



Australian Government

Department of Infrastructure and Regional Development

Bureau of Infrastructure, Transport and Regional Economics

STATISTICAL REPORT



Maritime

Waterline 60

Bureau of Infrastructure, Transport and Regional Economics

Waterline 60
August 2017

Department of Infrastructure and Regional Development
Canberra, Australia

© Commonwealth of Australia 2016

ISSN: 1324-4043

ISBN: 978-1-925531-63-3

August 2017/INFRA3299

Cover Photo: Container shipping at Fremantle Inner Harbour. Photo courtesy of Fremantle Ports.

Ownership of intellectual property rights in this publication

Unless otherwise noted, copyright (and any other intellectual property rights, if any) in this publication is owned by the Commonwealth of Australia (referred to below as the Commonwealth).

Disclaimer

The material contained in this publication is made available on the understanding that the Commonwealth is not providing professional advice, and that users exercise their own skill and care with respect to its use, and seek independent advice if necessary.

The Commonwealth makes no representations or warranties as to the contents or accuracy of the information contained in this publication. To the extent permitted by law, the Commonwealth disclaims liability to any person or organisation in respect of anything done, or omitted to be done, in reliance upon information contained in this publication.

Creative Commons licence

With the exception of (a) the Coat of Arms; and (b) the Department of Infrastructure and Regional Development's photos and graphics, copyright in this publication is licensed under a Creative Commons Attribution 3.0 Australia Licence.

Creative Commons Attribution 3.0 Australia Licence is a standard form licence agreement that allows you to copy, communicate and adapt this publication provided that you attribute the work to the Commonwealth and abide by the other licence terms. A summary of the licence terms is available from <http://creativecommons.org/licenses/by/3.0/au/deed.en>. The full licence terms are available from <http://creativecommons.org/licenses/by/3.0/au/legalcode>.

Use of the Coat of Arms

The Department of the Prime Minister and Cabinet sets the terms under which the Coat of Arms is used. Please refer to the Department's Commonwealth Coat of Arms and Government Branding web page <http://www.dpmc.gov.au/resource-centre/government-australian-government-branding-guidelines-use-australian-government-logo-australian-government-departments-and-agencies> and in particular, the *Commonwealth Coat of Arms Information and Guidelines* publication.

An appropriate citation for this report is:

Bureau of Infrastructure, Transport and Regional Economics (BITRE), 2017, Waterline 60, Statistical Report, BITRE, Canberra ACT.

Contact us

This publication is available in PDF format. All other rights are reserved, including in relation to any Departmental logos or trademarks which may exist. For enquiries regarding the licence and any use of this publication, please contact:

Bureau of Infrastructure, Transport and Regional Economics (BITRE)
Department of Infrastructure and Regional Development
GPO Box 501, Canberra ACT 2601, Australia

Telephone: (international) +61 2 6274 7210
Fax: (international) +61 2 6274 6855
Email: bitre@infrastructure.gov.au
Website: www.bitre.gov.au

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 December quarter 2016.

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 loading and unloading of container ships and the landside transport of containers to and 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 Thomas Rutherford. For further information on this report please phone Thomas Rutherford on (02) 6274 6818, Jack McAuley on (02) 6274 7309 or email maritime_stats@infrastructure.gov.au.

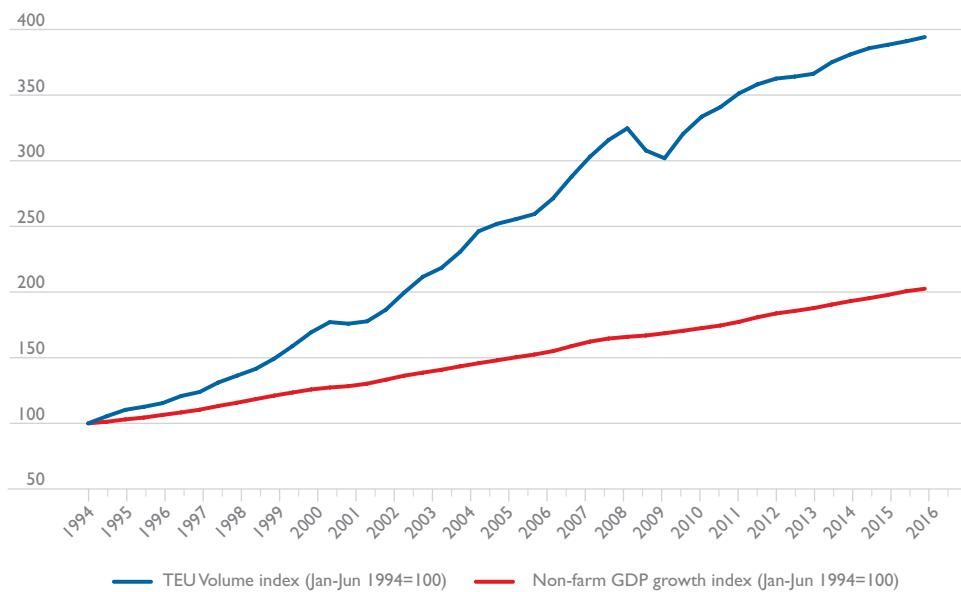
Gary Dolman
Head of Bureau
Bureau of Infrastructure, Transport and Regional Economics
Canberra
August 2017

At a glance

Throughput

- During the period July–December 2016 the *number of unitised cellular container ships (UCCs) handled by stevedores* decreased by 0.4 per cent in the five ports, as compared with July–December 2015. The largest declines occurred at Brisbane (2.3 per cent) and Sydney (1.8 per cent) and there was an increase of 9.8 per cent at Adelaide.
- The *total number of twenty foot equivalent units (TEUs) handled by stevedores* increased by 1.8 per cent during the period July–December 2016, as compared with the same period in 2015. The largest increases occurred at Brisbane (4.1 per cent) and Sydney (2.6 per cent), while there was a decline of 3.9 per cent at Adelaide.
- Growth in annual TEU throughput at Australia's container ports has declined to 1.6 per cent, while non-farm GDP growth was 1.9 per cent over the year to July–December 2016. Figure A.1 illustrates historical growth in these series. Over the period from 1994 to 2016, non-farm GDP increased by more than 100 per cent while container throughput grew by more than 290 per cent.
- Waterline 60 includes two new indicators relating to empty container park operations: *number of containers moved through empty container parks* (Indicator 3.7) and *number of TEUs moved through empty container parks* (Indicator 3.8). The *number of TEUs moved through empty container parks* declined by 1.6 per cent in July–December 2016, compared to the same period in 2015. The biggest decline was in Sydney (11.0 per cent), while the greatest increase was in Adelaide (21.6 per cent). The new indicators can be found in Table 3.7.
- Figure A.2 illustrates the proportions of TEUs handled by VBS/TAS trucks, by rail, and the balance, for each port and the five ports total. The balance of TEUs handled outside of the VBS/TAS and rail systems relates to the movement of empty export containers via bulk runs, as well as the degree to which stevedores facilitate the ad hoc or opportunistic pickup and delivery of containers outside of pre-booked slots.

Figure A.I Growth in container traffic compared to GDP growth (1994 = 100)



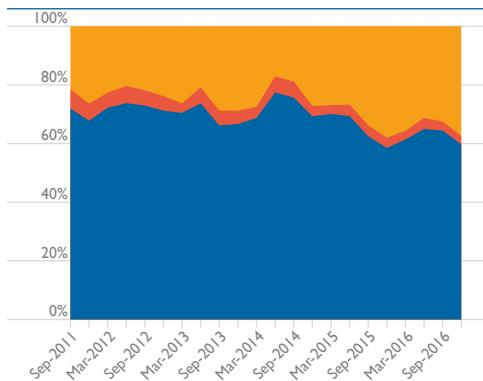
Sources: BITRE estimates (2017), ABS (2017).



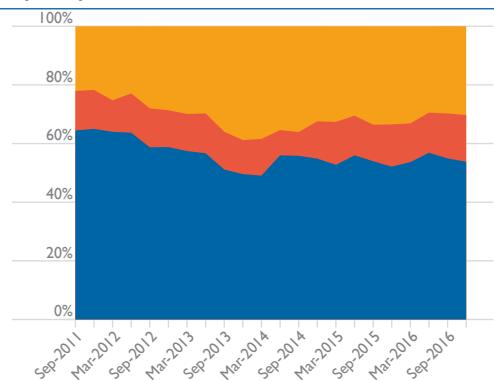
North Quay Rail Terminal. Photo courtesy of Fremantle Ports.

Figure A.2 Proportion of containers handled by VBS/TAS trucks, rail and other

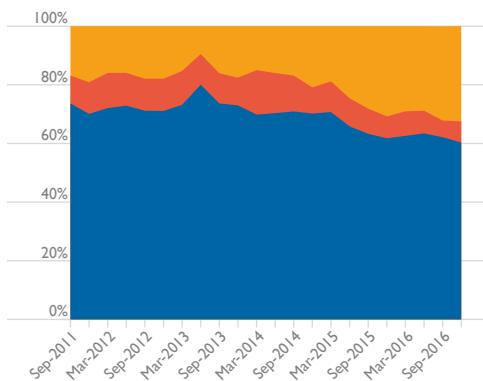
Brisbane



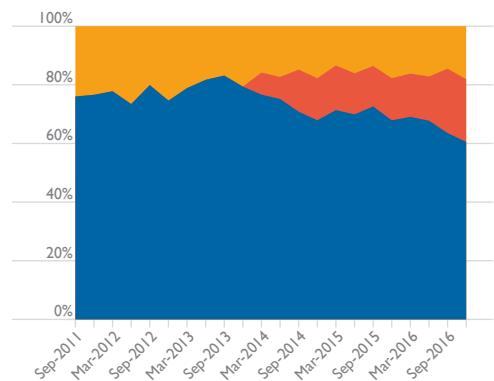
Sydney



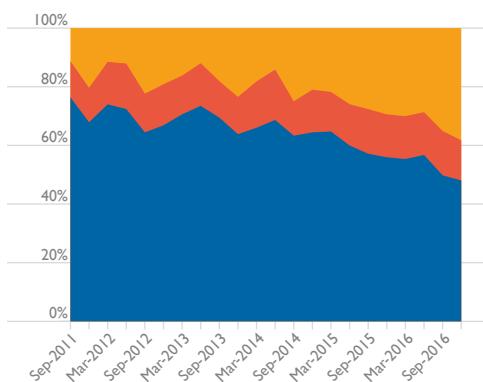
Melbourne



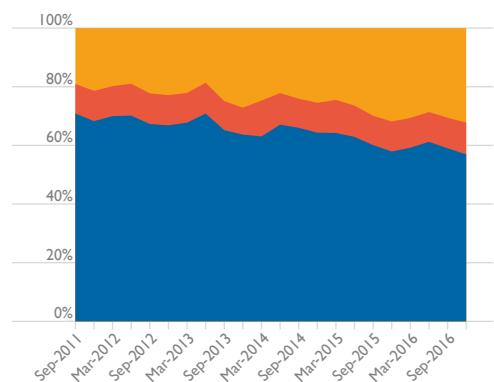
Adelaide



Fremantle



Five Ports



■ TEUs by VBS trucks ■ TEUs by rail ■ Balance of TEUs handled

Note: Balance of TEUs handled relates to the movement of empty export containers via bulk runs (as required by the stevedores when completing loading of a vessel). The balance also reflects the degree to which stevedores facilitate the ad hoc or opportunistic pickup and delivery of containers outside pre-booked slots. The balance is computed against the total containers handled wharfside; landside-only operations are additional to the totals.

Sources: BITRE estimates (2017).

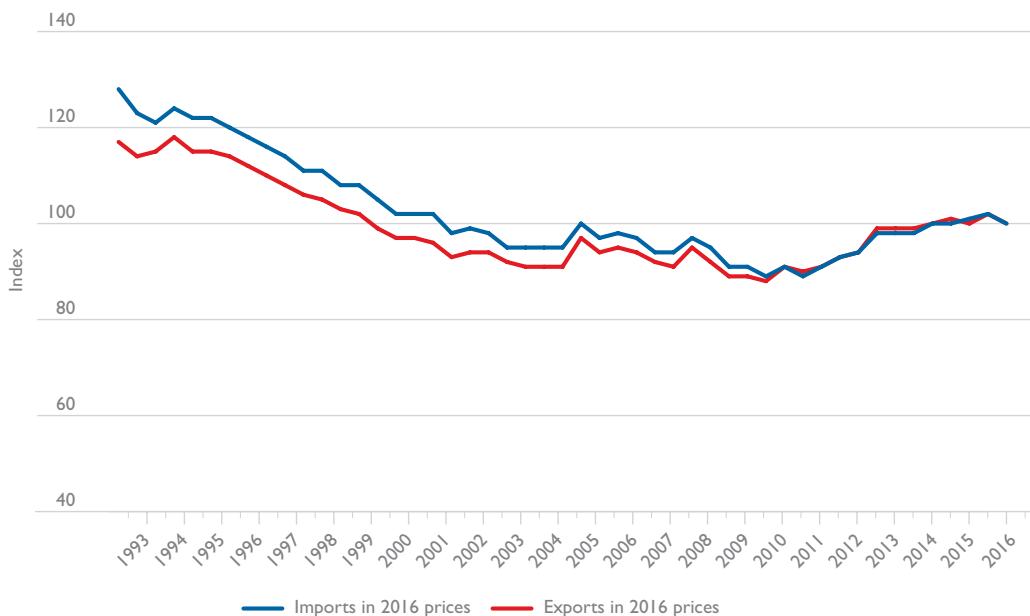
Productivity

- Compared to July–December 2015, the *median ship turnaround time* in July–December 2016 increased in four ports, with the biggest increase in Fremantle (8.3 per cent). Adelaide posted a decline (4.2 per cent). On average, this indicator increased 1.0 per cent.
- Average *lifts per ship-hour at berth* increased by 1.1 per cent to 41.8 in July–December 2016 compared to the same period in 2015.
- Average *lifts per stevedore-hour* improved by 12.1 per cent in Brisbane in July–December 2016 compared to the same period in 2015. Declines occurred in Adelaide (6.7 per cent), Sydney (6.2 per cent) and Fremantle (3.6 per cent).
- The *number of ships waiting for more than two hours to enter container terminals* declined from 156 to 149 and *median waiting time* decreased by 4.2 per cent across the five ports. The *percentage of ships waiting at anchorage for more than 2 hours* declined in July–December 2016 compared to the same period in 2015, from 7.7 per cent to 7.3 per cent of ships.
- Wharfside productivity improved at Brisbane in July–December 2016, with (*TEUs per hour*) *crane rate*, *elapsed labour rate* and *ship rate* improving by 2.3 per cent, 7.9 per cent and 5.9 per cent respectively, compared to the same period in 2015.
- The average *ship rate* (*TEUs per hour*) improved by 2.2 per cent across the five ports in the period July–December 2016 (compared to the same period in 2015). Over the same period, crane rate declined by 0.5 per cent but elapsed labour rate increased by 0.6 per cent.
- The *truck and container turnaround times* have been revised in Waterline 60. These are now computed on the basis of 'gate in to last container loaded', where the previous definition was 'gate in to gate out'. The historical series has been revised from March quarter 2011.
- Average *truck turnaround times* increased by 1.0 percent across the five ports in July–December 2015. Brisbane and Adelaide posted decreases of 5.1 per cent, while Sydney experienced an increase of 6.1 percent. *Container turnaround times* decreased by 4.3 per cent in Brisbane, 1.4 per cent in Adelaide and 0.5 per cent in Fremantle.
- The *per cent of trucks backloaded* shows the number of backloaded operations as a percentage of total VBS trucks in all five ports. During the period July–December 2016, the largest percentage of backloaded operations was in Adelaide (22.9 per cent). The share of backloaded operations grew in Brisbane (from 9.5 to 11.9 percent), Fremantle (from 11.1 to 11.9 per cent) and Sydney (from 8.6 to 8.9 per cent) as compared with the period July–December 2015.
- The total *number of truck timeslots used* in the five ports declined by 2.4 per cent in July–December 2016 compared to the same period in 2015. In the same period, the *number of truck slots available* increased by 14.8 per cent. Usage of weekday night truck timeslots declined by 3.0 per cent across the five ports compared to the same period in 2015.

Port-interface cost

- The port interface cost index for exports decreased for all ship categories in the period July–December 2016:
 - For small ships (5 000 to 20 000 GT) port interface costs decreased by \$19/TEU for exports;
 - For medium size ships (35 000 to 40 000 GT) port interface costs decreased by \$20/TEU for exports; and
 - For large size ships (50 000 to 55 000 GT) port interface costs decreased by \$21/TEU for exports.
- The port interface cost index for imports decreased for all ship categories in the period July–December 2016:
 - For small ships (5 000 to 20 000 GT) port interface costs decreased by \$19/TEU for imports;
 - For medium size ships (35 000 to 40 000 GT) port interface costs decreased by \$20/TEU for imports; and
 - For large size ships (50 000 to 55 000 GT) port interface costs decreased by \$21/TEU for imports.
- Figure A.3 provides a long-term illustration of port interface costs for medium-sized ships (35 000–40 000 GT), adjusted by the non-farm GDP deflator.

Figure A.3 Adjusted port interface cost indices for medium sized vessels



Note: Medium sized vessels range in size between 35 000 and 40 000 GT. July–December 2016 is the base period.

Sources: BITRE estimates (2017).

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
FACT	Flinders Adelaide Container Terminal
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 Islands (Brisbane),• Brotherson Dock, at Port Botany (Sydney),• Swanson Dock (Melbourne),• Flinders Adelaide Container Terminal at Outer Harbor / Pelican Point (Adelaide)• North Quay in the “Inner Harbour” on the Swan River (Fremantle)
GT	Gross tonnage
Infrastructure	Department of Infrastructure and Regional Development
n.a.	Not applicable
Mins	Minutes
Pbm	Per berth metre
PCI	Port Interface Cost Index
Qtr	Quarter
TAS	Truck Appointment System (used by Hutchison Ports Australia to schedule trucks at a container terminal). See also VBS
TEU	Twenty-foot equivalent unit
TTT	Truck turnaround time
UCC	Cellular Container ship; a type of specialised container ship
VBS	Vehicle Booking System, used to schedule trucks at a container terminal. DP World and Patrick use a shared system developed by 1-Stop Connections Pty Ltd; FACT operates a similar system.

Acknowledgements

BITRE is particularly grateful for the assistance of the following organisations in the provision of data used to prepare Waterline:

- stevedoring companies: DP World, Flinders Adelaide Container Terminal, 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 Operations Pty Ltd, Flinders Ports and Fremantle Ports
- Ports Australia
- shipping lines
- customs brokers
- road transport operators
- pilot, tug and mooring operators.

Contents

Foreword	iii
At a glance	v
Abbreviations and terms	x
Acknowledgements	xi
Chapter 1 Measures of container terminal throughput	1
Chapter 2 Measures of container terminal productivity	19
Chapter 3 Vehicle booking system and empty container park operations	41
Chapter 4 Port interface cost index	55
Appendix A Maps of five major Australian container ports	73
References	88

List of tables

Table 1.1	Container terminal throughput: Brisbane	12
Table 1.2	Container terminal throughput: Sydney	13
Table 1.3	Container terminal throughput: Melbourne.....	14
Table 1.4	Container terminal throughput: Adelaide.....	15
Table 1.5	Container terminal throughput: Fremantle.....	16
Table 1.6	Container terminal throughput: Five ports.....	17
Table 1.7	Container terminal throughput: container ship visits by port, July–December 2016	18
Table 1.8	Container terminal throughput: container ship visits by port, January–June 2016.....	18
Table 2.1	Container terminal productivity: Brisbane.....	34
Table 2.2	Container terminal productivity: Sydney.....	35
Table 2.3	Container terminal productivity: Melbourne.....	36
Table 2.4	Container terminal productivity: Adelaide	37
Table 2.5	Container terminal productivity: Fremantle.....	38
Table 2.6	Container terminal productivity: Five ports	39
Table 3.1	Timeslots available and actually used by trucks: Brisbane.....	48
Table 3.2	Timeslots available and actually used by trucks: Sydney.....	49
Table 3.3	Timeslots available and actually used by trucks: Melbourne	50
Table 3.4	Timeslots available and actually used by trucks: Adelaide	51
Table 3.5	Timeslots available and actually used by trucks: Fremantle	52
Table 3.6	Timeslots available and actually used by trucks: Five ports	53
Table 3.7	Empty Container Park operations.....	54
Table 4.1	Port interface costs by ship type-parameters and estimates: Brisbane	62
Table 4.2	Port interface costs by ship type-parameters and estimates: Sydney.....	64
Table 4.3	Port interface costs by ship type-parameters and estimates: Melbourne....	66
Table 4.4	Port interface costs by ship type-parameters and estimates: Adelaide	68
Table 4.5	Port interface costs by ship type-parameters and estimates: Fremantle	70
Table 4.6	The national port interface cost indices, by size of ship.....	72

List of figures

Figure A.1	Growth in container traffic compared to GDP growth (1994 = 100)	vi
Figure A.2	Proportion of containers handled by VBS/TAS trucks, rail and other.....	vii
Figure A.3	Adjusted port interface cost indices for medium sized vessels	ix
Figure I.1	TEU throughput by container port: wharf-side.....	6
Figure I.2	TEU throughput by container port: landside.....	7
Figure I.3	TEU throughput by container port: Whole of port.....	8
Figure I.4	Container terminal traffic: Number of UCC ships handled.....	9
Figure I.5	Container terminal traffic: Number of trucks used in VBS/TAS operations	10
Figure I.6	Rail share of TEUs handled	11
Figure 2.1	Wharf-side crane rate.....	25
Figure 2.2	Wharf-side elapsed labour rate	26
Figure 2.3	Wharf-side ship rate.....	27
Figure 2.4	Productivity in five ports: Comparison of wharf-side rates.....	28
Figure 2.5	Average TEUs per truck on landside of container terminals.....	29
Figure 2.6	Average container turnaround time on landside of container terminals	30
Figure 2.7	Longest and shortest truck turnaround time in five ports	31
Figure 2.8	Longest and shortest container turnaround time in five ports	31
Figure 2.9	Average number of lifts per hour a ship spent at berth.....	32
Figure 2.10	Average number of lifts per berth visit.....	33
Figure 3.1	Timeslots used by trucks in all off-peak periods	44
Figure 3.2	Timeslots used by trucks in off-peak periods Monday to Friday	45
Figure 3.3	Timeslots used by trucks on Saturday and Sunday.....	46
Figure 3.4	TEUs processed per VBS timeslot used at container terminals.....	47
Figure 4.1	Port Interface Cost Index for container imports and exports, by ship size....	60

CHAPTER I

Measures of container terminal throughput

Overview

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

There are four wharfside quarterly throughput indicators:

- 1.1 UCC ships handled, as reported by stevedores
- 1.2 Total containers handled by stevedores
- 1.3 Total TEUs handled by stevedores
- 1.4 40-foot containers as per cent of all containers handled

There are nine landside quarterly throughput indicators:

- 1.5 Number of trucks used in VBS/TAS operations
- 1.6 Total number of containers transported by trucks and rail
- 1.7 Total number of containers transported by trucks
- 1.8 Number of containers by rail
- 1.9 Balance of containers handled landside
- 1.10 Total number of TEUs transported by trucks and rail
- 1.11 Total number of TEUs transported by trucks
- 1.12 Number of TEUs by rail
- 1.13 Balance of TEUs handled landside

Using data from port authorities, there are two quarterly whole-of-terminal throughput indicators:

- 1.14 Total number of container ship visits
- 1.15 Total number of containers (lifts) exchanged

Using data from port authorities, there are seven six-monthly whole-of-port throughput indicators:

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

Indicators are presented separately for Brisbane, Sydney, Melbourne, Adelaide and Fremantle, as well as for the five ports as a whole, where applicable.

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 stacking area adjoining the wharf for storing containers. While in the terminal, the containers are at the disposal 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 may also contract with a terminal owner to manage all terminal operations. In Australia, there are three major stevedoring companies which handle containers: Patrick, Dubai Ports World and Hutchison Ports Australia.

Wharfside 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 equals two TEUs.

Indicator 1.4 40-foot containers 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 VBS/TAS trucks. This indicator is computed using data provided by stevedores. Up to Waterline 55, this indicator included the trucks undertaking bulk runs; this has been discontinued due to inconsistent data.

Indicator 1.8 Number of containers by rail

This indicator, which counts the total number of containers carried by rail in or out of a container terminal, 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. Only “on dock” rail data is reported for Sydney as port precinct rail data is not available.

Indicator 1.9 Balance of containers handled landside

This indicator shows the difference between the throughput of containers on the wharfside (Indicator 1.2) and the total containers transported by VBS/TAS trucks and rail (Indicator 1.6). It illustrates the scale and variability of the container handling task outside of VBS/TAS and railway operations. This indicator includes containers handled by consignees’ own transport, but excludes landside-only operations.

To avoid double counting of containers, this indicator is calculated differently in Melbourne and Adelaide, where it is the difference between throughput of containers on the wharfside (Indicator 1.2) and the number of containers transported by VBS/TAS trucks (Indicator 1.5).

