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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 issue of *Waterline* provides the latest data available on stevedoring productivity and landside performance. This issue of *Waterline* covers port terminal activity up to the December quarter 2008 on both the wharfside and the landside of five Australian major port terminals: Brisbane, Sydney, Melbourne, Adelaide and Fremantle.

Waterline is prepared in the Infrastructure, Surface Transport and Road Safety Statistics section by Adam Malarz and was desktop published by Melinda Keane.

Bulk ports and supply chain indicators: BITRE would like to acknowledge and thank all those in the shipping industry who have provided supportive comments on a proposal to develop new performance indicators covering Australia's bulk shipping sector and the supply chain as a whole. In order to progress this project, BITRE plans to hold a workshop involving a wide range of stakeholders. The aim of the workshop will be, among others, to decide whether sufficient data to support the construction of these new indicators will be available and whether the set of indicators so derived are likely to be meaningful, robust and useful to both policymakers and the industry.

BITRE is particularly grateful for the assistance of the following in the provision of data used to prepare this issue of *Waterline*: Ports Australia; individual port authorities and corporations; shipping lines and customs brokers; road transport operators; pilot; tug and mooring operators; stevedoring companies (Patrick and DP World); and the Office of Transport Security of the Department of Infrastructure, Transport, Regional Development and Local Government.

Each year since 2004, two issues of *Waterline* have been published. From 2010, starting with *Waterline 47*, the journal will be released once a year—in the December quarter. Quarterly data will still be collected from industry twice a year.

This issue of *Waterline* and back issues, including selected time series data in Excel spreadsheet format, are available for downloading from www.bitre.gov.au. For further information on this publication please contact us by email: waterline@infrastructure.gov.au; telephone: (02) 6274 7168; fax: (02) 6274 6816.

Gary Dolman
Acting Executive Director
Bureau of Infrastructure, Transport and Regional Economics
Canberra
November 2009

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Landside of port terminal

- The five port total of containers moved decreased from 893 091 in the September quarter 2008 to 880 899 in the December quarter 2008, a decrease of 1.4 per cent (Chapter 1).
- The five port average container turnaround time was 26.0 minutes in the September quarter 2008 and 24.6 minutes in the December quarter 2008 (Chapter 1).
- The five port total of trucks processed decreased from 507 328 in the September quarter 2008 to 500 910 in the December quarter 2008, a decrease of 1.3 per cent (Chapter 1).
- The five port average truck turnaround time was 40.6 minutes in the September quarter 2008 and 38.1 minutes in the December quarter 2008 (Chapter 1).
- The five port total of vehicle booking system slots used decreased from 566 593 in the September quarter 2008 to 558 788 in the December quarter 2008 (Chapter 1).

Wharfside of port terminal

- The five port average crane rate stayed at 27.5 containers per hour for the September and the December quarters of 2008 (Chapter 2).
- The five port average vessel working rate has increased over the period from 38.6 containers per hour in the September quarter 2008 to 40.7 in the December quarter 2008 (Chapter 2).
- The five port total of container moves decreased from 1 043 867 in the September quarter 2008 to 1 036 375 in the December 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 $619/TEU in 2001 constant prices for January–June 2008 and $609/TEU in July–December 2008 (Chapter 3).
- Total ship visits increased by 2.9 per cent for the year ended 31 December 2008 (Chapter 4).
- In July–December 2008, total cargo throughput was 64.0 million tonnes and total container traffic 3.1 million twenty foot equivalent units (Chapter 5).
- The tonnage of cargo expected to be moved under coastal permits stabilised around 15.3 million tonnes in 2007 and 2008 (Chapter 7).

Chapter 1 Landside performance indicators

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

- 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 (TEU) 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 TEU 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
- the adjusted usage rates for vehicle booking system slots.

An explanation of terms is provided in Appendix B.

Results: five ports

Table 1.1 presents the new data for the September quarter 2008 and the December 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 September and December quarters of 2008.

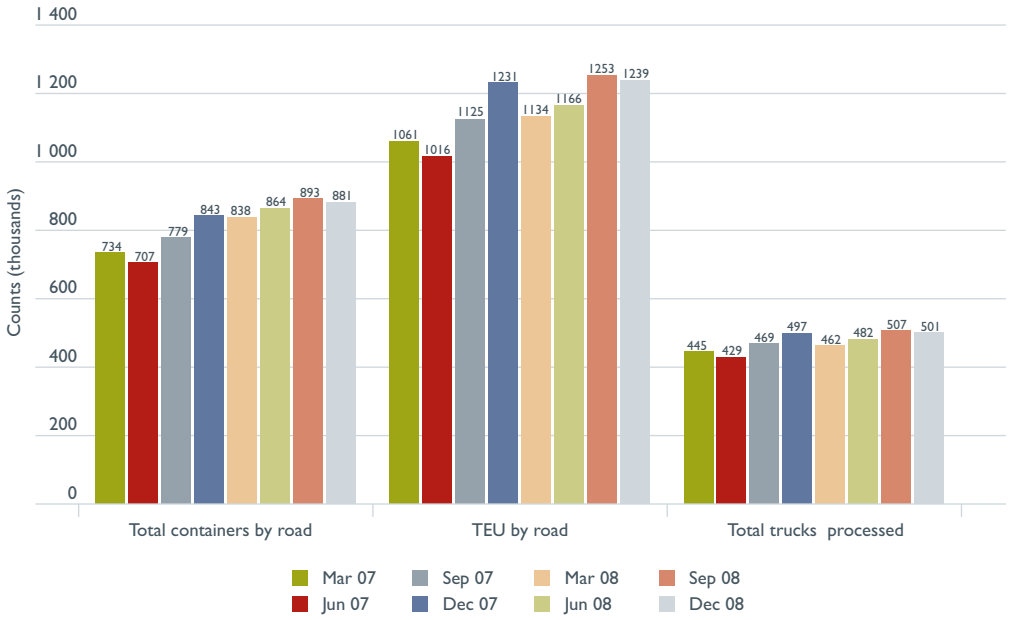
In summary:

- The five port average container turnaround time improved from 26.0 minutes in the September quarter 2008 to 24.6 minutes in the December quarter 2008. This means a potential saving of resources to the road transport industry of approximately 684 hours per day in the December quarter.
- The five port average truck turnaround time also improved from 40.6 minutes in the September quarter 2008 to 38.1 minutes in the December quarter 2008. This means a potential saving of resources to the road transport industry of approximately 695 hours per day in the December quarter.

- The five port average of containers per truck was 1.8 in both the September quarter 2008 and the December quarter 2008.
- The five port total of trucks processed at the five ports decreased from 507 328 in the September quarter 2008 to 500 910 in the December quarter 2008, a decrease of 1.3 per cent.
- The five port total of containers moved decreased from 893 091 in the September quarter 2008 to 880 899 in the December quarter 2008, a decrease of 1.4 per cent.
- The five port total of TEU moved decreased from 1 253 145 in the September quarter 2008 to 1 239 292 in the December quarter 2008, a decrease of 1.1 per cent.
- The five port total of VBS slots used decreased from 566 593 in the September quarter 2008 to 558 788 in the December quarter 2008 a decrease of 1.4 per cent.
- The five port adjusted usage rates of VBS slots in the September and December 2008 quarters were respectively
  - Monday to Friday night shift 15.1 and 15.4 per cent
  - Monday to Friday day shift 59.6 and 60.2 per cent
  - Monday to Friday evening shift 19.8 and 17.3 per cent
  - Saturday 3.9 and 4.9 per cent
  - Sunday 1.6 and 2.1 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.

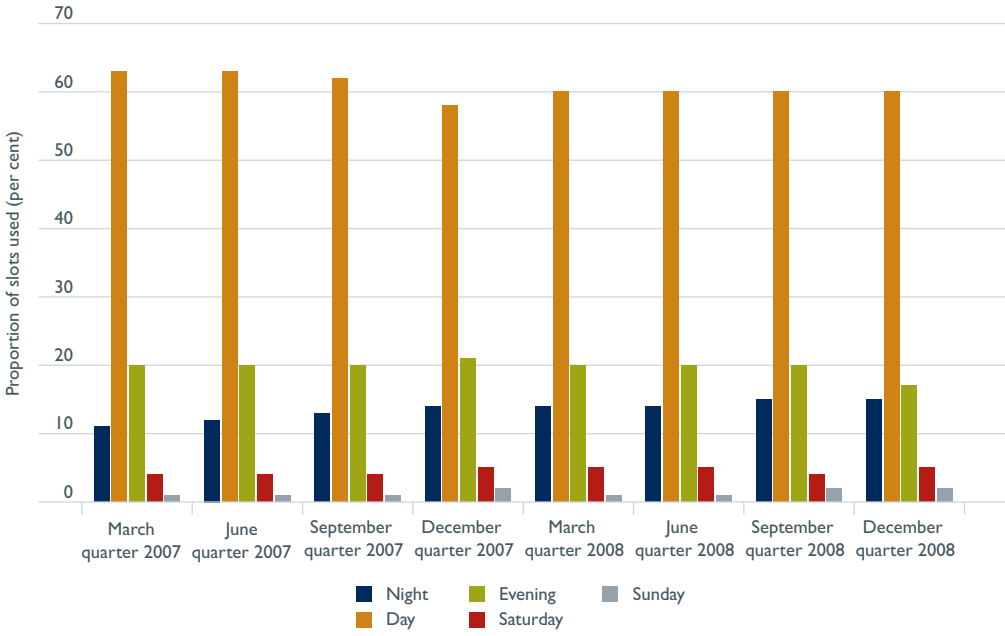
Figure 1.1 Five ports: landside of container terminal size of task indicators



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

Sources: Patrick 2009a and DP World 2009.

Figure 1.2 Five ports: adjusted vehicle booking system time usage 2007–08



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 2009a and DP World 2009.

Individual ports

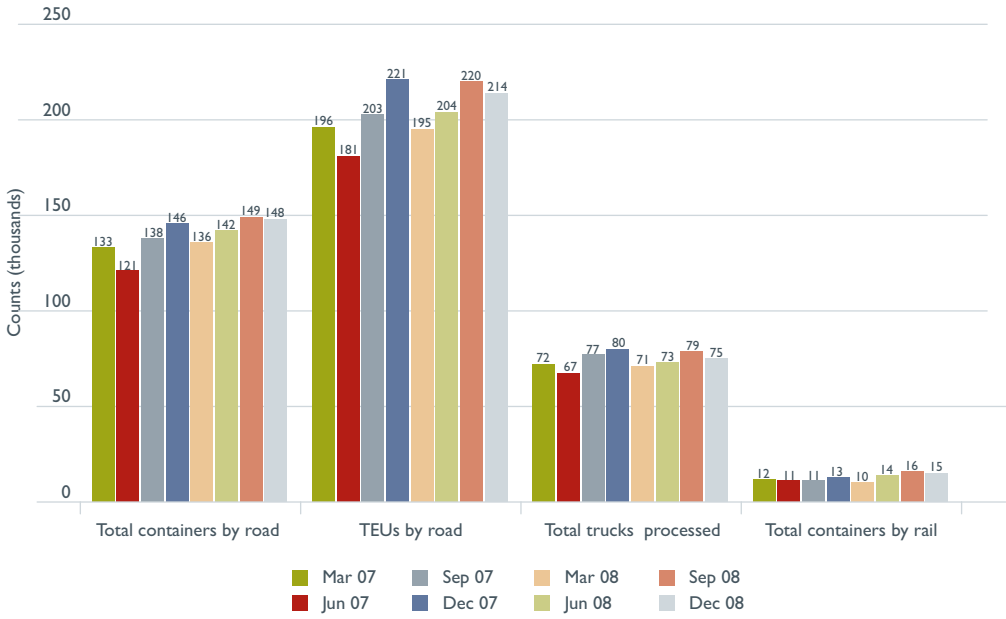
The rest of this chapter presents the landside task indicators for Brisbane, Sydney, Melbourne, Adelaide and Fremantle respectively. The data for Brisbane, Sydney, Melbourne and Fremantle use, where appropriate, are weighted averages for the container terminals operated by DP World and Patrick.

Brisbane

The Brisbane (DP World, Patrick) average container turnaround time decreased from 28.1 minutes in the September quarter 2008 to 26.2 minutes in the December quarter 2008. The truck turnaround time decreased from 48.5 minutes in the September quarter 2008 to 47.8 minutes in the December quarter 2008. The total number of trucks processed decreased by 4.9 per cent from the September to the December quarters 2008 and the total TEU decreased by 2.6 per cent over the same period. Total containers moved decreased from the September to the December quarters by 0.2 per cent.

The number of containers moved by rail decreased from the September to the December quarters by 6.2 per cent.

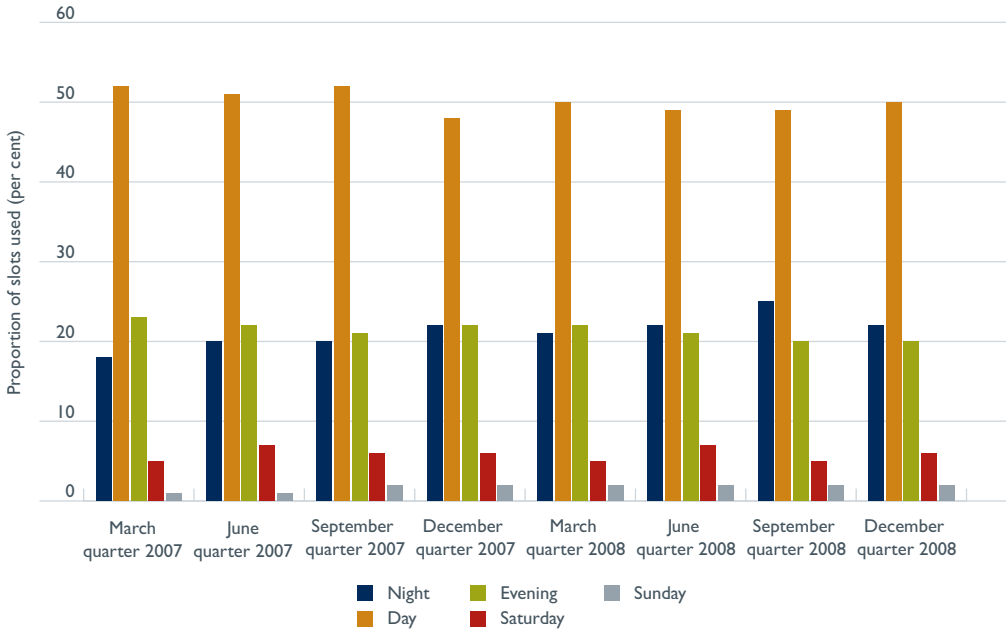
Figure 1.3 Brisbane: landside of container terminal size of task indicators



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

Sources: Patrick 2009a and DP World 2009.

Figure 1.4 Brisbane: adjusted vehicle booking system time usage 2007–08



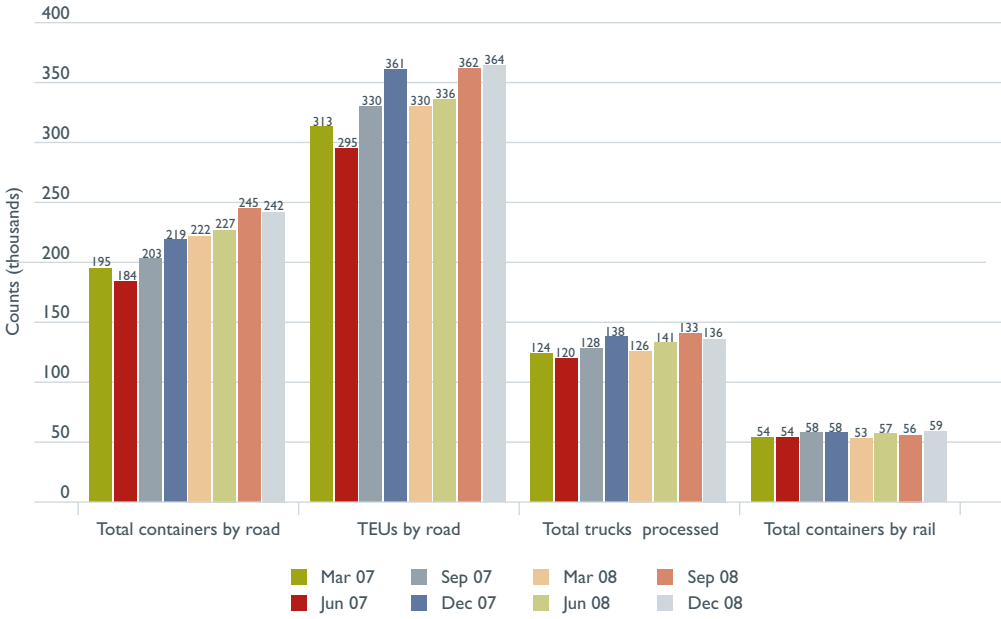
Note: The definitions of the time windows are as follows: Night (2400–0600 Monday to Friday), Day (0600–1800 Monday to Friday) and Evening (1800–2400 Monday to Friday).

Sources: Patrick 2009a and DP World 2009.

Sydney

The Sydney (DP World, Patrick) average container turnaround time decreased from 42.6 minutes in the September quarter 2008 to 37.9 minutes in the December quarter 2008. The truck turnaround time decreased from 51.6 minutes the September quarter 2008 to 48.7 minutes in the December quarter 2008. The number of trucks processed decreased by 3.4 per cent from the September to the December quarters 2008 and the total TEU increased by 0.4 per cent. Over the same period total containers moved decreased by 1.1 per cent. The number of containers moved by rail increased from the September to the December quarters by 4.6 per cent.

