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Foreword

Waterline is a bi–annual journal which reports on trends in container handling productivity on the waterfront in Australia as well as the cost of importing and exporting containers. It covers both the unloading of container ships and the transport of containers from container terminals. This *Waterline* provides the latest data available on stevedoring productivity and landside performance. Some of the data series used for this publication are available as spreadsheets on the BITRE website www.bitre.gov.au. The journal is published by Bureau of Infrastructure, Transport and Regional Economics (BITRE) and provides information on freight movements on both the wharf side and the landside of five Australian major city port terminals: Brisbane, Sydney, Melbourne, Adelaide and Fremantle. This *Waterline* covers port terminal activity up to December quarter 2007.

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

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- pilot, tug and mooring operators
- stevedoring companies: Patrick and DP World; and
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Download this issue of *Waterline* and back issues, including selected time series data in Excel spreadsheet format, from www.bitre.gov.au.

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August 2008

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In brief

Landside of port terminal

- The five port total of containers moved increased from 779 202 in the September quarter 2007 to 842 726 in the December quarter 2007, an increase of 8.2 per cent (Chapter 1).
- The five port average container turnaround time was 27.3 minutes in the September quarter 2007 and 27.5 minutes in the December quarter 2007 (Chapter 1).
- The five port total of trucks processed increased from 469 111 in the September quarter 2007 to 497 247 in the December quarter 2007, an increase of 3.7 per cent (Chapter 1).
- The five port average truck turnaround time was 38.7 minutes in the September quarter 2007 and 40.7 minutes in the December quarter 2007 (Chapter 1).
- The five port total of vehicle booking system slots used increased from 544 187 in the September quarter 2007 to 580 395 in the December quarter 2007 (Chapter 1).

Wharfside of port terminal

- The five–port average crane rate increased from 26.5 containers per hour in the September quarter 2007 to 27.2 containers per hour in the December quarter 2007 (Chapter 2).
- The five–port average vessel working rate has increased over the period from 37.7 containers per hour in the September quarter 2007 to 38.4 in the December quarter 2007 (Chapter 2).
- The five port total of container moves increased from 950 996 in the September quarter 2007 to 1 027 779 in the December quarter 2007 (Chapter 2).
- The national port interface cost index for exporting a container was $591/teu in 2001 constant prices for January–June 2007 and $592/teu in July–December 2007 (Chapter 3).
- Total ship visits increased by 2.1 per cent for the year ended 31 December 2007 (Chapter 4).
- In July–December 2007, total cargo throughput was 62.6 million tonnes and total container traffic 2.971 million twenty foot equivalent units (Chapter 5).
- The tonnage of cargo estimated to be moved under coastal permits increased from 15.0 million tonnes in 2006 to 15.3 million tonnes in 2007 (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 (TEUs) processed in a quarter. They also include the number of containers loaded on or unloaded from rail in a quarter.

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

This chapter also discusses three Vehicle Booking System indicators. They are the number of VBS slots available, the number of VBS slots used and 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 March quarter 2007 to December quarter 2007 landside of port terminal performance indicators at the five major Australian container ports. Figure 1.1 presents the landside task indicators for the March to December quarters of 2007.

In summary:

- the five port average container turnaround time was 27.3 minutes in the September quarter 2007 and 27.5 minutes in the December quarter 2007
- the five port average truck turnaround time was 38.7 minutes in the September quarter 2007 and 40.7 minutes in the December quarter 2007
- the five port average of containers per truck was 1.6 in both the September quarter 2007 and the December quarter 2007
- the five port total of trucks increased from 469 111 in the September quarter 2007 to 497 247 in the December quarter 2007, an increase of 6.0 per cent

- the five port total of containers moved increased from 779 202 in the September quarter 2007 to 842 726 in the December quarter 2007, an increase of 8.2 per cent
- the five port total of TEUs moved increased from 1 124 964 in the September quarter 2007 to 1 230 910 in the December quarter 2007, an increase of 9.4 per cent
- the five port total of VBS slots used increased from 544 187 in the September quarter 2007 to 580 395 in the December quarter 2007 and the five port adjusted usage rates of VBS slots in the September and December 2007 quarters were
  - Monday to Friday Night shift 19.4 and 22.8 per cent
  - Monday to Friday Day shift 93.0 and 93.2 per cent
  - Monday to Friday Evening shift 29.8 and 33.2 per cent
  - Saturday 5.5 and 7.6 per cent
  - Sunday 2.2 and 3.1 per cent