Due to the mix of operations at Brisbane, both the standard and alternate calculations may double-count some containers. The standard calculation is used.

Indicator 1.10 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 1.11 (TEUs moved by trucks) and Indicator 1.12 (TEUs moved by rail).

Indicator 1.11 Total number of TEUs transported by trucks

This indicator includes the total number of TEUs transported by VBS/TAS trucks. In previous editions of Waterline, this indicator included the number of TEUs transported by trucks undertaking bulk runs; this has been discontinued due to inconsistent data.

Indicator 1.12 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. Only “on dock” rail data is reported for Sydney as port precinct rail data is not available.

Indicator 1.13 Balance of TEUs handled landside

This indicator is similar to Indicator 1.9, but calculated in TEUs. It shows the difference between the throughput of TEUs on the wharfside (Indicator 1.3) and the total TEUs transported by VBS/TAS trucks and rail (Indicator 1.10).

To avoid double counting of TEUs, this indicator is calculated differently in Melbourne and Adelaide, where it is the difference between throughput of TEUs on the wharfside (Indicator 1.3) and the number of TEUs transported by VBS/TAS trucks (Indicator 1.11).

Due to the mix of operations at Brisbane, both the standard and alternate calculations may double-count some TEUs. The standard calculation is used.

Whole-of-container-terminal throughput

Indicator 1.14 Total number of container ship visits

This is a count of all port calls by UCC ships where the vessel visited and exchanged containers at the container terminal. Table 1.7 summarises ship visits by size of ship and by container port.

Indicator 1.15 Total number of containers (lifts) exchanged

This indicator is estimated using Indicator 1.4 (percentage of 40-foot containers) and the total number of TEUs exchanged with container vessels, as reported by ports.

Whole-of-port throughput

Indicator 1.16 Total cargo throughput

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

Indicator 1.17 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 1.18 Total number of TEUs exchanged

This is a count of TEUs, exchanged through the port. This count is further broken down into Indicators 1.19 to 1.22.

Indicator 1.19 Full import TEUs

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

Indicator 1.20 Empty import TEUs

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

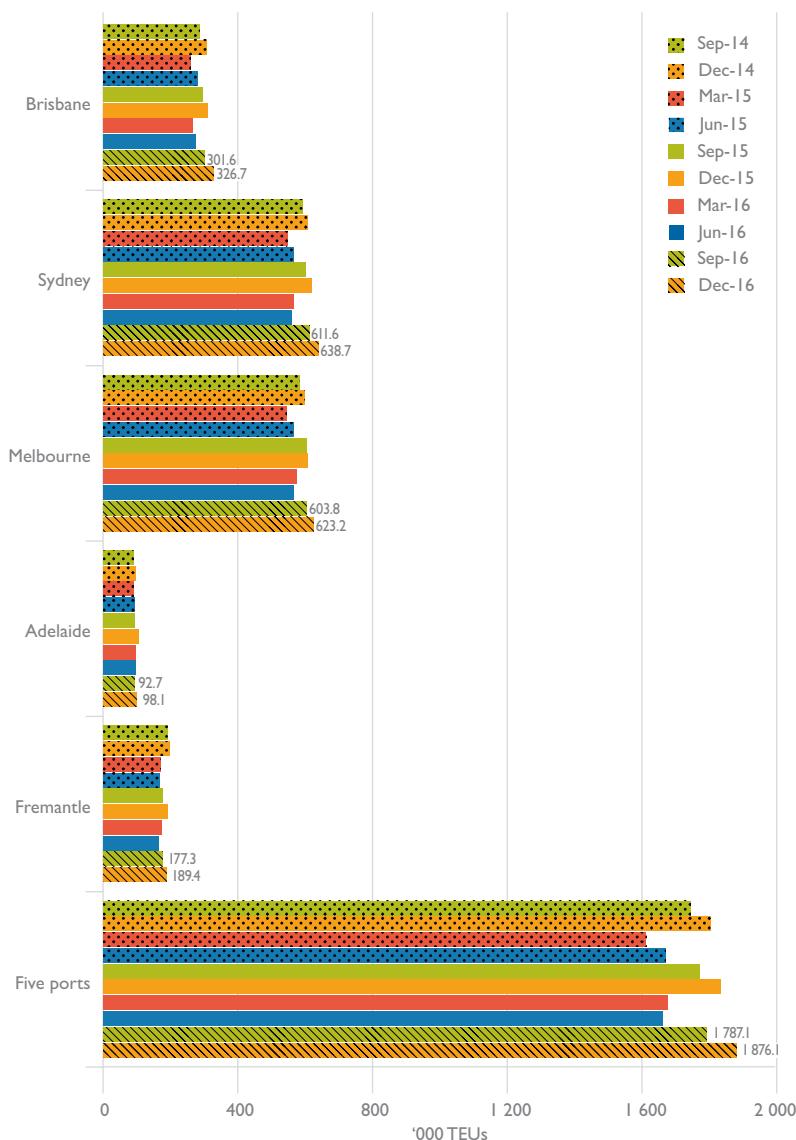
Indicator 1.21 Full export TEUs

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

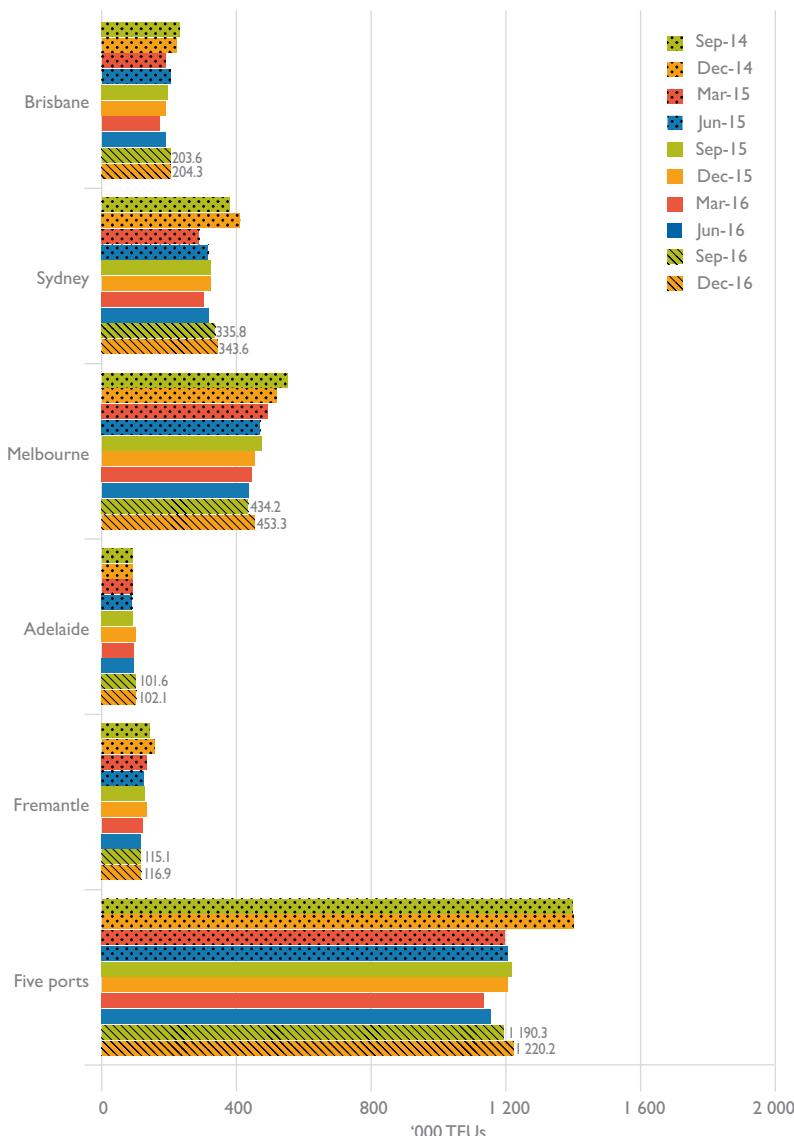
Indicator 1.22 Empty export TEUs

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

Figure I.I TEU throughput by container port: wharf-side



Sources: DP World (2017), Flinders Adelaide Container Terminal (2017), Hutchison Ports Australia (2017) and Patrick (2017).

Figure I.2 TEU throughput by container port: landside

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

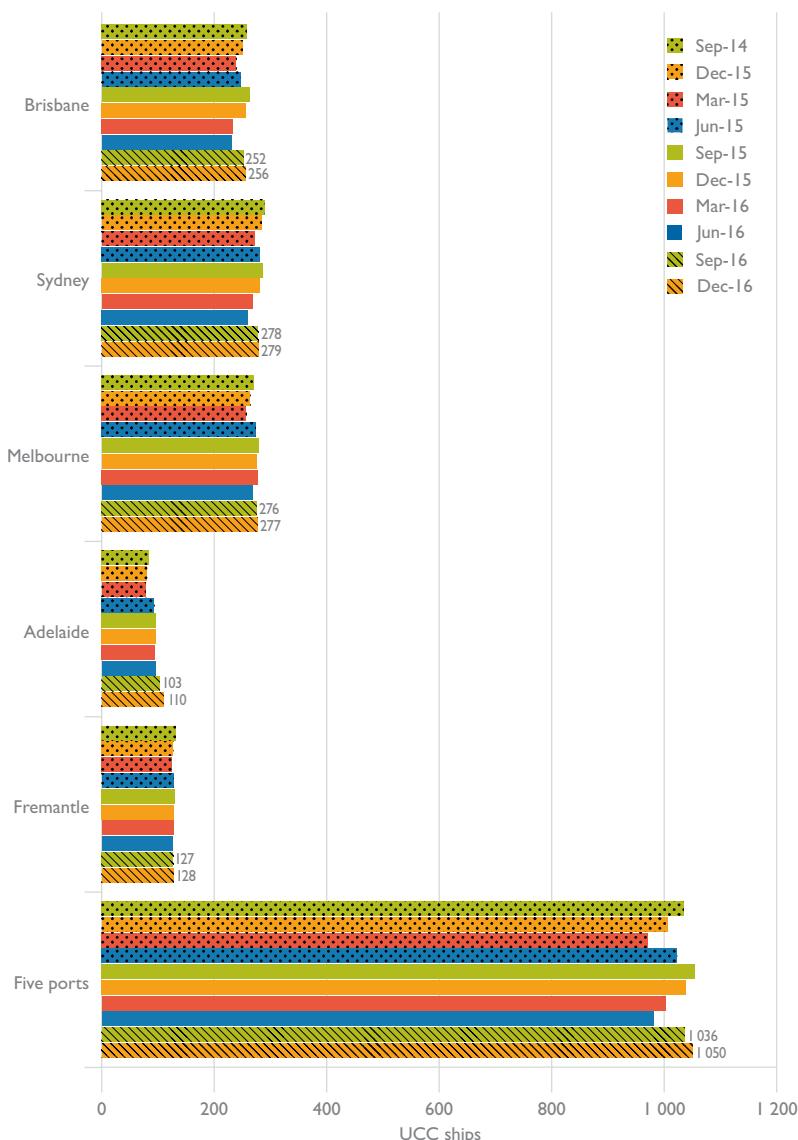
Sources: DP World (2017), Flinders Adelaide Container Terminal (2017), Hutchison Ports Australia (2017), Patrick (2017), Flinders Ports (2017), Port of Brisbane Pty Ltd (2017), Port of Melbourne Operations Pty Ltd (2017) and Fremantle Ports (2017).

Figure I.3 TEU throughput by container port: Whole of port



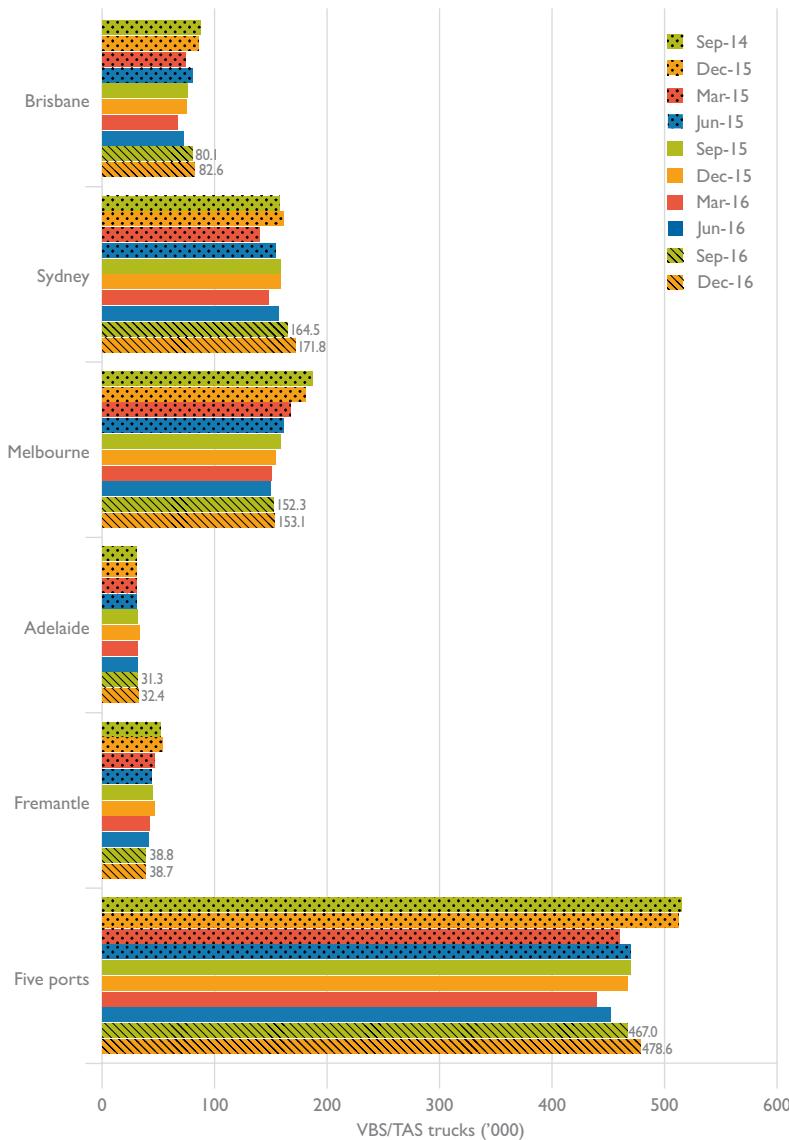
Notes: The data relate to terminals at Fisherman Islands (Brisbane), Brotherson Dock at Port Botany (Sydney), Swanson Dock (Melbourne), Flinders Adelaide Terminal at Outer Harbor/Pelican Point (Adelaide), and North Quay in the Inner Harbour (Fremantle).

Sources: Port of Brisbane Pty Ltd (2017), Port Authority of New South Wales (2017), Port of Melbourne Operations Pty Ltd (2017), Flinders Ports (2017) and Fremantle Ports (2017).

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

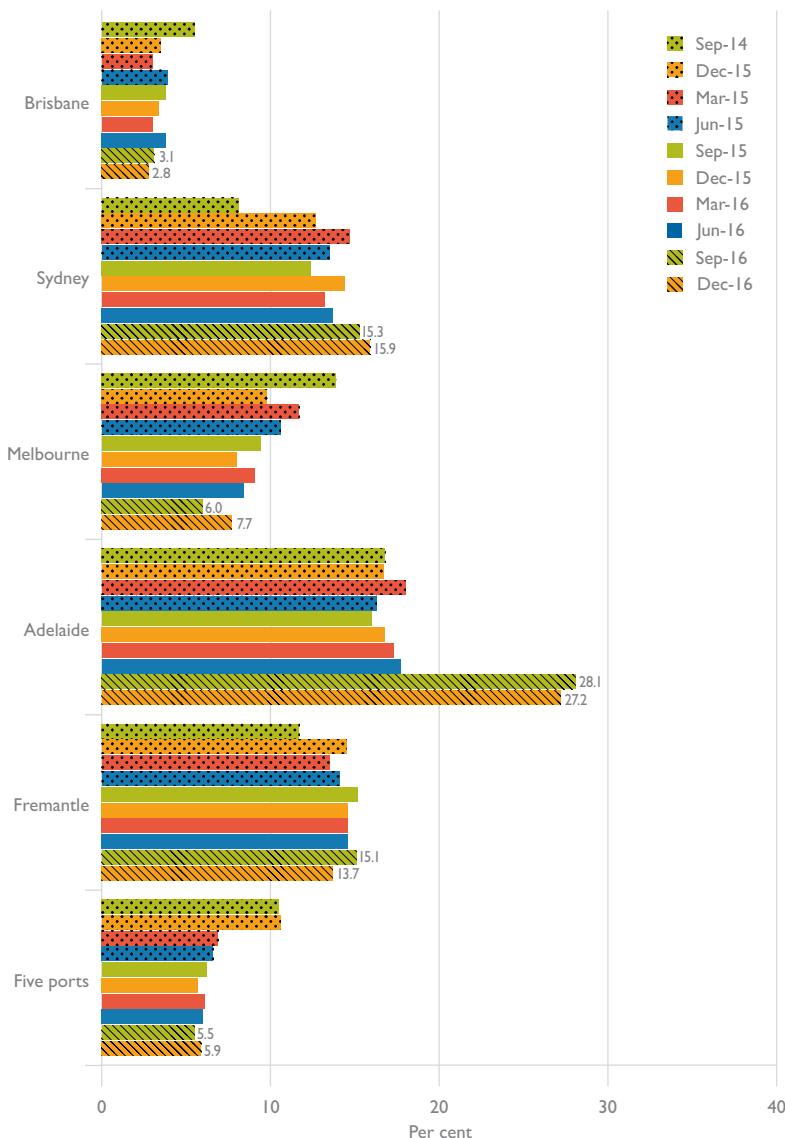
Notes: The data contained in this figure relates to Indicator I.1 as defined in the explanatory notes and Table I.1 to I.6.

Sources: DP World (2017), Flinders Adelaide Container Terminal (2017), Hutchison Ports Australia (2017) and Patrick (2017).

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 (2017), Flinders Adelaide Container Terminal (2017), Hutchison Ports Australia (2017) and Patrick (2017).

Figure I.6 Rail share of TEUs handled

Sources: DP World (2017), Flinders Adelaide Container Terminal (2017), Hutchison Ports Australia (2017), Patrick (2017), Flinders Ports (2017), Port of Brisbane Pty Ltd (2017), Port of Melbourne Operations Pty Ltd (2017) and Fremantle Ports (2017).

Table I.1 Container terminal throughput: Brisbane

	2014				2015				2016							
	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	
Wharfside																
UCC ships handled, as reported by stevedores	258	250	508	239	247	486	263	257	520	233	231	464	252	256	508	
Total containers handled ('000)	191.0	203.3	394.2	172.9	191.0	363.9	197.7	208.1	405.8	177.8	185.2	363.0	200.9	220.4	421.4	
Total TEUs handled ('000)	285.3	305.2	590.5	258.4	279.0	537.4	295.2	308.7	603.9	265.8	274.4	540.1	301.6	326.7	628.4	
40-foot containers as per cent of all containers handled (%)	49.4	50.1	49.8	49.4	46.1	47.7	49.3	48.4	48.8	49.4	48.2	48.8	50.1	48.2	49.1	
Landside																
Number of trucks used in VBS/TAS operations ('000)	87.7	85.7	173.4	74.4	80.6	155.0	76.1	75.0	151.2	67.3	72.8	140.1	80.1	82.6	162.7	
Total containers transported by VBS/TAS trucks and rail ('000)	157.8	153.2	311.1	128.7	142.4	271.2	136.1	133.8	269.9	118.1	130.6	248.6	139.9	143.6	283.5	
Containers by VBS/TAS trucks ('000)	145.5	143.7	289.3	121.6	132.4	254.0	125.9	124.2	250.1	111.0	121.4	232.4	131.6	135.5	267.1	
Containers by rail ('000)	12.3	9.5	21.8	7.2	10.0	17.2	10.2	9.6	19.8	7.1	9.2	16.3	8.4	8.1	16.4	
Balance of containers handled landside ('000)	33.2	50.0	83.2	44.2	48.6	92.7	61.6	74.3	135.9	59.8	54.6	114.4	61.0	76.8	137.8	
Total TEUs transported by VBS/TAS trucks and rail ('000)	231.5	222.1	453.5	188.9	204.4	393.3	195.6	191.3	386.9	171.0	188.6	359.6	203.6	204.3	407.9	
TEUs by VBS/TAS trucks ('000)	215.9	211.4	427.3	181.1	193.5	374.6	184.4	180.7	365.0	163.0	178.2	341.3	194.3	195.1	389.4	
TEUs by rail ('000)	15.6	10.7	26.2	7.8	10.9	18.7	11.2	10.6	21.9	8.0	10.3	18.4	9.3	9.2	18.5	
Balance of TEUs handled landside ('000)	53.8	83.1	136.9	69.5	74.6	144.1	99.6	117.4	217.0	94.7	85.8	180.5	98.0	122.4	220.4	
Whole of container terminal																
Total number of container ship visits	252	234	486	236	236	472	246	241	487	227	226	453	245	236	481	
Total containers (lifts) exchanged ('000)	190.6	196.8	387.3	170.7	186.0	356.7	191.1	201.6	392.7	174.6	182.8	357.4	199.5	214.4	413.9	
Whole of port																
Total cargo throughput (million tonnes)	33.6				8.8				16.7				7.5			
Non-containerised general cargo throughput (million tonnes)	0.4				0.2				0.4				0.2			
Total TEUs exchanged ('000)	595.2	262.9	280.6	543.5	294.7	309.2	603.9	267.0	276.3	543.3	306.3	325.6	632.0			
Full import ('000)	264.9	118.3	118.9	237.2	131.7	135.5	267.1	119.9	122.5	242.5	138.7	146.9	285.6			
Empty import ('000)	35.0	13.2	23.5	36.8	20.1	19.7	39.8	13.2	17.7	31.0	19.9	19.8	39.7			
Full export ('000)	167.3	64.7	87.4	152.0	81.5	87.6	169.1	64.4	83.3	147.7	92.5	86.8	179.4			
Empty export ('000)	128.1	66.7	50.8	117.5	61.4	66.4	127.8	69.5	52.7	122.2	55.2	72.1	127.3			

Note:

Blank cells mean no data was reported in that period. Prior to March 2015, Whole of Port statistics were reported at six-monthly intervals only.

Balance of TEUs handled may include some or all: empty container operations, bulk runs and containers handled at the port by importers/exporters. The balance is computed against the total containers handled wharfside; landside-only operations are additional to the totals.

Sources: DP World (2017), Hutchison Ports Australia (2017), Patrick (2017) and Port of Brisbane Pty Ltd (2017).

Table I.2 Container terminal throughput: Sydney

	2014			2015			2016		
	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec
Wharfside									
UCC ships handled, as reported by stevedores	290	284	574	272	281	553	286	281	567
Total containers handled ('000)	387.6	393.5	781.2	354.9	367.0	721.8	389.4	399.3	788.7
Total TEUs handled ('000)	592.4	606.8	1 992	547.7	563.5	1 111.3	599.8	618.4	1 218.3
40-foot containers as per cent of all containers handled (%)	52.8	54.2	53.5	54.4	53.6	54.0	54.9	54.5	54.6
Landside									
Number of trucks used in VBS/TAS operations ('000)	157.9	161.0	318.9	139.9	153.8	293.7	158.3	158.4	316.7
Total containers transported by VBS/TAS trucks and rail ('000)	249.3	271.1	520.4	244.7	279.3	524.0	275.3	287.1	562.3
Containers by VBS/TAS trucks ('000)	217.0	218.2	435.2	189.0	214.7	403.7	225.0	225.7	450.7
Containers by rail ('000)	32.3	52.9	85.2	55.7	64.7	120.3	50.3	61.4	111.6
Balance of containers handled landside ('000)	138.3	122.5	260.8	110.2	87.7	197.8	114.1	112.2	226.3
Total TEUs transported by VBS/TAS trucks and rail ('000)	378.7	410.0	788.7	369.2	391.8	760.9	398.4	411.4	809.7
TEUs by VBS/TAS trucks ('000)	330.6	332.8	663.4	288.8	315.5	604.3	323.8	322.3	646.1
TEUs by rail ('000)	48.1	77.2	125.3	80.3	76.3	156.6	74.6	89.0	163.7
Balance of TEUs handled landside ('000)	2 13.7	196.8	410.5	178.6	171.8	350.4	201.4	207.1	408.5
Whole of container terminal									
Total number of container ship visits	288	275	563	260	267	527	277	271	548
Total containers (lifts) exchanged ('000)	361.5	362.9	724.4	350.1	362.7	712.7	385.3	392.3	777.6
Whole of Port									
Total cargo throughput (million tonnes)	10.3	4.4	5.8	10.3	5.7	6.4	12.1	5.9	6.1
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
Total TEUs exchanged ('000)	1 185.9	542.4	561.3	1 03.7	592.1	614.2	1 206.3	559.1	1 117.5
Full import ('000)	597.8	265.3	282.0	547.4	299.2	307.5	606.7	275.6	280.2
Empty import ('000)	6.3	3.1	2.3	5.5	2.1	3.9	6.0	1.7	2.7
Full export ('000)	233.8	112.1	122.8	234.9	112.3	121.2	233.6	110.8	115.4
Empty export ('000)	348.0	161.8	154.2	316.0	178.4	181.5	359.9	171.1	160.0

Note:

Blank cells mean no data was reported in that period. Prior to March 2015, Whole of Port statistics were reported at six-monthly intervals only.