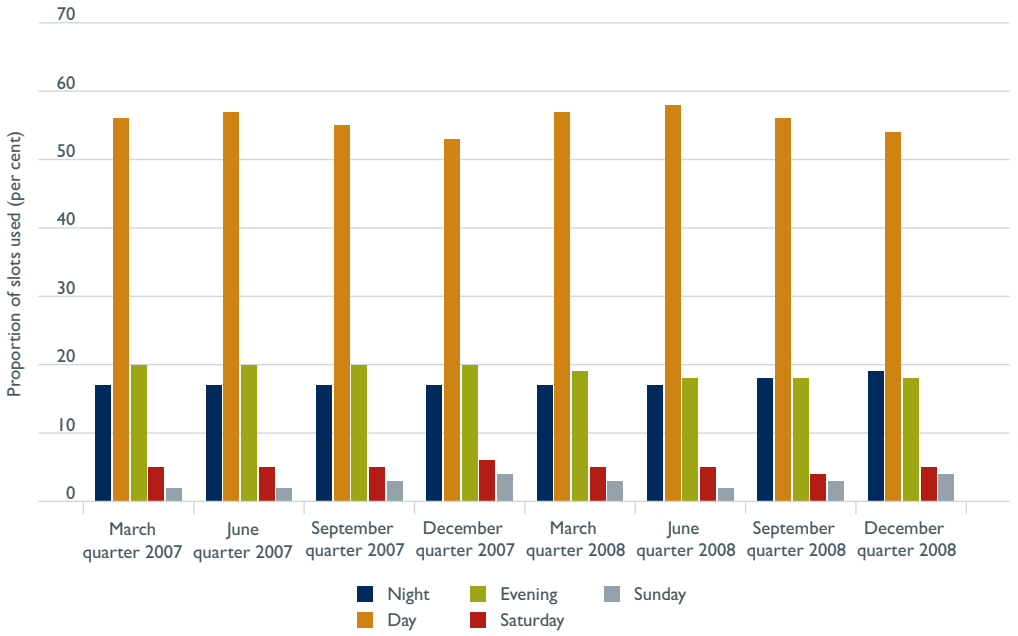
Figure 1.5 Sydney: landside of container terminal size of task indicators



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

Sources: Patrick 2009a and DP World 2009.

Figure 1.6 Sydney: adjusted vehicle booking system usage 2007–08

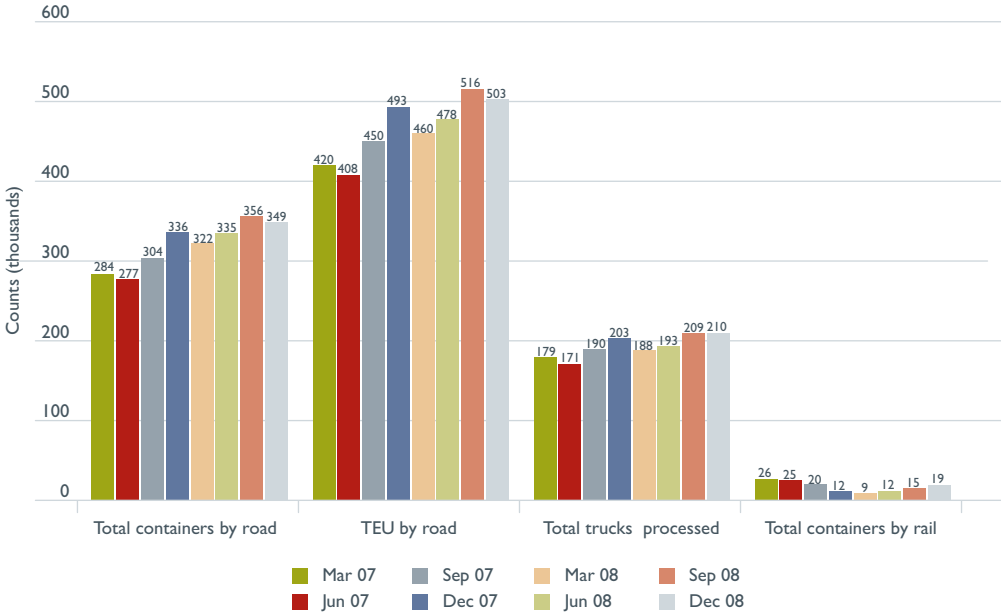


Sources: Patrick 2009a and DP World 2009.

Melbourne

The Melbourne (DP World, Patrick) average container turnaround time was 16.4 minutes in the September and 16.0 December quarters 2008. The truck turnaround time decreased from 27.2 minutes for the September quarter to 25.8 minutes in the December quarter 2008. The number of trucks processed increased by 0.5 per cent from the September to the December quarters 2008 and the total TEU decreased by 2.5 per cent. Over the same period total containers moved also decreased by 2.1 per cent. The number of containers moved by rail increased from the September to the December quarters by 23.5 per cent.

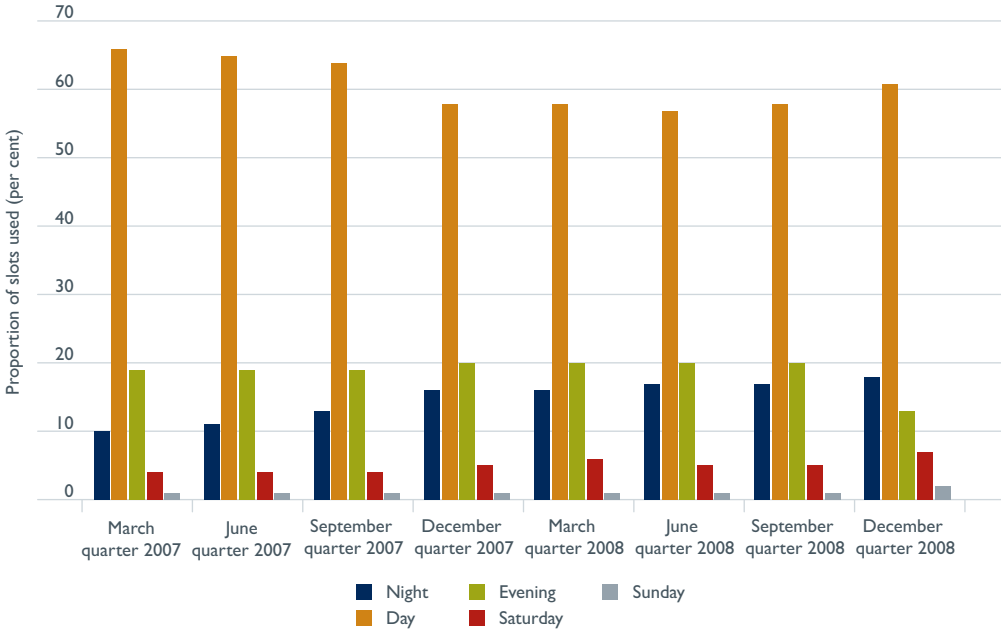
Figure 1.7 Melbourne: landside of container terminal size of task indicators



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

Sources: Patrick 2008a and DP World 2008.

Figure 1.8 Melbourne: adjusted vehicle booking system time usage 2007–08



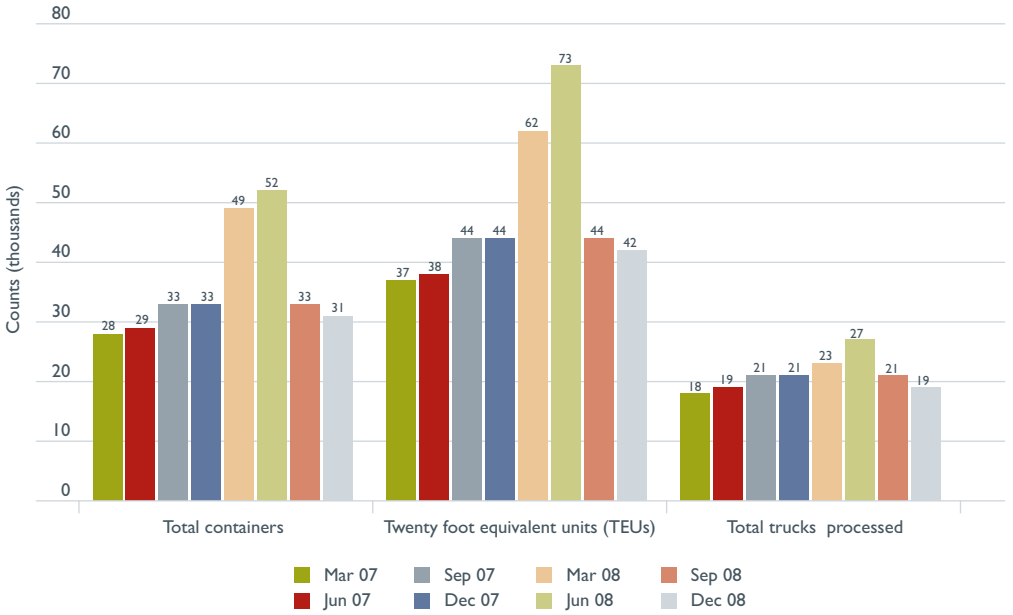
Note: The definitions of the time windows are as follows: Night (2400–0600 Monday to Friday), Day (0600–1800 Monday to Friday) and Evening (1800–2400 Monday to Friday).

Sources: Patrick 2008a and DP World 2008.

Adelaide

The Adelaide (DP World) average container turnaround time increased from 18.6 minutes in the September quarter 2008 to 23.5 minutes in the December quarter 2008. The truck turnaround time increased from 29.2 minutes in the September quarter 2008 to 37.8 minutes in the December quarter 2008. The total number of trucks processed decreased by 8.8 per cent from the September quarter 2008 to the December 2008 and the total TEU decreased by 5.6 per cent. Over the same period total containers moved decreased by 6.6 per cent.

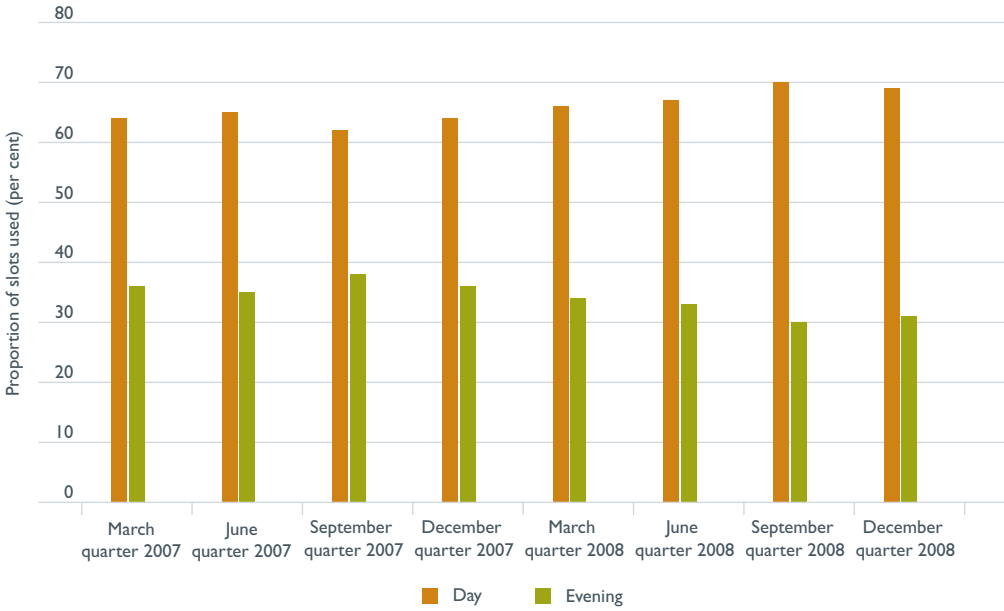
Figure 1.9 Adelaide: landside of container terminal size of task indicators



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

Sources: Patrick 2008a and DP World 2008.

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



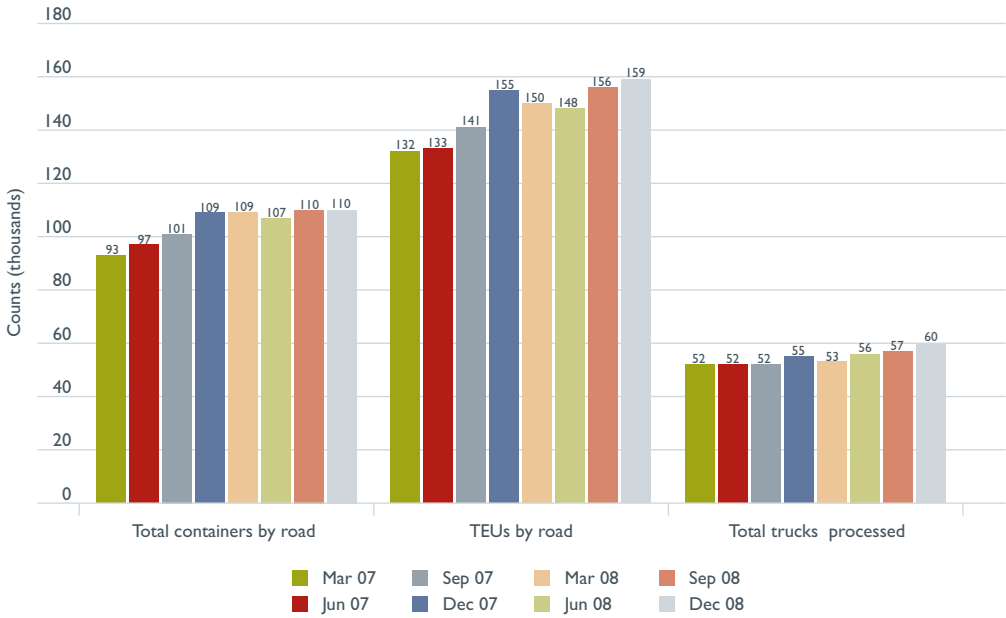
Note: The definitions of the time windows are as follows: Day (0700–1400 Monday to Friday) and Evening (1400–2200 Monday to Friday). This container port does not open at Night (2400–0600 Monday to Friday) or on weekends.

Sources: Patrick 2009a and DP World 2009.

Fremantle

The Fremantle (DP World, Patrick) average container turnaround time decreased from 20.7 minutes in the September quarter 2008 to 18.3 minutes in the December quarter 2008. The truck turnaround time decreased from 34.1 minutes in the September quarter 2008 to 29.6 minutes in the December quarter 2008. The total number of trucks processed increased by 5.2 per cent from the September to the December quarters 2008 and the total TEU increased by 2.7 per cent. Over the same period total containers moved increased by 0.3 per cent.

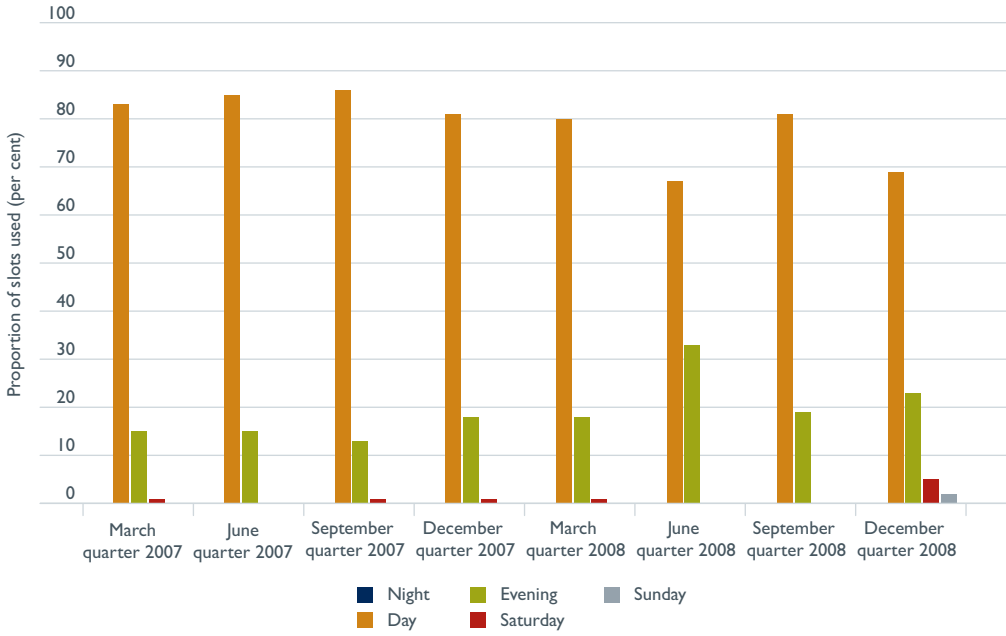
Figure 1.11 Fremantle: landside of container terminal size of task indicators



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

Sources: Patrick 2008a and DP World 2008.

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



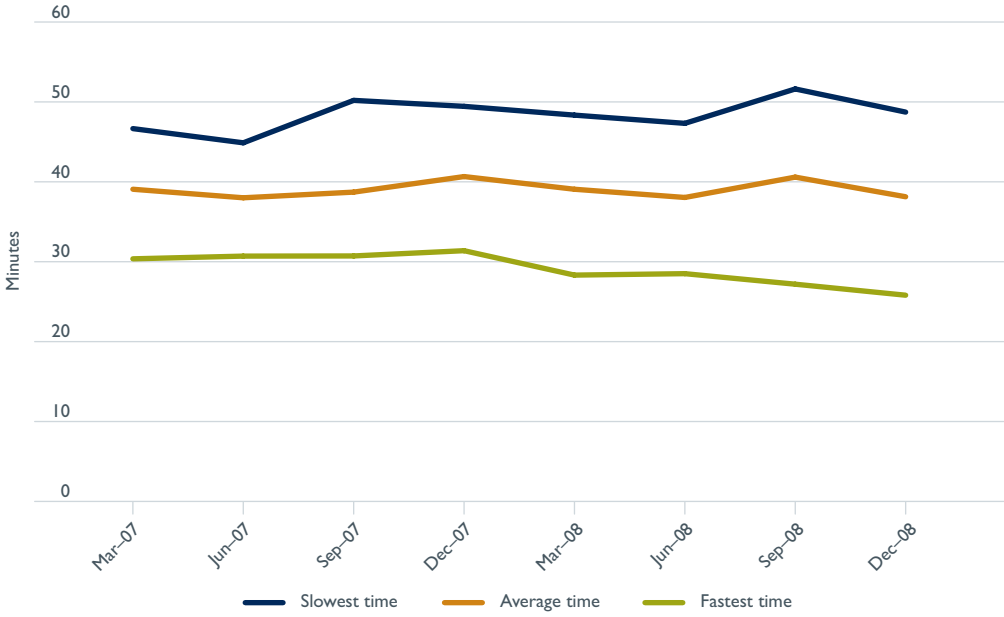
Note: The definitions of the time windows are as follows: Night (2400–0600 Monday to Friday), Day (0600–1800 Monday to Friday) and Evening (1800–2400 Monday to Friday).

