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## **Waterline 45**

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# Foreword

*Waterline* reports on trends in container handling productivity on the waterfront in Australia as well as the cost of importing and exporting containers. It covers both the unloading of container ships and the transport of containers from container terminals. This *Waterline* provides the latest data available on stevedoring productivity and landside performance. Some of the data series used for this publication are available as spreadsheets on the BITRE website [www.bitre.gov.au](http://www.bitre.gov.au). This publication provides information on freight movements on both the wharfside and the landside of five Australian major port terminals: Brisbane, Sydney, Melbourne, Adelaide and Fremantle. This issue covers port terminal activity up to the June quarter 2008.

*Waterline* is prepared in the Maritime and Rail Statistics Section by Tony Carmody under the supervision of Godfrey Lubulwa and was desktop published by Kerry Rose.

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

- Ports Australia
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- Queensland Transport
- shipping lines
- customs brokers
- road transport operators
- pilot, tug and mooring operators
- stevedoring companies: Patrick and DP World
- Office of Transport Security of the Department of Infrastructure, Transport, Regional Development and Local Government.

Download this issue of *Waterline* and back issues, including selected time series data in Excel spreadsheet format, from [www.bitre.gov.au](http://www.bitre.gov.au).

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April 2009



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# In brief

The introductory article at the start of this publication discusses a proposal for *Waterline* to begin covering indicators of performance in Australia's bulk ports.

## Landside of port terminal

- The five port total of containers moved increased from 838 405 in the March quarter 2008 to 864 190 in the June quarter 2008, an increase of 3.1 per cent (Chapter 1).
- The five port average container turnaround time was 25.1 minutes in the March quarter 2008 and 24.0 minutes in the June quarter 2008 (Chapter 1).
- The five port total of trucks processed increased from 461 746 in the March quarter 2008 to 482 235 in the June quarter 2008, an increase of 4.4 per cent (Chapter 1).
- The five port average truck turnaround time was 39.1 minutes in the March quarter 2008 and 38.0 minutes in the June quarter 2008 (Chapter 1).
- The five port total of vehicle booking system slots used increased from 546 152 in the March quarter 2008 to 567 555 in the June quarter 2008 (Chapter 1).

## Wharfside of port terminal

- The five port average crane rate increased from 27.3 containers per hour in the March quarter 2008 to 27.5 containers per hour in the June quarter 2008 (Chapter 2).
- The five port average vessel working rate has decreased over the period from 39.8 containers per hour in the March quarter 2008 to 39.1 in the June quarter 2008 (Chapter 2).
- The five port total of container moves increased from 949 324 in the March quarter 2008 to 977 870 in the June quarter 2008 (Chapter 2).
- The national Port Interface Cost Index for exporting a container for ships in the 35 000 to 40 000 GT range was \$590 per TEU in 2001 constant prices for July–December 2007 and \$620/TEU in January–June 2008 (Chapter 3).
- Total ship visits increased by 2.0 per cent for the financial year ended 30 June 2008 (Chapter 4).
- In January–June 2008, total cargo throughput was 63.8 million tonnes and total container traffic 2.859 million twenty foot equivalent units (Chapter 5).

- The tonnage of cargo estimated to be moved under coastal permits decreased from 16.0 million tonnes in the financial year 2006–2007 to 15.8 million tonnes in the financial year 2007–2008 (Chapter 7).
- Harbour towage charges increased at all of the five major ports during the financial year 2007–08 (Chapter 8).

# Performance indicators for bulk shipping

To date *Waterline* has reported on the key trends in the waterfront and landside dimensions of Australian container port terminal performance. The Bureau of Infrastructure, Transport and Regional Economics (BITRE) is now considering extending the indicators for regular publication to bulk shipping. The proposal follows maritime reporting developments in Europe and Canada (Olivier 2008) and in the United States of America (National Retail Federation 2008).

This paper briefly examines the possible extension of the coverage of *Waterline* indicators to include bulk shipping and opens for discussion which bulk commodities and port authorities to include in the collection of data on bulk shipping.

Potential bulk shipping indicators are listed in the table 'Potential Indicators'.

## Why bulk shipping indicators?

The reasons for extending the indicators to cover bulk shipping include the following:

- The size of the share of bulk shipping in Australia's maritime industry is significant. In 2006–07, non-containerised trade, which comprises mainly bulk freight, was 97.5 per cent by weight and 70.5 per cent by value of Australia's maritime trade estimated to be 656 million tonnes and \$142.4 million respectively in that year. The current focus of *Waterline* on containerised trade leaves out an important part of maritime trade data.
- Where data is provided for analysis there may be opportunities for productivity improvements at some bulk ports, for example, by reducing vessel queues and the length of time vessels spend in a port.
- Some bulk ports are experiencing congestion leading to higher demurrage costs and reduced capacity of Australian exporters to fulfil export demand.
- There may also be opportunities to improve the functioning of the whole transport logistic chain. Bulk ports are significant links in transport chains for Australia's exports. Data on an appropriate set of indicators could provide a greater understanding of where bottlenecks lie, which in turn could deliver benefits to ports and port authorities and to their various customers on both the wharfside and landside. For example, Pincus and Ergas (2008) refer to the Goonyella Coal Chain Review which estimated that approximately A\$1.2 billion per year was being lost in foregone revenue and demurrage costs from the Goonyella Coal Chain alone.
- Data is needed to inform decisions on investment in infrastructure. Information about supply of bulk port capacity, bottlenecks, demand for port services and related data will inform decisions on priorities for investment in maritime infrastructure.

## Which commodities and port authorities are in scope?

The selection of commodities and port authorities to survey is based on International Cargo Statistics (ICS). ICS is prepared by the Australian Bureau of Statistics from data provided by Australian Customs. It includes all commodities, exports and imports that are subject to customs duty.

A port would be selected if it processes a sizeable volume of a bulk commodity. The cut-off by weight for each bulk commodity is proposed to be a minimum of 2 million tonnes of port throughput per year. A bulk commodity should also form a sizeable share of a port's business—at least 50 per cent of the port's throughput. These conditions limit reporting to the larger ports and on the larger volume commodities thereby giving maximum possible commodity coverage while minimising respondent burden. It is proposed that the ports that meet these criteria be reviewed annually. While these cut-offs are arbitrary they lead to a manageable sample size of thirteen ports.

It is proposed that the request for data be limited to export commodities because this is where most bulk freight movements occur. Monitoring the efficiency of container port terminals already provides information on the import side of the maritime freight sector.

Data for 2006–07 is used to develop an initial selection of commodities and ports. Australia's six largest (by volume) bulk commodities are being considered:

- iron ore and concentrates
- coal, coke and briquettes
- aluminium ores, concentrates and alumina
- cereals and cereal preparations
- cork and wood.

The table 'Bulk Ports and the Main Bulk Commodity the Port Handles, 2006–07' shows the quantities of these commodities and the Australian ports which processed them in 2006–07. The table also shows that 13 ports meet the criteria for inclusion in the sample: (a) they each handle individual bulk (main) commodities with a throughput of 2 million tonnes or more a year and (b) the main commodity contributes at least 50 per cent of the annual port throughput. While the top 8 largest ports process about 82 per cent of Australia's bulk freight, the 13 ports in the sample process 85.5 per cent of all bulk freight in Australia. For Dampier, Port Hedland, Port Walcott and Port Yampi Sound, all four Western Australian ports, and Whyalla in South Australia, *iron ore and concentrates* is more than 82 per cent of each port's annual throughput. Similarly for Abbot Point in Queensland *coal, coke and briquettes* is more than 90 per cent of port throughput, while Weipa in Queensland specialises in *aluminium ores, concentrates and alumina*.

## Bulk ports and the main bulk commodity the port handles, 2006–07

Bulk port	Operator	Total throughput of port (million tonnes)	Main bulk freight handled in port (per cent)	Main bulk commodity	Main commodity as percent of total throughput	Cumulative share of total bulk
Ports proposed in the sample						
1. Dampier—WA	Rio Tinto	125.7	103.5	Iron ore and concentrates	82.3	19.1
2. Port Hedland—WA	BHP Billiton Iron Ore & Fortescue	106.8	102.4	Iron ore and concentrates	95.9	35.4
3. Hay Point/ Dalrymple Bay—Qld	Hay Point-Babcock Brown; Dalrymple Bay-BHP Billiton	86.4	72.7	Coal, coke and briquettes	84.2	48.6
4. Newcastle—NSW	Newcastle Port Corporation	82.5	63.5	Coal, coke and briquettes	77.0	61.1
5. Gladstone—Qld	Gladstone Ports Corporation	54.7	34.3	Coal, coke and briquettes	62.8	69.5
6. Port Walcott—WA	Also known as Cape Lambert port; owned by Robe River Iron Associates and operated by Pilbara Iron	53.9	53.9	Iron ore and concentrates	100.0	77.7
7. Port Kembla—NSW	Port Kembla Port Corporation (Government)	13.9	9.7	Coal, coke and briquettes	69.5	79.8
8. Abbot Point—Qld	Ports Corporation of Queensland	11.2	11.1	Coal, coke and briquettes	99.4	81.5
9. Fremantle/Perth—WA	Fremantle Port Authority	10.1	3.8	Cereals and cereal preps.	37.7	83.0
10. Bunbury—WA	Bunbury Port Authority	10.0	1.4	Cork and wood	14.0	84.6
11. Brisbane—Qld	Ports of Brisbane Corporation	9.3	4.2	Coal, coke and briquettes	44.9	86.0
12. Esperance—WA	Esperance Port Authority	9.3	7.5	Iron ore and concentrates	81.1	87.4
13. Weipa—Qld	Rio Tinto Aluminium operates the port facilities	6.2	6.2	Aluminium ores and concentrates; alumina	100.0	88.3
Other ports not to be in the sample						
14. Geraldton—WA	Geraldton Port Authority	6.0	3.5	Iron ore and concentrates	57.5	89.2
15. Launceston—Tas	Port of Launceston	3.3	2.8	Cork and wood	84.0	89.7
16. Albany—WA	Albany Port Authority	3.3	1.4	Cork and wood	43.0	90.2
17. Cape Cuvier—WA	Private; Dampier Salt Limited	2.6	1.1	Crude minerals	41.7	90.6
18. Geelong—Vic	Controlled by Victorian Regional Channels Authority	2.3	1.3	Cork and wood	56.8	91.0
19. Whyalla—SA	Onesteel Whyalla Steel works	2.2	2.2	Iron ore and concentrates	98.8	91.3
20. Portland—Vic	Port of Portland Propriety	1.8	1.3	Cork and wood	72.4	91.6
21. Yampi Sound—WA		1.5	1.5	Iron ore and concentrates	100.0	91.8
22. Burnie—Tas	Tasmania Ports Corporation	1.5	1.3	Cork and wood	87.6	92.0
23. Twofold Bay/ Eden—NSW	Port of Eden Authority	1.3	1.3	Cork and wood	100.0	92.2
24. Other ports	Not applicable	50.9	68.1	na	na	na
Total Australia		656.5	559.9	na	na	na

na not applicable

Note: Ports are excluded from regular reporting because either the port's throughput for the main bulk commodity was less than 2 million tonnes in 2006–07 or the share of the main bulk commodity in total port throughput was less than 50 per cent.

Source: BITRE computations based on ABS International Cargo Statistics, unpublished.

The table below shows the task indicators and performance indicators proposed. The first four are task indicators and the next four are performance indicators. The last five indicators are proposed because bulk ports are often part of integrated operations with bottlenecks a result of broader elements of the supply chain, rather than port infrastructure and practices; these indicators relate to rail but they could be re-defined for road.

Potential Indicators

Indicator	Scope	Units
Port's total throughput—each quarter	All freight	Tonnes
Port's total bulk freight loaded—each quarter	All bulk	Tonnes
Port's total main bulk freight loaded—each quarter	The main commodity handled at the port	Tonnes
Port's design capacity for main bulk freight loaded—each quarter	Main bulk commodity handled at port	Tonnes
Port's utilisation rate for main bulk freight loaded—each quarter	Main bulk commodity handled at port	Per cent, average for quarter
Port's load rate for main bulk freight loaded	Main bulk commodity handled at port	Tonnes per hour
Number of vessels loaded with main bulk commodity handled at port, each quarter	Main bulk commodity handled at port	Count of vessels by size of vessel
Average vessel turnaround time for vessels loaded with main bulk commodity handled at port	Main bulk commodity handled at port	Hours
Capacity of rail system servicing a port	For ports dependent on rail system for freight movements	Tonnes that can be hauled by rail to port
Train payload delivered/payload designed	Main bulk commodity handled at port	Fraction
Train unload times	Main bulk commodity handled at port	Hours
Train turnaround times	Main bulk commodity handled at port	Hours
Unload pit utilisation	Main bulk commodity handled at port	Fraction

Confidentiality

BITRE respects commercial-in-confidence data. Thus the indicators proposed will be reported in aggregated form, to the greatest possible extent, to ensure the confidentiality of underlying data. Most of the indicators published in *Waterline* are reported as weighted averages. If it is not possible to aggregate data—for example where there is only one operator—publication of data will only occur with permission from the data provider. An alternative, for discussion, where the number of respondents is small, may be to report averages across a number of ports handling the same commodity.

## Reporting frequency

Data on the wharfside and landside of container port terminals is currently collected by data providers on a quarterly basis but reported to BITRE twice a year. It is proposed that the same arrangement is adopted for the bulk shipping indicators.

This would be an ongoing commitment for each port included in the sample.

## Comments

BITRE would like comments as part of the process of developing the new indicators. Comments could cover among other things whether there should be other indicators considered and whether there are data sources that can be used in constructing the indicators. Transmit comments to [waterline@infrastructure.gov.au](mailto:waterline@infrastructure.gov.au) by 31 May 2009.

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# Chapter 1      Landside performance indicators

This chapter reports on landside port terminal indicators at the five capital city port terminals. There are three types of indicators:

- indicators of size of task at the landside of port terminals
- performance indicators
- indicators of activity in the vehicle booking system.

The size of task-performed indicators include the total number of trucks, the number of containers and the number of twenty-foot equivalent units (TEUs) processed in a quarter. They also include the number of containers loaded on or unloaded from rail in a quarter.

The landside of port terminal performance indicators are: the average number of containers per truck, the average TEUs per truck, container turnaround time and average truck turnaround time.

This chapter also discusses three Vehicle Booking System (VBS) indicators: the number of VBS slots available, the number of VBS slots used and the adjusted usage rates for VBS slots.

An explanation of terms is provided in Appendix B.

## Results: five ports

Table 1.1 presents the new data for the March quarter 2008 and the June quarter 2008 on landside of port terminal performance indicators at the five major Australian container ports. Figure 1.1 presents the landside task indicators for the March and June quarters of 2008.

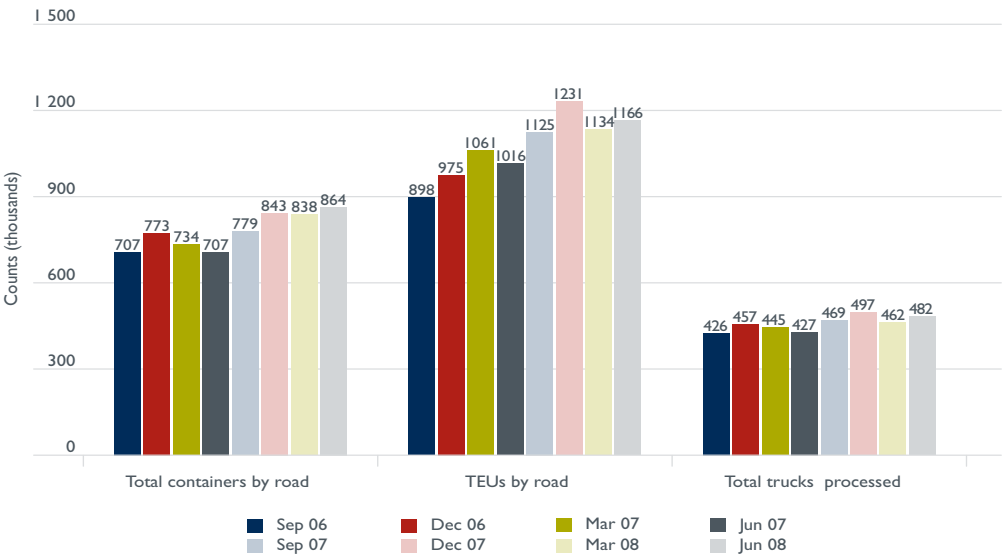
In summary:

- The five port average container turnaround time improved from 25.1 minutes in the March quarter 2008 to 24.0 minutes in the June quarter 2008. This means a potential saving of resources to the road transport industry of approximately 264 hours per day in the June quarter.
- The five port average truck turnaround time also improved from 39.1 minutes in the March quarter 2008 to 38.0 minutes in the June quarter 2008. This means a potential saving of resources to the road transport industry of approximately 147 truck hours per day in the June quarter.
- The five port average of containers per truck was 1.7 in both the March quarter 2008 and the June quarter 2008.

- The five port total of trucks processed at the five ports increased from 461 764 in the March quarter 2008 to 482 235 in the June quarter 2008, an increase of 4.4 per cent.
- The five port total of containers moved increased from 838 405 in the March quarter 2008 to 864 190 in the June quarter 2008, a increase of 3.1 per cent.
- The five port total of TEUs moved increased from 1 134 438 in the March quarter 2008 to 1 165 539 in the June quarter 2008, an increase of 2.7 per cent.
- The five port total of VBS slots used increased from 546 152 in the March quarter 2008 to 567 555 in the June quarter 2008.
- The five port adjusted usage rates of VBS slots in the March and June 2008 quarters were respectively
  - Monday to Friday Night shift 13.7 and 14.4 per cent
  - Monday to Friday day shift 59.8 and 59.6 per cent
  - Monday to Friday evening shift 20.4 and 20.1 per cent
  - Saturday 4.8 and 4.6 per cent
  - Sunday 1.3 and 1.3 per cent

As before, the Monday to Friday day shift is the most popular time for picking up or dropping off containers at port terminals.

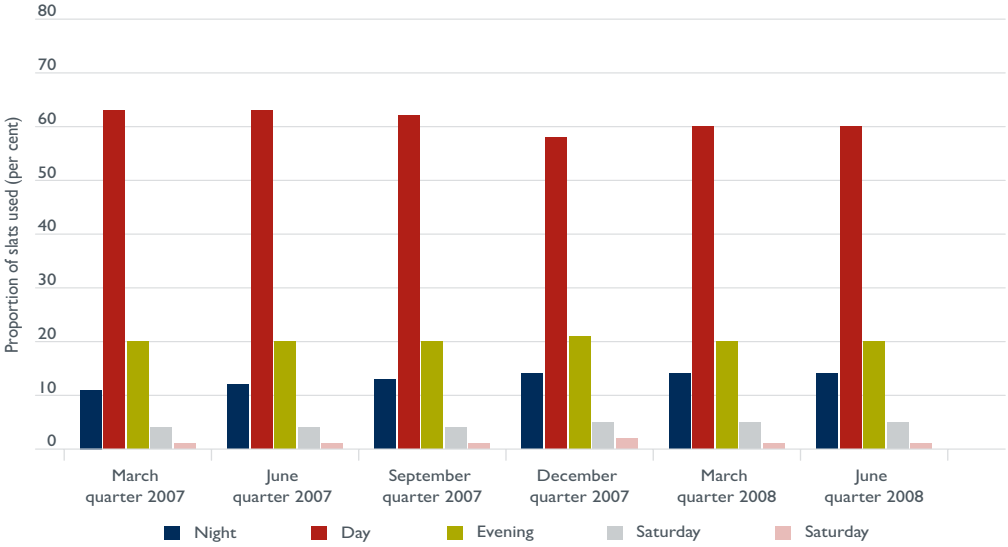
**Figure 1.1 Five ports: landside of container terminal size of task indicators**



Note: The counts of containers by road, TEUs by road and trucks processed include operations under the vehicle booking system and bulk runs.

Sources: Patrick 2008a and DPWorld 2008.

**Figure 1.2 Five ports: adjusted vehicle booking system time usage 2007–2008**



Note: The definitions of the time windows are as follows: Night (2400–0600 Monday to Friday), Day (0600–1800 Monday to Friday) and Evening (1800–2400 Monday to Friday).

Sources: Patrick 2008a and DP World 2008.

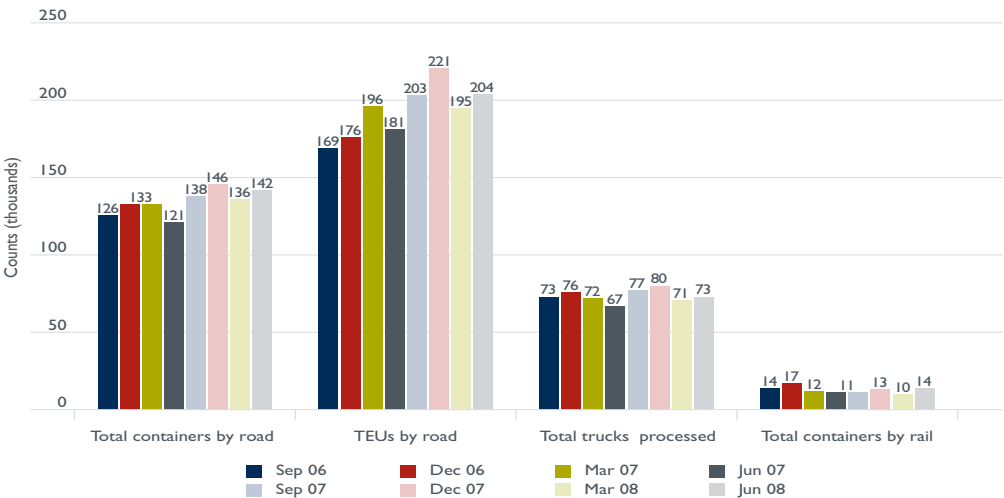
## Individual ports

The rest of the chapter presents the landside task indicators for Brisbane, Sydney, Melbourne, Adelaide and Fremantle respectively. The data for Brisbane, Sydney, Melbourne and Fremantle use weighted averages for the container terminals operated by DP World and Patrick.

### Brisbane

The Brisbane (DP World, Patrick) average container turnaround time decreased from 26.9 minutes in the March quarter 2008 to 25.4 minutes in the June quarter 2008. The truck turnaround time decreased from 48.4 minutes in the March quarter 2008 to 47.3 minutes in the June quarter 2008. The total number of trucks increased by 2.6 per cent from the March to the June quarters 2008 and the total TEUs increased by 4.6 per cent over the same period. Total containers moved increased from the March to the June quarters by 4.8 per cent.