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

Balance of TEUs handled may include some or all of: empty container operations, bulk runs and containers handled at the port by importers/exporters. The balance is computed against the total containers handled wharfside; landside-only operations are additional to the totals.

Sources: DP World (2017), Hutchison Ports Australia (2017), Patrick (2017) and NSW Ports (2017).

Table I.3 Container terminal throughput: Melbourne

	2014				2015				2016					
	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Sep Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Jul-Dec
Wharfside														
UCC ships handled, as reported by stevedores	271	264	535	257	274	531	279	275	554	278	268	546	276	553
Total containers handled ('000)	388.6	395.5	784.2	363.6	376.8	740.4	399.1	400.9	800.0	380.7	374.7	755.4	397.4	805.8
Total TEUs handled ('000)	581.9	595.7	1 177.7	543.1	563.1	1 062.2	602.6	604.8	207.4	574.0	564.6	1 38.6	603.8	623.2
40-foot containers as per cent of all containers handled (%)	49.7	50.6	50.2	49.4	49.4	49.4	51.0	50.9	50.9	50.8	50.7	50.7	51.9	52.3
Landside														
Number of trucks used in VBS/TAS operations ('000)	186.9	180.6	367.6	167.6	161.3	328.9	158.9	154.0	312.9	150.4	149.6	300.0	152.3	153.1
Total containers transported by VBS/TAS trucks and rail ('000)	371.3	349.8	721.0	332.1	319.1	651.1	319.5	302.7	622.2	296.9	292.2	589.1	289.4	301.5
Containers by VBS/TAS trucks ('000)	317.3	311.0	628.3	289.5	279.2	568.7	282.0	270.5	552.5	262.1	260.8	522.9	265.4	270.0
Containers by rail ('000)	54.0	38.8	92.8	42.5	39.9	82.4	37.5	32.2	69.7	34.8	31.4	66.2	24.0	31.5
Balance of containers handled landside ('000)	71.4	84.5	155.9	74.0	97.7	171.7	117.1	130.4	247.5	118.6	113.9	322.5	132.1	138.4
Total TEUs transported by VBS/TAS trucks and rail ('000)	550.9	517.5	1 068.4	492.4	469.6	962.0	473.8	452.4	926.2	444.5	435.5	880.0	434.2	453.3
TEUs by VBS/TAS trucks ('000)	470.1	459.2	929.2	428.8	410.0	838.8	417.2	403.8	821.0	392.1	388.2	780.2	397.8	405.2
TEUs by rail ('000)	80.9	58.4	139.2	63.5	59.7	123.2	56.6	48.6	105.2	52.4	47.4	99.8	36.5	48.1
Balance of TEUs handled landside ('000)	111.9	136.6	248.4	114.3	153.1	267.4	185.4	201.1	386.4	182.0	176.4	358.4	206.1	218.0
Whole of container terminal														
Total number of container ship visits	266	259	525	249	267	516	271	267	538	268	264	532	276	270
Total containers (lifts) exchanged ('000)	384.4	389.2	773.6	359.0	373.3	732.3	393.8	393.2	786.9	375.2	368.8	744.0	397.9	546
Whole of port														
Total cargo throughput (million tonnes)	17.2	8.4	9.0	17.5	8.7	8.8	17.5	8.5	8.7	17.2	8.6	8.8	8.8	17.4
Non-containernised general cargo throughput (million tonnes)	1.1	0.5	0.6	1.1	0.6	1.1	0.6	1.1	0.6	1.1	0.6	1.1	0.4	0.8
Total TEUs exchanged ('000)	1 323.8	616.6	638.5	1 255.1	673.9	681.1	1 355.0	646.1	637.4	1 283.6	673.4	673.4	694.7	1 368.2
Full import ('000)	608.8	278.9	284.0	562.9	315.2	313.3	628.5	292.7	291.1	583.8	319.0	323.2	642.2	
Empty import ('000)	57.6	29.5	36.1	65.7	25.2	28.9	54.1	30.6	32.0	62.6	23.7	24.8	48.5	
Full export ('000)	429.3	204.8	218.1	422.8	206.4	213.8	420.1	209.8	216.9	426.7	216.5	215.6	432.1	
Empty export ('000)	228.0	103.4	100.3	203.7	127.1	125.1	252.2	113.0	97.5	210.5	114.3	131.2	245.4	

Note:

Blank cells mean no data was reported in that period. Prior to March 2015, Whole of Port statistics were reported at six-monthly intervals only.

Balance of TEUs handled may include some or all of empty container operations, bulk runs and containers handled at the port by importers/exporters. The balance is computed against the total containers handled wharfside; landside-only operations are additional to the totals.

The counts of containers by rail include those handled by Qube Logistics.
Sources: DP World (2017), Patrick (2017) and Port of Melbourne Operations Pty Ltd (2017).

Table I.4 Container terminal throughput: Adelaide

	2014			2015			2016		
	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec
Wharfside									
UCC ships handled, as reported by stevedores	84	81	165	78	93	171	97	194	95
Total containers handled ('000)	65.1	67.7	132.9	63.0	64.3	127.4	65.0	139.7	64.9
Total TEUs handled ('000)	91.5	95.3	186.8	89.1	92.1	181.3	93.2	105.4	95.5
40-foot containers as per cent of all containers handled (%)	40.5	40.7	40.6	41.4	43.2	42.3	43.4	41.0	42.1
Landside									
Number of trucks used in VBS/TAS operations ('000)	30.4	31.0	61.5	31.0	30.3	61.3	31.9	33.3	65.2
Total containers transported by VBS/TAS trucks and rail ('000)	64.5	64.4	128.8	64.6	62.6	127.2	64.7	71.3	135.9
Containers by VBS/TAS trucks ('000)	53.3	52.9	106.3	53.2	51.9	105.0	54.5	58.8	113.3
Containers by rail ('000)	11.1	11.4	22.6	11.4	10.7	22.1	10.2	12.5	22.7
Balance of containers handled landside ('000)	11.8	14.8	26.6	9.9	12.5	22.3	10.5	15.9	26.4
Total TEUs transported by VBS/TAS trucks and rail ('000)	91.0	91.5	182.5	91.0	89.9	180.9	93.4	101.2	194.6
TEUs by VBS/TAS trucks ('000)	75.7	75.5	151.2	75.0	74.9	149.9	78.5	83.5	162.0
TEUs by rail ('000)	15.3	15.9	31.3	16.0	15.0	31.0	14.9	17.7	32.6
Balance of TEUs handled landside ('000)	15.8	19.7	35.6	14.1	17.2	31.3	14.7	21.8	36.5
Whole of container terminal									
Total number of container ship visits	85	81	166	77	92	169	98	97	195
Total containers (lifts) exchanged ('000)	65.5	67.5	133.0	61.8	63.9	125.6	65.2	74.4	139.6
Whole of Port									
Total cargo throughput (million tonnes)	7.0	3.9	3.7	7.6	3.5	3.6	7.1	3.6	3.2
Non-containernised general cargo throughput (million tonnes)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Total TEUs exchanged ('000)	187.0	87.3	91.6	178.9	93.4	104.9	198.4	94.3	97.1
Full import ('000)	70.6	33.6	33.1	66.7	35.4	39.2	74.6	35.8	33.3
Empty import ('000)	22.6	10.8	13.4	24.2	10.4	14.0	24.4	9.7	15.5
Full export ('000)	77.6	36.9	39.0	75.9	38.0	41.2	79.1	36.8	41.0
Empty export ('000)	16.2	6.0	6.1	12.1	9.7	10.6	20.2	11.9	7.4

Note:

Blank cells mean no data was reported in that period. Prior to March 2015, Whole of Port statistics were reported at six-monthly intervals only.

Balance of TEUs handled may include some or all of: empty container operations, bulk runs and containers handled at the port by importers/exporters. The balance is computed against the total containers handled wharfside; landside-only operations are additional to the totals.

Some cells may not sum to totals due to rounding.

Sources: Flinders Adelaide Container Terminal (2017) and Flinders Ports (2017).

Table I.6 Container terminal throughput: Five ports

	2014			2015			2016		
	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec
Wharfside									
UCC ships handled, as reported by stevedores	1 035	1 006	2 041	971	1 023	1 994	1 055	1 039	2 094
Total containers handled ('000)	1 62.2	1 92.9	2 355.1	1 069.6	1 120	2 181.6	1 695	2 100	2 379.5
Total TEUs handled ('000)	1 741.6	1 801.2	3 542.8	608.9	666.4	3 275.3	768.4	828.6	3 597.0
40-foot containers as per cent of all containers handled (%)	49.9	51.0	50.4	50.4	49.9	50.1	51.2	51.1	51.7
Landside									
Number of trucks used in VBS/TAS operations ('000)	515.1	512.2	1 027.3	459.6	470.1	929.7	469.6	467.3	936.9
Total containers transported by VBS/TAS and rail ('000)	946.4	949.7	1 896.0	863.1	889.9	1 753.0	885.4	888.4	1 773.8
Containers by VBS/TAS trucks ('000)	818.7	814.9	1 633.6	729.1	747.8	1 476.9	757.6	752.6	1 510.2
Containers by rail ('000)	127.6	134.8	262.5	134.0	142.1	276.1	127.8	135.8	263.6
Balance of containers handled landside ('000)	281.0	293.4	574.4	260.5	272.7	533.2	331.7	366.3	698.0
Total TEUs transported by VBS/TAS trucks and rail ('000)	1 395.0	1 397.6	2 792.6	1 274.9	1 280.5	2 555.3	1 289.8	1 291.2	2 581.0
TEUs by VBS/TAS trucks ('000)	1 212.8	1 206.6	2 419.4	1 084.2	1 095.0	2 179.2	1 05.4	1 097.3	2 202.7
TEUs by rail ('000)	182.2	191.0	373.1	190.7	185.5	376.1	184.4	193.9	378.4
Balance of TEUs handled landside ('000)	442.8	477.9	920.7	413.6	460.6	874.1	550.1	603.6	1 153.7
Whole of container terminal									
Total number of container ship visits	1 023	975	1 998	948	990	1 938	1 024	1 006	2 030
Total containers (lifts) exchanged ('000)	1 31.0	1 47.5	2 278.5	1 056.1	1 097.8	2 153.9	1 155.2	1 186.1	2 341.3
Whole of Port									
Total cargo throughput (million tonnes)	85.5	34.7	35.7	70.5	33.6	35.1	68.7	34.8	34.2
Non-containernised general cargo throughput (million tonnes)	2.1	1.0	1.1	2.2	1.1	2.2	1.0	1.0	2.0
Total TEUs exchanged ('000)	3 690.0	1 683.3	1 743.4	3 426.7	1 836.8	1 901.6	3 738.3	1 741.0	1 734.9
Full import ('000)	1 731.9	779.3	801.0	1 580.3	871.5	889.2	1 760.7	807.5	807.4
Empty import ('000)	1 384.6	61.2	80.8	1 420.0	62.9	72.4	1 35.3	60.1	73.8
Full export ('000)	1 026.2	470.8	519.1	989.9	487.2	516.7	1 03.8	472.0	506.9
Empty export ('000)	793.3	372.0	342.5	714.5	415.2	423.2	838.5	401.4	346.9

Note:

Blank cells mean no data was reported in that period. Prior to March 2015, Whole of Port statistics were reported at six-monthly intervals only.

Balance of TEUs handled may include some or all of: empty container operations, bulk runs and containers handled at the port by importers/exporters. The balance is computed against the total containers handled wharfside; landside-only operations are additional to the totals.

DP World (2017), Patrick (2017), Hutchison Ports Australia (2017), Flinders Adelaide Container Terminal (2017), Port of Brisbane Pty Ltd (2017), NSW Ports (2017), Port of Melbourne Operations Pty Ltd (2017), Flinders Ports (2017) and Fremantle Ports (2017).

Table 1.7 Container terminal throughput: container ship visits by port, July–December 2016

	Brisbane	Sydney	Melbourne	Adelaide	Fremantle	Total
<i>Gross Tonnage</i>						
5 000–20 000 GT	65	80	76	0	25	246
20 001–35 000 GT	13	63	39	20	9	144
35 001–40 000 GT	47	59	64	27	32	229
40 001–50 000 GT	186	139	154	49	36	564
50 001 and above GT	170	198	204	119	151	842
All ship sizes	481	545	546	218	253	2 043

Sources: Port of Brisbane Pty Ltd (2017), NSW Ports (2017), Port of Melbourne Operations Pty Ltd (2017), Flinders Ports (2017) and Fremantle Ports (2017).

Table 1.8 Container terminal throughput: container ship visits by port, January–June 2016

	Brisbane	Sydney	Melbourne	Adelaide	Fremantle	Total
<i>Gross Tonnage</i>						
5 000–20 000 GT	56	70	71	0	25	222
20 001–35 000 GT	11	65	44	24	11	155
35 001–40 000 GT	40	58	68	33	35	234
40 001–50 000 GT	187	138	150	45	38	558
50 001 and above GT	157	179	196	89	146	767
All ship sizes	451	507	528	191	255	1 932

Sources: Port of Brisbane Pty Ltd (2017), NSW Ports (2017), Port of Melbourne Operations Pty Ltd (2017), Flinders Ports (2017) and Fremantle Ports (2017).

CHAPTER 2

Measures of container terminal productivity

Overview

Chapter 2 of Waterline presents container terminal productivity measures. The indicators are in three groups—wharfside, landside and whole-of-container-terminal.

Seven quarterly wharfside 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 five quarterly landside productivity indicators are reported for trucks involved in VBS/TAS operations. Bulk run trucks are not included in calculating these indicators:

- 2.8 Containers per truck
- 2.9 TEUs per truck
- 2.10 Per cent of trucks backloaded
- 2.11 Average truck turnaround time
- 2.12 Average container turnaround time.

Twelve indicators are reported for whole-of-container-terminal productivity.

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

The indicators are presented for Brisbane, Sydney, Melbourne, Adelaide, and Fremantle, as well as aggregates of the five ports, where applicable.

Wharfside productivity measures

Measures of productivity on the wharfside 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.

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 terminal divided by the length (in metres) of berths. At a container terminal it measures the intensity of use of the terminal container handling facility. The six month figure is a weighted average of the corresponding quarterly throughput.

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:

- 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).

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
- Industrial stoppages
- 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 formal vehicle booking systems (VBS and TAS). They do not include the performance of bulk run 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 Per cent of trucks backloaded

'Backloaded operations' (also called 'triangular operations') refers to trucks which haul containers on both the inbound and outbound legs of a single trip. Such operations make more effective use of trucks and landside infrastructure. This indicator shows the number of backloaded trucks as a percentage of the total VBS/TAS trucks in Brisbane, Sydney, Melbourne and Fremantle. It was published for the first time in Waterline 57..

Indicator 2.11 Average truck turnaround time

The indicator measures the time elapsed from when the truck enters the gate of a container terminal to the time when the last container is loaded. This measure does not include the time the truck waits outside the gate of a container terminal. 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 2.12 Average container turnaround time

This is as the “average truck turnaround time” (Indicator 2.11) 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 2.13 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 elapses from the time a ship enters a port to the time a ship leaves the port.

Indicator 2.14 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 2.15 Number of ships waiting at anchorage for more than 2 hours

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

Indicator 2.16 Per cent of ships waiting at anchorage for more than 2 hours

This is the number of container ships in Indicator 2.15 as a per cent of the total number of container ships that visited the container terminal in the period.

Indicator 2.17 Average waiting time at anchorage

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

Indicator 2.18 Median waiting time at anchorage

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

Indicator 2.19 Total time ships spent at berth

This is the total hours spent in berth by all dedicated container ships (UCC) that exchanged containers at that port. The time a ship spends at 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 2.20 Average TEUs per ship-hour at berth

This is the total TEUs lifted on/off dedicated container ships (UCC) divided by the total time ship spent at berth (Indicator 2.19). 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 2.21 Average lifts per ship-hour at berth

This indicator is similar to Indicator 2.20 whereas the total crane lifts (containers handled) is used in calculating the indicator rather than the number of TEUs.

Indicator 2.22 Total time ships are available to stevedores

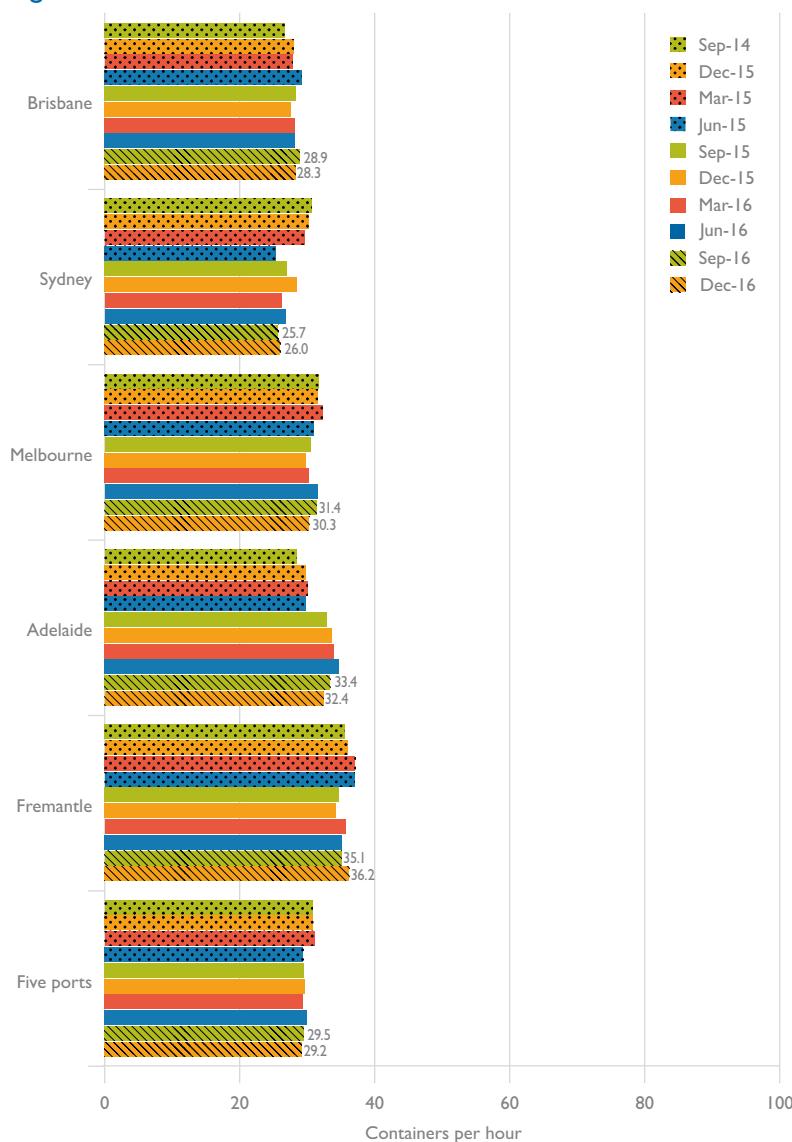
This is the total time (in hours) when ships can be loaded or unloaded.

Indicator 2.23 Average lifts per hour of stevedoring operation

This is the total number of crane lifts (containers handled) divided by the total (gross) time available to stevedores for loading and unloading containers.

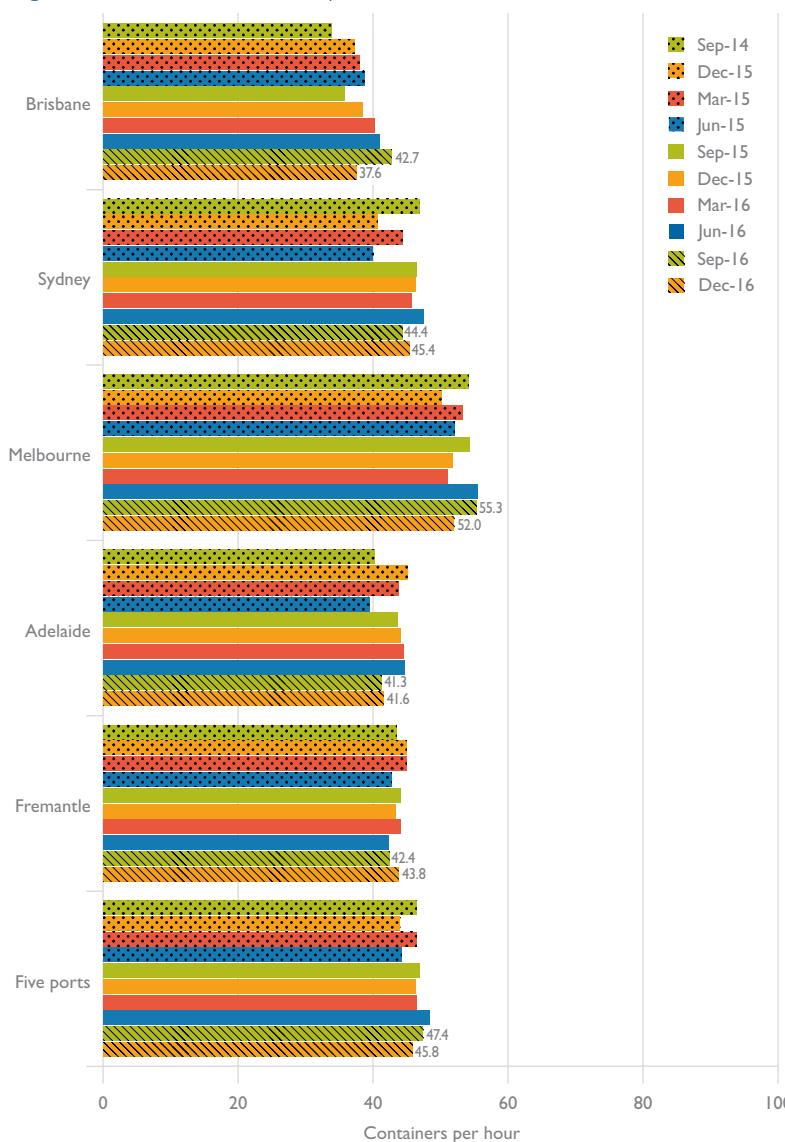
Indicator 2.24 Average lifts per berth visit

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

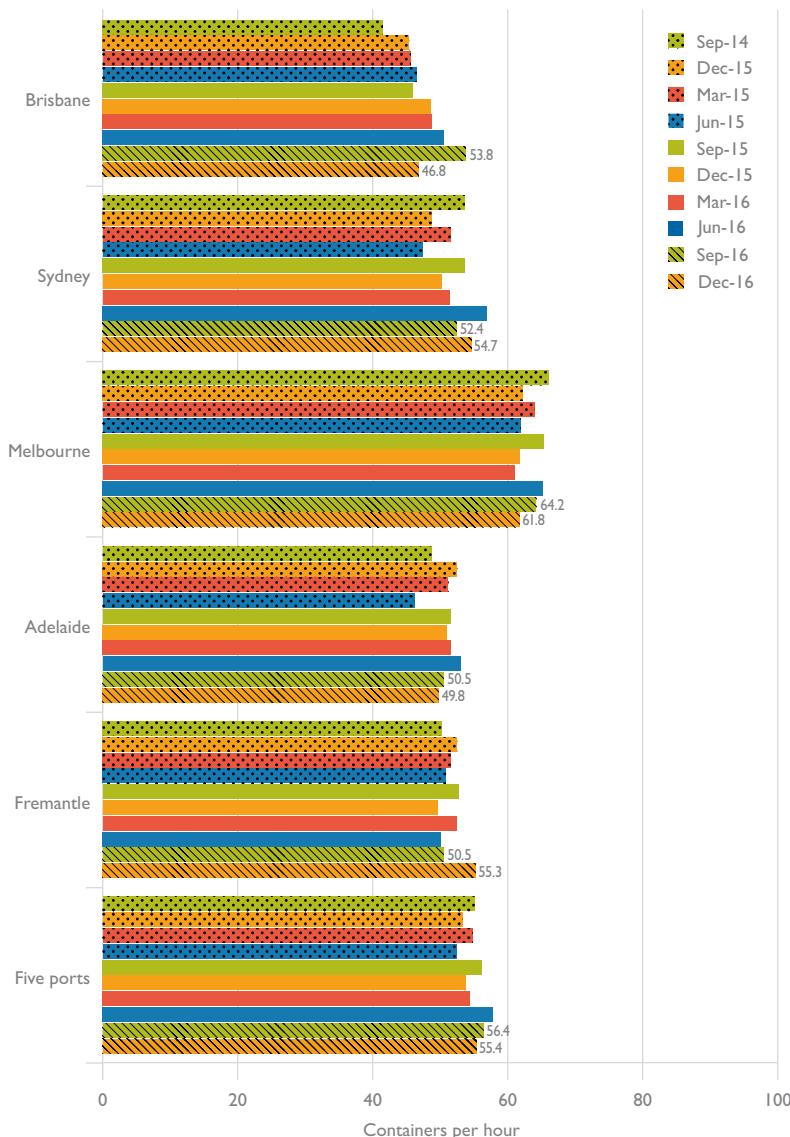
Figure 2.1 Wharf-side crane rate

Sources: DPWorld (2017), Flinders Adelaide Container Terminal (2017), Hutchison Ports Australia (2017) and Patrick (2017).