Sources: Patrick 2009a and DP World 2009.

Productivity of landside container movements

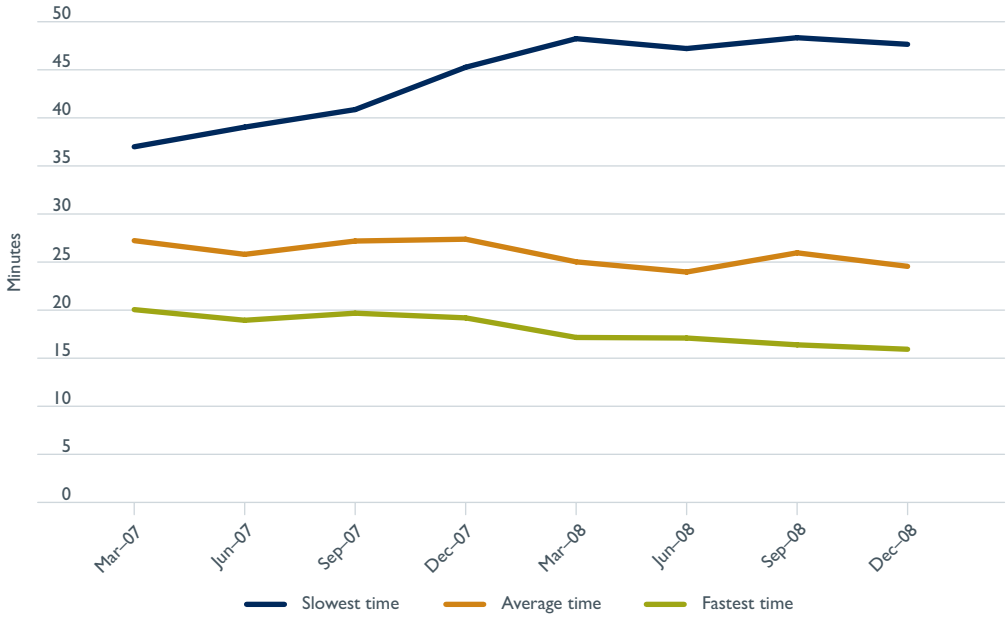
Figure 1.13 and 1.14 chart the movements in the productivity achieved across the five ports in the movement of containers from the port container terminal by road. These figures are also presented in Table 1.1. Times vary from quarter to quarter and from port to port. Between the September quarter 2008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

Figure 1.13 Productivity of truck turnaround: fastest, average and slowest rates achieved



Note: The fastest and lowest rates correspond to different port terminals in the various quarters.
Sources: Patrick 2009a and DP World 2009.

Figure 1.14 Productivity of container turnaround: fastest, average and slowest rates achieved



Note: The fastest and slowest rates correspond to different port terminals in the various quarters.
Sources: Patrick 2009a and DP World 2009.

Table 1.1 Container terminal landside performance indicators

Port/indicator	*Mar–07*	*Jun–07*	*Sep–07*	*Dec–07*	*Mar–08*	*Jun–08*	*Sep–08*	*Dec–08*
Five ports								
Road								
Total trucks	445 368	428 738	469 111	497 247	461 764	482 235	507 328	500 910
Total containers	733 640	707 166	779 202	842 726	838 405	864 190	893 091	880 899
Total TEU	1 060 989	1 016 001	1 124 964	1 230 910	1 134 438	1 165 539	1 253 145	1 239 292
Truck turnaround time—minutes	39.1	38.0	38.7	40.7	39.1	38.0	40.6	38.1
Containers per truck	1.6	1.6	1.6	1.6	1.7	1.7	1.6	1.7
Average container turnaround time—minutes	27.3	25.9	27.3	27.5	25.1	24.0	26.0	24.6
TEU per truck	2.3	2.3	2.3	2.4	2.4	2.4	2.4	2.4
Rail								
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	1191 361	1187 453
Monday–Friday								
Day (0600–1800)	326 434	333 425	362 893	362 538	358 091	366 142	893 091	880 899
Evening (1800–2400)	130 546	134 787	143 572	148 692	145 566	145 837	143 686	140 626
Night (2400–0600)	71 247	78 357	89 319	96 565	93 701	99 395	102 986	101 428
Subtotal	528 227	546 569	595 784	607 795	597 358	611 374	1139 763	1122 953
Saturday								
Day (0600–1800)	24 519	24 100	26 276	31 125	32 920	31 199	27 914	32 417
Evening (1800–2400)	3 251	3 149	3 058	3 313	3 172	4 084	4 166	4 555
Night (2400–0600)	5 532	6 216	9 671	8 156	7 362	7 398	6 968	7 586
Subtotal	33 302	33 465	39 005	42 594	43 454	42 681	39 048	44 558
Sunday								
Day (0600–1800)	2 438	2 146	6 585	5 358	3 250	1 527	1 630	4 197
Evening (1800–2400)	2 863	2 641	6 459	4 253	4 577	4 993	2 243	6 423
Night (2400–0600)	7 023	7 253	8 198	9 563	8 366	8 342	8 677	9 322
Subtotal	12 324	12 040	21 242	19 174	16 193	14 862	12 550	19 942
Number of VBS timeslots used								
Overall total	485 630	495 231	544 187	580 395	546 152	567 555	566 593	558 788
Monday–Friday								
Day (0600–1800)	308 126	313 340	337 500	338 231	326 571	338 318	337 855	325 265
Evening (1800–2400)	99 445	99 042	108 000	120 527	111 389	114 351	112 213	111 958
Night (2400–0600)	54 316	59 373	70 261	82 723	74 827	81 504	85 446	83 317
Subtotal	461 887	471 755	515 761	541 481	512 787	534 173	535 514	520 540
Saturday								
Day (0600–1800)	13 869	13 478	14 349	20 741	20 187	19 154	15 445	19 452
Evening (1800–2400)	597	515	546	910	625	944	1206	1380
Night (2400–0600)	3 458	4 471	5 575	6 071	5 641	5 877	5 336	5 825
Subtotal	17 924	18 464	20 470	27 722	26 453	25 975	21 987	26 657
Sunday								
Day (0600–1800)	610	169	1 120	2 365	0 839	0 771	0 820	2 095
Evening (1800–2400)	1 179	1 026	1 584	2 063	1 077	0 973	1 629	3 101
Night (2400–0600)	4 030	3 817	5 251	6 764	4 995	5 662	6 644	6 395
Subtotal	5 819	5 012	7 955	11 192	6 911	7 406	9 093	11 591

(continued)

Table 1.1 Container terminal landside performance indicators (continued)

Port/indicator	*Mar–07*	*Jun–07*	*Sep–07*	*Dec–07*	*Mar–08*	*Jun–08*	*Sep–08*	*Dec–08*
Brisbane								
Road								
Total trucks	71 784	67 376	77 427	79 713	71 094	72 946	79 345	75 460
Total containers	133 297	120 543	138 002	145 923	135 848	142 301	148 818	148 488
TEU	196 312	180 501	203 081	220 937	195 227	204 282	219 576	213 936
Truck turnaround time—minutes[a]	46.7	42.7	40.7	45.4	48.4	47.3	48.5	47.8
Containers per truck	1.7	1.7	1.7	1.7	1.8	1.8	1.7	1.8
Average container turnaround time—minutes	28.1	25.1	24.4	27.0	26.9	25.4	28.1	26.2
TEU per truck	2.4	2.5	2.4	2.5	2.5	2.6	2.5	2.5
Rail								
Total containers[b]	11 595	11 495	11 088	13 345	09 693	13 929	15 722	14 747
Number of VBS timeslots available								
Overall total	98 283	109 418	123 407	115 570	112 059	108 882	108 786	101 717
Monday–Friday								
Day (0600–1800)	44 006	48 309	56 763	53 328	51 401	47 750	46 811	44 161
Evening (1800–2400)	21 479	23 805	25 824	24 439	23 895	22 731	23 023	21 564
Night (2400–0600)	22 036	26 076	27 692	25 834	25 614	27 119	28 813	25 296
Subtotal	87 521	98 190	110 279	103 601	100 910	97 600	98 647	91 021
Saturday								
Day (0600–1800)	5 241	5 814	5 755	5 548	6 118	6 046	5 155	5 507
Evening (1800–2400)	175	68	0	128	0	171	19	0
Night (2400–0600)	1 927	2 300	3 602	2 638	1 695	2 088	2 024	2 143
Subtotal	7 343	8 182	9 357	8 314	7 813	8 305	7 198	7 650
Sunday								
Day (0600–1800)								
Evening (1800–2400)	638	10	600	0	0	0	0	0
Night (2400–0600)	2 781	3 036	3 167	3 655	3 336	2 977	2 941	3 046
Subtotal	3 419	3 046	3 771	3 655	3 336	2 977	2 941	3 046
Number of VBS timeslots used								
Overall total	77 607	81 609	88 742	94 331	85 712	86 255	85 893	78 676
Monday–Friday								
Day (0600–1800)	40 621	41 345	46 301	45 490	43 131	41 940	41 754	39 166
Evening (1800–2400)	17 584	17 654	18 329	20 583	18 630	17 729	16 862	16 100
Night (2400–0600)	14 207	16 071	17 548	20 396	17 940	19 153	21 117	17 224
Subtotal	72 412	75 070	82 178	86 470	79 701	78 822	79 734	72 491
Saturday								
Day (0600–1800)	3 115	3 554	3 327	3 959	3 220	3 944	2 837	2 918
Evening (1800–2400)	18	11	0	93	0	112	0	0
Night (2400–0600)	908	1 920	1 846	1 528	1 277	1 928	1 572	1 552
Subtotal	4 041	5 485	5 173	5 580	4 497	5 984	4 409	4 470
Sunday								
Day (0600–1800)								
Evening (1800–2400)								
Night (2400–0600)	1 154	1 054	1 391	2 281	1 514	1 449	1 750	1 716
Subtotal	1 154	1 054	1 391	2 281	1 514	1 449	1 750	1 716

(continued)

Table 1.1 Container terminal landside performance indicators (continued)

Port/indicator	*Mar–07*	*Jun–07*	*Sep–07*	*Dec–07*	*Mar–08*	*Jun–08*	*Sep–08*	*Dec–08*
Sydney								
Road								
Total trucks	124 478	120 055	128 094	138 168	125 788	133 225	140 901	136 158
Total containers	194 814	184 120	203 034	218 692	222 230	227 445	244 910	242 330
TEU	312 613	294 545	330 489	361 420	330 015	335 680	362 200	363 603
Truck turnaround time—minutes	42.8	44.9	47.4	49.4	45.8	44.1	51.6	48.7
Containers per truck	1.3	1.3	1.4	1.4	1.5	1.5	1.5	1.5
Average container turnaround time—minutes	37.1	39.1	41.0	42.8	34.8	35.5	42.6	37.9
TEU per truck	2.1	2.1	2.2	2.3	2.3	2.2	2.2	2.3
Rail								
Total containers	54 174	53 612	58 081	58 361	52 975	57 067	56 247	58 862
Number of VBS timeslots available								
Overall total	168 936	169 013	186 692	183 396	182 176	183 633	178 481	187 112
Monday–Friday								
Day (0600–1800)	79 857	79 603	82 014	82 366	85 493	90 034	92 286	88 735
Evening (1800–2400)	37 848	37 779	41 586	40 861	38 978	35 822	33 424	34 639
Night (2400–0600)	28 399	28 559	30 486	30 628	28 870	30 407	31 410	33 959
Subtotal	146 104	145 941	154 086	153 855	153 341	156 263	157 120	157 333
Saturday								
Day (0600–1800)	11 083	11 054	11 553	13 096	13 206	13 071	11 100	11 852
Evening (1800–2400)	2 382	2 340	2 086	2 209	2 468	2 968	2 553	2 377
Night (2400–0600)	2 555	2 758	4 323	3 167	2 754	2 555	2 087	2 794
Subtotal	16 020	16 152	17 962	18 472	18 428	18 594	15 740	17 023
Sunday								
Day (0600–1800)	2 224	2 132	6 411	4 575	3 246	1 527	1 302	4 122
Evening (1800–2400)	1 756	2 035	5 211	3 144	4 044	4 297	0 976	4 901
Night (2400–0600)	2 832	2 753	3 022	3 350	3 117	2 952	3 343	3 733
Subtotal	6 812	6 920	14 644	11 069	10 407	8 776	5 621	12 756
Number of VBS timeslots used								
Overall total	131 841	129 803	143 946	150 039	134 159	139 823	146 186	146 922
Monday–Friday								
Day (0600–1800)	73 871	73 667	78 629	78 780	76 695	80 590	82 176	79 326
Evening (1800–2400)	26 662	25 438	28 840	30 103	25 055	24 525	26 586	25 977
Night (2400–0600)	22 356	22 350	25 022	26 181	22 153	23 984	26 638	28 074
Subtotal	122 889	121 455	132 491	135 064	123 904	129 100	135 400	133 376
Saturday								
Day (0600–1800)	4 196	4 168	4 789	6 423	4 991	5 616	5 178	5 228
Evening (1800–2400)	50	38	21	175	109	220	137	33
Night (2400–0600)	1 742	1 770	2 127	2 394	1 708	1 414	1 098	1 987
Subtotal	5 988	5 976	6 937	8 992	6 808	7 250	6 413	7 248
Sunday								
Day (0600–1800)	440	155	1 104	2 121	0 835	0 724	0 634	1 630
Evening (1800–2400)	718	528	1 031	1 379	0 651	0 485	0 596	1 796
Night (2400–0600)	1 806	1 689	2 382	2 482	1 961	2 264	3 143	2 872
Subtotal	2 964	2 372	4 517	5 982	3 447	3 473	4 373	6 298

(continued)

Table 1.1 Container terminal landside performance indicators (continued)

Port/indicator	*Mar–07*	*Jun–07*	*Sep–07*	*Dec–07*	*Mar–08*	*Jun–08*	*Sep–08*	*Dec–08*
Melbourne								
Road								
Total trucks	179 376	170 839	190 132	203 152	188 119	192 996	208 763	209 862
Total containers	284 238	276 977	303 949	335 877	322 059	335 025	356 461	349 015
TEU	419 669	407 763	450 216	493 111	459 639	477 662	515 555	502 706
Truck turnaround time—minutes	30.3	30.7	30.7	31.4	28.3	28.5	27.2	25.8
Containers per truck	1.6	1.6	1.6	1.6	1.7	1.7	1.7	1.7
Average container turnaround time—minutes	20.1	20.1	20.2	19.8	17.2	17.2	16.4	16.0
TEU per truck	2.3	2.3	2.3	2.4	2.4	2.5	2.5	2.4
Rail								
Total containers[b]	25 500	25 165	19 983	12 010	08 977	12 412	14 985	18 511
Number of VBS timeslots available								
Overall total	192 107	200 146	225 245	248 191	241 012	250 670	251 124	245 488
Monday–Friday								
Day (0600–1800)	123 774	126 677	138 405	141 145	135 879	140 400	139 851	133 117
Evening (1800–2400)	36 871	38 860	42 583	49 041	48 083	50 225	49 052	47 844
Night (2400–0600)	20 812	23 722	31 129	39 943	38 869	41 793	42 763	42 003
Subtotal	181 457	189 259	212 117	230 129	222 831	232 418	231 666	222 964
Saturday								
Day (0600–1800)	7 022	6 928	7 813	10 909	12 260	11 443	11 019	13 566
Evening (1800–2400)	692	741	742	861	703	945	1594	2174
Night (2400–0600)	1 050	1 158	1 746	2 351	2 772	2 755	2 857	2 649
Subtotal	8 764	8 827	10 301	14 121	15 735	15 143	15 470	18 389
Sunday								
Day (0600–1800)	9	0	170	397	0	0	328	75
Evening (1800–2400)	467	596	648	994	533	696	1267	1522
Night (2400–0600)	1 410	1 464	2 009	2 550	1 913	2 413	2 393	2 538
Subtotal	1 886	2 060	2 827	3 941	2 446	3 109	3 988	4 135
Number of VBS timeslots used								
Overall total	180 491	188 627	210 328	230 038	221 017	231 844	225 456	224 096
Monday–Friday								
Day (0600–1800)	119 859	123 488	133 582	133 917	127 222	131 860	130 144	125 083
Evening (1800–2400)	34 332	35 893	39 156	45 036	43 300	46 782	44 155	44 322
Night (2400–0600)	17 753	20 952	27 679	36 058	34 405	38 367	37 691	37 853
Subtotal	171 944	180 333	200 417	215 011	204 927	217 010	211 990	207 259
Saturday								
Day (0600–1800)	5 681	5 475	5 763	9 559	11 099	9 251	6 947	10 099
Evening (1800–2400)	529	466	515	642	515	612	1069	1345
Night (2400–0600)	808	781	1 602	2 149	2 530	2 535	2 666	2 286
Subtotal	7 018	6 722	7 880	12 350	14 144	12 398	10 682	13 730
Sunday								
Day (0600–1800)								
Evening (1800–2400)	459	498	553	684	426	488	1033	1305
Night (2400–0600)	1 070	1 074	1 478	1 993	1 520	1 949	1 751	1 802
Subtotal	1 529	1 572	2 031	2 677	1 946	2 437	2 784	3 107