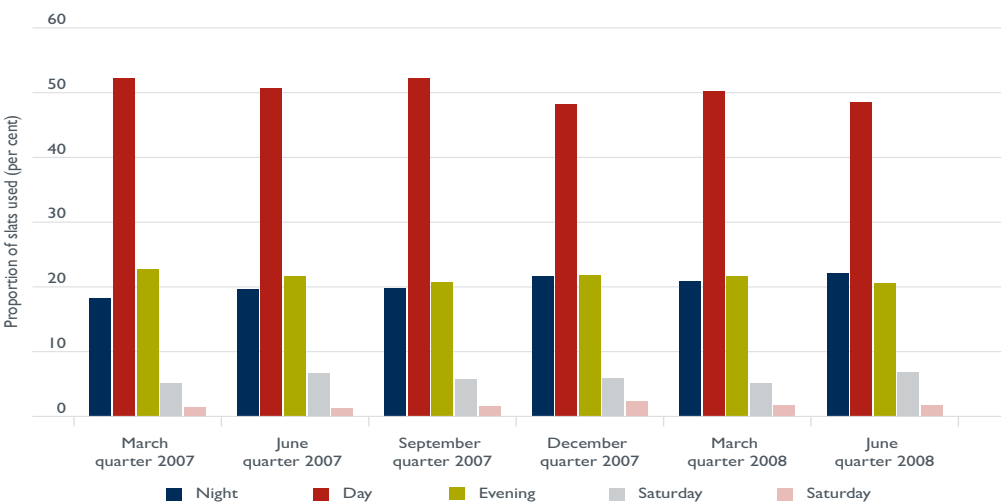
**Figure 1.3 Brisbane: landside of container terminal size of task indicators**



Note : The counts of containers by road, TEUs by road and trucks processed include operations under the vehicle booking system and bulk runs.

Sources: Patrick 2008a and DPWorld 2008.

**Figure 1.4 Brisbane: adjusted vehicle booking system time usage 2007–2008**



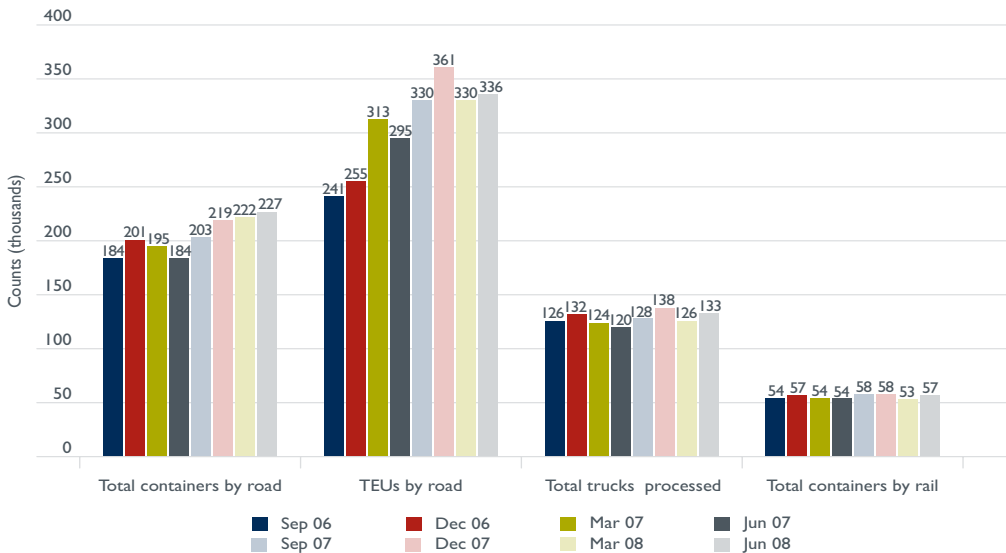
Note: The definitions of the time windows are as follows: Night (2400–0600 Monday to Friday), Day (0600–1800 Monday to Friday) and Evening (1800–2400 Monday to Friday).

Sources: Patrick 2008a and DPWorld 2008.

## Sydney

The Sydney (DP World, Patrick) average container turnaround time increased from 34.8 minutes in the March quarter 2008 to 35.5 minutes in the June quarter 2008. The truck turnaround time decreased from 45.8 minutes in the March quarter 2008 to 44.1 minutes in the June quarter 2008. The number of trucks processed increased by 5.9 per cent from the March to the June quarters 2008 and the total TEUs increased by 1.7 per cent. Over the same period total containers moved increased by 2.4 per cent.

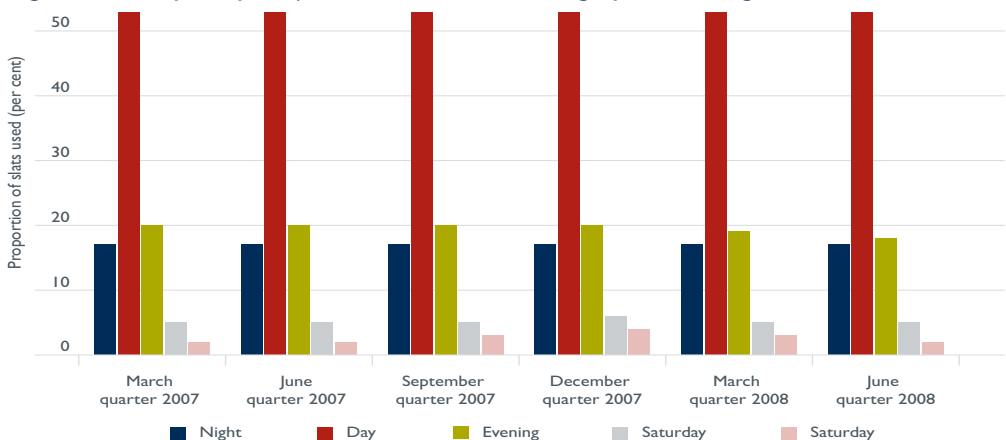
**Figure 1.5 Sydney: landside of container terminal size of task indicators**



Note: The counts of containers by road, TEUs by road and trucks processed include operations under the vehicle booking system and bulk runs.

Sources: Patrick 2008a and DPWorld 2008.

**Figure 1.6 Sydney: adjusted vehicle booking system usage 2007–2008**



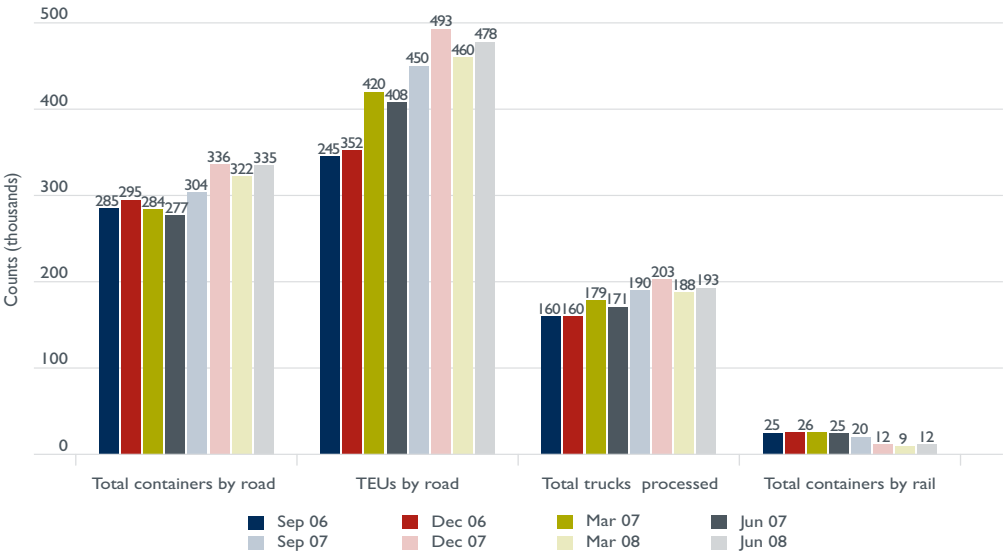
Note: The definitions of the time windows are as follows: Night (2400–0600 Monday to Friday), Day (0600–1800 Monday to Friday) and Evening (1800–2400 Monday to Friday).

Sources: Patrick 2008a and DPWorld 2008.

Melbourne

The Melbourne (DP World, Patrick) average container turnaround time was 17.2 minutes in the March and June quarters 2008. The truck turnaround time increased from 28.3 minutes for the March quarter to 28.5 minutes in the June quarter 2008. The number of trucks processed increased by 2.6 per cent from the March to the June quarters 2008 and the total TEUs increased by 3.9 per cent. Over the same period total containers moved also increased by 4.0 per cent.

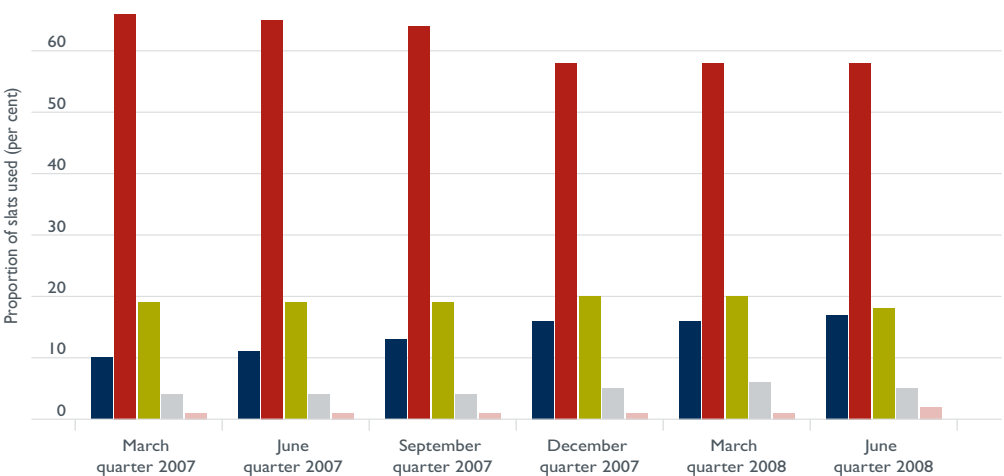
Figure 1.7 Melbourne: landside of container terminal size of task indicators



Note: The counts of containers by road, TEUs by road and trucks processed include operations under the vehicle booking system and bulk runs.

Sources: Patrick 2008a and DPWorld 2008.

Figure 1.8 Melbourne: adjusted vehicle booking system time usage 2007–2008



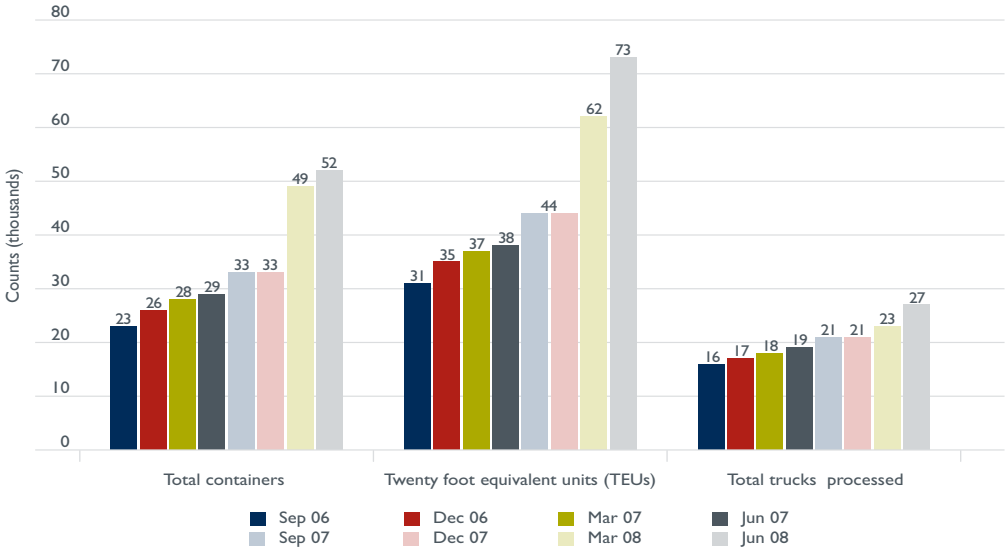
Note: The definitions of the time windows are as follows: Night (2400–0600 Monday to Friday), Day (0600–1800 Monday to Friday) and Evening (1800–2400 Monday to Friday).

Sources: Patrick 2008a and DPWorld 2008.

### Adelaide

The Adelaide (DP World) average container turnaround time decreased from 29.3 minutes in the March quarter 2008 to 22.5 minutes in the June quarter 2008. The truck turnaround time decreased from 46.8 minutes in the March quarter 2008 to 35.4 minutes in the June quarter 2008. The total number of trucks processed increased by 16.9 per cent from the March quarter 2008 to the June 2008 and the total TEUs increased by 18.2 per cent. Over the same period total containers moved increased by 5.1 per cent.

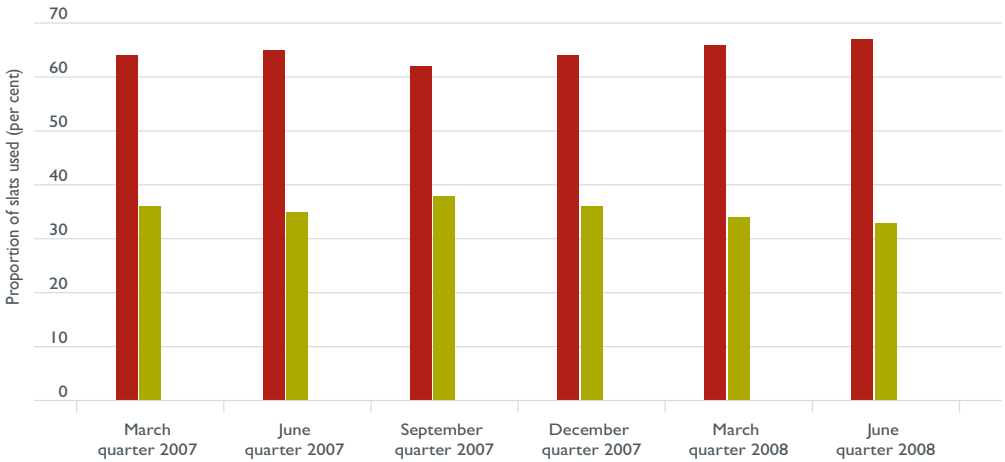
**Figure 1.9 Adelaide: landside of container terminal size of task indicators**



Note: The counts of containers by road, TEUs by road and trucks processed include operations under the vehicle booking system and bulk runs.

Sources: Patrick 2008a and DPWorld 2008.

**Figure 1.10 Adelaide: adjusted vehicle booking system usage 2007–2008**



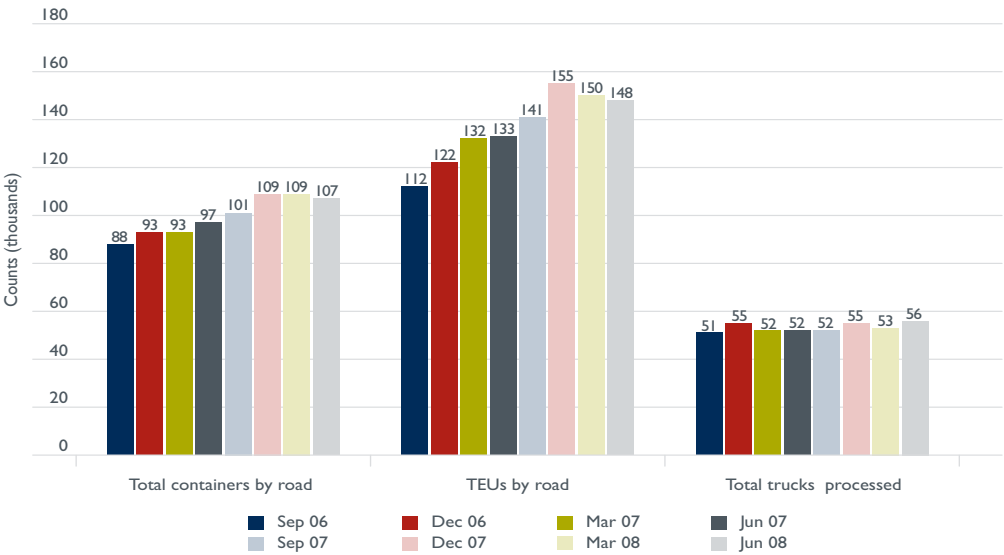
Note: The definitions of the time windows are as follows: Night (2400–0600 Monday to Friday), Day (0600–1800 Monday to Friday) and Evening (1800–2400 Monday to Friday).

Sources: Patrick 2008a and DPWorld 2008.

Fremantle

The Fremantle (DP World, Patrick) average container turnaround time increased from 18.3 minutes in the March quarter 2008 to 18.7 minutes in the June quarter 2008. The truck turnaround time decreased from 32.9 minutes in the March quarter 2008 to 32.0 minutes in the June quarter 2008. The total number of trucks processed decreased by 4.4 per cent from the March to the June quarters 2008 and the total TEUs decreased by 1.1 per cent. Over the same period total containers moved decreased by 1.2 per cent.

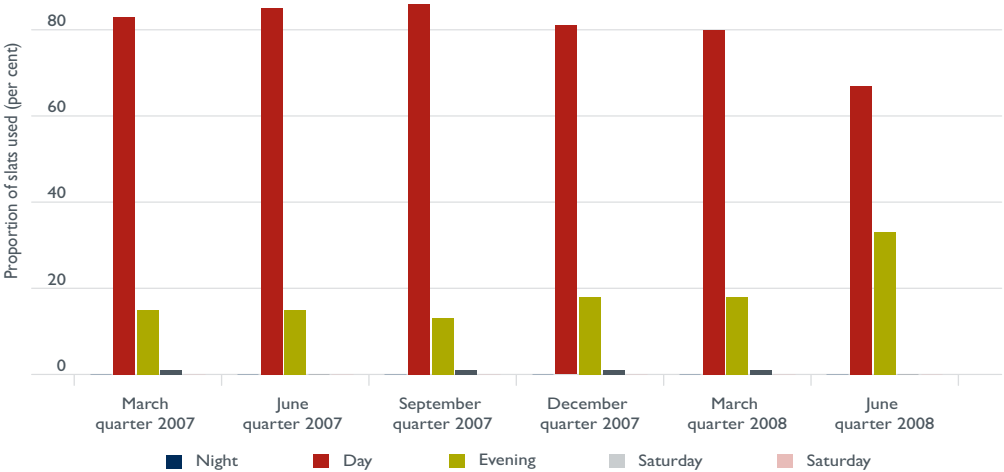
Figure 1.11 Fremantle: landside of container terminal size of task indicators



Note: The counts of containers by road, TEUs by road and trucks processed include operations under the vehicle booking system and bulk runs.

Sources: Patrick 2008a and DPWorld 2008.

Figure 1.12 Fremantle: adjusted vehicle booking system usage 2007–2008



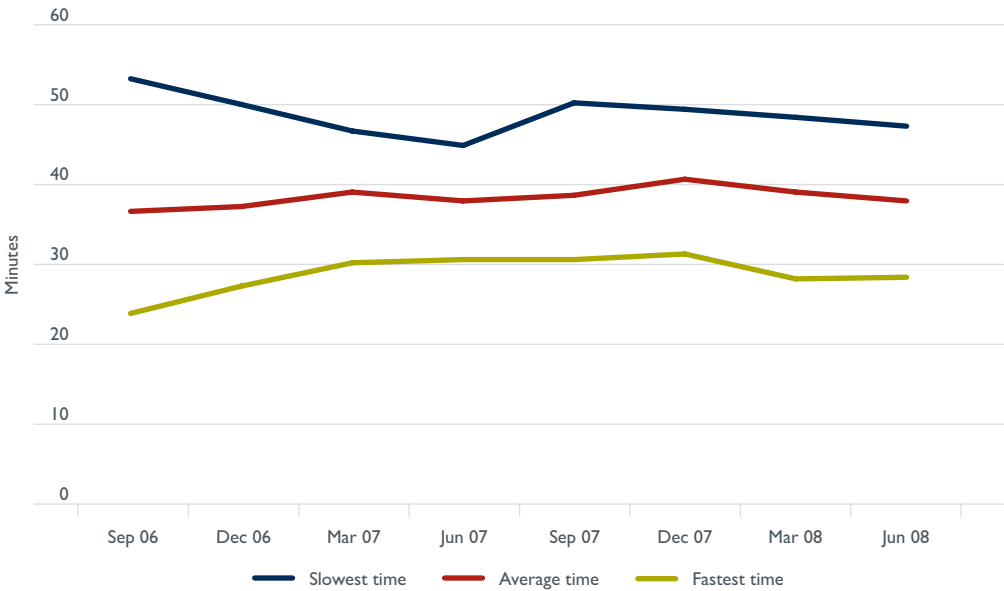
Note: The definitions of the time windows are as follows: Night (2400–0600 Monday to Friday), Day (0600–1800 Monday to Friday) and Evening (1800–2400 Monday to Friday).

Sources: Patrick 2008a and DPWorld 2008.

*Productivity of landside container movements*

Figure 1.13 and 1.14 chart the movements in the productivity achieved across the five ports in the movement of containers from the port container terminal by road. These figures are also presented in Table 1.1. Times vary from quarter to quarter and from port to port. Between the March quarter 2008 and the June quarter 2008 there has been a decrease in the median time taken for truck and container turnaround.

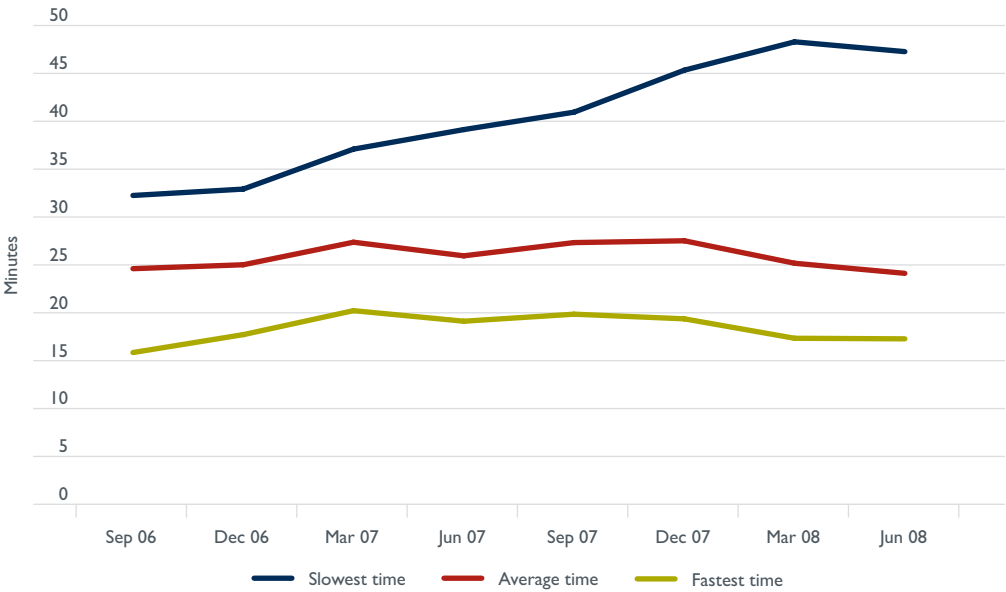
**Figure 1.13 Productivity of truck turnaround—five ports: fastest, average and slowest rates achieved**



Note: The upper and lower limit correspond to different port terminals in the various quarters.

Sources: Patrick 2008a and DP World 2008.

