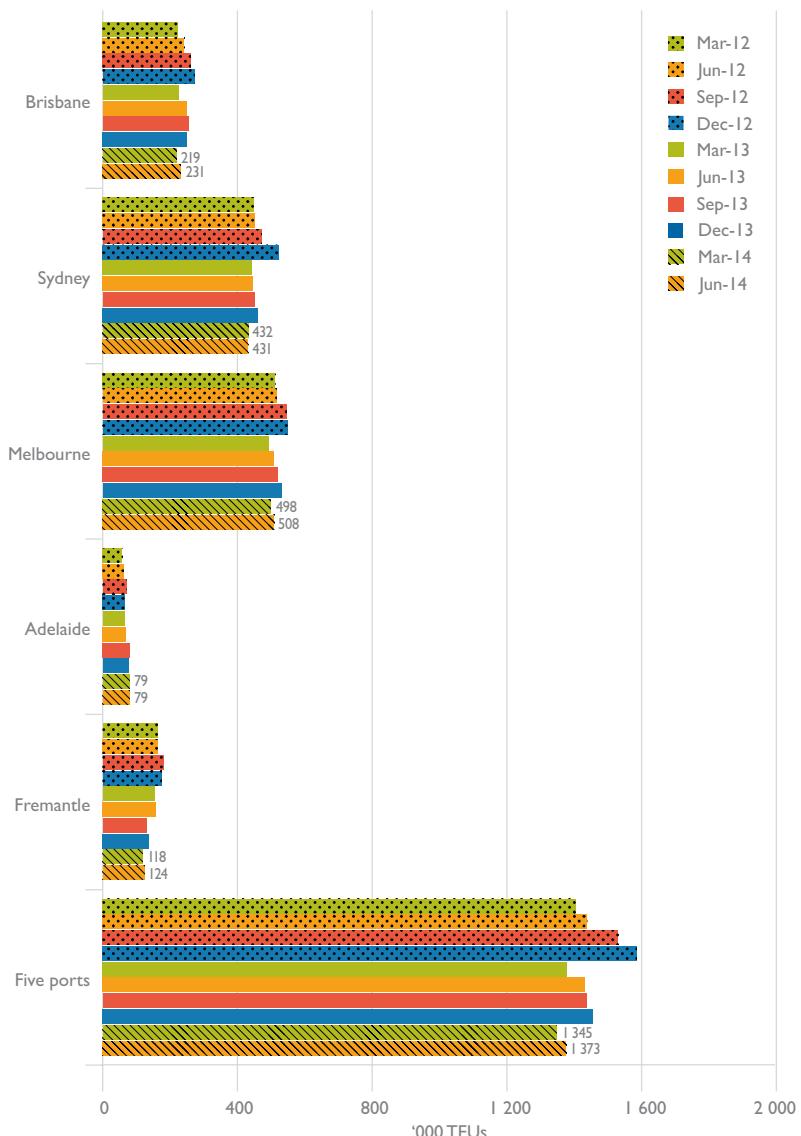
Indicator I.20 Empty export TEUs

This is a count of empty containers in TEUs exported (loaded) at the port.

Figure I.I TEU throughput by container port: Wharf-side of port

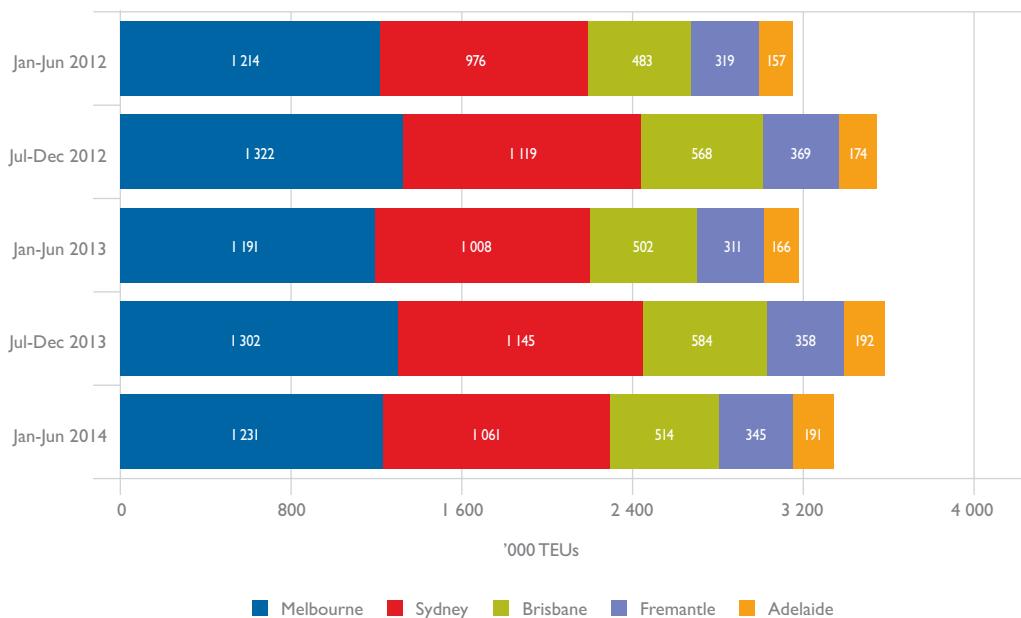


Sources: DP World (2014), Flinders Adelaide Container Company (2014), Hutchison Ports Australia (2014) and Patrick (2014).

Figure I.2 TEU throughput by container port: Landside of port

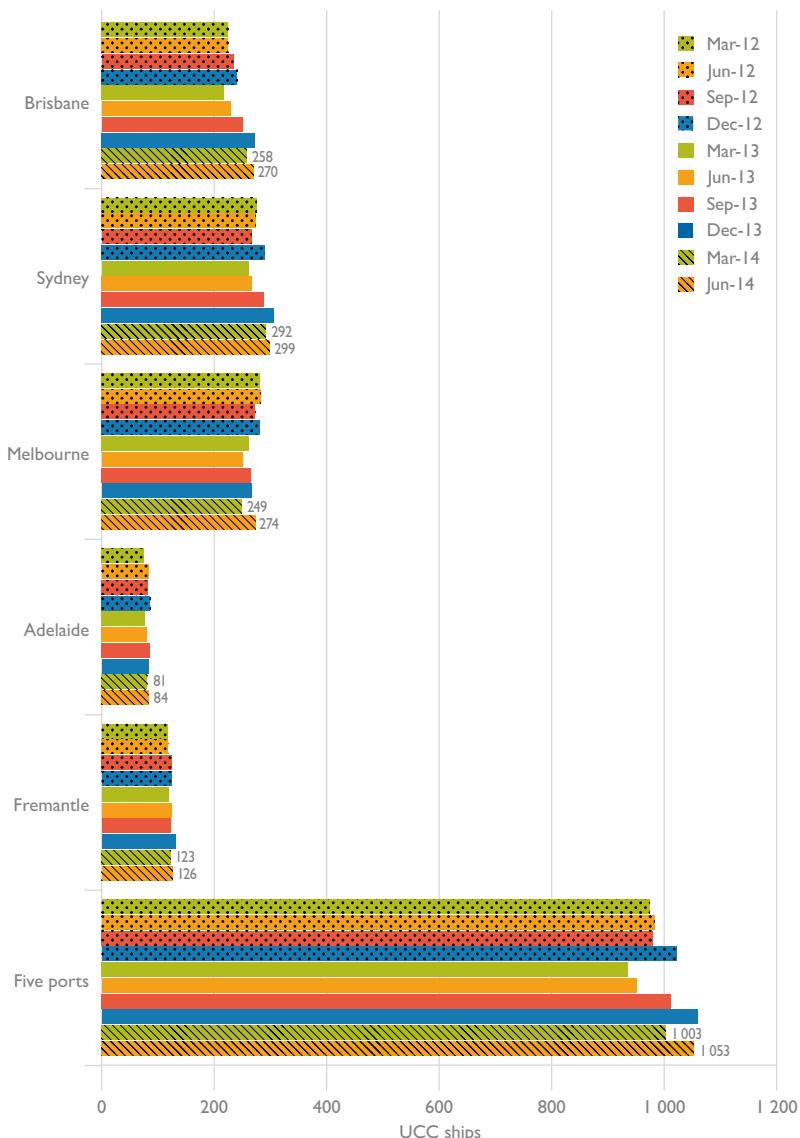
Notes: The data in this figure shows the total TEUs moved on the landside by rail, by VBS/TAS trucks and bulk runs trucks where data are available.

Sources: DP World (2014), Flinders Adelaide Container Company (2014), Hutchison Ports Australia (2014), Patrick (2014), Port of Adelaide (2014), Port of Brisbane Pty Ltd (2014), Port of Melbourne Corporation (2014) and Fremantle Port Authority (2014).

Figure 1.3 TEU throughput by container port: Whole of port

Notes: The data relate to terminals at Fisherman Island (Brisbane), Brotherson Dock at Port Botany (Sydney), Swanson Dock (Melbourne), Flinders Adelaide Terminal at Outer Harbor/ Pelican Point (Adelaide), and North Quay in the Inner Harbour (Fremantle).

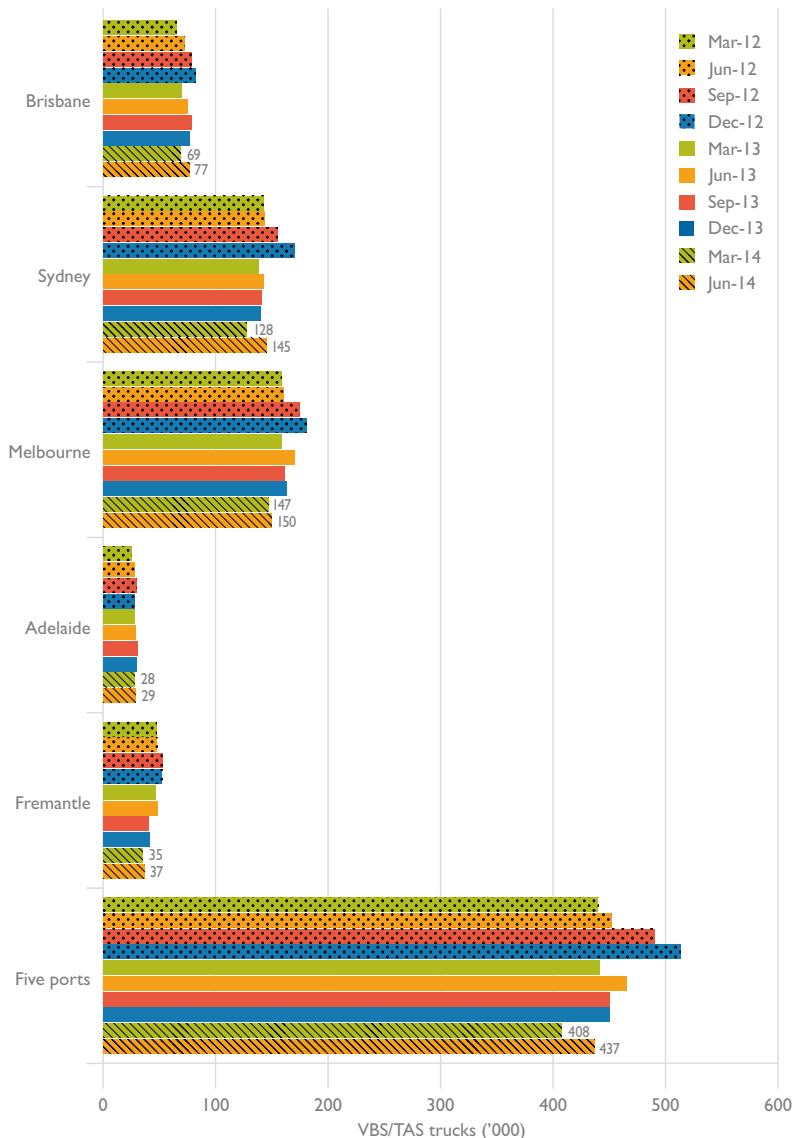
Sources: Port of Brisbane Pty Ltd (2014), Port Authority New South Wales (2014), Port of Melbourne Corporation (2014), Port of Adelaide (2014) and Fremantle Port Authority (2014).

Figure I.4 Container terminal traffic: Number of UCC ships handled

Notes: The data contained in this figure relates to Indicator I.1 as defined in the explanatory notes and Table I.1 to I.6.

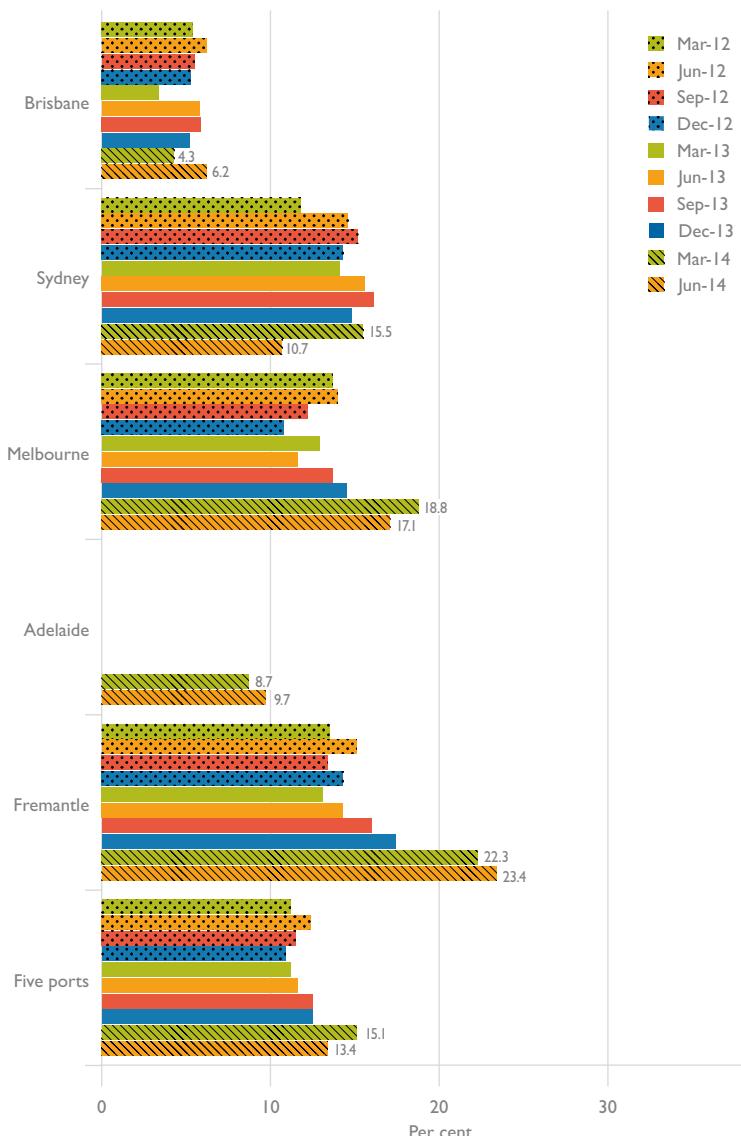
Sources: DP World (2014), Flinders Adelaide Container Company (2014), Hutchison Ports Australia (2014) and Patrick (2014).

Figure 1.5 Container terminal traffic: Number of trucks used in VBS/TAS operations



Notes: Data on number of trucks used in bulk runs are not available.

Sources: DP World (2014), Flinders Adelaide Container Company (2014), Hutchison Ports Australia (2014) and Patrick (2014).

Figure I.6 Containers by rail as per cent of containers on the landside

Sources: DP World (2014), Flinders Adelaide Container Company (2014), Hutchison Ports Australia (2014), Patrick (2014), Port of Adelaide (2014), Port of Brisbane Pty Ltd (2014), Port of Melbourne Corporation (2014) and Fremantle Port Authority (2014).

Table I.1 Container terminal throughput: Brisbane

	2012				2013				2014						
	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun
Wharfside															
UCC ship handled, as reported by stevedores	225	225	450	234	241	475	217	229	446	250	273	523	258	270	528
Total containers handled ('000)	158.2	169.9	328.2	182.1	193.7	375.8	159.5	175.1	334.6	197.2	190.7	387.9	167.3	179.5	346.8
Total TEUs handled ('000)	234.7	254.0	488.7	273.6	291.7	565.4	240.4	259.6	500.0	292.3	286.2	578.5	245.9	262.6	508.6
40-foot container as per cent of all containers handled (%)	48.4	49.5	48.9	50.2	50.6	50.4	50.7	48.3	49.4	48.2	50.1	49.2	47.0	46.3	46.6
Landside															
Number of trucks used in VBS/TAS operations ('000)	65.2	72.2	137.4	78.7	81.9	160.6	69.4	75.1	144.6	78.9	77.3	156.2	69.2	76.7	145.9
Total containers transported by trucks and rail ('000)	152.5	162.8	315.3	168.1	179.1	347.1	151.5	168.8	320.3	172.0	169.2	341.2	148.1	157.4	305.4
Containers by trucks ('000)	143.0	151.2	294.2	157.0	167.9	324.9	145.0	157.5	302.5	160.6	158.8	319.4	140.1	146.0	286.1
Containers by rail ('000)	9.5	11.6	21.1	11.1	11.1	22.2	6.5	11.3	17.8	11.3	10.5	21.8	8.0	11.4	19.3
Total TEUs transported by trucks and rail ('000)	222.9	241.3	464.2	260.9	272.3	533.2	224.9	248.0	472.9	254.0	250.4	504.4	218.5	231.3	449.8
TEUs by trucks ('000)	210.8	226.4	437.2	246.6	257.8	504.4	217.1	233.6	450.8	239.1	237.5	476.6	209.2	217.0	426.2
TEUs by rail ('000)	12.1	14.9	27.0	14.3	14.5	28.8	7.7	14.4	22.1	14.9	13.0	27.8	9.3	14.4	23.6
Whole of Container Terminal															
Total number of container ship visits	226	229	455	240	244	484	220	222	442	252	262	514	245	258	503
Total containers (lifts) exchanged ('000)	155.9	162.0	317.9	196.2	211.0	407.2	157.1	166.2	323.4	196.8	186.5	383.3	167.5	174.2	341.7
Whole of port															
Total cargo throughput (million tonnes)	18.8			19.8			17.7			18.8			19.9		
Non-containernised general cargo throughput (million tonnes)	0.7			0.9			0.6			0.5			0.5		
Total TEUs exchanged ('000)	482.7			567.6			502.3			583.7			513.6		
Full import ('000)	216.0			255.5			224.3			259.5			228.0		
Empty import ('000)	26.7			34.0			29.1			36.4			31.0		
Full export ('000)	153.1			187.6			147.8			178.0			145.4		
Empty export ('000)	86.9			90.9			101.1			109.8			109.2		

Note: Blank cells mean no data was reported for the categories (data for these indicators were reported at six-monthly intervals only).

Sources: DP World (2014), Hutchison Ports Australia (2014), Patrick (2014) and Port of Brisbane Pty Ltd (2014).

Table I.2 Container terminal throughput: Sydney

	2012				2013				2014					
	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun
Wharfside														
UCC ship handled, as reported by stevedores	276	274	550	266	290	556	261	267	528	289	306	595	292	299
Total containers handled ('000)	327.4	328.5	655.9	355.2	387.7	742.9	325.6	340.8	666.4	366.7	387.0	753.7	352.6	355.2
Total TEUs handled ('000)	492.3	492.8	985.0	539.0	592.5	131.5	493.6	511.2	104.7	561.0	584.5	145.5	535.9	536.2
40-foot container as per cent of all containers handled (%)	50.4	50.0	50.2	51.7	52.8	52.3	51.6	50.0	50.8	53.0	51.1	52.0	50.9	51.5
Landside														
Number of trucks used in VBS/TAS operations ('000)	142.9	143.5	286.4	154.8	169.8	324.6	138.5	143.1	281.7	141.1	140.3	281.4	127.8	145.3
Total containers transported by trucks and rail ('000)	298.7	301.5	600.2	314.6	347.3	661.9	295.7	298.3	594.0	298.9	302.8	601.7	285.6	283.2
Containers by trucks ('000)	257.2	252.1	509.3	263.1	293.0	556.0	248.0	247.4	495.4	246.8	253.7	500.5	236.7	251.3
Containers by rail ('000)	41.4	49.4	90.9	51.5	54.4	105.9	47.7	51.0	98.6	52.0	49.1	101.1	48.8	31.9
Total TEUs transported by trucks and rail ('000)	448.5	452.0	900.6	470.8	522.4	993.3	442.0	446.1	888.1	450.3	459.8	910.1	431.8	431.1
TEUs by trucks ('000)	395.7	386.0	781.8	399.3	448.0	847.2	379.5	376.6	756.1	378.0	391.8	769.9	364.8	384.9
TEUs by rail ('000)	52.8	66.0	118.8	71.5	74.5	146.0	62.5	69.5	132.0	72.3	68.0	140.2	66.9	46.2
Whole of Container Terminal														
Total number of container ship visits	277	277	554	268	289	557	262	272	534	289	302	591	289	297
Total containers (lifts) exchanged ('000)	289.8	295.1	584.9	324.9	355.7	680.5	301.5	309.9	611.4	341.7	357.3	699.0	321.0	322.7
Whole of port														
Total cargo throughput (million tonnes)	15.4	15.8	15.8	0.0	0.0	0.0	14.3	14.3	9.8	9.8	9.8	9.3	9.3	9.3
Non-containernised general cargo throughput (million tonnes)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total TEUs exchanged ('000)	975.9	1118.5	1118.5	564.1	499.9	499.9	1007.8	1007.8	145.3	145.3	145.3	1061.1	1061.1	1061.1
Full import ('000)	481.6	541.6	541.6	5.7	2.9	2.9	7.4	7.4	524.6	524.6	524.6	524.6	524.6	524.6
Empty import ('000)	5.7	5.7	5.7	222.5	234.4	234.4	208.5	208.5	3.4	3.4	3.4	5.5	5.5	5.5
Full export ('000)	222.5	266.2	266.2	266.2	317.2	317.2	292.0	292.0	227.5	227.5	227.5	208.5	208.5	208.5
Empty export ('000)	266.2	317.2	317.2	317.2	292.0	292.0	337.8	337.8	332.6	332.6	332.6	322.6	322.6	322.6

Note: Blank cells mean no data was reported for the categories (data for these indicators were reported at six-monthly intervals only).

Cells with an entry of "0.0" mean that data were reported but rounded to zero.

Sources: DP World (2014), Patrick (2014) and NSW Ports (2014).

Table I.3 Container terminal throughput: Melbourne

	2012				2013				2014						
	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun
Wharfside															
UCC ship handled, as reported by stevedores	281	283	564	273	281	554	262	250	512	265	531	249	274	523	
Total containers handled ('000)	354.9	359.4	714.2	382.2	387.1	769.3	340.0	337.3	677.3	364.6	377.4	742.1	355.3	370.8	726.2
Total TEUs handled ('000)	522.9	531.1	1 054.0	572.7	583.5	1 156.2	508.0	505.7	1 013.6	550.1	565.9	1 116.0	525.2	548.4	1 073.6
40-foot container as per cent of all containers handled (%)	47.4	47.8	47.6	49.8	50.7	50.3	49.4	49.9	49.7	50.9	49.9	50.4	47.8	47.9	47.9
Landside															
Number of trucks used in VBST/TAS operations ('000)	158.7	160.6	319.3	174.4	180.7	355.2	158.4	169.8	328.2	161.7	163.0	324.7	146.9	149.7	296.7
Total containers transported by trucks and rail ('000)	347.4	350.6	698.0	368.0	370.4	738.4	330.2	339.9	670.1	344.8	353.8	698.6	336.9	341.9	678.8
Containers by trucks ('000)	299.8	301.9	601.7	323.7	331.2	655.0	287.9	300.6	588.5	297.7	302.6	600.3	273.5	283.1	556.6
Containers by rail ('000)	47.6	48.7	96.3	44.2	39.2	83.4	42.3	39.4	81.7	47.1	51.2	98.3	63.5	58.8	122.2
Total TEUs transported by trucks and rail ('000)	510.6	515.1	1 025.7	544.9	547.9	1 022.9	490.8	507.8	988.6	518.6	529.7	1 048.3	497.8	508.2	1 006.1
TEUs by trucks ('000)	440.4	443.2	883.6	478.7	488.9	967.6	427.6	448.8	876.4	447.5	452.9	900.4	404.0	421.3	825.4
TEUs by rail ('000)	70.1	72.0	142.1	66.3	59.0	125.3	63.2	59.0	122.2	71.1	76.8	147.8	93.8	86.9	180.7
Whole of Container Terminal															
Total number of container ship visits	300	304	604	296	303	599	283	268	551	279	279	558	260	266	526
Total containers (lifts) exchanged ('000)	355.5	357.7	713.2	380.2	384.6	764.9	346.2	344.3	690.5	368.9	380.1	749.0	359.3	361.6	720.8
Whole of Port															
Total cargo throughput (million tonnes)		17.8		17.8		17.8		17.2		17.2		17.6		17.4	
Non-containerised general cargo throughput (million tonnes)		1.2		1.2		1.2		1.1		1.1		1.1		1.0	
Total TEUs exchanged ('000)		1 214.3		1 322.4		1 322.4		1 190.6		1 190.6		1 302.2		1 230.5	
Full import ('000)		544.4		605.4		605.4		529.2		529.2		593.6		538.7	
Empty import ('000)		68.3		64.1		64.1		68.9		68.9		59.4		75.6	
Full export ('000)		430.5		435.6		435.6		428.5		428.5		438.3		441.0	
Empty export ('000)		1 820.0		2 177.2		2 177.2		1 640.0		1 640.0		2 10.9		1 75.2	

Note:

Blank cells mean no data was reported for the categories (data for these indicators were reported at six-monthly intervals only).