(continued)

Table 1.1 Container terminal landside performance indicators (continued)

Port/indicator	*Mar–07*	*Jun–07*	*Sep–07*	*Dec–07*	*Mar–08*	*Jun–08*	*Sep–08*	*Dec–08*
Adelaide								
Road								
Total trucks	17 945	18 875	21 058	20 951	23 423	27 381	21 094	19 239
Total containers	27 799	28 968	32 850	33 103	49 422	51 922	33 118	30 924
TEU	36 585	38 461	43 797	44 352	62 092	73 403	44 236	41 741
Truck turnaround time — minutes	39.2	35.3	50.2	41.5	46.8	35.4	29.2	37.8
Containers per truck	1.6	1.5	1.6	1.6	1.6	1.6	1.6	1.6
Average container turnaround time—minutes	25.3	23.0	32.1	26.3	29.3	22.5	18.6	23.5
TEU per truck	2.0	2.0	2.1	2.1	2.2	2.1	2.1	2.2
Rail								
Total containers	na	na	na	na	na	na	0	0
Number of VBS timeslots available								
Overall total	33 429	34 362	36 727	36 960	37 245	39 706	40 661	38 033
Monday–Friday								
Day (0700–1400)	19 503	20 236	21 113	21 883	22 517	23 248	24 239	22 891
Evening (1400–2200)	13 926	14 126	15 614	15 077	14 728	16 458	16 422	15 142
Subtotal	33 429	34 362	36 727	36 960	37 245	39 706	40 661	38 033
Number of VBS timeslots used								
Overall total	28 961	29 363	33 220	33 544	32 919	33 889	31 601	30 786
Monday–Friday								
Day (0700–1400)	18 411	19 054	20 699	21 454	21 639	22 632	22 101	21 106
Evening (1400–2200)	10 550	10 309	12 521	12 090	11 280	11 257	09 500	09 680
Subtotal	28 961	29 363	33 220	33 544	32 919	33 889	31 601	30 786
Fremantle								
Road								
Total trucks	51 785	51 593	52 400	55 263	53 340	55 687	57 225	60 191
Total containers	93 492	96 558	101 367	109 131	108 846	107 497	109 784	110 142
TEU	132 395	133 192	141 178	155 442	149 558	147 915	155 815	159 047
Truck turnaround time—minutes	33.6	32.3	33.8	33.4	32.9	32.0	34.1	29.6
Containers per truck	1.7	1.7	1.7	1.7	1.8	1.7	1.6	1.6
Average container turnaround time—minutes	20.3	19.0	19.7	19.2	18.3	18.7	20.7	18.3
TEU per truck	2.3	2.4	2.4	2.5	2.4	2.4	2.4	2.3
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	88 413	87 336
Monday–Friday								
Day (0600–1800)	59 294	58 600	64 598	63 816	62 801	64 710	66 008	64 228
Evening (1800–2400)	20 422	20 217	17 965	19 274	19 882	20 601	21 765	21 437
Night (2400–0600)	0	0	12	160	348	76	0	170
Subtotal	79 716	78 817	82 575	83 250	83 031	85 387	87 773	85 835

(continued)

Table 1.1 Container terminal landside performance indicators (continued)

Port/indicator	*Mar–07*	*Jun–07*	*Sep–07*	*Dec–07*	*Mar–08*	*Jun–08*	*Sep–08*	*Dec–08*
Saturday								
Day (0600–1800)	1 173	304	1 155	1 572	1 336	0 639	0 640	1 492
Evening (1800–2400)	2	0	230	115	1	0	0	4
Night (2400–0600)	0	0	0	0	141	0	0	0
Subtotal	1175	304	1385	1687	1478	639	640	1496
Sunday								
Day (0600–1800)	205	14	0	386	4	0	0	0
Evening (1800–2400)	2	0	0	115	0	0	0	0
Night (2400–0600)	0	0	0	8	0	0	0	5
Subtotal	207	14	0	509	4	0	0	5
Number of VBS timeslots used								
Overall total	66 730	65 829	67 913	72 111	71 888	75 696	77 272	77 669
Monday–Friday								
Day (0600–1800)	55 364	55 786	58 290	58 589	57 883	61 296	61 679	60 584
Evening (1800–2400)	10 317	9 748	9 153	12 714	13 124	14 057	15 110	15 879
Night (2400–0600)	0	0	0	0	0	0	0	0
Subtotal	65 681	65 534	67 443	71 303	71 007	75 353	76 789	76 462
Saturday								
Day (0600–1800)	877	281	470	800	877	343	483	1207
Evening (1800–2400)	0	0	0	0	0	0	0	0
Night (2400–0600)	0	0	0	0	0	0	0	0
Subtotal	877	281	470	800	877	343	483	1207
Sunday								
Day (0600–1800)	170	14	0	8	4	0	0	0
Evening (1800–2400)	2	0	0	0	0	0	0	0
Night (2400–0600)	0	0	0	0	0	0	0	0
Subtotal	172	14	0	8	4	0	0	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, TEU and TEU 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 2009a, DP World 2009.

Chapter 2 Stevedoring productivity

Stevedoring productivity in this chapter refers to the productivity of moving containers from the ship to the wharf 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 stevedores 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 27.5 containers per hour in the September quarter 2008 (3.9 per cent higher than the September quarter 2007 rate of 26.5). In the December quarter 2008, the crane rate was 27.5 containers per hour (0.9 per cent higher than the December quarter 2007 rate of 27.2).

Table 2.1 presents the indicators of stevedoring productivity to the December 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 December quarter 1996 to December quarter 2008 period. The data are weighted averages of responses from stevedores operating at the respective container terminals.

From Figure 2.1 and Table 2.1:

- 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, 27.5 in the September quarter 2008, and 27.5 containers per hour for the December quarter 2008.
- The five port total of container moves decreased from 1 043 867 in the September quarter 2008 to 1 036 375 moves in the December quarter 2008. The data for the December quarter 2008 is down 0.7 per cent on the December 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, 38.6 in the September quarter 2008, and 40.7 containers per hour in the December quarter 2008. The December quarter 2008 rate was 5.7 per cent greater than the December quarter 2007 rate.

From Figure 2.2 and Table 2.1 the Brisbane average crane rate was 23.1 in the June quarter 2008 and 25.2 in the September quarter 2008, and 23.8 containers per hour in the December quarter 2008. The vessel working rate changed from 28.5 containers per hour in the June quarter 2008 to 32.5 in the September quarter 2008, and then to 31.4 in the December quarter 2008.

From Figure 2.3 and Table 2.1 the Sydney average crane rate was 27.2 in the June quarter 2008 and 26.7 in the September quarter 2008, and 27.0 containers per hour in the December quarter 2008. The vessel working rate changed from 39.7 containers per hour in the June quarter 2007 to 35.7 in the September quarter 2008, and then to 38.3 in the December quarter 2008.

Figure 2.4 and Table 2.1 show that the Melbourne average crane rate was 29.4 in the June quarter 2008 and 29.6 in the September quarter 2008, and 30.1 containers per hour in the December quarter 2008. The vessel working rate changed from 45.7 containers per hour in the December quarter 2007 to 47.0 in the September quarter 2008, and then to 50.8 in the December quarter 2008.

Figure 2.5 and Table 2.1 indicate that the Adelaide average crane rate was 29.6 in the June quarter 2008 and 29.3 in the September and 26.5 in the December quarter 2008. The vessel working rate changed from 40.4 containers per hour in the June quarter 2007 to 40.0 in the September quarter 2008, and then to 32.3 in the December quarter 2008.

From Figure 2.6 and Table 2.1 the Fremantle average crane rate was 27.8 in the June quarter 2008 and 26.2 the September quarter 2008, and 26.7 containers per hour in the December quarter 2008. The vessel working rate was 31.3 containers per hour in the June quarter 2008 and 29.2 in the September quarter 2008, and 33.6 in the December 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 December quarter 1996 and the December quarter 2008. Figure 2.7 shows a rising trend in the median crane rate. Figure 2.8 also shows a rising trend in the median ship rate.

TEU per hour

Table 2.2 presents the stevedoring productivity indicators in terms of TEU 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 TEU 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

Port/indicator	*Dec–06*	*Mar–07*	*Jun–07*	*Sep–07*	*Dec–07*	*Mar–08*	*Jun–08*	*Sep–08*	*Dec–08*
Five ports									
Ships handled	1 094	1 075	1 110	1 154	1 138	1 107	1 156	1 156	1 073
Total containers	923 755	880 552	874 269	950 996	1 027 779	949 324	977 870	1043 867	1036 375
Crane rate	26.8	27.0	27.2	26.5	27.2	27.3	27.5	27.5	27.5
Vessel working rate	36.1	36.7	37.4	37.7	38.4	39.8	39.1	38.6	40.7
Crane time not worked (per cent)	23	22	21	20	20	19.3	19.8	20.8	18.1
40-foot containers (per cent)	44	42	41	43	44	42.9	42.7	44.7	44.8
Ship rate	46.8	47.3	47.1	47.2	48.0	49.3	48.7	48.8	49.6
Throughput pbm	129	123	123	133	144	133	137	146	145
Brisbane									
Ships handled	271	270	262	267	254	248	255	243	231
Total containers	157 725	153 481	146 916	164 803	177 766	153 170	162 475	172 604	171 674
Crane rate	23.0	22.8	23.0	23.0	24.5	22.8	23.1	25.2	23.8
Vessel working rate	25.1	26.7	26.2	26.3	30.1	29.6	28.5	32.5	31.4
Crane time not worked (per cent)	31	27	28	22	21	21.0	21.3	20.0	17.6
40-foot containers (per cent)	43	42	41	43	46	44.6	43.1	44.5	44.6
Stevedoring variability (per cent)	52	63	52	49	47	53.6	68.4	39.5	46.3
Ship rate	36.5	36.7	36.6	33.7	37.9	37.5	36.3	40.6	38.1
Throughput pbm	98	96	91	103	111	95	101	107	107
Sydney									
Ships handled	322	305	317	338	342	321	343	351	321
Total containers	299 864	274 937	271 655	299 142	327 858	302 223	308 660	342 522	346 663
Crane rate	26.4	26.2	26.9	24.9	25.8	27.1	27.2	26.7	27.0
Vessel working rate	34.6	35.8	36.1	36.4	37.6	39.8	39.7	35.7	38.3
Crane time not worked (per cent)	24	24	24	21	22	22.1	22.8	26.1	22.0
40-foot containers (per cent)	47	45	44	46	47	45.5	45.4	46.4	46.6
Stevedoring variability (per cent)	55	55	48	47	43	49.2	72.1	50.4	56.7
Ship rate	45.7	46.9	47.6	46.1	48.5	51.2	51.4	48.4	49.1
Throughput pbm	154	142	140	154	169	156	159	176	179
Melbourne									
Ships handled	314	316	326	333	331	326	346	353	316
Total containers	330 896	320 426	315 181	334 640	361 085	332 443	340 140	363 079	355 915
Crane rate	28.1	28.7	28.5	28.6	29.3	28.9	29.4	29.6	30.1
Vessel working rate	43.5	43.2	44.8	46.0	45.6	46.6	45.7	47.0	50.8
Crane time not worked (per cent)	19	19	15	18	17	15.7	17.4	16.8	15.1
40-foot containers (per cent)	42	42	41	44	43	43.4	43.6	45.8	45.1
Stevedoring variability (per cent)	59	54	56	51	51	54.9	68.2	60.9	44.3
Ship rate	53.4	53.5	52.5	55.9	55.2	55.3	55.3	56.5	59.8
Throughput pbm	181	175	173	183	198	182.1	186.3	198.8	194.9

(continued)

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

Port/indicator	*Dec–06*	*Mar–07*	*Jun–07*	*Sep–07*	*Dec–07*	*Mar–08*	*Jun–08*	*Sep–08*	*Dec–08*
Adelaide									
Ships handled	65	67	74	86	82	84	77	68	67
Total containers	40 949	43 359	46 382	52 693	53 486	54 357	59 584	56 250	54 905
Crane rate	31.0	30.9	30.0	29.8	29.7	29.6	29.6	29.3	26.5
Vessel working rate	36.0	36.5	33.9	35.5	29.8	35.7	40.4	40.0	32.3
Crane time not worked (per cent)	16	12	14	13	10	14.2	9.3	9.6	9.4
40-foot containers (per cent)	35	31	30	29	32	30.7	31.6	32.6	32.8
Stevedoring variability (per cent)	na	na	na	na	na	na	na	na	na
Ship rate	42.8	41.7	39.2	40.9	33.1	41.6	44.5	44.2	35.7
Throughput pbm	87	92	99	112	114	116	127	120	117
Fremantle									
Ships handled	122	117	131	130	129	128	135	141	138
Total containers	94 321	88 349	94 135	99 718	107 584	107 131	107 011	109 412	107 218
Crane rate	27.8	28.1	29.0	28.4	28.0	28.3	27.8	26.2	26.7
Vessel working rate	33.5	33.6	35.3	33.8	34.9	34.9	31.3	29.2	33.6
Crane time not worked (per cent)	27	29	26	28	25	24.1	24.1	26.7	22.1
40-foot containers (per cent)	44	40	37	39	41	38.0	37.7	42.2	44.0
Stevedoring variability (per cent)	53	56	44	55	63	56.3	80.9	66.7	53.6
Ship rate	46.1	47.1	47.6	47.1	46.8	46.0	41.2	39.8	43.1
Throughput pbm	73	68	73	77	83	83.0	82.9	84.7	83.0

na not available.

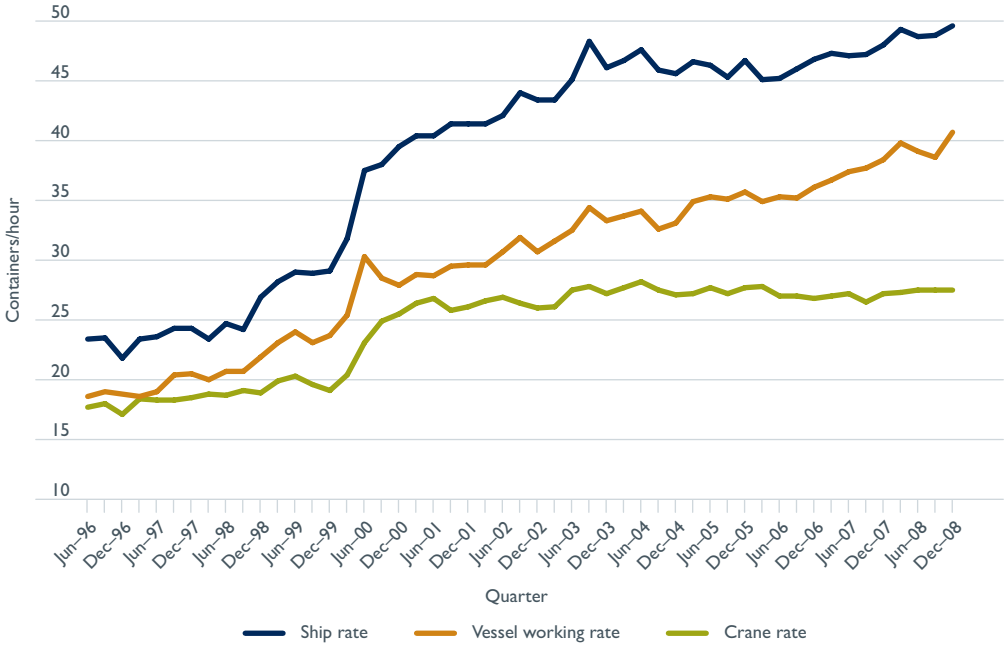
r revised.

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 TEU 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

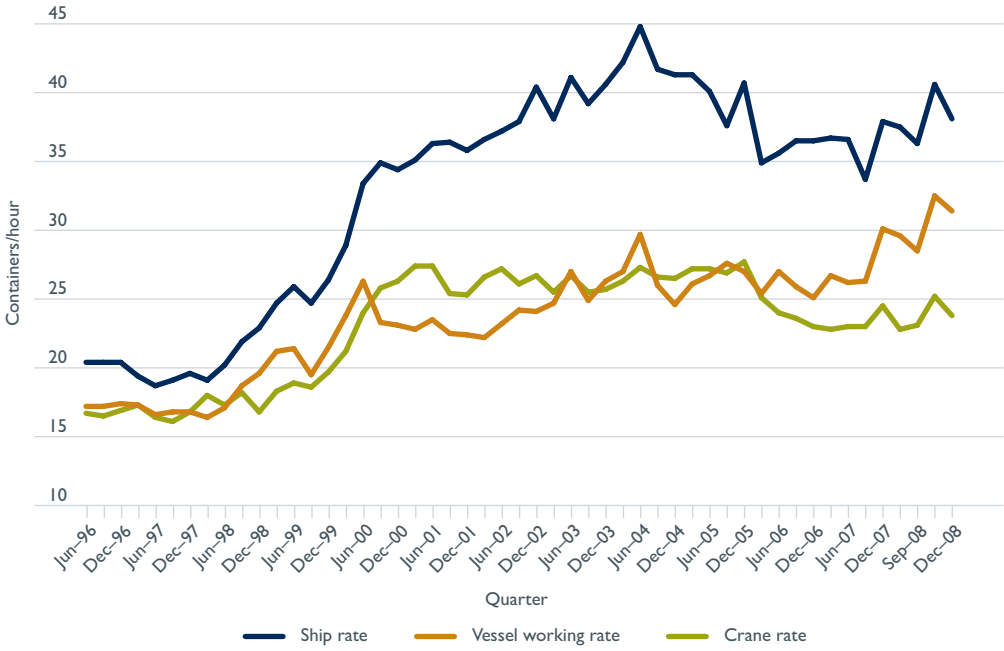
Source: Patrick 2009b, DP World 2009.