**Figure 1.14 Productivity of container turnaround—five ports: fastest, average and slowest rates achieved**



Note: The fastest and slowest rates correspond to different port terminals in the various quarters.

Sources: Patrick 2008a and DPWorld 2008.

**Table 1.1 Container terminal landside performance indicators**

Port/Indicator	Sep-06	Dec-06	Mar-07	Jun-07	Sep-07	Dec-07	Mar-08	Jun-08
<i>Five ports</i>								
<i>Road</i>								
Total trucks	425 706	457 328	445 368	428 738	469 111	497 247	461 764	482 235
Total containers	707 089	773 293	733 640	707 166	779 202	842 726	838 405	864 190
Total TEUs	898 483	974 557	1 060 989	1 016 001	1 124 964	1 230 910	1 134 438	1 165 539
Truck turnaround time – mins.	36.7	37.3	39.1	38.0	38.7	40.7	39.1	38.0
Containers per truck	1.5	1.4	1.6	1.6	1.6	1.6	1.7	1.7
Avg. container turnaround time – mins.	24.5	24.9	27.3	25.9	27.3	27.5	25.1	24.0
TEUs per truck	2.1	2.1	2.3	2.3	2.3	2.4	2.4	2.4
<i>Rail</i>								
Total containers	na	na	na	na	na	na	na	na
Number of VBS timeslots available								
Overall total			573 853	592 074	656 031	669 563	657 005	668 917
<i>Monday–Friday</i>								
Day (0600–1800)			326 434	333 425	362 893	362 538	358 091	366 142
Evening (1800–2400)			130 546	134 787	143 572	148 692	145 566	145 837
Night (2400–0600)			71 247	78 357	89 319	96 565	93 701	99 395
Subtotal			528 227	546 569	595 784	607 795	597 358	611 374
<i>Saturday</i>								
Day (0600–1800)			24 519	24 100	26 276	31 125	32 920	31 199
Evening (1800–2400)			3 251	3 149	3 058	3 313	3 172	4 084
Night (2400–0600)			5 532	6 216	9 671	8 156	7 362	7 398
Subtotal			33 302	33 465	39 005	42 594	43 454	42 681
<i>Sunday</i>								
Day (0600–1800)			2 438	2 146	6 585	5 358	3 250	1 527
Evening (1800–2400)			2 863	2 641	6 459	4 253	4 577	4 993
Night (2400–0600)			7 023	7 253	8 198	9 563	8 366	8 342
Subtotal			12 324	12 040	21 242	19 174	16 193	14 862
Number of VBS timeslots used								
Overall total			485 630	495 231	544 187	580 395	546 152	567 555
<i>Monday–Friday</i>								
Day (0600–1800)			308 126	313 340	337 500	338 231	326 571	338 318
Evening (1800–2400)			99 445	99 042	108 000	120 527	111 389	114 351
Night (2400–0600)			54 316	59 373	70 261	82 723	74 827	81 504
Subtotal			461 887	471 755	515 761	541 481	512 787	534 173
<i>Saturday</i>								
Day (0600–1800)			13 869	13 478	14 349	20 741	20 187	19 154
Evening (1800–2400)			597	515	546	910	625	944
Night (2400–0600)			3 458	4 471	5 575	6 071	5 641	5 877
Subtotal			17 924	18 464	20 470	27 722	26 453	25 975
<i>Sunday</i>								
Day (0600–1800)			610	169	1 120	2 365	839	771
Evening (1800–2400)			1 179	1 026	1 584	2 063	1 077	973
Night (2400–0600)			4 030	3 817	5 251	6 764	4 995	5 662
Subtotal			5 819	5 012	7 955	11 192	6 911	7 406

(continued)

**Table 1.1 Container terminal landside performance indicators (continued)**

<i>Port/Indicator</i>	<i>Sep-06</i>	<i>Dec-06</i>	<i>Mar-07</i>	<i>Jun-07</i>	<i>Sep-07</i>	<i>Dec-07</i>	<i>Mar-08</i>	<i>Jun-08</i>
<i>Brisbane</i>								
Road								
Total trucks	72 660	75 976	71 784	67 376	77 427	79 713	71 094	72 946
Total containers	126 112	132 686	133 297	120 543	138 002	145 923	135 848	142 301
TEUs	168 695	175 761	196 312	180 501	203 081	220 937	195 227	204 282
Truck turnaround time – mins. <sup>a</sup>	53.2	50.0	46.7	42.7	40.7	45.4	48.4	47.3
Containers per truck	1.7	1.7	1.7	1.7	1.7	1.7	1.8	1.8
Avg. container turnaround time – mins.	32.2	30.7	28.1	25.1	24.4	27.0	26.9	25.4
TEUs per truck	2.3	2.3	2.4	2.5	2.4	2.5	2.5	2.6
Rail								
Total containers <sup>b</sup>	14 007	16 558	11 595	11 495	11 088	13 345	9 693	13 929
Number of VBS timeslots available								
Overall total			98 283	109 418	123 407	115 570	112 059	108 882
Monday–Friday								
Day (0600–1800)			44 006	48 309	56 763	53 328	51 401	47 750
Evening (1800–2400)			21 479	23 805	25 824	24 439	23 895	22 731
Night (2400–0600)			22 036	26 076	27 692	25 834	25 614	27 119
Subtotal			87 521	98 190	110 279	103 601	100 910	97 600
Saturday								
Day (0600–1800)			5 241	5 814	5 755	5 548	6 118	6 046
Evening (1800–2400)			175	68	0	128	0	171
Night (2400–0600)			1 927	2 300	3 602	2 638	1 695	2 088
Subtotal			7 343	8 182	9 357	8 314	7 813	8 305
Sunday								
Day (0600–1800)								
Evening (1800–2400)			638	10	600	0	0	0
Night (2400–0600)			2 781	3 036	3 167	3 655	3 336	2 977
Subtotal			3 419	3 046	3 771	3 655	3 336	2 977
Number of VBS timeslots used								
Overall total			77 607	81 609	88 742	94 331	85 712	86 255
Monday–Friday								
Day (0600–1800)			40 621	41 345	46 301	45 490	43 131	41 940
Evening (1800–2400)			17 584	17 654	18 329	20 583	18 630	17 729
Night (2400–0600)			14 207	16 071	17 548	20 396	17 940	19 153
Subtotal			72 412	75 070	82 178	86 470	79 701	78 822
Saturday								
Day (0600–1800)			3 115	3 554	3 327	3 959	3 220	3 944
Evening (1800–2400)			18	11	0	93	0	112
Night (2400–0600)			908	1 920	1 846	1 528	1 277	1 928
Subtotal			4 041	5 485	5 173	5 580	4 497	5 984
Sunday								
Day (0600–1800)								
Evening (1800–2400)								
Night (2400–0600)			1 154	1 054	1 391	2 281	1 514	1 449
Subtotal			1 154	1 054	1 391	2 281	1 514	1 449

*(continued)*

**Table 1.1 Container terminal landside performance indicators (continued)**

<i>Port/Indicator</i>	<i>Sep-06</i>	<i>Dec-06</i>	<i>Mar-07</i>	<i>Jun-07</i>	<i>Sep-07</i>	<i>Dec-07</i>	<i>Mar-08</i>	<i>Jun-08</i>
<i>Sydney</i>								
Road								
Total trucks	126 255	131 780	124 478	120 055	128 094	138 168	125 788	133 225
Total containers	184 136	200 725	194 814	184 120	203 034	218 692	222 230	227 445
TEUs	241 380	254 925	312 613	294 545	330 489	361 420	330 015	335 680
Truck turnaround time – mins.	40.0	43.4	42.8	44.9	47.4	49.4	45.8	44.1
Containers per truck	1.3	1.5	1.3	1.3	1.4	1.4	1.5	1.5
Avg. container turnaround time – mins.	30.4	32.9	37.1	39.1	41.0	42.8	34.8	35.5
TEUs per truck	1.9	1.9	2.1	2.1	2.2	2.3	2.3	2.2
Rail								
Total containers	54 219	56 789	54 174	53 612	58 081	58 361	52 975	57 067
Number of VBS timeslots available								
Overall total			168 936	169 013	186 692	183 396	182 176	183 633
Monday–Friday								
Day (0600–1800)			79 857	79 603	82 014	82 366	85 493	90 034
Evening (1800–2400)			37 848	37 779	41 586	40 861	38 978	35 822
Night (2400–0600)			28 399	28 559	30 486	30 628	28 870	30 407
Subtotal			146 104	145 941	154 086	153 855	153 341	156 263
Saturday								
Day (0600–1800)			11 083	11 054	11 553	13 096	13 206	13 071
Evening (1800–2400)			2 382	2 340	2 086	2 209	2 468	2 968
Night (2400–0600)			2 555	2 758	4 323	3 167	2 754	2 555
Subtotal			16 020	16 152	17 962	18 472	18 428	18 594
Sunday								
Day (0600–1800)			2 224	2 132	6 411	4 575	3 246	1 527
Evening (1800–2400)			1 756	2 035	5 211	3 144	4 044	4 297
Night (2400–0600)			2 832	2 753	3 022	3 350	3 117	2 952
Subtotal			6 812	6 920	14 644	11 069	10 407	8 776
Number of VBS timeslots used								
Overall total			131 841	129 803	143 946	150 039	134 159	139 823
Monday–Friday								
Day (0600–1800)			73 871	73 667	78 629	78 780	76 695	80 590
Evening (1800–2400)			26 662	25 438	28 840	30 103	25 055	24 525
Night (2400–0600)			22 356	22 350	25 022	26 181	22 153	23 984
Subtotal			122 889	121 455	132 491	135 064	123 904	129 100
Saturday								
Day (0600–1800)			4 196	4 168	4 789	6 423	4 991	5 616
Evening (1800–2400)			50	38	21	175	109	220
Night (2400–0600)			1 742	1 770	2 127	2 394	1 708	1 414
Subtotal			5 988	5 976	6 937	8 992	6 808	7 250
Sunday								
Day (0600–1800)			440	155	1 104	2 121	835	724
Evening (1800–2400)			718	528	1 031	1 379	651	485
Night (2400–0600)			1 806	1 689	2 382	2 482	1 961	2 264
Subtotal			2 964	2 372	4 517	5 982	3 447	3 473

*(continued)*

**Table 1.1 Container terminal landside performance indicators (continued)**

<i>Port/Indicator</i>	<i>Sep-06</i>	<i>Dec-06</i>	<i>Mar-07</i>	<i>Jun-07</i>	<i>Sep-07</i>	<i>Dec-07</i>	<i>Mar-08</i>	<i>Jun-08</i>
<b>Melbourne</b>								
<b>Road</b>								
Total trucks	159 808	160 035	179 376	170 839	190 132	203 152	188 119	192 996
Total containers	285 218	295 096	284 238	276 977	303 949	335 877	322 059	335 025
TEUs	345 254	351 972	419 669	407 763	450 216	493 111	459 639	477 662
Truck turnaround time – mins.	30.4	28.1	30.3	30.7	30.7	31.4	28.3	28.5
Containers per truck	1.5	1.8	1.6	1.6	1.6	1.6	1.7	1.7
Avg. container turnaround time – mins.	19.8	18.0	20.1	20.1	20.2	19.8	17.2	17.2
TEUs per truck	2.2	2.2	2.3	2.3	2.3	2.4	2.4	2.5
<b>Rail</b>								
Total containers <sup>b</sup>	24 625	25 866	25 500	25 165	19 983	12 010	8 977	12 412
Number of VBS timeslots available								
Overall total			192 107	200 146	225 245	248 191	241 012	250 670
<b>Monday–Friday</b>								
Day (0600–1800)			123 774	126 677	138 405	141 145	135 879	140 400
Evening (1800–2400)			36 871	38 860	42 583	49 041	48 083	50 225
Night (2400–0600)			20 812	23 722	31 129	39 943	38 869	41 793
Subtotal			181 457	189 259	212 117	230 129	222 831	232 418
<b>Saturday</b>								
Day (0600–1800)			7 022	6 928	7 813	10 909	12 260	11 443
Evening (1800–2400)			692	741	742	861	703	945
Night (2400–0600)			1 050	1 158	1 746	2 351	2 772	2 755
Subtotal			8 764	8 827	10 301	14 121	15 735	15 143
<b>Sunday</b>								
Day (0600–1800)			9	0	170	397	0	0
Evening (1800–2400)			467	596	648	994	533	696
Night (2400–0600)			1 410	1 464	2 009	2 550	1 913	2 413
Subtotal			1 886	2 060	2 827	3 941	2 446	3 109
<b>Number of VBS timeslots used</b>								
Overall total			180 491	188 627	210 328	230 038	221 017	231 844
<b>Monday–Friday</b>								
Day (0600–1800)			119 859	123 488	133 582	133 917	127 222	131 860
Evening (1800–2400)			34 332	35 893	39 156	45 036	43 300	46 782
Night (2400–0600)			17 753	20 952	27 679	36 058	34 405	38 367
Subtotal			171 944	180 333	200 417	215 011	204 927	217 010
<b>Saturday</b>								
Day (0600–1800)			5 681	5 475	5 763	9 559	11 099	9 251
Evening (1800–2400)			529	466	515	642	515	612
Night (2400–0600)			808	781	1 602	2 149	2 530	2 535
Subtotal			7 018	6 722	7 880	12 350	14 144	12 398
<b>Sunday</b>								
Day (0600–1800)								
Evening (1800–2400)			459	498	553	684	426	488
Night (2400–0600)			1 070	1 074	1 478	1 993	1 520	1 949
Subtotal			1 529	1 572	2 031	2 677	1 946	2 437

*(continued)*

**Table 1.1 Container terminal landside performance indicators (continued)**

<i>Port/Indicator</i>	<i>Sep-06</i>	<i>Dec-06</i>	<i>Mar-07</i>	<i>Jun-07</i>	<i>Sep-07</i>	<i>Dec-07</i>	<i>Mar-08</i>	<i>Jun-08</i>
<i>Adelaide</i>								
Road								
Total trucks	15 795	17 370	17 945	18 875	21 058	20 951	23 423	27 381
Total containers	23 219	25 756	27 799	28 968	32 850	33 103	49 422	51 922
TEUs	31 354	35 042	36 585	38 461	43 797	44 352	62 092	73 403
Truck turnaround time – mins.	31.5	34.1	39.2	35.3	50.2	41.5	46.8	35.4
Containers per truck	1.5	1.5	1.6	1.5	1.6	1.6	1.6	1.6
Avg. container turnaround time – mins.	21.4	23.0	25.3	23.0	32.1	26.3	29.3	22.5
TEUs per truck	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.1
Rail								
Total containers	na	na	na	na	na	na	na	na
Number of VBS timeslots available								
Overall total			33 429	34 362	36 727	36 960	37 245	39 706
Monday–Friday								
Day (0700–1400)			19 503	20 236	21 113	21 883	22 517	23 248
Evening (1400–2200)			13 926	14 126	15 614	15 077	14 728	16 458
Night (2200–0700)			0	0	0	0	0	0
Subtotal			33 429	34 362	36 727	36 960	37 245	39 706
Number of VBS timeslots used								
Overall total			28 961	29 363	33 220	33 544	32 919	33 889
Monday–Friday								
Day (0700–1400)			18 411	19 054	20 699	21 454	21 639	22 632
Evening (1400–2200)			10 550	10 309	12 521	12 090	11 280	11 257
Night (2200–0700)			0	0	0	0	0	0
Subtotal			28 961	29 363	33 220	33 544	32 919	33 889
<i>Fremantle</i>								
Road								
Total trucks	51 188	54 797	51 785	51 593	52 400	55 263	53 340	55 687
Total containers	88 404	93 274	93 492	96 558	101 367	109 131	108 846	107 497
TEUs	111 800	121 815	132 395	133 192	141 178	155 442	149 558	147 915
Truck turnaround time – mins.	24.0	27.4	33.6	32.3	33.8	33.4	32.9	32.0
Containers per truck	1.5	1.7	1.7	1.7	1.7	1.7	1.8	1.7
Avg. container turnaround time – mins.	15.7	17.6	20.3	19.0	19.7	19.2	18.3	18.7
TEUs per truck	2.2	2.2	2.3	2.4	2.4	2.5	2.4	2.4
Rail								
Total containers	na	na	na	na	na	na	na	na
Number of VBS timeslots available								
Overall total			81 098	79 135	83 960	85 446	84 513	86 026
Monday–Friday								
Day (0600–1800)			59 294	58 600	64 598	63 816	62 801	64 710
Evening (1800–2400)			20 422	20 217	17 965	19 274	19 882	20 601
Night (2400–0600)			0	0	12	160	348	76
Subtotal			79 716	78 817	82 575	83 250	83 031	85 387

*(continued)*

**Table 1.1 Container terminal landside performance indicators (continued)**

Port/Indicator	Sep-06	Dec-06	Mar-07	Jun-07	Sep-07	Dec-07	Mar-08	Jun-08
Saturday								
Day (0600–1800)			1 173	304	1 155	1 572	1 336	0 639
Evening (1800–2400)			2	0	230	115	1	0
Night (2400–0600)			0	0	0	0	141	0
Subtotal			1 175	304	1 385	1 687	1 478	639
Sunday								
Day (0600–1800)			205	14	0	386	4	0
Evening (1800–2400)			2	0	0	115	0	0
Night (2400–0600)			0	0	0	8	0	0
Subtotal			207	14	0	509	4	0
Number of VBS timeslots used								
Overall total			66 730	65 829	67 913	72 111	71 888	75 696
Monday–Friday								
Day (0600–1800)			55 364	55 786	58 290	58 589	57 883	61 296
Evening (1800–2400)			10 317	9 748	9 153	12 714	13 124	14 057
Night (2400–0600)			0	0	0	0	0	0
Subtotal			65 681	65 534	67 443	71 303	71 007	75 353
Saturday								
Day (0600–1800)			877	281	470	800	877	343
Evening (1800–2400)			0	0	0	0	0	0
Night (2400 - 0600)			0	0	0	0	0	0
Subtotal			877	281	470	800	877	343
Sunday								
Day (0600–1800)			170	14	0	8	4	0
Evening (1800–2400)			2	0	0	0	0	0
Night (2400–0600)			0	0	0	0	0	0
Subtotal			172	14	0	8	4	0

na not available

VBS stands for vehicle booking system.

a. Truck turnaround time in Brisbane includes some truck waiting time outside the terminal gate.

b. This data is incomplete because stevedores do not collect all rail data.

- Note:
1. The figures for total containers, total trucks, containers per truck, TEUs and TEUs per truck contain bulk runs.
  2. Day, evening and night time slots have been standardised for comparative purposes. Start and cut-off times for shifts differ between stevedoring companies and between ports. represent overall practice.
  3. Stevedoring companies count containers moved by rail only when they are hauled to an 'on dock' rail siding. They do not count containers moved by rail to a 'near dock' rail siding.  
 "On dock" refers to situations where the rail siding is on dock in a port terminal.  
 Near dock' rail sidings are in the neighbourhood of the port terminal but not on the dock.  
 The rail sidings in Brisbane, Fremantle, Adelaide and DP World, Melbourne are near dock.  
 The only complete rail figures are for the Sydney, Port Botany Container Terminal which has an on-dock rail siding..
  4. The concepts used in compiling these indicators are defined in the explanatory notes.
  5. All terminals are open Monday–Friday. Only Adelaide is not open on Saturday or Sunday.

Sources: Patrick 2008a, DP World 2008.

## Chapter 2 Stevedoring productivity

Stevedoring productivity in this chapter refers to the productivity of loading and unloading containers carried on unitized container ships by the stevedoring companies at the five major city ports in Australia. These ports are Brisbane, Sydney, Melbourne, Adelaide and Fremantle. These measures of productivity are the crane rate, the vessel working rate and the ship rate. The crane rate is the number of containers a dockside crane operator lifts on or off a container ship in an hour. The vessel working rate is a measure of the productivity of the stevedorers on board a container ship in loading and unloading containers. The ship rate is the rate at which a ship is unloaded. The way these measures are derived by the stevedoring companies is covered in Appendix B.

### Results

National crane rate productivity, as measured by the five port average, was 27.3 containers per hour in the March quarter 2008 (1.3 per cent higher than the March quarter 2007 rate of 27.0). In the June quarter 2008, the crane rate increased to 27.5 containers per hour (0.9 per cent higher than the June quarter 2007 rate of 27.2).

Table 2.1 presents the indicators of stevedoring productivity to June quarter 2008 at the five major Australian container ports, expressed in container moves per hour. Figures 2.1 to 2.6 present these data over the June quarter 1996 to June quarter 2008 period. The data are weighted averages of responses from stevedores operating at the respective container terminals.

In summary:

- The five port average crane rate (average productivity per crane while the ship is worked) was 26.5 in the September quarter 2007, 27.2 in the December quarter 2007, 27.3 in the March quarter 2008, and 27.5 containers per hour for the June quarter 2008.
- The five port total of container moves increased from 949 324 in the March quarter 2008 to 977 870 moves in the June quarter 2008. The data for the June quarter 2008 is up 11.9 per cent on the June quarter 2007 figure.
- The five port average vessel working rate (productivity per ship based on the time labour is aboard the ship) was 37.7 in the September quarter 2007, 38.4 in the December quarter 2007, 39.8 in the March quarter 2008, and 39.1 containers per hour in the June quarter 2008. The June quarter 2008 rate was 4.4 per cent greater than the June quarter 2007 rate.

The Brisbane average crane rate was 24.5 in both the December quarter 2007 and 22.8 in the March quarter 2008, and increased to 23.1 containers per hour in the June quarter 2008. The vessel working rate changed from 30.1 containers per hour in the December quarter 2007 to 29.6 in the March quarter 2008, and then to 28.5 in the June quarter 2008.

The Sydney average crane rate was 25.8 in both the December quarter 2007 and 27.1 in the March quarter 2008, and increased to 27.2 containers per hour in the June quarter 2008. The vessel working rate changed from 37.6 containers per hour in the December quarter 2007 to 39.8 in the March quarter 2008, and then to 39.7 in the June quarter 2008.

The Melbourne average crane rate was 29.3 in the December quarter 2007 and 28.9 in the March quarter 2008, and increased to 29.4 containers per hour in the June quarter 2008. The vessel working rate changed from 45.6 containers per hour in the December quarter 2007 to 46.6 in the March quarter 2008, and then to 45.7 in the June quarter 2008.

The Adelaide average crane rate was 29.7 in the December quarter 2007 and 29.6 in both the March and June quarter 2008. The vessel working rate changed from 29.8 containers per hour in the December quarter 2007 to 35.7 in the March quarter 2008, and then to 40.4 in the June quarter 2008.

The Fremantle average crane rate was 28.0 in the December quarter 2007 and 28.3 the March quarter 2008, and decreased to 27.8 containers per hour in the June quarter 2008. The vessel working rate was 34.9 containers per hour in both the December quarter 2007 and the March quarter 2008; it then decreased to 31.3 in the June quarter 2008.

## Fastest, average and slowest rates

Figures 2.7 and 2.8 show the fastest, average and slowest crane rates and ship rates achieved between the June quarter 1996 and the June quarter 2008. Figure 2.7 indicates that the fastest crane rate was achieved in September 2006. The average crane rate has changed very little since September 2003. Figure 2.8 continues to show a slowing in the upward trend in the fastest and median ship rate.