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

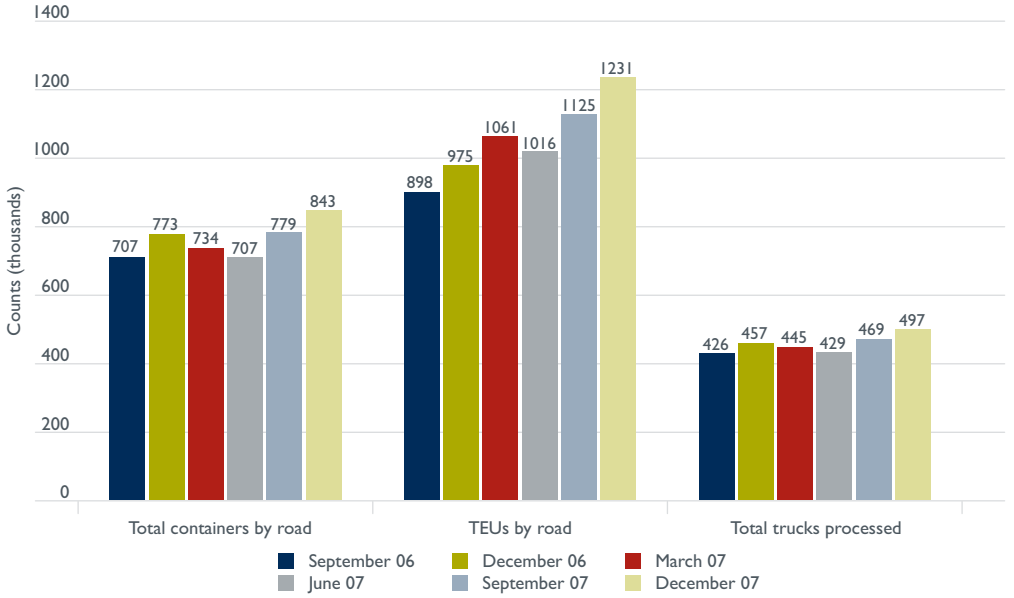
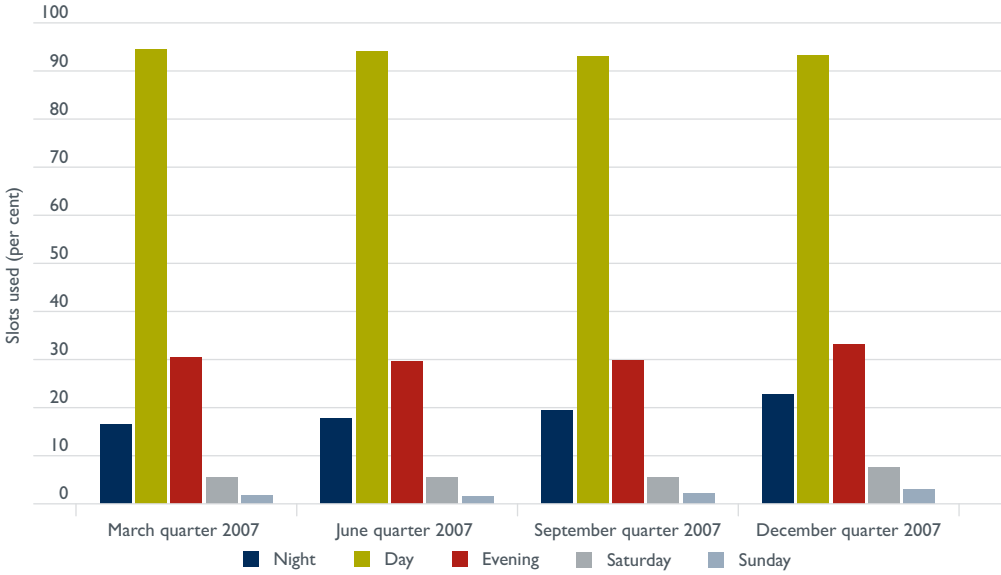


Figure 1.2 Five ports: adjusted vehicle booking system usage 2007



Individual ports

The rest of the chapter presents the landside task indicators for Brisbane, Sydney, Melbourne, Adelaide and Fremantle respectively. The landside of port terminal infrastructure arrangements for each of these ports is unique to each port. Thus, any comparison of performance indicators between ports would be misleading. The data for Brisbane, Sydney, Melbourne and Fremantle use, where appropriate, weighted averages for the container terminals operated by DP World and Patrick. The Adelaide data are for the DP World container terminal.

Brisbane

The Brisbane (DP World, Patrick) average container turnaround time increased from 24.4 minutes in the September quarter 2007 to 27.0 minutes in the December quarter 2007. The truck turnaround time increased from 40.7 minutes in the September quarter 2007 to 45.4 minutes in the December quarter 2007. The total number of trucks increased by 3.0 per cent from the September to the December quarters 2007 and the total TEUs increased by 8.8 per cent over the same period. Total containers moved increased from the September to the December quarters by 5.7 per cent.

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

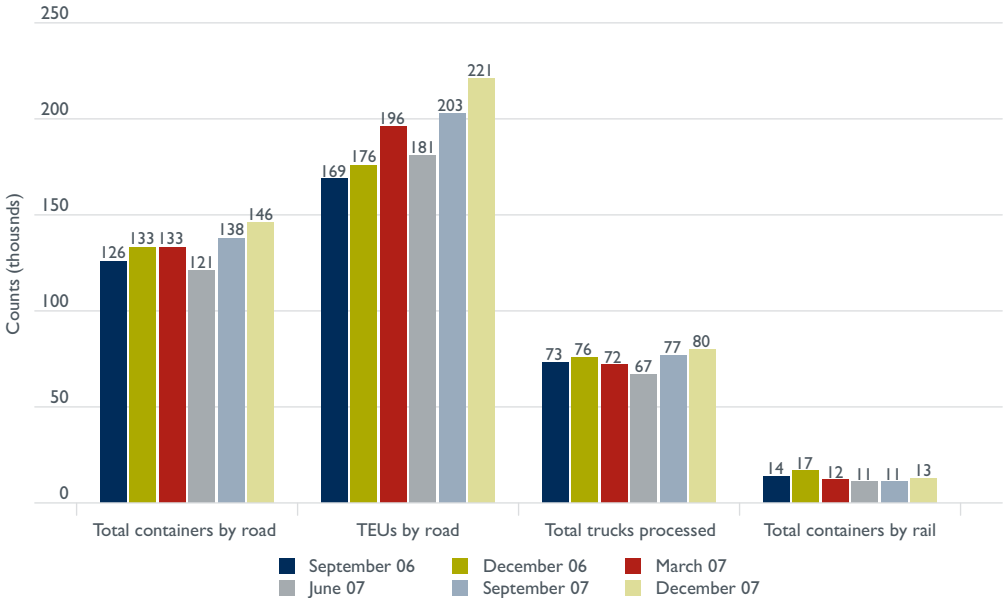
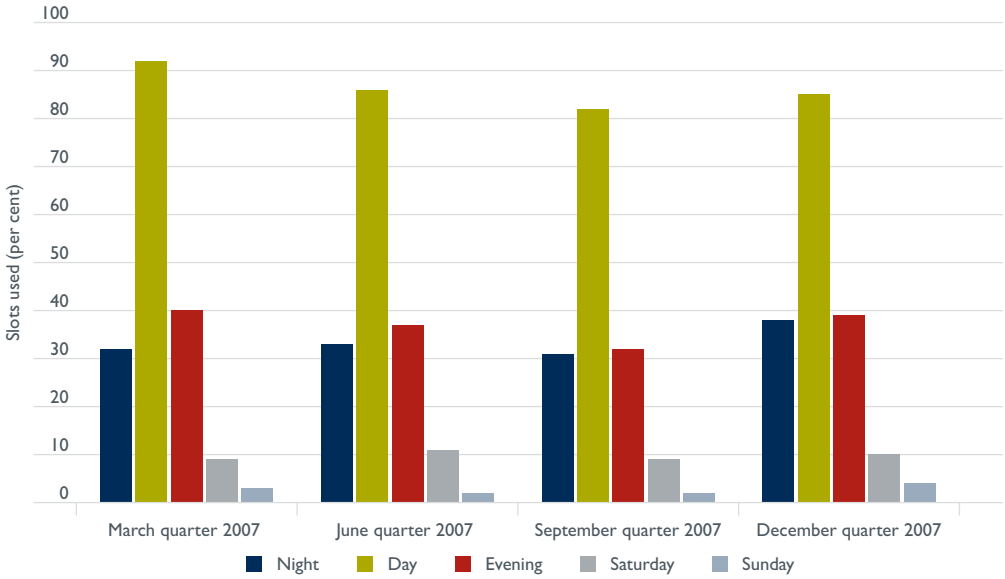