The counts of containers by rail include those handled by Qube Logistics

Whole of container terminal refers to East and West Swanson Docks and Webb Dock East, 3, 4 and 5.

Sources: DP World (2014), Patrick (2014) and Port of Melbourne Corporation (2014).

Table I.4 Container terminal throughput: Adelaide

	2012			2013			2014							
	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun
Wharfside														
UCC ship handled, as reported by stevedores	75	83	158	82	86	168	77	81	158	86	83	169	81	84
Total containers handled ('000)	53.5	62.4	115.9	63.0	62.4	125.4	58.5	61.1	119.6	68.1	69.4	137.5	69.6	70.8
Total TEUs handled ('000)	74.1	85.9	160.0	88.0	87.9	175.9	81.6	84.4	166.0	96.5	96.2	192.7	95.3	140.4
40-foot container as per cent of all containers handled (%)	38.6	37.6	38.1	39.7	41.0	40.3	39.4	38.1	38.7	41.7	38.6	40.2	37.0	37.2
Landside														
Number of trucks used in VBS/TAS operations ('000)	25.3	27.7	53.0	29.6	28.4	58.0	28.0	28.6	56.6	30.7	29.8	60.5	28.2	28.7
Total containers transported by trucks and rail ('000)	42.0	45.5	87.5	49.6	45.9	95.5	45.8	48.8	94.7	55.2	53.6	108.8	56.7	56.4
Containers by trucks ('000)	42.0	45.5	87.5	49.6	45.9	95.5	45.8	48.8	94.7	55.2	53.6	108.8	51.6	113.1
Containers by rail ('000)														
Total TEUs transported by trucks and rail ('000)	57.7	63.1	120.7	70.3	65.6	135.9	64.4	68.9	133.3	80.3	76.3	156.6	79.0	79.1
TEUs by trucks ('000)	57.7	63.1	120.7	70.3	65.6	135.9	64.4	68.9	133.3	80.3	76.3	156.6	72.1	158.1
TEUs by rail ('000)														
Whole of Container Terminal														
Total number of container ship visits	75	84	159	82	85	167	76	83	159	84	83	167	82	81
Total containers (lifts) exchanged ('000)	52.8	62.4	115.3	62.4	60.8	123.2	57.9	63.7	121.6	65.8	69.0	134.7	70.1	163
Whole of port														
Total cargo throughput (million tonnes)	8.0						7.2			7.9		8.0	8.1	
Non-containernised general cargo throughput (million tonnes)	0.1						0.2			0.1		0.2	0.2	
Total TEUs exchanged ('000)	157.0						173.6			165.5		191.9	190.8	
Full import ('000)	57.2						66.5			60.5		72.9	67.0	
Empty import ('000)	20.0						19.5			22.2		24.3	27.4	
Full export ('000)	67.3						69.2			72.3		76.9	81.1	
Empty export ('000)	12.6						18.4			10.4		17.8	15.3	

Note: Blank cells mean no data was reported for the categories (data for these indicators were reported at six-monthly intervals only).

Sources: Flinders Adelaide Container Company (2014) and Port of Adelaide (2014).

Table 1.5 Container terminal throughput: Fremantle

	2012						2013						2014					
	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun			
Wharfside																		
UCC ship handled, as reported by stevedores	117	118	235	125	124	249	119	124	122	243	122	131	253	123	126	249		
Total containers handled ('000)	107.4	109.4	216.8	121.2	119.0	240.2	104.5	106.2	122	210.7	125.2	127.4	114.1	117.5	231.6			
Total TEUs handled ('000)	152.8	161.0	313.8	181.3	178.3	359.6	153.1	155.5	167.0	308.6	186.8	353.8	166.6	168.3	334.8			
40-foot container as per cent of all containers handled (%)	42.3	47.1	44.7	49.6	49.8	49.7	46.5	46.5	48.8	46.5	48.8	49.2	49.0	46.0	43.2	44.6		
Landside																		
Number of trucks used in VBSTS/TAS operations ('000)	47.9	48.0	95.9	52.7	52.4	105.2	46.8	48.4	95.3	40.3	41.0	81.3	35.4	36.5	71.9			
Total containers transported by trucks and rail ('000)	110.1	110.7	220.8	119.4	117.6	237.1	104.1	106.9	210.9	89.0	93.8	182.8	83.4	87.9	171.3			
Containers by trucks ('000)	94.7	93.0	187.8	101.9	99.6	201.5	88.8	89.5	178.3	72.8	75.6	148.5	62.3	64.5	126.7			
Containers by rail ('000)	15.3	17.7	33.0	17.5	18.1	35.6	15.2	17.4	32.6	16.1	18.2	34.3	21.2	23.5	44.6			
Total TEUs transported by trucks and rail ('000)	162.5	164.3	326.7	180.4	174.0	354.3	153.7	157.5	311.1	130.2	136.9	267.1	117.9	123.6	241.5			
TEUs by trucks ('000)	140.4	139.4	279.9	156.3	149.1	305.4	133.5	134.9	268.3	109.4	113.1	222.6	91.6	94.7	186.3			
TEUs by rail ('000)	22.0	24.8	46.9	24.1	24.8	48.9	20.2	22.6	42.8	20.8	23.8	44.5	26.3	28.9	55.2			
Whole of Container Terminal																		
Total number of container ship visits	116	114	230	121	120	241	118	121	239	120	127	247	125	125	250			
Total containers (lifts) exchanged ('000)	98.8	101.5	200.3	117.7	113.7	231.4	99.2	100.1	199.3	110.3	119.7	230.0	115.6	116.1	231.7			
Whole of port																		
Total cargo throughput (million tonnes)	15.9			15.6			16.3			15.6			17.8					
Non-containerised general cargo throughput (million tonnes)	0.7			0.6			0.5			0.5			0.5					
Total TEUs exchanged ('000)	319.3			359.2			311.1			357.7			345.4					
Full import ('000)	157.2			176.2			153.7			176.5			164.1					
Empty import ('000)	8.4			7.2			6.7			9.0			14.0					
Full export ('000)	82.7			86.9			87.6			96.6			109.4					
Empty export ('000)	71.1			88.9			63.0			75.6			57.9					

Note: Blank cells mean no data was reported for the categories (data for these indicators were reported at six-monthly intervals only).

Sources: DP World (2013), Patrick (2013) and Fremantle Port Authority (2013).

Table I.6 Container terminal throughput: Five ports

	2012				2013				2014						
	MarQtr	JunQtr	Jan-Jun	SepQtr	DecQtr	Jul-Dec	MarQtr	JunQtr	Jan-Jun	SepQtr	DecQtr	Jul-Dec	MarQtr	JunQtr	Jan-Jun
Wharfside															
UCC ship handled, as reported by stevedores	974	983	1 957	980	1 022	2 002	936	951	1 887	1 012	1 059	2 071	1 003	1 053	2 056
Total containers handled ('000)	1 001.4	1 029.6	2 031.0	1 038.8	1 49.9	2 253.6	988.2	1 020.4	2 008.6	1 08.9	1 49.6	2 258.5	1 059.0	1 093.9	2 152.9
Total TEUs handled ('000)	1 476.8	1 524.7	3 001.6	1 654.6	1 734.0	3 388.6	1 476.6	1 516.3	2 992.9	666.9	1 719.6	3 386.5	1 568.9	1 612.8	3 181.7
40-foot container as per cent of all containers handled (%)	47.5	48.1	47.8	49.9	50.8	50.4	49.4	48.6	49.0	50.3	49.6	49.9	48.2	47.4	47.8
Landside															
Number of trucks used in VBS/TAS operations ('000)	440.0	452.0	892.0	490.2	513.2	1 003.4	441.2	465.1	906.3	449.8	450.0	899.8	407.5	437.0	844.5
Total containers transported by trucks and rail ('000)	950.7	971.0	1 921.7	1 019.7	1 060.3	2 080.0	927.3	962.8	1 890.0	959.8	973.2	1 933.1	910.7	926.8	1 837.5
Containers by trucks ('000)	836.8	843.7	1 680.4	895.3	937.6	1 832.9	815.6	843.8	1 659.3	833.2	844.3	1 677.5	764.2	795.6	1 559.8
Containers by rail ('000)	113.9	127.4	241.3	124.4	122.7	247.1	111.7	119.0	230.7	126.6	129.0	255.6	146.5	131.2	277.6
Total TEUs transported by trucks and rail ('000)	1 402.2	1 435.8	2 838.0	1 527.3	1 582.3	3 109.6	1 375.8	1 428.3	2 804.1	1 433.3	1 453.3	2 886.5	1 345.0	1 373.4	2 718.4
TEUs by trucks ('000)	1 245.0	1 258.2	2 503.2	1 351.2	1 409.4	2 760.5	1 222.2	1 262.8	2 485.0	1 254.4	1 271.7	2 526.1	1 141.8	1 189.3	2 331.1
TEUs by rail ('000)	157.2	177.6	334.8	176.2	172.9	349.1	153.6	165.5	319.1	179.0	181.5	360.4	203.2	184.1	387.3
Whole of Container Terminal															
Total number of container ship visits	981	987	1 968	1 016	1 040	2 056	959	966	1 925	1 024	1 053	2 077	1 001	1 027	2 028
Total containers (lifts) exchanged ('000)	952.8	978.7	1 931.6	1 081.4	1 125.8	2 207.2	961.9	984.2	1 946.2	1 083.5	1 126.2	1 960.6	1 033.5	1 043.5	2 076.9
Whole of port															
Total cargo throughput (million tonnes)	75.9	75.9	76.3	73.4	73.4	69.8	72.5								
Non-containerised general cargo throughput (million tonnes)	2.7		2.9		2.3		2.2								
Total TEUs exchanged ('000)	3 149.3		3 541.4		3 177.1		3 580.7						3 341.4		
Full import ('000)	1 456.4		1 667.8		1 467.6		1 679.1						1 522.4		
Empty import ('000)	129.0		127.8		134.3		132.4						153.5		
Full export ('000)	956.0		1 013.6		944.7		1 017.4						985.4		
Empty export ('000)	618.8		732.1		630.5		751.8						680.2		

Note: Blank cells mean no data was reported for the categories (data for these indicators were reported at six-monthly intervals only).

Sources: As for Tables I.1 to I.5.

Table 1.7 Container terminal throughput: Container Ship Visits by Port

	Brisbane	Sydney	Melbourne	Adelaide	Fremantle	Total	
Gross Tonnage			January–June 2014				
5 000–20 000 GT	105	81	47	0	24	257	
20 001–35 000 GT	45	106	60	16	4	231	
35 001–40 000 GT	62	83	86	35	45	311	
40 001–50 000 GT	134	135	143	57	56	525	
50 001 and above GT	157	181	190	55	121	704	
All ship sizes	503	586	526	163	250	2,028	

Sources: Port of Brisbane Pty Ltd (2014), NSW Ports (2014), Port of Melbourne Corporation (2014), Port of Adelaide (2014) and Fremantle Port Authority (2014).

CHAPTER 2

Measures of container terminal productivity

Overview

Chapter 2 of Waterline presents in a consolidated format all container terminal productivity measures. As for Chapter 1, the indicators are in three groups—wharf-side, landside and whole of container terminal.

Seven quarterly wharf-side productivity indicators are covered:

- 2.1 Crane rate – containers per hour
- 2.2 Elapsed labour rate – containers per hour
- 2.3 Ship rate – containers per hour
- 2.4 Crane rate – TEUs per hour
- 2.5 Elapsed labour rate – TEUs per hour
- 2.6 Ship rate – TEUs per hour
- 2.7 Throughput pbm (containers per berth metre).

The following four quarterly landside productivity indicators are reported for trucks involved in VBS/TAS operations. Bulk runs trucks are not included in calculating these indicators:

- 2.8 Containers per truck
- 2.9 TEUs per truck
- 2.10 Average truck turnaround time
- 2.11 Average container turnaround time.

Eleven indicators are reported for whole of container terminal productivity. Indicators 2.14 to 2.17 and Indicator 2.21 are new indicators included in this report and they have a quarterly interval:

- 2.12 Median of ship turnaround time
- 2.13 95th percentile of ship turnaround time
- 2.14 Number of ships waited in anchorage for more than 2 hours
- 2.15 Per cent of ships waited in anchorage for more than 2 hours
- 2.16 Average waiting time in anchorage
- 2.17 Median of waiting time in anchorage
- 2.18 Total time ships spent in berth
- 2.19 Average TEUs per hour ship spent in berth
- 2.20 Average lifts per hour ship spent in berth
- 2.21 Total time ships available to stevedore
- 2.22 Average lifts per hour of stevedoring operation
- 2.23 Average lifts per berth visit.

The chapter presents these indicators for Brisbane, Sydney, Melbourne, Adelaide, Fremantle and Five ports, where Five ports are aggregations of data for the five capital city container terminals.

Wharf-side productivity measures

Measures of productivity on the wharf-side of a container terminal relate only to containers moved by stevedoring companies from/to UCC ships at that container terminal.

Indicator 2.1 Crane rate – containers per hour

This is computed as the total number of containers handled divided by the total elapsed crane time (see details in Box 1). This indicator is interpreted as a proxy measure for the productivity of capital at a container terminal.

Box 1: Elapsed Crane Time

This is the crane time allocated by the stevedore to work on a container ship, assuming the container ship is ready for loading or unloading. It is computed as the total allocated crane hours, less operational and non-operational delays such as:

- No labour allocated
- Closed-port holiday
- Port-wide industrial stoppage
- Total crane time spent handling break-bulk cargo and containers that require manual intervention, e.g. use of wires, chains, non-rigid spreaders or other handling gear
- Award or enterprise agreement breaks as applicable
- Adverse weather
- Delays caused by the ship or its agent
- All breakdowns, including spreader changes
- Other equipment breakdowns which stop crane operations
- Booming up for passing ships
- Handling hatch covers
- Cage work and lashing/unlashing where crane operations are affected
- Crane long-travelling between hatches and crossing accommodation
- Labour withdrawn without operator's agreement including enterprise agreement related industrial stoppages
- Over-dimensional containers requiring additional (rigid) spreader
- Spreader changes
- Waiting for export cargo
- Defective ship's gear (e.g. jammed twist-locks, broken cell guides, ballast pumps unable to maintain list/trim).

Indicator 2.2 Elapsed labour rate – containers per hour

This indicator measures labour productivity at a container terminal and is computed as the number of containers handled divided by the total elapsed labour time (see details in Box 2). Sometimes this measure is reported as the "ship working rate".

Indicator 2.3 Ship rate – containers per hour

This is the average number of containers moved on or off a ship in an hour. Generally, this indicator measures the combined stevedoring productivity of capital and labour.

Indicator 2.4 Crane rate – TEUs per hour

This is similar to Indicator 2.1 after converting containers to TEUs.

Indicator 2.5 Elapsed labour rate – TEUs per hour

This is similar to Indicator 2.2 after converting containers to TEUs.

Indicator 2.6 Ship rate – TEUs per hour

This is similar to Indicator 2.3 after converting containers to TEUs.

Indicator 2.7 Throughput pbm (containers per berth metre)

This is the number of containers through a container terminals divided by the length (in metres) of berths. At a container terminal it measures the intensity of use of the terminal container handling facility.

Box 2: Elapsed Labour Time

This is the time elapsed between labour first boarding a container ship and labour last leaving the ship, less any time when the labour has not worked for whatever reasons including non-operational delays such as:

- No labour allocated to ship
- Closed-port holiday
- Port-wide industrial stoppage
- Break bulk and containers that require manual interventions, e.g. use of wires, chains, non-rigid spreaders or other handling gear.

Landside productivity measures

These indicators relate to the performance in processing containers through the I-stop Vehicle Booking System (VBS) by Patrick and DP World, or through the Truck Appointment System (TAS) by Hutchison Ports Australia. They do not include the performance of bulk runs trucks.

Indicator 2.8 Containers per truck

Count of containers processed through the VBS/TAS systems divided by the total number of VBS/TAS trucks used.

Indicator 2.9 TEUs per truck

Count of TEUs through the VBS/TAS systems divided by the total number of VBS/TAS trucks used. In contrast to Indicator 2.8, this indicator measures the truck efficiency in a standard unit, a TEU, and thus takes into account the different sizes of containers.

Indicator 2.10 Average truck turnaround time

The indicator measures the time lapsed from when the truck enters the gate of a container terminal to the time when the truck exits the gate. This measure does not include the time the truck waits outside the gate of a container terminal. It also excludes time for Australian Quarantine and Inspection Service inspections. This is a measure of stevedoring efficiency and shows how fast (expressed in minutes) a stevedoring company processes a truck at a container terminal.

Indicator 2.11 Average container turnaround time

This is as the “average truck turnaround time” (Indicator 2.10) divided by “average containers per truck” (Indicator 2.8). It is a measure of the stevedoring efficiency in handling containers at a container terminal.

Container turnaround time improves (that is, it goes down) if either the truck utilisation rates improve, implying that the number of containers per truck increases, or the container terminal is faster in processing each truck.

Whole of container terminal measures

Indicator 2.12 Median of ship turnaround time

This is the median of the time (in hours) a container ship is in a port. It is the time that lapses from the time a ship enters a port to the time a ship leaves the port.

Indicator 2.13 95th percentile of ship turnaround time

The 95th percentile indicates that for 95 per cent of the ships, the turnaround time is below the value of the indicator. Conversely, for 5 per cent of the ships, the turnaround time is above the value of the indicator.

Indicator 2.14 Number of ships waited in anchorage for more than 2 hours

This indicator provides the number of container ships, as reported by port authorities that, at the ships’ first time entry, waited for longer than 2 hours for port entry clearance. Delay before entering a port usually results from the geography-specific situation of a port and may also be caused by operational reasons, both at the terminal or ship or both.

Indicator 2.15 Per cent of ships waited in anchorage for more than 2 hours

This is the number of container ships in Indicator 2.14 as a per cent of the total number of container ships that visited the container terminal in the period.

Indicator 2.16 Average waiting time in anchorage

This is the average time (hours) ships have waited in anchorage. Only ships that waited for port entry clearance for two hours or more are included in the calculation. The indicator shows gross delay. Breaking the data down so as to differentiate between port and non-port factors causing delays may breach commercial confidentiality.

Indicator 2.17 Median of waiting time in anchorage

This is the median of time (hours) ships have waited in anchorage. Only ships that waited for port entry clearance for two hours or more are included in the calculation.

Indicator 2.18 Total time ships spent in berth

This is the total hours spent in berth by all dedicated container ships that exchanged containers at that port. The time a ship spends in berth is the elapsed time between the time a ship arrives at berth and the time of its departure from berth. Port authorities report the berth time as a “gross value” including all times spent by a ship at berth such as time for loading/unloading containers, for maintenance and supply operations, or waiting for labour or suitable weather.

Indicator 2.19 Average TEUs per hour ship spent in berth

This is the total TEUs lifted on/off dedicated container ships (UCC) divided by the total time ship spent in berth (Indicator 2.18). The indicator is strongly influenced by changes in average number of TEUs exchanged per visiting ships and by the mix of ship sizes during the period. The average number of TEUs exchanged also varies seasonally and cyclically.

Indicator 2.20 Average lifts per hour ship spent in berth

This indicator is similar to Indicator 2.19 whereas the total crane lifts (containers handled) is used in calculating the indicator rather than the number of TEUs.

Indicator 2.21 Total time ships available to stevedores

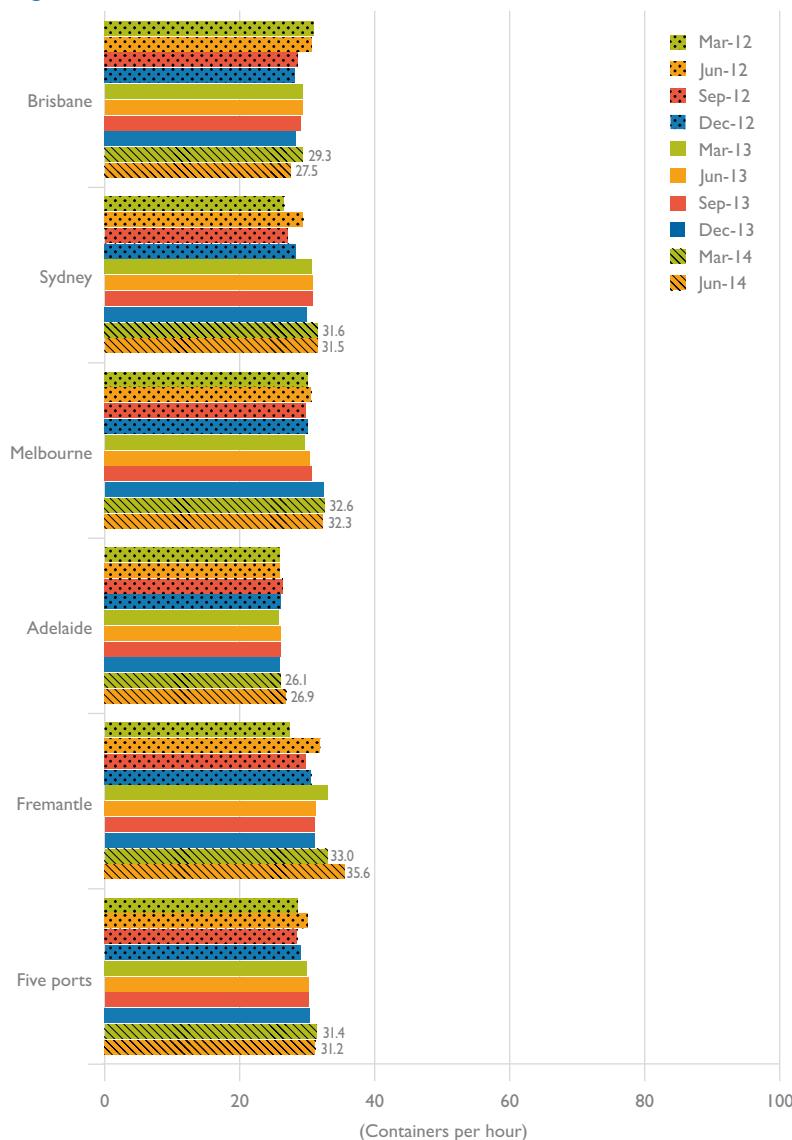
This is the total time (in hours) when ships can be loaded or unloaded.

Indicator 2.22 Average lifts per hour of stevedoring operation

This is the total number of crane lifts (containers handled) divided by the total time actually spent by stevedores in loading and unloading containers.