## TEUs per hour

Table 2.2 presents the stevedoring productivity indicators in terms of TEUs per hour. These data are retained in *Waterline* for the purpose of long-term historical comparison. They are not directly comparable with the data in Table 2.1 because indicators based on TEUs per hour may be affected by changes in the mix of 20 foot and 40 foot containers from one period to the next.

**Table 2.1 Container terminal performance indicators: productivity in containers per hour**

<i>Port/Indicator</i>	<i>Jun-06</i>	<i>Sep-06</i>	<i>Dec-06</i>	<i>Mar-07</i>	<i>Jun-07</i>	<i>Sep-07</i>	<i>Dec-07</i>	<i>Mar-08</i>	<i>Jun-08</i>
<i>Five ports</i>									
Ships handled	1 075	1 117	1 094	1 075	1 110	1 154	1 138	1 107	1 156
Total containers	795 252	864 475	923 755	880 552	874 269	950 996	1 027 779	949 324	977 870
Crane rate	27.0	27.0	26.8	27.0	27.2	26.5	27.2	27.3	27.5
Vessel working rate	35.3	35.2	36.1	36.7	37.4	37.7	38.4	39.8	39.1
Crane time not worked (per cent)	22	23	23	22	21	20	20	19.3	19.8
40-foot containers (per cent)	41	42	44	42	41	43	44	42.9	42.7
Ship rate	45.2	46.0	46.8	47.3	47.1	47.2	48.0	49.3	48.7
Throughput pbm	111	121	129	123	123	133	144	133	137
<i>Brisbane</i>									
Ships handled	257	280	271	270	262	267	254	248	255
Total containers	129 537	149 996	157 725	153 481	146 916	164 803	177 766	153 170	162 475
Crane rate	24.0	23.6	23.0	22.8	23.1	23.0	24.5	22.8	23.1
Vessel working rate	27.0	25.9	25.1	26.7	26.2	26.3	30.1	29.6	28.5
Crane time not worked (per cent)	24	29	31	27	28	22	21	21.0	21.3
40-foot containers (per cent)	42	39	43	42	41	43	46	44.6	43.1
Stevedoring variability (per cent)	50	59	52	63	52	49	47	53.6	68.4
Ship rate	35.6	36.5	36.5	36.7	36.6	33.7	37.9	37.5	36.3
Throughput pbm	81	93	98	96	91	103	111	95	101
<i>Sydney</i>									
Ships handled	307	318	322	305	317	338	342	321	343
Total containers	249 580	274 042	299 864	274 937	271 655	299 142	327 858	302 223	308 660
Crane rate	26.7	26.5	26.4	26.2	26.9	24.9	25.8	27.1	27.2
Vessel working rate	33.9	34.2	34.6	35.8	36.1	36.4	37.6	39.8	39.7
Crane time not worked (per cent)	25	26	24	24	24	21	22	22.1	22.8
40-foot containers (per cent)	44	46	47	45	44	46	47	45.5	45.4
Stevedoring variability (per cent)	54	50	55	55	48	47	43	49.2	72.1
Ship rate	45.0	46.3	45.7	46.9	47.6	46.1	48.5	51.2	51.4
Throughput pbm	129	141	154	142	140	154	169	156	159
<i>Melbourne</i>									
Ships handled	318	321	314	316	326	333	331	326	346
Total containers	297 877	314 900	330 896	320 426	315 181	334 640	361 085	332 443	340 140
Crane rate	28.2	28.3	28.1	28.7	28.5	28.6	29.3	28.9	29.4
Vessel working rate	40.5	41.2	43.5	43.2	44.8	46.0	45.6	46.6	45.7
Crane time not worked (per cent)	19	20	19	19	15	18	17	15.7	17.4
40-foot containers (per cent)	40	42	42	42	41	44	43	43.4	43.6
Stevedoring variability (per cent)	57	59	59	54	56	51	51	54.9	68.2
Ship rate	50.1	51.4	53.4	53.5	52.5	55.9	55.2	55.3	55.3
Throughput pbm	163	172	181	175	173	183	198	182.1	186.3

(continued)

**Table 2.1 Container terminal performance indicators: productivity in containers per hour (continued)**

Port/Indicator	Jun-06	Sep-06	Dec-06	Mar-07	Jun-07	Sep-07	Dec-07	Mar-08	Jun-08
<i>Adelaide</i>									
Ships handled	67	68	65	67	74	86	82	84	77
Total containers	37 581	39 208	40 949	43 359	46 382	52 693	53 486	54 357	59 584
Crane rate	30.6	32.0	31.0	30.9	30.0	29.8	29.7	29.6	29.6
Vessel working rate	35.9	37.4	36.0	36.5	33.9	35.5	29.8	35.7	40.4
Crane time not worked (per cent)	13	13	16	12	14	13	10	14.2	9.3
40-foot containers (per cent)	31	32	35	31	30	29	32	30.7	31.6
Stevedoring variability (per cent)	na	na	na	na	na	na	na	na	na
Ship rate	41.2	43.2	42.8	41.7	39.2	40.9	33.1	41.6	44.5
Throughput pbm	80	83	87	92	99	112	114	116	127
<i>Fremantle</i>									
Ships handled	126	130	122	117	131	130	129	128	135
Total containers	80 677	86 329	94 321	88 349	94 135	99 718	107 584	107 131	107 011
Crane rate	27.3	27.6	27.8	28.1	29.0	28.4	28.0	28.3	27.8
Vessel working rate	33.1	31.7	33.5	33.6	35.3	33.8	34.9	34.9	31.3
Crane time not worked (per cent)	26	27	27	29	26	28	25	24.1	24.1
40-foot containers (per cent)	39	43	44	40	37	39	41	38.0	37.7
Stevedoring variability (per cent)	47	47	53	56	44	55	63	56.3	80.9
Ship rate	44.9	43.5	46.1	47.1	47.6	47.1	46.8	46.0	41.2
Throughput pbm	62	67	73	68	73	77	83	83.0	82.9

na not available

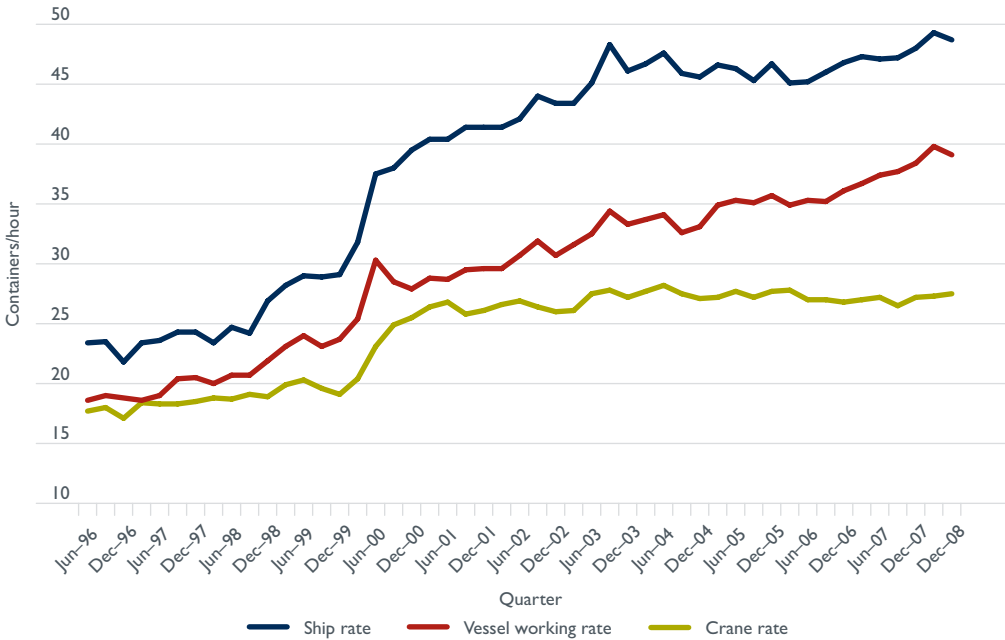
r revised

pbm per berth metre

- Notes:
1. The definitions used in compiling the stevedoring productivity data are detailed in explanatory notes at the end of the journal.
  2. The data in this table are expressed in container moves per hour and therefore are not directly comparable with the TEUs per hour data in Table 2.2.
  3. Crane time not worked is the difference between the ship and the vessel working rates as a percentage of the vessel working rate.
  4. Time series data on indicators in this table is available as an excel spreadsheet at [www.bitre.gov.au](http://www.bitre.gov.au)

Sources: Patrick 2008b, DP World 2008.

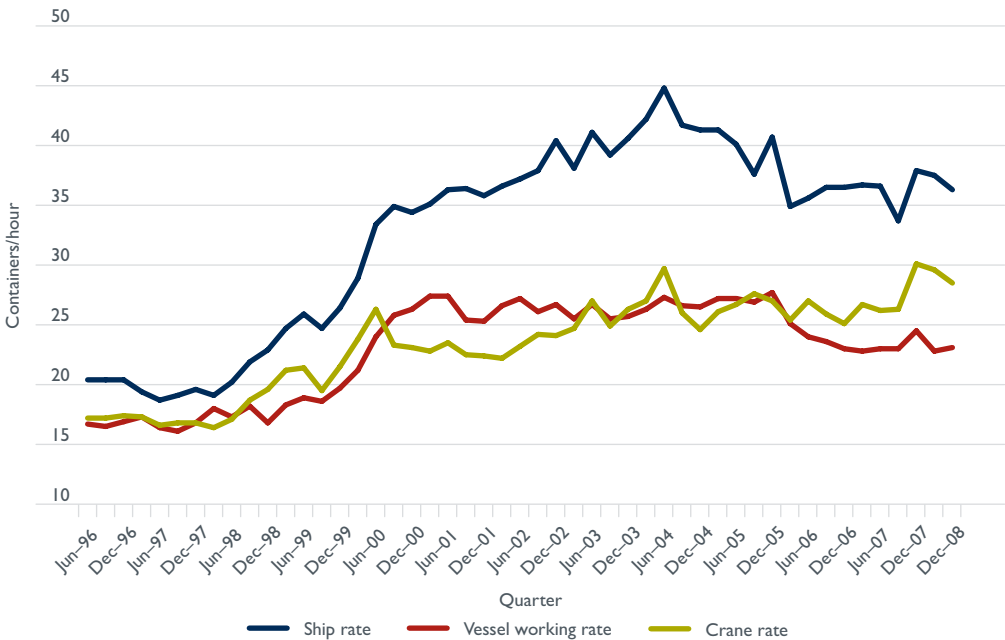
**Figure 2.1 Five ports: productivity in containers per hour**



Note: These figures are based on data in Table 2.1. See explanatory notes for definition of terms.

Sources: Patrick 2008b and DPWorld 2008.

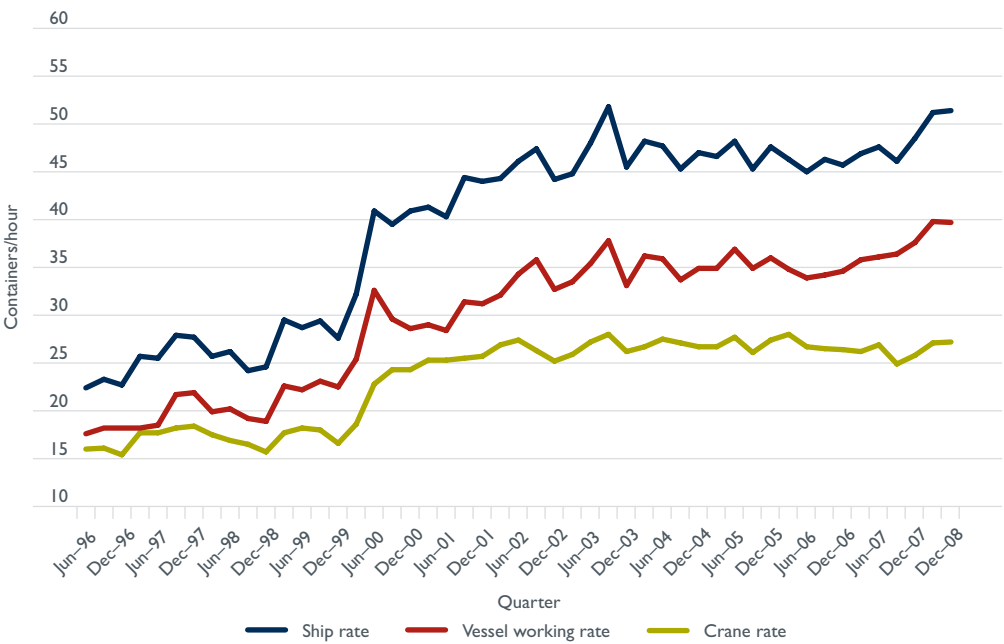
**Figure 2.2 Brisbane: productivity in containers per hour**



Note: These figures are based on data in Table 2.1. See explanatory notes for definition of terms.

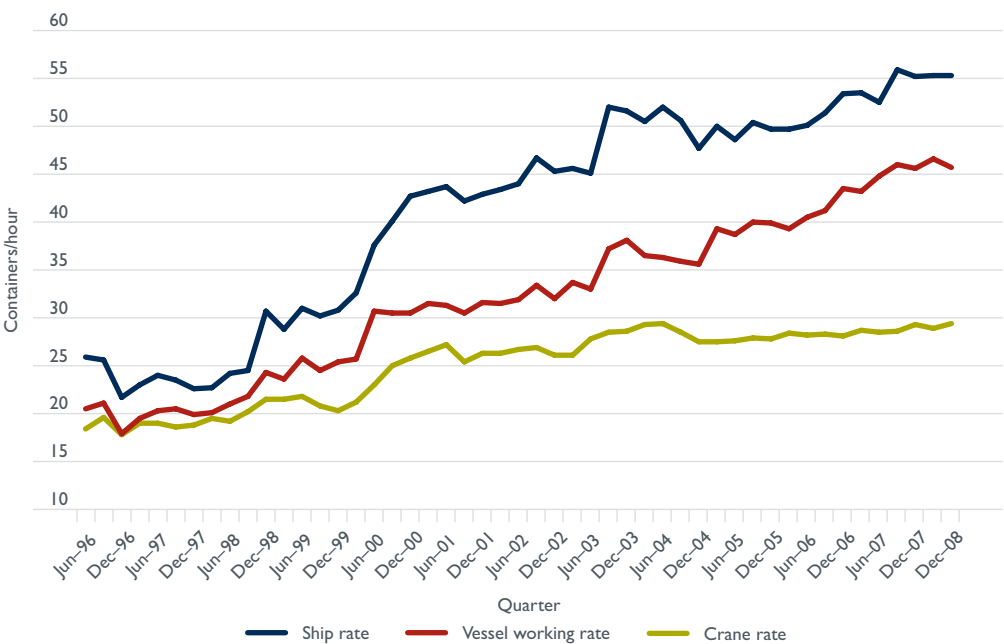
Sources: Patrick 2008b and DPWorld 2008.

Figure 2.3 Sydney: productivity in containers per hour



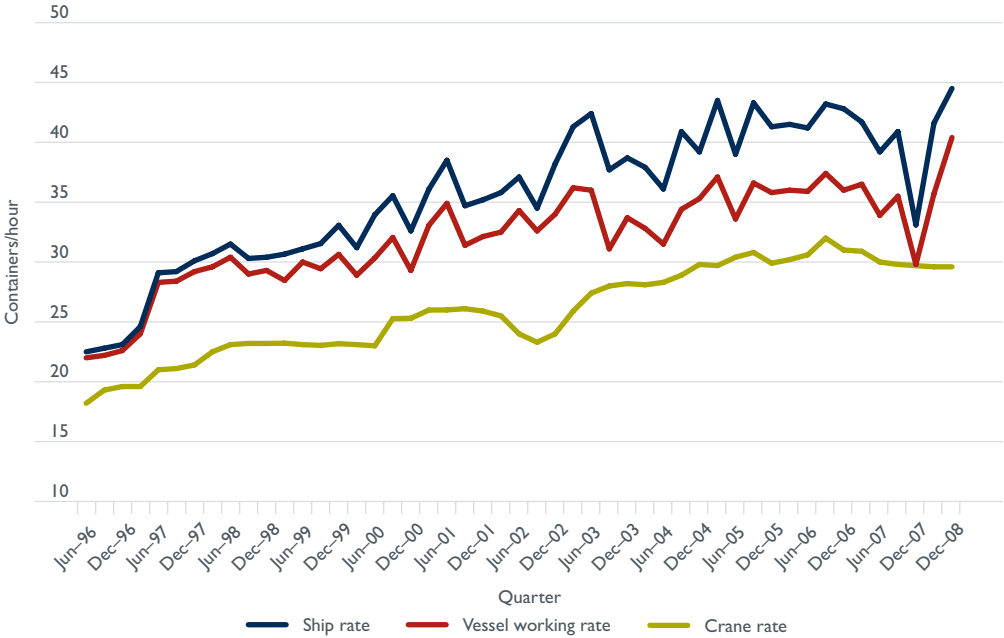
Note: These figures are based on data in Table 2.1. See explanatory notes for definition of terms.  
Sources: Patrick 2008b and DPWorld 2008.

Figure 2.4 Melbourne: productivity in containers per hour



Note: These figures are based on data in Table 2.1. See explanatory notes for definition of terms.  
Sources: Patrick 2008b and DPWorld 2008.

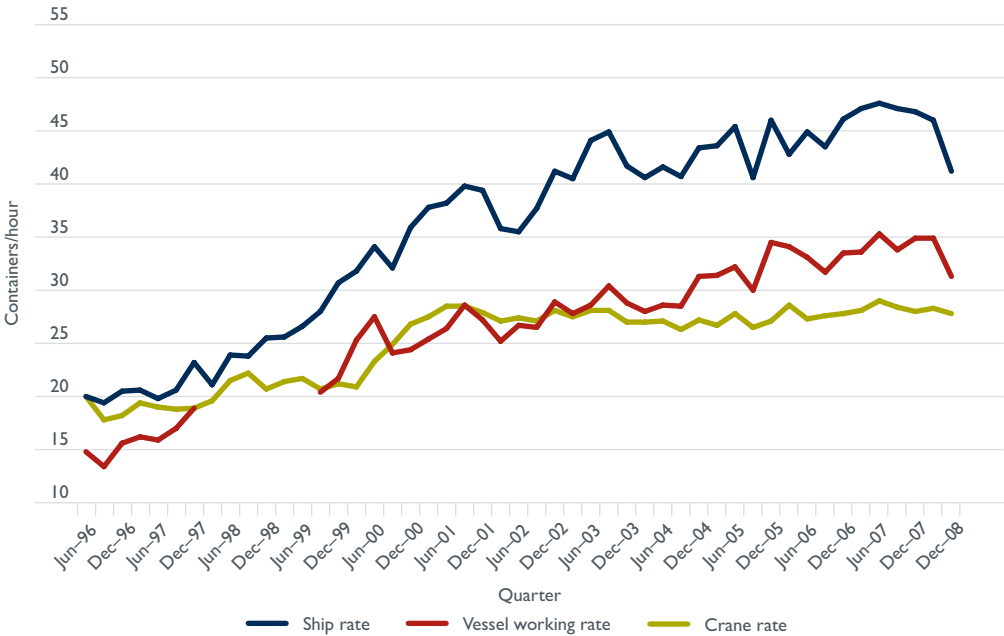
**Figure 2.5 Adelaide: productivity in containers per hour**



Note: These figures are based on data in Table 2.1. See explanatory notes for definition of terms.

Sources: Patrick 2008b and DPWorld 2008.

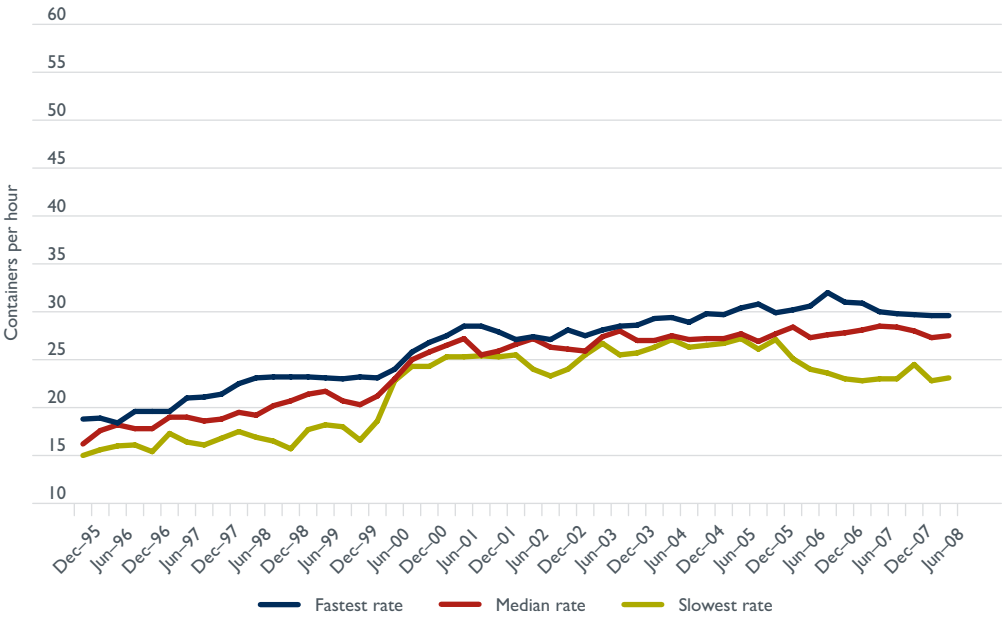
**Figure 2.6 Fremantle: productivity in containers per hour**



Note: These figures are based on data in Table 2.1. See explanatory notes for definition of terms.

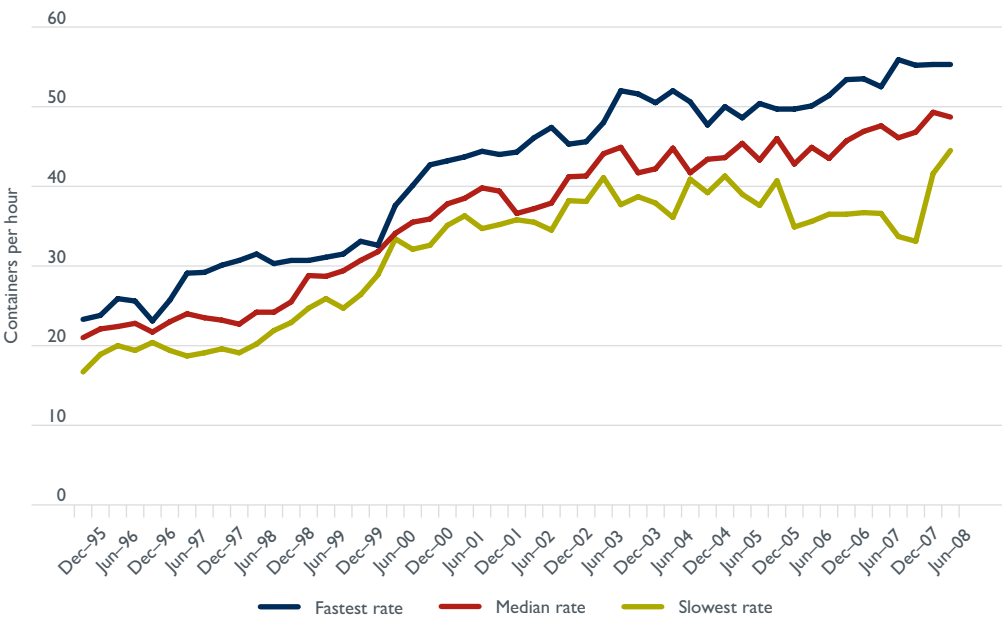
Sources: Patrick 2008b and DPWorld 2008.