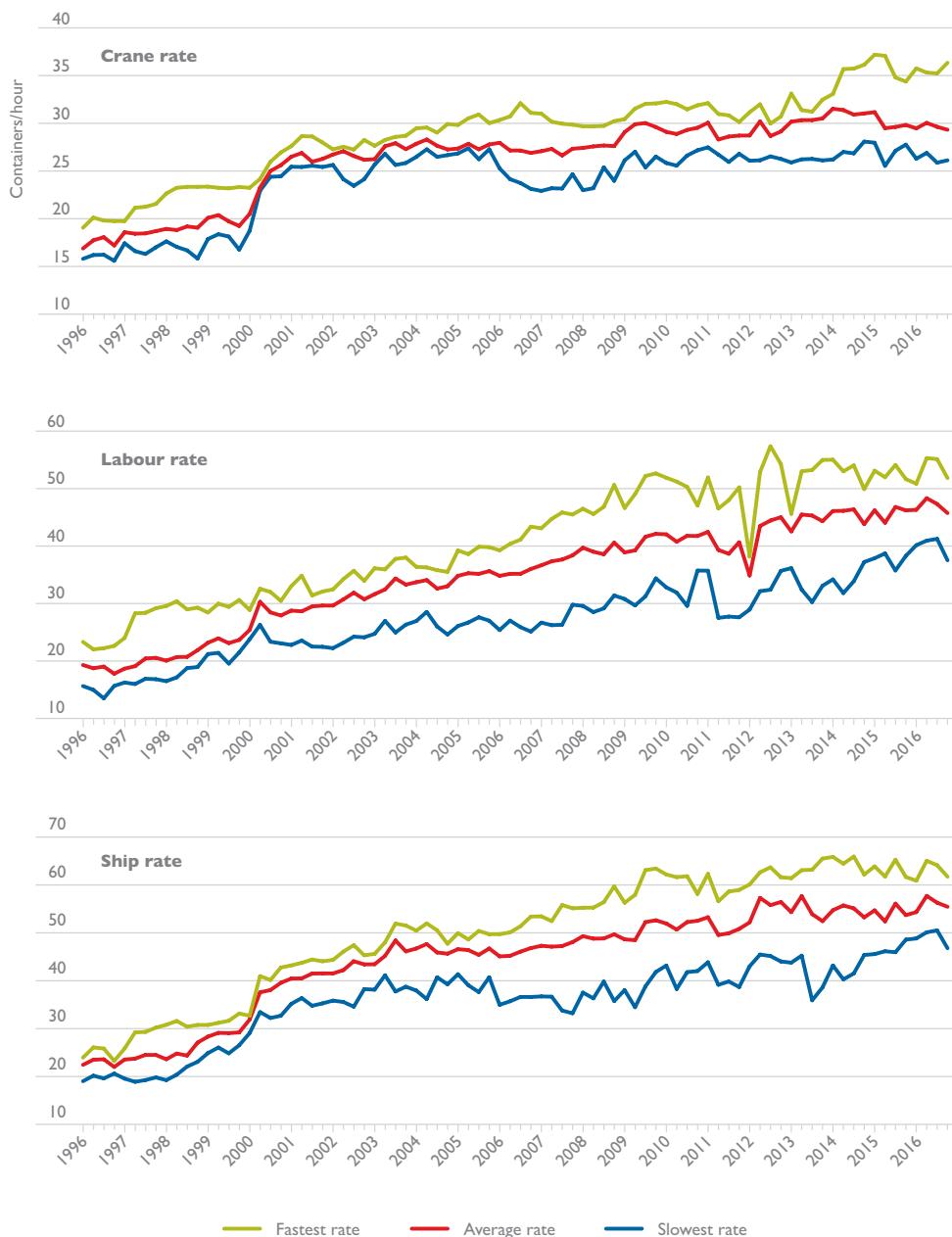
Figure 2.2 Wharf-side elapsed labour rate



Sources: DPWorld (2017), Flinders Adelaide Container Terminal (2017), Hutchison Ports Australia (2017) and Patrick (2017).

Figure 2.3 Wharf-side ship rate

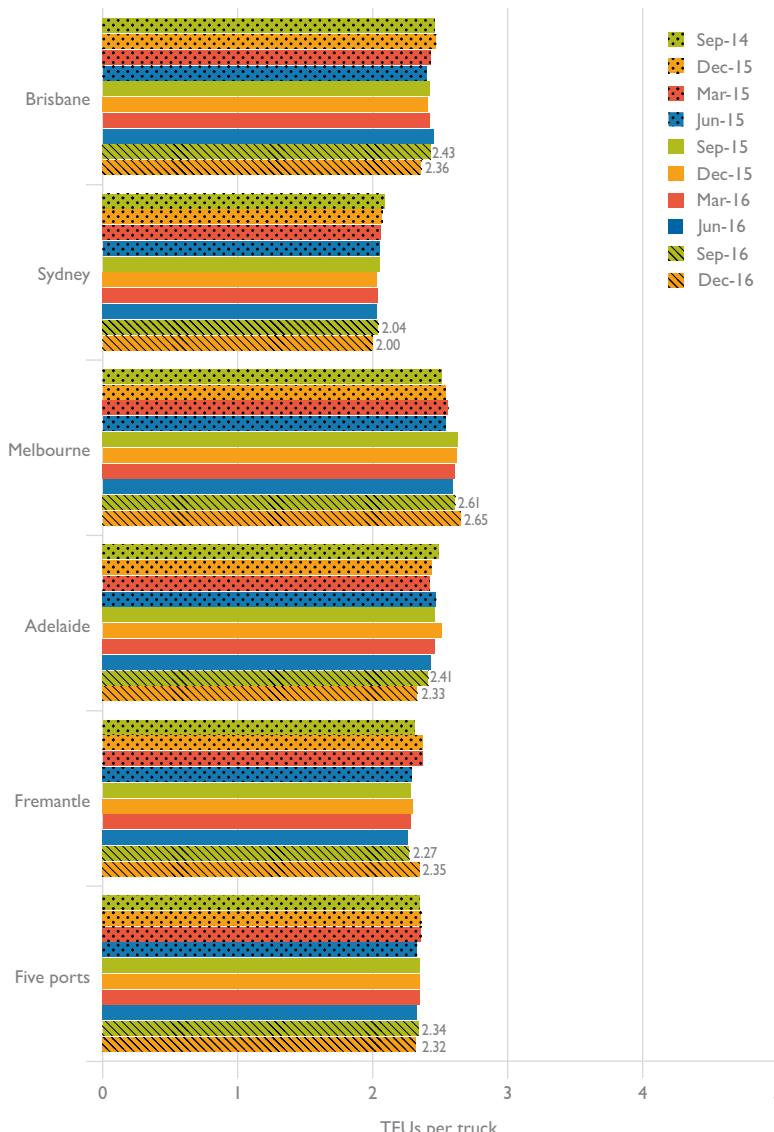
Sources: DPWorld (2017), Flinders Adelaide Container Terminal (2017), Hutchison Ports Australia (2017) and Patrick (2017).

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. The average rate is weighted by the TEU throughput at each port.

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

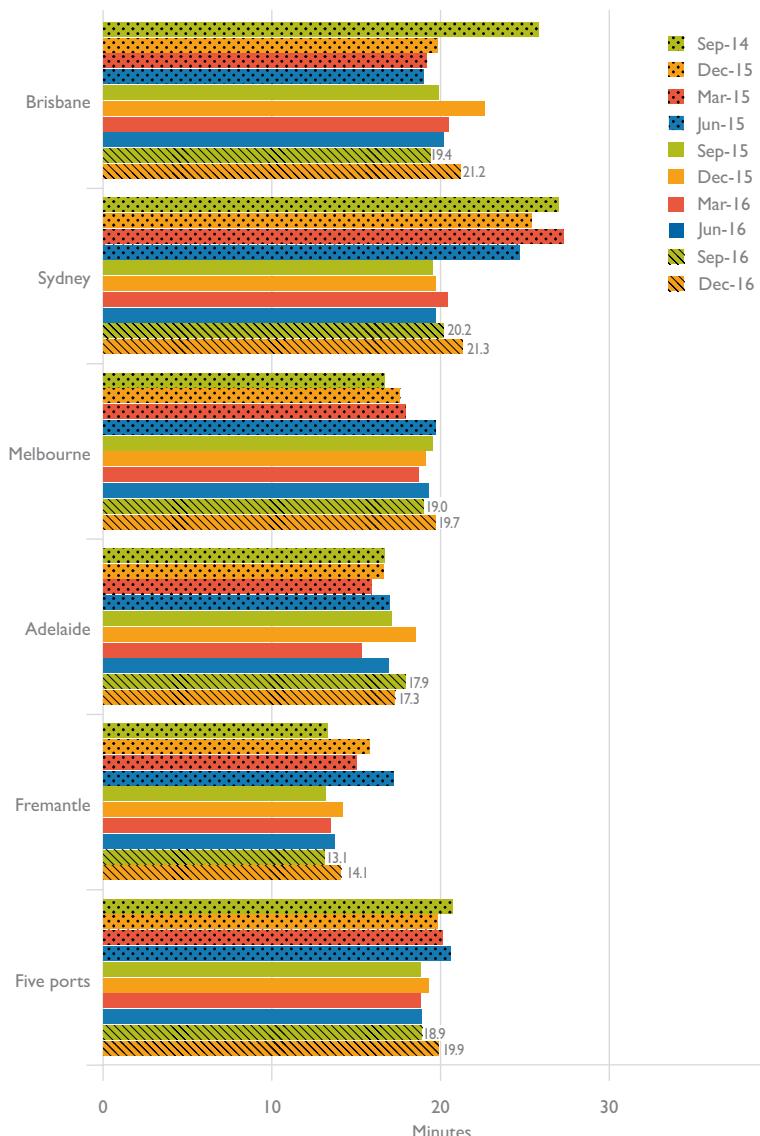
Sources: DP World (2017), Flinders Adelaide Container Terminal (2017), Hutchison Ports Australia (2017) and Patrick (2017).

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.

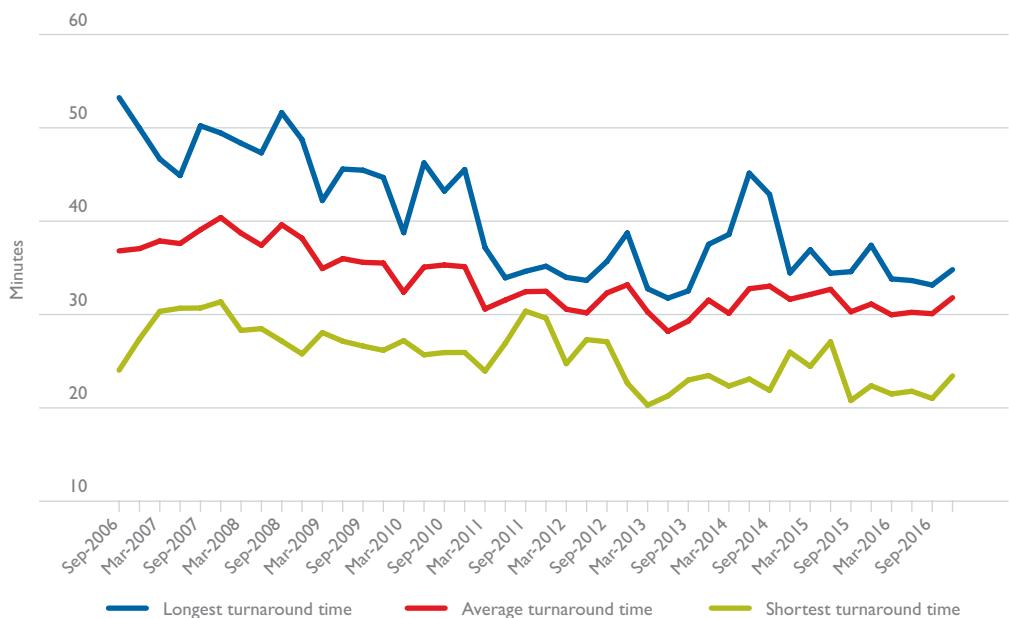
Sources: DPWorld (2017), Flinders Adelaide Container Terminal (2017), Hutchison Ports Australia (2017) and Patrick (2017).

Figure 2.6 Average container turnaround time on landside of container terminals



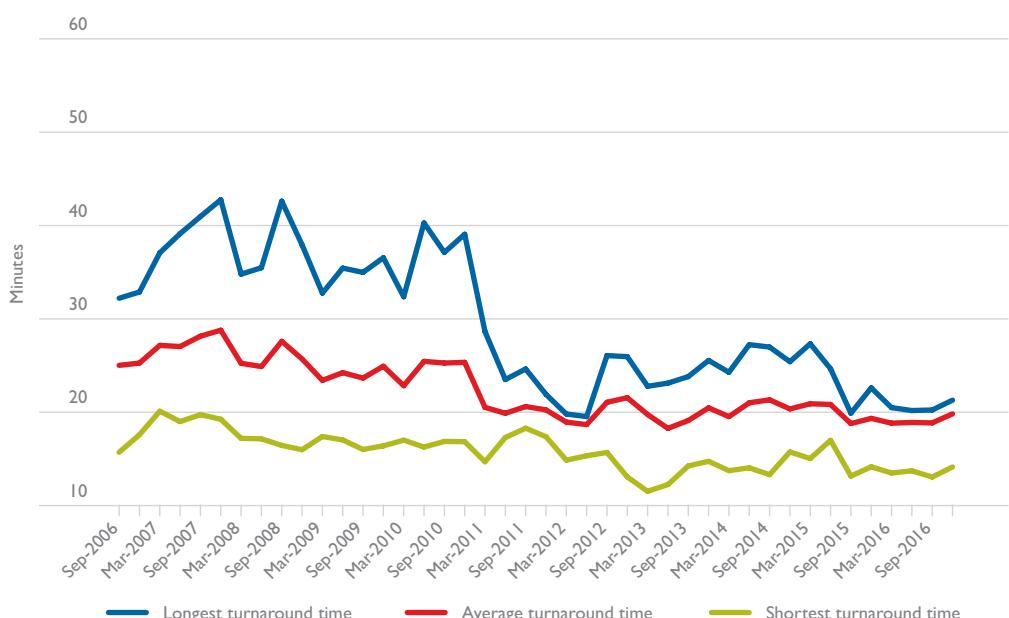
Notes: This indicator is based on only the containers that are processed through the VBS/TAS system.

Sources: DP World (2017), Flinders Adelaide Container Terminal (2017), Hutchison Ports Australia (2017) and Patrick (2017).

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. The average rate is weighted by the TEU throughput at each port.

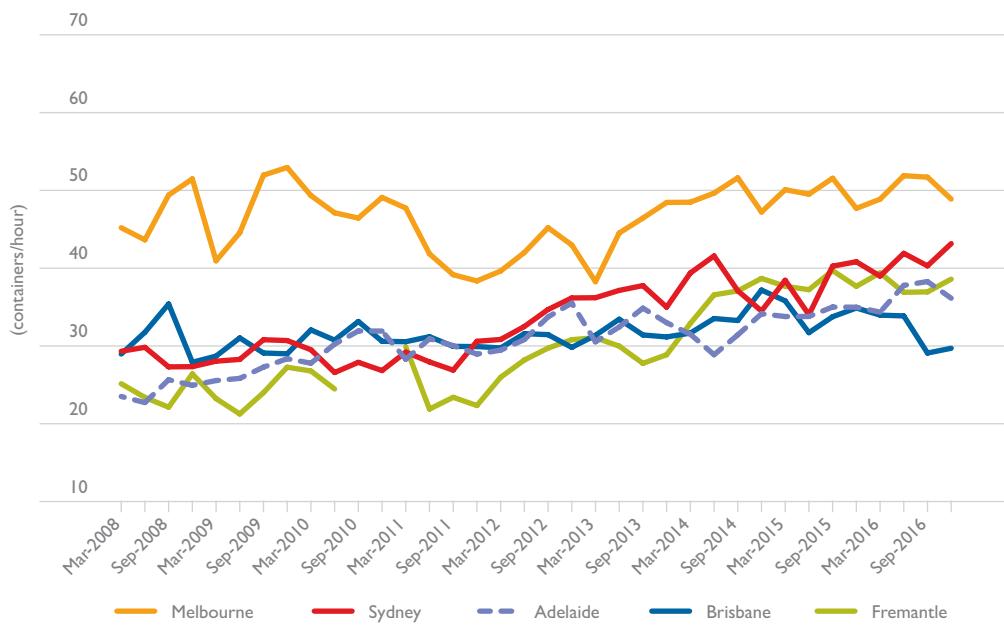
Sources: DPWorld (2017), Flinders Adelaide Container Terminal (2017), Hutchison Ports Australia (2017), Patrick (2017).

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. The average rate is weighted by the TEU throughput at each port.

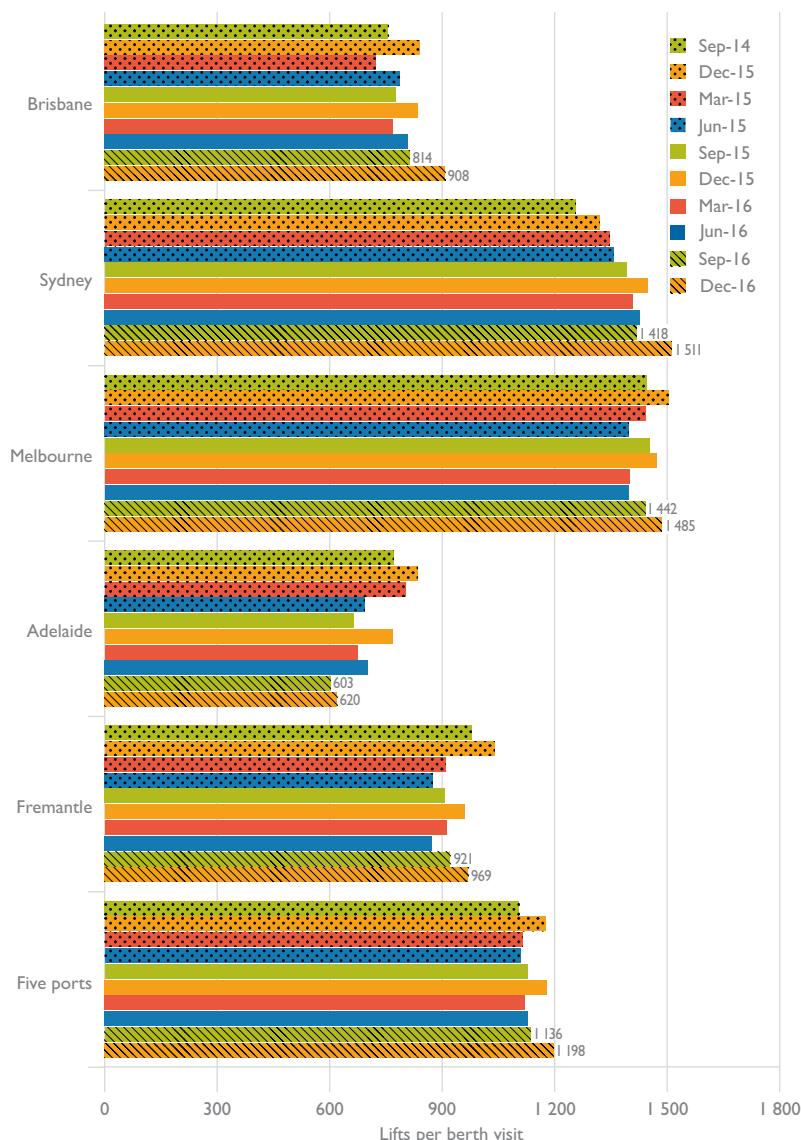
Sources: DP World (2017), Flinders Adelaide Container Terminal (2017), Hutchison Ports Australia (2017) and Patrick (2017).

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 (2017), NSW Ports (2017), Port of Melbourne Operations Pty Ltd (2017), Flinders Ports (2017) and Fremantle Ports (2017).

Figure 2.10 Average number of lifts per berth visit

Sources: BITRE estimates based on data from Port of Brisbane Pty Ltd (2017), NSW Ports (2017), Port of Melbourne Operations Pty Ltd (2017), Flinders Ports (2017) and Fremantle Ports (2017).

Table 2.1 Container terminal productivity: Brisbane

	2014			2015			2016		
	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec
Wharfside									
Containers per hour	26.7	28.0	27.4	27.8	29.2	28.6	28.3	27.6	27.9
Crane rate	33.9	37.3	35.7	38.0	38.8	38.4	35.8	38.4	37.1
Elapsed labour rate	41.5	45.4	43.5	45.6	46.5	46.1	46.0	48.6	47.3
Ship rate									
TEUs per hour									
Crane rate	39.8	42.0	40.9	41.8	42.8	42.3	42.3	41.3	41.8
Elapsed labour rate	50.5	56.2	53.4	57.2	56.9	57.0	53.7	57.3	55.5
Ship rate	61.8	68.3	65.2	68.7	68.4	68.5	69.0	72.6	70.9
Throughput pbm	76.6	81.5	79.1	69.4	76.6	73.0	79.3	83.5	81.4
Landside									
Containers per truck	1.7	1.7	1.7	1.6	1.6	1.6	1.7	1.7	1.7
TEUs per truck	2.5	2.5	2.5	2.4	2.4	2.4	2.4	2.4	2.4
Per cent of trucks backloaded (%)	10.8	10.2	10.5	8.9	9.7	9.3	9.5	10.8	11.3
Truck turnaround time (mins)	42.9	33.2	38.1	31.3	31.2	31.2	32.9	37.4	35.2
Average container turnaround time (mins)	25.8	19.8	22.8	19.1	19.0	19.1	19.9	22.6	21.2
Whole of Container Terminal									
Ship turnaround time									
Median (hours)	30.6	30.7	30.7	28.2	28.9	28.8	27.9	30.1	29.0
95th percentile (hours)	51.8	51.6	51.6	44.5	45.8	45.2	54.5	56.8	56.1
Port congestion									
Number of ships waiting at anchorage for more than 2 hours	4	0	4	11	11	22	15	17	32
Per cent of ships waiting at anchorage for more than 2 hours (%)	1.6	0.0	0.8	4.7	4.7	4.7	6.1	7.1	6.6
Average waiting time at anchorage (hours)	10.8	-	10.8	10.0	20.0	15.0	17.3	14.4	15.7
Median of waiting time at anchorage (hours)	10.8	-	10.8	9.0	18.8	10.1	13.8	8.3	11.1
Total time ships spent at berth ('000 hours)	6.1	5.8	11.8	5.1	5.5	10.6	5.5	5.8	11.2
Average TEUs per ship-hour at berth (TEUs per hour)	46.9	51.3	49.0	50.5	49.4	49.9	52.3	51.9	52.1
Average lifts per ship-hour at berth (lifts per hour)	31.4	34.1	32.7	33.8	33.8	33.8	35.0	35.0	35.0
Total time ships are available to stevedores ('000 hours)	5.9	5.6	11.4	4.7	5.0	9.7	5.8	5.8	11.6
Average lifts per stevedores' hour (lifts per hour)	32.4	35.3	33.8	36.7	37.1	36.9	32.8	35.0	33.9
Average lifts per berth visit (lifts)	756.3	840.9	797.0	723.1	788.2	755.7	777.0	836.5	806.4

Note:

Cells may not sum to totals due to rounding.

Sources: DP World (2017), Hutchison Ports Australia (2017), Patrick (2017) and Port of Brisbane Pty Ltd (2017).