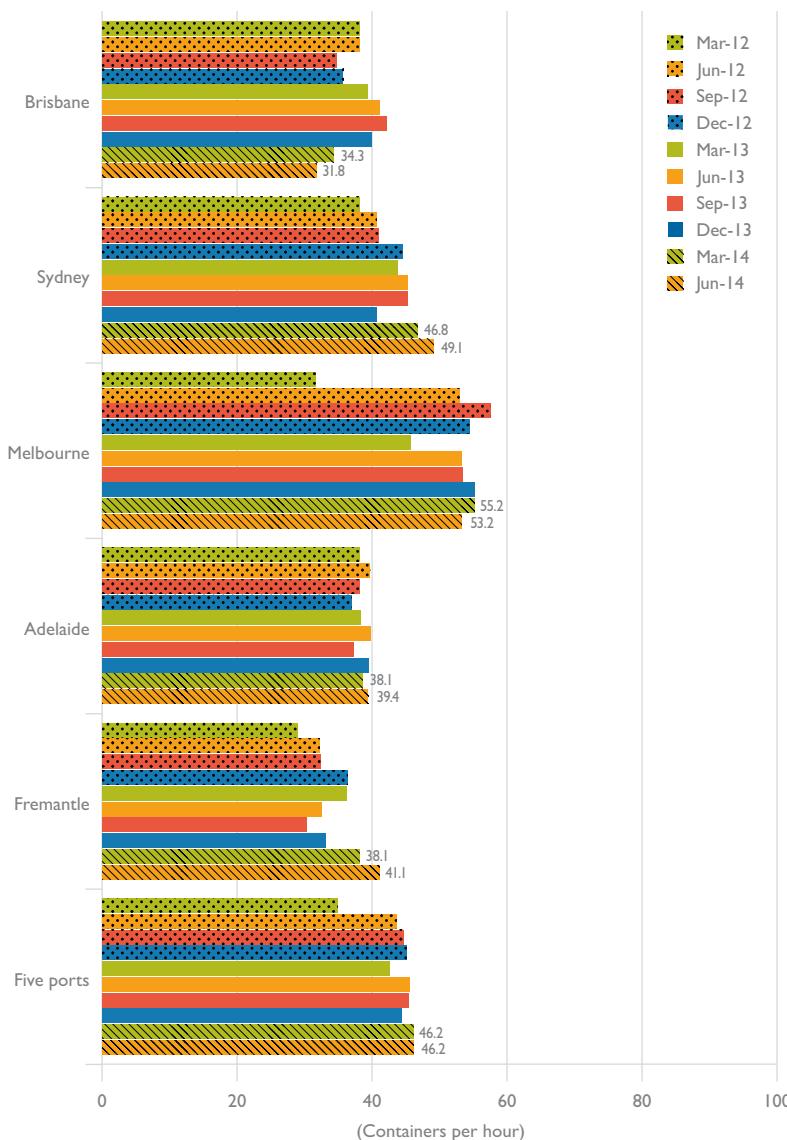
Indicator 2.23 Average lifts per berth visit

This is the number of crane lifts (containers handled) divided by the number of berth visits of dedicated container ships (UCC).

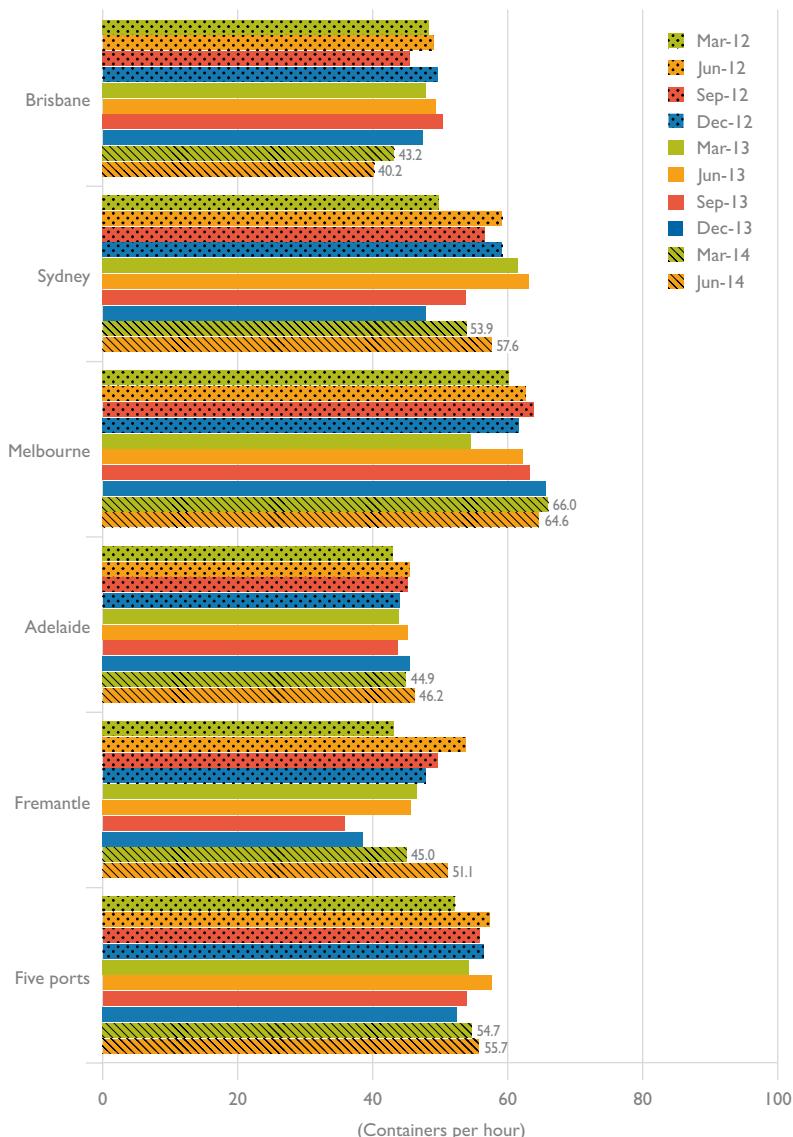
Figure 2.1 Wharf-side crane rate

Sources: DP World (2014), Flinders Adelaide Container Company (2014), Hutchison Ports Australia (2014) and Patrick (2014).

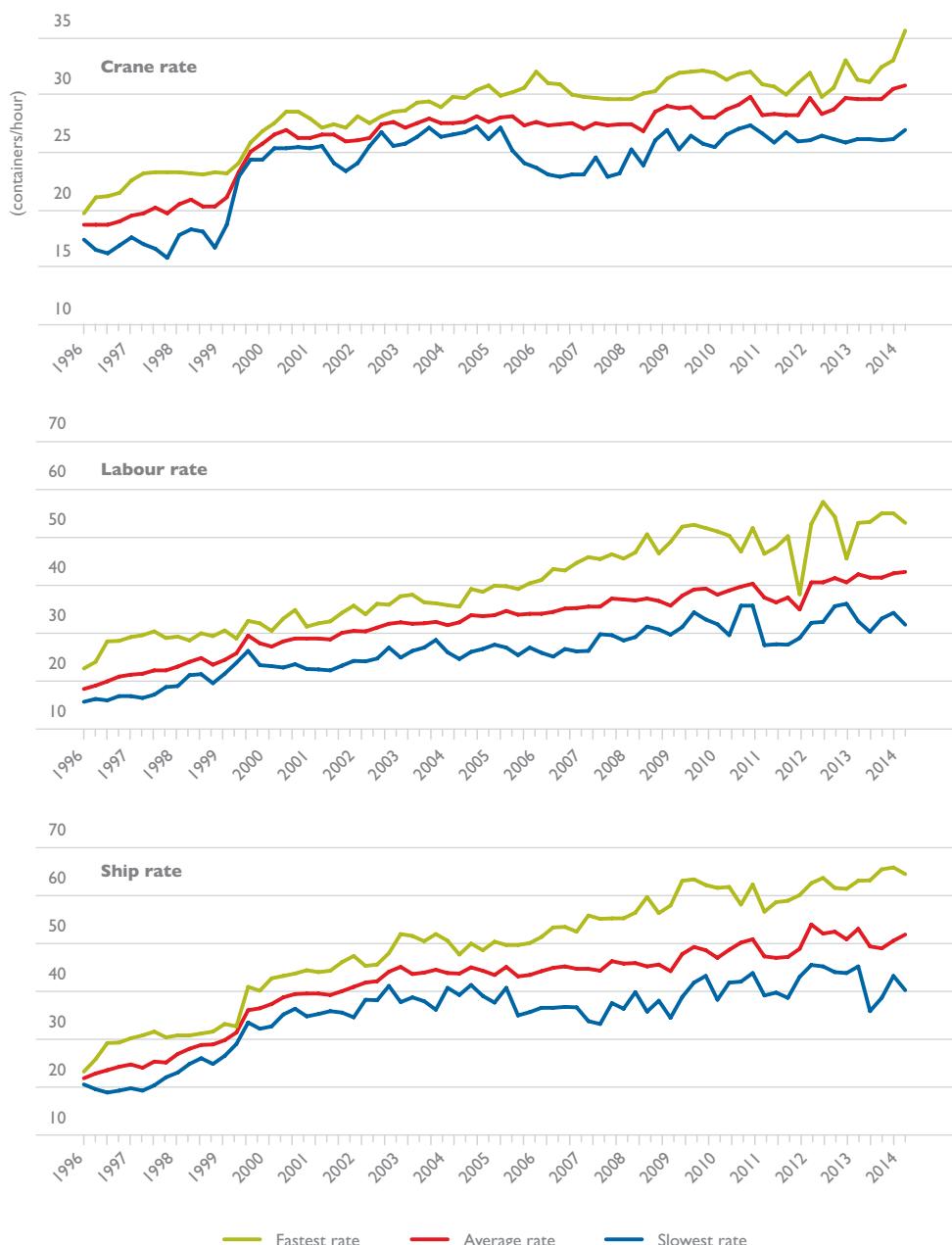
Figure 2.2 Wharf-side elapsed labour rate



Sources: DP World (2014), Flinders Adelaide Container Company (2014), Hutchison Ports Australia (2014) and Patrick (2014).

Figure 2.3 Wharf-side ship rate

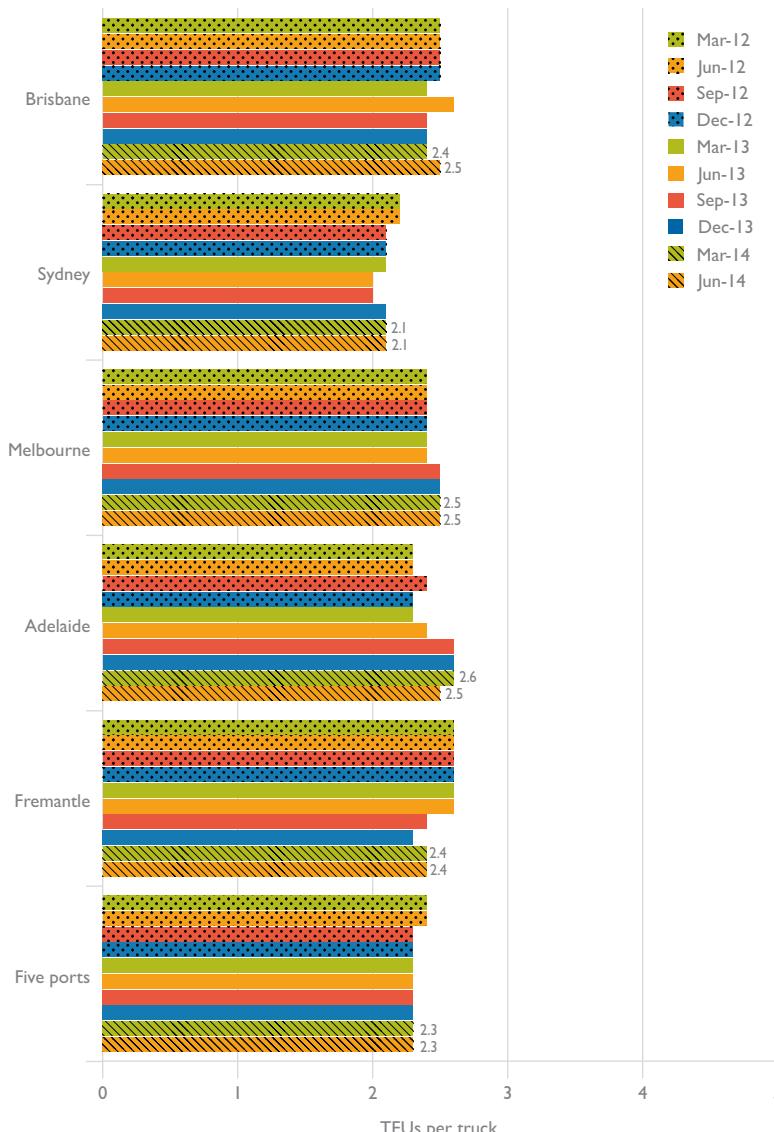
Sources: DP World (2014), Flinders Adelaide Container Company (2014), Hutchison Ports Australia (2014) and Patrick (2014).

Figure 2.4 Productivity in five ports: Comparison of wharf-side rates

Notes: The wharf-side crane rate, labour rate and ship rate are compared among all five ports and the fastest, average and slowest rates are illustrated. The fastest and slowest rate may correspond to different ports in different periods.

Crane rate, labour rate and ship rate are measured in containers per crane hour; elapsed labour hour and berth hour respectively.

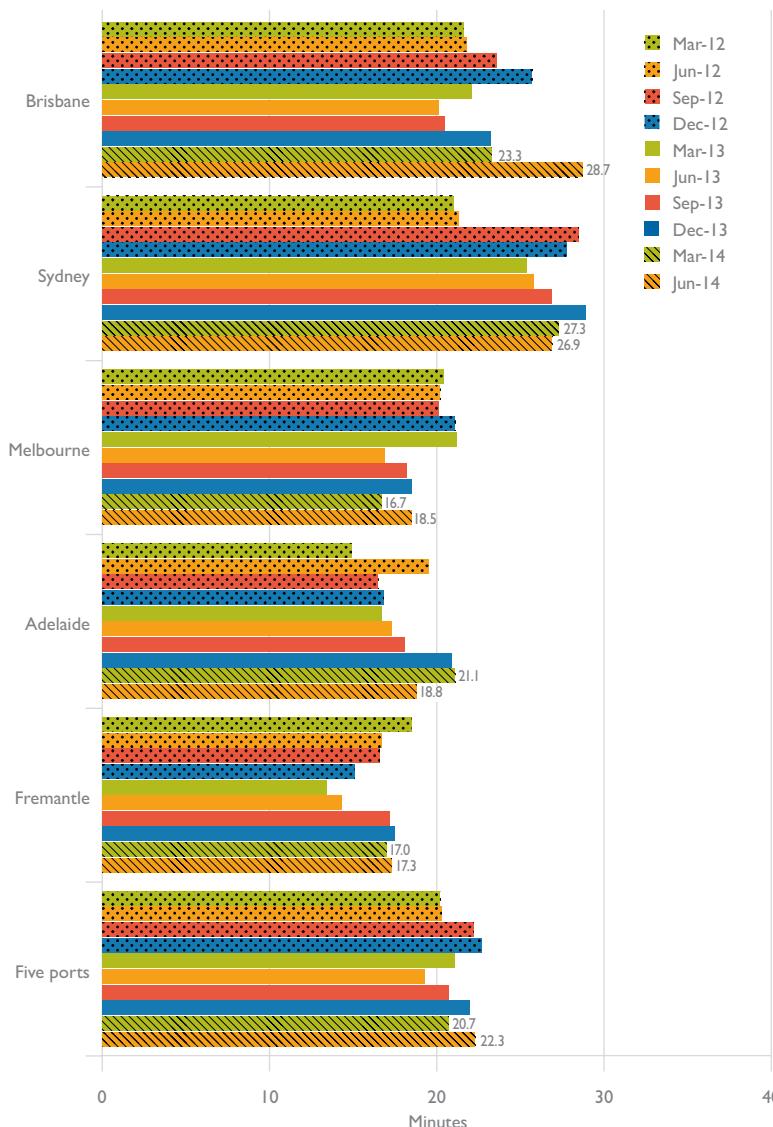
Sources: DP World (2014), Flinders Adelaide Container Company (2014), Hutchison Ports Australia (2014) and Patrick (2014).

Figure 2.5 Average TEUs per truck on landside of container terminals

Notes: This indicator is based on only the trucks that are processed through the VBS/TAS system.

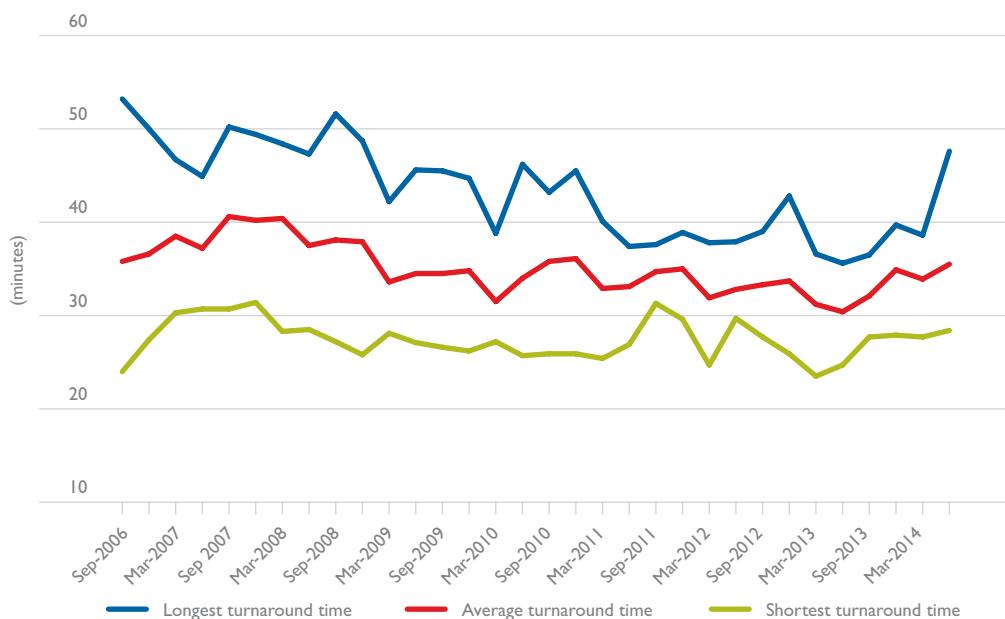
Sources: DP World (2014), Flinders Adelaide Container Company (2014), Hutchison Ports Australia (2014) and Patrick (2014).

Figure 2.6 Average container turnaround time on landside of container terminals



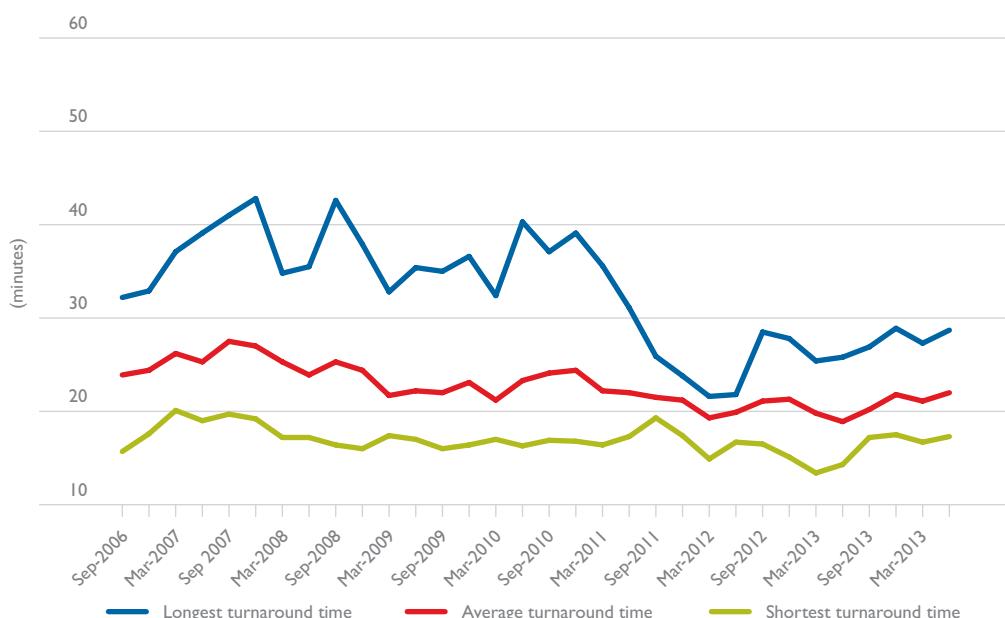
Notes: This indicator is based on only the containers that are processed through the VBS/TAS system.

Sources: DP World (2014), Flinders Adelaide Container Company (2014), Hutchison Ports Australia (2014) and Patrick (2014).

Figure 2.7 Longest and shortest truck turnaround time in five ports

Notes: The truck turnaround time is compared among all five ports in each quarter. The longest and shortest truck turnaround time may correspond to different ports in different periods.

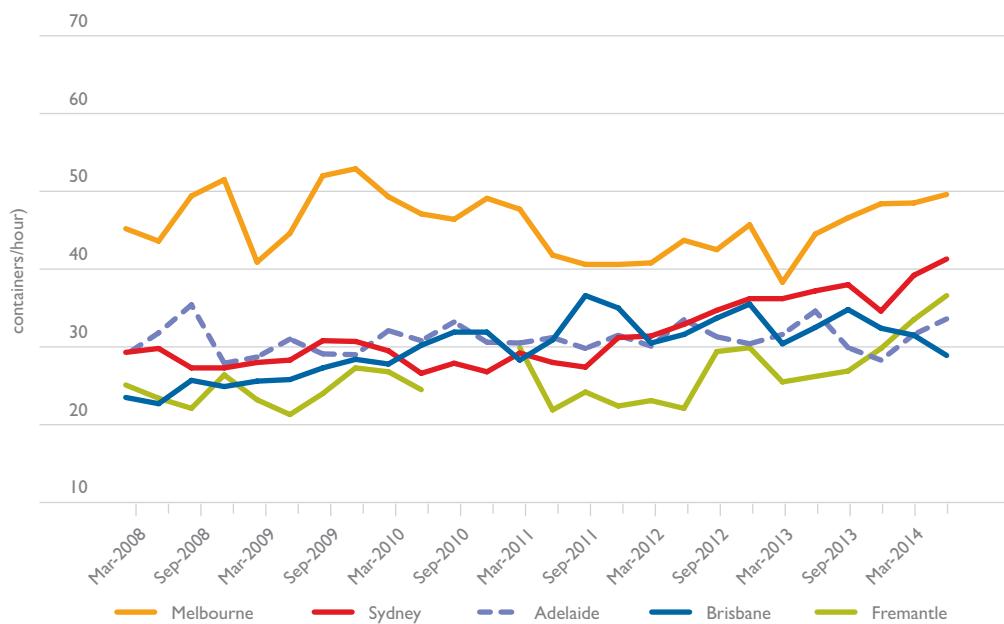
Sources: DPWorld (2014), Flinders Adelaide Container Company (2014), Hutchison Ports Australia (2013), Patrick (2014).

Figure 2.8 Longest and shortest container turnaround time in five ports

Notes: The container turnaround time is compared among all five ports in each quarter. The longest and shortest container turnaround time may correspond to different ports in different periods.

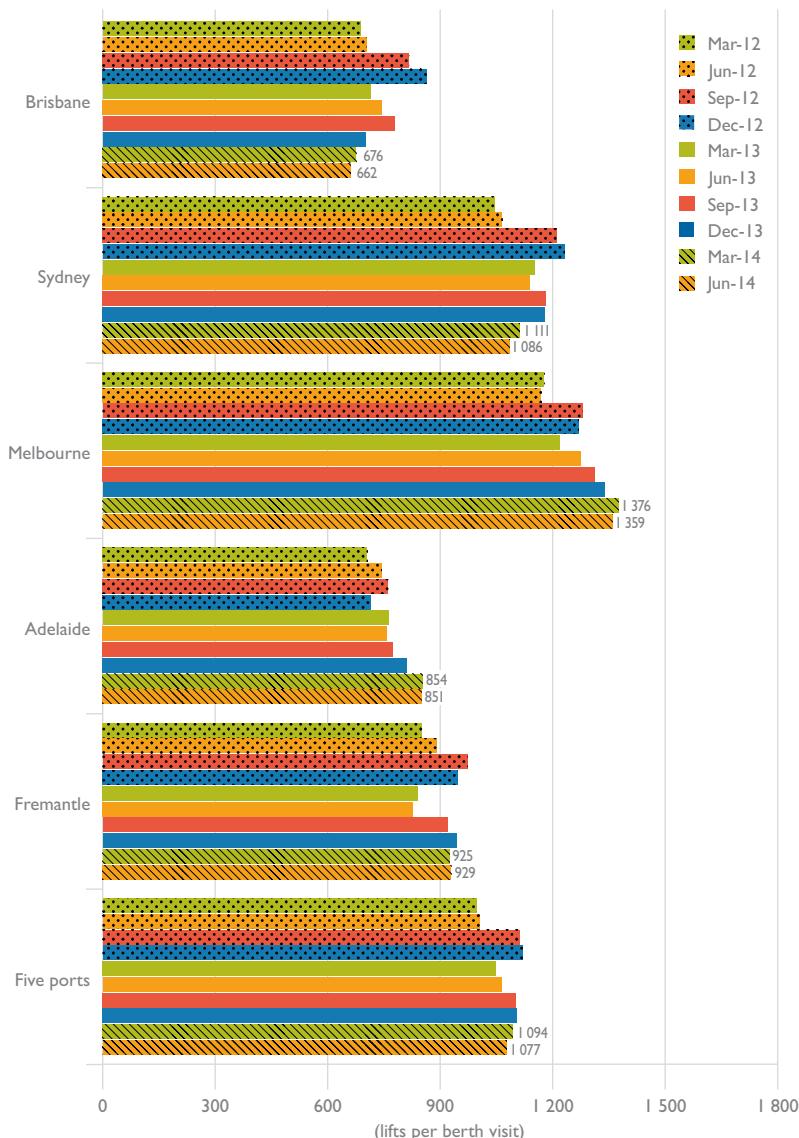
Sources: DP World (2014), Flinders Adelaide Container Company (2014), Hutchison Ports Australia (2013) and Patrick (2014).