**Figure 2.7** Productivity-five ports: fastest, average and slowest rates achieved



Note: These figures are based on data in Table 2.1. See explanatory notes for definition of terms.  
Sources: Patrick 2008b and DPWorld 2008.

**Figure 2.8** Productivity-five ports: fastest, average and slowest ship rates achieved



Note: These figures are based on data in Table 2.1. See explanatory notes for definition of terms.  
Sources: Patrick 2008b and DPWorld 2008.

**Table 2.2 Container terminal performance indicators: productivity in TEUs per hour**

	<i>Jun-06</i>	<i>Sep-06</i>	<i>Dec-06</i>	<i>Mar-07</i>	<i>Jun-07</i>	<i>Sep-07</i>	<i>Dec-07</i>	<i>Mar-08</i>	<i>Jun-08</i>
<i>Five Ports</i>									
Ships handled	1 075	1 117	1 094	1 075	1 110	1 154	1 138	1 107	1 156
Total TEUs	1 120 123	1 229 340	1 329 707	1 253 983	1 234 276	1 363 144	1 479 205	1 356 859	1 395 650
Crane rate	38.0	38.4	38.5	38.3	38.4	37.9	39.1	39.0	39.2
Vessel working rate	49.6	50.1	51.9	52.3	52.9	54.1	55.3	57.0	55.9
Ship rate	63.7	65.6	67.4	67.4	66.6	67.6	69.2	70.6	69.8
Throughput pbm (TEUs per metre)	157.0	172.3	186.3	175.7	173.0	191.0	207.3	190.1	195.6
<i>Brisbane</i>									
Ships handled	257	280	271	270	262	267	254	248	255
Total TEUs	184 468	208 853	226 197	218 323	207 120	236 083	258 726	221 515	232 442
Crane rate	34.4	32.7	33.0	32.3	32.4	32.8	35.6	32.9	32.9
Vessel working rate	38.8	35.9	36.0	37.9	36.9	37.5	43.7	42.8	40.7
Ship rate	51.1	50.6	52.4	52.1	51.5	48.1	55.2	54.3	51.8
Throughput pbm (TEUs per metre)	114.8	130.0	140.8	135.9	128.9	146.9	161.0	137.8	144.6
<i>Sydney</i>									
Ships handled	307	318	322	305	317	338	342	321	343
Total TEUs	358 563	399 648	441 497	399 924	392 505	437 332	481 442	439 755	448 857
Crane rate	38.2	38.7	38.9	38.2	38.8	36.5	37.9	39.5	39.5
Vessel working rate	48.8	50.0	51.0	52.1	52.2	53.1	55.2	58.1	57.8
Ship rate	64.6	67.5	67.4	68.2	68.8	67.2	71.1	74.5	74.9
Throughput pbm (TEUs per metre)	184.6	205.8	227.3	205.9	202.1	225.2	247.9	226.4	231.1
<i>Melbourne</i>									
Ships handled	318	321	314	316	326	333	331	326	346
Total TEUs	415 981	445 767	470 823	455 538	445 563	482 599	516 425	476 655	488 594
Crane rate	39.3	40.1	40.0	40.8	40.2	41.0	41.9	41.4	42.2
Vessel working rate	56.5	58.4	61.9	61.5	63.4	66.2	65.2	66.9	65.6
Ship rate	70.0	72.8	76.1	76.1	74.2	80.1	78.9	79.3	79.5
Throughput pbm (TEUs per metre)	227.8	244.1	257.8	249.5	244.0	264.3	282.8	261.0	267.6
<i>Adelaide</i>									
Ships handled	67	68	65	67	74	86	82	84	77
Total TEUs	49 296	51 899	55 227	56 739	60 134	68 175	70 647	71 066	78 420
Crane rate	40.14	42.3	41.8	40.4	39.0	38.6	39.3	38.7	38.9
Vessel working rate	47.07	49.5	48.6	47.8	43.9	45.9	39.4	46.7	52.7
Ship rate	53.99	57.2	57.8	54.5	50.8	52.9	43.8	54.4	58.6
Throughput pbm (TEUs per metre)	104.9	110.4	117.5	120.7	127.9	145.1	150.3	151.2	166.9

*(continued)*

**Table 2.2 Container terminal performance indicators: productivity in TEUs per hour (continued)**

	<i>Jun-06</i>	<i>Sep-06</i>	<i>Dec-06</i>	<i>Mar-07</i>	<i>Jun-07</i>	<i>Sep-07</i>	<i>Dec-07</i>	<i>Mar-08</i>	<i>Jun-08</i>
<i>Fremantle</i>									
Ships handled	126	130	122	117	131	130	129	128	135
Total TEUs	111 815	123 173	135 963	123 459	128 954	138 955	151 965	147 868	147 337
Crane rate	37.6	39.4	40.0	39.2	39.9	39.6	39.5	38.7	38.3
Vessel working rate	45.9	45.2	48.3	47.0	48.4	47.2	49.4	48.3	43.1
Ship rate	62.2	62.0	66.6	65.9	65.3	65.7	66.2	63.5	56.8
Throughput pbm (TEUs per metre)	86.6	95.4	105.3	95.6	99.8	107.6	117.7	114.5	114.1

pbm per berth metre

Note: For data back to the December quarter 1993, refer to an excel spreadsheet available at [www.bitre.gov.au](http://www.bitre.gov.au).

Sources: Patrick 2008b, DP World 2008.

## Chapter 3 Port interface cost index

The Port Interface Cost Index (PICI) provides a measure of shore-based shipping costs (charges) for containers moved through Australian mainland major city ports. These five ports account for approximately 90 per cent of Australia's container traffic.<sup>1</sup> Data for July–December 2007 and January–June 2008 are presented in Tables 3.1 to 3.6. The PICI is based on an indicative approach; that is, the index is not an average of all costs, but is based on those costs typically charged by service providers in most instances (see Appendix B for details).

The PICI has as its starting point the estimation of parameters for two typical sizes of container ships. These are vessels with a size of 17 215 GT and 37 394 GT. These parameters summarised as Table 3.1 enable the PICI charges to be estimated on a per TEU basis.

It is then possible to estimate ship-based and cargo-based charges per TEU for these typical vessels. These are presented in Tables 3.2 and 3.3. Ship-based charges are the charges vessel owners pay for a port visit by the vessel. Cargo-based charges are the charges levied on the actual cargo of containers.

The port interface costs per TEU consist of the total costs which affect the import and export of a container. They are presented in Tables 3.4 and 3.5. The total costs are the sum of the ship-based charges, the cargo-based charges, the stevedoring costs, customs brokers fees and transport charges. The stevedoring costs are taken from the ACCC annual report on the stevedoring industry. These costs enable the calculation of the national port interface index measured in current and constant (2001) prices in dollars per TEU. This is the final result and provides an estimate of how much it takes to import or export one TEU.

### Port and related charges

Table 3.1 provides the parameters used to determine the port and related charges in Tables 3.2 and 3.3. These parameters relate to a representative port call by container ships using the Lloyd's ship classification unitized cellular container ship (UCC). For the 15 000 to 20 000 gross tons (GT) range<sup>2</sup> the representative vessel size used is 17 215 GT and for the 35 000 to 40 000 GT range the representative vessel size 37 394 GT.

Tables 3.2 and 3.3 provide the port and related charges at the five mainland capital city ports for the

15 000 to 20 000 GT range and the 35 000 to 40 000 GT range respectively, for July–December 2007 and January–June 2008. Port and related charges comprise ship-based charges and cargo-based charges.

1. Based on numbers for Australian ports published by Ports Australia which is the new name for the Australian Association of Port and Maritime Authorities (AAPMA). ([aapma.org.au/trade\\_stats/?Id=5](http://aapma.org.au/trade_stats/?Id=5))

2. To obtain a sufficient sample size for Adelaide and Fremantle containers exchanged (average), the ship size range was increased to 10 000 GT to 26 000 GT.

## Ship-based charges

While overall ship-based charges changed little in January–June 2008, there were some significant changes in charges per TEU, mainly reflecting the variation in the average number of TEUs exchanged per ship call.

Compared to the previous period July–December 2007, the overall changes in total ship-based charges per TEU in January–June 2008 for ships in the 15 000 to 20 000 GT range were:

- Brisbane                      48 per cent increase
- Sydney                        27 per cent increase
- Melbourne                  13 per cent decrease
- Adelaide                    2 per cent increase
- Fremantle                  11 per cent increase.

For ships in this range, compared to July–December 2007, the average number of TEUs exchanged decreased by 31 per cent at Brisbane and by 8 per cent at Fremantle and by 20 per cent at Sydney. The TEUs exchanged increased by 17 per cent at Melbourne and by 2 per cent at Adelaide, compared to the July–December 2007 period.

Compared to the previous period, the overall changes in total ship-based charges per TEU in January–June 2008 for ships in the 35 000 to 40 000 GT range were:

- Brisbane                      6 per cent increase
- Sydney                        13 per cent increase
- Melbourne                  10 per cent increase
- Adelaide                    9 per cent decrease
- Fremantle                  1 per cent increase.

In the 35 000 to 40 000 GT range, the average number of TEUs exchanged increased at all ports in the January–June 2008 period when compared to the previous period. In Sydney, they decreased by 11 per cent, in Brisbane by 5 per cent and Melbourne by 8 per cent. In Fremantle they increased by 1 per cent and in Adelaide by 5 per cent.

Fremantle has the lowest ship-based charges on a per ship visit basis for representative vessel sizes for ships in the 15 000 to 20 000 GT range and Sydney for the 35 000 to 40 000 GT range.

## Cargo-based charges

There have been no increases in cargo-based charges in the 15 000–20 000 GT range and in the 35 000–40 000 GT range in Brisbane, Sydney, Melbourne, Adelaide and Fremantle in this period.

## Stevedoring charges per TEU

The stevedoring charges per TEU used in this issue of *Waterline* are those published in the most recently available ACCC report on stevedoring prices (ACCC 2008). These charges are \$173.24 per TEU.

## Land-based charges per TEU

Average customs brokers' fees and road transport charges for July–December 2007 and January–June 2008 are included in Tables 3.4 and 3.5. These charges are based on data provided by some 30 customs brokers and 30 road transport operators.

Customs brokers' fees for imports are higher than fees for exports, reflecting the more complex clearance procedures for import containers. During January–June 2008, the average customs brokers fee for imports increased 2 per cent for Adelaide and 3 per cent for Fremantle, 5 per cent for Sydney and 1 per cent for Melbourne. For exports, the average fee increased by 7 per cent for Sydney, decreased by 11 per cent for Melbourne and by 17 per cent for Adelaide and did not change for Fremantle. They did not change in either category for Brisbane.

Road transport charges increased by 19 per cent at Brisbane and 12 per cent at Adelaide and by 33 per cent for Melbourne and 1 per cent at Fremantle. They did not change at Sydney. One of the parameters used to estimate road transport charges is the time taken to move containers between the wharf and the customer's warehouse. Both distance and traffic congestion impact on this parameter and, therefore, help explain the significant difference between road transport charges at Melbourne and Sydney compared with Brisbane, Adelaide and Fremantle.

## Indices for individual ports

Table 3.4 indicates that for ships in the 15 000 to 20 000 GT range, between July–December 2007 and January–June 2008, costs per TEU for import containers increased by 10 per cent at Brisbane, one per cent at Sydney and one per cent at Fremantle. They also increased by 16 per cent at Melbourne and 1 per cent at Adelaide. For exports, they increased by 10 per cent for Brisbane and 15 per cent for Melbourne. They also increased by 1 per cent for Sydney and 2 per cent at Adelaide. They did not change for Fremantle.

Table 3.5 indicates that for ships in the 35 000 to 40 000 GT range, between July–December 2007 and January–June 2008 costs for import containers increased by 8 per cent at Brisbane, 17 per cent at Melbourne and 4 per cent at Adelaide. They increased by 1 per cent at Sydney and 1 per cent at Fremantle. Export costs increased by 9 per cent at Brisbane and by 16 per cent at Melbourne. They increased by 1 per cent at Sydney and by 1 per cent at Adelaide. They did not change at Fremantle.

These results should be interpreted with caution. The use of a single stevedoring charge for all ports reflects the scope of the available information, which is not disaggregated on an individual port basis. In practice, container stevedoring charges tend to vary between ports.

## National index

Figure 3.1 provides the national PICI for ships in the 15 000 to 20 000 GT range from 1993 onwards. In current prices, the national index for imports increased from \$789 per TEU in July–December 2007 to \$ 852 in January–June 2008, and the index for exports increased from \$740 per TEU to \$797 per TEU.

In real terms (2001 prices), the national cost index per import increased from \$635 per TEU to \$670 per TEU and for exports from \$596 to \$627 per TEU.

Table 3.6 shows the national port interface cost index from July–December 2003 for ships in the 35 000 to 40 000 GT range. The national index for imports increased from \$781 per TEU in July–December 2007 to \$843 per TEU in January–June 2008 in current prices. The index for exports increased from \$732 per TEU to \$788 per TEU in current prices.

In constant 2001 prices, the national cost index for imports increased from \$629 per TEU to \$663 per TEU and for exports from \$590 to \$620 per TEU.

## Harbour towage charges

A key component of the PICI is towage charges. BITRE collects towage charges for the purpose of monitoring trends in charges over time. *Waterline* provides a summary of the changes in harbor towage charges every 12 months. This is the cost of providing tugs into and out of the five mainland capital city ports and a selection of regional ports and in Tasmania.

Table 3.7 provides the publicly available towage charges for the five mainland capital city ports while Table 3.8 shows data for a selection of regional ports as at 30 June 2007 and 30 June 2008 for the two representative vessel sizes, 19 999 GT and 59 999 GT.

Nine of the ten ports recorded changes to towage charges during the 2007–08 financial year:

- Brisbane: a 16.9 per cent increase in the 19 999 GT vessel size and a 7.6 per cent increase in the 59 999 GT vessel size
- Sydney: a 14.6 per cent increase in the 19 999 GT vessel size and 23.8 per cent increase in the 59 999 GT vessel size
- Melbourne: a 6.3 per cent increase in the 19 999 GT vessel size and a 11.7 per cent increase in the 59 999 GT vessel size
- Adelaide: a 6.1 per cent increase in the 19 999 GT vessel size and no increase in the 59 999 GT vessel size
- Fremantle: a 4.3 per cent increase in the 19 999 GT vessel size and a 4.3 per cent increase in the 59 999 GT vessel size
- Bunbury: a 0.7 per cent decrease in the 19 999 GT vessel size and a 9 per cent increase in the 59 999 GT vessel size
- Burnie: a 7.0 per cent increase in the 19 999 GT vessel size
- Gladstone: no change for both vessel sizes
- Newcastle: a 4.8 per cent increase in the 19 999 GT vessel size and a 7.2 per cent decrease in the 59 999 GT vessel size
- Pt Kembla: a 14.3 per cent decrease in the 59 999 GT vessel size.

The estimates in Tables 3.7 and 3.8 should be interpreted with caution and should not be used for interport comparisons as local conditions vary between ports and charges may vary for individual ship operators based on negotiated contracts.

**Table 3.1 Parameters used in the port interface cost indices, 2008**

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
Vessel size GT 17 215										
Average TEUs exchanged <sup>a</sup>										
All	765	526	885	706	810	944	650	664	1 813	1 671
Loaded	529	421	606	489	632	676	351	378	1 542	1 522
Empty	236	106	279	217	178	268	299	286	271	149
Loaded inwards	339	247	465	356	413	446	79	126	848	757
Loaded outwards	190	174	140	133	218	230	271	253	694	765
Ship call parameters <sup>a</sup>										
Number of port calls	1	3	3	3	3	2	2	2	9	6
Elapsed berth time (hrs)	25	25	30	23	20	20	38	40	41	41
Vessel size GT 37 394										
Average TEUs exchanged <sup>b</sup>										
All	1 246	1 186	2 234	1 999	2 113	1 942	931	1 032	1 304	1 320
Loaded	848	817	1 569	1 366	1 603	1 650	710	720	825	846
Empty	398	369	665	634	510	292	221	312	479	474
Loaded inwards	565	522	1 178	1 036	1 038	954	266	305	417	386
Loaded outwards	283	294	392	330	565	695	444	415	409	460
Ship call parameters <sup>b</sup>										
Number of port calls	1	3	3	3	3	2	2	2	3	3
Elapsed berth time (hrs)	27	26	38	34	30	31	40	39	33	33

a. Mean value for ships between 15 000 and 20 000 GT.

b. Mean value for ships between 35 000 and 40 000 GT.

Sources: BITRE estimates based on ship call data supplied by relevant port authorities/corporations and other port service providers.

**Table 3.2 Port and related charges for ships in the 15 000–20 000 GT range, 2008**

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
<b>Ship-based charges (\$/TEU)</b>										
Conservancy	3.74	5.43	–	–	–	–	3.55	4.05	–	–
Tonnage	–	–	8.35	10.46	6.59	5.65	10.63	10.77	1.62	1.76
Pilotage	9.20	13.37	3.75	4.69	9.35	8.02	6.90	6.75	1.43	1.55
Towage <sup>a</sup>	12.60	18.95	11.30	14.67	12.32	10.95	18.64	18.79	5.61	6.35
Mooring, unmooring	2.94	4.27	3.31	4.14	1.71	1.47	–	–	0.54	0.58
Berth hire <sup>b</sup>	–	–	–	–	–	–	–	–	–	–
Total <sup>c</sup>	28.48	42.03	26.70	33.96	29.98	26.10	39.72	40.36	9.20	10.25
<b>Cargo-based charges (\$/TEU)</b>										
Wharfage										
Imports	28.60	28.60	89.65	89.65	39.05	39.05	64.31	64.31	56.53	56.53
Exports	28.60	28.60	51.15	51.15	39.05	39.05	64.31	64.31	56.53	56.53
Harbour dues	46.20	46.20	–	–	–	–	–	–	–	–
Berth charge	–	–	–	–	–	–	–	–	15.29	16.93
<b>Total port and related charges (\$/TEU)<sup>c</sup></b>										
Loaded imports	103.28	116.83	116.35	123.61	69.03	65.15	104.02	104.67	82.66	83.71
Loaded exports	103.28	116.83	77.85	85.11	69.03	65.15	104.02	104.67	82.66	83.71
<b>Charges per ship visit (\$/visit)</b>										
Total ship-based charges	21 779	22 116	23 624	23 987	24 286	24 644	25 797	26 786	16 678	17 118
Empty TEUs <sup>d</sup>	2 819	3 689	3 068	2 392	1 766	2 658	0	0	2 308	1 268

– not applicable

r. revised

a. After enquiries at all ports the number of tugs required for towage in Adelaide and Fremantle used in PICI calculations was revised in *Waterline 43*.

b. Charged by stevedores and itemised separately from basic stevedoring charge.

c. Components may not sum to totals due to rounding.

d. Sum of wharfage, harbour dues and berth charge per empty teu, multiplied by average exchange of empty TEUs.

Note: Port and related charges are based on the parameters described in Table 3.

Sources: BITRE estimates based on ship call data supplied by relevant port authorities/corporations, and price schedules of relevant port authorities/corporations, towage operators and pilotage service providers.

**Table 3.3 Port and related charges for ships in the 35 000–40 000 GT range, 2008**

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
Ship-based charges (\$/TEU)										
Conservancy	4.98	5.23	–	–	–	–	4.37	3.95	–	–
Tonnage	–	–	7.18	8.02	5.49	5.97	12.32	10.92	4.90	4.84
Pilotage	13.45	14.13	2.69	3.01	4.56	4.96	4.81	4.34	1.99	1.97
Towage <sup>a</sup>	9.77	10.63	4.74	5.48	5.06	5.71	16.74	15.57	11.58	11.93
Mooring, unmooring	1.80	1.90	1.68	1.88	0.66	0.71	–	–	0.75	0.74
Berth hire <sup>b</sup>	–	–	–	–	–	–	–	–	–	–
Total <sup>c</sup>	30.01	31.89	16.30	18.40	15.76	17.35	38.24	34.77	19.22	19.48
Cargo-based charges (\$/TEU)										
Wharfage										
Imports	28.60	28.60	89.65	89.65	39.05	39.05	64.31	64.31	56.53	56.53
Exports	28.60	28.60	51.15	51.15	39.05	39.05	64.31	64.31	56.53	56.53
Harbour dues	46.20	46.20	–	–	–	–	–	–	–	–
Berth charge	–	–	–	–	–	–	–	–	16.93	16.93
Total port and related charges (\$/TEU) <sup>c</sup>										
Loaded imports	104.81	106.69	105.95	108.05	54.81	56.40	102.54	99.08	92.68	92.94
Loaded exports	104.81	106.69	67.45	69.55	54.81	56.40	102.54	99.08	92.68	92.94
Charges per ship visit (\$/visit)										
Total ship-based charges	37 393	37 819	36 416	36 779	33 311	33 696	35 614	35 870	25 056	25 716
Empty TEUs <sup>d</sup>	6 224	5 765	7 315	6 970	5 051	2 889	0	0	4 082	4 047

– not applicable

r. revised

a. After enquiries at all ports the number of tugs required for towage in Adelaide and Fremantle used in PICI calculations has been revised in *Waterline 43*.

b. Charged by stevedores and itemised separately from basic stevedoring charge.

c. Components may not sum to totals due to rounding.

d. Sum of wharfage, harbour dues and berth charge per empty teu, multiplied by average exchange of empty TEUs.

Note: Port and related charges are based on the parameters described in Table 3.1.

Sources: BITRE estimates based on ship call data supplied by relevant port authorities/corporations, and price schedules of relevant port authorities/corporations, towage operators and pilotage service providers.