Figure 2.1 Five ports: productivity in containers per hour



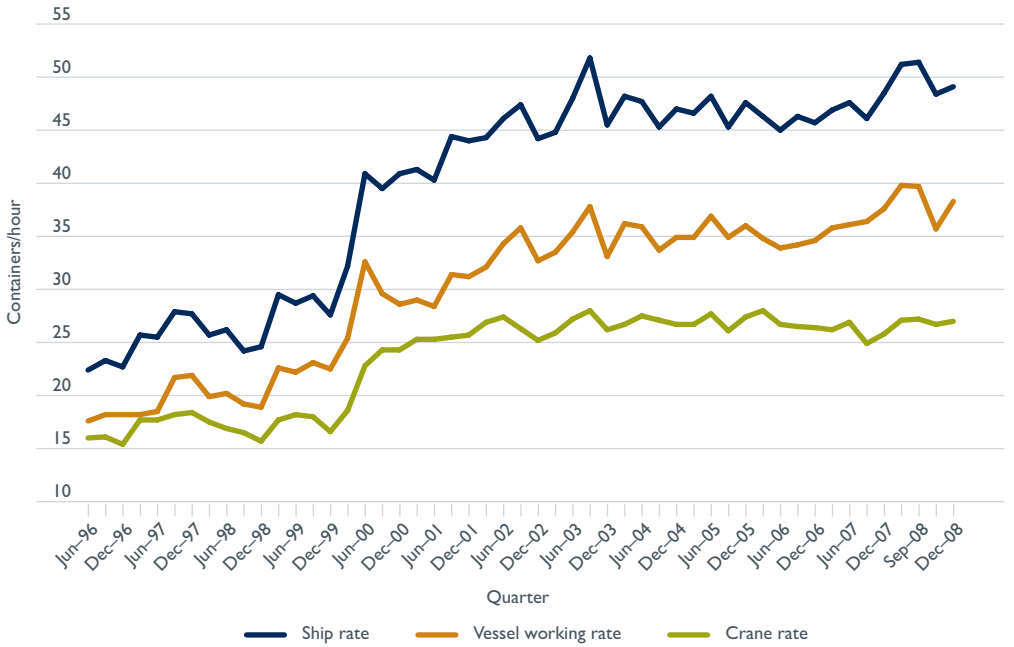
Note: These figures are based on data in Table 2.1. See explanatory notes for definition of terms.
Sources: Patrick 2009b and DP World 2009.

Figure 2.2 Brisbane: productivity in containers per hour



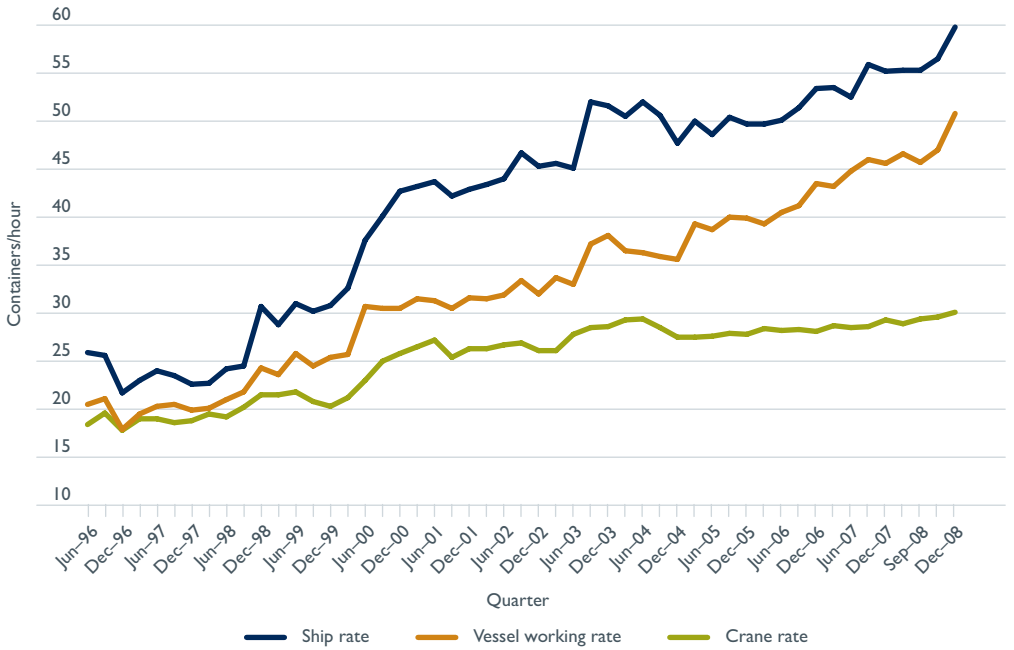
Note: These figures are based on data in Table 2.1. See explanatory notes for definition of terms.
Sources: Patrick 2009b and DP World 2009.

Figure 2.3 Sydney: productivity in containers per hour



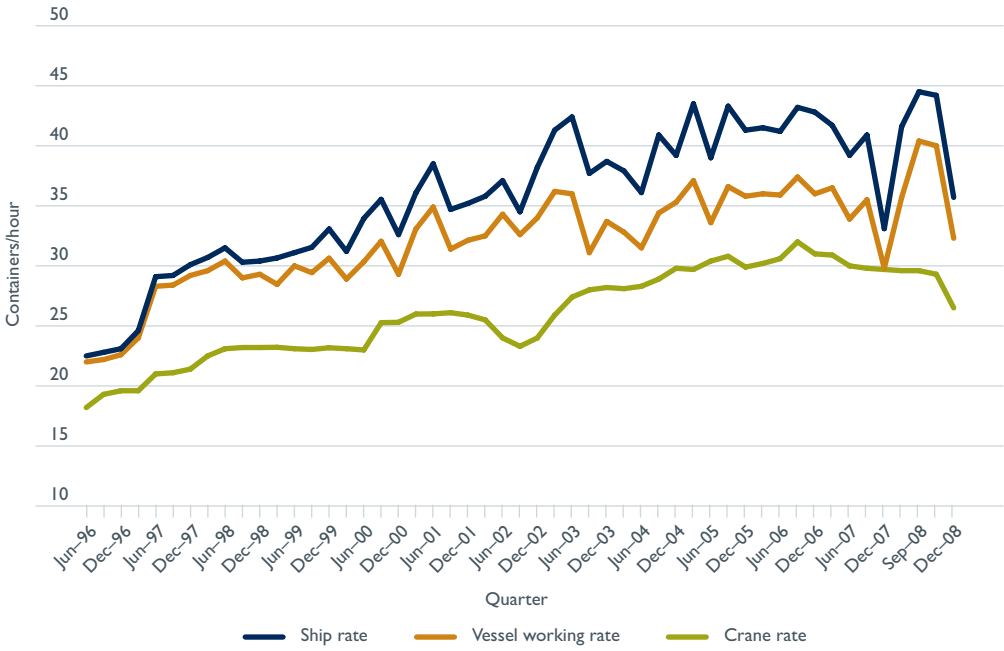
Note: These figures are based on data in Table 2.1. See explanatory notes for definition of terms.
Sources: Patrick 2009b and DP World 2009.

Figure 2.4 Melbourne: productivity in containers per hour



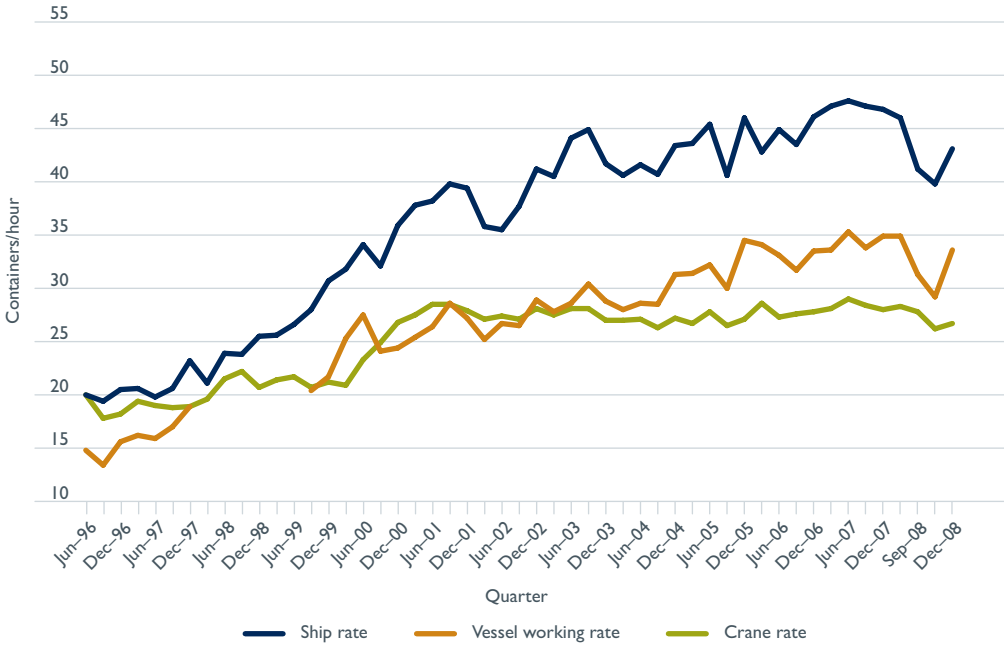
Note: These figures are based on data in Table 2.1. See explanatory notes for definition of terms.
Sources: Patrick 2009b and DP World 2009.

Figure 2.5 Adelaide: productivity in containers per hour



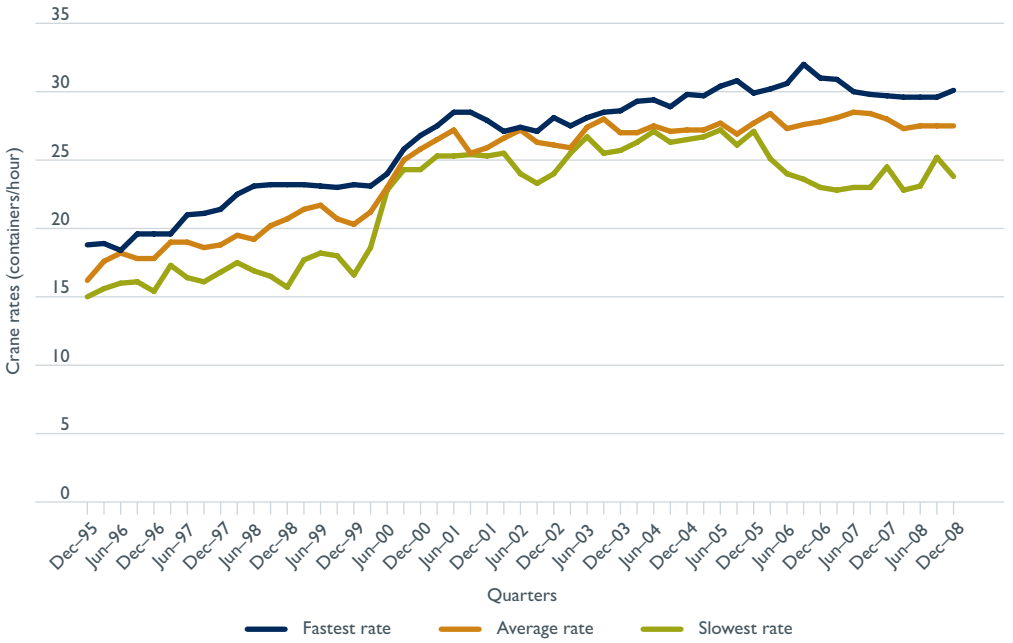
Note: These figures are based on data in Table 2.1. See explanatory notes for definition of terms.
Sources: Patrick 2009b and DP World 2009.

Figure 2.6 Freemantle: 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 2009b and DP World 2009.

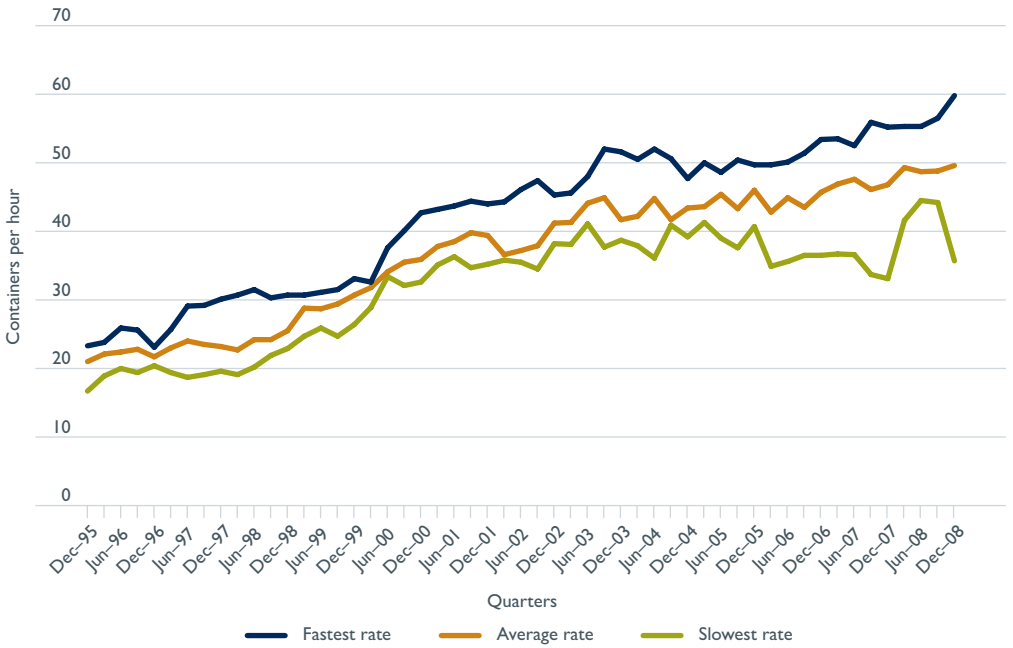
Figure 2.7 Productivity: fastest, average and slowest crane rates achieved



Note: These figures are based on data in Table 2.1. See explanatory notes for definition of terms. The fastest and slowest rates correspond to different port terminals in the various quarters.

Sources: Patrick 2009b and DP World 2009.

Figure 2.8 Productivity: 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 2009b and DP World 2009.

Table 2.2 Container terminal performance indicators: productivity in TEU per hour

	Dec–06	*Mar–07*	*Jun–07*	*Sep–07*	*Dec–07*	*Mar–08*	*Jun–08*	*Sep–08*	*Dec–08*
Five Ports									
Ships handled	1 094	1 075	1 110	1 154	1 138	1 107	1 156	1 156	1 073
Total TEU	1 329 707	1 253 983	1 234 276	1 363 144	1 479 205	1 356 859	1 395 650	1 510 291	1 500 175
Crane rate	38.5	38.3	38.4	37.9	39.1	39.0	39.2	39.9	39.8
Vessel working rate	51.9	52.3	52.9	54.1	55.3	57.0	55.9	56.0	59.0
Ship rate	67.4	67.4	66.6	67.6	69.2	70.6	69.8	70.8	72.1
Throughput pbm (TEU per metre)	186.3	175.7	173.0	191.0	207.3	190.1	195.6	211.6	210.2
Brisbane									
Ships handled	271	270	262	267	254	248	255	243	231
Total TEU	226 197	218 323	207 120	236 083	258 726	221 515	232 442	249 372	248 183
Crane rate	33.0	32.3	32.4	32.8	35.6	32.9	32.9	36.4	34.5
Vessel working rate	36.0	37.9	36.9	37.5	43.7	42.8	40.7	46.9	45.5
Ship rate	52.4	52.1	51.5	48.1	55.2	54.3	51.8	58.7	55.1
Throughput pbm (TEU per metre)	140.8	135.9	128.9	146.9	161.0	137.8	144.6	155.2	154.4
Sydney									
Ships handled	322	305	317	338	342	321	343	351	321
Total TEU	441 497	399 924	392 505	437 332	481 442	439 755	448 857	501 480	508 196
Crane rate	38.9	38.2	38.8	36.5	37.9	39.5	39.5	39.1	39.5
Vessel working rate	51.0	52.0	52.2	53.1	55.2	58.1	57.8	52.4	56.2
Ship rate	67.4	68.2	68.8	67.2	71.1	74.5	74.9	70.9	72.0
Throughput pbm (TEU per metre)	227.3	205.9	202.1	225.2	247.9	226.4	231.1	258.2	261.7
Melbourne									
Ships handled	314	316	326	333	331	326	346	353	316
Total TEU	470 823	455 538	445 563	482 599	516 425	476 655	488 594	529 223	516 431
Crane rate	40.0	40.8	40.2	41.0	41.9	41.4	42.2	43.2	43.7
Vessel working rate	61.9	61.5	63.4	66.2	65.2	66.9	65.6	68.5	73.7
Ship rate	76.1	76.1	74.2	80.1	78.9	79.3	79.5	82.3	86.8
Throughput pbm (TEU per metre)	257.8	249.5	244.0	264.3	282.8	261.0	267.6	289.8	282.8
Adelaide									
Ships handled	65	67	74	86	82	84	77	68	67
Total TEU	55 227	56 739	60 134	68 175	70 647	71 066	78 420	74 603	72 937
Crane rate	41.8	40.4	39.0	38.6	39.3	38.7	38.9	38.9	35.1
Vessel working rate	48.6	47.8	43.9	45.9	39.4	46.7	52.7	53.0	42.9
Ship rate	57.8	54.5	50.8	52.9	43.8	54.4	58.6	58.6	47.4
Throughput pbm (TEU per metre)	117.5	120.7	127.9	145.1	150.3	151.2	166.9	158.7	155.2

(continued)

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

	Dec–06	*Mar–07*	*Jun–07*	*Sep–07*	*Dec–07*	*Mar–08*	*Jun–08*	*Sep–08*	*Dec–08*
Fremantle									
Ships handled	122	117	131	130	129	128	135	141	138
Total TEU	135 963	123 459	128 954	138 955	151 965	147 868	147 337	155 613	154 428
Crane rate	40.0	39.2	39.9	39.6	39.5	38.7	38.3	37.3	38.5
Vessel working rate	48.3	47.0	48.4	47.2	49.4	48.3	43.1	41.5	48.4
Ship rate	66.6	65.9	65.3	65.7	66.2	63.5	56.8	56.6	62.1
Throughput pbm (TEU per metre)	105.3	95.6	99.8	107.6	117.7	114.5	114.1	120.5	119.6

na not available.
r revised.
pbm per berth metre.
Note: For data back to the December quarter 1993, refer to an excel spreadsheet available at www.bitre.gov.au.
Sources: Patrick 2009b, DP World 2009.