Figure 1.4 Brisbane: adjusted vehicle booking system usage 2007



Sydney

The Sydney (DP World, Patrick) average container turnaround time increased from 41.0 minutes in the September quarter 2007 to 42.8 minutes in the December quarter 2007. The truck turnaround time increased from 47.4 minutes in the September quarter 2007 to 49.4 minutes in the December quarter 2007. The number of trucks processed increased by 7.9 per cent from the September to the December quarters 2007 and the total TEUs increased by 9.4 per cent. Over the same period total containers moved increased by 7.7 per cent.

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

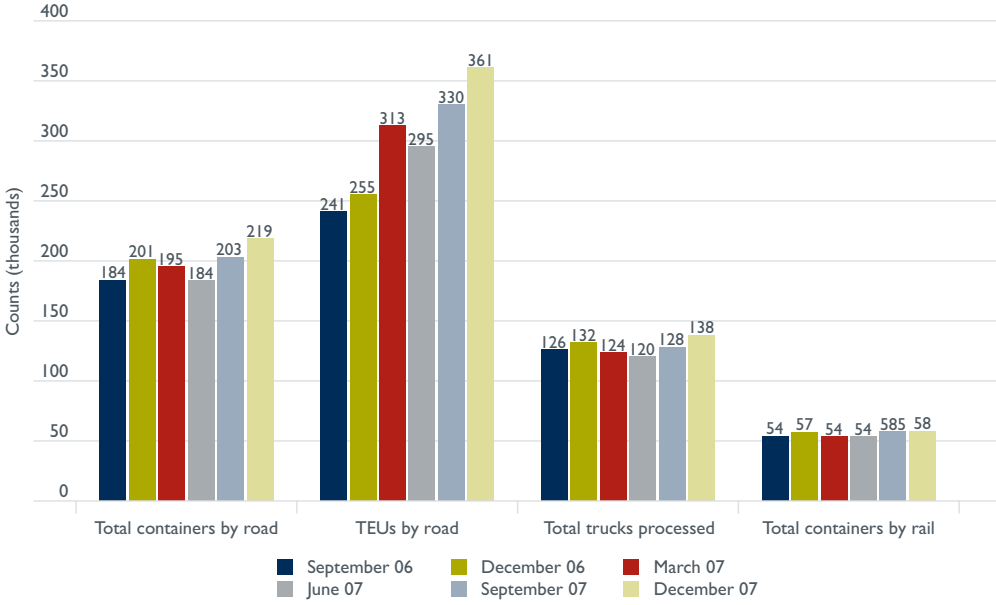
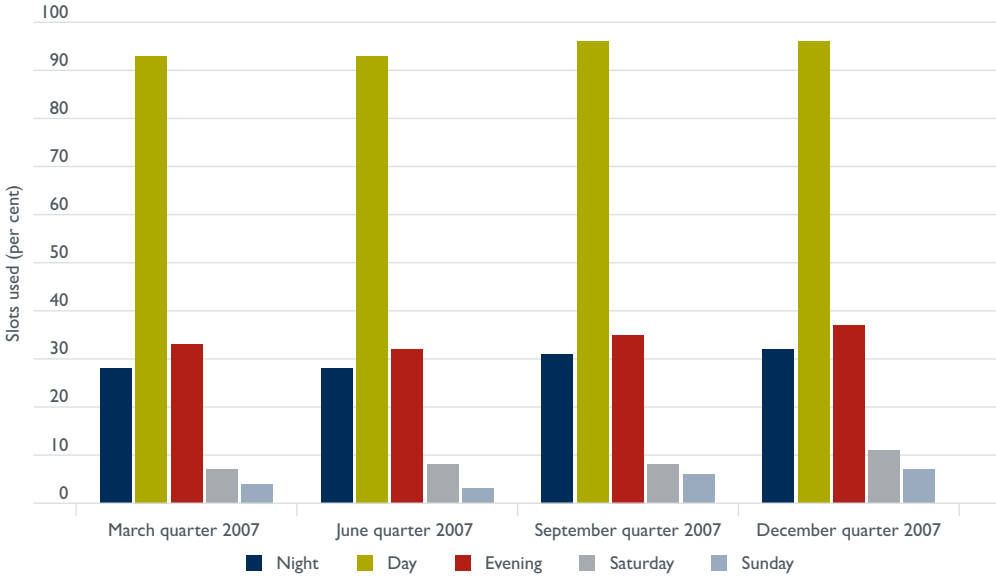


Figure 1.6 Sydney: adjusted vehicle booking system usage 2007



Melbourne

The Melbourne (DP World, Patrick) average container turnaround time decreased from 20.2 minutes in the September quarter 2007 to 19.8 minutes in the December quarter 2007. The truck turnaround time increased from 30.7 minutes for the September quarter to 31.4 minutes in the December quarter 2007. The number of trucks processed increased by 6.9 per cent from the September to the December quarters 2007 and the total TEUs increased by 9.5 per cent. Over the same period total containers moved also increased by 10.5 per cent.