Table 2.2 Container terminal productivity: Sydney

	2014			2015			2016		
	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec
Wharfside									
Containers per hour									
Crane rate	30.7	30.3	30.5	29.6	25.4	27.5	27.0	28.5	27.8
Elapsed labour rate	46.9	40.7	43.8	44.3	40.0	42.1	46.4	46.3	45.7
Ship rate	53.6	48.8	51.2	51.5	47.4	49.4	53.7	50.2	51.9
TEUs per hour									
Crane rate	46.8	46.5	46.6	45.7	39.1	42.4	41.7	44.2	43.0
Elapsed labour rate	71.9	63.0	67.4	68.8	62.1	65.4	71.7	71.8	70.8
Ship rate	82.2	75.4	78.8	79.9	73.4	76.6	82.9	80.3	79.5
Throughput pbm	106.6	108.2	107.4	97.6	100.9	99.2	107.1	109.8	108.4
Landside									
Containers per truck	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
TEUs per truck	2.1	2.1	2.1	2.1	2.1	2.1	2.0	2.0	2.0
Per cent of trucks backloaded (%)	11.4	8.7	10.1	8.1	8.3	8.2	8.5	8.6	8.9
Truck turnaround time (mins)	37.1	34.5	35.8	36.9	34.4	35.6	27.7	28.1	27.9
Average container turnaround time (mins)	27.0	25.4	26.2	27.3	24.7	25.9	19.5	19.7	19.6
Whole of Container Terminal									
Ship turnaround time									
Median (hours)	30.4	34.2	32.6	32.5	34.1	32.9	32.1	33.9	32.5
95th percentile (hours)	60.5	68.8	65.4	60.3	84.5	69.2	60.3	57.4	57.7
Port congestion									
Number of ships waiting at anchorage for more than 2 hours	61	73	134	68	110	178	55	42	97
Per cent of ships waiting at anchorage for more than 2 hours (%)	21.2	26.6	23.8	26.2	41.2	33.8	19.9	15.5	17.7
Average waiting time at anchorage (hours)	10.3	15.1	12.9	24.7	28.0	26.7	15.7	12.5	14.3
Median of waiting time at anchorage (hours)	5.6	7.3	6.4	7.8	11.5	9.8	8.6	6.4	7.4
Total time ships spent at berth ('000 hours)	9.7	10.5	20.3	9.1	10.7	19.8	9.6	9.2	19.2
Average TEUs per ship-hour at berth (TEUs per hour)	56.7	53.2	54.9	59.3	52.2	55.5	62.0	63.2	62.6
Average lifts per ship-hour at berth (lifts per hour)	37.1	34.5	35.7	38.4	34.0	36.1	40.3	40.8	40.5
Total time ships are available to stevedores (000 hours)	8.3	9.7	18.0	8.3	9.9	18.2	8.5	8.7	17.2
Average lifts per stevedores' hour (lifts per hour)	43.7	37.4	40.3	42.1	36.8	39.2	45.2	45.0	45.1
Average lifts per berth visit (lifts)	1 255.2	1 319.8	1 286.7	1 346.4	1 358.3	1 352.4	1 390.8	1 447.6	1 418.9

Note: Some cells may not sum to totals due to rounding.

Sources: DP World (2017), Hutchison Ports Australia (2017), Patrick (2017), NSW Ports (2017) and Port Authority of New South Wales (2017).

Table 2.3 Container terminal productivity: Melbourne

	2014			2015			2016		
	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec
Wharfside									
Containers per hour	31.7	31.6	31.6	32.3	31.0	31.6	30.5	29.8	30.2
Crane rate	54.2	50.1	52.1	53.3	52.1	52.7	54.3	51.8	53.1
Elapsed labour rate	66.1	62.3	64.2	64.0	61.9	62.9	65.4	61.8	63.6
Ship rate									
TEUs per hour	47.2	47.3	47.3	48.0	46.2	47.1	45.9	44.8	45.3
Crane rate	81.4	75.3	78.3	80.1	78.1	79.1	81.9	78.0	80.0
Elapsed labour rate	99.5	94.1	96.8	96.6	93.1	94.8	99.0	93.3	96.1
Ship rate									
Throughput pbm	177.6	180.8	179.2	166.2	172.2	169.2	182.4	183.2	182.8
Landside									
Containers per truck	1.7	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.7
TEUs per truck	2.5	2.5	2.5	2.6	2.5	2.5	2.6	2.6	2.6
Per cent of trucks backloaded (%)	16.4	16.2	16.3	16.7	16.1	16.4	16.5	15.2	15.9
Truck turnaround time (mins)	28.4	30.4	29.4	31.0	34.0	32.5	34.6	33.5	34.1
Average container turnaround time (mins)	16.7	17.6	17.2	17.9	19.7	18.8	19.5	19.1	19.3
Whole of Container Terminal									
Ship turnaround time	34.6	38.6	36.3	35.6	34.3	35.0	35.3	37.5	36.3
Median (hours)	55.1	65.9	62.6	52.6	59.5	55.6	47.9	60.7	56.8
95th percentile (hours)									
Port congestion									
Number of ships waiting at anchorage for more than 2 hours	9	4	13	10	9	19	5	2	7
Per cent of ships waiting at anchorage for more than 2 hours (%)	3.4	1.5	2.5	4.0	3.4	3.7	1.9	0.8	1.3
Average waiting time at anchorage (hours)	33.1	27.2	31.3	20.3	29.8	24.8	19.4	14.8	18.1
Median of waiting time at anchorage (hours)	36.6	27.7	29.1	21.3	24.4	21.5	20.4	14.8	20.0
Total time ships spent at berth ('000 hours)	7.4	8.2	15.7	7.2	7.5	14.7	7.6	8.2	15.9
Average TEUs per ship-hour at berth (TEUs per hour)	77.3	71.1	74.1	74.0	74.4	77.8	71.9	74.8	73.7
Average lifts per ship-hour at berth (lifts per hour)	51.6	47.2	49.3	50.1	49.5	49.8	51.6	47.7	49.6
Total time ships are available to stevedores ('000 hours)	7.2	7.9	15.1	6.9	7.3	14.2	7.4	7.8	15.2
Average lifts per stevedores' hour (lifts per hour)	53.6	49.2	51.3	52.0	51.4	51.7	53.5	50.4	51.9
Average lifts per berth visit (lifts)	1445.0	1502.8	1473.5	1441.8	1398.0	1419.1	1453.1	1472.5	1462.7

Note:

Cells may not sum to totals due to rounding.

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

Sources: DP World (2017), Patrick (2017) and Port of Melbourne Operations Pty Ltd (2017).

Table 2.4 Container terminal productivity: Adelaide

	2014				2015				2016			
	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr
Wharfside												
Containers per hour												
Crane rate	28.4	29.8	29.1	30.1	29.8	30.0	32.9	33.7	33.3	34.0	34.7	34.3
Elapsed labour rate	40.2	45.1	42.7	43.8	41.6	43.7	44.1	43.9	44.5	44.6	41.3	32.4
Ship rate	48.7	52.5	50.6	51.2	46.1	48.6	51.5	51.0	51.2	53.0	50.5	41.6
TEUs per hour												
Crane rate	39.8	41.9	40.9	42.5	42.7	42.6	47.1	47.6	47.4	50.0	50.0	44.9
Elapsed labour rate	56.5	63.4	60.0	61.9	56.5	59.2	62.7	62.2	62.4	65.5	64.2	46.5
Ship rate	68.3	73.9	71.2	72.4	66.1	69.2	73.8	71.9	72.8	75.9	76.3	58.6
Throughput pbm	108.6	112.9	110.7	105.1	107.2	106.1	108.3	124.5	116.4	108.1	112.9	70.9
Landside												
Containers per truck	1.8	1.7	1.7	1.7	1.7	1.7	1.8	1.7	1.7	1.7	1.7	1.7
TEUs per truck	2.5	2.4	2.5	2.4	2.5	2.4	2.5	2.5	2.5	2.5	2.4	2.4
Per cent of trucks backloaded (%)												
Truck turnaround time (mins)	29.3	28.4	28.9	27.2	29.1	28.1	24.7	26.5	25.7	23.9	24.5	24.2
Average container turnaround time (mins)	16.7	16.6	16.7	15.9	17.0	16.4	17.1	18.5	17.8	15.3	16.9	16.1
Whole of Container Terminal												
Ship turnaround time	22.0	22.4	22.1	21.9	21.6	21.8	18.1	20.8	20.0	19.0	19.9	19.6
Median (hours)	36.6	35.2	35.8	39.5	37.6	38.0	32.3	33.4	33.0	29.8	34.8	33.0
95th percentile (hours)												
Port congestion												
Number of ships waiting at anchorage for more than 2 hours	5	6	11	2	4	6	5	4	9	6	5	11
Per cent of ships waiting at anchorage for more than 2 hours (%)	5.9	7.4	6.6	2.6	4.4	3.6	5.1	4.1	4.6	6.3	5.2	5.8
Average waiting time at anchorage (hours)	18.8	12.1	15.1	16.4	29.9	25.4	17.5	21.8	19.4	8.6	10.7	9.6
Median of waiting time at anchorage (hours)	13.3	6.2	8.2	16.4	28.0	22.7	14.8	16.3	14.8	8.2	9.0	9.0
Total time ships spent at berth ('000 hours)	2.0	1.8	3.8	1.7	2.0	3.7	1.9	2.1	4.1	1.9	2.0	3.9
Average TEUs per ship-hour at berth (TEUs per hour)	46.7	52.3	49.4	50.6	45.4	47.8	48.4	49.2	48.8	50.0	48.7	49.4
Average lifts per ship-hour at berth (lifts per hour)	33.3	37.2	35.2	35.8	31.7	33.6	33.8	34.9	34.3	34.0	33.9	33.9
Total time ships are available to stevedores ('000 hours)	1.6	1.5	3.1	1.4	1.6	3.1	1.5	1.7	3.2	1.5	1.5	1.6
Average lifts per stevedores' hour (lifts per hour)	40.4	45.0	42.6	42.9	39.2	40.9	43.8	43.9	43.9	44.4	44.2	40.8
Average lifts per berth visit (lifts)	770.2	833.8	801.2	802.0	694.0	743.3	665.0	766.8	715.7	673.7	701.9	697.8

Note: Cells may not sum to totals due to rounding.

Blank cells mean no data was reported for the categories. Backloaded trucks were reported for the first time in Waterline 57.

Sources: Flinders Adelaide Container Terminal (2017) and Flinders Ports (2017).

Table 2.5 Container terminal productivity: Fremantle

	2014			2015			2016		
	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec
Wharfside									
Containers per hour									
Crane rate	35.6	36.0	35.8	37.1	37.0	37.0	34.7	34.3	34.5
Elapsed labour rate	43.5	44.9	44.2	42.8	43.9	44.1	43.3	43.7	42.3
Ship rate	50.3	52.5	51.4	51.6	50.9	51.3	52.7	49.6	51.1
TEUs per hour									
Crane rate	52.1	53.5	52.8	54.5	54.9	54.7	51.6	51.1	51.4
Elapsed labour rate	63.3	66.5	64.9	65.7	63.4	64.6	66.0	64.9	65.5
Ship rate	73.6	78.0	75.9	75.9	75.8	75.9	79.2	74.6	76.8
Throughput pbm	101.2	103.5	102.4	89.8	87.9	88.9	92.2	99.0	95.6
Landside									
Containers per truck	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6
TEUs per truck	2.3	2.4	2.3	2.4	2.3	2.3	2.3	2.3	2.3
Per cent of trucks backloaded (%)	10.5	12.0	11.3	12.7	11.4	12.1	11.0	11.1	11.1
Truck turnaround time (mins)	21.9	26.0	24.0	24.4	27.1	25.7	20.8	22.4	21.6
Average container turnaround time (mins)	13.3	15.7	14.6	15.0	17.2	16.1	13.2	14.2	13.7
Whole of Container Terminal									
Ship turnaround time									
Median (hours)	28.1	28.5	28.4	25.2	25.1	25.2	23.9	27.5	25.1
95th percentile (hours)	49.9	54.4	54.4	49.0	43.9	46.8	44.7	61.6	50.9
Port congestion									
Number of ships waiting at anchorage for more than 2 hours	2	4	6	2	4	6	6	5	11
Per cent of ships waiting at anchorage for more than 2 hours (%)	1.5	3.2	2.3	1.6	3.1	2.4	4.6	3.9	4.2
Average waiting time at anchorage (hours)	14.9	22.3	19.8	16.4	9.8	12.0	13.7	28.1	20.2
Median of waiting time at anchorage (hours)	14.9	22.3	15.4	16.4	5.9	7.7	11.7	23.8	11.7
Total time ships spent at berth ('000 hours)	3.5	3.4	6.9	3.0	3.0	6.1	3.0	3.3	6.3
Average TEUs per ship-hour at berth (TEUs per hour)	54.4	57.7	56.0	55.8	55.7	55.7	59.6	56.7	58.1
Average lifts per ship-hour at berth (lifts per hour)	37.1	38.7	37.9	37.7	37.2	37.5	39.7	37.7	38.6
Total time ships are available to stevedores ('000 hours)	3.1	3.1	6.2	2.7	2.7	5.4	2.7	3.0	5.7
Average lifts per stevedores' hour (lifts per hour)	41.8	42.8	42.3	42.5	41.4	42.0	44.4	42.0	43.2
Average lifts per berth visit (lifts)	978.0	1 040.0	1 008.2	909.8	874.8	892.2	907.6	959.0	933.1

Note: Cells may not sum to totals due to rounding.

Sources: DP World (2017), Patrick (2017) and Fremantle Ports (2017).

Table 2.6 Container terminal productivity: Five ports

	2014				2015				2016						
	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec	Mar Qtr	Jun Qtr	Jan-Jun	Sep Qtr	Dec Qtr	Jul-Dec
Wharfside															
Containers per hour															
Crane rate	30.8	30.9	30.9	31.1	29.4	30.2	29.5	29.7	29.6	30.0	29.7	29.5	29.2	29.4	29.2
Elapsed labour rate	46.5	44.0	45.2	46.4	44.2	45.3	46.9	46.3	46.6	46.4	48.4	47.4	47.4	45.8	46.6
Ship rate	55.1	53.3	54.2	54.8	52.4	53.6	56.1	53.8	54.9	54.4	57.8	56.1	56.4	55.4	55.9
TEUs per hour															
Crane rate	46.0	46.5	46.3	46.6	43.9	45.3	44.5	44.8	44.7	44.3	45.0	44.6	44.8	44.1	44.4
Elapsed labour rate	69.8	66.3	68.0	70.0	66.5	68.2	71.1	70.2	70.6	70.4	73.2	71.8	72.4	69.7	71.0
Ship rate	83.0	80.6	81.8	82.9	79.1	80.9	85.2	81.4	83.3	82.6	87.3	84.9	85.9	84.3	85.1
Throughput pbm	113.9	116.9	115.4	104.9	109.0	106.9	114.6	118.6	116.6	108.3	108.1	108.2	115.3	121.5	118.4
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	2.4	2.3	2.3	2.4	2.3	2.4	2.3	2.3	2.3	2.3	2.3	2.3
Per cent of trucks backloaded (%)	n.a.														
Truck turnaround time (mins)	32.9	31.5	32.2	31.9	32.7	32.3	30.3	31.1	30.7	30.0	30.2	30.1	30.2	31.9	31.0
Average container turnaround time (mins)	20.7	19.8	20.3	20.1	20.6	20.3	18.8	19.3	19.1	18.7	18.9	18.8	18.9	19.8	19.4
Whole of Container Terminal															
Ship turnaround time															
Median (hours)	31.3	33.0	31.9	30.5	30.7	30.6	30.1	31.7	30.9	30.0	29.4	29.7	30.4	32.2	31.2
95th percentile (hours)	55.0	62.9	60.0	53.0	61.3	56.7	51.6	57.7	55.6	55.3	50.2	52.9	52.9	56.3	54.6
Port congestion															
Number of ships waiting at anchorage for more than 2 hours	81	87	168	93	138	231	86	70	156	70	51	121	68	81	149
Per cent of ships waiting at anchorage for more than 2 hours (%)	7.9	8.9	8.4	9.8	13.9	11.9	8.4	7.0	7.7	7.2	5.3	6.2	6.6	8.0	7.3
Average waiting time at anchorage (hours)	13.5	15.8	14.7	22.1	27.0	25.0	16.1	14.6	15.5	24.3	15.3	20.5	76.4	16.9	44.1
Median of waiting time at anchorage (hours)	8.2	8.2	8.2	8.8	13.1	10.6	11.5	8.4	9.9	8.2	10.2	8.5	8.9	10.4	9.5
Total time ships spent at berth ('000 hours)	28.7	29.7	58.4	26.1	28.7	54.8	27.6	29.1	56.7	26.9	25.6	52.5	27.9	29.2	57.0
Average TEUs per ship-hour at berth (TEUs per hour)	59.0	58.3	58.6	60.9	57.3	59.0	63.3	61.7	62.4	61.5	64.2	62.8	63.5	63.2	63.4
Average lifts per ship-hour at berth (lifts per hour)	39.4	38.6	39.0	40.5	38.2	39.3	41.8	40.8	41.3	40.6	42.7	41.6	41.8	41.8	41.8
Total time ships are available to stevedores ('000 hours)	26.0	27.8	53.8	24.0	26.5	50.5	25.9	26.9	52.8	24.3	23.7	48.0	25.9	27.9	53.8
Average lifts per stevedores' hour (lifts per hour)	43.4	41.3	42.3	44.0	41.5	42.7	44.6	44.0	44.3	45.0	46.2	45.6	45.0	43.6	44.3
Average lifts per berth visit (lifts)	1 105.1	1 176.4	1 139.8	1 114.0	1 108.9	1 111.4	1 128.1	1 179.0	1 153.3	1 121.0	1 129.5	1 125.2	1 135.7	1 197.6	1 166.5

Note:

Cells may not sum to totals due to rounding; n.a.: not applicable. Backloaded trucks were reported for the first time in Waterline 57.

Sources:

DP World (2017), Hutchison Ports Australia (2017), Flinders Adelaide Container Terminal (2017), Port of Brisbane Pty Ltd (2017), Maritime Safety Queensland (2017), Port Authority of New South Wales (2017), NSW Ports (2017), Port of Melbourne Operations Pty Ltd (2017), Port of Flinders Ports (2017) and Fremantle Ports (2017).

CHAPTER 3

Vehicle booking system and empty container park operations

Overview

This chapter reports on three main indicator types:

1. The number of truck booking or appointment timeslots available at a container terminal
2. The number of truck booking or appointment timeslots used at a container terminal
3. The volume of container traffic through empty container parks

The data is derived from the vehicle booking systems used by the stevedores. 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, 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, 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. The indicator increases as opportunities for out/return load carrying trips in one job increase. Results for this indicator are presented in Figure 3.4.

Indicator 3.7 Number of containers moved through empty container parks

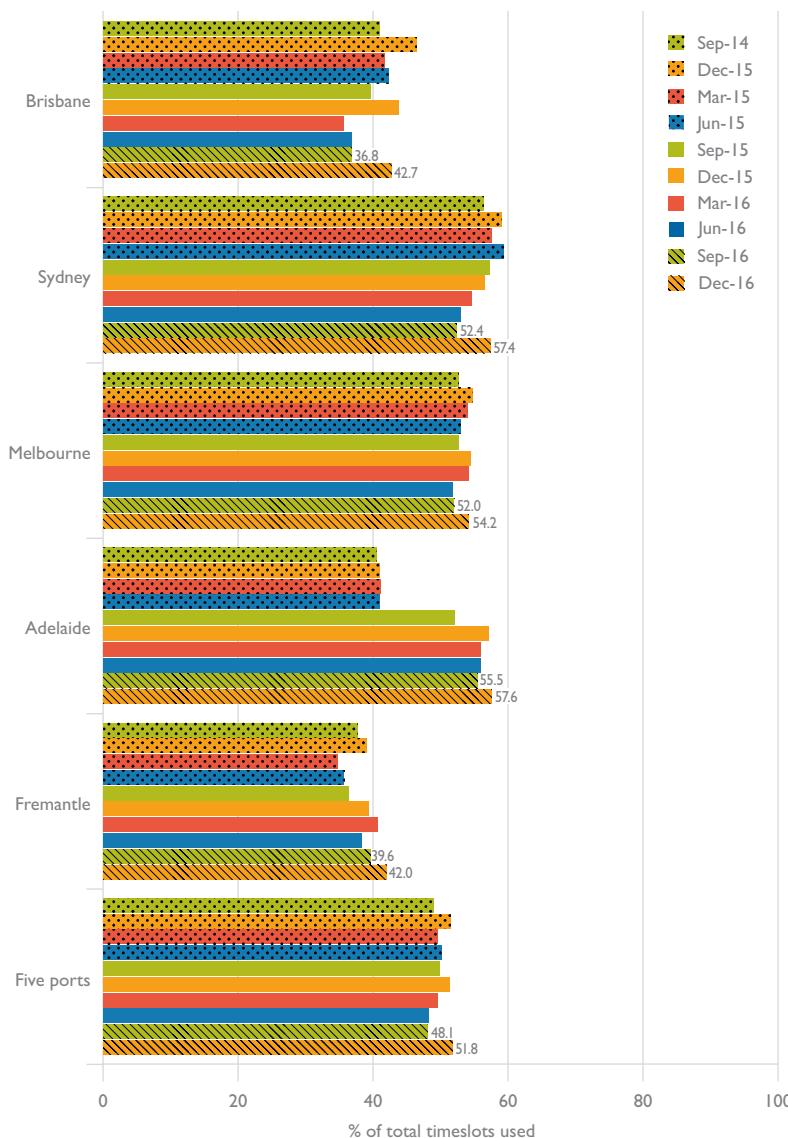
This indicator is a measure of the usage of empty container parks. It shows the number of notifications of container movements to empty container parks in the vicinity of each port.

Indicator 3.8 Number of TEUs moved through empty container parks

This indicator is a measure of the usage of empty container parks. It shows the number of TEUs moved in the operations shown by Indicator 3.7.

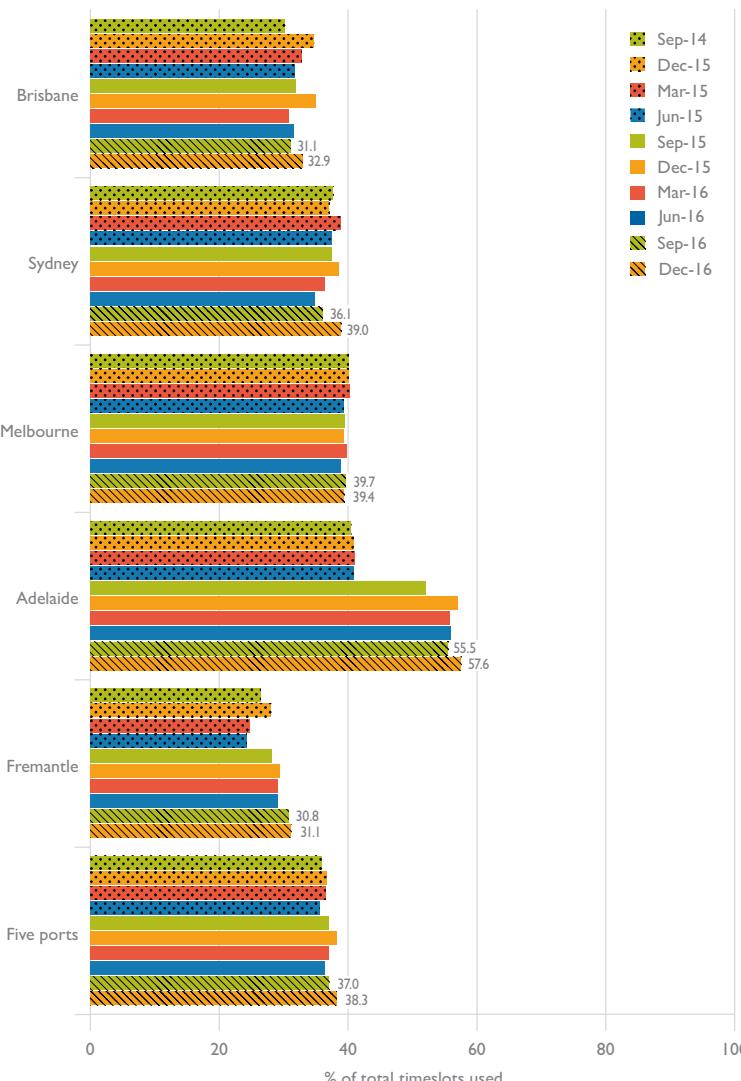


Truck weighbridge at North Quay, Port of Fremantle. Photo courtesy of Fremantle Ports.