Chapter 3 Port interface cost index

The port interface cost index 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.[1] Data for January–June 2008 and July–December 2008 are presented in Tables 3.1 to 3.6. The port interface cost index 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 Port Interface Cost Index (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 enable the PICI charges to be estimated on a per TEU basis. This index appears as Table 3.1.

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 prices per TEU in current and constant dollars (2001). 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 GT range[2] the representative vessel size used is 17 215 GT and for the 35 000 to 40 000 GT range the representative vessel size is 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 January–June 2008 and July–December 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).
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 July–December 2008, there were some significant changes in charges per TEU, mainly reflecting the variation in the average number of TEU exchanged per ship call.

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

- Brisbane 4 per cent decrease
- Sydney 10 per cent decrease
- Melbourne 11 per cent decrease
- Adelaide 28 per cent increase
- Fremantle 16 per cent increase.

For ships in this range, compared to January–June 2008, the average number of TEU exchanged increased by 4 per cent at Brisbane and decreased by 6 per cent at Fremantle. They increased by 11 per cent at Sydney. The TEU exchanged increased by 12 per cent at Melbourne and by 37 per cent at Adelaide, compared to the January–June 2008 period.

For ships in the 35 000 to 40 000 GT range, compared to the previous period, the overall changes in total ship-based charges per TEU in July–December 2008 were:

- Brisbane 8 per cent decrease
- Sydney 6 per cent decrease
- Melbourne 5 per cent decrease
- Adelaide 3 per cent increase
- Fremantle 2 per cent decrease.

In the 35 000 to 40 000 GT range, the average number of TEU exchanged increased at all ports in the July–December 2008 period when compared to the previous period. In Sydney they increased by 7 per cent, in Brisbane by 9 per cent and Melbourne by 6 per cent. In Fremantle they increased by 2 per cent and in Adelaide they did not change.

Fremantle has the lowest ship-based charges on a per ship visit basis for ships in the 15 000 to 20 000 GT range and Melbourne 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, Adelaide and Fremantle in this period. Port of Melbourne introduced a channel infrastructure fee of $34.65 per TEU on 1 April 2008 to recover the costs of the Channel Deepening Project.

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 January–June 2008 and July–December 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 imported containers. For imports there was no change except for a 2 per cent decrease at Adelaide. For exports there was no change in charges at any of the five ports.

Road transport charges increased for Brisbane, Sydney and Fremantle by 3 per cent. For Adelaide these charges increased by 1 per cent and for Melbourne did not change.

One of the parameters used in estimating 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

In practice, container stevedoring charges tend to vary between ports. In this analysis, 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. The results should therefore be interpreted with caution.

Compared to the previous period, the percentage change in costs per TEU for import containers between January–June 2008 and July–December 2008 for ships in the 15 000 to 20 000 GT range were:

- Brisbane 1 per cent increase
- Sydney 1 per cent increase
- Melbourne 4 per cent increase
- Adelaide 2 per cent decrease
- Fremantle 1 per cent increase.

For export containers:

- Brisbane 1 per cent increase
- Sydney 1 per cent increase
- Melbourne 4 per cent increase
- Adelaide 1 per cent decrease
- Fremantle 1 per cent increase.

Compared to the previous period, the percentage change in costs per TEU for import Containers between January–June 2008 and July–December 2008 for ships in the 35 000 to 40 000 GT range were:

- Brisbane 1 per cent increase
- Sydney 1 per cent increase
- Melbourne 4 per cent increase
- Adelaide no change
- Fremantle 1 per cent increase.

For export containers:

- Brisbane 1 per cent increase
- Sydney 1 per cent increase
- Melbourne 4 per cent increase
- Adelaide 1 per cent decrease
- Fremantle 1 per cent increase.

National index

Figure 3.1 provides the national port interface cost index for ships in the 15 000 to 20 000 GT range from 1993 onwards. In current prices, the national index for imports increased from $852 per TEU in January–June 2008 to $855 in July–December 2008, and the index for exports increased from $797 per TEU to $800 per TEU.

In real terms (constant 2001 dollars), the national cost index per import decreased from $669 per TEU to $629 per TEU and for exports from $626 to $588 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 $843 per TEU in January–June 2008 to $848 per TEU in July–December 2008 in current prices. The index for exports increased from $788 per TEU to $793 per TEU in current prices.

In real terms (2001 prices), the national cost index for imports decreased from $662 per TEU to $652 per TEU and for exports from $619 to $609 per TEU.

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

	Brisbane		*Sydney*		*Melbourne*		*Adelaide*		*Fremantle*	
	Jan–June 2008	*Jul–Dec 2008*	*Jan–June 2008*	*Jul–Dec 2008*	*Jan–June 2008*	*Jul–Dec 2008*	*Jan–June 2008*	*Jul–Dec 2008*	*Jan–June 2008*	*Jul–Dec 2008*
Vessel size GT 17 215										
Average TEU exchanged[a]										
All	526	549	706	787	944	1 055	664	910	1 671	1 570
Loaded	421	390	489	535	676	721	378	590	1 522	1 371
Empty	106	159	217	252	268	334	286	320	149	200
Loaded inwards	247	256	356	413	446	499	126	192	757	710
Loaded outwards	174	134	133	123	230	222	253	398	765	661
Ship call parameters[a]										
Number of port calls	3	4	3	4	2	3	2	2	6	6
Elapsed berth time (hrs)	25	26	23	28	20	22	40	41	41	43
Vessel size GT 37 394										
Average TEU exchanged[b]										
All	1 186	1 292	1 999	2 136	1 942	2 054	1 032	1 032	1 320	1 297
Loaded	817	827	1 366	1 384	1 650	1 632	720	720	846	872
Empty	369	466	634	752	292	423	312	312	474	425
Loaded inwards	522	566	1036	1068	954	1054	305	305	386	493
Loaded outwards	294	261	330	316	695	577	415	415	460	379
Ship call parameters[b]										
Number of port calls	3	5	3	3	2	4	2	2	3	3
Elapsed berth time (hrs)	26	28	34	41	31	31	39	45	33	34

na not available.

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*	
	Jan–Jun 2008	*Jul–Dec 2008*	*Jan–Jun 2008*	*Jul–Dec 2008*	*Jan–Jun 2008*	*Jul–Dec 2008*	*Jan–Jun 2008*	*Jul–Dec 2008*	*Jan–Jun 2008*	*Jul–Dec 2008*
Ship-based charges ($/TEU)										
Conservancy	5.43	5.21	–	–	–	–	4.05	2.53	–	–
Tonnage	–	–	10.46	9.38	5.65	5.31	10.77	7.92	1.76	1.87
Pilotage	13.37	12.82	4.69	4.21	8.02	7.18	6.75	4.92	1.55	1.65
Towage[a]	18.95	18.18	14.67	13.16	10.95	9.80	18.79	13.70	6.35	6.75
Mooring, unmooring	4.27	4.10	4.14	3.72	1.47	1.31	–	–	0.58	0.62
Berth hire[b]	–	–	–	–	–	–	–	–	–	–
Total[c]	42.03	40.31	33.96	30.47	26.10	23.60	40.36	29.07	10.25	10.90
Cargo-based charges ($/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
Channel infrastructure fees	–	–	–	–	–	34.65	–	–	–	–
Total port and related charges ($/TEU)[c]										
Loaded imports	116.83	115.11	123.61	120.12	65.15	97.30	104.67	93.38	83.71	84.36
Loaded exports	116.83	115.11	85.11	81.62	65.15	97.30	104.67	93.38	83.71	84.36
Charges per ship visit ($/visit)										
Total ship-based charges	22 116	22 116	23 987	23 987	24 644	23 987	26 786	26 462	17 118	17 118
Empty TEU[d]	3 689	1 650	2 392	2 769	2 658	3 309	0	0	1 268	1 702

– 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 TEU.

Notes: 1. Port and related charges are based on the parameters described in Table 3.

2. Channel infrastructure fees apply to Port of Melbourne from 1 April 2008. These fees are included in cost estimates from July–December 2008 onwards.

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 2008	*Jul–Dec 2008*	*Jan–Jun 2008*	*Jul–Dec 2008*	*Jan–Jun 2008*	*Jul–Dec 2008*	*Jan–Jun 2008*	*Jul–Dec 2008*	*Jan–Jun 2008*	*Jul–Dec 2008*
Ship-based charges ($/TEU)										
Conservancy	5.23	4.80	–	–	–	–	3.95	3.95	–	–
Tonnage	–	–	8.02	7.51	5.97	5.93	10.92	12.13	4.84	4.93
Pilotage	14.13	12.97	3.01	2.82	4.96	4.69	4.34	4.34	1.97	2.00
Towage[a]	10.63	9.75	5.48	5.13	5.71	5.39	15.57	15.57	11.93	12.14
Mooring, unmooring	1.90	1.74	1.88	1.76	0.71	0.67	–	–	0.74	0.75
Berth hire[b]	–	–	–	–	–	–	–	–	–	–
Total[c]	31.89	29.26	18.40	17.22	17.35	16.69	34.77	35.99	19.48	19.82
Cargo-based charges ($/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
Channel infrastructure fees	–	–	–	–	–	34.65	–	–	–	–
Total port and related charges ($/TEU)[c]										
Loaded imports	106.69	104.06	108.05	106.87	56.40	90.39	99.08	100.29	92.94	93.28
Loaded exports	106.69	104.06	69.55	68.37	56.40	90.39	99.08	100.29	92.94	93.28
Charges per ship visit ($/visit)										
Total ship-based charges	37 819	37 819	36 779	36 779	33 696	33 696	35 870	37 121	25 716	25 716
Empty TEU[d]	5 765	5	6 970	8 268	2 889	4 185	0	0	4 047	3 628

– 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 TEU.

Notes: 1. Port and related charges are based on the parameters described in Table 3.

2. Channel infrastructure fees apply to Port of Melbourne from 1 April 2008. These fees are included in cost estimates from July–December 2008 onwards.

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

	Brisbane		*Sydney*		*Melbourne*		*Adelaide*		*Fremantle*	
	Jan–June 2008	*Jul–Dec 2008*	*Jan–June 2008*	*Jul–Dec 2008*	*Jan–June 2008*	*Jul–Dec 2008*	*Jan–June 2008*	*Jul–Dec 2008*	*Jan–June 2008*	*Jul–Dec 2008*
					$/TEU					
Import										
Ship-based charges	42	40	34	30	26	23	40	29	10	11
Cargo-based charges	75	75	90	90	39	74	64	64	73	73
Stevedoring[p]	173	173	173	173	173	173	173	173	173	173
Customs brokers' fees	139	139	142	142	140	140	141	139	192	192
Road transport charges	354	364	482	495	471	471	272	275	351	360
Import total[a]	784	792	921	930	849	882	692	680	800	810
Export										
Ship-based charges	42	40	34	30	26	23	40	29	10	11
Cargo-based charges	75	75	51	51	39	74	64	64	73	73
Stevedoring[p]	173	173	173	173	173	173	173	173	173	173
Customs brokers' fees	117	117	115	115	97	97	94	94	99	99
Road transport charges	354	364	482	495	471	471	272	275	351	360
Export total[a]	761	770	856	865	806	839	645	636	707	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 3.2.
2. *Waterline* data on customs brokers' fees and road transport charges are collected for the purpose of monitoring trends in charges overtime. 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; and ABS 2009.

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

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jan–Jun 2008	Jul–Dec 2008	Jan–Jun 2008	Jul–Dec 2008	Jan–Jun 2008	Jul–Dec 2008	Jan–Jun 2008	Jul–Dec 2008	Jan–Jun 2008	Jul–Dec 2008
	$/TEU									
Import										
Ship-based charges	32	29	18	17	17	17	35	36	19	20
Cargo-based charges	75	75	90	90	39	74	64	64	73	73
Stevedoring[p]	173	173	173	173	173	173	173	173	173	173
Customs brokers' fees	139	139	142	142	140	140	141	139	192	192
Road transport charges	354	364	482	495	471	471	272	275	351	360
Import total[a]	774	781	906	917	841	875	686	687	809	819
Export										
Ship-based charges	32	29	18	17	17	17	35	36	19	20
Cargo-based charges	75	75	51	51	39	74	64	64	73	73
Stevedoring[p]	173	173	173	173	173	173	173	173	173	173
Customs brokers' fees	117	117	115	115	97	97	94.25	94.25	99	99
Road transport charges	354	364	482	495	471	471	272	275	351	360
Export total[a]	751	759	840	851	798	832	639	643	717	726

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 3.2.

2. *Waterline* data on customs brokers' fees and road transport charges are collected for the purpose of monitoring trends in charges overtime. 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, remantle and Burnie. Stevedoring charges vary between ports but detailed data for individual ports are not publicly available.

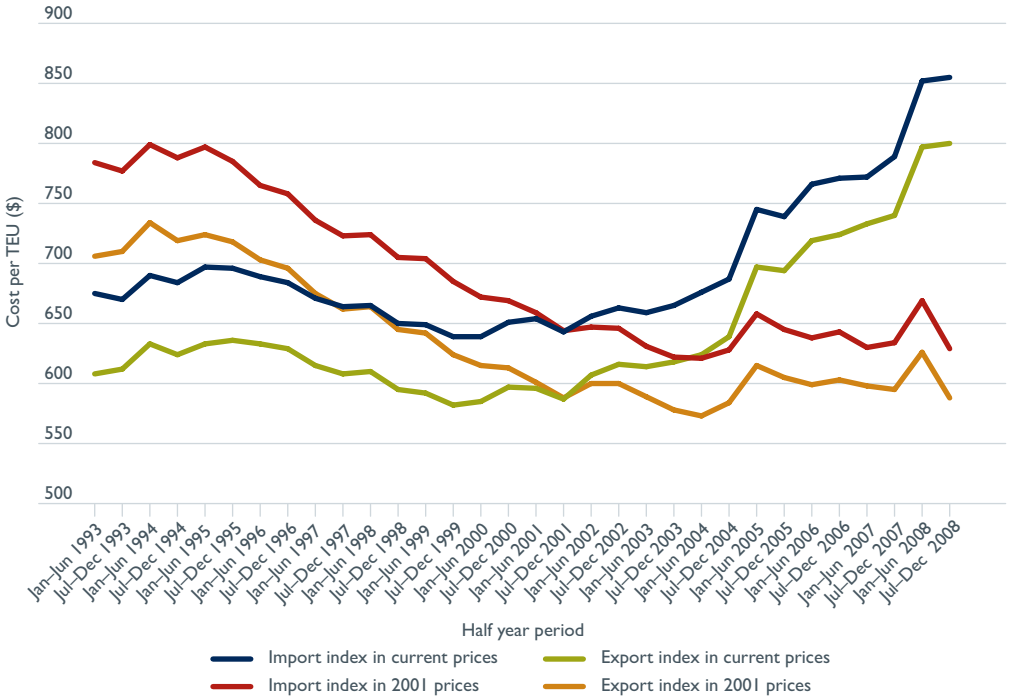
Sources: BITRE estimates based on: ship call data supplied by relevant port authorities/corporations; price schedules of relevant port authorities/corporations; towage operators and pilotage service providers; surveys of customs brokers and road transport operators; stevedoring charge data supplied by the ACCC 2008; and ABS 2009.

Table 3.6 The national port interface cost index for ships in the 35 000–40 000 GT range, 2001–2007

	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	Jul–Dec 2008
Imports in current prices	674	684	739	737	764	773	766	781	843	830
Imports in 2001 prices	619	625	652	642	650	644	625	628	662	638
Exports in current prices	623	636	691	692	717	726	726	732	788	793
Exports in 2001 prices	572	581	610	603	610	605	593	589	619	609

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; and industry sources; and ABS 5206.041 National Accounts table.

Figure 3.1 National port interface cost indicies for ships in the 15 000–20 000 GT range, 1993–2008



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 and industry sources; and ABS 2009. Data for years before 2007 is from previous issues of *Waterline*.

Chapter 4 Ship visits

This chapter presents 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 TEU exchanged per ship visit for container vessels with sizes ranging from 5000–60 000 GT.

Average TEU exchanged increased only slightly in the second half of 2008.

Total ship visits to five ports increased by 3.0 per cent in calendar year 2008 compared with the preceding year, with ship visits peaking at 2337 for the six months to December 2008. There was only a slight variation in ship visits between the six month periods to September 2008 and December 2008.