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

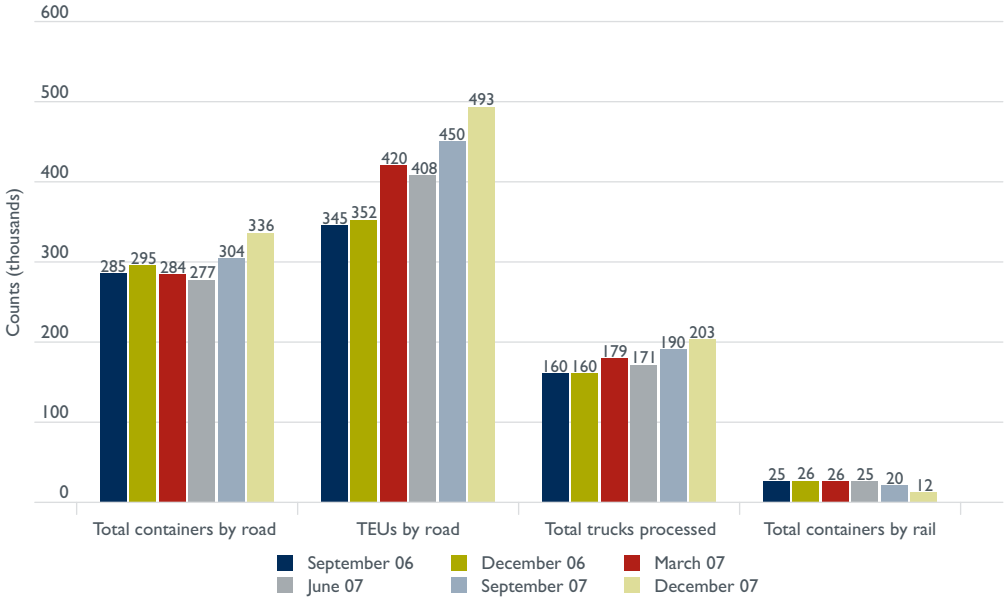
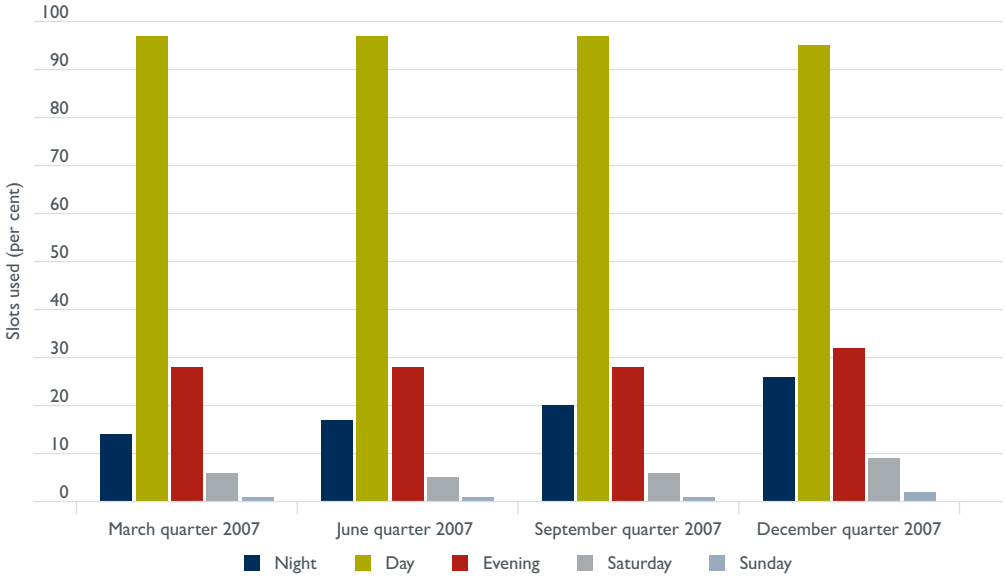


Figure 1.8 Melbourne: adjusted vehicle booking system usage 2007



Adelaide

The Adelaide (DP World) average container turnaround time decreased from 32.1 minutes in the September quarter 2007 to 26.3 minutes in the December quarter 2007. The truck turnaround time decreased from 50.2 minutes in the September quarter 2007 to 41.5 minutes in the December quarter 2007. The total number of trucks processed decreased by 0.5 per cent form the September to the quarters December 2007 and the total TEUs increased by 1.3 per cent. Over the same period total containers moved increased by 0.8 per cent.

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

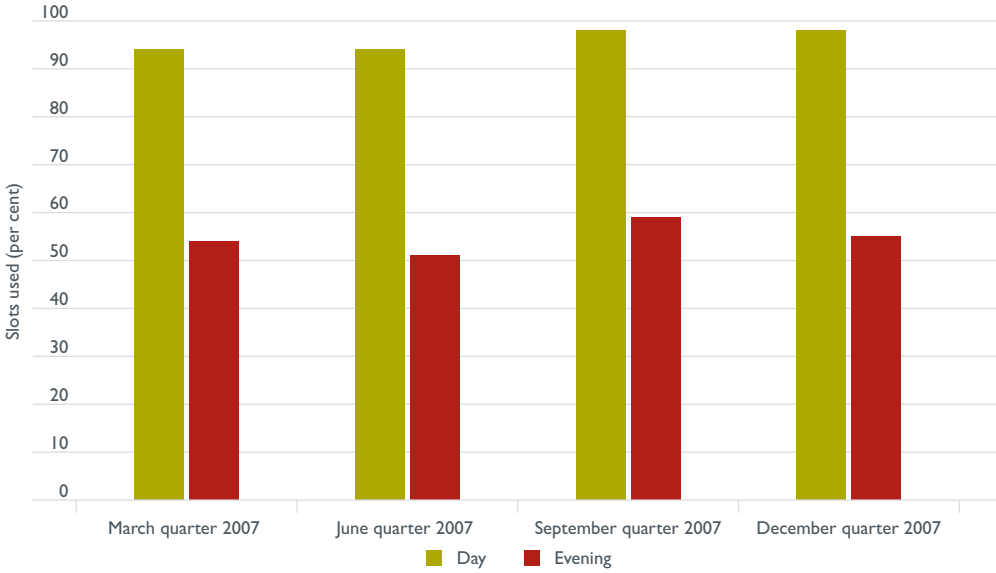
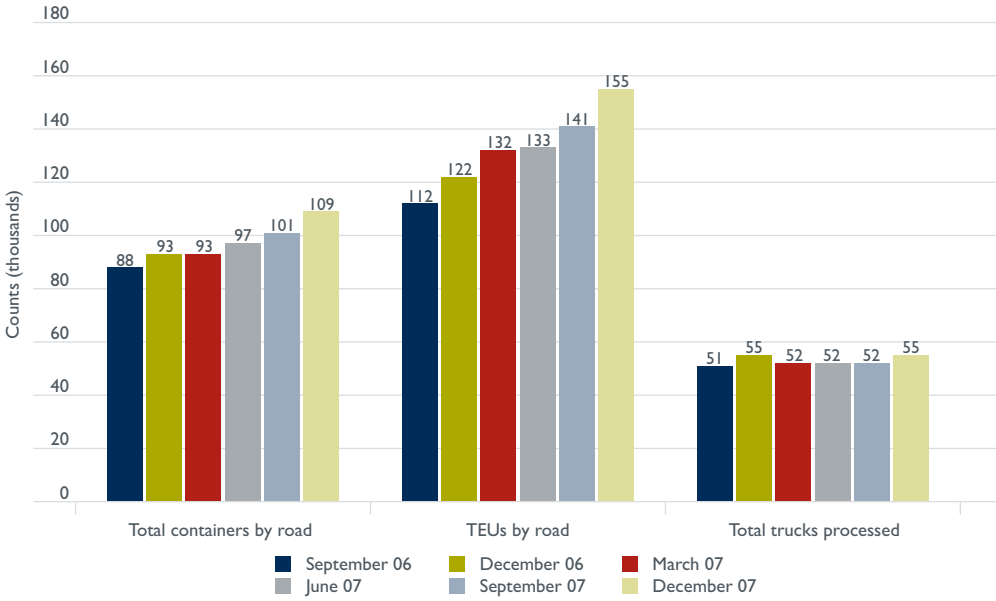