Figure 3.1 Timeslots used by trucks in all off-peak periods

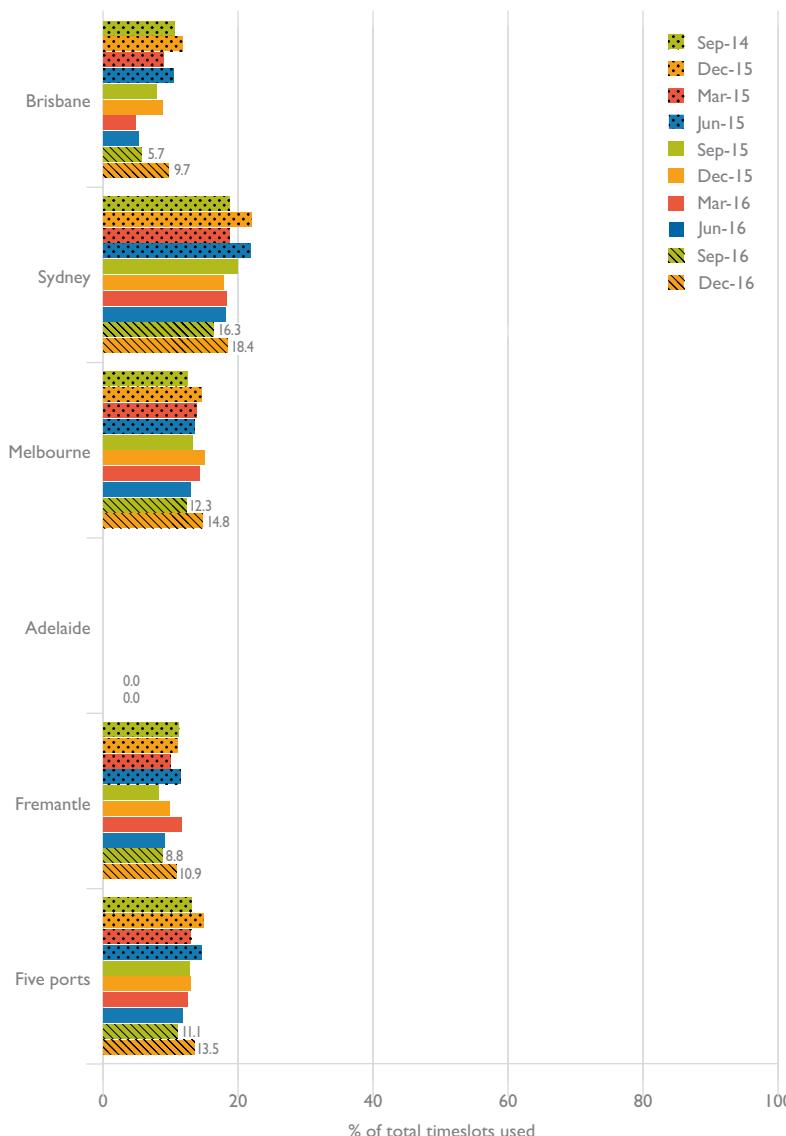
Sources: DPWorld (2017), Flinders Adelaide Container Terminal (2017), Hutchison Ports Australia (2017) and Patrick (2017)..

Figure 3.2 Timeslots used by trucks in off-peak periods Monday to Friday



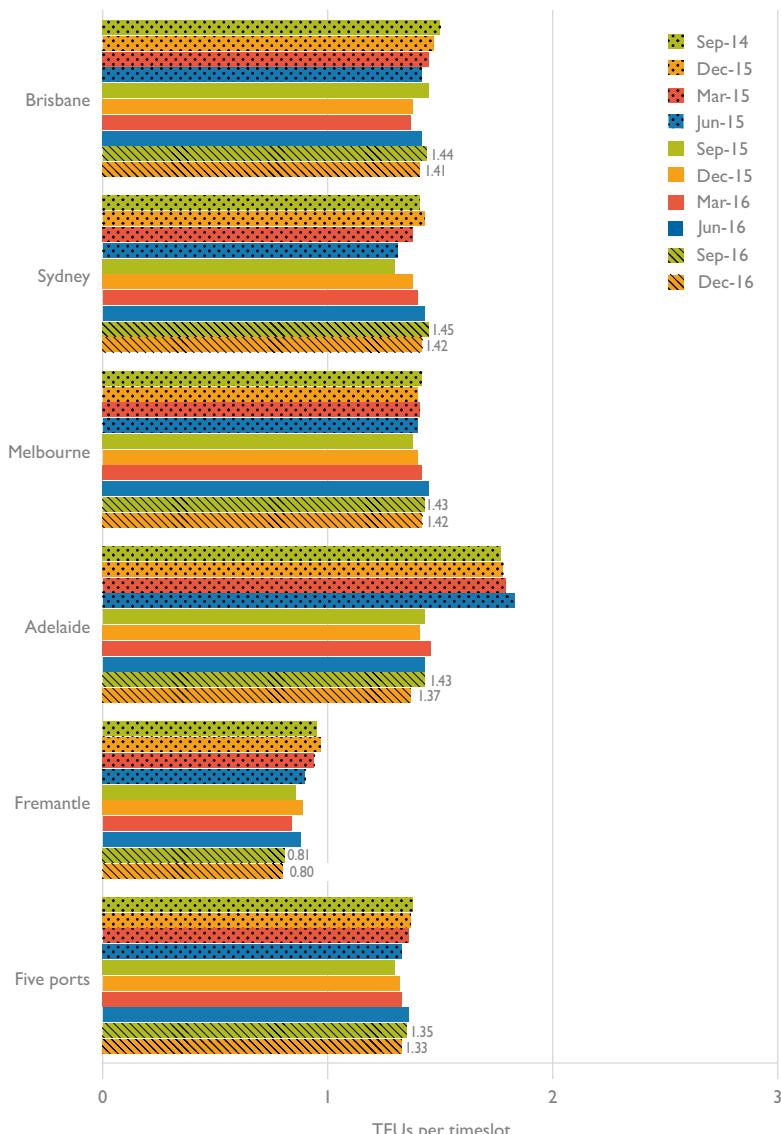
Sources: DPWorld (2017), Flinders Adelaide Container Terminal (2017), Hutchison Ports Australia (2017) and Patrick (2017).

Figure 3.3 Timeslots used by trucks on Saturday and Sunday



Sources: DPWorld (2017), Flinders Adelaide Container Terminal (2017), Hutchison Ports Australia (2017) and Patrick (2017).

Figure 3.4 TEUs processed per VBS timeslot used at container terminals



Sources: DPWorld (2017), Flinders Adelaide Container Terminal (2017), Hutchison Ports Australia (2017) and Patrick (2017).

Table 3.1 Timeslots available and actually used by trucks: Brisbane

Available ('000)	Weekday	Shift	2014			2015			2016		
			Sep Qtr	Dec Qtr	Mar Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Sep Qtr	Dec Qtr	Mar Qtr
			Day	Evening	Night	Day	Evening	Night	Day	Evening	Night
Saturday		Sub-total	136.1	136.0	123.0	134.9	125.3	130.6	158.7	192.3	239.6
Sunday		Sub-total	13.3	14.0	12.0	14.4	12.4	10.0	5.7	6.3	7.8
Total timeslots available			155.2	155.7	138.6	154.9	141.2	143.5	165.1	199.2	248.4
Used ('000)			85.0	77.2	73.0	78.8	76.6	73.6	76.6	79.4	85.1
Saturday	Monday – Friday	Day	29.8	29.3	27.3	28.8	24.7	25.5	22.5	24.5	25.6
Sunday	Monday – Friday	Day	13.7	20.8	13.8	14.6	15.8	20.4	14.1	15.1	16.2
Total timeslots used			128.6	127.3	114.1	122.2	117.1	119.5	113.2	119.1	126.9
Note: Data are rounded to the nearest 1000. Cells with an entry of "0.0" mean that data were reported but rounded to zero.											
Sources: DP World (2017), Hutchison Ports Australia (2017) and Patrick (2017).											

Table 3.2 Timeslots available and actually used by trucks: Sydney

Weekday	Available ('000)	2014			2015			2016		
		Sep Qtr		Dec Qtr	Mar Qtr		Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr
		Day	104.6	99.3	111.5	131.4	128.1	134.0	134.8	
Saturday	Day	53.1	50.3	49.3	53.8	58.4	53.9	48.4	47.7	52.3
	Evening	44.1	46.7	44.8	48.8	49.1	47.2	39.7	37.6	83.6
	Night								41.9	63.6
	Sub-total	207.9	201.6	193.4	214.1	238.8	229.2	222.1	220.1	315.2
Sunday	Day	17.2	20.5	16.9	21.5	19.6	21.5	18.1	19.0	17.8
	Evening	2.3	4.0	2.1	3.9	2.9	1.6	1.1	1.6	4.0
	Night	4.1	5.7	5.1	6.6	6.4	5.5	4.0	4.5	4.8
	Sub-total	23.6	30.1	24.0	32.0	28.9	28.7	23.1	25.0	23.8
Total timeslots available	Day	12.1	14.1	9.7	14.9	13.8	12.0	11.8	10.7	8.3
	Evening	7.3	7.5	6.4	7.5	7.8	7.0	6.7	6.1	6.4
	Night	4.0	5.1	3.8	4.6	5.5	3.2	3.6	3.3	4.6
	Sub-total	23.4	26.8	20.0	27.0	27.1	22.2	22.1	20.1	18.0
Used ('000)	Day	102.3	95.5	88.5	97.6	106.4	101.7	98.1	104.6	110.4
	Evening	49.3	45.2	43.3	48.0	49.6	47.9	42.3	42.4	45.9
	Night	39.1	41.1	37.9	42.3	43.8	42.4	36.4	35.3	37.9
	Sub-total	190.7	181.8	169.8	187.9	199.9	192.1	176.8	182.2	194.2
Saturday	Day	15.6	18.8	14.7	18.3	16.1	14.8	14.9	16.0	14.9
	Evening	2.0	3.0	1.6	3.2	2.2	1.3	0.7	1.4	1.0
	Night	3.9	5.1	4.6	6.1	6.2	5.4	3.9	4.3	4.8
	Sub-total	21.5	26.9	21.0	27.6	24.5	21.5	19.4	21.7	20.7
Sunday	Day	11.7	12.7	9.2	14.4	13.4	11.3	10.7	9.7	10.3
	Evening	7.2	7.1	5.8	7.0	7.2	6.5	6.1	5.7	5.8
	Night	3.5	4.4	3.1	3.7	4.5	2.6	3.2	3.1	3.0
	Sub-total	22.4	24.2	18.1	25.1	25.1	20.4	20.0	18.5	19.1
Total timeslots used		234.6	233.0	208.8	240.5	249.4	234.0	216.2	222.5	232.1
Sources: DPDWorld (2017), Hutchison Ports Australia (2017) and Patrick (2017).		241.9								

Table 3.3 Timeslots available and actually used by trucks: Melbourne

Available ('000)	Weekday	Shift	2014			2015			2016		
			Sep Qtr	Dec Qtr	Mar Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Sep Qtr	Dec Qtr	
			Day	159.5	152.0	143.2	140.9	145.8	133.9	129.1	131.3
Saturday	Day	Evening	74.6	72.6	68.4	65.4	66.4	62.1	57.2	61.2	64.3
	Day	Night	61.4	62.9	57.4	52.8	55.6	54.9	52.8	49.4	52.2
	Sub-total		295.5	287.5	269.0	259.1	267.8	250.9	241.9	237.9	249.5
	Sub-total										249.4
Sunday	Day	Evening	0.6	0.5	0.3	0.4	0.3	0.6	0.6	0.2	0.0
	Day	Night	4.6	5.5	5.9	5.0	4.8	4.6	4.7	4.0	4.8
	Sub-total		23.9	26.3	25.5	23.2	23.7	24.3	23.6	21.4	20.3
	Sub-total										24.6
Total timeslots available	Day	Evening	5.8	8.9	6.2	7.8	6.3	9.1	7.4	6.1	5.5
	Day	Night	6.2	7.1	5.0	4.6	5.2	5.0	4.6	5.0	6.0
	Sub-total		18.7	23.9	18.5	18.5	18.2	20.7	18.2	14.9	15.5
	Sub-total										19.5
Used ('000)	Day	Evening	156.7	148.7	139.6	137.8	143.0	131.3	126.5	129.2	133.8
	Day	Night	73.1	70.9	66.7	63.8	64.9	60.4	58.6	56.1	59.6
	Sub-total		289.4	280.6	261.8	252.9	262.3	244.6	236.3	233.4	244.4
	Sub-total										243.8
Saturday	Day	Evening	0.6	0.5	0.2	0.4	0.3	0.6	0.5	0.1	0.3
	Day	Night	4.5	5.4	5.6	5.0	4.8	4.5	4.7	3.9	4.7
	Sub-total		23.4	25.3	24.4	22.4	22.9	23.5	22.5	20.5	19.5
	Sub-total										23.6
Sunday	Day	Evening	5.6	8.6	6.0	7.5	6.1	8.8	7.2	5.8	5.3
	Day	Night	6.6	7.8	7.0	5.7	6.5	6.3	5.8	4.9	5.8
	Sub-total		18.0	22.9	17.6	17.4	17.3	19.6	17.1	14.3	14.9
	Sub-total										18.7
Total timeslots used			330.7	328.8	303.7	292.7	302.6	287.8	275.9	268.3	278.8
											286.1

Sources: DP World (2017) and Patrick (2017).

Table 3.4 Timeslots available and actually used by trucks: Adelaide

	Weekday	Shift	2014			2015			2016		
			Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr
Available ('000)	Monday – Friday	Day	26.2	24.8	25.0	24.7	26.6	25.6	24.1	24.5	24.4
		Evening	18.4	17.5	17.6	17.4	18.2	18.7	17.2	17.0	17.5
		Night				15.6	17.2	15.6	16.7	16.2	16.1
		Sub-total	44.6	42.3	42.6	42.1	40.4	41.4	56.9	58.3	58.1
	Saturday	Day									57.4
		Evening									
		Night									
		Sub-total									
	Sunday	Day									
		Evening									
		Night									
		Sub-total									
Total timeslots available		44.6	42.3	42.6	42.1	40.4	41.4	56.9	58.3	58.1	57.4
Used ('000)	Monday – Friday	Day	25.5	25.1	24.7	24.2	26.3	25.5	23.5	23.9	23.5
		Evening	17.3	17.3	17.3	16.7	17.4	18.4	16.3	15.8	17.2
		Night				11.2	15.4	13.4	14.7	13.2	14.4
		Sub-total	42.8	42.4	42.0	40.9	54.9	59.3	53.1	54.4	52.8
	Saturday	Day									
		Evening									
		Night									
		Sub-total									
Total timeslots used											
	Sunday	Day									
		Evening									
		Night									
		Sub-total									
Note:	Blank cells mean no data was reported for the categories. Until September Quarter 2015, Adelaide did not operate VBS on night shift.										
Source:	Flinders Adelaide Container Terminal (2017).										

Table 3.5 Timeslots available and actually used by trucks: Fremantle

Available ('000)	Weekday	Shift	2014				2015				2016			
			Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr
			Day	80.5	82.5	78.3	73.9	76.1	74.4	68.3	66.1	67.1	67.2	67.1
Saturday	Day	Evening	22.0	24.9	21.5	24.9	25.3	24.2	23.1	23.8	24.9	23.8	24.9	24.9
	Day	Night	12.2	13.4	9.0	7.2	9.3	11.1	9.6	9.0	11.2	11.2	12.4	12.4
	Sub-total		114.7	120.8	108.8	102.6	110.3	110.8	102.1	98.2	102.0	104.5		
	Sub-total		7.6	7.7	5.6	6.1	4.8	4.6	7.1	5.3	4.8	6.7		
Sunday	Day	Evening	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
	Day	Night	0.3	0.0	0.0	0.1	0.2	0.1	0.1	0.0	0.3	0.0	0.2	0.2
	Sub-total		7.0	7.6	6.6	7.4	5.3	7.5	6.3	4.6	5.2	6.8		
	Sub-total		129.3	136.1	121.0	116.0	120.5	122.9	115.5	108.1	112.0	118.0		
Total timeslots available	Day	Evening	79.0	80.0	76.5	72.4	75.0	73.1	67.0	64.7	66.2	66.3		
	Day	Night	21.6	23.8	20.4	20.2	24.0	24.5	23.4	21.9	23.0	23.3		
	Sub-total		112.5	116.9	105.5	99.7	108.1	108.6	100.0	95.3	100.0	101.9		
	Sub-total		7.4	7.3	5.5	6.0	4.6	4.5	6.9	5.1	4.5	5.9		
Saturday	Day	Evening	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
	Day	Night	0.2	0.0	0.0	0.1	0.2	0.1	0.0	0.3	0.3	0.0	0.2	0.2
	Sub-total		7.4	7.3	5.5	6.0	4.6	4.5	6.9	5.1	4.5	5.9		
	Sub-total		6.6	6.7	5.9	6.3	4.7	6.8	5.9	4.2	4.6	5.9		
Sunday	Day	Evening	0.3	0.4	0.3	0.4	0.4	0.4	0.2	0.2	0.3	0.3	0.5	0.5
	Day	Night	0.0	0.1	0.0	0.2	0.1	0.1	0.0	0.0	0.2	0.1	0.1	0.1
	Sub-total		6.9	7.2	6.2	6.9	5.1	7.3	6.2	4.4	5.1	6.5		
	Sub-total		126.8	131.4	117.2	112.6	117.8	120.4	113.1	104.8	109.6	114.3		
Total timeslots used														

Note: Data are rounded to the nearest 1000. Cells with an entry of "0.0" mean that data were reported but rounded to zero.

Sources: DP World (2017) and Patrick (2017).

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

Available ('000)	Weekday	2014								2015								2016							
		Sep Qtr		Dec Qtr		Mar Qtr		Jun Qtr		Sep Qtr		Dec Qtr		Mar Qtr		Jun Qtr		Sep Qtr		Dec Qtr					
		Day	Evening	Day	Night	Day	Night	Day	Evening	Day	Night	Day	Night	Day	Evening	Day	Night	Day	Evening	Day	Night				
Saturday	Sub-total	798.8	788.3	736.9	752.7	802.5	782.8	781.7	806.9	879.1	949.8														
	Day	54.4	58.6	50.5	56.8	52.8	53.5	48.5	46.8	44.6	77.1														
	Evening	5.0	6.9	5.3	6.6	4.9	2.4	1.7	2.1	1.2															
	Night	9.0	12.5	11.5	12.3	12.1	11.8	9.2	9.1	10.8															
Sunday	Sub-total	68.4	78.1	67.3	75.7	69.8	67.7	59.5	57.9	56.6	118.0														
	Day	29.1	35.0	24.9	33.8	27.3	30.2	25.4	21.2	18.8															
	Evening	14.8	16.0	14.4	14.4	14.1	14.1	13.1	11.3	12.8															
	Night	11.1	13.1	9.3	10.2	11.7	9.1	8.7	7.8	8.1															
Total timeslots available	Sub-total	54.9	64.1	48.6	58.5	54.1	53.4	47.2	40.3	39.6	57.9														
	Day	922.1	930.5	852.7	886.9	926.4	903.9	888.4	905.1	975.4	1125.6														
	Evening	191.1	186.5	175.0	177.5	180.6	176.7	163.2	160.7	170.2	180.8														
	Night	124.3	136.1	115.9	115.2	134.4	142.1	124.6	121.8	129.1	139.1														
Used ('000)	Sub-total	764.0	749.0	693.2	703.5	742.3	724.0	679.4	684.4	718.4	723.2														
	Day	50.7	54.2	45.8	50.9	46.3	44.8	43.7	42.7	40.1	403.3														
	Evening	3.9	4.8	4.1	5.0	2.9	2.0	1.2	1.8	1.1															
	Night	8.7	12.3	10.7	11.7	11.7	11.5	9.1	8.8	10.5															
Saturday	Sub-total	63.3	71.3	60.5	67.6	61.0	58.3	54.0	53.4	51.7	66.2														
	Day	27.1	31.6	21.9	30.3	24.5	28.8	23.9	19.8	18.0	25.8														
	Evening	14.4	15.3	13.3	13.1	14.1	13.3	12.1	10.8	12.3	13.1														
	Night	10.1	12.6	8.1	8.7	10.0	8.0	7.8	7.4	7.7	7.7														
Sunday	Sub-total	51.5	59.5	43.3	52.1	48.6	50.0	43.8	38.0	37.9	46.6														
	Day	878.8	879.8	797.0	823.2	851.8	832.4	777.2	775.8	775.8	808.0	836.0													
	Total timeslots used																								
	Sources:	DP World (2017), Flinders Adelaide Container Terminal (2017), Hutchison Ports Australia (2017) and Patrick (2017).																							

Table 3.7 Empty Container Park operations

Number of containers ('000)	2014			2015			2016				
	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	Mar Qtr	Jun Qtr	Sep Qtr	Dec Qtr	
Brisbane	130.8	135.2	120.3	131.2	133.9	135.3	115.7	127.7	135.4	139.1	
Sydney	216.8	219.8	200.6	204.4	217.4	207.2	193.3	189.2	188.7	195.0	
Melbourne	349.7	347.4	335.8	325.7	344.6	332.1	314.1	316.2	329.8	356.8	
Adelaide	10.1	10.7	11.5	17.7	18.3	19.4	18.6	20.1	22.0	23.6	
Fremantle	95.0	95.8	84.6	80.1	82.7	84.8	79.8	81.2	82.4	87.7	
Five ports	802.4	808.9	752.8	759.1	797.0	778.9	721.5	734.5	758.4	802.3	
Number of TEUs ('000)	Brisbane	189.2	190.7	166.2	179.2	186.2	186.5	159.6	178.4	190.3	186.5
Sydney	325.8	331.8	303.8	308.5	328.7	311.7	289.9	281.1	281.2	289.0	
Melbourne	513.7	510.7	492.1	474.7	509.1	492.7	466.0	469.6	488.3	529.0	
Adelaide	15.2	16.0	17.0	26.0	26.6	27.3	26.3	28.0	32.3	33.3	
Fremantle	132.2	131.9	119.8	114.5	118.0	121.1	114.5	115.6	117.6	124.3	
Five ports	176.0	184.1	108.9	102.8	139.2	168.6	139.2	156.2	1072.6	1096	1162.1

Sources: Containerchain Pty Ltd (2017).

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 moved into a port by ships in a GT range, divided by the number of ship visits 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 ship visits 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 ship visits 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 ship visits 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 fast (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 4.5.

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 charged 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:

1. 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);
2. PICI (5 ports, imports) is the sum PICI (Brisbane, imports), PICI (Sydney, imports), PICI (Melbourne, imports), PICI (Adelaide, imports), PICI (Fremantle, imports);
3. Then share (port k, imports) = PICI (port k, imports) / PICI (5 ports, imports).

Similarly for each port compute the port shares for exports:

1. 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);
2. PICI (5 ports, exports) is the sum PICI (Brisbane, exports), PICI (Sydney, exports), PICI (Melbourne, exports), PICI (Adelaide, exports), PICI (Fremantle, exports);
3. 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

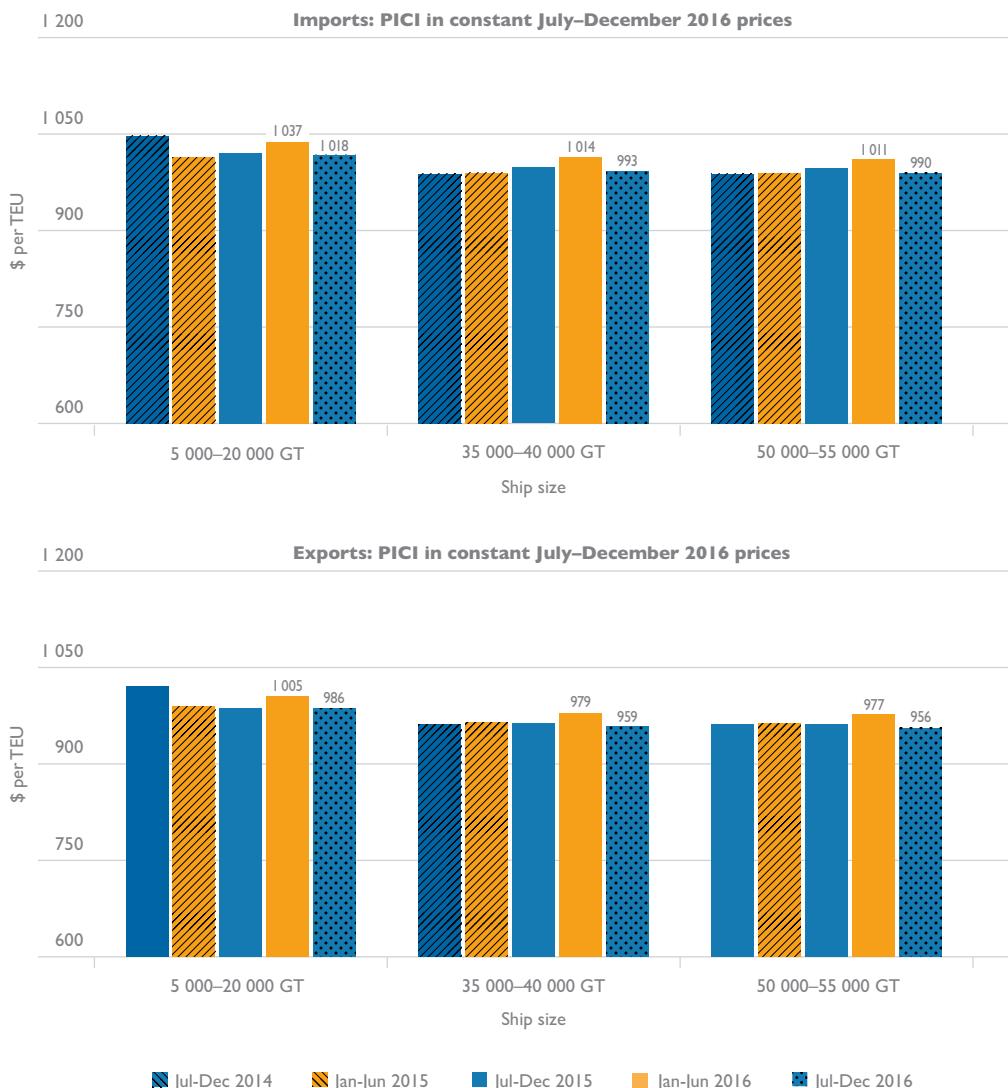
The national PICI for ships in a GT range is the national average cost per TEU. From BTCE (1993) this is a weighted average of individual port estimates computed as follows, taking imports shipped in ships in the 5 000 to 20 000 GT as an example.