Figure 2.9 Average number of lifts per hour a ship spent at berth



Note: In September and December quarters of 2010 only part of ship movement statistics for Fremantle was available for analysis. These data points are not plotted.

Sources: BITRE estimates based on data from Port of Brisbane Pty Ltd (2014), NSW Ports (2014), Port of Melbourne Corporation (2014), Port of Adelaide (2014) and Fremantle Port Authority (2014).

Figure 2.10 Average number of lifts per berth visit

Sources: BITRE estimates based on data from Port of Brisbane Pty Ltd (2014), NSW Ports (2014), Port of Melbourne Corporation (2014), Port of Adelaide (2014) and Fremantle Port Authority (2014).

Table 2.1 Container terminal productivity: Brisbane

	2012				2013				2014						
	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun
Wharfside															
Containers per hour															
Crane rate	31.0	30.7	30.9	28.6	28.2	28.4	29.3	29.3	29.3	28.3	28.3	29.3	27.5	28.4	28.4
Elapsed labour rate	38.2	38.1	38.1	34.7	35.7	35.2	39.4	41.1	40.3	42.1	40.6	39.9	34.3	34.3	33.0
Ship rate	48.3	49.0	48.6	45.5	49.6	47.6	47.9	49.3	48.6	50.4	47.4	48.4	43.2	40.2	41.6
TEUs per hour															
Crane rate	46.0	45.9	46.0	42.9	42.5	42.7	44.1	43.5	43.8	43.1	42.3	42.2	43.2	40.3	41.6
Elapsed labour rate	56.5	57.0	56.7	52.0	54.0	53.0	59.4	61.1	60.3	62.5	59.9	60.5	50.3	46.6	48.3
Ship rate	71.6	73.3	72.4	68.2	74.9	71.6	72.3	73.3	72.8	75.0	71.3	72.4	63.5	58.9	60.9
Throughput pbm	98.5	105.7	102.1	113.3	120.5	116.9	99.3	108.9	104.1	122.7	118.7	120.7	104.1	111.7	108.0
Landside															
Containers per truck	1.7	1.7	1.7	1.6	1.7	1.6	1.7	1.8	1.7	1.7	1.7	1.7	1.6	1.7	1.6
TEUs per truck	2.5	2.5	2.5	2.5	2.5	2.5	2.4	2.6	2.5	2.4	2.4	2.4	2.4	2.5	2.4
Truck turnaround time (mins)	37.8	37.9	37.8	38.3	42.8	40.6	36.6	35.6	36.1	34.1	38.4	36.3	37.9	47.6	43.1
Average container turnaround time (mins)	21.6	21.8	21.7	23.6	25.7	24.7	22.1	20.1	21.1	20.5	23.2	21.8	23.3	28.7	26.2
Whole of Container Terminal															
Ship turnaround time															
Median (hours)	29.8	30.1	30.0	31.2	31.6	31.4	30.2	30.8	30.7	30.0	29.3	29.8	29.2	29.4	29.3
95th percentile (hours)	51.5	53.4	52.4	52.5	67.2	58.2	97.0	52.8	70.4	49.1	53.8	53.0	51.1	52.0	51.6
Ship waiting time at anchorage															
Number of ships waited in anchorage for more than 2 hours															
Per cent of ships waited in anchorage for more than 2 hours (%)															
Average waiting time in anchorage (hours)															
Median of waiting time in anchorage (hours)															
Total time ships spent in berth ('000 hours)	5.1	5.1	10.2	5.8	5.9	11.8	5.2	5.1	10.3	5.6	5.8	11.4	5.3	6.0	11.3
Average TEUs per hour ship spent in berth (TEUs per hour)	45.3	47.2	46.2	50.6	53.4	52.0	45.9	48.2	47.0	51.7	48.6	50.1	46.3	42.2	44.1
Average lifts per hour ship spent in berth (lifts per hour)															
Total time ships are available to stevedores ('000 hours)	30.5	31.6	31.1	33.7	35.5	34.6	30.4	32.5	31.5	34.8	32.4	33.6	31.5	28.9	30.1
Average lifts per stevedores' hour (lifts per hour)															
Average lifts per berth visit (lifts)															
Note:	Blank cells mean no data was reported for the categories. They relate to new indicators first reported in this issue of Waterline.														
Sources:	DP World (2014), Hutchison Ports Australia (2014), Patrick (2014) and Port of Brisbane Pty Ltd (2014).														

Table 2.2 Container terminal productivity: Sydney

	2012				2013				2014							
	MarQtr	JunQtr	Jan-Jun	SepQtr	DecQtr	Jul-Dec	MarQtr	JunQtr	Jan-Jun	SepQtr	DecQtr	Jul-Dec	MarQtr	JunQtr	Jan-Jun	
Wharfside																
Containers per hour																
Crane rate	26.6	29.4	28.0	27.1	28.3	27.7	30.7	30.8	30.8	30.0	30.4	31.6	31.5	31.4		
Elapsed labour rate	38.2	40.6	39.5	40.9	44.5	42.7	43.8	45.3	44.6	45.3	40.7	43.0	46.8	49.1	47.6	
Ship rate	49.8	59.2	54.5	56.6	59.2	57.9	61.5	63.2	62.4	53.8	47.8	50.8	53.9	57.6	55.5	
TEUs per hour																
Crane rate	39.8	44.0	41.9	41.0	43.2	42.1	46.4	46.1	46.3	46.6	45.3	46.0	48.0	47.5	47.5	
Elapsed labour rate	57.3	61.0	59.2	62.0	67.8	64.9	66.3	68.1	67.2	69.5	62.0	65.7	71.2	74.4	72.3	
Ship rate	74.7	88.9	81.9	85.8	90.6	88.2	93.4	95.2	94.3	82.0	72.2	77.1	82.0	87.3	84.2	
Throughput pbm	165.2	161.8	163.5	182.9	199.6	191.3	167.7	175.5	171.6	188.8	199.3	194.2	181.6	182.9	182.3	
Landside																
Containers per truck	1.5	1.5	1.5	1.4	1.4	1.4	1.4	1.3	1.4	1.3	1.3	1.3	1.4	1.4	1.4	
TEUs per truck	2.2	2.2	2.2	2.1	2.1	2.1	2.1	2.0	2.0	2.0	2.0	2.0	2.1	2.1	2.1	
Truck turnaround time (mins)	30.7	30.8	30.8	39.0	38.1	38.5	34.7	34.9	34.8	36.5	39.7	38.1	37.2	36.6	36.9	
Average container turnaround time (mins)	21.0	21.3	21.1	28.5	27.8	28.1	25.4	25.8	25.6	26.9	28.9	27.9	27.3	26.9	27.1	
Whole of Container Terminal																
Ship turnaround time																
Median (hours)	34.8	33.4	33.8	34.2	35.1	34.5	31.7	31.3	31.3	30.0	33.2	31.3	27.8	25.5	26.6	
95th percentile (hours)	54.3	57.8	57.4	55.0	55.1	55.2	54.6	51.8	52.8	53.8	58.2	56.8	46.9	43.8	45.3	
Ship waiting time at anchorage																
Number of ships waited in anchorage for more than 2 hours																
Per cent of ships waited in anchorage for more than 2 hours (%)																
Average waiting time in anchorage (hours)																
Median of waiting time in anchorage (hours)																
Total time ships spent in berth ('000 hours)	9.2	9.0	18.2	9.4	9.8	19.2	8.3	8.3	16.7	9.0	10.3	19.3	8.2	7.8	16.0	
Average TEUs per hour ship spent in berth (TEUs per hour)	47.2	49.4	48.3	52.6	55.3	54.0	54.9	55.8	55.3	57.5	52.6	54.9	59.6	62.3	60.9	
Average lifts per hour ship spent in berth (lifts per hour)																
Total time ships are available to stevedores ('000 hours)	31.4	32.9	32.1	34.7	36.2	35.4	36.2	37.2	36.7	38.0	34.6	36.2	39.2	41.3	40.2	
Average lifts per stevedores' hour (lifts per hour)																
Average lifts per berth visit (lifts)																
Average lifts per berth visit (lifts)	1 046.2	1 065.4	1 055.8	1 212.1	1 230.6	1 221.7	1 50.7	1 39.4	1 45.0	1 82.3	1 79.2	1 80.7	1 10.9	1 086.2	1 098.4	

Note: Blank cells mean no data was reported for the categories. They relate to new indicators first reported in this issue of Waterline.

Sources: DP World (2014), Patrick (2014), NSW Ports (2014) and Port Authority New South Wales (2014).

Table 2.3 Container terminal productivity: Melbourne

	2012			2013			2014		
	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun
Wharfside									
Containers per hour									
Crane rate	30.1	30.6	30.4	29.8	30.1	29.9	29.6	30.4	30.0
Elapsed labour rate	31.7	53.0	42.3	57.6	54.5	56.0	45.7	53.2	49.5
Ship rate	60.2	62.7	61.5	63.8	61.7	62.8	54.6	62.3	58.4
TEUs per hour									
Crane rate	44.3	45.1	44.7	44.6	45.3	45.0	44.1	45.6	44.9
Elapsed labour rate	74.2	78.6	76.4	86.3	82.1	84.2	68.3	66.9	67.7
Ship rate	88.8	92.8	90.8	95.6	93.1	94.4	81.7	93.6	87.6
Throughput pbm	198.0	204.6	201.3	209.3	212.0	210.7	186.2	184.7	185.5
Landside									
Containers per truck	1.7	1.7	1.7	1.6	1.6	1.6	1.6	1.6	1.6
TEUs per truck	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Truck turnaround time (mins)	33.9	33.8	33.8	32.8	34.6	33.7	34.1	27.3	30.6
Average container turnaround time (mins)	20.4	20.2	20.3	20.1	21.1	20.6	21.2	16.9	19.0
Whole of Container Terminal									
Ship turnaround time									
Median (hours)	37.7	35.9	36.6	35.4	36.7	36.0	38.1	35.6	36.6
95th percentile (hours)	65.3	61.5	63.5	70.0	68.2	69.9	65.0	62.4	64.9
Ship waiting time at anchorage									
Number of ships waited in anchorage for more than 2 hours									
Per cent of ships waited in anchorage for more than 2 hours (%)									
Average waiting time in anchorage (hours)									
Median of waiting time in anchorage (hours)									
Total time ships spent in berth ('000 hours)	8.7	8.2	16.9	8.9	8.4	17.4	9.0	7.7	16.8
Average TEUs per hour ship spent in berth (TEUs per hour)	60.1	64.5	62.3	63.7	68.9	66.2	57.2	66.7	61.6
Average lifts per hour ship spent in berth (lifts per hour)	40.8	43.7	42.2	42.5	45.7	44.1	38.3	44.5	41.1
Total time ships are available to stevedores ('000 hours)									
Average lifts per stevedores' hour (lifts per hour)									
Average lifts per berth visit (lifts)									
Note:	Blank cells mean no data was reported for the categories. They relate to new indicators first reported in issue 53 of Waterline..								
Sources:	DP World (2013), Patrick (2013) and Port of Melbourne Corporation (2013).								

Table 2.4 Container terminal productivity: Adelaide

	2012			2013			2014							
	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun
Wharfside														
Containers per hour														
Crane rate	25.9	26.0	26.0	26.4	26.1	26.3	25.8	26.1	25.9	26.0	26.1	26.1	26.9	26.5
Elapsed labour rate	38.1	39.7	38.9	38.1	37.0	37.6	38.3	39.8	39.1	37.2	39.5	38.3	38.6	39.4
Ship rate	43.0	45.5	44.2	45.2	44.0	44.6	43.8	45.2	44.5	43.7	45.5	44.6	44.9	46.2
TEUs per hour														
Crane rate	36.0	35.8	35.9	36.9	36.8	36.9	35.9	36.0	36.0	37.0	36.0	36.5	35.7	36.9
Elapsed labour rate	52.8	54.7	53.7	53.2	52.2	52.7	53.4	54.9	54.2	52.7	54.7	53.7	52.9	54.1
Ship rate	59.6	62.6	61.1	63.1	62.0	62.6	61.0	62.5	61.7	61.9	63.1	62.5	61.5	63.4
Throughput pbm	113.7	132.8	123.3	134.1	132.7	133.4	124.5	130.0	127.3	145.0	147.6	146.3	148.0	150.7
Landside														
Containers per truck	1.7	1.6	1.7	1.7	1.6	1.6	1.6	1.7	1.7	1.8	1.8	1.8	1.8	1.8
TEUs per truck	2.3	2.3	2.3	2.4	2.3	2.3	2.3	2.4	2.4	2.6	2.6	2.6	2.6	2.5
Truck turnaround time (mins)	24.7	32.0	28.5	27.7	27.1	27.4	27.3	29.7	28.5	32.5	37.5	35.0	38.6	33.3
Average container turnaround time (mins)	14.9	19.5	17.3	16.5	16.8	16.6	16.7	17.3	17.0	18.1	20.9	19.5	21.1	18.8
Whole of Container Terminal														
Ship turnaround time														
Median (hours)	22.2	21.9	22.0	22.7	21.2	21.8	23.3	21.7	22.2	24.0	25.4	24.5	26.6	24.6
95th percentile (hours)	40.1	38.8	39.1	42.6	38.8	41.5	39.8	36.2	37.7	46.0	50.4	47.5	42.4	39.3
Ship waiting time at anchorage														
Number of ships waited in anchorage for more than 2 hours														
Per cent of ships waited in anchorage for more than 2 hours (%)														
Average waiting time in anchorage (hours)	11.7	12.2	11.9	10.5	19.8	15.1	9.0	10.5	11.9	10.5	19.8	15.1	9.8	11.1
Median of waiting time in anchorage (hours)	19.3	13.7	16.5	16.3	22.8	20.6	19.3	13.7	16.5	16.3	22.8	20.6	23.2	22.4
Total time ships spent in berth ('000 hours)	1.8	1.9	3.6	2.0	4.0	4.0	1.8	3.7	2.2	2.4	4.6	4.6	17.8	15.5
Average TEUs per hour ship spent in berth (TEUs per hour)	41.7	46.0	44.0	43.7	42.9	43.3	44.0	47.7	45.9	42.3	39.3	40.7	43.3	46.2
Average lifts per hour ship spent in berth (lifts per hour)	30.1	33.5	31.8	31.3	30.4	30.8	31.6	34.6	33.1	29.9	28.3	29.1	31.6	33.6
Total time ships are available to stevedores ('000 hours)														
Average lifts per stevedores' hour (lifts per hour)														
Average lifts per berth visit (lifts)	704.6	743.1	725.0	761.1	715.3	737.8	762.1	758.2	760.1	773.8	811.3	806.8	854.4	850.9

Note: Blank cells mean no data was reported for the categories. They relate to new indicators first reported in this issue of Waterline.

Sources: Flinders Adelaide Container Company (2014) and Port of Adelaide (2014).

Table 2.5 Container terminal productivity: Fremantle

		2012				2013				2014					
		Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr
Wharfside															
Containers per hour															
Crane rate	27.4	31.9	29.6	29.8	30.6	30.2	33.0	31.3	32.1	31.1	31.1	33.0	35.6	34.3	34.3
Elapsed labour rate	29.0	32.2	30.6	32.4	36.3	34.4	36.2	32.5	34.3	30.3	33.1	31.7	41.1	39.6	39.6
Ship rate	43.2	53.8	48.5	49.6	47.8	48.7	46.5	45.7	46.1	35.8	38.6	37.2	45.0	51.1	48.1
TEUs per hour															
Crane rate	39.5	47.0	43.3	44.7	46.0	45.3	48.5	46.0	47.3	46.3	46.6	46.5	48.2	50.8	49.5
Elapsed labour rate	41.7	47.5	44.6	48.6	54.5	51.6	53.3	47.7	50.5	45.2	49.6	47.4	55.6	58.6	57.1
Ship rate	61.8	79.1	70.5	73.7	71.0	72.4	67.9	66.4	67.1	53.4	57.6	55.5	65.8	73.1	69.5
Throughput pbm	83.2	84.7	83.9	93.8	92.2	93.0	80.9	82.2	81.6	86.9	96.9	92.2	88.3	91.0	89.7
Landside															
Containers per truck	1.8	1.8	1.8	1.7	1.7	1.7	1.8	1.7	1.7	1.7	1.6	1.6	1.6	1.6	1.6
TEUs per truck	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.4	2.3	2.3	2.4	2.4	2.4
Truck turnaround time (mins)	32.4	29.7	31.0	28.6	25.9	27.3	23.5	24.7	24.1	27.7	27.9	27.8	27.7	28.4	28.0
Average container turnaround time (mins)	18.5	16.7	17.6	16.6	15.1	15.8	13.4	14.3	13.9	17.2	17.5	17.4	17.0	17.3	17.1
Whole of Container Terminal															
Ship turnaround time															
Median (hours)	38.3	35.4	37.3	36.7	34.0	35.5	36.5	34.6	35.5	33.9	34.1	33.9	30.6	26.6	28.6
95th percentile (hours)	84.1	75.0	81.8	66.2	59.9	63.6	64.5	59.9	62.0	85.6	66.7	75.7	50.8	44.5	47.7
Ship waiting time at anchorage															
Number of ships waited in anchorage for more than 2 hours	7	7	7	14	9	10	19	6	19	6	1	1	7		
Per cent of ships waited in anchorage for more than 2 hours (%)	5.7	5.6	5.7	7.3	7.8	7.5	4.8	0.8	0.8	0.8	0.8	0.8	2.8		
Average waiting time in anchorage (hours)	14.5	16.5	15.5	17.2	9.2	13.0	11.4	9.7	10.6						
Median of waiting time in anchorage (hours)	13.6	10.7	12.2	8.1	6.8	7.2	8.2	9.7	9.0						
Total time ships spent in berth ('000 hours)	4.3	4.6	8.9	4.0	3.8	7.8	3.9	3.8	7.7	4.1	4.0	8.1	3.5	3.2	6.6
Average TEUs per hour ship spent in berth (TEUs per hour)	36.4	33.8	35.0	44.2	44.8	44.5	39.1	40.3	39.7	40.7	45.0	42.8	48.9	52.4	50.6
Average lifts per hour ship spent in berth (lifts per hour)	23.1	22.1	22.6	29.4	29.9	29.6	25.5	26.2	25.8	26.9	29.8	28.3	33.5	36.6	35.0
Total time ships are available to stevedores ('000 hours)							2.9	3.3	6.2	4.0	4.3	8.3	3.4	3.1	6.5
Average lifts per stevedores' hour (lifts per hour)							34.2	30.3	32.3	27.3	28.1	27.7	34.4	37.1	35.7
Average lifts per berth visit (lifts)	851.9	890.5	871.1	972.9	947.2	960.1	840.9	827.0	833.8	919.2	942.5	931.1	924.6	929.4	927.1

Note: Blank cells mean no data was reported for the categories. They relate to new indicators first reported in this issue of Waterline.

Table 2.6 Container terminal productivity: Five ports

	2012				2013				2014						
	Mar Qtr	Jun Qtr	Jan-Jun	Sep-Qtr	Dec-Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep-Qtr	Dec-Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun
Wharfside															
Containers per hour															
Crane rate	28.6	30.1	29.3	28.5	29.0	28.8	30.0	30.2	30.1	30.2	30.4	30.2	31.4	31.2	31.3
Elapsed labour rate	34.9	43.6	39.2	44.6	45.1	44.8	42.6	45.5	44.1	45.4	44.4	44.8	46.2	46.2	46.1
Ship rate	52.2	57.3	54.8	55.8	56.4	56.1	54.3	57.6	56.0	53.9	52.5	53.1	54.7	55.7	55.1
TEUs per hour															
Crane rate	42.2	44.5	43.4	42.8	43.8	43.3	44.9	44.9	44.9	45.3	45.4	45.3	46.5	46.1	46.2
Elapsed labour rate	61.3	64.7	63.0	66.8	68.1	67.5	63.8	63.7	63.8	68.5	66.7	67.5	68.6	68.6	68.5
Ship rate	77.1	85.1	81.2	83.8	85.3	84.5	81.5	86.1	83.8	81.2	78.6	79.8	81.4	82.8	82.0
Throughput pbm	140.3	144.3	142.3	154.7	161.1	157.9	138.5	142.9	140.7	155.4	161.1	158.2	148.4	153.3	150.8
Landside															
Containers per truck	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
TEUs per truck	2.4	2.4	2.4	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
Truck turnaround time (mins)	32.8	33.0	32.9	34.7	35.6	35.1	33.0	30.6	31.8	32.4	34.7	33.6	32.9	35.5	34.2
Average container turnaround time (mins)	20.2	20.3	20.2	22.2	22.7	22.4	21.1	19.3	20.2	20.7	22.0	21.3	20.7	22.3	21.5
Whole of Container Terminal															
Ship turnaround time															
Median (hours)	n.a.														
95th percentile (hours)	n.a.														
Ship waiting time at anchorage															
Number of ships waited in anchorage for more than 2 hours															
Per cent of ships waited in anchorage for more than 2 hours (%)															
Average waiting time in anchorage (hours)															
Median of waiting time in anchorage (hours)															
Total time ships spent in berth ('000 hours)	29.1	28.8	57.8	30.1	30.0	60.1	28.3	26.8	55.1	28.8	30.4	59.2	26.6	26.4	52.9
Average TEUs per hour ship spent in berth (TEUs per hour)	50.2	52.7	51.4	54.7	57.9	56.3	51.9	56.3	54.0	58.2	57.2	57.6	59.4	60.8	60.1
Average lifts per hour ship spent in berth (lifts per hour)	33.8	35.5	34.7	36.5	38.4	37.4	34.6	37.7	36.1	38.8	38.1	38.4	40.0	41.1	40.5
Total time ships are available to stevedores (000 hours)															
Average lifts per stevedores' hour (lifts per hour)															
Average lifts per berth visit (lifts)	997.2	1 004.7	1 000.9	1 124.1	1 189.1	1 155.1	1 048.6	1 064.0	1 056.1	1 017.1	1 051.1	1 095.1	1 094.4	1 077.1	1 085.6

Note:

n.a.: not applicable.

Sources: As for Tables 2.1 to 2.5.

CHAPTER 3

Timeslots for trucks at container terminals

Overview

This chapter reports on two main indicators:

1. The number of truck booking or appointments timeslots available at a container terminal
2. The number of truck booking or appointments timeslots used at a container terminal

The data is derived from the Vehicle Booking System (VBS) used by Patrick and DP World, and Hutchison Ports Australia's Truck Appointments System (TAS). An important use of these statistics is to monitor the time of day and week when trucks access the container terminals to pick up or deliver containers. For this reason the count of slots available and used are provided for the following windows:

Monday to Friday Day: 6:01 AM to 6:00 PM

Monday to Friday Evening: 6:01 PM to 12:00 Midnight

Monday to Friday Night: 12:01 Midnight to 6:00 AM

Saturday Day: 6:01 AM to 6:00 PM

Saturday Evening: 6:01 PM to 12:00 Midnight

Saturday Night: 12:01 Midnight to 6:00 AM

Sunday Day: 6:01 AM to 6:00 PM

Sunday Evening: 6:01 PM to 12:00 Midnight

Sunday Night: 12:01 Midnight to 6:00 AM

The stevedores at the five container terminals do not have identical day, evening and night shifts. Thus data has been adjusted to fit into these standardised work shifts for comparative purposes.

Indicator 3.1 Number of truck timeslots available

Stevedoring companies make available a number of truck timeslots at various times in each day, based on the deployment of container handling equipment. The main factors affecting the availability of truck timeslots are the volume of containers to be processed, and terminal resources available to process containers. When shipping schedules and container volumes demand extra resources, additional labour and extra equipment can be deployed to the landside of a container terminal and extra available timeslots are advertised normally one or two days in advance.