Figure 1.10 Adelaide: adjusted vehicle booking system usage 2007



Fremantle

The Fremantle (DP World, Patrick) average container turnaround time decreased from 19.7 minutes in the September quarter 2007 to 19.2 minutes in the December quarter 2007. The truck turnaround time increased from 33.8 minutes in the September quarter 2007 to 33.4 minutes in the December quarter 2007. The total number of trucks processed decreased by 5.5 per cent from the September to the December quarters 2007 and the total TEUs increased by 10.1 per cent. Over the same period total containers moved increased by 7.7 per cent.

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

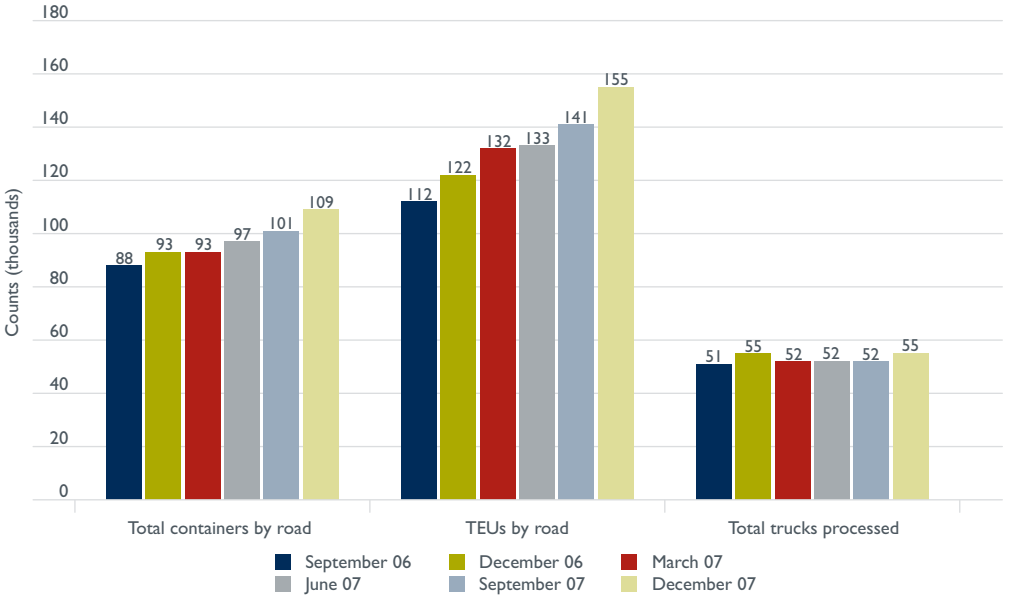
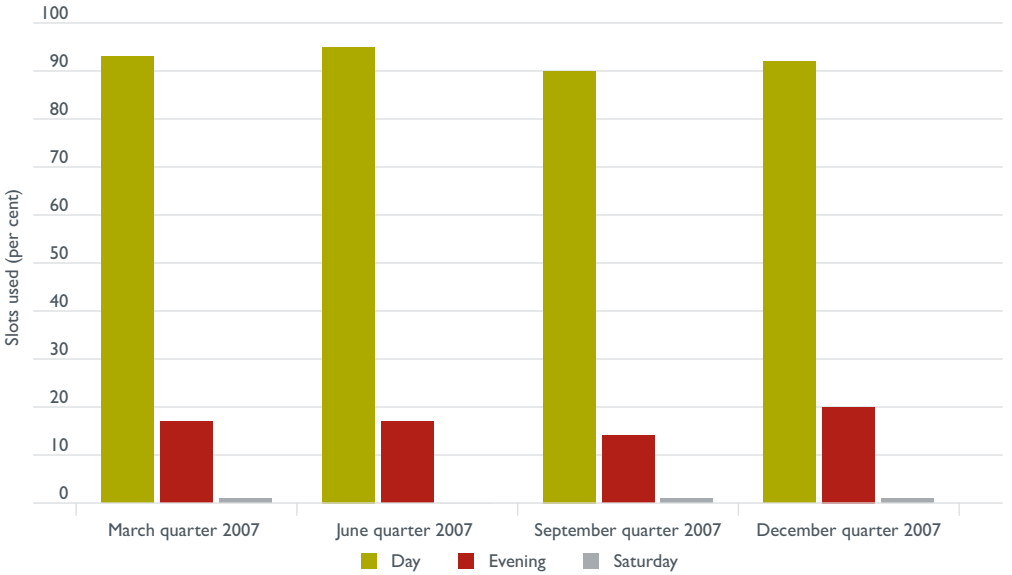


Figure 1.12 Fremantle: adjusted vehicle booking system usage 2007



Productivity of landside container movements

Figure 1.13 and 1.14 chart the movements in 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. These time ranges vary from quarter to quarter and from port to port. Between the September quarter 2006 and the December quarter 2007 there has been an increase in the time taken for truck and container turnaround.