**Table 3.4 Port interface costs for ships in the 15 000–20 000 GT range, 2008**

	<i>Brisbane</i>		<i>Sydney</i>		<i>Melbourne</i>		<i>Adelaide</i>		<i>Fremantle</i>	
	<i>Jul–Dec</i>	<i>Jan–June</i>	<i>Jul–Dec</i>	<i>Jan–June</i>	<i>Jul–Dec</i>	<i>Jan–June</i>	<i>Jul–Dec</i>	<i>Jan–June</i>	<i>Jul–Dec</i>	<i>Jan–June</i>
	<i>2007</i>	<i>2008</i>	<i>2007</i>	<i>2008</i>	<i>2007</i>	<i>2008</i>	<i>2007</i>	<i>2008</i>	<i>2007</i>	<i>2008</i>
	<i>(\$/TEU)</i>									
<b>Import</b>										
Ship-based charges	28	42	27	34	30	26	40	40	9	10
Cargo-based charges	75	75	90	90	39	39	64	64	73	73
Stevedoring <sup>p</sup>	173	173	173	173	173	173	173	173	173	173
Customs brokers' fees	139	139	135	142	138	140	139	141	187	192
Road transport charges	297	354	485	482	353	471	242	272	349	351
Import total <sup>a</sup>	713	784	910	921	734	850	658	692	791	800
<b>Export</b>										
Ship-based charges	28	42	27	34	30	26	40	40	9	10
Cargo-based charges	75	75	51	51	39	39	64	64	73	73
Stevedoring <sup>p</sup>	173	173	173	173	173	173	173	173	173	173
Customs brokers' fees	117	117	107	115	108	97	113	94	99	99
Road transport charges	297	354	485	482	353	471	242	272	349	351
Export total <sup>a</sup>	690	761	843	856	704	806	633	645	704	707

r. revised

p. updated annually after the release of the ACCC stevedoring monitoring report.

a. components may not sum to totals due to rounding.

Notes: 1. Based on parameters described in table 3.1.

2. Waterline data on customs brokers' fees and road transport charges are collected for the purpose of monitoring trends in charges over time. They should not be used for inter-port comparisons, as sample characteristics may vary between ports.

3. The stevedoring charge used in Waterline is monitored by the ACCC and is the weighted average for Brisbane, Sydney, Melbourne, Adelaide, Fremantle and Burnie. Stevedoring charges vary between ports but detailed data for individual ports are not publicly available.

Sources: BITRE estimates based on: ship call data supplied by relevant port authorities/corporations; price schedules of relevant port authorities/corporations, towage operators and pilotage service providers; surveys of customs brokers and road transport operators; stevedoring charge data supplied by the ACCC 2008; ABS 2008.

**Table 3.5 Port interface costs for ships in the 35 000–40 000 GT range, 2008**

	<i>Brisbane</i>		<i>Sydney</i>		<i>Melbourne</i>		<i>Adelaide</i>		<i>Fremantle</i>	
	<i>Jul-Dec</i>	<i>Jan-June</i>	<i>Jul-Dec</i>	<i>Jan-June</i>	<i>Jul-Dec</i>	<i>Jan-June</i>	<i>Jul-Dec</i>	<i>Jan-June</i>	<i>Jul-Dec</i>	<i>Jan-June</i>
	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
	(\$/TEU)									
Import										
Ship-based charges	30	32	16	18	16	17	38	35	19	19
Cargo-based charges	75	75	90	90	39	39	64	64	73	73
Stevedoring <sup>p</sup>	173	173	173	173	173	173	173	173	173	173
Customs brokers' fees	139	139	135	142	138	140	139	141	187	192
Road transport charges	297	354	485	482	353	471	242	272	349	351
Import total <sup>a</sup>	714	774	899	906	720	841	657	686	801	809
Export										
Ship-based charges	30	32	16	18	16	17	38	35	19	19
Cargo-based charges	75	75	51	51	39	39	64	64	73	73
Stevedoring <sup>p</sup>	173	173	173	173	173	173	173	173	173	173
Customs brokers' fees	117	117	107	115	108	97	113	94	99	99
Road transport charges	297	354	485	482	353	471	242	272	349	351
Export total <sup>a</sup>	692	751	833	840	690	798	631	639	714	717

r. revised

p. updated annually after the release of the ACCC stevedoring monitoring report.

a. components may not sum to totals due to rounding.

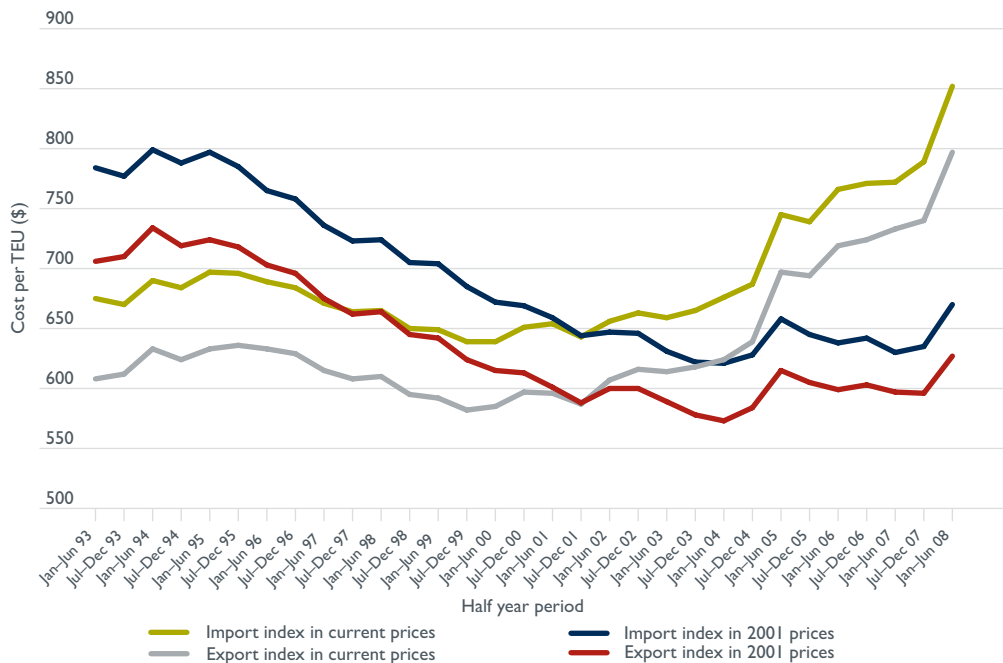
- Notes:
1. Based on parameters described in table 3.1.
  2. Waterline data on customs brokers' fees and road transport charges are collected for the purpose of monitoring trends in charges over time. They should not be used for inter-port comparisons, as sample characteristics may vary between ports.
  3. The stevedoring charge used in Waterline is monitored by the ACCC and is the weighted average for Brisbane, Sydney, Melbourne, Adelaide, Fremantle and Burnie. Stevedoring charges vary between ports but detailed data for individual ports are not publicly available.

Sources: BITRE estimates based on: ship call data supplied by relevant port authorities/corporations; price schedules of relevant port authorities/corporations, towage operators and pilotage service providers; surveys of customs brokers and road transport operators; stevedoring charge data supplied by the ACCC 2008; ABS 2008.

**Table 3.6 The national port interface cost index for ships in the 35 000–40 000 GT range, 2003–2008**

	<i>Jan-Jun</i>	<i>Jul-Dec</i>	<i>Jan-Jun</i>	<i>Jul-Dec</i>	<i>Jan-Jun</i>	<i>Jul-Dec</i>	<i>Jan-Jun</i>	<i>Jul-Dec</i>	<i>Jan-Jun</i>	<i>Jul-Dec</i>	<i>Jan-Jun</i>
	2003	2003	2004	2004	2005	2005	2006	2006	2007	2007	2008
	(\$/TEU)										
Imports in current prices	653	661	674	684	739	737	764	773	766	781	843
Imports in 2001 prices	625	618	619	625	653	642	650	644	624	629	663
Exports in current prices	608	614	623	636	691	692	717	726	726	732	788
Exports in 2001 prices	583	574	572	581	610	603	610	605	592	590	620

Sources: BITRE estimates based on: ship call data supplied by port authorities/corporations; price schedules of port authorities/corporations, towage operators and pilotage service providers; surveys of customs brokers and road transport operators; stevedoring charges data supplied by the ACCC 2008; and ABS 2008.

**Figure 3.1 National port interface cost indices for ships in the 15 000–20 000 GT range, 1993–2008****Table 3.7 Harbour towage charges, five mainland capital ports 30 June 2007 and 30 June 2008**

Regional Port	Brisbane		Sydney <sup>b</sup>		Melbourne		Adelaide		Fremantle		5 Ports Average	
Vessel size	30 Jun	30 Jun	30 Jun	30 Jun	30 Jun	30 Jun	30 Jun	30 Jun	30 Jun	30 Jun	30 Jun	30 Jun
(GT)	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
	(\$ per tug <sup>a</sup> )											
19 999 GT	3 091	3 615	3 042	3 487	3 757	3 993	3 918	4 157	2 541	2 651	3 399	3 544
59 999 GT	4 549	4 896	3 515	4 351	4 175	4 664	5 587	5 587	4 301	4 488	4 425	4 797

a. Cost for each tug to assist a ship arriving at or departing from a berth within the limits of the port at any time.

b. Sydney is represented by tariffs charged at Port Botany only.

Sources: BITRE estimates based on towage operators' tariff schedules, where there is more than one operator, the charges have been averaged.

**Table 3.8 Harbour towage charges, five regional and Tasmanian ports 30 June 2007 and 30 June 2008**

Regional Port	Bunbury		Burnie		Gladstone		Newcastle		Port Kembla		5 Ports Average	
Vessel size	30 Jun	30 Jun	30 Jun	30 Jun	30 Jun	30 Jun	30 Jun	30 Jun	30 Jun	30 Jun	30 Jun	30 Jun
(GT)	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008	2007	2008
	(\$ Per Tug Rate <sup>a</sup> )											
19 999 GT	3 409	3 386	3 280	3 510	1 988	1 988	1 788	1 873	2 563	2 563	2 581	1 987
59 999 GT	5 084	5 541	na	na	3 703	3 703	2 837	2 632	6 655	5 705	4 523	3 010

na not applicable

a. Cost for each tug to assist a ship arriving at or departing from a berth within the limits of the port at any time.

Sources: BITRE estimates based on towage operators' tariff schedules, where there is more than one operator, the charges have been averaged.

## Chapter 4 Ship visits

This chapter presents information on the trends in container ship size over time for ships which visit the five ports covered by *Waterline* (see Appendix B for the definition of ship units used).

Table 4.1 provides the five port total number of ship visits and the average number of TEUs exchanged per ship visit for container vessels with sizes ranging from 5000–60 000 GT.

Average TEUs fell for all ship sizes in the first half of 2008.

Total ship visits increased by 2.0 per cent in financial year 2007–08 compared with the preceding year, with ship visits peaking at 2261 for the six months to December 2007. There was little variation in ship visits between the six month periods to December 2007 and June 2008. The largest increases were in the 50 000–55 000 GT range and 20 000–25 000 GT range where there were increases of 65 and 59 visits respectively.

On a five port basis, Table 4.2 shows the distribution of ship visits by vessel gross tonnage for 2007–08. For all ports the vessel with the largest number of visits was in the 25 000–30 000 GT range. This was closely followed by the 35 000 to 40 000 GT range.

**Table 4.1 Five port average number of TEUs exchanged and total ship visits per 6 month period for selected GT ranges, weighted by number of ships**

Gross Tonnage	Jan-Jun 2002	Jul-Dec 2002	Jan-Jun 2003	Jul-Dec 2003	Jan-Jun 2004	Jul-Dec 2004	Jan-Jun 2005	Jul-Dec 2005	Jan-Jun 2006	Jul-Dec 2006	Jan-Jun 2007	Jul-Dec 2007	Jan-Jun 2008
5 000–10 000													
Average TEUs exchanged	239	187	161	193	333	204	283	368	267	560	391	402	317
Total ship visits	66	78	75	72	93	80	71	67	93	108	144	131	159
10 000–15 000													
Average TEUs exchanged	712	424	405	485	688	628	554	506	464	656	711	864	507
Total ship visits	79	59	53	54	40	84	89	106	136	108	116	125	103
15 000–20 000													
Average TEUs exchanged	763	839	839	826	971	885	693	800	685	890	873	1 116	841
Total ship visits	285	223	181	191	153	266	316	439	406	430	224	209	189
20 000–25 000													
Average TEUs exchanged	762	818	902	990	1 014	935	818	859	685	925	878	942	856
Total ship visits	233	241	182	214	199	306	321	294	374	256	163	148	207
25 000–30 000													
Average TEUs exchanged	888	1 070	1 027	1 031	959	1 071	956	1 021	882	1 101	991	2 528	1 047
Total ship visits	186	252	286	323	344	185	332	377	395	475	558	618	545
30 000–35 000													
Average TEUs exchanged	1 014	1 149	1 262	1 374	1 478	896	1 216	1 434	1 152	1 329	1 185	1 296	803
Total ship visits	216	232	175	257	247	191	223	141	198	156	177	235	243
35 000–40 000													
Average TEUs exchanged	1 262	1 403	1 408	1 445	1 474	1 385	1 394	1 454	1 137	1 383	1 345	1 867	1 638
Total ship visits	203	223	214	189	225	228	227	225	178	223	313	357	333
40 000–45 000													
Average TEUs exchanged	1 228	1 465	1 450	1 558	1 601	1 098	1 511	1 653	1 177	1 435	1 630	1 819	1 766
Total ship visits	195	172	162	186	181	143	196	165	223	249	212	173	136
45 000–50 000													
Average TEUs exchanged	808	938	1 201	1 270	1 379	0 853	1 279	1 433	914	1 029	1 236	1 651	1 529
Total ship visits	5	38	72	77	75	32	65	77	88	81	154	153	145
50 000–55 000													
Average TEUs exchanged	1 134	1 027	995	1 044	1 366	795	1 735	1 250	1 321	1 373	1 232	1 807	1 600
Total ship visits	60	55	61	69	22	71	89	60	55	55	110	101	166
55 000–60 000													
Average TEUs exchanged	1 069	1 166	1 252	0	0	681	537	0	0	596	659	1 457	0
Total ship visits	15	14	3	0	0	6	8	0	0	2	1	11	0
Total ship visits	1 543	1 587	1 464	1 632	1 579	1 592	1 937	1 951	2 146	2 143	2 172	2 261	2 226

Source: BITRE estimates based on ship call data supplied by relevant port authorities and corporations.

**Table 4.2 Ship visits by port, 2007–08**

<i>Number of ship visits</i>	<i>Brisbane</i>	<i>Sydney</i>	<i>Melbourne</i>	<i>Adelaide</i>	<i>Fremantle</i>	<i>Total</i>
5 000–10 000	80	153	57	0	0	290
10 000–15 000	75	73	53	0	27	228
15 000–20 000	129	111	82	51	25	398
20 000–25 000	110	97	104	24	20	355
25 000–30 000	200	376	402	89	96	1 163
30 000–35 000	116	151	139	24	48	478
35 000–40 000	146	193	194	74	83	690
40 000–45 000	65	65	90	31	58	309
45 000–50 000	63	54	54	44	83	298
50 000–55 000	29	62	65	35	76	267
Above 55 000	0	3	2	2	4	11
Total	1 013	1 338	1 242	374	520	4 487

Source: BITRE estimates based on ship call data supplied by relevant port authorities and corporations.



## Chapter 5      Port performance — non-financial

The non-financial data presented in this chapter supplements the data presented for container productivity in Chapter 2. This data covers the total bulk and non-bulk cargo which goes through the five mainland major city ports covered in *Waterline*. Non-bulk cargo consists of general cargo and containerised cargo. The total of containers is for the whole port rather than for the container terminals.

The January–June 2005 to January–June 2008 non-financial indicators for the five mainland capital city ports are presented in Table 5.1. A longer time series of this data is available in an Excel spreadsheet at [www.bitre.gov.au](http://www.bitre.gov.au).

### Cargo throughput

Total cargo throughput at the five ports was 63.756 million tonnes for January–June 2008, compared with 62.591 million tonnes for the previous half-year July–December 2007 and 59.953 million tonnes for January–June 2007. This represented an increase of 1.9 per cent in total cargo throughput for the five ports for January–June 2008 compared with July–December 2007 and an increase of 6.3 per cent compared with January–June 2007.

Compared with January–June 2007, total cargo throughput in January–June 2008 increased by 4.1 per cent at Brisbane, 5.7 per cent at Sydney, 7.1 per cent at Melbourne, 4.2 per cent at Adelaide and by 9.6 per cent at Fremantle.

Non-containerised general cargo throughput at the five ports was 2.826 million tonnes for January–June 2008, which represents an increase of 4.6 per cent on the 2.701 million tonnes throughput for July–December 2007 and an increase of 2.1 per cent on the 2.768 million tonnes throughput for January–June 2007.

Total container traffic throughput for the five ports was 2.859 million TEUs for January–June 2008, which represents a decrease of 3.8 per cent on the 2.971 million TEUs throughput for July–December 2007 and an increase of 9.0 per cent on the 2.624 million TEUs throughput for January–June 2007.

Compared with July–December 2007, loaded TEUs at the five ports increased by 10.8 per cent, with loaded imports increasing by 11.9 per cent and loaded exports increasing by 9.1 per cent.

**Table 5.1 Non-financial performance indicators, selected Australian ports, 2005–2008**

	<i>Jan–Jun 2005</i>	<i>Jul–Dec 2005</i>	<i>Jan–Jun 2006</i>	<i>Jul–Dec 2006</i>	<i>Jan–Jun 2007</i>	<i>Jul–Dec 2007</i>	<i>Jan–Jun 2008</i>
<i>Five ports<sup>a</sup></i>							
Total cargo throughput (thousand tonnes)	57 064	57 776	58 358	60 694	59 953	62 591	63 756
Non-containerised general cargo (thousand tonnes) <sup>b</sup>	2 518	2 572	2 506	2 522	2 768	2 701	2 826
Containerised cargo (TEUs exchanged)							
Full import	978 300	1 139 342	1 028 263	1 242 921	1 166 116	1 389 211	1 305 203
Empty import	135 088	129 224	199 487	137 911	139 096	136 768	142 714
Full export	719 329	755 826	686 673	807 702	778 137	817 213	849 152
Empty export	411 302	445 509	402 163	500 511	540 582	627 401	563 815
TOTAL	2 244 019	2 469 901	2 316 586	2 689 045	2 623 931	2 970 593	2 858 884
Total employment <sup>c</sup>	967	1 036	1 056	1 076	1 114	1 141	1 154
Port turnaround time (hrs) <sup>d</sup>							
Median result	–	–	–	–	–	–	–
95th percentile	–	–	–	–	–	–	–
<i>Brisbane</i>							
Total cargo throughput (thousand tonnes)	12 967	13 531	13 226	13 936	14 130	15 006	14 716
Non-containerised general cargo (thousand tonnes) <sup>b</sup>	447	461	459	466	546	516	542
Containerised cargo (TEUs exchanged)							
Full import	133 594	172 175	149 226	186 666	177 073	216 280	196 074
Empty import	34 136	33 218	34 164	40 400	38 023	32 133	33 613
Full export	113 090	130 459	115 564	136 672	120 261	125 275	130 028
Empty export	61 643	60 349	71 123	75 844	100 106	114 465	92 892
TOTAL	342 463	396 201	370 077	439 582	435 463	488 153	452 607
Total employment <sup>c</sup>	248	253	256	258	293	312	312
Port turnaround time (hrs) <sup>d</sup>							
Median result	28	27	30	36	33	35	33
95th percentile	54	53	51	57	54	54	51
<i>Sydney</i>							
Total cargo throughput (thousand tonnes)	12 635	13 219	13 505	14 024	13 772	14 886	14 558
Non-containerised general cargo (thousand tonnes) <sup>b</sup>	329	312	304	331	347	270	262
Containerised cargo (TEUs exchanged)							
Full import	320 732	378 451	342 216	419 784	380 056	459 364	428 179
Empty import	7 670	9 929	9 490	9 616	9 762	9 796	9 224
Full export	158 342	171 320	173 932	192 703	176 919	188 416	196 678
Empty export	170 699	191 297	168 830	213 006	218 275	248 943	237 825
TOTAL	657 443	750 997	694 468	835 109	785 012	906 519	871 906
Total employment <sup>c</sup>	200	241	243	246	244	240	223
Port turnaround time (hrs) <sup>d</sup>							
Median result	28	29	28	30	30	30	28
95th percentile	51	50	48	56	53	57	47
<i>Melbourne</i>							
Total cargo throughput (thousand tonnes)	14 211	13 978	13 781	14 884	14 628	15 159	15 665
Non-containerised general cargo (thousand tonnes) <sup>b</sup>	1 126	1 060	1 081	1 061	1 175	1 184	1 251

*(continued)*

**Table 5.1 Non-financial performance indicators, selected Australian ports, 2005–2008 (continued)**

	<i>Jan–Jun 2005</i>	<i>Jul–Dec 2005</i>	<i>Jan–Jun 2006</i>	<i>Jul–Dec 2006</i>	<i>Jan–Jun 2007</i>	<i>Jul–Dec 2007</i>	<i>Jan–Jun 2008</i>
Containerised cargo (TEUs exchanged)							
Full import	406 623	456 345	416 323	485 828	463 052	542 218	508 357
Empty import	59 334	51 035	60 806	55 592	54 843	47 900	50 920
Full export	329 766	330 003	339 949	355 544	343 064	354 504	372 536
Empty export	141 136	149 346	126 118	158 613	177 075	205 955	174 254
TOTAL	936 859	986 729	943 196	1 055 577	1 038 034	1 150 577	1 106 067
Total employment <sup>c</sup>	184	191	199	196	201	209.3	223
Port turnaround time (hrs) <sup>d</sup>							
Median result	33	32	30	31	31	32	30
95th percentile	60	54	52	62	63	65	56
<i>Adelaide</i>							
Total cargo throughput (thousand tonnes)	4 699	4 832	5 137	5 212	5 072	5 014	5 283
Non-containerised general cargo (thousand tonnes) <sup>b</sup>	207	282	193	181	180	196	187
Containerised cargo (TEUs exchanged)							
Full import	19 785	24 201	23 483	30 277	31 441	38 144	40 656
Empty import	19 663	21 280	18 024	21 342	23 583	28 340	29 018
Full export	40 259	46 933	43 954	46 606	50 233	57 587	59 075
Empty export	6 760	6 562	4 954	7 979	7 656	12 710	14 591
TOTAL	86 467	98 976	90 415	106 204	112 913	136 781	143 340
Total employment <sup>c</sup>	95	94	97	97	99	103	107
Port turnaround time (hrs) <sup>d</sup>							
Median result	22	21	19	20	21	20	21
95th percentile	41	34	32	32	35	34	35
<i>Fremantle</i>							
Total cargo throughput (thousand tonnes)	12 551	12 217	12 709	12 638	12 352	12 525	13 534
Non-containerised general cargo (thousand tonnes) <sup>b</sup>	409	457	468	482	520	535	585
Containerised cargo (TEUs exchanged)							
Full import	97 566	108 170	97 015	120 366	114 494	133 205	131 937
Empty import	14 285	13 762	13 274	10 961	12 885	18 599	19 939
Full export	77 872	77 111	77 003	76 177	87 660	91 431	90 835
Empty export	31 064	37 955	31 138	45 069	37 470	45 328	44 253
TOTAL	220 787	236 998	218 430	252 573	252 509	288 563	284 964
Total employment <sup>c</sup>	241	258	261	280	277	277	289
Port turnaround time (hrs) <sup>d</sup>							
Median result	24	23	21	25	27	26	29
95th percentile	51	56	48	54	55	51	62

– not applicable

a. Components may not sum to totals due to rounding.

b. Excludes bulk cargoes

c. Only employees of Port Authorities (full time equivalent). Comparisons between ports are not appropriate because each port authority/corporation has a different structure.

d. Port turnaround times refer only to ships calling at container terminals. Comparisons between ports are not appropriate because each port has a different set of parameters to measure the turnaround time. Normally, only inter-temporal comparison at individual ports is of use. Note also, the figures for Adelaide for January–June and July–December 2007 have been amended for those appearing in Waterline 44.