Indicator 3.2 Number of timeslots actually used

This is the count of timeslots actually used by trucks

Indicator 3.3 Timeslots used by trucks in all off-peak periods as per cent of total timeslots used at container terminals

This indicator, derived from Indicator 3.2, gives the count of timeslots used by trucks during the off-peak period as a per cent of all timeslots used. The off-peak period is defined as all time periods except Monday to Friday 6:01 AM to 6:00 PM.

Results for this indicator are presented in Figure 3.1. The indicator is further divided up into Monday to Friday off-peak usage (Indicator 3.4) and week-end usage (Indicator 3.5).

Indicator 3.4 Timeslots used by trucks in Monday to Friday off-peak periods as per cent of total timeslots used

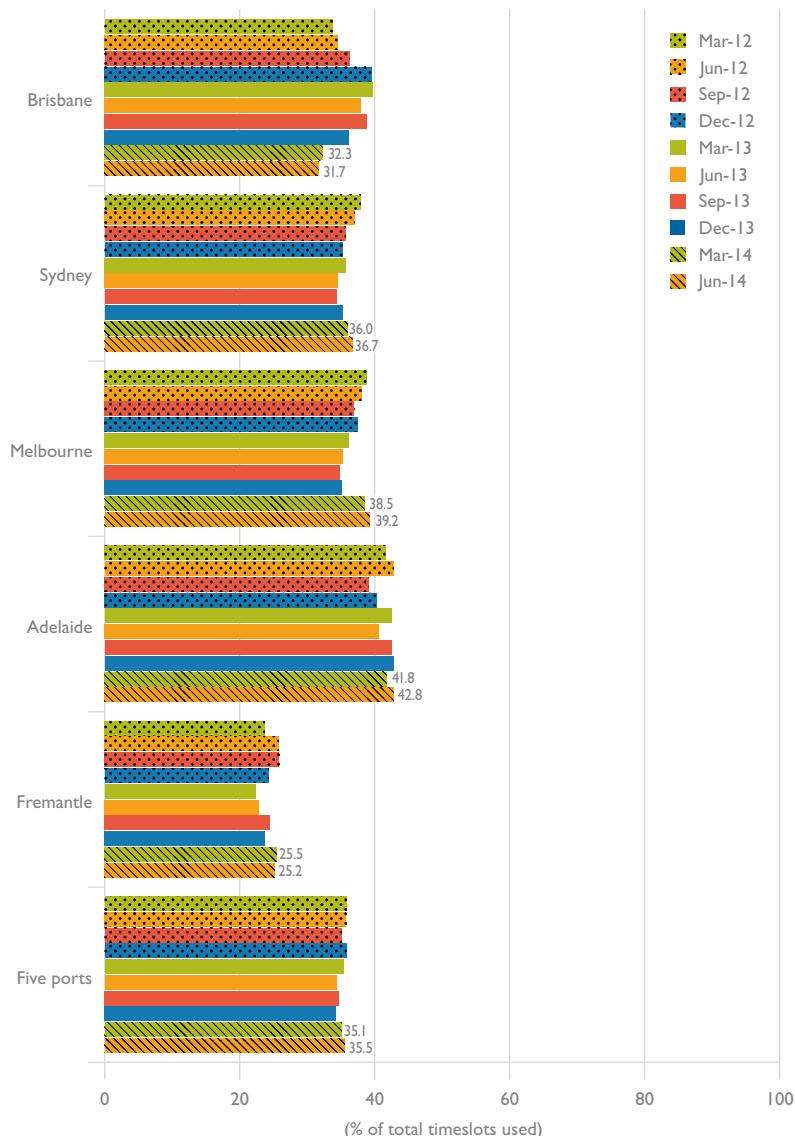
This indicator, is derived from Indicator 3.2, gives a count of timeslots used by trucks during the Monday to Friday off-peak period as a per cent of all timeslots used. Results for this indicator are presented in Figure 3.2.

Indicator 3.5 Timeslots used by trucks on Saturday and Sunday as per cent of total timeslots used

This indicator, is derived from indicator 3.2, gives a count of timeslots used by trucks during the Weekend (Saturday to Sunday) as a per cent of all timeslots used. Results for this indicator are presented in Figure 3.3.

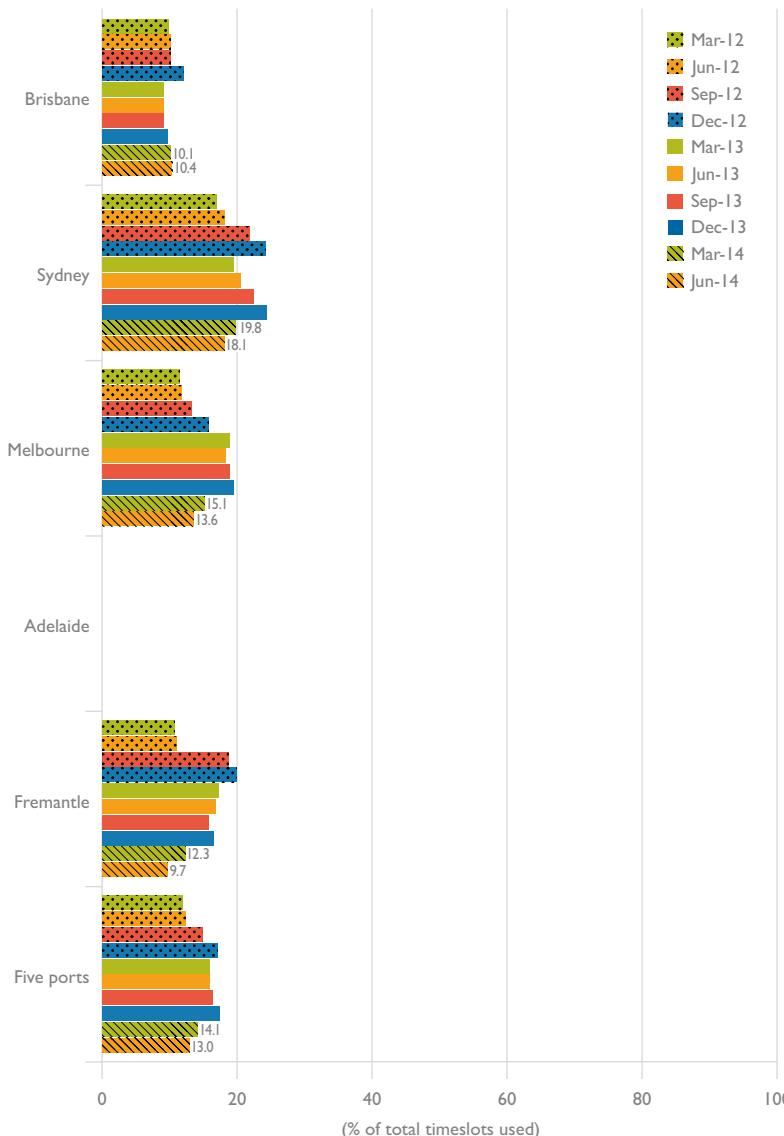
Indicator 3.6 Average TEUs handled per VBS/TAS truck timeslot

This indicator is a measure of the intensity of usage of timeslots. It is an estimate of the number of TEUs handled per truck timeslot used. The indicator increases as opportunities for triangulation and twin jobs increase at a container terminal. Results for this indicator are presented in Figure 3.4.

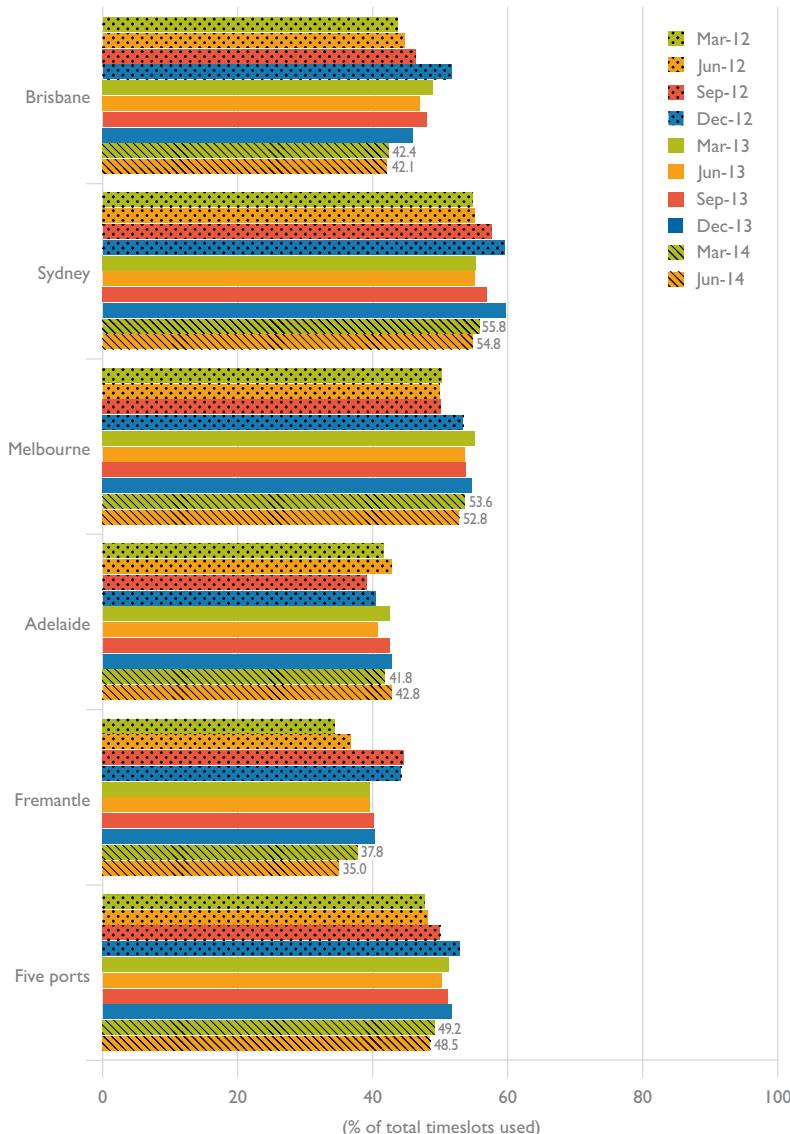
Figure 3.1 Timeslots used by trucks in off-peak periods Monday to Friday

Sources: DP World (2014), Flinders Adelaide Container Company (2014), Hutchison Ports Australia (2014) and Patrick (2014).

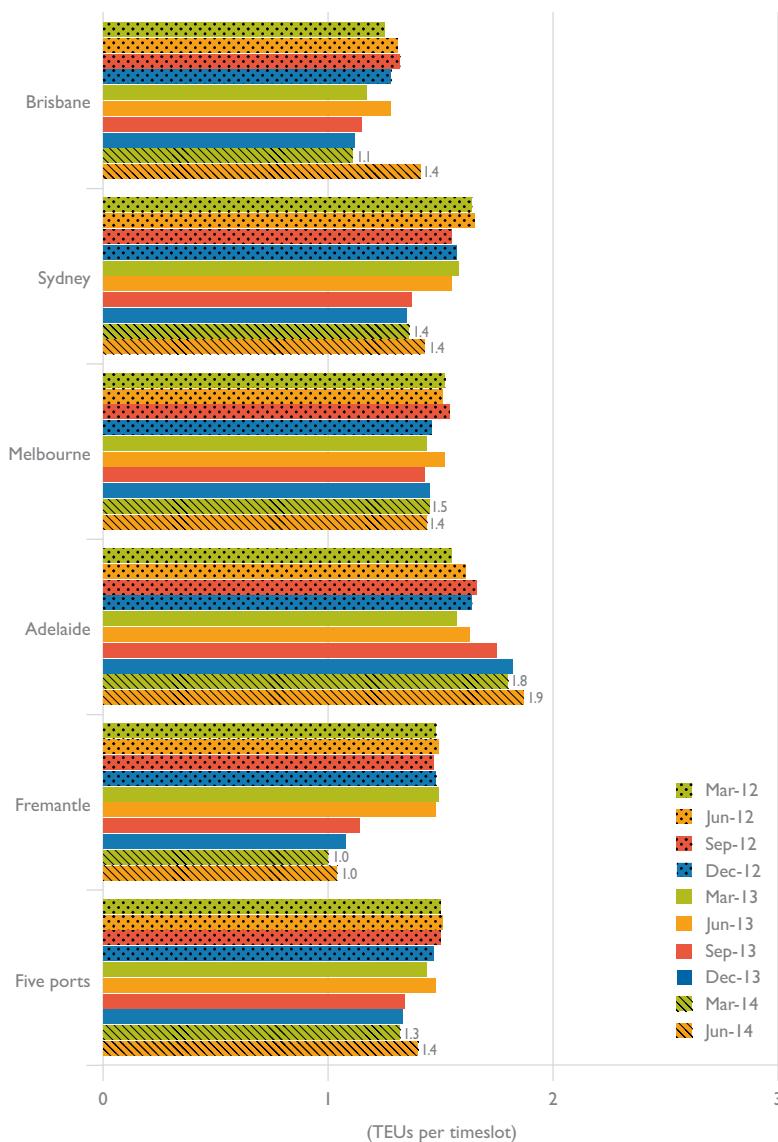
Figure 3.2 Timeslots used by trucks on Saturday and Sunday



Sources: DP World (2014), Flinders Adelaide Container Company (2014), Hutchison Ports Australia (2014) and Patrick (2014).

Figure 3.3 Timeslots used by trucks in all off-peak periods

Sources: DP World (2014), Flinders Adelaide Container Company (2014), Hutchison Ports Australia (2014) and Patrick (2014).

Figure 3.4 TEUs processed per timeslot used by trucks at container terminals

Sources: DP World (2014), Flinders Adelaide Container Company (2014), Hutchison Ports Australia (2014) and Patrick (2014).

Table 3.1 Timeslots available and actually used by trucks: Brisbane

		2012				2013				2014			
Weekday		Shift	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	
Available timeslots ('000)	Monday – Friday	Day	77.5	80.0	82.2	79.3	75.2	80.6	94.3	99.4	94.4	100.7	
		Evening	32.0	33.0	34.1	37.2	32.7	33.0	38.3	37.7	33.5	37.5	
		Night	15.0	17.3	22.0	28.4	27.7	26.3	30.5	28.0	19.4	20.8	
		Sub-total	124.5	130.3	138.3	145.0	135.7	139.9	163.1	165.2	147.4	159.0	
Saturday	Day	10.4	10.7	9.6	10.5	9.2	8.0	10.5	12.4	11.5	12.8		
		Evening	0.4	0.2	0.2	0.2	0.0	0.1	0.4	0.0	0.9	2.2	
		Night	0.2	1.6	1.6	2.4	0.0	0.5	0.2	0.6	0.0	0.9	
		Sub-total	11.1	12.4	11.5	13.0	9.2	8.7	11.1	13.0	13.4	15.8	
Sunday	Day	2.1	1.4	3.5	4.3	3.2	5.2	5.1	4.0	5.7	6.7		
		Evening	0.6	0.3	0.3	1.0	0.7	0.6	0.6	0.2	0.5	0.6	
		Night	0.7	0.8	0.9	2.9	2.3	2.3	2.1	1.9	1.9	1.4	
		Sub-total	3.5	2.5	4.8	8.1	6.1	8.1	7.8	6.1	8.0	8.7	
Total available timeslots		139.0	145.1	154.6	166.2	151.0	156.8	181.9	184.2	168.8	183.5		
Used timeslots ('000)	Monday – Friday	Day	76.6	79.0	81.1	78.5	74.0	79.5	87.4	92.3	87.8	83.6	
		Evening	31.1	32.3	33.3	36.6	32.1	32.2	36.2	35.3	31.9	29.9	
		Night	14.8	17.1	21.5	27.8	25.5	24.6	29.2	26.6	17.3	15.9	
		Sub-total	122.5	128.4	136.0	142.9	131.6	136.3	152.9	154.2	137.0	129.4	
Saturday	Day	10.0	10.5	9.4	10.3	8.7	7.6	9.1	11.2	9.5	9.7		
		Evening	0.3	0.1	0.2	0.2	0.0	0.1	0.1	0.0	1.7	1.2	
		Night	0.2	1.5	1.6	2.3	0.0	0.5	0.2	0.5	0.0	0.8	
		Sub-total	10.5	12.2	11.2	12.8	8.7	8.2	9.4	11.7	11.2	11.6	
Sunday	Day	1.8	1.4	3.0	3.8	2.2	3.2	3.8	3.4	2.7	2.6		
		Evening	0.4	0.3	0.1	0.7	0.3	0.4	0.4	0.1	0.3	0.1	
		Night	0.7	0.7	0.9	2.4	1.9	1.8	1.8	1.5	1.2	0.7	
		Sub-total	3.0	2.4	4.1	6.8	4.5	5.3	5.9	4.9	4.2	3.3	
Total used timeslots		135.9	142.9	151.3	162.5	144.8	149.8	168.2	170.9	152.4	144.4		

Note: Data are rounded to the nearest 1 000. Cells with an entry of '0.0' mean that data were reported but are less than 1,000.

Sources: DP World (2014), Hutchison Ports Australia (2014) and Patrick (2014).

Table 3.2 Timeslots available and actually used by trucks: Sydney

	Weekday	Shift	2012				2013				2014			
			Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr		
Available timeslots ('000)	Monday – Friday	Day	91.6	89.0	90.0	93.0	83.8	86.8	95.0	97.6	101.8	109.0		
		Evening	41.6	40.6	41.5	42.9	38.0	38.5	43.9	44.1	44.4	50.4		
		Night	36.8	36.3	36.0	38.9	30.2	29.6	35.5	37.3	34.9	39.4		
		Sub-total	170.0	166.0	167.5	174.8	152.0	155.0	174.4	179.0	181.2	198.7		
Saturday	Day	11.1	12.1	11.4	15.2	8.3	8.4	11.8	15.9	14.4	16.7			
	Evening	1.7	1.5	3.1	3.7	2.0	2.4	3.4	4.0	1.3	2.0			
	Night	4.5	4.6	7.1	7.8	5.6	5.7	6.6	7.2	3.8	3.9			
	Sub-total	17.4	18.1	21.5	26.7	15.9	16.5	21.7	27.1	19.5	22.7			
Sunday	Day	8.8	10.4	14.6	17.9	11.7	13.5	16.8	17.1	13.0	13.3			
	Evening	4.7	5.0	7.7	7.9	6.0	6.3	8.2	8.1	6.8	6.4			
	Night	3.9	3.4	3.6	3.8	3.2	3.5	3.6	4.0	3.4	2.9			
	Sub-total	17.4	18.8	25.8	29.6	20.9	23.3	28.6	29.2	23.2	22.7			
Total available timeslots	Day	204.8	202.9	214.9	231.2	188.7	194.7	224.8	235.3	223.9	244.1			
Used timeslots ('000)	Monday – Friday	Day	86.5	85.0	86.4	89.9	79.9	84.0	90.3	86.5	85.7	95.2		
		Evening	38.8	37.6	39.1	41.5	36.1	37.2	41.5	42.1	41.0	44.6		
		Night	33.8	32.9	33.5	36.8	27.9	27.4	30.4	33.6	28.8	32.7		
		Sub-total	159.1	155.5	159.0	168.2	143.9	148.6	162.1	162.2	155.5	172.5		
Saturday	Day	10.5	11.3	10.7	14.6	7.9	8.2	11.3	14.4	11.4	13.8			
	Evening	1.6	1.3	2.8	3.5	1.9	2.3	3.0	3.8	1.1	1.2			
	Night	4.2	4.3	6.1	7.3	5.1	5.3	5.9	6.5	3.6	3.4			
	Sub-total	16.3	16.9	19.6	25.3	14.9	15.9	20.2	24.7	16.0	18.4			
Sunday	Day	8.4	9.8	14.1	17.2	11.1	13.3	15.8	16.4	12.6	11.4			
	Evening	4.4	4.8	7.4	7.6	5.8	6.0	7.7	6.6	5.8				
	Night	3.3	3.0	3.5	3.7	3.0	3.3	3.4	3.8	3.1	2.5			
	Sub-total	16.2	17.6	25.0	28.5	20.0	22.6	26.9	27.7	22.4	19.7			
Total used timeslots		191.6	189.9	203.5	222.1	178.8	187.1	209.2	214.6	193.9	210.6			

Sources: DP World (2014) and Patrick (2014).

Table 3.3 Timeslots available and actually used by trucks: Melbourne

	Weekday	Shift	2012				2013				2014			
			Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Mar Qtr	Jun Qtr
Available timeslots ('000)	Monday – Friday	Day	152.4	154.7	148.5	149.7	133.9	140.9	150.2	147.3	143.1	150.7		
		Evening	66.1	66.0	64.9	72.8	60.1	60.1	65.4	65.7	66.6	71.7		
		Night	51.8	51.7	46.3	53.3	49.5	49.4	50.4	51.7	55.8	56.8		
	Sub-total		270.3	272.4	259.6	275.8	243.5	250.4	266.0	264.7	265.5	279.3		
Saturday	Day	18.1	20.0	19.2	26.0	17.6	16.4	17.5	18.4	20.9	20.4			
	Evening	1.3	1.5	4.2	4.3	4.2	4.3	4.6	4.6	5.6	5.6	0.8		
	Night	8.5	8.5	3.2	3.5	9.6	9.1	10.7	11.1	4.0	3.9			
	Sub-total		27.9	30.0	26.6	33.8	31.4	29.7	32.8	35.0	26.8	25.1		
Sunday	Day	5.9	5.3	4.3	6.5	12.4	13.2	15.3	14.8	9.2	6.9			
	Evening	3.8	4.2	4.2	4.9	6.7	6.8	8.7	8.1	6.1	6.2			
	Night	0.5	0.5	5.6	5.4	7.2	7.3	7.3	8.0	6.3	5.7			
	Sub-total		10.2	10.0	14.1	16.8	26.3	27.3	31.2	30.9	21.6	18.8		
Total available timeslots			308.3	312.3	300.3	326.5	301.3	307.4	330.1	330.6	313.8	323.2		
Used timeslots ('000)	Monday – Friday	Day	140.5	144.5	148.1	148.8	130.7	138.0	146.3	143.1	138.5	146.8		
		Evening	62.0	61.9	63.7	67.0	58.5	58.4	63.1	63.0	63.4	69.0		
		Night	47.7	47.9	46.0	52.8	47.1	46.6	47.4	47.8	51.6	53.0		
	Sub-total		250.2	254.3	257.8	268.7	236.3	243.0	256.8	254.0	253.4	268.7		
Saturday	Day	16.1	18.3	19.1	25.9	17.2	16.0	16.8	17.7	20.1	19.9			
	Evening	0.4	0.5	3.5	4.5	4.1	4.1	4.3	5.4	1.5	0.7			
	Night	7.6	7.7	3.1	3.4	8.7	8.2	9.0	9.2	3.5	3.8			
	Sub-total		24.0	26.5	25.7	33.8	29.9	28.3	30.1	32.3	25.1	24.4		
Sunday	Day	4.5	3.6	4.2	6.4	12.2	12.9	14.6	14.2	8.7	6.6			
	Evening	3.4	3.6	3.7	4.9	6.5	6.6	8.3	7.7	5.7	6.0			
	Night	0.3	0.1	5.6	5.4	6.7	6.8	6.8	7.4	5.7	5.2			
	Sub-total		8.2	7.4	13.5	16.7	25.3	26.2	29.7	29.3	20.1	17.9		
Total used timeslots			282.4	288.1	296.9	319.2	291.5	297.6	316.5	315.6	298.7	311.0		

Sources: DPWorld (2014) and Patrick (2014).

Table 3.4 Timeslots available and actually used by trucks: Adelaide

		2012				2013				2014			
		Weekday	Shift	MarQtr	JunQtr	SepQtr	DecQtr	MarQtr	JunQtr	SepQtr	DecQtr	MarQtr	JunQtr
Available timeslots ('000)	Monday – Friday	Day	24.6	23.8	26.2	24.9	25.3	26.7	26.9	23.9	25.9	24.4	
		Evening	20.0	20.0	19.1	18.3	20.3	20.1	20.1	18.0	18.7	18.7	18.4
		Night											
		Sub-total	44.6	43.8	45.4	43.2	45.7	46.7	47.0	41.9	44.5	42.8	
Used timeslots ('000)	Saturday	Day											
		Evening											
		Night											
		Sub-total											
Total available timeslots	Sunday	Day											
		Evening											
		Night											
		Sub-total	44.6	43.8	45.4	43.2	45.7	46.7	47.0	41.9	44.5	42.8	
Used timeslots ('000)	Monday – Friday	Day	21.8	22.4	25.8	23.8	23.6	25.0	26.3	24.0	25.6	24.2	
		Evening	15.5	16.7	16.6	16.1	17.4	17.2	19.5	17.9	18.4	18.2	
		Night											
		Sub-total	37.3	39.1	42.3	39.9	41.0	42.2	45.8	41.9	44.0	42.4	
Total used timeslots	Saturday	Day											
		Evening											
		Night											
		Sub-total											
Total used timeslots	Sunday	Day											
		Evening											
		Night											
		Sub-total	37.3	39.1	42.3	39.9	41.0	42.2	45.8	41.9	44.0	42.4	

Note: Blank cells mean no data was reported for the categories because the VBS is not operated for trucks in night shift or on weekends at Adelaide.
Source: Flinders Adelaide Container Company (2014).