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

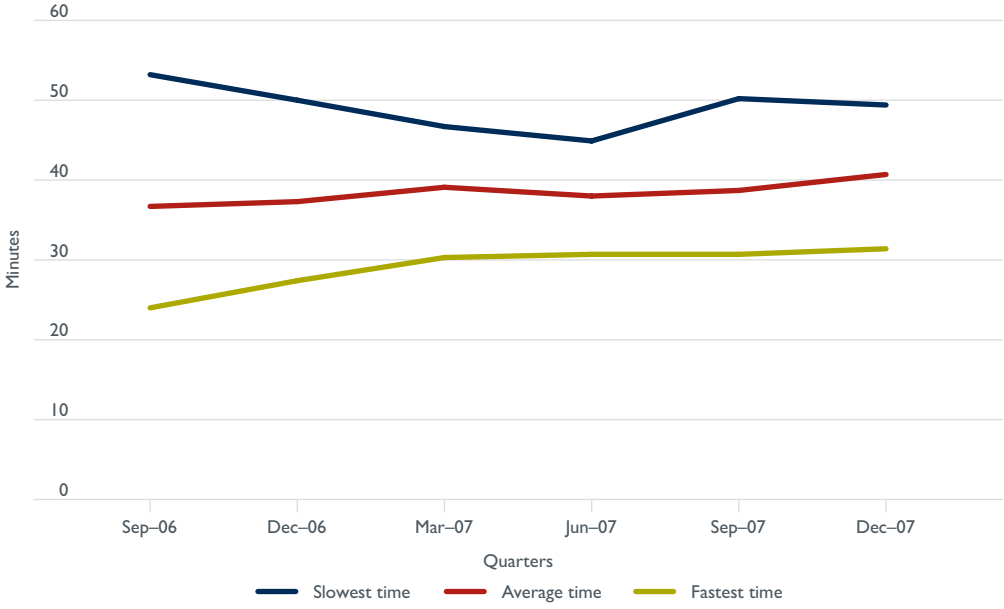


Figure 1.14 Productivity of container turnaround—five ports: fastest, average and slowest times achieved

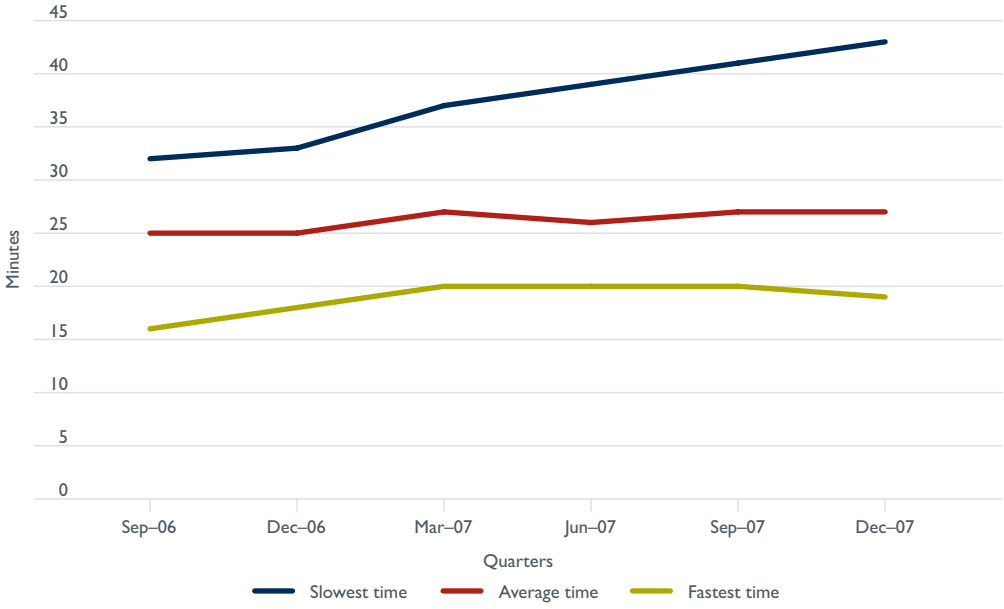


Table 1.1 Container terminal landside performance indicators

Port/Indicator	*Sep–06*	*Dec–06*	*Mar–07*	*Jun–07*	*Sep–07*	*Dec–07*
Five ports						
Road						
Total trucks	425 706	457 328	445 368	428 738	469 111	497 247
Total containers	707 089	773 293	733 640	707 166	779 202	842 726
Total TEUs	898 483	974 557	1 060 989	1 016 001	1 124 964	1 230 910
Truck turnaround time–mins.	36.7	37.3	39.1	38.0	38.7	40.7
Containers per truck	1.5	1.4	1.6	1.6	1.6	1.6
Avge. container turnaround time–mins.	24.5	24.9	27.3	25.9	27.3	27.5
TEUs per truck	2.1	2.1	2.3	2.3	2.3	2.4
Rail						
Total containers	na	na	na	na	na	na
Number of VBS timeslots available						
Overall total			573 853	592 074	656 031	669 563
Monday–Friday						
Day (0600–1800)			326 434	333 425	362 893	362 538
Evening (1800–2400)			130 546	134 787	143 572	148 692
Night (2400–0600)			71 247	78 357	89 319	96 565
Sub total			528 227	546 569	595 784	607 795
Saturday						
Day (0600–1800)			24 519	24 100	26 276	31 125
Evening (1800–2400)			3 251	3 149	3 058	3 313
Night (2400–0600)			5 532	6 216	9 671	8 156
Sub total			33 302	33 465	39 005	42 594
Sunday						
Day (0600–1800)			2 438	2 146	6 585	5 358
Evening (1800–2400)			2 863	2 641	6 459	4 253
Night (2400–0600)			7 023	7 253	8 198	9 563
Sub total			12 324	12 040	21 242	19 174
Number of VBS timeslots used						
Overall total			485 630	495 231	544 187	580 395
Monday–Friday						
Day (0600–1800)			308 126	313 340	337 500	338 231
Evening (1800–2400)			99 445	99 042	108 000	120 527
Night (2400–0600)			54 316	59 373	70 261	82 723
Sub total			461 887	471 755	515 761	541 481
Saturday						
Day (0600–1800)			13 869	13 478	14 349	20 741
Evening (1800–2400)			597	515	546	910
Night (2400–0600)			3 458	4 471	5 575	6 071
Sub total			17 924	18 464	20 470	27 722
Sunday						
Day (0600–1800)			610	169	1 120	2 365
Evening (1800–2400)			1 179	1 026	1 584	2 063
Night (2400–0600)			4 030	3 817	5 251	6 764
Sub total			5 819	5 012	7 955	11 192

continued

Table 1.1 Container terminal landside performance indicators (continued)