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

$$= b_1 \cdot TC_{Br,M} + b_2 \cdot TC_{Sy,M} + b_3 \cdot TC_{Mel,M} + b_4 \cdot TC_{Ad,M} + b_5 \cdot TC_{Fr,M}$$

The shares b_1 , b_2 , b_3 , b_4 , b_5 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 (2017).



Inner Harbour at Port of Fremantle. Photo courtesy of Fremantle Ports.

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			
	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jan-Jun 2016	Jul-Dec 2014	Jan-Dec 2015	Jul-Dec 2015	Jan-Jun 2016	Jul-Dec 2014	Jul-Dec 2015	Jul-Dec 2015	Jan-Jun 2016
Parameters for estimating port interface fees and charges^a												
Total TEUs exchanged	286	289	267	246	283	1 273	1 138	1 391	1 253	1 388	1 489	1 330
Loaded	223	223	208	182	218	957	849	1 001	939	1 011	1 034	917
Loaded inwards	104	97	80	115	82	620	539	665	330	586	617	548
Loaded outwards	119	126	128	67	135	336	310	336	609	426	417	370
Empty	63	66	60	63	65	316	289	390	313	377	455	413
No of port calls by ships in GT range	4	5	4	5	4	4	3	4	4	4	4	3
Elapsed berth time for ships in GT range (hours)	19	19	27	21	24	27	25	29	26	23	24	22
Charges per ship visit (\$)												
Total ship-based charges	23 851	24 092	23 617	24 215	24 748	44 374	44 822	44 480	45 931	47 354	52 402	52 919
Empty TEUs ^b	1 234	1 289	1 333	1 418	1 472	6 208	5 662	8 727	7 006	8 526	8 935	8 097
Ship-based charges (\$/TEU)												
Conservancy	7	7	8	9	8	6	7	6	6	7	8	8
Tonnage	-	-	-	-	-	-	-	-	-	-	-	-
Pilotage	30	30	32	36	33	13	14	12	13	13	14	13
Towage	36	36	40	44	38	14	16	13	15	14	13	14
Mooring, unmooring ^c	11	11	9	10	9	2	3	2	2	2	2	2
Total ship-based charges (\$/TEU)	83	83	88	99	88	35	39	32	37	34	35	37
Fees and charges for imports												
Ship-based charges	83	83	88	99	88	35	39	32	37	34	35	40
Cargo-based charges												
Wharfage	34	36	36	36	37	34	36	36	37	34	36	37
Harbour dues	56	66	66	67	56	66	66	67	67	56	66	66
Other charges												
Stevedoring	176	172	170	170	176	172	170	170	176	172	172	170
Customs brokers' fees	50	50	150	150	150	150	150	150	150	150	150	150
Road transport charges	459	466	470	486	459	466	470	486	486	459	466	470
Total fees and charges (\$/import TEU)	959	974	982	1 007	997	910	926	945	944	911	930	945
Port's share in national import index ^d	16%	17%	17%	17%	18%	15%	16%	16%	17%	15%	16%	17%

	5 000 to 20 000 GT ships				35 000 to 40 000 GT ships				50 000 to 55 000 GT ships				
	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jan-Jun 2016	Jul-Dec 2014	Jul-Dec 2015	Jan-Jun 2015	Jul-Dec 2015	Jan-Jun 2016	Jul-Dec 2014	Jul-Dec 2015	Jan-Jun 2015	Jul-Dec 2015
Fees and charges for exports													
Ship-based charges	83	83	88	99	88	35	39	32	37	34	35	40	36
Cargo-based charges													
Wharfage	34	36	36	36	37	34	36	36	37	34	36	36	37
Harbour dues	56	66	66	66	67	56	66	66	67	56	66	66	67
Other charges													
Stevedoring	176	172	170	170	176	172	172	170	170	176	172	172	170
Customs brokers' fees	164	156	156	156	164	164	156	156	156	164	164	156	156
Road transport charges	459	466	470	486	486	459	466	470	486	486	459	466	486
Total fees and charges (\$/import TEU)	973	989	1 013	1 004	925	944	932	951	951	925	945	937	951
Port's share in national export index^e	16%	17%	17%	17%	15%	16%	16%	16%	16%	15%	16%	16%	16%

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.

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.

Sources: BITRE estimates based on ship call data from Port of Brisbane Pty Ltd (2017) and other sources (see 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										
	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jan-Jun 2016	Jul-Dec 2016	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jan-Jun 2016	Jul-Dec 2016	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jan-Jun 2016	Jul-Dec 2016	Jul-Dec 2015	Jan-Jun 2016	Jul-Dec 2016	Jul-Dec 2015	Jan-Jun 2016	Jul-Dec 2016
Parameters for estimating port interface fees and charge^a																					
Total TEUs exchanged	203	498	620	584	556	2 071	2 158	2 163	2 084	1 933	2 220	2 427	2 530	2 470	2 706						
Loaded	154	448	318	360	1 477	1 451	1 390	1 060	1 512	1 693	1 725	1 762	1 416								
Loaded inwards	54	185	246	26	963	989	1 009	893	569	1 083	1 135	1 180	1 159	775							
Loaded outwards	100	263	308	338	293	397	488	442	497	491	429	558	545	603	641						
Empty	49	50	38	39	238	711	681	712	694	873	709	733	805	708	1 291						
No of port calls by ships in GT range	4	6	5	6	7	3	2	3	3	3	3	4	3	3	3						
Elapsed berth time for ships in GT range (hours)	25	27	28	31	30	33	35	32	35	34	37	40	38	35	37						
Charges per ship visit (\$)																					
Total ship-based charges	2 1261	23 351	23 550	24 264	25 174	44 595	49 453	49 453	51 377	53 517	55 433	60 663	60 946	63 091	65 677						
Empty TEUs ^b	649	660	512	524	3 300	9 438	9 038	9 668	9 420	12 103	9 404	9 731	10 929	9 619	17 886						
Ship-based charges (\$/TEU)																					
Conservancy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tonnage	27	11	9	9	11	10	10	10	10	10	10	10	10	13	12	12	12	12	12	12	12
Pilotage	9	7	6	6	7	2	4	4	4	4	4	5	2	4	4	4	4	4	4	4	4
Towage	56	23	19	19	22	7	7	7	8	9	9	7	7	7	7	7	7	7	7	7	7
Mooring, unmooring ^c	13	5	4	4	5	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Total ship-based charges (\$/TEU)	105	47	38	39	45	22	23	23	25	25	25	25	25	25	25	24	24	24	24	24	24
Fees and charges for imports																					
Ship-based charges	105	47	38	39	45	22	23	23	25	25	25	25	25	25	25	25	25	25	24	26	24
Cargo-based charges	125	125	127	127	130	125	125	127	127	130	125	125	125	125	125	127	127	127	130	130	130
Wharfage	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Harbour dues																					
Other charges																					
Stevedoring	176	172	170	170	176	172	170	170	170	176	172	172	172	172	170	170	170	170	170	170	170
Customs brokers' fees	153	153	151	151	153	153	153	153	151	151	151	151	151	151	151	151	151	151	151	151	151
Road transport charges	529	517	517	542	542	529	517	517	542	542	542	529	517	517	517	517	517	517	542	542	542
Total fees and charges (\$/import TEU)	1 088	1 013	1 007	1 030	1 039	1 005	989	992	1 015	1 021	1 008	991	993	1 016	1 018						
Port's share in national import index ^d	34%	34%	34%	34%	34%	34%	34%	34%	32%	32%	33%	32%	32%	32%	32%	33%	32%	32%	32%	33%	33%

	5 000 to 20 000 GT ships				35 000 to 40 000 GT ships				50 000 to 55 000 GT ships					
	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jan-Jun 2016	Jul-Dec 2016	Jul-Dec 2016	Jan-Jun 2015	Jul-Dec 2015	Jan-Jun 2016	Jul-Dec 2016	Jul-Dec 2016	Jan-Jun 2015	Jul-Dec 2015	Jul-Dec 2016
Fees and charges for exports														
Ship-based charges	105	47	38	39	45	22	23	23	25	28	25	25	24	26
Cargo-based charges														
Wharfage	79	79	82	82	85	79	79	82	85	79	79	82	82	85
Harbour dues	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other charges														
Stevedoring	176	172	170	170	176	172	172	170	170	176	172	172	170	170
Customs brokers' fees	144	144	137	133	144	144	144	137	133	133	144	144	137	133
Road transport charges	529	517	517	542	542	529	517	517	542	542	529	517	517	542
Total fees and charges (\$/export TEU)	1 033	959	945	967	975	950	935	930	952	958	953	937	931	954
Port's share in national export index^e	34%	34%	34%	34%	34%	32%	32%	32%	33%	32%	32%	32%	32%	33%

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.

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.

Sources: BITRE estimates based on ship call data from NSW Ports (2017) and other sources (see text).

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											
	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jan-Jun 2016	Jul-Dec 2016	Jul-Dec 2014	Jan-Jun 2014	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jan-Jun 2016	Jul-Dec 2016	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jan-Jun 2016	Jul-Dec 2016	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jan-Jun 2016	Jul-Dec 2016		
Parameters for estimating port interface fees and charge ^a																								
Total TEUs exchanged	407	700	774	725	609	2 286	2 151	2 158	2 042	2 003	2 623	2 575	2 841	2 701	2 775									
Loaded	289	585	705	634	571	1 877	1 752	1 730	1 644	1 644	2 059	2 039	2 221	2 166	2 188									
Loaded inwards	53	218	332	306	276	1 198	1 095	1 142	1 062	1 094	1 246	1 190	1 396	1 295	1 391									
Loaded outwards	236	367	372	328	296	679	657	588	582	550	812	850	825	871	796									
Empty	118	116	69	91	37	410	400	428	398	359	565	535	620	536	587									
No of port calls by ships in GT range	3	5	6	7	6	3	3	3	3	3	3	3	4	3	3									
Elapsed berth time for ships in GT range (hours)	23	25	22	20	23	31	27	31	27	28	31	27	31	30	31									
Charges per ship visit (\$)																								
Total ship-based charges	26 810	27 115	27 475	28 484	28 500	53 903	54 176	55 298	56 566	54 641	65 883	66 121	67 581	68 910	70 140									
Empty TEUs ^b	2 088	2 047	1 261	1 663	686	7 256	7 080	7 787	7 238	6 620	9 999	9 477	11 271	9 744	10 832									
Ship-based charges (\$/TEU)																								
Conservancy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Tonnage	16	9	9	10	11	11	11	11	11	11	12	11	13	13	12	13	13	13	13	13	13	13	13	
Pilotage	19	11	10	11	14	6	6	6	6	6	7	7	5	6	5	6	5	6	5	6	5	6	5	
Towage	29	17	16	17	21	7	7	8	8	9	9	6	6	6	6	6	6	6	6	6	6	6	7	
Mooring, unmooring ^c	2	1	1	2	2	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	1	
Total ship-based charges (\$/TEU)	66	39	36	39	47	24	25	26	28	27	25	26	27	25	26	27	25	26	26	25	26	25	25	
Fees and charges for imports																								
Ship-based charges	66	39	36	39	47	24	25	26	28	27	25	26	28	27	25	26	27	25	26	24	26	25	25	
Cargo-based charges																								
Wharfage	71	71	73	73	74	71	71	73	73	74	71	71	71	71	73	73	73	73	73	74	74	74	74	
Harbour dues	40	40	41	41	41	40	40	41	41	41	40	40	40	40	41	41	40	40	41	41	41	41	41	
Other charges																								
Stevedoring	176	172	170	170	176	172	172	170	170	170	176	172	172	172	170	170	170	170	170	170	170	170	170	
Customs brokers' fees	153	155	155	155	153	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	155	
Road transport charges	536	536	539	549	549	536	536	539	549	549	536	536	536	536	536	536	536	536	536	536	536	536	549	
Total fees and charges (\$/import TEU)	1 043	1 013	1 016	1 028	1 037	1 000	999	1 006	1 016	1 017	1 002	1 000	1 004	1 014	1 015	1 015	1 015	1 015	1 015	1 015	1 015	1 015	1 015	
Port's share in national import index ^d	39%	39%	38%	39%	38%	37%	36%	37%	36%	37%	36%	37%	36%	37%	36%	37%	36%	37%	36%	37%	36%	37%	36%	36%

	5 000 to 20 000 GT ships				35 000 to 40 000 GT ships				50 000 to 55 000 GT ships				
	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jan-Jun 2016	Jul-Dec 2014	Jul-Dec 2015	Jan-Jun 2015	Jul-Dec 2015	Jan-Jun 2016	Jul-Dec 2014	Jul-Dec 2015	Jan-Jun 2015	Jul-Dec 2015
Fees and charges for exports													
Ship-based charges	66	39	36	39	47	24	25	26	28	27	25	26	24
Cargo-based charges													
Wharfage	71	71	71	70	71	71	71	70	71	71	71	71	70
Harbour dues	40	40	41	41	41	40	40	41	41	40	40	41	41
Other charges													
Stevedoring	176	172	170	170	176	172	172	170	170	176	172	172	170
Customs brokers' fees	144	150	141	141	144	150	141	141	141	144	150	141	141
Road transport charges	536	536	539	549	549	536	536	539	549	549	536	539	549
Total fees and charges (\$/export TEU)	1 033	1 008	1 000	1 012	1 018	991	994	990	1 000	999	995	998	997
Port's share in national export index^e	39%	39%	39%	39%	38%	37%	37%	36%	37%	36%	37%	36%	37%

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.

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.

Sources: BITRE estimates based on ship call data from Port of Melbourne Operations Pty Ltd (2017) and other sources (see text).

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					
	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jan-Jun 2016	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jan-Jun 2016	Jul-Dec 2016	2014	2015	2016	2015	2016
Parameters for estimating port interface fees and charges ^a														
Total TEUs exchanged	1 023	1 041	968	873	768	1 109	1 065	1 060	1 165	978	955	816	855	816
Loaded	757	786	681	679	667	903	872	814	422	449	422	449	386	386
Loaded inwards	329	336	237	314	441	425	414	422	449	449	449	422	449	386
Loaded outwards	427	450	444	366	226	478	458	391	405	430	405	310	310	162
Empty	266	255	287	194	101	206	194	246	246	162	162	310	310	162
No of port calls by ships in GT range	2	2	2	2	2	3	2	2	2	2	2	2	2	2
Elapsed berth time for ships in GT range (hours)	21	23	20	17	21	23	22	21	21	22	21	21	21	22
Charges per ship visit (\$)														
Total ship-based charges	41 940	42 828	43 015	42 721	44 581	48 823	49 418	49 933	51 341	51 341	51 341	51 341	51 341	51 341
Empty TEUs ^b	1 815	1 736	1 992	1 343	698	1 405	1 320	1 705	2 150	1 125	1 125	1 125	1 125	1 125
Ship-based charges (\$/TEU)														
Conservancy	5	5	5	6	7	6	6	7	6	7	6	7	6	7
Tonnage	9	9	10	10	13	11	11	11	11	10	10	10	10	13
Pilotage	6	6	7	8	9	6	6	6	6	6	6	6	6	7
Towage	21	21	23	25	29	21	22	23	23	21	21	21	21	25
Mooring, unmooring ^c	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total ship-based charges (\$/TEU)	41	41	44	49	58	44	46	47	47	43	43	43	43	52
Fees and charges for imports														
Ship-based charges	41	41	44	49	58	44	46	47	47	43	43	43	43	52
Cargo-based charges	84	84	85	85	86	84	84	85	85	85	85	85	85	86
Wharfage	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Harbour dues	176	172	172	170	170	176	172	172	172	170	170	170	170	170
Other charges	149	149	149	149	149	148	148	148	148	148	148	148	148	148
Stevedoring	358	377	381	399	399	358	377	381	381	399	399	399	399	399
Customs brokers fees	814	829	838	859	869	817	833	839	852	863	863	863	863	863
Road transport charges	6%	5%	5%	5%	5%	6%	5%	5%	5%	5%	5%	5%	5%	5%
Total fees and charges (\$/import TEU)														
Port's share in national import index ^d														

	5 000 to 20 000 GT ships						35 000 to 40 000 GT ships						50 000 to 55 000 GT ships										
	Jul-Dec 2014		Jan-Jun 2015		Jul-Dec 2015		Jan-Jun 2016		Jul-Dec 2014		Jan-Jun 2015		Jul-Dec 2015		Jan-Jun 2016		Jul-Dec 2014		Jan-Jun 2015		Jul-Dec 2015		
	Ship-based charges	41	Cargo-based charges	41	Wharfage	84	Harbour dues	7	Other charges	85	Stevedoring	172	Customs brokers' fees	112	Road transport charges	358	Total fees and charges (\$/export TEU)	777	Port's share in national export index ^e	6%			
Fees and charges for exports																							
Ship-based charges																							
Cargo-based charges																							
Wharfage																							
Harbour dues																							
Other charges																							
Stevedoring																							
Customs brokers' fees																							
Road transport charges																							
Total fees and charges (\$/export TEU)																							
Port's share in national export index ^e																							

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.

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.

Sources: BITRE estimates based on ship call data from Flinders Ports (2017) and other sources (see 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					
	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jan-Jun 2016	Jul-Dec 2016	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jul-Dec 2016
Parameters used in estimation of the port interface fees and charges^a												
Total TEUs exchanged	2 831	2 499	2 587	2 455	2 699	786	748	780	759	825	1 620	1 483
Loaded	2 251	1 999	2 029	2 039	2 204	641	610	621	657	736	1 225	1 130
Loaded inwards		1 359	1 197	1 264	1 159	315	449	426	361	484	540	746
Loaded outwards		893	802	766	881	889	192	184	260	173	197	479
Empty	580	499	558	415	494	146	138	160	103	89	395	353
No of port calls by ships in GT range	13	13	9	13	13	2	2	2	3	3	4	4
Elapsed berth time for ships in GT range (hours)	33	32	34	34	35	19	19	19	17	20	29	24
Charges per ship visit (\$)												
Total ship-based charges	13 299	13 348	13 619	13 651	12 543	34 399	34 596	35 177	35 313	38 533	40 844	41 063
Empty TEUs ^b	6 574	5 659	6 482	4 822	5 856	1 650	1 560	1 853	1 192	1 053	4 478	4 004
Ship-based charges (\$/TEU)												
Conservancy	-	-	-	-	-	-	-	-	-	-	-	-
Tonnage	-	-	1	-	1	11	12	12	12	11	8	8
Pilotage	2	2	2	2	2	2	7	7	7	10	3	3
Towage	2	2	2	2	2	24	26	25	26	24	13	15
Mooring, unmooring ^c	0	1	1	1	1	2	2	2	2	2	1	1
Total ship-based charges (\$/TEU)	5	5	6	5	44	46	45	47	47	25	28	28
Fees and charges for imports												
Ship-based charges	5	5	5	6	5	44	46	45	47	47	25	28
Cargo-based charges												
Wharfage	75	75	77	79	75	77	77	79	75	75	77	77
Harbour dues	35	35	36	36	35	35	36	36	36	35	35	36
Other charges												
Stevedoring	176	172	170	170	176	172	170	170	176	172	172	170
Customs brokers fees	163	163	162	162	163	163	162	162	163	163	163	162
Road transport charges	457	458	462	467	467	458	462	467	467	457	458	462
Total fees and charges (\$/import TEU)	911	909	916	918	950	955	958	960	932	931	938	940
Port's share in national index ^d	11%	11%	11%	11%	10%	11%	10%	10%	10%	11%	10%	10%

	5 000 to 20 000 GT ships				35 000 to 40 000 GT ships				50 000 to 55 000 GT ships				
	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jan-Jun 2016	Jul-Dec 2014	Jul-Dec 2015	Jan-Jun 2015	Jul-Dec 2015	Jan-Jun 2016	Jul-Dec 2014	Jul-Dec 2015	Jan-Jun 2015	Jul-Dec 2015
Fees and charges for exports													
Ship-based charges	5	5	5	6	5	44	46	45	47	47	25	28	28
Cargo-based charges													
Wharfage	75	75	77	77	79	75	77	77	79	75	75	77	77
Harbour dues	35	35	36	36	35	35	36	36	36	35	35	36	36
Other charges													
Stevedoring	176	172	170	170	176	172	170	170	170	176	172	172	170
Customs brokers' fees	97	97	89	109	109	97	97	89	109	109	97	97	109
Road transport charges	457	458	462	467	467	457	458	462	467	467	457	458	467
Total fees and charges (\$/export TEU)	845	843	842	865	866	884	884	881	906	908	866	865	887
Port's share in national export index^e	11%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
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.												
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.												
Sources:	BITRE estimates based on ship call data from Fremantle Ports (2017) and other sources (see text).												

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

	Jul-Dec 2014	Jan-Jun 2015	Jul-Dec 2015	Jan-Jun 2016	Jul-Dec 2016
	ABS GDP deflator (100.0 for Jul-Dec 2016)	98.3	98.1	97.6	97.7
5 000 – 20 000 GT ships	Import costs: in nominal price	1029	995	996	1013
	Import costs: constant 2016 price	1047	1014	1021	1018
	Export costs: in nominal price	1004	970	963	1018
	Export costs: constant 2016 price	1021	989	987	986
	Import costs: in nominal price	972	971	974	986
	Import costs: constant 2016 price	988	990	998	993
	Export costs: in nominal price	945	946	940	959
	Export costs: constant 2016 price	961	964	963	959
	Import costs: in nominal price	972	970	973	979
	Import costs: constant 2016 price	988	989	997	988
35 000 – 40 000 GT ships	Export costs: in nominal price	945	945	954	990
	Export costs: constant 2016 price	961	963	962	990
	Import costs: in nominal price	972	970	973	990
50 000 – 55 000 GT ships	Import costs: constant 2016 price	988	989	997	1011
	Export costs: in nominal price	945	945	939	954
	Export costs: constant 2016 price	961	963	977	956

Notes:

Blank cells mean the data are not reported.

Values in constant 2016 prices are derived using the ABS non-farm GDP deflator with Jan-Jun 2016 as the base period. Constant price = Nominal or current price* (Base period deflator/Current year deflator).

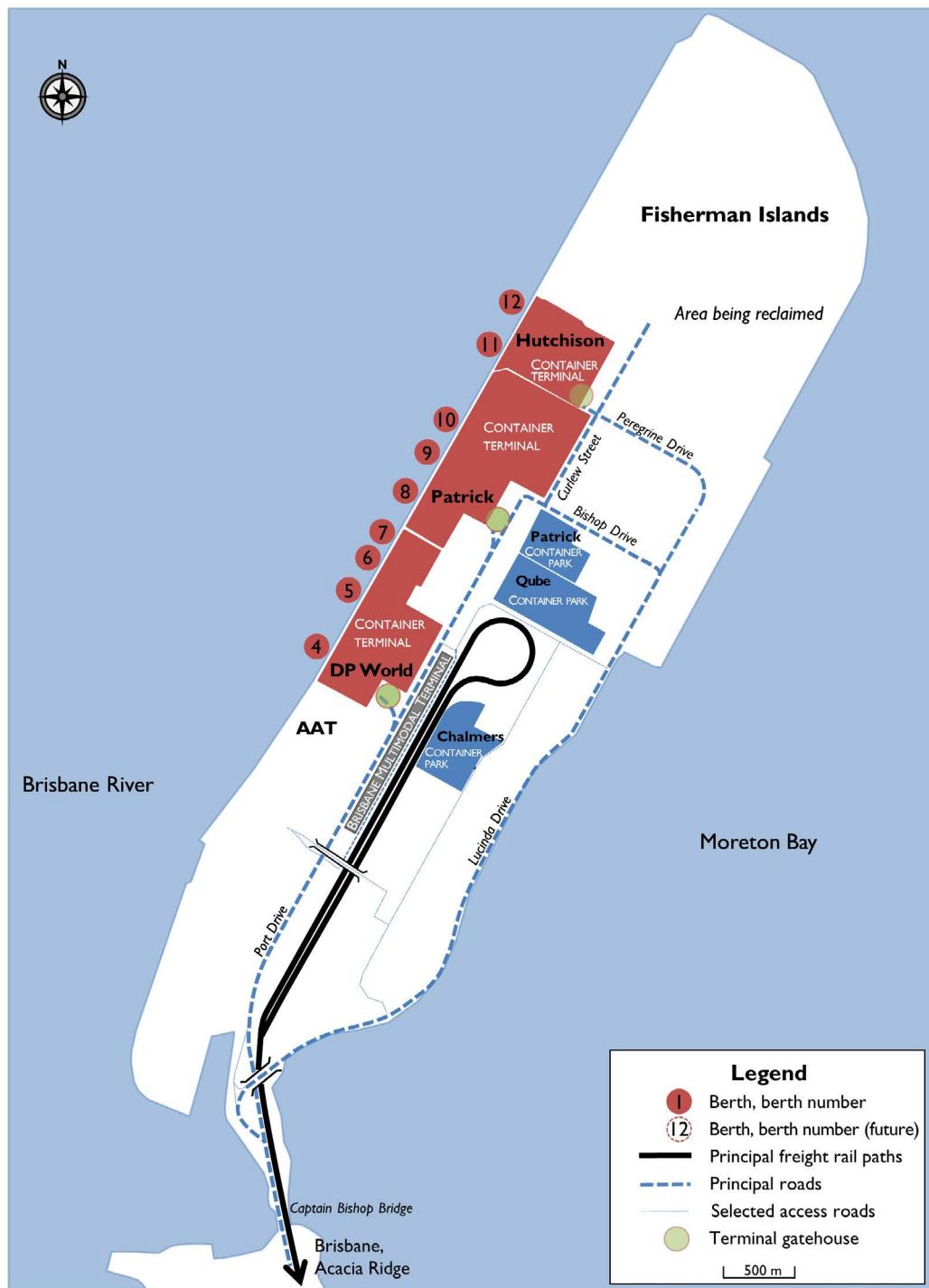
Sources: BITRE estimates based on data in Tables 4.1 to 4.5 and data from ABS (2017).