Table 3.5 Timeslots available and actually used by trucks: Fremantle

Available timeslots ('000)	Weekday	Shift	2012				2013				2014			
			Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr		
Saturday		Day	67.8	66.6	62.6	61.8	59.0	61.4	64.8	69.3	70.9	75.1		
		Evening	22.8	21.5	21.5	20.1	17.9	19.1	21.0	21.1	20.9	19.3		
		Night	3.8	6.2	7.7	6.8	3.8	4.1	6.0	6.4	8.5	10.4		
		Sub-total	94.5	91.8	88.7	80.8	84.7	91.8	96.9	100.3	104.8			
Sunday		Day	7.5	7.4	7.2	7.0	6.2	5.2	4.4	5.5	6.7	7.0		
		Evening	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0		
		Night	0.5	0.9	1.6	1.4	1.5	1.1	1.3	1.9	1.8	0.0		
		Sub-total	8.1	8.3	8.8	8.4	7.7	6.5	5.7	7.4	8.5	7.0		
Total available timeslots	Monday – Friday ('000)	Day	2.7	3.1	11.3	12.2	8.4	9.5	10.4	11.0	5.7	4.2		
		Evening	0.1	0.0	1.3	1.2	0.9	1.1	1.2	1.4	0.3	0.3		
		Night	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		Sub-total	2.8	3.1	12.7	13.4	9.2	10.6	11.6	12.5	6.0	4.5		
Used timeslots ('000)	Monday – Friday	Day	64.4	64.3	60.8	59.8	57.6	59.9	60.9	65.7	68.6	72.2		
		Evening	19.6	20.3	20.9	19.4	17.5	18.6	19.4	20.0	20.1	18.2		
		Night	3.7	5.9	7.5	6.6	3.8	4.1	5.6	6.1	8.0	9.7		
		Sub-total	87.7	90.6	89.1	85.9	79.0	82.5	85.9	91.9	96.7	100.1		
Saturday		Day	7.2	7.3	7.0	6.8	6.0	5.1	3.9	4.8	6.2	6.6		
		Evening	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0		
		Night	0.4	0.9	1.5	1.4	1.4	1.1	1.2	1.9	1.8	0.0		
		Sub-total	7.8	8.2	8.5	8.2	7.5	6.3	5.1	6.7	8.0	6.6		
Sunday		Day	2.7	3.1	10.8	11.9	8.2	9.3	9.7	10.2	5.4	3.9		
		Evening	0.1	0.0	1.2	1.2	0.8	1.1	1.1	1.4	0.2	0.2		
		Night	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0		
		Sub-total	2.7	3.1	12.1	13.1	9.0	10.4	10.9	11.6	5.6	4.2		
Total used timeslots		98.2	101.9	109.7	107.2	95.4	99.2	101.9	110.2	110.3	110.9			

Note: Data are rounded to the nearest 1000. Cells with an entry of "0.0" mean that data were reported but are less than 1,000.

Sources: DP World (2014) and Patrick (2014).

Table 3.6 Timeslots available and actually used by trucks: Five ports

	Weekday		Shift	2012				2013				2014			
				Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr
Available timeslots ('000)		Monday – Friday													
		Day	414.0	414.2	409.6	408.7	377.2	396.4	431.1	437.5	436.2	459.8			
		Evening	182.4	181.1	181.1	191.3	169.1	170.8	188.8	186.7	184.0	197.3			
		Night	107.5	111.6	112.0	127.5	111.3	109.5	122.4	123.4	118.6	127.4			
		Sub-total	703.8	706.8	702.6	727.5	657.6	676.6	742.3	747.6	738.8	784.6			
Saturday		Day	47.1	50.1	47.3	58.6	41.3	38.1	44.1	52.1	53.5	56.8			
		Evening	3.5	3.1	7.6	8.2	6.2	6.9	8.4	9.6	5.0	5.0			
		Night	13.8	15.5	13.6	15.1	16.7	16.5	18.7	20.8	9.7	8.8			
		Sub-total	64.4	68.8	68.4	82.0	64.2	61.4	71.3	82.5	68.2	70.6			
Sunday		Day	19.6	20.3	33.7	40.8	35.7	41.4	47.6	46.9	33.6	31.1			
		Evening	9.1	9.4	13.5	15.1	14.3	14.8	18.6	17.8	13.6	13.5			
		Night	5.2	4.6	10.2	12.1	12.6	13.1	13.1	13.9	11.6	10.0			
		Sub-total	33.8	34.3	57.3	68.1	62.6	69.2	79.2	78.6	58.8	54.6			
		Total available timeslots	802.1	809.9	828.4	877.6	784.4	807.3	892.8	908.6	865.7	909.8			
Used timeslots ('000)		Monday – Friday													
		Day	389.8	395.2	402.1	400.8	365.9	386.3	411.3	411.7	406.1	421.9			
		Evening	167.1	168.9	173.5	180.7	161.6	163.5	179.7	178.4	174.8	179.9			
		Night	99.9	103.7	108.5	124.0	104.3	102.7	112.5	114.1	105.7	111.3			
		Sub-total	656.8	667.8	684.2	705.5	631.8	652.6	703.5	704.2	686.6	713.1			
Saturday		Day	43.8	47.5	46.0	57.5	39.8	36.8	41.1	48.1	47.1	50.0			
		Evening	2.4	1.9	6.6	8.2	6.0	6.7	7.4	9.2	4.2	3.1			
		Night	12.4	14.3	12.4	14.5	15.3	15.2	16.3	18.1	8.9	7.9			
		Sub-total	58.6	63.8	65.0	80.1	61.0	58.7	64.8	75.4	60.3	61.0			
Sunday		Day	17.4	17.9	32.2	39.4	33.7	38.7	43.9	44.2	29.3	24.5			
		Evening	8.2	8.6	12.4	14.4	13.5	14.0	17.5	16.7	12.9	12.2			
		Night	4.4	3.8	10.0	11.5	11.6	11.9	12.0	12.7	10.1	8.4			
		Sub-total	30.0	30.4	54.6	65.2	58.8	64.6	73.4	73.6	52.3	45.1			
		Total used timeslots	745.5	761.9	803.8	850.9	751.6	775.8	841.7	853.1	799.3	819.2			

Sources: DP World (2014), Flinders Adelaide Container Company (2014), Hutchison Ports Australia (2013) and Patrick (2014).

CHAPTER 4

Port interface cost index

Overview

The port interface cost index (PICI) provides a measure of shore-based shipping charges which approximate costs of carting containers through Australia's mainland major city ports. The PICI is based on an indicative approach; that is, the index is not an average of all charges, but is based on those typically charged by service providers in most instances. The PICI is computed as a national average (Table 4.6) taking into account the port fees and charges for imports and exports of containers at the five major container ports (Table 4.1 to 4.5).

What PICI measures

The PICI is a measure of shore-based shipping costs or charges for containers moved through mainland capital city ports. These are called "shore-based" because they are that part of the charges paid by importers and exporters of containers which are directly related to the activity which occurs in the port and on the wharf. They do not include the total price for importing or exporting goods carried in containers paid by customers to customs brokers and freight forwarders. The index is a measure of the movements in costs to users of waterfront and related services and signals whether the cost is increasing or decreasing. The waterfront is defined as the interface between seaports and land transport, hence the term port interface cost index. Port interface costs are estimated for standard representative ships.

The port interface cost index is based on twenty indicators which fall in four main groups:

- a. Parameters used in computing the index
- b. Ship based charges;
- c. Cargo based charges; and
- d. Other charges, namely: Stevedoring costs; Customs brokers' fees; Road transport costs.

Parameters used in computing the index

These parameters enable the PICI charges to be estimated on a per TEU basis for these typical ships.

Indicator 4.1 Ship size

The port interface costs vary by ship size.

Ship size is the total internal capacity of a ship often referred to as Gross (Registered) Tonnage. The PICI has as its starting point the estimation of parameters for three typical sizes of container ships.

- 9 991 GT ship represents all ships of sizes ranging from 5 000 to 20 000 GT
- 37 394 GT ship represents all ships of sizes ranging from 35 000 to 40 000 GT
- 53 324 GT ship represents all ships of sizes ranging from 50 000 to 55 000 GT

Indicator 4.2 Average TEUs exchanged

This is the sum of indicator 4.3 and Indicator 4.6.

Indicator 4.3 Average TEUs Full (or loaded)

This is the sum of indicator 4.4 and Indicator 4.5.

Indicator 4.4 Average TEUs Full inwards (or imports)

This is the sum of full (or loaded) import containers converted to standardised twenty foot equivalent units for moved into a port by ships in a GT range, divided by the number of unique ships in the GT range for the given period.

Indicator 4.5 TEUs Full outwards (or exports)

This is the sum of full (or loaded) export containers converted to standardised twenty foot equivalent units moved out of a port by ships in a GT range, divided by the number of unique ships in the GT range for the given period.

Indicator 4.6 Empty TEUs

This is the sum of empty import and empty export containers converted to standardised twenty-foot equivalent units that are moved into and out of a port by ships in a GT range, divided by the number of unique ships in the GT range for the given period.

Indicator 4.7 Average number of port calls by ships in the GT range

This is the total number of ship calls to a container port by ships in the GT range, divided by the number of unique ships in the GT range for the given period.

Indicator 4.8 Average elapsed berth time for ships in GT range

This is the total number of elapsed berth time in hours for ships in the GT range, divided by the number of ship visits in the GT range for the given period. A ship's elapsed berth time (hours) is the time between a ship's arrival at berth, and a ship's departure from berth.

These parameters are summarised at the table of each of Tables 4.1 to 4.5 for each container port.

Ship based charges (\$ per ship visit)

Indicator 4.9 Total ship-based charges by ship visit

Ship-based charges are the charges ship owners pay for a port visit by the ship.

Indicator 4.10 Total ship-based charges for handling empty containers

This is also a summary cost indicator for the port. It is computed as the sum of wharfage, harbour dues, berth charges and channel fees charged per empty TEU multiplied by the average number of empty TEUs exchanged.

Ship based charges (\$ per TEU)

Indicator 4.11 Conservancy

Conservancy charges are navigation service charges levied by the government of the state in which the port is situated.

Indicator 4.12 Tonnage

Tonnage charges are based on the Gross Tonnage of the ship—port service charges levied by the port authority.

Indicator 4.13 Pilotage

Pilotage charges cover services for piloting the ship. A pilot is a mariner who guides ships through dangerous or congested waters, such as harbors or river mouths. Pilots are expert ship handlers who possess detailed knowledge of local waterways.

Indicator 4.14 Towage

Towage charges are levied by the operator of a tugboat—a boat that manoeuvres vessels by pushing or towing them.

Indicator 4.15 Mooring, unmooring charges

These relate to the services provided to moor—make fasten (a ship, for example) by means of cables, anchors, or lines—or to unmoor—to loosen (a ship) from moorings or anchorage. These charges can be levied either by the port authority, stevedoring company or other service providers

Indicator 4.16 Total ship-based charges per TEU

The total costs are the sum of the ship-based charges in Indicators 4.11 to 4.15.

Cargo based fees and charges (\$ per TEU)

Each of these fees and charges are discussed only once in the text below. They are however, listed separately for imports and exports in Tables 4.1 to 4.6.

Indicator 4.17 Cargo based: Wharfage

Wharfage is the charge assessed against cargo or merchandise, vessel's stores, fuel and supplies for passage on, over, under or through any wharf, pier, or bank controlled by a port authority. Wharfage is also charge for cargo passing between ships or overside ships (to or from barge, lighter or water) when berthed at a wharf, pier or bank controlled by the port authority.

Indicator 4.18 Cargo based: Harbour dues

These are monies that a ship owner must pay to a port authority for keeping a ship in a harbour. The amount of money charged is usually based on the volume of cargo the ship is carrying.

Other cargo based charges (\$ per TEU)

Indicator 4.19 Other charges: Stevedoring charge

Stevedoring charges are the charges levied by stevedoring companies for handling containers. They are estimated for Australia each year by the Australian Competition and Consumer Commission (ACCC) which monitors their price. The stevedoring costs are taken from the ACCC's annual report on the stevedoring industry.

Indicator 4.20 Other charges: Customs broker fees

These are the fees charged by customs brokers for the administrative costs associated with organising the import and export of containers for a representative consignment.

Indicator 4.21 Other charges: Road transport charges

Transport charges are estimates of what transport companies charge for transporting a container to or from the wharf from/to the metropolitan area of the capital city in which the port is situated. These charges are estimated for a representative transport distance.

Indicator 4.22 Total fees and charges (\$/TEU)

This is the sum of ship-based charges per TEU, the cargo-based charges per TEU, and the other cargo-based charges per TEU. These costs enable the calculation of the national PICI measured in current and constant prices in dollars per TEU. These are computed separately for imports and exports in Tables 4.2 to 4.6.

Indicator 4.23 Port's share in national index

These shares are used in computing the national PICI and they are computed for exports and imports separately as follows.

For each port compute the port shares for imports:

- Compute PICI (port k, imports) is given by the average (total) port interface cost for imports (indicator 4.22) times the total TEUs imported through the port (indicator 4.4);
- Compute PICI (5 ports, imports) is the sum PICI (Brisbane, imports), PICI (Sydney, imports), PICI (Melbourne, imports), PICI (Adelaide, imports), PICI (Fremantle, imports);
- Then share (port k, imports) = PICI (port k, imports)/ PICI (5 ports, imports).

Similarly for each port compute the port shares for exports:

- Compute PICI (port k, exports) is given by the average (total) port interface cost for exports (indicator 4.22) times the total TEUs imported through the port (indicator 4.5);
- Compute PICI (5 ports, exports) is the sum PICI (Brisbane, exports), PICI (Sydney, exports), PICI (Melbourne, exports), PICI (Adelaide, exports), PICI (Fremantle, exports);
- Then share (port k, exports) = PICI (port k, exports)/ PICI (5 ports, exports).

Indicator 4.24 National Port Interface Cost index for ships in GT range

The national port interface cost indexes are the main outputs of the PICI calculations. These indexes are computed separately for imports and exports and for each of the ship GT ranges monitored in Waterline:

- 5 000 to 20 000 GT
- 35 000 to 40 000 GT
- 50 000 to 55 000 GT.

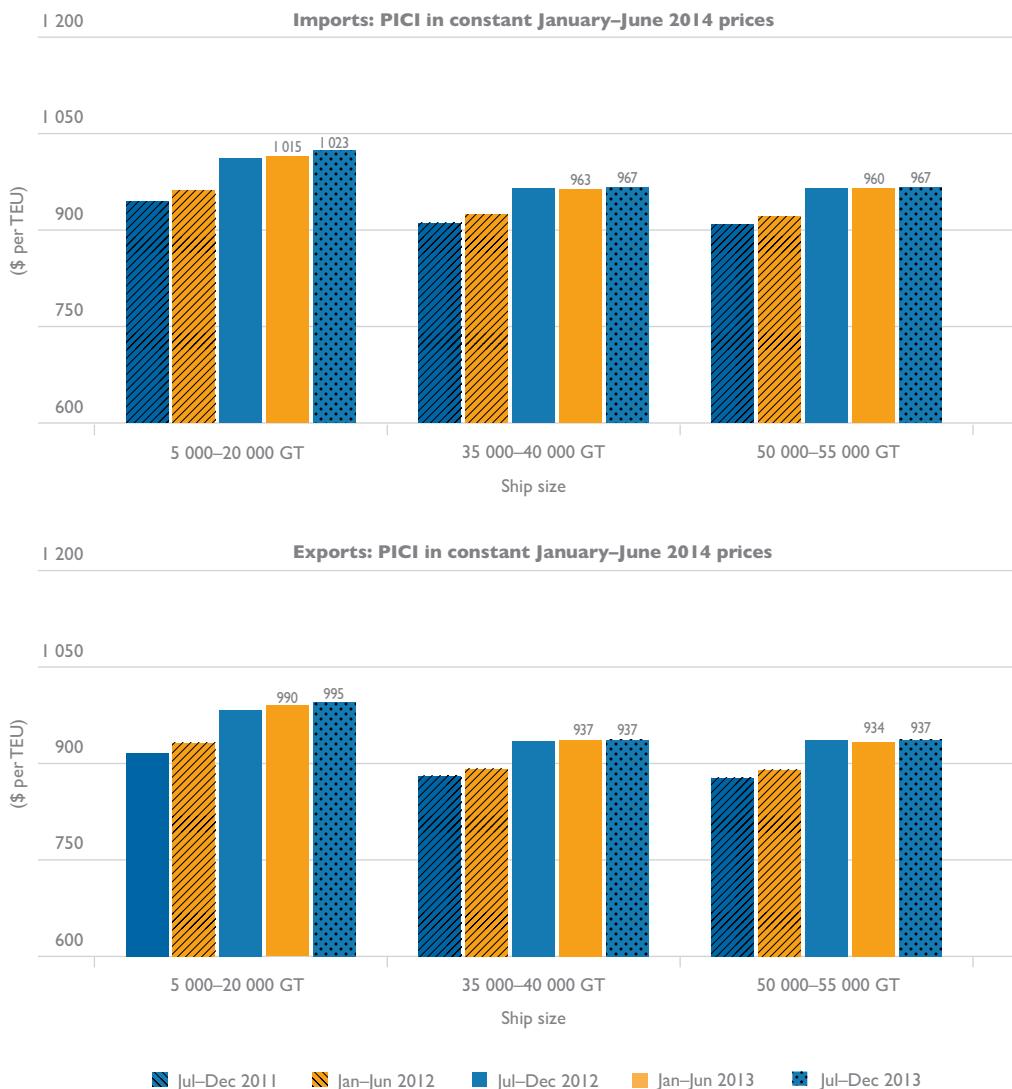
The national PICI for ships in a GT range is the national average cost per TEU. From BTCE (1993) this is a weighted average of individual port estimates computed as follows, taking imports shipped in ships in the 5 000 to 20 000 GT as an example.

Now let $TC_{Br,M}$, $TC_{Sy,M}$, $TC_{Mel,M}$, $TC_{Ad,M}$, $TC_{Fr,M}$ respectively stand for the sum of ship-based, cargo-based and other fees and charges on each TEU of imports transported to a Brisbane port (Br), Sydney port (Sy), Melbourne port (Mel), Adelaide (Ad) and Fremantle (Fr) for ships in the 5 000 to 20 000 GT range.

Then PICI for imports shipped in ships in the 5 000 to 20 000 GT

$$= b_{1*}TC_{Br,M} + b_{2*}TC_{Sy,M} + b_{3*}TC_{Mel,M} + b_{4*}TC_{Ad,M} + b_{5*}TC_{Fr,M}$$

The shares b1, b2, b3, b4, b5 are as computed in indicator 4.23. Note that these shares are different for imports and exports.

Figure 4.I Port Interface Cost Index for container imports and exports, by ship size

Sources: BITRE estimates based on data in Tables 4.I to 4.5 and data from ABS (2014a).

Table 4.1 Port interface costs by ship type – parameters and estimates: Brisbane

	5 000 to 20 000 GT ships				35 000 to 40 000 GT ships				50 000 to 55 000 GT ships			
	Jan-Jun 2012	Jul-Dec 2012	Jan-Jun 2013	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2012	Jan-Jun 2013	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2012	Jan-Jun 2013	Jul-Dec 2013
Parameters used in estimation of the port interface fees and charges^a												
Total TEUs exchanged	360	350	374	310	258	1199	1499	1260	1187	1127	1374	1746
Loaded	284	156	288	241	222	956	619	973	934	839	877	909
Loaded inwards	139	132	167	154	137	348	416	638	602	552	406	582
Loaded outwards	45	24	121	86	85	609	203	335	332	287	471	327
Empty	76	194	86	69	37	242	880	287	253	287	497	838
No of port calls by ships in GT range	4	4	5	5	5	3	3	3	3	3	3	4
Elapsed berth time for ships in GT range (hours)	24	25	23	17	16	25	26	23	23	26	22	23
Charges per ship visit (\$)												
Total ship-based charges	20 445	21 208	21 817	22 161	23 126	39 016	40 956	41 599	43 106	46 225	47 247	48 417
Empty TEUs ^b	1 973	3 612	1 604	1 315	698	6 268	16 367	5 343	4 833	5 482	8 972	15 588
Ship-based charges (\$/TEU)												
Conservancy	5	5	5	6	8	6	5	6	7	7	7	7
Tonnage	-	-	-	-	-	-	-	-	-	-	-	-
Pilotage	21	22	21	26	32	12	10	12	13	14	12	10
Towage	24	27	26	31	39	13	11	13	14	15	12	10
Mooring unmooring ^c	6	7	6	8	11	2	2	2	3	2	1	2
Total ship-based charges (\$/TEU)	57	61	58	72	90	33	27	32	35	38	34	27
Fees and charges for imports (\$/TEU)												
Ship-based charges	57	61	58	72	90	33	27	32	35	38	34	27
Cargo-based charges												
Wharfage	31	32	32	33	33	31	32	32	33	31	32	32
Harbour dues	68	62	63	63	68	62	62	63	63	60	62	62
Other charges												
Stevedoring	177	177	177	176	177	177	177	177	176	177	177	177
Customs brokers' fees	146	146	151	142	149	146	146	151	142	149	146	151
Road transport charges	401	401	446	452	456	401	401	446	452	456	401	446
Total fees and charges (\$/TEU)	880	878	926	939	967	855	844	900	902	916	849	902
Port's share in national index ^d	16%	17%	17%	18%	16%	15%	16%	16%	17%	15%	16%	17%
50 913 5 968 7 134												

Fees and charges for exports (\$/TEU)	5 000 to 20 000 GT ships						35 000 to 40 000 GT ships						50 000 to 55 000 GT ships						50 000 to 55 000 GT ships						
	Jan-Jun 2012			Jul-Dec 2012			Jan-Jun 2013			Jul-Dec 2013			Jan-Jun 2014			Jul-Dec 2014			Jan-Jun 2013			Jul-Dec 2013			
Ship-based charges	57	61	58	72	90	33	27	32	35	38	34	27	33	35	41										
Cargo-based charges	31	32	32	33	33	31	32	32	33	33	31	32	32	33	33										
Wharfage	68	62	62	63	63	68	62	62	63	63	60	62	62	63	63										
Harbour dues																									
Other charges																									
Stevedoring	177	177	177	176	177	177	177	177	177	176	177	177	177	177	177										
Customs brokers' fees	146	146	151	142	149	146	146	146	151	142	149	149	146	146	146										
Road transport charges	401	401	446	452	456	401	401	446	452	456	401	401	446	452	456										
Total fees and charges (\$/TEU)	880	878	926	939	967	855	844	900	902	916	849	845	900	902	919										
Port's share in national index ^e	16%	17%	17%	18%	16%	15%	16%	16%	17%	15%	15%	16%	16%	16%	15%										

a The average TEUs exchanged and the ship call parameters are mean values for ships in the GT category for the period in question.
b Sum of wharfage, harbour dues, berth charges and channel fees charged per empty TEU multiplied by the average number of empty TEUs exchanged.

c BITRE estimates.

d This is estimated as the TEU imports brought to the port as a per cent of five ports TEU imports.

e This is estimated as the TEU exports brought to the port as a per cent of five ports TEU exports.

Notes: Estimates of charges and fees are rounded to the nearest whole dollar. A value of zero indicates that the charge or fees per TEU is less than fifty cents.
Sources: BITRE estimates based on ship call data from port authorities and other sources as described in text.