Port/Indicator	*Sep–06*	*Dec–06*	*Mar–07*	*Jun–07*	*Sep–07*	*Dec–07*
Brisbane						
Road						
Total trucks	72 660	75 976	71 784	67 376	77 427	79 713
Total containers	126 112	132 686	133 297	120 543	138 002	145 923
TEUs	168 695	175 761	196 312	180 501	203 081	220 937
Truck turnaround time–mins.[a]	53.2	50.0	46.7	42.7	40.7	45.4
Containers per truck	1.7	1.7	1.7	1.7	1.7	1.7
Avge. container turnaround time–mins.	32.2	30.7	28.1	25.1	24.4	27.0
TEUs per truck	2.3	2.3	2.4	2.5	2.4	2.5
Rail						
Total containers[b]	14 007	16 558	11 595	11 495	11 088	13 345
Number of VBS timeslots available						
Overall total			98 283	109 418	123 407	115 570
Monday–Friday						
Day (0600–1800)			44 006	48 309	56 763	53 328
Evening (1800–2400)			21 479	23 805	25 824	24 439
Night (2400–0600)			22 036	26 076	27 692	25 834
Sub total			87 521	98 190	110 279	103 601
Saturday						
Day (0600–1800)			5 241	5 814	5 755	5 548
Evening (1800–2400)			175	68	0	128
Night (2400–0600)			1 927	2 300	3 602	2 638
Sub total			7 343	8 182	9 357	8 314
Sunday						
Day (0600–1800)						
Evening (1800–2400)			638	10	600	0
Night (2400–0600)			2 781	3 036	3 167	3 655
Sub total			3 419	3 046	3 771	3 655
Number of VBS timeslots used						
Overall total			77 607	81 609	88 742	94 331
Monday–Friday						
Day (0600–1800)			40 621	41 345	46 301	45 490
Evening (1800–2400)			17 584	17 654	18 329	20 583
Night (2400–0600)			14 207	16 071	17 548	20 396
Sub total			72 412	75 070	82 178	86 470
Saturday						
Day (0600–1800)			3 115	3 554	3 327	3 959
Evening (1800–2400)			18	11	0	93
Night (2400–0600)			908	1 920	1 846	1 528
Sub total			4 041	5 485	5 173	5 580
Sunday						
Day (0600–1800)						
Evening (1800–2400)						
Night (2400–0600)			1 154	1 054	1 391	2 281
Sub total			1 154	1 054	1 391	2 281

continued

Table 1.1 Container terminal landside performance indicators (continued)

Port/Indicator	*Sep–06*	*Dec–06*	*Mar–07*	*Jun–07*	*Sep–07*	*Dec–07*
Sydney						
Road						
Total trucks	126 255	131 780	124 478	120 055	128 094	138 168
Total containers	184 136	200 725	194 814	184 120	203 034	218 692
TEUs	241 380	254 925	312 613	294 545	330 489	361 420
Truck turnaround time–mins.	40.0	43.4	42.8	44.9	47.4	49.4
Containers per truck	1.3	1.5	1.3	1.3	1.4	1.4
Avge. container turnaround time–mins.	30.4	32.9	37.1	39.1	41.0	42.8
TEUs per truck	1.9	1.9	2.1	2.1	2.2	2.3
Rail						
Total containers	54 219	56 789	54 174	53 612	58 081	58 361
Number of VBS timeslots available						
Overall total			168 936	169 013	186 692	183 396
Monday–Friday						
Day (0600–1800)			79 857	79 603	82 014	82 366
Evening (1800–2400)			37 848	37 779	41 586	40 861
Night (2400–0600)			28 399	28 559	30 486	30 628
Sub total			146 104	145 941	154 086	153 855
Saturday						
Day (0600–1800)			11 083	11 054	11 553	13 096
Evening (1800–2400)			2 382	2 340	2 086	2 209
Night (2400–0600)			2 555	2 758	4 323	3 167
Sub total			16 020	16 152	17 962	18 472
Sunday						
Day (0600–1800)			2 224	2 132	6 411	4 575
Evening (1800–2400)			1 756	2 035	5 211	3 144
Night (2400–0600)			2 832	2 753	3 022	3 350
Sub total			6 812	6 920	14 644	11 069
Number of VBS timeslots used						
Overall total			131 841	129 803	143 946	150 039
Monday– Friday						
Day (0600–1800)			73 871	73 667	78 629	78 780
Evening (1800–2400)			26 662	25 438	28 840	30 103
Night (2400–0600)			22 356	22 350	25 022	26 181
Sub total			122 889	121 455	132 491	135 064
Saturday						
Day (0600–1800)			4 196	4 168	4 789	6 423
Evening (1800–2400)			50	38	21	175
Night (2400–0600)			1 742	1 770	2 127	2 394
Sub total			5 988	5 976	6 937	8 992
Sunday						
Day (0600–1800)			440	155	1 104	2 121
Evening (1800–2400)			718	528	1 031	1 379
Night (2400–0600)			1 806	1 689	2 382	2 482
Sub total			2 964	2 372	4 517	5 982

continued

Table 1.1 Container terminal landside performance indicators (continued)