Table 4.2 shows the distribution of ship visits to five ports by vessel gross tonnage in 2008. For all ports, vessels with the largest number of visits were 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 TEU exchanged and total ship visits per 6 month period for selected GT ranges, weighted by number of ships

GT	*Jun–03*	*Dec–03*	*Jun–04*	*Dec–04*	*Jun–05*	*Dec–05*	*Jun–06*	*Dec–06*	*Jun–07*	*Dec–07*	*Jun–08*	*Dec–08*
5000–10 000												
Average TEU exchanged	161	193	333	204	283	368	267	560	391	402	319	660
Total ship visits	75	72	93	80	71	67	93	108	144	131	159	166
10 000–15 000												
Average TEU exchanged	405	485	688	628	554	506	464	656	711	864	511	627
Total ship visits	53	54	40	84	89	106	136	108	116	125	103	43
15 000–20 000												
Average TEU exchanged	839	826	971	885	693	800	685	890	873	1 116	845	1 029
Total ship visits	181	191	153	266	316	439	406	430	224	209	189	214
20 000–25 000												
Average TEU exchanged	902	990	1014	935	818	859	685	925	878	942	857	948
Total ship visits	182	214	199	306	321	294	374	256	163	148	207	246
25 000–30 000												
Average TEU exchanged	1 027	1 031	959	1 071	956	1 021	882	1 101	991	2 528	1 049	1 226
Total ship visits	286	323	344	185	332	377	395	475	558	618	545	527
30 000–35 000												
Average TEU exchanged	1 262	1 374	1 478	896	1 216	1 434	1 152	1 329	1 185	1 296	806	1 115
Total ship visits	175	257	247	191	223	141	198	156	177	235	243	214
35 000–40 000												
Average TEU exchanged	1 408	1 445	1 474	1 385	1 394	1 454	1 137	1 383	1 605	1 867	1 643	1 932
Total ship visits	214	189	225	228	227	225	178	223	313	357	333	407
40 000–45 000												
Average TEU exchanged	1 450	1 558	1 601	1 098	1 511	1 653	1 177	1 435	1 630	1 819	1 773	2 003
Total ship visits	162	186	181	143	196	165	223	249	212	173	136	152
45 000–50 000												
Average TEU exchanged	1 201	1 270	1 379	0 853	1 279	1 433	914	1 029	1 236	1 651	1 536	1 923
Total ship visits	72	77	75	32	65	77	88	81	154	153	145	114
50 000–55 000												
Average TEU exchanged	995	1 044	1 366	795	1 735	1 250	1 321	1 373	1 232	1 807	1 606	1 907
Total ship visits	61	69	22	71	89	60	55	55	110	101	166	254
55 000–60 000												
Average TEU exchanged	1 252	0	0	681	537	0	0	596	659	1 457	0	0
Total ship visits	3	0	0	6	8	0	0	2	1	11	0	0
Total ship visits	1 464	1 632	1 579	1 592	1 937	1 951	2 146	2 143	2 172	2 261	2 226	2 337

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

Table 4.2 Ship visits by port, 2008

Number of ship visits	*Brisbane*	*Sydney*	*Melbourne*	*Adelaide*	*Fremantle*	*Total 2008*
5000–10 000	80	165	75	0	5	325
10 000–15 000	41	48	32	0	25	146
15 000–20 000	112	116	92	47	36	403
20 000–25 000	139	127	136	32	19	453
25 000–30 000	233	334	338	75	92	1 072
30 000–35 000	118	135	129	24	51	457
35 000–40 000	188	199	203	68	82	740
40 000–45 000	71	58	84	28	47	288
45 000–50 000	57	52	51	29	70	259
50 000–55 000	80	96	105	37	102	420
Above 55 000	0	0	0	0	0	0
Total	1 119	1 330	1 245	340	529	4 563

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 2002 to July–December 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

Cargo throughput

Total cargo throughput at the five ports was 64.0 million tonnes for July–December 2008, compared with 63.8 million tonnes for the previous half-year January–June 2008 and 62.6 million tonnes for July–December 2007. This represented an increase of 0.5 per cent in total cargo throughput for the five ports for July–December 2008 compared with January–June 2008 and an increase of 2.3 per cent compared with July–December 2007.

Compared with January–June 2008, total cargo throughput in July–December 2008 increased by 7.4 per cent at Brisbane, and by 1.1 per cent at Sydney, decreased by 0.8 per cent at Melbourne, by 6.3 per cent at Adelaide and by 3.7 per cent at Fremantle.

Non-containerised general cargo throughput at the five ports was 2.855 million tonnes for July–December 2008, which represents a increase of 1.0 per cent on the 2.826 million tonnes throughput for January–June 2008 and an increase of 5.7 per cent on the 2.701 million tonnes throughput for July–December 2007.

Total container traffic throughput for the five ports was 3.133 million TEU for July–December 2008, which represents a increase of 9.6 per cent on the 2.859 million TEU throughput for January–June 2008 and an increase of 5.5 per cent on the 2.971 million TEU throughput for July–December 2007.

Compared with January–June 2008, loaded TEU at the five ports increased by 5.4 per cent, with loaded imports increasing by 4.3 per cent and loaded exports increasing by 7.3 per cent.

Table 5.1 Non–financial performance indicators, selected Australian ports, 2006–2008

	Jan–Jun 2006	*Jul–Dec 2006*	*Jan–Jun 2007*	*Jul–Dec 2007*	*Jan–Jun 2008*	*Jul–Dec 2008*
Five ports[a]						
Total cargo throughput ('000 tonnes)	58 358	60 694	59 953	62 591	63 756	64 049
Non–containerised general cargo ('000 tonnes)[b]	2 506	2 522	2 768	2 701	2 826	2 855
Containerised cargo (TEU exchanged)						
Full import	1 028 263	1 242 921	1 166 116	1 389 211	1 305 203	1 449 281
Empty import	199 487	137 911	139 096	136 768	142 714	140 312
Full export	686 673	807 702	778 137	817 213	849 152	876 847
Empty export	402 163	500 511	540 582	627 401	563 815	666 821
Total	2 316 586	2 689 045	2 623 931	2 970 593	2 858 884	3 133 261
Average total employment[c]	1 056	1 076	1 114	1 141	1 154	1 222
Port turnaround time (hrs)[d]						
Median result	–	–	–	–	–	–
95th percentile	–	–	–	–	–	–
Brisbane						
Total cargo throughput ('000 tonnes)	13 226	13 936	14 130	15 006	14 716	15 808
Non–containerised general cargo ('000 tonnes)[b]	459	466	546	516	542	670
Containerised cargo (TEU exchanged)						
Full import	149 226	186 666	177 073	216 280	196 074	218 787
Empty import	34 164	40 400	38 023	32 133	33 613	37 363
Full export	115 564	136 672	120 261	125 275	130 028	139 042
Empty export	71 123	75 844	100 106	114 465	92 892	104 798
Total	370 077	439 582	435 463	488 153	452 607	499 990
Average total employment[c]	256	258	293	312	312	342
Port turnaround time (hrs)[d]						
Median result	30	36	33	35	33	26
95th percentile	51	57	54	54	51	45
Sydney						
Total cargo throughput ('000 tonnes)	13 505	14 024	13 772	14 886	14 558	14 715
Non–containerised general cargo ('000 tonnes)[b]	304	331	347	270	262	142
Containerised cargo (TEU exchanged)						
Full import	342 216	419 784	380 056	459 364	428 179	489 703
Empty import	9 490	9 616	9 762	9 796	9 224	10 840
Full export	173 932	192 703	176 919	188 416	196 678	222 367
Empty export	168 830	213 006	218 275	248 943	237 825	262 222
Total	694 468	835 109	785 012	906 519	871 906	985 132
Average total employment[c]	243	246	244	240	223	244
Port turnaround time (hrs)[d]						
Median result	28	30	30	30	28	30
95th percentile	48	56	53	57	47	56
Melbourne						
Total cargo throughput ('000 tonnes)	13 781	14 884	14 628	15 159	15 665	15 542
Non–containerised general cargo ('000 tonnes)[b]	1 081	1 061	1 175	1 184	1 251	1 273

(continued)

Table 5.1 Non–financial performance indicators, selected Australian ports, 2006–2008 (continued)

	Jan–Jun 2006	Jul–Dec 2006	Jan–Jun 2007	Jul–Dec 2007	Jan–Jun 2008	Jul–Dec 2008
Containerised cargo (TEU exchanged)						
Full import	416 323	485 828	463 052	542 218	508 357	557 940
Empty import	60 806	55 592	54 843	47 900	50 920	48 483
Full export	339 949	355 544	343 064	354 504	372 536	359 377
Empty export	126 118	158 613	177 075	205 955	174 254	231 319
Total	943196	1 055 577	1 038 034	1 150 577	1 106 067	1 197 119
Average total employment[c]	199	196	201	209.3	223	228
Port turnaround time (hrs)[d]						
Median result	30	31	31	32	30	31
95th percentile	52	62	63	65	56	62
Adelaide						
Total cargo throughput ('000 tonnes)	5 137	5 212	5 072	5 014	5 283	4 952
Non–containerised general cargo ('000 tonnes)[b]	193	181	180	196	187	190
Containerised cargo (TEU exchanged)						
Full import	23 483	30 277	31 441	38 144	40 656	40 260
Empty import	18 024	21 342	23 583	28 340	29 018	27 862
Full export	43 954	46 606	50 233	57 587	59 075	59 382
Empty export	4 954	7 979	7 656	12 710	14 591	16 724
Total	90 415	106 204	112 913	136 781	143 340	144 228
Average total employment[c]	97	97	99	103	107	107
Port turnaround time (hrs)[d]						
Median result	19	20	21	20	21	25
95th percentile	32	32	35	34	35	39
Fremantle						
Total cargo throughput ('000 tonnes)	12 709	12 638	12 352	12 525	13 534	13 032
Non–containerised general cargo ('000 tonnes)[b]	468	482	520	535	585	580
Containerised cargo (TEU exchanged)						
Full import	97 015	120 366	114 494	133 205	131 937	142 591
Empty import	13 274	10 961	12 885	18 599	19 939	15 764
Full export	77 003	76 177	87 660	91 431	90 835	96 679
Empty export	31 138	45 069	37 470	45 328	44 253	51 758
Total	218 430	252 573	252 509	288 563	284 964	306 792
Average total employment[c]	261	280	277	277	289	302
Port turnaround time (hrs)[d]						
Median result	21	25	27	26	29	31
95th percentile	48	54	55	51	62	67

– not applicable.

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

b. Excludes bulk cargoes.

c. 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: Longer time series data on these indicators is available in an excel spreadsheet at www.bitre.gov.au. The five major ports covered are Brisbane, Sydney, Melbourne, Adelaide and Fremantle.

Source: Ports Australia 2009.

Chapter 6 Stevedoring and ship arrival reliability

This section presents two indicators of waterfront reliability; stevedoring cargo receival and ship arrival advice.

Stevedoring-cargo receival

Table 6.1 presents the available information on cargo receival 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 September quarter 2008 decreased at Brisbane, Sydney, Melbourne and Fremantle, compared to the previous quarter. It was not available for Adelaide. Stevedoring reliability in the December quarter 2008 increased for Brisbane and Melbourne. It decreased for Sydney and did not change for 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 at 24 hours prior to actual arrival. Compared with the previous quarter, the September quarter 2008 indicator rose at Brisbane and Adelaide. It fell at Sydney and Fremantle and was not available for Melbourne. In the December quarter 2008, the indicator rose at Brisbane and Fremantle and fell at Sydney 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 September quarter 2008, this indicator fell at Brisbane and Adelaide. It rose at Sydney and Fremantle. It was not available for Melbourne. In the December quarter 2008 this indicator rose at Sydney and Fremantle and fell at Brisbane and Adelaide. It was not available for Melbourne.

Table 6.1 Stevedoring and ship arrival reliability indicators, September and December quarters 2008

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
Indicator	*Jul–Sept*	*Oct–Dec*	*Jul–Sept*	*Oct–Dec*	*Jul–Sept*	*Oct–Dec*	*Jul–Sept*	*Oct–Dec*	*Jul–Sept*	*Oct–Dec*
	per cent									
Stevedoring										
Cargo receival	91.3	92.5	87.1	84.2	83.9	84.8	0.0	0.0	94.7	94.7
Ship arrival										
Advice at 24 hours	42.6	40.1	27.7	31.5	na	na	100.0	95.2	51.8	61.4
Advice inside 24 hours	74.1	73.1	92.5	93.6	na	na	97.7	94.7	88.8	92.1

na not available.

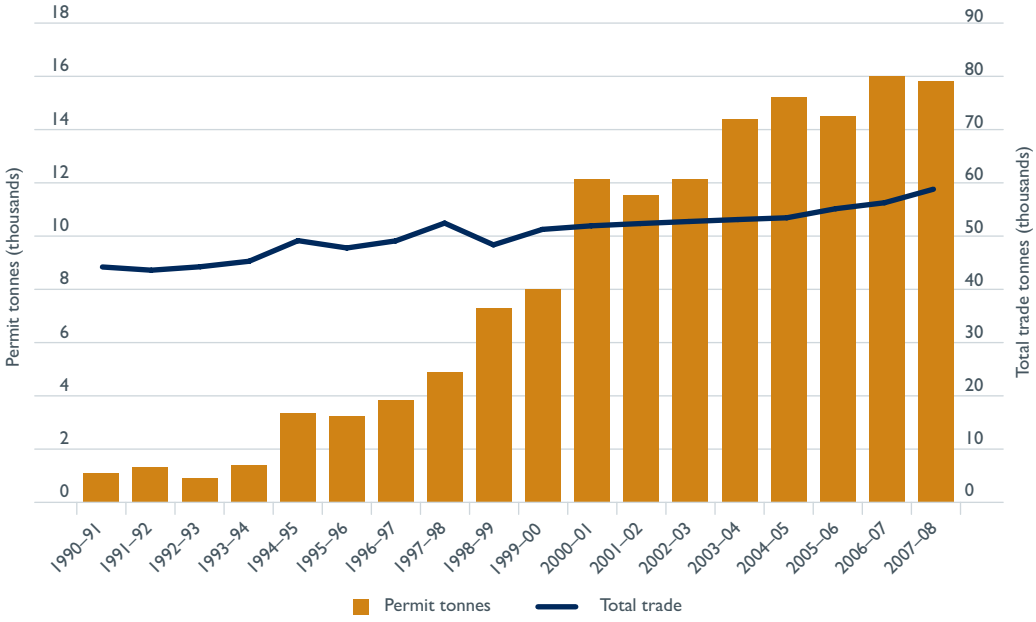
Sources: Ports Australia 2009, Patrick 2009b, DP World 2009.

Chapter 7 Coastal shipping permits[3]

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 or for a series of voyages along the coast. 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 under SVPs and CVPs remained practically unchanged at around 15.3 million tonnes in 2007 and 2008 (Figure 7.1).

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



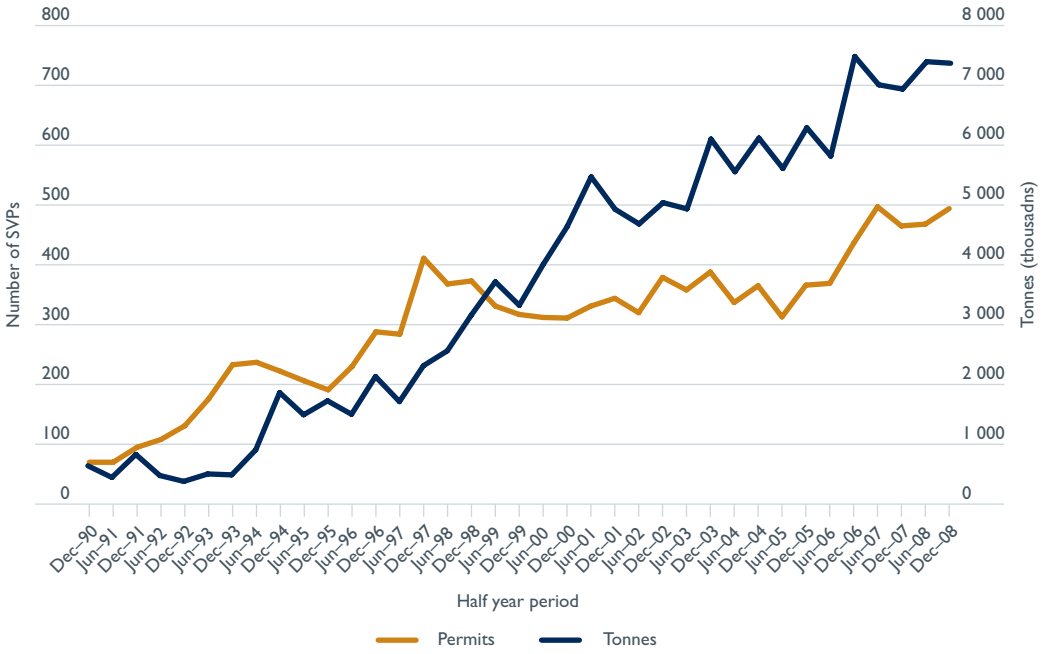
Note: All permit tonnages are pre-voyage estimates.
Source: Department of Infrastructure, Transport, Regional Development and Local Government 2009.

3. This is the last issue of *Waterline* publishing data on permits issued. From 2010, data on permits issued and tonnages planned to be shipped will be published in *Australian Sea Freight* in the chapter discussing use of permits in Australian coastal shipping.
   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>.

Single voyage permits

Figure 7.2 illustrates the number of SVPs issued, and the pre-voyage estimation of tonnes of cargo to be carried, between January–June 1991 and July–December 2008. The number of SVPs issued in July–December 2008 increased by 6.2 per cent compared with the July–December 2007 period. The associated estimated tonnes of cargo to be carried also increased by 6.2 per cent, compared with July–December 2007.

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



Note: All tonnages are pre-voyage estimates.
Source: Department of Infrastructure, Transport, Regional Development and Local Government 2009.