Note: Longer time series data on these indicators is available in an excel spreadsheet at [www.bitre.gov.au](http://www.bitre.gov.au).

The five major ports covered are Brisbane, Sydney, Melbourne, Adelaide and Fremantle.

Source: Ports Australia 2008



## Chapter 6      Stevedoring and ship arrival reliability

This section presents two indicators of waterfront reliability: stevedoring cargo receipt and ship arrival advice.

### Stevedoring-cargo receipt

Table 6.1 presents the available information on cargo received at major container terminals.

The indicator for each port is prepared by combining each stevedore's cargo availability figures with the proportion of container lifts handled at the stevedore's terminals at the port to produce the weighted mean presented in Table 6.1.

Stevedoring reliability in the March quarter 2008 increased at Brisbane, Melbourne and Fremantle compared to the previous quarter. It decreased at Sydney and was not available for Adelaide. Stevedoring reliability in the June quarter 2008 decreased for Brisbane, and increased at Sydney, Melbourne and Fremantle compared to the previous quarter. It was not available for Adelaide.

### Ship arrival

Table 6.1 also includes data for two indicators of ship arrival advice.

The first indicator is the percentage of ship arrivals within one hour of the most recently advised arrival time available to the port authority/corporation 24 hours prior to the ship's actual arrival. Compared with the previous quarter, the March quarter 2008 indicator rose at Brisbane, Sydney and Fremantle. It was not available for Melbourne and did not change at Adelaide. In the June quarter 2008, the indicator rose at Sydney and fell at Brisbane and Fremantle and Adelaide. It was not available for Melbourne.

The second indicator is the percentage of ship arrivals within one hour of the last scheduled arrival time advised inside the 24 hours prior to actual arrival. In the March quarter 2008, this indicator fell at Adelaide, Fremantle, Brisbane and Sydney. It was not available for Melbourne. In the June quarter 2008 this indicator rose at Adelaide and fell at Sydney Brisbane and Fremantle. It was not available for Melbourne.

**Table 6.1    Stevedoring and ship arrival reliability indicators, March and June quarters 2008**

<i>Indicator</i>	<i>Brisbane</i>		<i>Sydney</i>		<i>Melbourne</i>		<i>Adelaide</i>		<i>Fremantle</i>	
	<i>Jan–Mar</i>	<i>Apr–June</i>	<i>Jan–Mar</i>	<i>Apr–June</i>	<i>Jan–Mar</i>	<i>Apr–June</i>	<i>Jan–Mar</i>	<i>Apr–June</i>	<i>Jan–Mar</i>	<i>Apr–June</i>
	<i>(per cent)</i>									
Stevedoring										
Cargo receipt	94.7	93.6	88.0	89.4	88.4	89.5	0.0	0.0	95.1	95.5
Ship arrival										
Advice at 24 hrs	55.2	35.7	37.4	41.0	na	na	100.0	97.0	63.7	54.9
Advice inside 24 hrs	89.7	74.9	91.4	89.5	na	na	97.7	100	89.8	86.3

na            not available

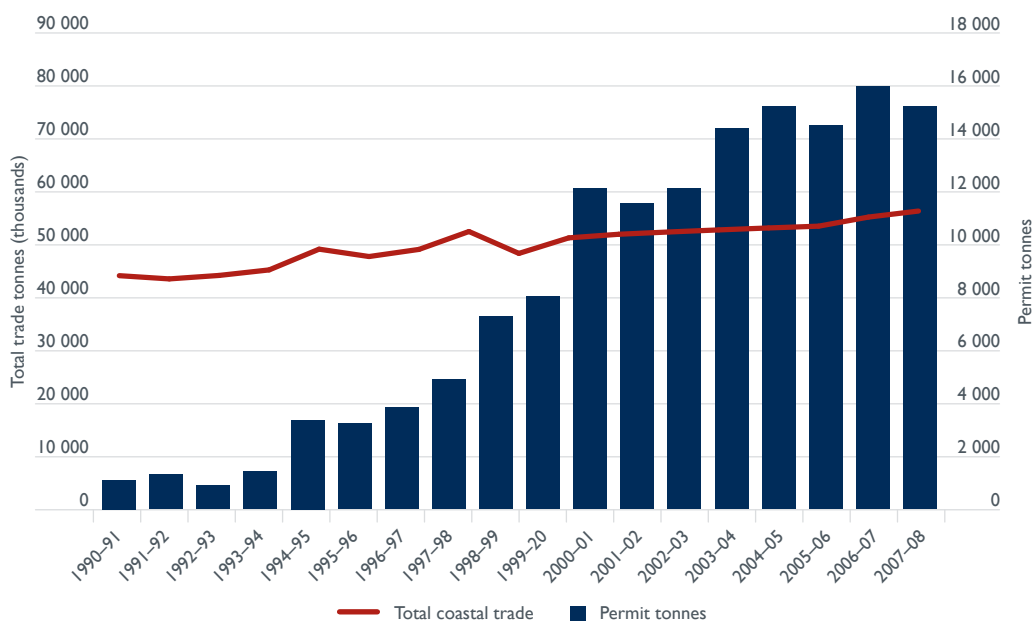
Sources:    AAPMA 2008, Patrick 2008b, DP World 2008.

## Chapter 7 Coastal shipping permits

In order for foreign vessels to trade on the Australian coast it is necessary for them to obtain shipping permits. Permits can be obtained for a single voyage (single voyage permits—SVPs) or for a series of voyages along the coast (continuing voyage permits—CVPs). The extent to which these permits are sought and issued is a proxy measure of the competition which exists between Australian flag and foreign flag vessels. Definitions of permits are provided in Appendix B.

Total tonnages planned to be shipped under cargo permits issued to applicants for SVPs and CVPs decreased from 16.0 million tonnes in the financial year 2007 to 15.8 million tonnes in the financial year 2008 (Figure 7.1).

**Figure 7.1 Total coastal trade and permit tonnages, 1990–91 to 2007–08**



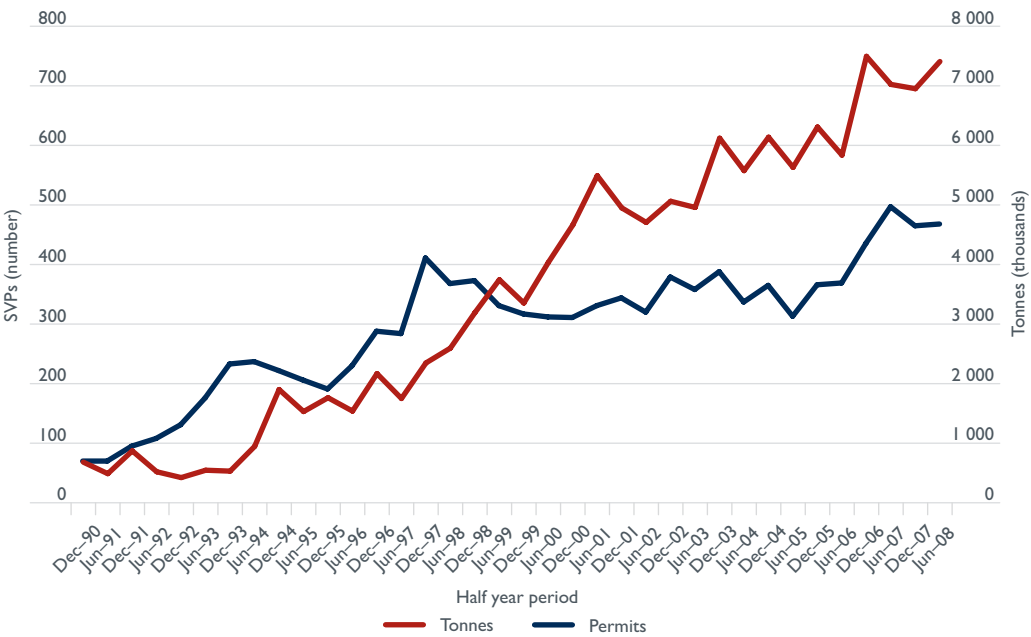
Note: All tonnages are pre-voyage estimates.

Source: Department of Infrastructure, Transport, Regional Development and Local Government 2008.

## Single voyage permits

Figure 7.2 illustrates the number of SVPs issued, and the pre-voyage estimates of tonnes of cargo to be carried, between January–June 1991 and January–June 2008. The number of SVPs issued in January–June 2008 increased by 0.6 per cent compared with July–December 2007 and decreased by 5.8 per cent compared with the January–June 2007 period. The associated estimated tonnes of cargo to be carried increased by 15.4 per cent compared with July–December 2007, and increased by 14.2 per cent compared with January–June 2007.

**Figure 7.2** Number of SVPs and tonnes planned to be carried via SVPs, December 1990 to June 2008



Note: All tonnages are pre-voyage estimates.

Source: Department of Infrastructure, Transport, Regional Development and Local Government 2008.

The total number of SVPs issued in the 2008 financial year was 933, the same as in 2007. Over the same period estimated SVP cargo increased by 4.3 per cent from 14 314 thousand tonnes to 14 942 thousand tonnes.

Table 7.1 gives a breakdown of SVPs by cargo types for January–June 2008. General cargo (including containerised cargo) permits now represent 2.6 per cent by weight, while making up 29.3 per cent of total permits issued. Bulk cargo accounts for 71.3 per cent of the total tonnage moved under SVPs.

**Table 7.1 Summary of single voyage permits issued, January–June 2008**

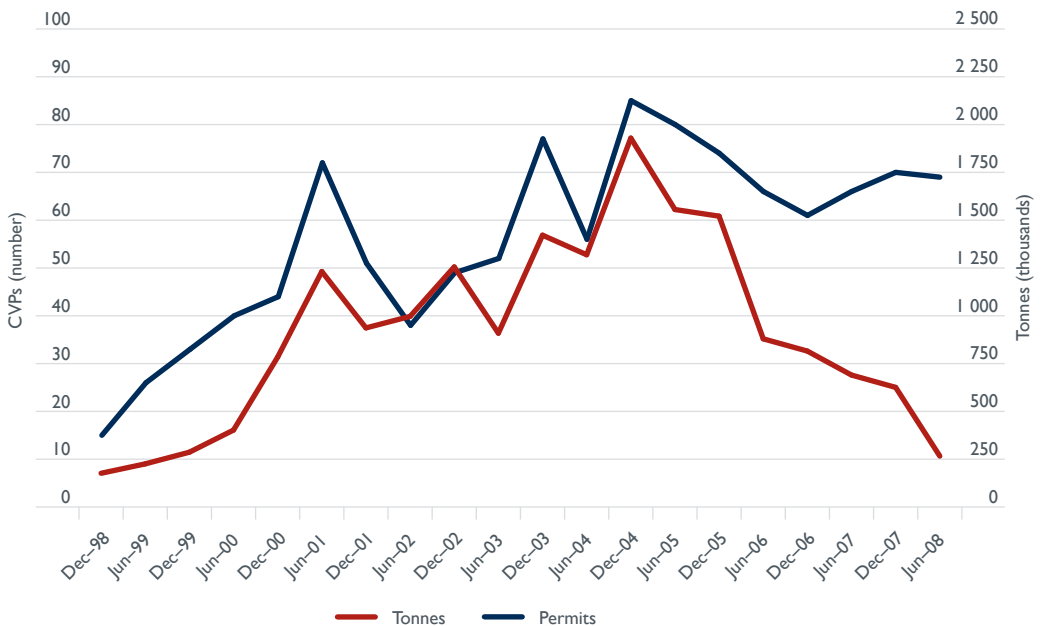
<i>Cargo Category</i>	<i>Permits</i>	<i>Tonnes</i>
Bulk Cargo		
Petroleum Products	80	1 705 755
Liquefied Gas	6	53 942
Other Bulk Liquids	27	174 555
Dry Bulk	218	5 269 541
General Cargo	137	190 053
Total	468	7 393 846

Note: Tonnages are the pre-voyage estimated tonnes to be carried.

Source: Department of Infrastructure, Transport, Regional Development and Local Government 2008a.

## Continuing voyage permits

Although CVPs were available prior to 1998, they were rarely requested or issued during this period. Since 1998, there have been significant fluctuations in both the number of permits issued and the tonnage to be carried, as shown in Figure 7.3. In January–June 2008, a total of 266 thousand tonnes of cargo were to be carried under CVPs, compared with 624 thousand tonnes in July–December 2007 and 689 thousand tonnes in January–June 2007.

**Figure 7.3 Number of CVPs and tonnes planned to be carried via CVPs, December 1998 to June 2008**

Note: All tonnages are pre-voyage estimates.

Source: Department of Infrastructure, Transport, Regional Development and Local Government 2008.

CVPs issued since the start of 2006 have been for three months maximum duration rather than the six months allowed previously. One CVP is estimated to be equivalent to three SVPs on average.

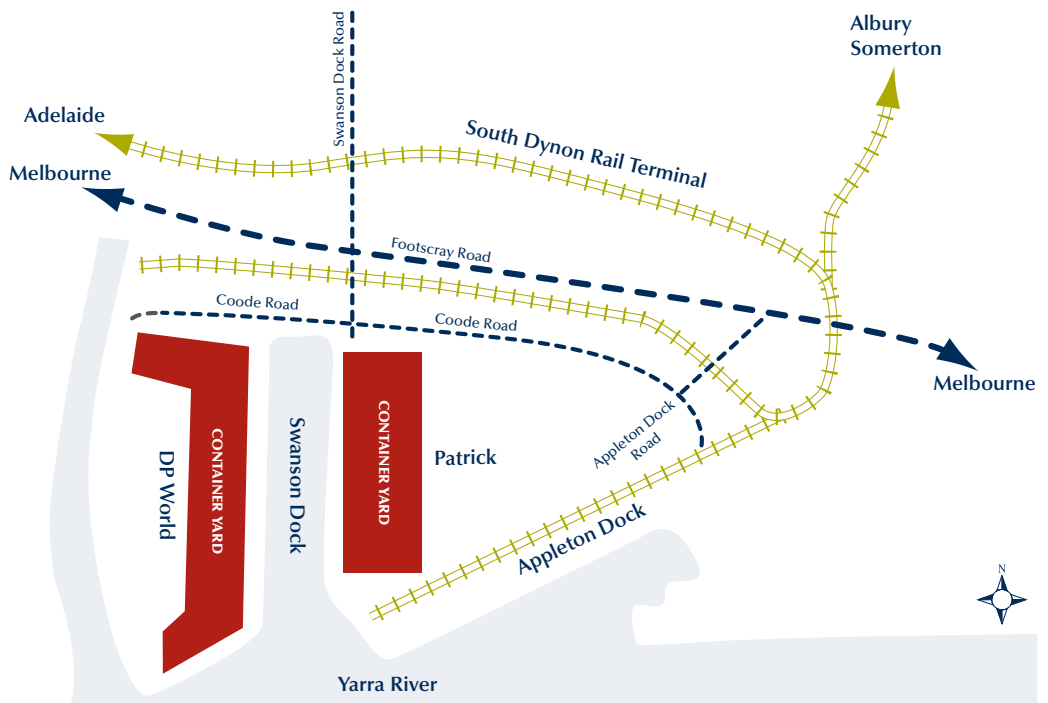
In January–June 2008, there were 69 CVPs issued compared with 66 in the same period in 2007, an increase of 4.5 per cent.

More information on coastal permits can be found on the Department of Infrastructure Transport and Regional Development' internet site at

<<http://www.infrastructure.gov.au/maritime/freight/licences/index.aspx>>.

## Appendix A      Diagrams of five major Australian container port terminals

Figure A1 Patrick and DP World terminals—Swanson dock, Port Melbourne, Victoria

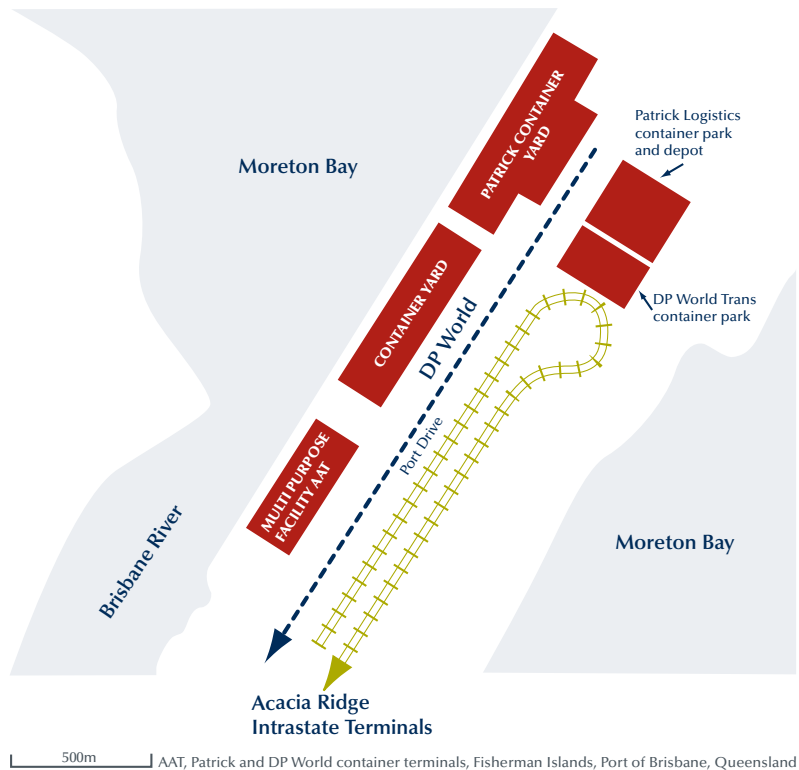


200m Patrick and DP World container terminals, Swanson Dock, Port Melbourne, Victoria

Note: For DP World and Patrick trains from the Swanston Dock to access the rail network they have to cross Footscray Road. This access is being improved with a grade separation funded by an Auslink National Project. The trains pass through the South Dynon rail terminal which is only a few hundred metres north of Footscray Road. The diagram is correct as at March 2007.

Source: DOTARS (2006), DOTARS (2007a), DP World (2007b), Google Maps Australia (2007), Patrick (2007c), Port of Melbourne (2006), SKM (2003).

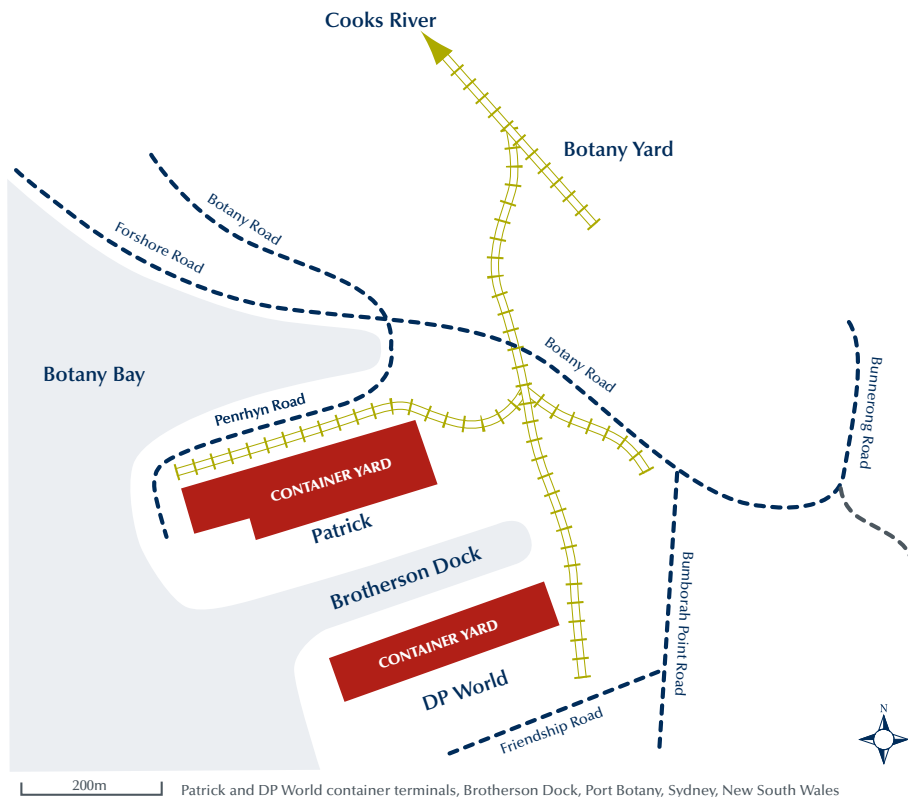
**Figure A2 Patrick and DP World terminals—Fisherman Islands, Port of Brisbane, Queensland**



**Note:** This is a purpose built container terminal and includes a near dock rail terminal shared by the two stevedores for export and import containers and Australian Amalgamated Terminals (AAT) which provides a multi purpose facility with container handling capacity which can be used for motor vehicles as well as other stevedoring activities. Berths 1 to 3 are leased by AAT, berths 4 to 6 are leased by DPWorld and Berths 7 to 9 are leased by Patrick for their Autostrad container terminal. The rail terminal has a direct turning loop which avoids shunting of trains. The Fisherman Islands terminal is connected to the Acacia Ridge terminal and to regional terminals. The Acacia Ridge multi-modal container terminal is connected to the intrastate narrow gauge rail network as well as the interstate standard gauge network. The diagram is correct as at March 2007.