Table 4.2 Port interface costs by ship type – parameters and estimates: Sydney

	5 000 to 20 000 GT ships				35 000 to 40 000 GT ships				50 000 to 55 000 GT ships			
	Jan-Jun 2012	Jul-Dec 2012	Jan-Jun 2013	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2012	Jan-Jun 2013	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2012	Jan-Jun 2013	Jul-Dec 2013
Parameters used in estimation of the port interface fees and charges^a												
Total TEUs exchanged	272	260	204	179	196	186	1997	2115	1824	1861	2133	2379
Loaded	224	185	154	141	153	120	1345	1395	1191	1195	1500	1648
Loaded inwards	132	95	63	71	69	883	1008	1011	846	867	1112	1232
Loaded outwards	92	90	92	70	84	318	337	384	345	328	389	416
Empty	48	75	50	37	42	660	652	720	633	666	632	731
No of port calls by ships in GT range	4	3	3	4	4	3	3	2	3	3	3	3
Elapsed berth time for ships in GT range (hours)	23	26	20	18	17	36	35	34	35	28	38	36
Charges per ship visit (\$)												
Total ship-based charges	18 763	19 464	19 772	20 078	20 260	39 103	40 770	41 954	42 663	42 884	48 543	50 187
Empty TEUs ^b	587	951	629	484	547	8 055	8 218	9 080	8 178	8 613	7 722	9 215
Ship-based charges (\$/TEU)												
Conservancy	-	-	-	-	-	-	-	-	-	-	-	-
Tonnage	18	19	24	28	26	10	9	9	10	10	12	11
Pilotage	6	6	8	9	9	2	2	2	3	3	2	2
Towage	36	40	52	60	56	7	7	7	8	8	7	7
Mooring, unmooring ^c	9	10	13	15	13	2	2	2	2	2	2	2
Total ship-based charges (\$/TEU)	69	75	97	112	104	21	20	20	23	23	21	24
Fees and charges for imports												
Ship-based charges	69	75	97	112	104	21	20	20	23	23	21	24
Cargo-based charges												
Wharfage	111	114	114	117	117	111	114	114	117	111	114	114
Harbour dues	0	0	0	0	0	0	0	0	0	0	0	0
Other charges												
Stevedoring	177	177	177	176	177	177	177	177	176	177	177	177
Customs brokers' fees	139	139	148	148	153	139	139	148	148	153	139	148
Road transport charges	485	485	522	525	485	485	522	525	525	485	485	522
Total fees and charges (\$/TEU)	981	991	1058	1079	1075	933	936	981	990	995	937	985
Port's share in national index ^d	32%	33%	33%	31%	34%	31%	32%	32%	32%	31%	32%	32%

	5 000 to 20 000 GT ships						35 000 to 40 000 GT ships						50 000 to 55 000 GT ships					
	Jan-Jun			Jul-Dec			Jan-Jun			Jul-Dec			Jan-Jun			Jul-Dec		
	2012	2013	2014	2012	2013	2014	2012	2013	2014	2012	2013	2014	2012	2013	2014	2012	2013	2014
Fees and charges for exports																		
Ship-based charges	69	75	97	112	104	21	20	20	23	23	23	21	24	22	22	26	26	
Cargo-based charges	68	70	70	72	72	68	70	70	72	68	70	70	72	72	72	72	72	
Wharfage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Harbour dues																		
Other charges																		
Stevedoring	177	177	177	176	177	177	177	177	177	176	177	177	177	177	177	177	176	
Customs brokers' fees	137	137	138	138	137	137	137	137	138	138	138	137	137	137	138	138	137	
Road transport charges	485	485	522	525	525	485	485	522	525	525	525	485	485	522	525	525	525	
Total fees and charges (\$/TEU)	936	944	1 004	1 025	1 013	888	890	927	936	933	890	890	932	934	936	934	936	
Port's share in national index^e	33%	33%	34%	31%	34%	31%	32%	32%	29%	32%	31%	32%	32%	32%	32%	32%	32%	

a The average TEUs exchanged and the ship call parameters are mean values for ships in the GT category for the period in question.

b Sum of wharfage, harbour dues, berth charges and channel fees charged per empty/TEU multiplied by the average number of empty TEUs exchanged.

c BITRE estimates.

d This is estimated as the TEU imports brought to the port as a per cent of five ports TEU imports.

e This is estimated as the TEU exports brought to the port as a per cent of five ports TEU exports.

Notes: Estimates of charges and fees are rounded to the nearest whole dollar. A value of zero indicates that the charge or fees per TEU is less than fifty cents.

Sources:

Table 4.3 Port interface costs by ship type – parameters and estimates: Melbourne

	5 000 to 20 000 GT ships				35 000 to 40 000 GT ships				50 000 to 55 000 GT ships			
	Jan-Jun 2012	Jul-Dec 2012	Jan-Jun 2013	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2012	Jan-Jun 2013	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2012	Jan-Jun 2013	Jul-Dec 2013
Parameters used in estimation of the port interface fees and charges^a												
Total TEUs exchanged	490	496	476	442	400	1761	1892	2026	1904	2032	2515	2702
Loaded	392	343	340	335	294	1426	1518	1702	1597	1701	2036	2159
Loaded inwards	169	141	139	151	103	833	929	973	1004	1014	1155	1263
Loaded outwards	224	203	201	185	191	593	589	729	593	687	881	897
Empty	98	153	136	106	106	336	374	324	307	331	479	542
No of port calls by ships in GT range	4	3	3	3	3	3	3	3	3	3	3	3
Elapsed berth time for ships in GT range (hours)	25	32	38	29	26	29	28	29	28	34	32	29
Charges per ship visit (\$)												
Total ship-based charges	21 876	24 282	24 473	25 162	25 438	40 267	47 692	48 038	49 680	50 053	47 598	57 837
Empty TEUs ^b	1 073	2 551	2 279	1 867	1 869	3 694	6 252	5 421	5 398	5 831	5 272	9 069
Ship-based charges (\$/TEU)												
Conservancy	-	-	-	-	-	-	-	-	-	-	-	-
Tonnage	7	11	11	13	14	8	11	10	11	10	8	11
Pilotage	15	15	15	17	19	7	6	6	7	6	5	5
Towage	21	22	23	25	29	8	8	7	8	8	6	6
Mooring unmooring ^c	2	2	2	2	2	1	0	1	0	0	0	0
Total ship-based charges (\$/TEU)	45	49	51	57	64	23	25	24	26	25	19	21
Fees and charges for imports												
Ship-based charges	45	49	51	57	64	23	25	24	26	25	19	21
Cargo-based charges												
Wharfage	44	67	71	44	67	67	71	71	44	67	67	71
Harbour dues	38	39	39	38	39	39	39	39	38	39	39	39
Other charges												
Stevedoring	177	177	177	176	177	177	177	177	176	177	177	177
Customs brokers' fees	153	153	153	153	153	153	153	153	153	153	153	153
Road transport charges	485	484	529	531	534	485	484	529	531	534	485	484
Total fees and charges (\$/TEU)	941	969	1016	1027	1036	919	945	989	996	997	915	941
Port's share in national index ^d	41%	39%	39%	40%	39%	39%	37%	37%	37%	39%	37%	38%

Fees and charges for exports (\$/TEU)	5 000 to 20 000 GT ships						35 000 to 40 000 GT ships						50 000 to 55 000 GT ships						
	Jan-Jun 2012		Jul-Dec 2012		Jan-Jun 2013		Jul-Dec 2013		Jan-Jun 2014		Jul-Dec 2014		Jan-Jun 2013		Jul-Dec 2013		Jan-Jun 2014		
Ship-based charges	45	49	51	57	64	23	25	24	26	25	19	21	25	23	25	25	23	25	
Cargo-based charges	44	67	67	71	71	44	67	67	71	71	44	67	67	71	71	71	71	71	
Wharfage	38	39	39	39	39	38	39	39	39	39	38	39	39	39	39	39	39	39	
Harbour dues																			
Other charges																			
Stevedoring	177	177	177	176	177	177	177	177	177	177	176	177	177	177	177	177	177	177	176
Customs brokers' fees	134	134	142	142	143	134	134	142	142	142	143	134	134	134	142	142	142	142	143
Road transport charges	485	484	529	531	534	485	484	529	529	531	534	485	484	485	529	531	531	531	534
Total fees and charges (\$/TEU)	922	950	1006	1017	1026	901	926	978	986	988	897	923	979	983	988	988	988	988	988
Port's share in national index ^e	41%	39%	40%	40%	39%	39%	37%	38%	38%	37%	39%	37%	38%	38%	37%	38%	38%	37%	37%

a The average TEUs exchanged and the ship call parameters are mean values for ships in the GT category for the period in question.

b Sum of wharfage, harbour dues, berth charges and channel fees charged per empty TEU multiplied by the average number of empty TEUs exchanged.

c BITRE estimates.

d This is estimated as the TEU imports brought to the port as a per cent of five ports TEU imports.

e This is estimated as the TEU exports brought to the port as a per cent of five ports TEU exports.

Notes: Estimates of charges and fees are rounded to the nearest whole dollar. A value of zero indicates that the charge or fees per TEU is less than fifty cents.

Sources:

Table 4.4 Port interface costs by ship type – parameters and estimates: Adelaide

	5 000 to 20 000 GT ships						35 000 to 40 000 GT ships						50 000 to 55 000 GT ships						
	Jan-Jun 2012	Jul-Dec 2012	Jan-Jun 2013	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2012	Jul-Dec 2012	Jan-Jun 2013	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2012	Jul-Dec 2012	Jan-Jun 2013	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	
Parameters used in estimation of the port interface fees and charges^a																			
Total TEUs exchanged	-	-	-	-	-	-	932	921	1 037	903	981	1 317	1 311	1 268	1 337	1 337	1 337	1 363	
Loaded	-	-	-	-	-	-	731	728	824	673	750	1 045	1 017	1 055	1 069	1 069	1 069	1 104	
Loaded, inwards	-	-	-	-	-	-	337	358	347	293	306	511	550	504	525	525	525	490	
Loaded, outwards	-	-	-	-	-	-	395	371	477	380	444	534	467	551	544	544	544	614	
Empty	-	-	-	-	-	-	201	192	213	230	231	272	295	214	268	268	268	259	
No of port calls by ships in GT range	-	-	-	-	-	-	2	3	2	2	2	2	2	2	3	2	2	2	
Elapsed berth time for ships in GT range (hours)	-	-	-	-	-	-	21	22	24	22	23	29	26	26	29	29	29	28	
Charges per ship visit (\$)																			
Total ship-based charges	-	-	-	-	-	-	37 746	38 840	39 574	40 189	40 496	45 036	45 832	46 130	48 463	48 410	48 410		
Empty TEUs ^b	-	-	-	-	-	-	1 284	1 249	1 380	1 519	1 521	1 735	1 912	1 388	1 769	1 712	1 712		
Ship-based charges (\$/TEU)																			
Conservancy	-	-	-	-	-	-	6	5	5	5	5	5	5	5	5	5	5	5	
Tonnage	-	-	-	-	-	-	9	10	9	10	10	10	10	10	10	10	10	10	
Pilotage	-	-	-	-	-	-	6	6	5	7	6	4	4	4	4	4	4	4	
Towage	-	-	-	-	-	-	20	21	19	22	21	15	16	17	17	17	17	16	
Moorings, unmooring ^c	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total ship-based charges (\$/TEU)	-	-	-	-	-	-	40	42	38	45	41	34	35	36	36	36	36	36	
Fees and charges for imports																			
Ship-based charges	-	-	-	-	-	-	40	42	38	45	41	34	35	36	36	36	36	36	
Cargo-based charges	-	-	-	-	-	-	78	79	79	82	82	78	79	79	82	82	82	82	
Wharfage	-	-	-	-	-	-	6	6	6	7	7	6	6	6	7	7	7	7	
Harbour dues	-	-	-	-	-	-	177	177	177	176	177	177	177	177	177	177	177	176	
Other charges	-	-	-	-	-	-	149	148	148	148	148	149	148	148	148	148	148	148	
Stevedoring	-	-	-	-	-	-	308	312	348	350	354	308	312	348	350	350	350	354	
Customs brokers' fees	-	-	-	-	-	-	759	765	798	808	808	753	758	796	800	800	802	802	
Road transport charges	-	-	-	-	-	-	5%	5%	5%	6%	6%	5%	5%	5%	6%	6%	6%	6%	
Total fees and charges (\$/TEU)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Port's share in national index ^d	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

	5 000 to 20 000 GT ships						35 000 to 40 000 GT ships						50 000 to 55 000 GT ships					
	Jan-Jun 2012	Jul-Dec 2012	Jan-Jun 2013	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2012	Jul-Dec 2012	Jan-Jun 2013	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2012	Jul-Dec 2012	Jan-Jun 2013	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2014
Fees and charges for exports																		
Ship-based charges	-	-	-	-	-	-	40	42	38	45	41	34	35	36	36	36	36	36
Cargo-based charges																		
Wharfage	-	-	-	-	-	-	78	79	79	82	82	78	79	79	82	82	82	82
Harbour dues	-	-	-	-	-	-	6	6	7	7	7	6	6	6	7	7	7	7
Other charges																		
Stevedoring	-	-	-	-	-	-	177	177	177	176	176	177	177	177	177	177	176	176
Customs brokers' fees	-	-	-	-	-	-	102	103	111	111	112	102	103	111	111	111	112	112
Road transport charges	-	-	-	-	-	-	308	312	348	350	354	308	312	348	350	354	350	354
Total fees and charges (\$/TEU)	-	-	-	-	-	-	712	720	761	771	771	706	713	759	763	766	766	766
Port's share in national index^e	-	-	-	-	-	-	5%	5%	5%	6%	6%	5%	5%	5%	5%	5%	5%	5%

a The average TEUs exchanged and the ship call parameters are mean values for ships in the GT category for the period in question.

b Sum of wharfage, harbour dues, berth charges and channel fees charged per empty TEU multiplied by the average number of empty TEUs exchanged.

c BITRE estimates.

d This is estimated as the TEU imports brought to the port as a per cent of five ports TEU imports.

e This is estimated as the TEU exports brought to the port as a per cent of five ports TEU exports.

Notes: Estimates of charges and fees are rounded to the nearest whole dollar. A value of zero indicates that the charge or fees per TEU is less than fifty cents.

Blank cells mean the data are not reported.

Sources: BITRE estimates based on ship call data from port authorities and other sources as described in text.

Table 4.5 Port interface costs by ship type – parameters and estimates: Fremantle

	5 000 to 20 000 GT ships				35 000 to 40 000 GT ships				50 000 to 55 000 GT ships			
	Jan-Jun 2012	Jul-Dec 2012	Jan-Jun 2013	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2012	Jan-Jun 2013	Jul-Dec 2013	Jan-Jun 2014	Jul-Dec 2012	Jan-Jun 2013	Jul-Dec 2013
Parameters used in estimation of the port interface fees and charges^a												
Total TEUs exchanged	2 615	2 744	2 339	2 709	2 532	1 002	1 038	971	854	793	1 478	1 646
Loaded	2 255	2 85	1 944	2 112	2 120	734	783	725	664	637	1 087	1 172
Loaded inwards	1 276	1 360	1 117	1 303	1 218	538	594	461	453	424	735	800
Loaded outwards	979	825	826	809	902	197	188	264	211	213	352	377
Empty	360	560	395	597	413	267	255	246	190	156	391	475
No of port calls by ships in GT range	12	12	8	13	12	3	3	3	3	3	4	3
Elapsed berth time for ships in GT range (hours)	55	46	46	48	35	30	27	27	27	22	33	31
Charges per ship visit (\$)												
Total ship-based charges	10 106	12 105	12 676	12 644	28 166	31 702	31 702	33 092	32 985	33 522	37 579	37 579
Empty TEUs ^b	3 525	5 753	4 064	6 443	4 452	2 616	2 625	2 528	2 055	1 685	3 826	4 877
Ship-based charges (\$/TEU)												
Conservancy	-	-	-	-	-	-	-	-	-	-	-	-
Tonnage	1	1	1	1	1	7	8	8	10	11	7	7
Pilotage	1	1	2	2	2	3	4	5	6	6	2	3
Towage	1	1	2	2	2	17	17	18	22	23	13	12
Mooring, unmooring ^c	0	0	1	0	0	1	1	1	2	1	1	1
Total ship-based charges (\$/TEU)	4	4	5	5	5	28	31	33	39	42	23	23
Fees and charges for imports												
Ship-based charges	4	4	5	5	5	28	31	33	39	42	23	23
Cargo-based charges	65	68	68	72	72	65	68	72	72	65	68	68
Wharfage	30	32	32	34	34	30	32	32	34	30	32	32
Harbour dues												
Other charges												
Stevedoring	177	177	177	176	177	177	177	177	176	177	177	177
Customs brokers' fees	156	156	163	163	156	156	163	163	163	156	156	163
Road transport charges	397	409	455	458	453	397	409	455	458	453	397	409
Total fees and charges (\$/TEU)	830	847	900	908	902	854	873	928	942	939	849	865
Port's share in national index ^d	11%	11%	11%	11%	11%	10%	10%	10%	11%	11%	10%	10%
												11%

	5 000 to 20 000 GT ships						35 000 to 40 000 GT ships						50 000 to 55 000 GT ships					
	Jan-Jun			Jul-Dec			Jan-Jun			Jul-Dec			Jan-Jun			Jul-Dec		
	2012	2013	2014	2012	2013	2014	2012	2013	2014	2012	2013	2014	2012	2013	2014	2012	2013	2014
Fees and charges for exports																		
Ship-based charges	4	4	5	5	5	5	28	31	33	39	42	23	23	26	26	27		
Cargo-based charges	65	62	62	72	72	65	62	62	72	72	65	62	62	72	72	72		
Wharfage	30	32	34	34	34	30	32	32	34	34	30	32	32	34	34	34		
Harbour dues																		
Other charges																		
Stevedoring	177	177	177	176	177	177	177	177	177	176	177	177	177	177	177	177	176	
Customs brokers' fees	84	84	97	97	84	84	84	97	97	97	97	84	84	97	97	97		
Road transport charges	397	409	455	458	453	397	409	455	458	453	397	409	409	455	455	458	453	
Total fees and charges (\$/TEU)	758	769	829	842	837	782	795	856	876	873	777	787	849	863	859			
Port's share in national index^e	10%	11%	10%	11%	11%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	

a The average TEUs exchanged and the ship call parameters are mean values for ships in the GT category for the period in question.
 b Sum of wharfage, harbour dues, berth charges and channel fees charged per empty TEU multiplied by the average number of empty TEUs exchanged.

c BITRE estimates.
 d This is estimated as the TEU imports brought to the port as a per cent of five ports TEU imports.
 e This is estimated as the TEU exports brought to the port as a per cent of five ports TEU exports.

Notes: Estimates of charges and fees are rounded to the nearest whole dollar. A value of zero indicates that the charge or fees per TEU is less than fifty cents.
 Blank cells mean the data are not reported.

Sources: BITRE estimates based on ship call data from port authorities and other sources as described in text.

Table 4.6 The national port interface cost indices, by size of ship

	Jan-Jun 2012	Jul-Dec 2012	Jan-Jun 2013	Jul-Dec 2013	Jan-Jun 2014
ABS GDP deflator (100.0 for 2014)	98.7	98.5	99.2	99.9	100.0
5 000 – 20 000 GT ships					
Import costs: in nominal price	932	948	1 003	1 014	1 023
Import costs: constant 2014 price	944	962	1 011	1 015	1 023
Export costs: nominal price	904	918	975	989	995
Export costs: in constant 2014 price	916	932	983	990	995
35 000 – 40 000 GT ships					
Import costs: in nominal price	899	910	956	962	967
Import costs: constant 2014 price	911	924	964	963	967
Export costs: nominal price	870	879	928	936	937
Export costs: in constant 2014 price	881	892	935	937	937
50 000 – 55 000 GT ships					
Import costs: in nominal price	887	896	908	957	959
Import costs: constant 2014 price	891	906	920	964	959
Export costs: nominal price	856	867	877	929	933
Export costs: in constant 2014 price	861	876	888	936	933

Notes:

Blank cells mean the data are not reported.

Values in constant 2014 prices are derived using the ABS GDP deflator with Jan-Jun 2014 as the base period. Constant price = Nominal or current price* (Base period deflator/ Current year deflator).

BITRE estimates based on data in Tables 4.1 to 4.5 and data from ABS (2014a).

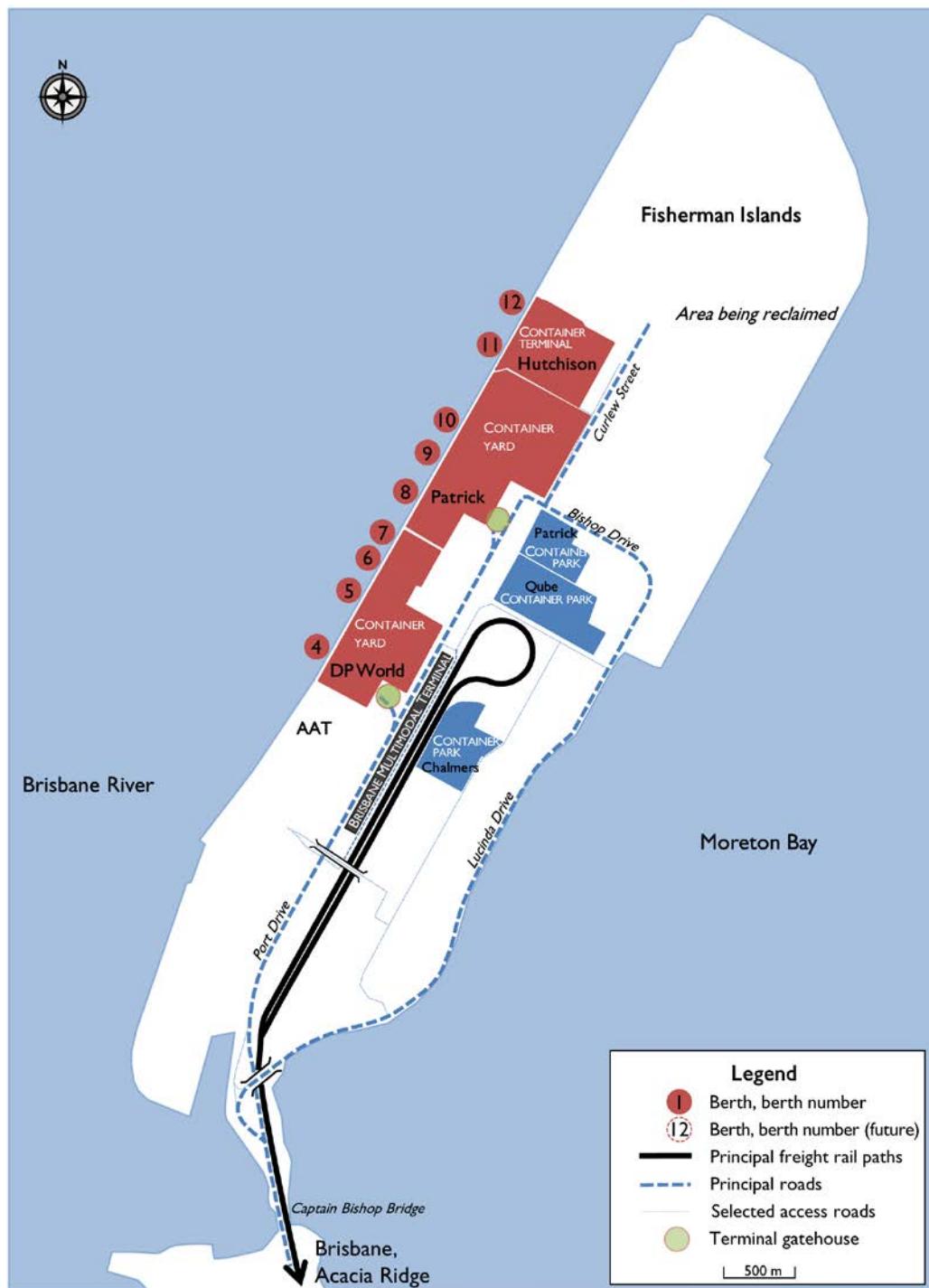
Sources:

APPENDIX A

Maps of five major Australian container ports

This appendix presents maps and supplementary information such as facilities and services at the five major Australian container ports.

Brisbane (Fisherman Islands terminals)



(Last updated: July 2014)

Brisbane (Fisherman Islands Terminals)

The Port of Brisbane is managed and developed by the Port of Brisbane Pty Ltd, under a 99-year lease from the Queensland Government.

Dockside

- **Stevedores.** The map shows the DP World, Patrick and Hutchison Ports Australia terminals. Some containers are also handled by Australian Amalgamated Terminals (AAT), who provides a multi-purpose, multi-user facility that is based at Berths 1–3, to the west of the DP World container yard.
- **Berths.** DP World operates from container berths 4–7. The Patrick container berths are 8–10. The Hutchison berths are Berth 11 and (in the second-phase development) Berth 12.
- **Equipment.** DP World has 6 cranes, including 2 post-Panamax cranes and 2 Super postPanamax cranes. Patrick has 5 cranes, consisting of 3 Panamax cranes and 2 post-Panamax cranes; in addition, Patrick has 27 automated straddle carriers. Hutchison's first phase development includes 2 post-Panamax cranes and 6 automated stacking cranes.