On a calendar year basis the total number of SVPs issued in 2008 was 974 compared with 970 in 2007. This represented an increase of just 0.4 per cent. Over the same period estimated SVP cargo increased by 5.9 per cent from 13 958 thousand tonnes to 14 785 thousand tonnes.

Table 7.1 gives a breakdown of SVPs by cargo types for July–December 2008. General cargo (including containerised cargo) permits now represent 0.9 per cent by weight, while making up 28.5 per cent of total permits issued. Bulk cargo accounts for 99.1 per cent of the total tonnage moved under SVPs.

Table 7.1 Summary of single voyage permits issued, July–December 2008

Cargo category	*Permits*	*Tonnes*
Bulk cargo		
Petroleum products	71	1 229 177
Liquefied gas	11	57 752
Other bulk liquids	20	96 895
Dry bulk	251	5 914 738
General cargo	141	69 376
Total	494	7 367 938

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

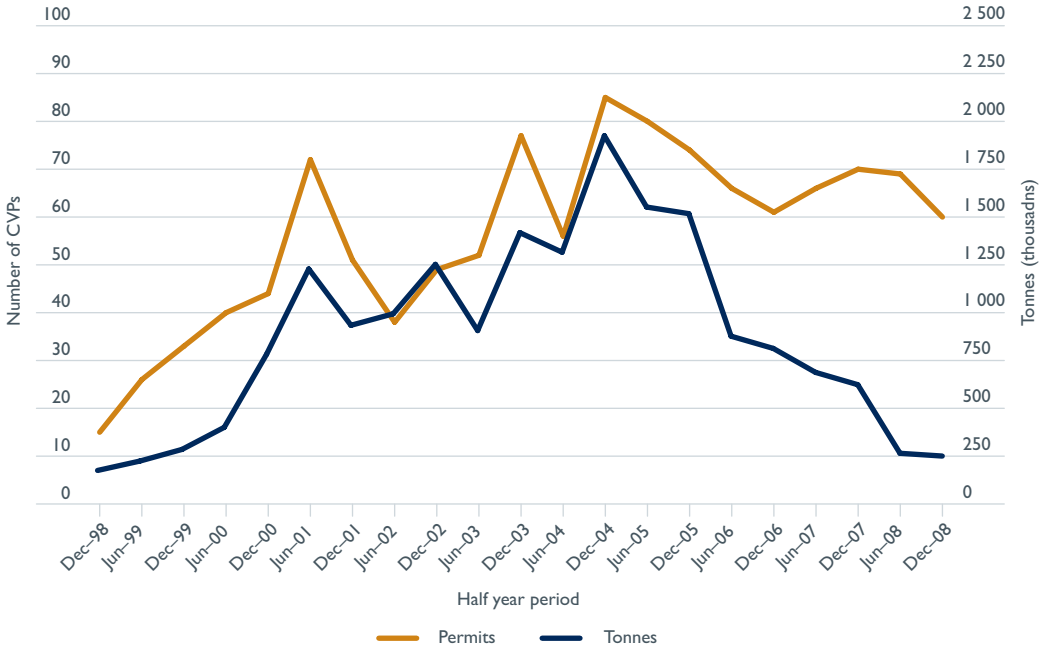
Source: Department of Infrastructure, Transport, Regional Development and Local Government (2009a).

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 intended to be carried, as shown in Figure 7.3. In July–December 2008, a total of 251 thousand tonnes of cargo were to be carried under CVPs, a decline of nearly 60 per cent, as compared with 624 thousand tonnes in July–December 2007. The number of CVP permits declined by 16.4 per cent from 71 to 61 in the corresponding period.

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.

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

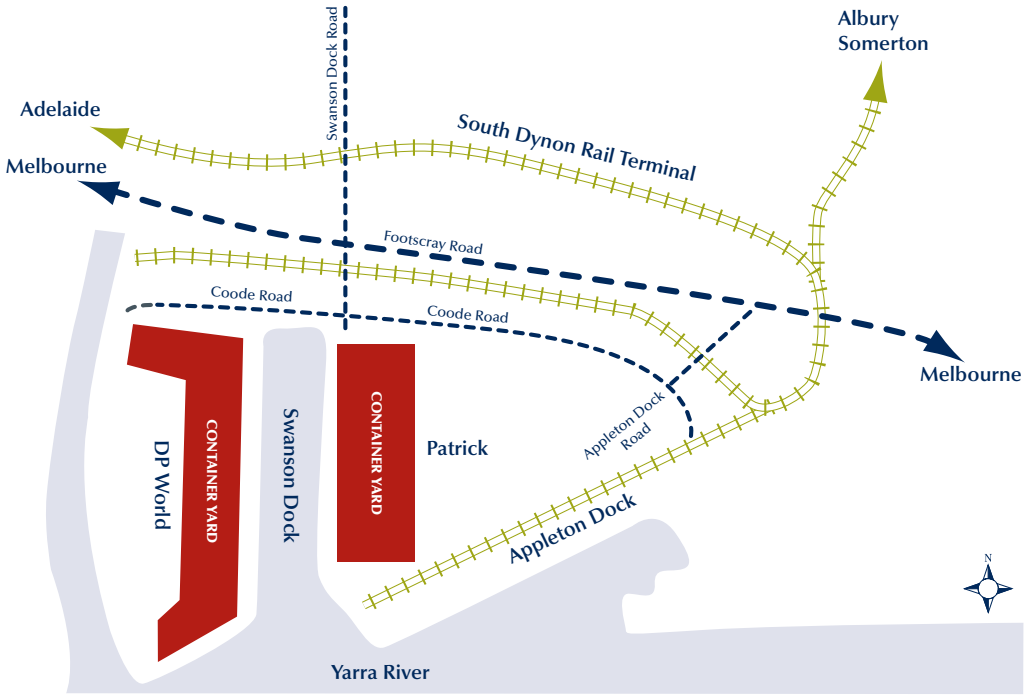


Note: All tonnages are pre-voyage estimates.

Source: Department of Infrastructure, Transport, Regional Development and Local Government 2009.

Appendix A Diagrams of five major Australian container port terminals

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

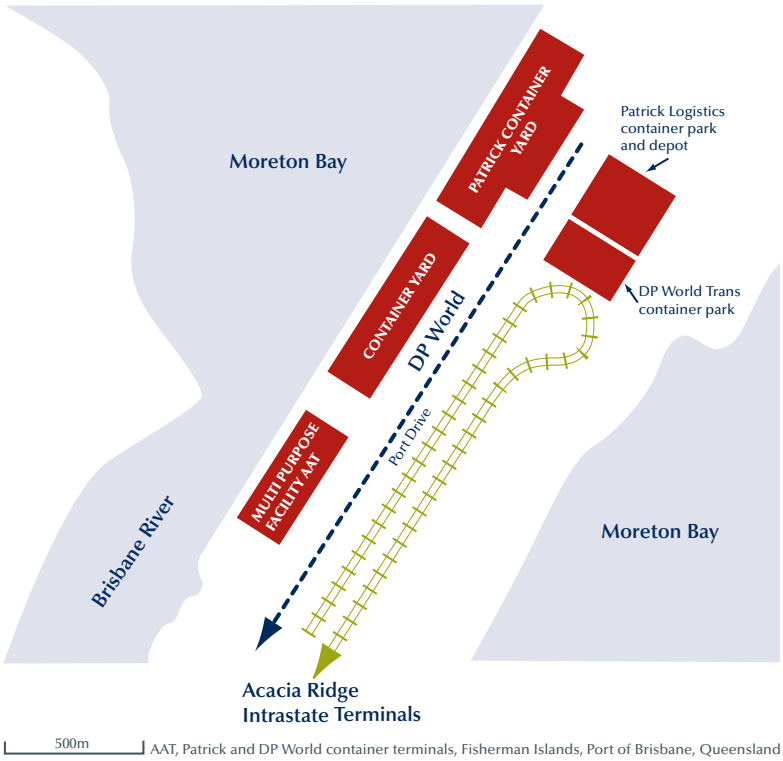


Patrick and DP World container terminals, Swanson Dock, Port Melbourne, Victoria

Note: For DP World and Patrick trains from the Wanston 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 throught the South Dynon rail terminal which is only a few hundred metres north of Footscray Road. The diagram is correct as as March 2007.

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

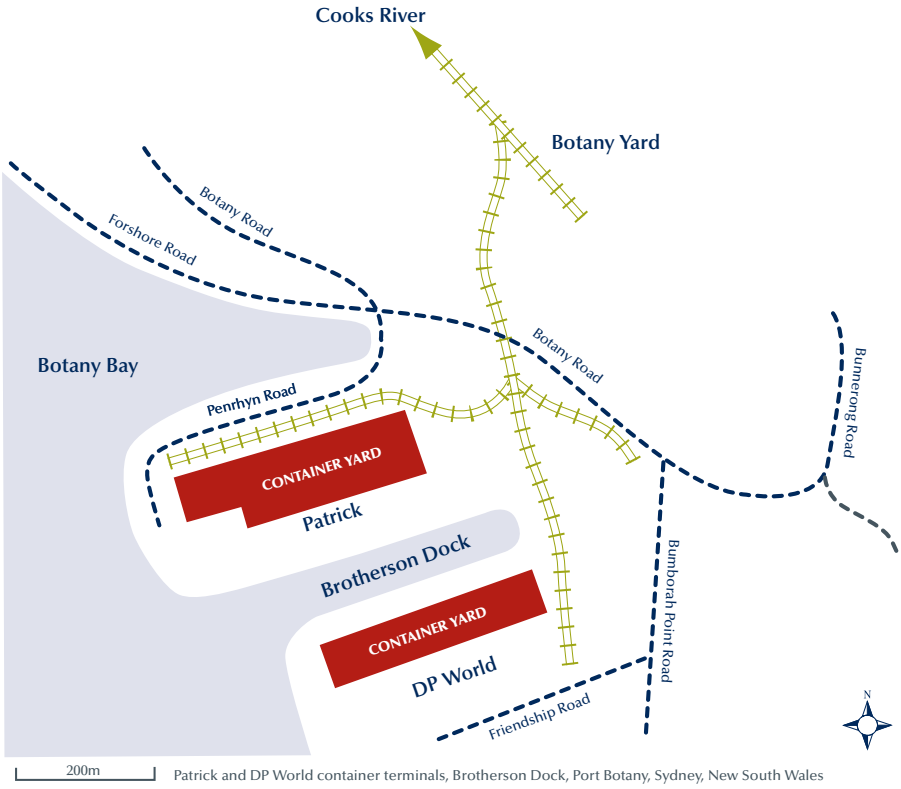
Figure A2 Patrick and DP World terminals—Fisherman Islands, Port of Brisbane, Queensland



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 DP World 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 (2007b), Port of Brisbane (2007).

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

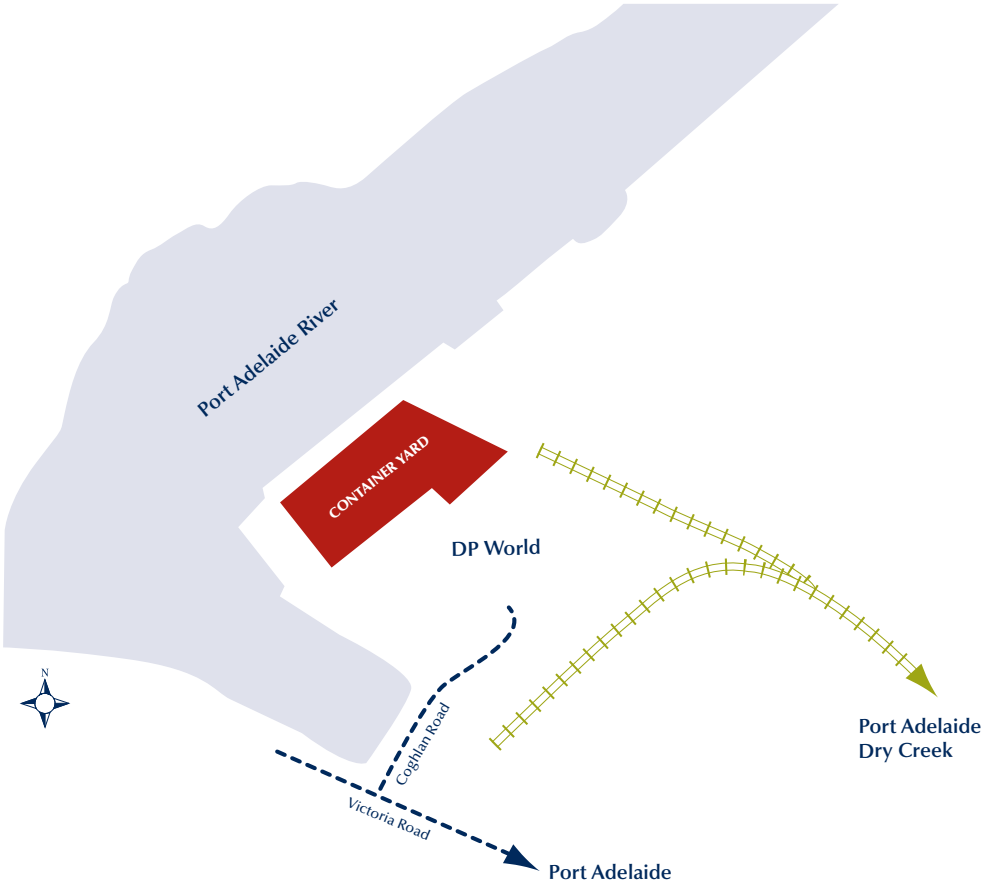


Patrick and DP World container terminals, Brotherson Dock, Port Botany, Sydney, New South Wales

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 8 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).

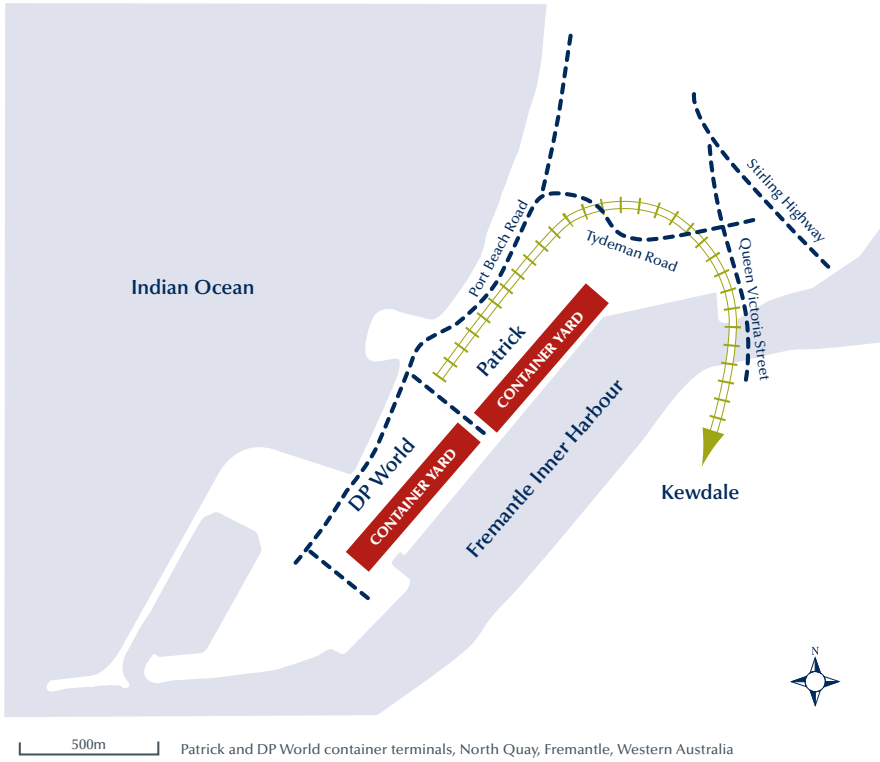
Figure A4 DP World terminal—Outer Harbour, Adelaide



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 guage (broad and standard guage) 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



Patrick and DP World container terminals, North Quay, Fremantle, Western Australia

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 guage providing access for narrow guage 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).

Appendix B Explanatory notes about terms in *Waterline*

Introduction

Waterline was started to provide a vehicle for publishing 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 wharf side 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 15 000–45 000 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
- Twenty foot equivalent units (TEU)— 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 TEU. By definition for any given period TEU handled are more than containers handled.

Landside of the port terminal definitions as used in Chapter 1

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

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 stevedores. 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 TEU. '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.

TEU handled

The total 40-foot containers lifted on/off fully cellular ships multiplied by 2, plus the total 20-foot containers lifted on/off fully cellular ships.

40 foot containers (per cent)

This is the number of 40 foot containers as a percentage of total containers handled. The higher this indicator is, the larger the degree to which productivity measured as TEU per hour, overstates the actual productivity. With TEU per hour used as the measure one container lift becomes two lifts. This is why the table which tabulates containers in TEU 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 40-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-dimensional containers requiring additional (rigid) spreader
- spreader changes
- waiting for export cargo
- defective ship's gear (e.g. jammed twist-locks, broken cell guides, ballast pumps unable to maintain list/trim, 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, e.g. 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 TEU handled divided by the elapsed labour time.

Throughput pbm (tonnes per berth metre squared)

This is the quantity of container and non-container cargo which passes through the port container terminals and is measured in tonnes per berth metre squared. It is a measure of the density of the storage system and reflects the ability of the terminal container storage area to transfer containers from ship to shore and vice versa.

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 (e) road transport costs. The construction of the Port Interface Cost Index is a four stage task:

Appendix B: Explanatory notes about terms in *Waterline,* 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.

TEU: This is an industry standard measure of shipping containers.

TEU are twenty foot equivalent units
TEU loaded means containers loaded with goods
TEU empty means empty containers
TEU loaded inwards means imported
TEU 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 (TEU 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
TEU	Twenty-foot equivalent units
TTT	Truck turnaround time
UCC	Unitized Cellular Container vessel
VBS	Vehicle Booking System

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