**Source:** DP World (2007b), Google Maps Australia (2007), DOTARS (2006), Patrick (2007c), Port of Brisbane (2007).

**Figure A3 Patrick and DP World terminals—Brotherson dock, Port Botany, Sydney, New South Wales**

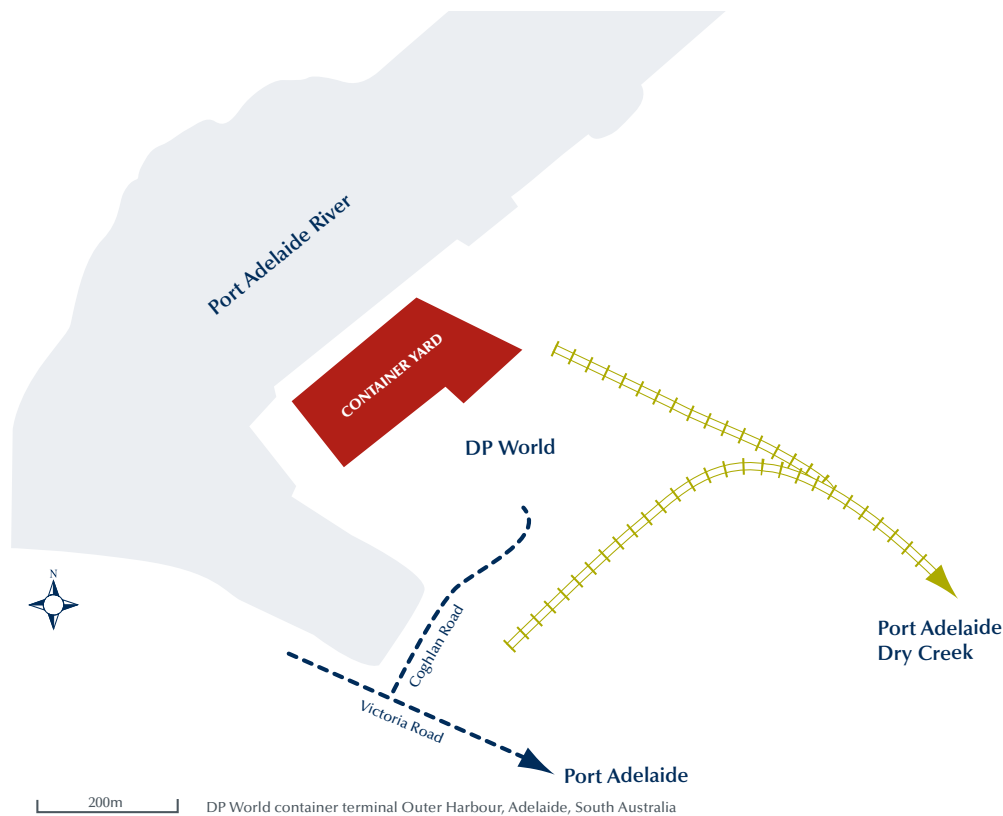


Patrick and DP World container terminals, Brotherson Dock, Port Botany, Sydney, New South Wales

**Note:** Port Botany has on-dock rail terminals. Access for both DP World and Patrick is directly adjacent to the container yards making it easier to load containers directly on to trains. Trains with containers for both the stevedores are split up at the Botany Rail Yard which is adjacent to the container terminal at Brotherson dock. DP World Transport has an intermodal terminal adjacent to the Port Botany container terminals which is used primarily for empty containers. Further down (about eight kilometres) along the Botany Freight Rail Line, the Cooks River terminal is also used for empty containers. To the West of the metropolitan area are intermodal terminals at Yennora, Leightonfield, Minto and Camellia. Development of the Port Botany rail link is planned as part of an Auslink National Project. The diagram is correct as at March 2007.

**Source:** DOTARS (2007b), DP World (2007b), Freight Industry Advisory Board (2005), Google Maps Australia (2007), DOTARS (2006), Patrick (2007c).

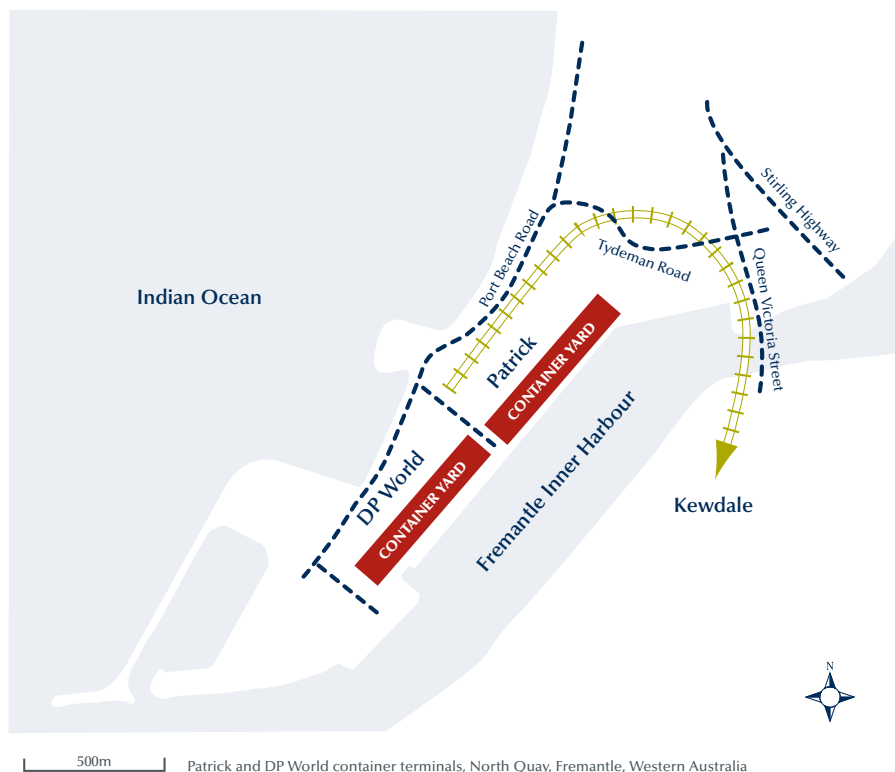
Figure A4 DP World terminal—Outer Harbour, Adelaide



**Note:** This is the only container terminal at Adelaide. It is operated by DP World stevedores, is located at Pelican Point, Outer Harbour, approximately 10 kilometres from Port Adelaide. It has an on-dock rail terminal adjacent to a container depot which in turn is connected via Port Adelaide to the Dry Creek intermodal terminal by a dual gauge (broad and standard gauge) line. The link is to be improved as an Auslink National Project by a new rail bridge across the Port River and Port Adelaide as Stage 3 of the Port River Expressway Upgrade (DOTARS 2007c). The diagram is correct as at March 2007.

**Source:** DOTARS (2007c), DP World (2007b), Google Maps Australia (2007), DOTARS (2006).

**Figure A5 Patrick and DP World container terminals—North Quay, Fremantle**



- Note:** The container terminal has a rail terminal adjacent to the Patrick container yard. The DP World terminal is located further along the dock. The rail terminal on North Quay has recently been upgraded as an Auslink National Project. The new link is dual gauge providing access for narrow gauge trains to the terminal. Containers travelling by rail have as origin/destination the Perth metropolitan area, regional Western Australia or are land bridged to Adelaide. However interstate containers (land bridge) are not dispatched directly from the Inner Harbour rail terminal but from Kewdale, which is Perth's only intermodal terminal. The diagram is correct as at March 2007.
- Source:** Department of Planning and Infrastructure (2004), DOTARS (2006), DP World (2007b), Fremantle Ports (2007), Google Maps Australia (2007), DOTARS (2007d), Patrick (2007c).

**Table A1 Bulk ports and the main bulk commodity the port handles, 2006–07**

Bulk port	Total throughput of port (million tonnes)	Main bulk freight handled in port	Main bulk commodity	Main commodity as percent of total throughput	Cumulative share of total bulk
				(per cent)	(per cent)
1. Dampier–WA	125.7	103.5	Iron ore & concentrates	82.3	19.1
2. Port Hedland–WA	106.8	102.4	Iron ore & concentrates	95.9	35.4
3. Hay Point–Qld	86.4	72.7	Coal, coke & briquettes	84.2	48.6
4. Newcastle–NSW	82.5	63.5	Coal, coke & briquettes	77.0	61.1
5. Gladstone–Qld	54.7	34.3	Coal, coke & briquettes	62.8	69.5
6. Port Walcott–WA	53.9	53.9	Iron ore & concentrates	100.0	77.7
7. Port Kembla–NSW	13.9	9.7	Coal, coke & briquettes	69.5	79.8
8. Abbot Point–Qld	11.2	11.1	Coal, coke & briquettes	99.4	81.5
9. Fremantle/Perth–WA	10.1	3.8	Cereals & cereal preps.	37.7	83.0
10. Bunbury–WA	10.0	1.4	Cork & wood	14.0	84.6
11. Brisbane–Qld	9.3	4.2	Coal, coke & briquettes	44.9	86.0
12. Esperance–WA	9.3	7.5	Iron ore & concentrates	81.1	87.4
13. Weipa–Qld	6.2	6.2	Aluminium ores & concentrates; alumina	100.0	88.3
14. Geraldton–WA	6.0	3.5	Iron ore & concentrates	57.5	89.2
15. Launceston–Tas	3.3	2.8	Cork & wood	84.0	89.7
16. Albany–WA	3.3	1.4	Cork & wood	43.0	90.2
17. Cape Cuvier–WA	2.6	1.1	Crude minerals	41.7	90.6
18. Geelong–Vic	2.3	1.3	Cork & wood	56.8	91.0
19. Whyalla–SA	2.2	2.2	Iron ore & concentrates	98.8	91.3
20. Portland–Vic	1.8	1.3	Cork & wood	72.4	91.6
21. Yampi Sound–WA	1.5	1.5	Iron ore & concentrates	100.0	91.8
22. Burnie–Tas	1.5	1.3	Cork & wood	87.6	92.0
23. Twofold Bay–NSW	1.3	1.3	Cork & wood	100.0	92.2
24. Other ports	50.9	68.1	na	na	na
Total Australia	656.5	559.9	na	na	na

Note: The highlighted ports are excluded from regular reporting because either the port's throughput for the main bulk commodity was less than 2 million tonnes in 2006–07 or the share of the main bulk commodity in total port throughput was less than 50 per cent.

Source: BITRE computations based on ABS International Cargo Statistics, unpublished.

na not applicable

**Table A2    Potential indicators**

<i>Indicator</i>	<i>Scope</i>	<i>Units</i>
1. Port's total throughput—each quarter	All freight	Tonnes
2. Port's total bulk freight loaded—each quarter	All bulk	Tonnes
3. Port's total main bulk freight loaded—each quarter	The main commodity handled at the port	Tonnes
4. Port's design capacity for main bulk freight loaded—each quarter	Main bulk commodity handled at port	Tonnes
5. Port's utilisation rate for main bulk freight loaded—each quarter	Main bulk commodity handled at port	Per cent, average for quarter
6. Port's load rate for main bulk freight loaded	Main bulk commodity handled at port	Tonnes per hour
7. Number of vessels loaded with main bulk commodity handled at port, each quarter	Main bulk commodity handled at port	Count of vessels by size of vessel
8. Average vessel turnaround time for vessels loaded with main bulk commodity handled at port	Main bulk commodity handled at port	Hours



# Appendix B      Explanatory notes about terms in *Waterline*

## Introduction

*Waterline* was started to provide a vehicle for descriptive data and various productivity indicators related to waterfront activities. These activities take place in three main parts of the port terminal:

- on the landside of port terminal
- at the wharfside of port terminal; and
- within the port terminal.

The information in *Waterline* falls under these three broad categories. These explanatory notes briefly describe these activities and the indicators associated with them. To correctly interpret the information in *Waterline* the reader should be clear about the following issues: the scope of coverage of *Waterline*, the sources of the various data items, the measures of output used in *Waterline*.

## Scope

*Waterline* data relates to five mainland major ports in Australia—namely Brisbane, Sydney, Melbourne, Adelaide and Fremantle.

*Waterline* focuses on containerised cargo; and excludes all other cargo types.

*Waterline* includes only fully cellular ships in its calculations. Fully cellular ships are defined as purpose-built container ships equipped with 40 foot cell guides below deck as a minimum, and exclude such vessels if used for mixed cargoes of containers and general cargo.

## Data sources

The measures of port terminal productivity are based on all available data about container movements at the five port terminals. Those measures are based on a census of activities at those port terminals.

Data on costs are based on a sample of ships that call at each of the mainland major ports in Australia. The chosen samples are all ships in the 15 000–20 000 GT range and all ships in the 35 000–40 000 GT range. These vessels represent almost 40 per cent of vessels in the 15 000 to 45 000 GT range, which itself is almost 85 per cent of all ship visits to these ports in 2005.

## Two measures of output are used in *Waterline*:

- containers handled—this is the total number of containers lifted on/off fully cellular ships; and
- TEUs—this is the number of containers calculated as twenty foot equivalent units. This means that a twenty foot container is counted as one container or TEU and a forty foot container is counted as two twenty foot containers or two TEUs. By definition for any given period TEUs handled are more than containers handled.

## Landside of the port terminal definitions as used in Chapter I

### Container turnaround time (minutes)

This indicator measures the efficiency in the handling of an individual container at a port terminal in a seven day period. This measure includes more than just the time it takes to bring a container from the container storage yard and put it on a truck or take it from the truck. It is related to the truck turnaround time as follows:

Container turnaround time = (Average truck turnaround time in a quarter) divided by (the average number of containers on a truck in a quarter).

In this definition, average truck turnaround time (TTT) in the quarter is a measure of the efficiency with which trucks are processed within a given terminal. The TTT indicator measures the length of time (in minutes) that a truck takes from the time it enters a port terminal to the time it exits the port terminal. The time spent at the gate is not included in this measure. It also does not include time spent in queuing outside the terminal gate.

Container turnaround time (CTT) recognises the task for the terminal and is a better measure of the performance of a terminal. CTT improves (that is, it goes down) if either the vehicle utilisation rates improves, implying that the number of containers per truck increases, or the port terminal is faster in processing each truck.

### Average truck turnaround time in the quarter (minutes)

This is a measure of the efficiency with which trucks are processed within a given terminal. The indicator measures the length of time (in minutes) that a truck takes from the time it enters a port terminal to the time it exits the port terminal.

### Vehicle booking system (VBS)

Stevedoring companies make available a number of vehicle booking slots per day per time zone, based on the deployment of container handling equipment. The major driver of the availability of VBS time slots is the volume of containers and terminal resources required to receive and deliver containers over a 24 hour period, seven days a week.

When shipping schedules permit and volumes demand, extra resources in the form of labour time and extra equipment can be deployed to the landside of a port terminal and extra time slots can be provided. Generally, resources are reallocated in this way one or two days in advance. The VBS indicators attempt to measure the supply of VBS time slots at port terminals. They are also an indication of the supply of infrastructure at a port terminal for use by the landside of logistics businesses during this period. Whilst these numbers reflect the infrastructure supplied, this supply, particularly for the evening, night and weekend shifts is frequently limited only by demand.

## Container terminal definitions as used in Chapter 2

### **Container terminal**

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

### **Stevedoring**

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

### **Total containers**

This is the total number of containers lifted on/off fully cellular ships in a given period. They should not be confused with TEUs. 'Twenty foot equivalent units' is universally recognised as a measure of containers which aggregates both twenty foot and forty foot containers into twenty foot units for statistical purposes.

### **TEUs handled**

The total 40-foot containers lifted on/off fully cellular ships multiplied by two, plus the total twenty foot containers lifted on/off fully cellular ships.

### **Forty foot containers (per cent)**

This is the number of forty foot containers as a percentage of total containers handled. The higher this indicator is, the larger the degree to which productivity measured as TEUs per hour, overstates the actual productivity. With TEUs per hour used as the measure, one container lift becomes two lifts. This is why the table which tabulates containers in TEUs should not be used for measuring productivity.

### **Crane rate (containers per hour)**

This indicator measures the productivity of capital at a port terminal. This is the total containers handled divided by the elapsed crane time. Elapsed crane time is defined as the total allocated crane hours, less operational and non-operational delays.

### **Crane time not worked (percent)**

This is the time when a crane could not be used for any reason (operational or non-operational) as a percentage of the total time allocated to a crane.

### **Ships**

Only fully cellular ships used as such are included in calculations. Fully cellular ships are defined as purpose built container ships equipped with forty foot cell guides below deck as a minimum. Such vessels are excluded if used for mixed cargoes of containers and general cargo.

### **Vessel working rate (containers per hour)**

This indicator measures labour productivity at a port terminal. It is computed as the total containers handled divided by the elapsed labour time (in hours). Sometimes the vessel working rate is referred to as the 'elapsed labour rate'. For a given worker, the elapsed labour time is estimated as the difference between the time when workers first board the ship and the time when they last leave the ship, less the time when the workers have not worked for whatever reason.

### **Ship rate (containers per hour)**

This indicator measures the combined stevedoring productivity of capital and labour. It gives the stevedoring productivity per ship while the ship is being worked. It is computed as the crane rate times the crane intensity.

### **Crane intensity**

Crane intensity is the total number allocated crane hours, divided by the elapsed time from labour first boarding the ship and labour last leaving the ship, less the following delays:

- no labour allocated to ship
- closed port holiday
- port-wide industrial stoppage

### **Elapsed crane time**

This is the total allocated crane hours, assuming that the vessel is ready for working, less the following 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 portainer breakdowns, including spreader changes

- other equipment breakdowns which stop portainer 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-dimension 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, etc.)

### **Elapsed labour time**

This is the elapsed time between labour first boarding the ship and labour last leaving the ship, less the following non-operational delays:

- no labour allocated to ship
- closed port holiday
- port-wide industrial stoppage
- break bulk and containers that require manual interventions, eg. use of wires, chains, non-rigid spreaders or other handling gear.

When calculating the ship break-bulk time, the time allowed is:

Total Crane Hours spent handling break-bulk divided by Crane Intensity as defined above.

### **Elapsed Labour Rate**

The total containers handled divided by the Elapsed Labour Time.

The total TEUs handled divided by the Elapsed Labour Time.

### **Throughput PBM (containers/TEUs per berth metre)**

This is the number of containers/TEUs that pass over the wharf at the port container terminals per metre of the wharf at which the container vessel is being unloaded. It is a measure of the productivity of the length of wharf available for container vessels.

## Port Interface Cost Index definitions as used in Chapter 3

The Port Interface Cost Index 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, therefore, 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.

Stevedoring and port and related charges are estimated for a standard representative ship transferring an average number of containers. Also land transport and custom's agent's charges are estimated for a representative transport distance for land transport and a representative consignment for customs agents charges.

The Port Interface Cost Index provides estimates in the changes in five major cost elements by port for exports and imports. The five cost components covered are: (a) ship-based charges (b) cargo-based charges (c) stevedoring costs (d) customs brokers' fees and (e) road transport costs. The construction of the Port Interface Cost Index is a four stage task:

### Stage 1

involves the determination of the vessel sizes to represent all vessels of interest that are used to transport containerised cargo. Two vessel sizes are used to represent all vessels of interest. These are: Vessel size of Gross tonnage equal to 17 215 represents all vessels of sizes ranging from 15 000 to 20 000; and Vessel size of Gross tonnage equal to 37 394 represents all vessels of sizes ranging from 35 000 to 40 000. This size determination was calculated at the commencement of the *Waterline* series and is still used. These two ranges are selected to provide the standard representative ships used in the calculations.

### Stage 2

BITRE calculates key parameters for containers carried by the two representative vessels from data provided by port authorities.

### Stage 3

BITRE estimates ship-based charges and cargo based charges for the representative vessels from price data obtained from port authorities and other maritime operators and transport companies and customs brokers.

### Stage 4

BITRE constructs a Port Interface Cost Index for the five ports showing how the various cost components have changed over the recent past.

### Vessel size

This is the total internal capacity of a vessel. It is often referred to as Gross Tonnage.

**TEUs** This is an industry standard measure of shipping containers.

**TEUs** are twenty foot equivalent units.

**TEUs loaded** means containers loaded with goods.

**TEUs empty** means empty containers.

**TEUs loaded inwards** means imported.

**TEUs loaded outwards** means exported.

**Number of port calls:** average number of visits of vessels in a particular GT range.

**Elapsed berth time (hours):** average time between arrival at and departure from their berth of all vessels in a particular GT range.

## Port and Related Charges

**Ship-based charges include the following items**

These charges are levied on container ships once they come into harbour.

They include:

- conservancy charges which are navigation service charges levied by the government of the state in which the port is situated
- tonnage charges that are based on the Gross Tonnage of the vessel—port service charges levied by the port authority
- pilotage charge to cover services for piloting the ship
- towage charges levied by the tug boat operator
- mooring and unmooring: charge levied either by the port authority or the stevedoring company
- berth hires charges sometimes charged by the stevedores.
- Cargo-based charges include the following items:
  - wharfage charges that are levied on each container by the port authorities,
  - harbour dues that are levied on each container by the port authorities,
  - berth charges that are sometimes charged by port authorities.

## Port Interface Costs

These costs are the sum of the ship-based charges and the cargo-based charges with the addition of a stevedoring charge and customs brokers and transport charges. They include ship-based charges and cargo-based charges as shown under the heading port and related charges. They also include:

### **Stevedoring charges**

Stevedoring and port and related charges are estimated for a standard representative ship transferring an average number of containers. Stevedoring charges are the charges levied by stevedoring companies for handling containers. They are estimated for Australia each year by the ACCC which monitors their price.

### **Customs brokers fees**

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

### **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.

### **Individual port index**

Port interface costs are calculated for each of the five ports for each six month period. They are shown as the import total or the export total in the Port Interface Cost tables and are the total cost of importing or exporting a container (TEU).

### **National Index**

The National Port Interface Cost Index is the Australian average for each six month period of importing or exporting a container in an average ship.

## Ship visits as used in Chapter 4

Ship visits measures the number of times a ship calls at a port or ports, for example, a ship that sails to Australia 3 times and makes a total of 15 port calls in a year counts as 1 ship, 3 voyages and 15 ship calls.

## Non-financial performance Indicators definitions as used in Chapter 5

### **Cargo throughput (tonnes)**

This is the quantity of container and non-container cargo which passes through the port and is measured in tonnes.

### **Non-containerised general cargo (tonnes)**

This is cargo which is not carried in containers.

### **Containerised cargo (TEUs exchanged)**

This is the cargo which is carried in containers normalised as twenty foot equivalent containers.

### **Average total employment**

This is the total employment of the port authorities. It does not include the waterside workers employed by stevedoring companies.

### **Port turnaround times (hours)**

This is the time in hours a container ship is in a port. It is measured as a median of all the container ships in port over a six month period. It is also measured as the 95th percentile for those ships. The 95th percentile says that 95 per cent of the time, the turnaround time is below this amount. Conversely, 5 per cent of the time, turnaround time is above that amount.

## Coastal shipping permits definitions as used in Chapter 7

### **Coastal shipping permits**

Under the *Navigation Act 1912* (section 286) vessels may be licensed to participate in Australia's coastal trade irrespective of flag and crew nationality. An unlicensed ship may be granted a permit to trade on the Australian coast in the carriage of either cargo or passengers where:

- there is no suitable licensed ship available for the shipping task
- or the service carried out by licensed ships is inadequate
- and it is considered to be desirable in the public interest that an unlicensed ship be allowed to undertake that shipping task.

### **Single voyage permits (SVP)**

This permit is issued for a single voyage between designated ports for the carriage of a specified cargo or passengers

### **Continuing voyage permits (CVP)**

This permit is issued for a period of up to three months and enables a vessel to carry specified cargo between specified ports for that period.



# Abbreviations

AAPMA	Association of Australian Ports and Marine Authorities
ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
Avge	Average
BTCE	Bureau of Transport and Communications Economics
BTRE	Bureau of Transport and Regional Economics
BITRE	Bureau of Infrastructure, Transport and Regional Economics
CVP	Continuing Voyage Permit
DOTARS	Department of Transport and Regional Services
DP World	Dubai Ports World
Five port	The five mainland capital city ports (Brisbane, Sydney, Melbourne, Adelaide, Fremantle)
GT	Gross tons, formerly abbreviated as GRT
Hrs	Hours
Infrastructure	Department of Infrastructure, Transport, Regional Development and Local Government
na	Not available
Mins	minutes
Pbm	Per berth metre
PICI	Port Interface Cost Index
R	revised
SVP	Single Voyage Permit
TEUs	Twenty-foot equivalent units
TTT	Truck turnaround time
UCC	Unitized Cellular Container vessel
VBS	Vehicle Booking System



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