APPENDIX A

Maps of five major Australian container ports

This appendix presents maps of container terminals and supplementary information about facilities and port services available at the five major Australian container ports.

Brisbane (Fisherman Islands terminals)



(Last updated: September 2016)

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 provide 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. Hutchison operates berths 11 and 12.

Equipment. DP World has 4 cranes, including 3 post-Panamax cranes and one Panamax crane. DP World's semi-automated terminal has 14 automated stacking cranes, with two more due to be commissioned in January 2017. Patrick has 5 cranes, consisting of 4 post-Panamax cranes and one Panamax crane; in addition, Patrick has 31 automated straddle carriers (AutoStrads). Hutchison's Brisbane Container Terminals includes 4 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

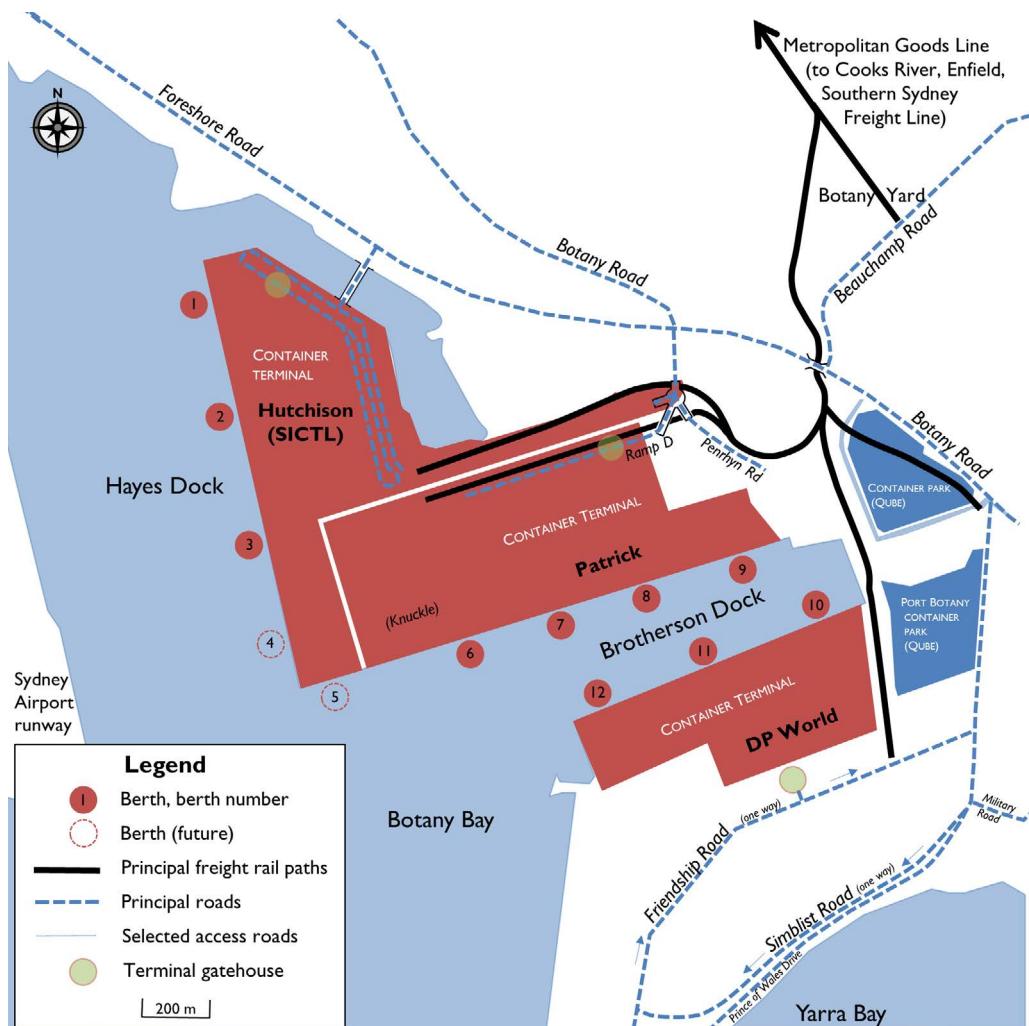
Facilities. An intermodal facility is provided on Fisherman Islands — the Brisbane Multimodal Terminal. Train lengths of up to 850 metres are permitted. Containers are shifted by road between that terminal and the container terminals. In that context, rail access is classed as having “near-dock” facilities.

Services. Scheduled rail services to the Brisbane Multimodal Terminal include long haul:

- bulk coal from West Moreton and grain from western Queensland, both via narrow gauge;
- reefer containers containing meat from northern abattoirs, by narrow-gauge trains;
- some containers are taken from Fisherman Islands—the presumption is that they are mainly empty containers; and
- 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: February 2017)

Sydney (Container Terminals at Port Botany)

Port Botany is managed by the 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 Limited, SICTL).

Berths. Patrick operates four berths, numbers 6–9. 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 4 twin-lift quay cranes and 4 single-lift quay cranes. DP World took delivery of their latest twin-lift, post-Panamax crane in March 2015. Patrick equipment includes 7 twin-lift quay cranes and 1 single-lift quay crane. The Hutchison terminal includes 4 post-Panamax quay cranes.

The Patrick terminal has implemented an automated container yard, with 45 automated straddle carriers (AutoStrads). Automatic operations commenced on 2 April 2015.

The Hutchison terminal operates 12 automated stacking cranes.

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; these are parallel to the Patrick sidings.

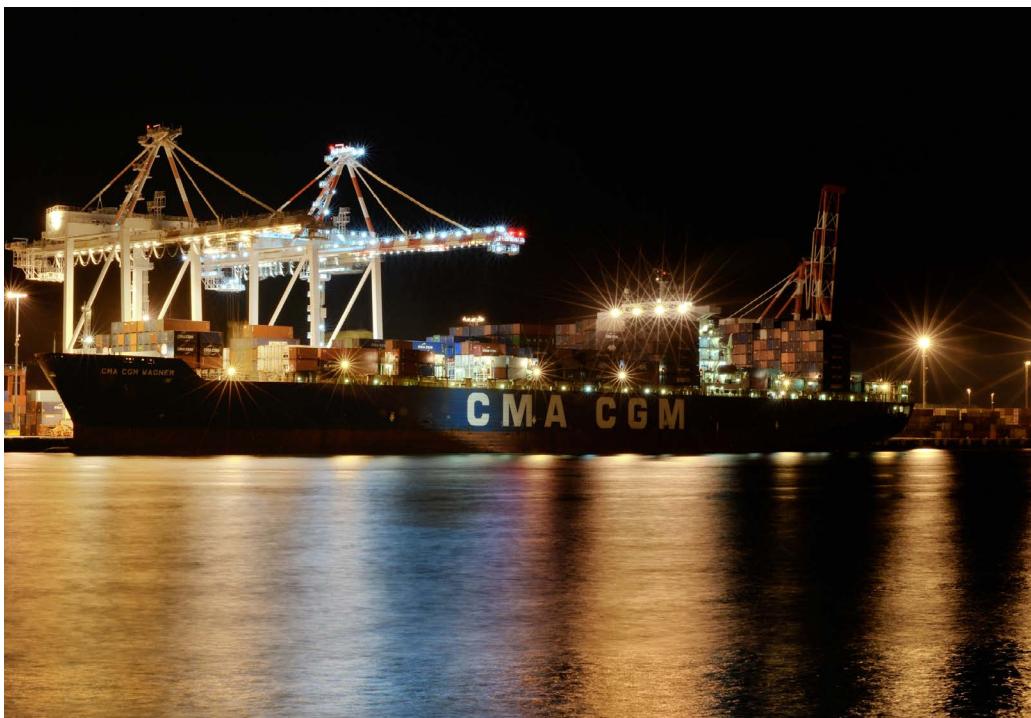
Services. Scheduled short-haul and long-haul rail container services between Botany and the hinterland include:

- Yennora, Cooks River, Minto and Enfield;
- logs and grain from Kelso (Southern Shorthaul Railroad; Pacific National);
- logs from Goulburn (Qube);
- reefer containers carrying processed meat, and grain in standard containers from Dubbo (Fletcher Export International/Southern Shorthaul Railroad; Qube);
- specialised grain transport from Coonamble (Qube);
- and agricultural produce from Nevertire, Warren, Warren South, Trangie, Narrabri, Wee Waa, Narromine and Forbes (Qube; Genesee & Wyoming; Sydney Rail Services);
- paper products and grain from Harefield (Qube);

- aluminium, logs and agricultural produce from Walsh Point, Carrington and Sandgate [Newcastle] (Qube and Crawfords Freightlines/Sydney Rail Services).

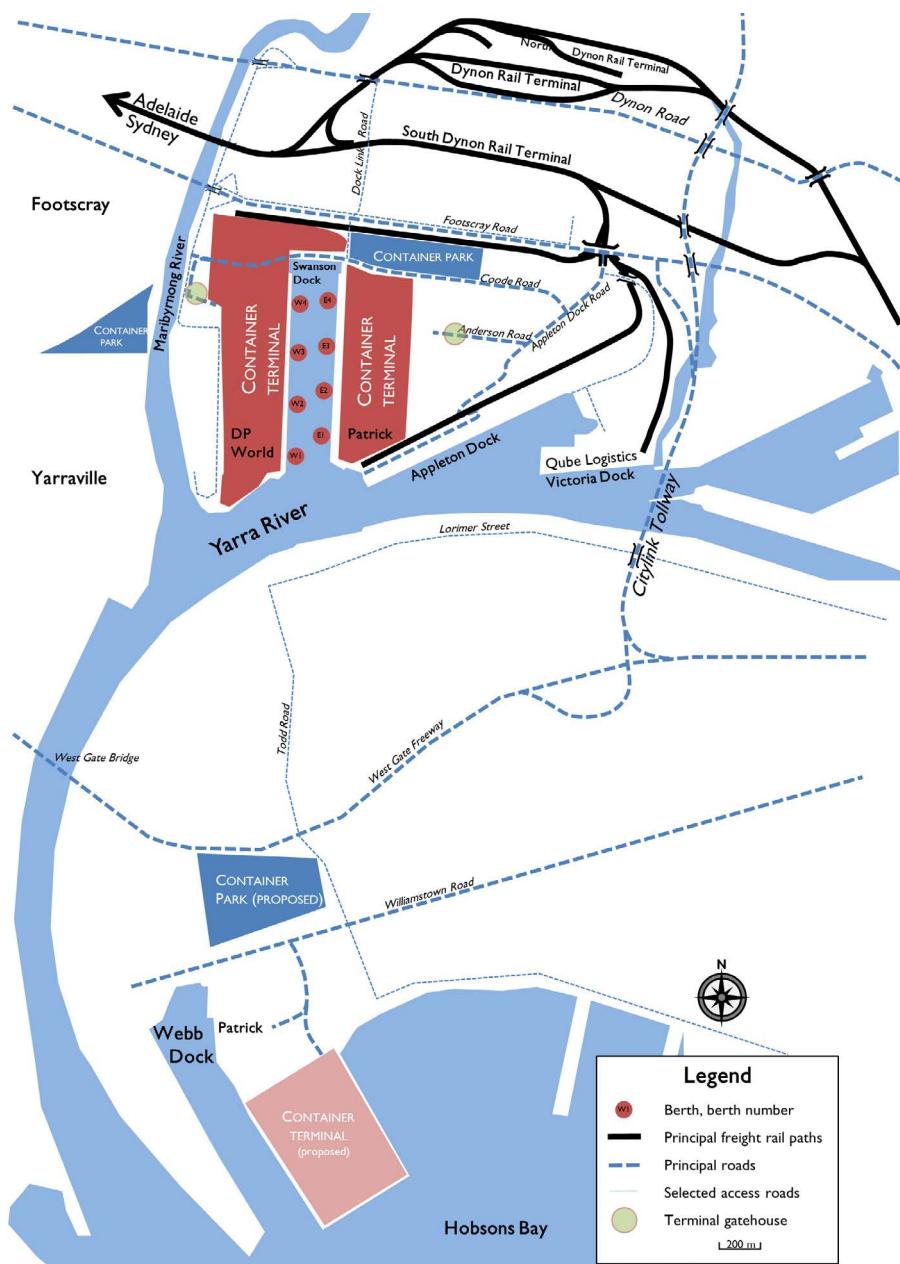
Rail access. Railway sidings at Botany Yard are used to regulate train entry to the port; to split trains, where necessary, for onwards movements to the port, and to re-form trains from port-terminal wagon rakes for movements to Cooks River, Enfield and beyond.

National and regional rail connections. The port is linked to the intrastate and interstate rail network, including the Southern Sydney Freight Line, and the Northern Sydney Freight Corridor via the Metropolitan Freight Network (including the Port Botany Goods Line).



CMA CGM Wagner berthed at DP World terminal, Fremantle Inner Harbour. Photo courtesy of Fremantle Ports.

Melbourne



(Last updated: November 2014)

Melbourne (Swanson, Appleton and Victoria Dock terminals)

The Port of Melbourne is operated by Port of Melbourne Operations Pty Ltd on behalf of the Lonsdale Consortium, which holds a 50-year lease of the State-owned assets at the port.

Dockside

Stevedores. DP World's container terminal is at Swanson Dock West. Patrick has a container terminal 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 long-haul rail services shifting containers include:

- rice from Deniliquin to Victoria Dock sidings (Qube, broad gauge);
- paper products from Maryvale to Victoria Dock sidings (Qube, broad gauge);
- milk products from Shepparton/Mooroopna to Victoria Dock sidings (Qube, broad gauge);
- meat and milk products from Westvic/Warrnambool to Appleton Dock (Pacific National, broad gauge);

- grain and other agricultural products from Tocumwal to Appleton Dock (Pacific National and Qube, broad gauge);
- cotton, wine and agricultural products, including fruit in reefer containers, from Merbein/Mildura to Appleton Dock (Pacific National, broad gauge);
- grain and other agricultural products from Dooen to West Swanson Dock (SCT/Wimmera Container Line, standard gauge);
- cotton, beverages, meat and agricultural products from Griffith, Wumbulgal, Leeton and Ettamogah to Appleton Dock (Pacific National, standard gauge).

Port rail containers also arrive by road shuttles from the Dynon railway terminals.

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.

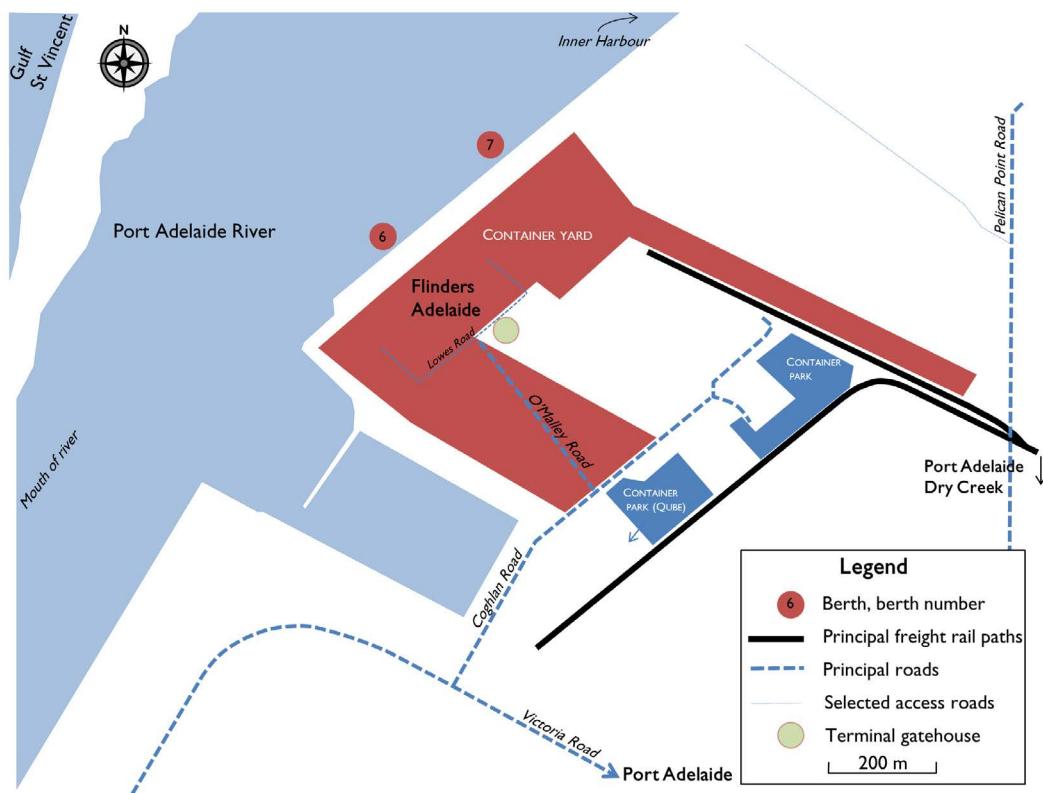
Of the five container ports represented here, the Port of Melbourne is unique in the proximity of intermodal terminals near to the docks as well as the on/near-dock facilities.

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.



MSC Ilona berthed at Patrick terminal in Fremantle Inner Harbour. Photo courtesy of Fremantle Ports.

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



(Last updated: November 2014)

Adelaide (Flinders 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, 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 facilities use berths 6 and 7.

Equipment. The terminal has four travelling container-handling cranes: three post-Panamax and one Panamax.

Road

Flinders Adelaide Container Terminal is accessed via O'Malley Road, leading from Cogħlan Road

Rail

Facilities. The Outer Harbor terminal has two sets of standard-gauge rail sidings. Two sidings, each of 640 metre length, serve the Flinders Adelaide Container Terminal. The other set of sidings serve the Qube Logistics terminal and container park.

Services. Scheduled railed movements to the dockside include:

Short-haul:

- Penfield (Direk) to Flinders Adelaide (SCT Logistics).

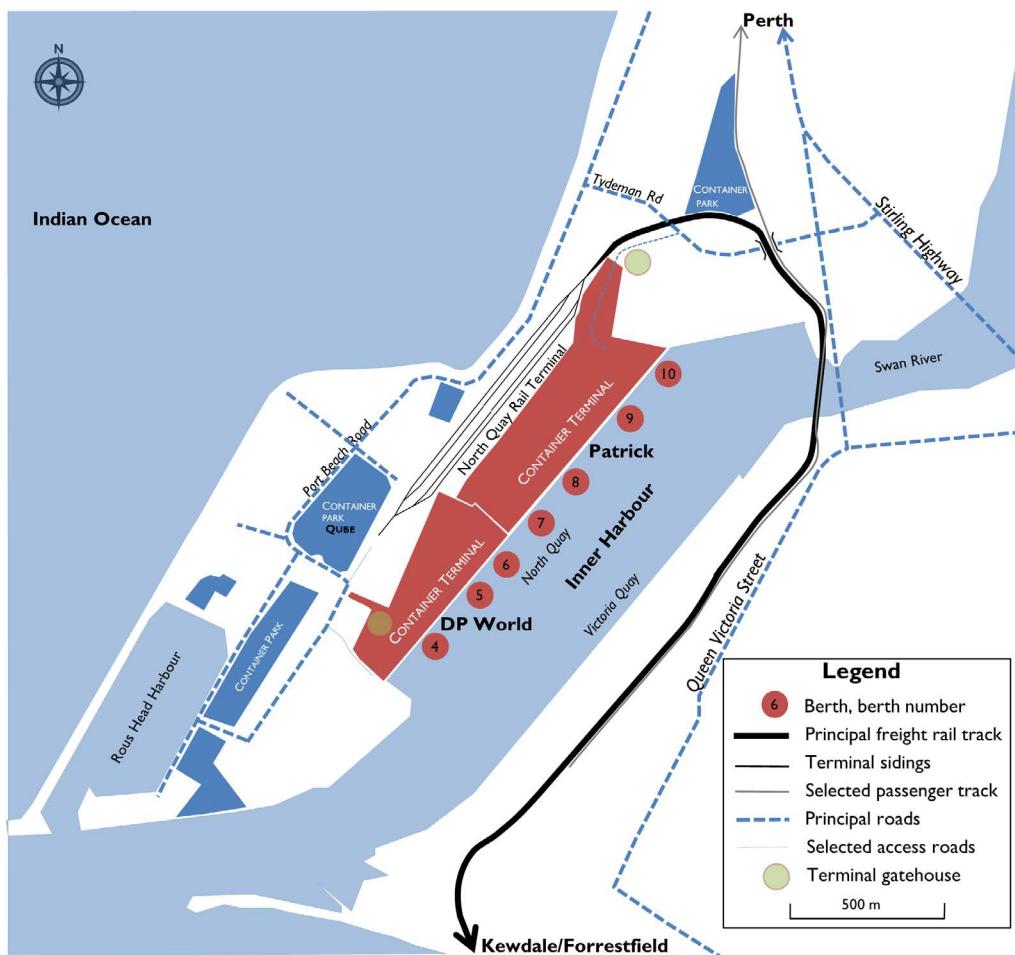
Long-haul:

- containerised lead from Port Pirie, agricultural products from Bowmans Intermodal Terminal, via Port Flat. (Patrick PortLink SA);
- bulk grain from various producers. Some of this is containerised at Viterra's (ABB) grain loader (inverter) for export;
- copper concentrates from Prominent Hill.

Rail linkages. The Outer Harbor facility is at the extremity of a freight-only railway between Outer Harbor, Port Adelaide and Dry Creek.

National rail connections. The Outer Harbor–Dry Creek line connects with the interstate network at Dry Creek. Nearby intermodal terminals include the Aurizon terminal at Port Flat, the Genesee and Wyoming terminal at Dry Creek, the Pacific National terminal at Islington and the SCT Logistics terminal at Penfield.

Fremantle (North Quay Terminals in the Inner Harbour)



(Last updated: August 2016)

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.

Equipment. The Patrick terminal has 4 cranes, of which 3 are post-Panamax; the DP World terminal has 3 cranes, including 2 post-Panamax. DP World commissioned its second post-Panamax crane in April 2015.

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. (Intermodal Link Services/SCT)

Long-haul:

- lead and nickel matte from Leonora and Kalgoorlie. (Aurizon)

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.

References

Australian Bureau of Statistics (ABS) 2017. *Australian National Accounts: National Income, Expenditure and Product*, Dec 2016, 'Table 24. Selected Analytical Series', time series spreadsheet, cat. no. 5206.0.

Australian Competition and Consumer Commission (ACCC) 2016. *Container stevedoring monitoring report 2015-16*, November 2016, Canberra.

Bureau of Transport and Communications Economics, 1993, *Port Interface Cost Index*, Report 84, BTCE, Australian Government Publishing Service, Canberra.

Containerchain Pty Ltd 2017. (unpublished data).

DP World 2017. (unpublished data).

Flinders Adelaide Container Terminal 2017. (unpublished data).

Fremantle Ports 2017. (unpublished data).

Hutchison Ports Australia 2017. (unpublished data).

Maritime Safety Queensland 2017. (unpublished data).

NSW Ports 2017. (unpublished data).

Patrick 2017. (unpublished data).

Port Authority of New South Wales 2017. (unpublished data).

Flinders Ports 2017. (unpublished data).

Port of Brisbane Pty Ltd 2017. (unpublished data).

Port of Melbourne Operations Pty Ltd 2017. (unpublished data).

Ports Australia 2015. (unpublished data).

SA Track and Signal 2014, Australian railway track and signal drawings and signal locations, (Online railway and port maps) <http://www.sa-trackandsignal.net/>.

Appendix A • Maps of five major Australian container ports



www.bitre.gov.au