Road

- Road access to the area is via the bridge to Fisherman Islands, over the Captain Bishop Bridge. Access to the DP World and Patrick terminals is via Port Drive or Lucinda Drive/Bishop Drive/Curlew Street; access to the Hutchison terminal is via Curlew Street.

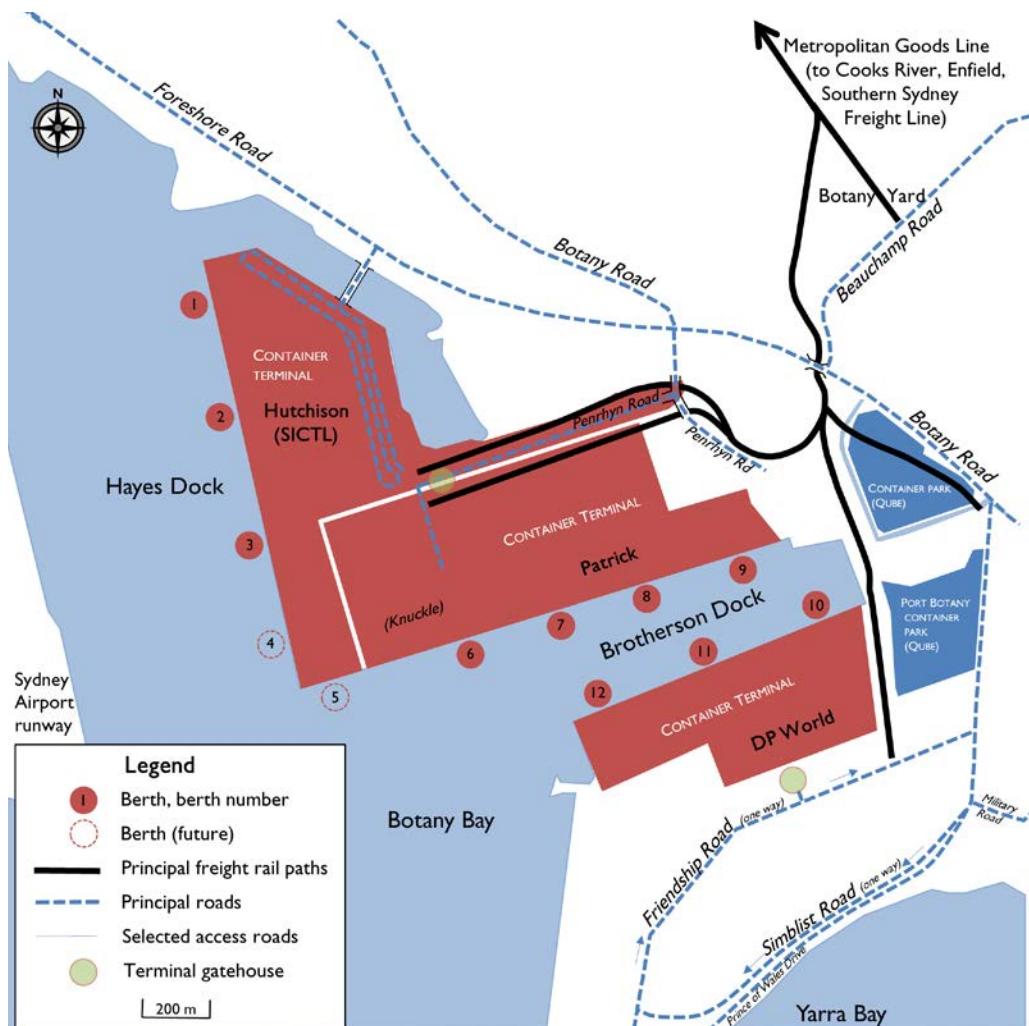
Rail

- **Facilities.** An intermodal facility is provided on Fisherman Islands—the Brisbane Multimodal Terminal. Train lengths of up to 850 metres are permitted. Containers are shifted by road between that terminal and the container terminals. In that context, rail access is classed as having “near-dock” facilities.
- **Services.** Scheduled rail services to the Brisbane Multimodal Terminal include:

Long-haul:

- bulk trains from West Moreton (coal) and from western Queensland (grain)—both via narrow gauge;
 - on a seasonal basis, containers are brought by (narrow-gauge) trains from Goondiwindi (carrying cotton), for export;
 - reefer containers containing meat from northern abattoirs are brought by (narrow-gauge) trains;
 - some containers are railed from the BMT—full import containers, as well as empty containers to be packed for export;
 - there are no scheduled standard-gauge container trains.
- **National rail connections.** Dual narrow and (national) standard gauge tracks are installed between Fisherman Islands and the interstate/intrastate intermodal terminal at Acacia Ridge.

Sydney (Port Botany Terminals)



(Last updated: July 2014)

Sydney (Container Terminals at Port Botany)

Port Botany is managed by NSW Ports Consortium, which has a 99-year lease of the State-owned assets at the port.

Dockside

- **Stevedores.** The three container terminals at Port Botany are served by the stevedores Patrick, DP World and Hutchison (Sydney International Container Terminals Pty Limited, SICTL).
- **Berths.** Patrick operates from berths 7–9; the stevedore will operate berth 6 in future at the Knuckle, to the west of its existing berths. DP World's three berths are numbered 10–12. Hutchison has three operational berths, 1–3, with berths 4 and 5 to be added in the future.
- **Equipment.** DP World equipment includes 3 twin-lift quay cranes and 4 single-lift quay cranes. Patrick equipment includes 5 twin-lift quay cranes and 3 single-lift quay cranes. The Hutchison terminal includes 4 post-Panamax quay cranes.
- The Patrick terminal is currently undergoing an upgrade to implement an automated terminal, to be commissioned early in 2015.

Road

- Access to the DP World terminal is via Friendship Road (one-way). The Patrick terminal is accessed from Penrhyn Road. Hutchison's terminal is accessed via a bridge from Foreshore Road.

Rail

- **Facilities.** Each stevedore has rail facilities near to, but not on, its berths.
- DP World has 3 sidings of 340 metre length. Patrick has 2 sidings of 650 metre length. Hutchison's terminal has 2 rail sidings of 680 metres, which are parallel to the Patrick sidings.
- Scheduled services. Scheduled rail container services between Botany and the hinterland include:

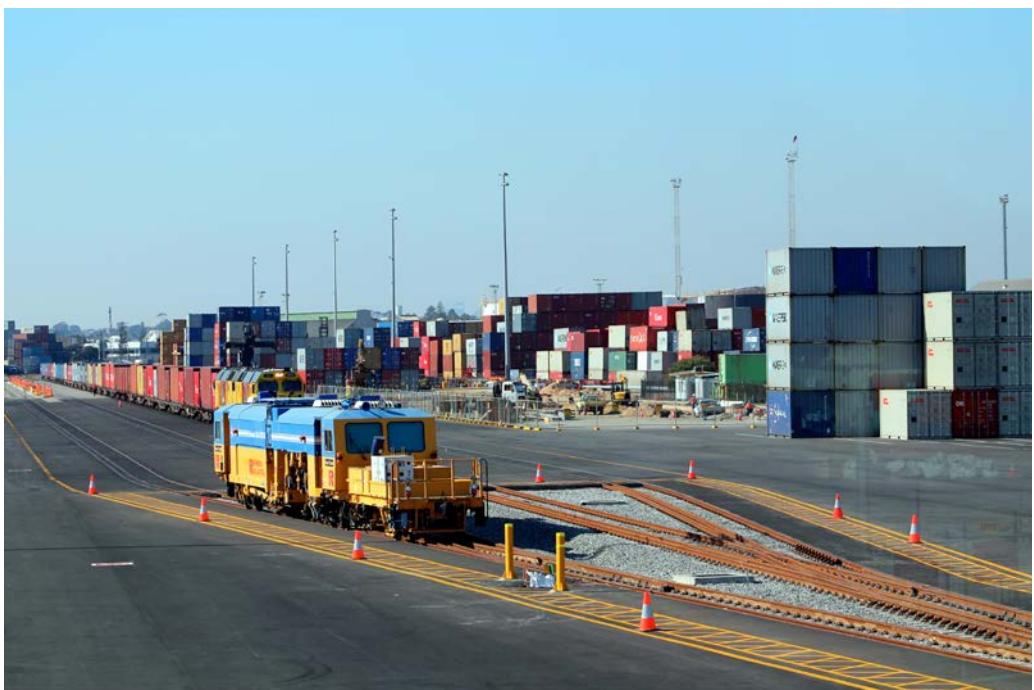
Short-haul:

- Yennora, Cooks River and Minto.

Long-haul:

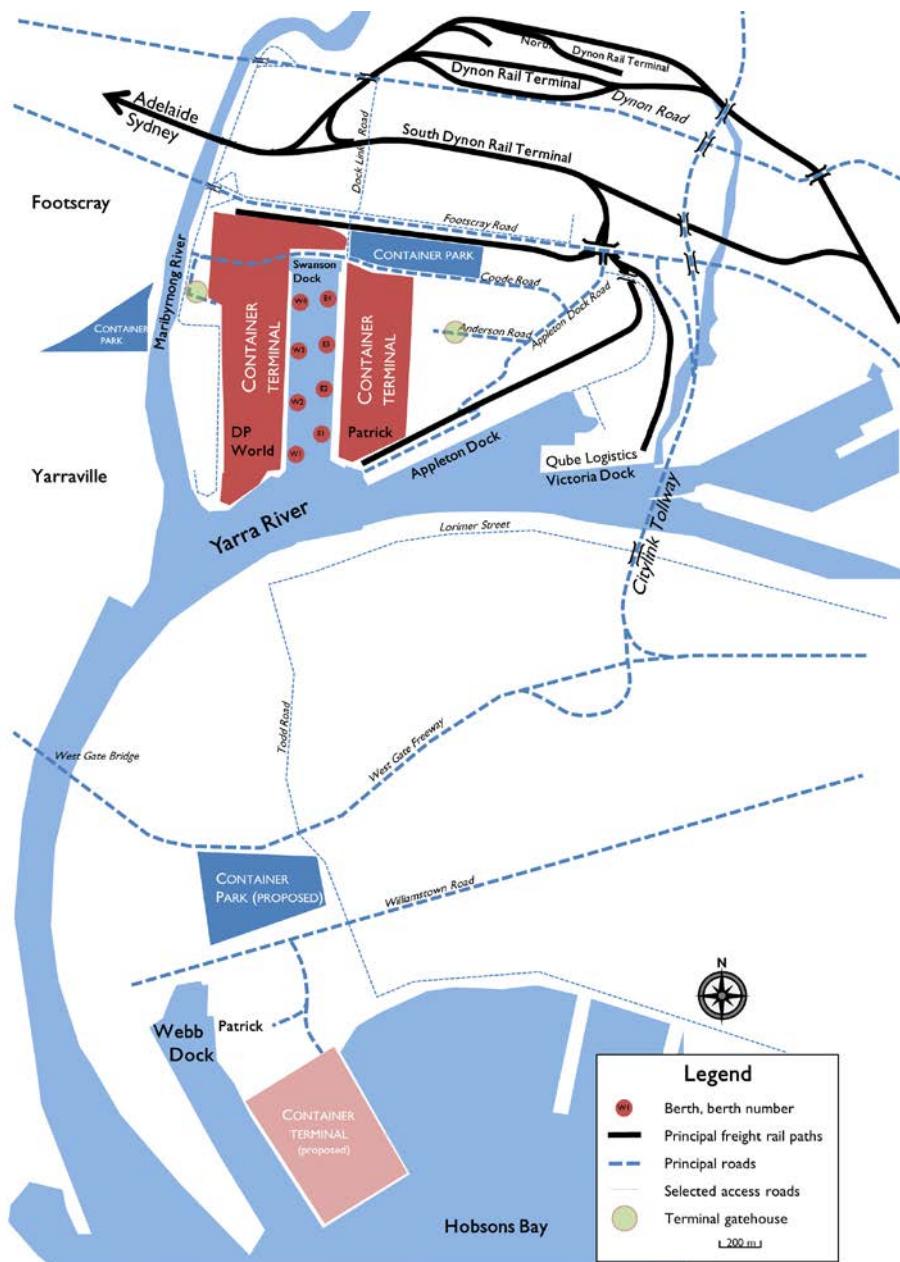
- Kelso (logs and grain) (Southern Shorthaul Railroad; Pacific National);
- Dubbo (processed meat, in reefer containers; grain) (Qube);
- Coonamble (specialised grain) (Qube)
- Nevertire, Warren, Warren South, Narrabri, Wee Waa, Narromine, Forbes (cotton and other agricultural products) (Qube and Freightliner);
- Harefield (Junee) (paper products, grain);
- Walsh Point, Carrington and Sandgate [Newcastle] (aluminium, logs and other agricultural products) (Qube and Crawfords Freightlines/Sydney Rail Services).

- **Other services.** A range of other Port Botany rail container services operate but do not appear in railway Working Timetables. These services include shuttles between Enfield and the port (with railed containers from Manildra Group, notably its Nowra–Bomaderry facility); and the MCS “Sydney Flyer” service between MCS/Cooks River Intermodal Terminal and DP World.
- **Rail access.** Railway sidings at Botany Yard are used to regulate train entry to the port, and to split trains where necessary, for onwards movements to the port; and to re-form trains from port-terminal wagon rakes, for movements to Cooks River, Enfield and beyond.
- **National and regional rail connections.** The port is linked to the intrastate and interstate rail network, including the Southern Sydney Freight Line, and Northern Sydney Freight Corridor via the Metropolitan Freight Network (which includes the Port Botany Goods Line).



Upgraded and expanded North Quay Rail Terminal at the Inner Harbour at Fremantle Port – photo courtesy of Fremantle Port Authority.

Melbourne



(Last updated: November 2014)

Melbourne

The Port of Melbourne Corporation, a public corporation, manages the port.

Dockside

- **Stevedores.** DPWorld's container terminal is at Swanson Dock West. Patrick has a container terminal is across the dock at Swanson Dock East. Patrick also handles some containers along with general freight at its 3-berth Webb Dock East site.
- **Logistics.** Qube Logistics has a container and general cargo terminal at Victoria Dock, with one berth.
- **Equipment.** The Patrick terminal has 8 cranes, of which 3 are post-Panamax; the DP World terminal has 8 cranes, including 3 post-Panamax. Patrick has 42 straddle carriers while DP World has 48 straddle carriers.
- **Berths.** There are 4 container berths at Patrick's Swanson Dock East—berths E1–E4. There are 4 berths at DP World's Swanson Dock West—berths W1–W4. There is one general cargo berth at Victoria Dock (berth 24), which handles containers.

Road

- Access to the DP World terminal is via Coode Road. Access to the Patrick terminal is via Appleton Dock Road; an access road leads to the Qube terminal from Appleton Dock Road.

Rail

- **Facilities.** Import and export containers are rail-served to near the dockside. Containers are also railed through the Dynon rail terminals (to the north of the docks) and conveyed by road between those terminals and the on-dock container stacks.
 - West Swanson Intermodal Terminal serves DP World. This is a single dual-gauge (standard and broad) siding of 510 metres, running just to the south of Footscray Road; there is also a locomotive run-around track;
 - Appleton Dock rail yard serves Patrick. The yard has two dual (standard and broad) gauge tracks of 640 metres in length and a locomotive run-around track;
 - Qube's Victoria Dock sidings have two dual-gauge (standard and broad) sidings, with 630 metre lengths, plus a locomotive run-around track.
- **Services.** Scheduled rail services shifting containers include:

Short-haul:

- In June 2014 Salta Properties opened a terminal at Altona; the company intends to operate shuttle services between the facility and the port.

Long-haul:

- Deniliquin to Qube's sidings adjacent to Victoria Dock (Qube, broad gauge);
- Maryvale Paper Mill to Qube's sidings adjacent to Victoria Dock (Qube, broad gauge);
- Westvic/Warrnambool to Appleton Dock (Pacific National, broad gauge);
- Tocumwal to Appleton Dock (Pacific National, broad gauge);
- Merbein/Mildura to Appleton Dock (Pacific National, broad gauge);

- Adelaide (Port Flat) to Appleton Dock (Patrick, standard gauge);
- Griffith to Appleton Dock (Pacific National, standard gauge).

Port rail containers also arrive by road shuttles from the Dynon railway terminals, including:

- Adelaide (Islington) to South Dynon (Pacific National, standard gauge).
- **Rail linkages.** The dock area consists of rail facilities near the docks and the nearby intermodal container terminals at South Dynon, Dynon and North Dynon. Although there is an eastern link from the Dynon terminals towards the east (Southern Cross and Flinders Street), the container movements are to and from the west via the Tottenham–Dynon line.
- Of the five container ports represented here, the Port of Melbourne is unique in the proximity of intermodal terminals near to the docks as well as the on/near-dock facilities.
- **National rail connections.** Principal freight rail paths are shown; most tracks (including dockside tracks) are dual gauge (namely, broad- and standard-gauge tracks). Access to the interstate network is via the dual-gauge track to the west, via Tottenham.

Appendix A • Maps of five major Australian container ports



Wharfside container terminal operations at Inner Harbour at Fremantle Port – photo courtesy of Fremantle Port Authority.

Adelaide (Adelaide Container Terminal at Outer Harbor/ Pelican Point)



(Last updated: November 2014)

Adelaide (Adelaide Container Terminal at Outer Harbor/Pelican Point)

Flinders Ports manages the port facilities in Adelaide; these are at Outer Harbor and the Inner Harbour (up the Port Adelaide River).

Dockside

- **Stevedores.** Port Adelaide's Outer Harbor Container Terminal is operated by Flinders Adelaide Container Company, using two berths.
- **Berths.** The map shows the container terminal, located in the outer harbour (at Outer Harbor) of Port Adelaide; the Inner Harbour at Port Adelaide is not shown. The Flinders Adelaide Container Company container facilities use berths 6 and 7.
- **Equipment.** The terminal has four travelling container-handling cranes (Panamax-standard).

Road

- Adelaide Container Terminal is accessed in O'Malley Road, leading from Coghlan Road.

Rail

- **Facilities.** The Outer Harbor terminal has two sets of rail sidings. Two sidings, each of 640 metre length, serve the Flinders Adelaide Container Company container terminal (dual standard and broad gauge track). The other set of sidings serve the Qube Logistics terminal and container park (with broad gauge).
- **Services.** Scheduled railed movements to the dockside (all by standard rather than broad gauge) include:

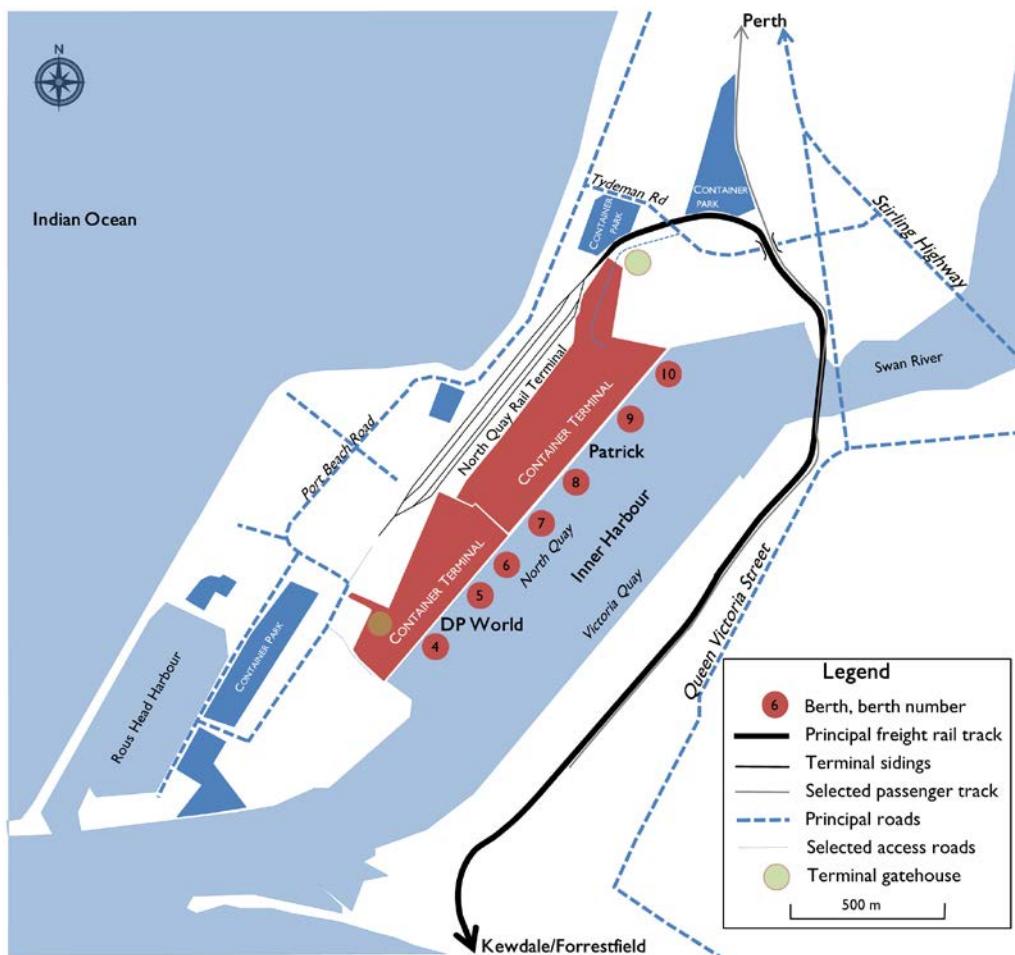
Short-haul:

- Penfield (Direk) to Flinders Adelaide Container Company (SCT Logistics); these services were introduced in the first half of 2014.

Long-haul:

- A regular train from Port Pirie and Bowmans operates to the Flinders Adelaide Container Company terminal via Port Flat terminal. Containers on the train include lead (from Port Pirie) and agricultural produce (from the Balco terminal at Bowmans). (Patrick);
- Grain is brought to Port Adelaide by rail in hopper wagons; some is then loaded into containers at Viterra's (ABB) container grain loader (inverter) and then exported.
- **Rail linkages.** The Outer Harbor facility is at the extremity of a freight-only railway between Outer Harbor, Port Adelaide and Dry Creek. The line is dual standard- and broad-gauge, with some sections of double-track.
- **National rail connections.** The Outer Harbor–Dry Creek line connects with the interstate network at Dry Creek. Nearby intermodal terminals include the Asciano terminals at Port Flat and Islington and the SCT Logistics terminal at Penfield (Direk).

Fremantle (North Quay Terminals in the Inner Harbour)



(Last updated: November 2014)

Fremantle (North Quay Terminals in the Inner Harbour)

Fremantle Ports, a Western Australian Government trading enterprise, manages the port.

Dockside

- **Stevedores.** Container stevedoring is undertaken at North Quay in the Inner Harbour by Patrick and DP World. Patrick have four berths and DP World has three berths.
- **Berths.** Patrick's berth 10 is a multi-purpose container, ro-ro and general cargo facility. The six other stevedore berths are dedicated container ship berths.

Road

- The principal roads on this peninsula are Tydeman Road (from the Stirling Highway) and Port Beach Road/Rudderham Drive. The DP World terminal is accessed via Rudderham Drive while the Patrick terminal is accessed via Tydeman Road.

Rail

- **Facilities.** North Quay Rail Terminal, to the west of the Patrick terminal, serves both Patrick and DP World container terminals. The sidings at that location are around 690 metres in length, accommodating blocks of 600 metre-length trains. The Rail Terminal has dual-gauge tracks.
- **Services.** Scheduled rail services to the port include the following (standard-gauge) trains:
 - Short-haul:
 - A container train operates between Kewdale/Forrestfield and the North Quay Rail Terminal; the service is operated under contract from the State government.
 - Long-haul:
 - Aurizon operates container services between Kalgoorlie and Fremantle; the contents of the containers is nickel matte, for the WMC Resources (part of BHP Billiton);
 - Lead (from Magellan Metals) is railed to the port in containers from Kalgoorlie via Forrestfield Container Terminal.
- **Rail linkages.** Trains access the Rail Terminal on a dual narrow- and standard-gauge freight-only line from Midland. Freight and passenger trains share a track on the bridge over the Swan River.
- **National rail connections.** The rail link to Midland, on the interstate network, includes spur tracks to interstate intermodal terminals at Kewdale and Forrestfield.

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