Port/Indicator	*Sep–06*	*Dec–06*	*Mar–07*	*Jun–07*	*Sep–07*	*Dec–07*
Melbourne						
Road						
Total trucks	159 808	160 035	179 376	170 839	190 132	203 152
Total containers	285 218	295 096	284 238	276 977	303 949	335 877
TEUs	345 254	351 972	419 669	407 763	450 216	493 111
Truck turnaround time–mins.	30.4	28.1	30.3	30.7	30.7	31.4
Containers per truck	1.5	1.8	1.6	1.6	1.6	1.6
Avge. container turnaround time–mins.	19.8	18.0	20.1	20.1	20.2	19.8
TEUs per truck	2.2	2.2	2.3	2.3	2.3	2.4
Rail						
Total containers[b]	24 625	25 866	25 500	25 165	19 983	12 010
Number of VBS timeslots available						
Overall total			192 107	200 146	225 245	248 191
Monday–Friday						
Day (0600–1800)			123 774	126 677	138 405	141 145
Evening (1800–2400)			36 871	38 860	42 583	49 041
Night (2400–0600)			20 812	23 722	31 129	39 943
Sub total			181 457	189 259	212 117	230 129
Saturday						
Day (0600–1800)			7 022	6 928	7 813	10 909
Evening (1800–2400)			692	741	742	861
Night (2400–0600)			1 050	1 158	1 746	2 351
Sub total			8 764	8 827	10 301	14 121
Sunday						
Day (0600–1800)			9	0	170	397
Evening (1800–2400)			467	596	648	994
Night (2400–0600)			1 410	1 464	2 009	2 550
Sub total			1 886	2 060	2 827	3 941
Number of VBS timeslots used						
Overall total			180 491	188 627	210 328	230 038
Monday–Friday						
Day (0600–1800)			119 859	123 488	133 582	133 917
Evening (1800–2400)			34 332	35 893	39 156	45 036
Night (2400–0600)			17 753	20 952	27 679	36 058
Sub total			171 944	180 333	200 417	215 011
Saturday						
Day (0600–1800)			5 681	5 475	5 763	9 559
Evening (1800–2400)			529	466	515	642
Night (2400–0600)			808	781	1 602	2 149
Sub total			7 018	6 722	7 880	12 350
Sunday						
Day (0600–1800)						
Evening (1800–2400)			459	498	553	684
Night (2400–0600)			1 070	1 074	1 478	1 993
Sub total			1 529	1 572	2 031	2 677

continued

Table 1.1 Container terminal landside performance indicators (continued)

Port/Indicator	*Sep–06*	*Dec–06*	*Mar–07*	*Jun–07*	*Sep–07*	*Dec–07*
Adelaide						
Road						
Total trucks	15 795	17 370	17 945	18 875	21 058	20 951
Total containers	23 219	25 756	27 799	28 968	32 850	33 103
TEUs	31 354	35 042	36 585	38 461	43 797	44 352
Truck turnaround time–mins.	31.5	34.1	39.2	35.3	50.2	41.5
Containers per truck	1.5	1.5	1.6	1.5	1.6	1.6
Avge. container turnaround time–mins.	21.4	23.0	25.3	23.0	32.1	26.3
TEUs per truck	2.0	2.0	2.0	2.0	0.0	0.0
Rail						
Total containers	na	na	na	na	na	na
Number of VBS timeslots available						
Overall total			33 429	34 362	36 727	36 960
Monday–Friday						
Day (0600–1800)			19 503	20 236	21 113	21 883
Evening (1800–2400)			13 926	14 126	15 614	15 077
Night (2400–0600)			0	0	0	0
Sub total			33 429	34 362	36 727	36 960
Number of VBS timeslots used						
Overall total			28 961	29 363	33 220	33 544
Monday–Friday						
Day (0600–1800)			18 411	19 054	20 699	21 454
Evening (1800–2400)			10 550	10 309	12 521	12 090
Night (2400–0600)			0	0	0	0
Sub total			28 961	29 363	33 220	33 544
Fremantle						
Road						
Total trucks	51 188	54 797	51 785	51 593	52 400	55 263
Total containers	88 404	93 274	93 492	96 558	101 367	109 131
TEUs	111 800	121 815	132 395	133 192	141 178	155 442
Truck turnaround time–mins.	24.0	27.4	33.6	32.3	33.8	33.4
Containers per truck	1.5	1.7	1.7	1.7	1.7	1.7
Avge. container turnaround time–mins.	15.7	17.6	20.3	19.0	19.7	19.2
TEUs per truck	2.2	2.2	2.3	2.4	2.4	2.5
Rail						
Total containers	na	na	na	na	na	na
Number of VBS timeslots available						
Overall total			81 098	79 135	83 960	85 446
Monday–Friday						
Day (0600–1800)			59 294	58 600	64 598	63 816
Evening (1800–2400)			20 422	20 217	17 965	19 274
Night (2400–0600)			0	0	12	160
Sub total			79 716	78 817	82 575	83 250
Saturday						
Day (0600–1800)			1 173	304	1 155	1 572
Evening (1800–2400)			2	0	230	115
Night (2400–0600)			0	0	0	0
Sub total			1175	304	1385	1687

continued

Table 1.1 Container terminal landside performance indicators (continued)

Port/Indicator	*Sep–06*	*Dec–06*	*Mar–07*	*Jun–07*	*Sep–07*	*Dec–07*
Sunday						
Day (0600–1800)			205	14	0	386
Evening (1800–2400)			2	0	0	115
Night (2400–0600)			0	0	0	8
Sub total			207	14	0	509
Number of VBS timeslots used						
Overall total			66 730	65 829	67 913	72 111
Monday–Friday						
Day (0600–1800)			55 364	55 786	58 290	58 589
Evening (1800–2400)			10 317	9 748	9 153	12 714
Night (2400–0600)			0	0	0	0
Sub total			65 681	65 534	67 443	71 303
Saturday						
Day (0600–1800)			877	281	470	800
Evening (1800–2400)			0	0	0	0
Night (2400–0600)			0	0	0	0
Sub total			877	281	470	800
Sunday						
Day (0600–1800)			170	14	0	8
Evening (1800–2400)			2	0	0	0
Night (2400–0600)			0	0	0	0
Sub total			172	14	0	8

na not available

VBS stands for vehicle booking system.

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

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

Note:
1. The figures for total containers, total trucks, containers per truck, TEUs and TEUs per truck contain bulk runs.
2. Day, evening and night time slots have been standardised for comparative purposes. Start and cut–off times for shifts differ between stevedoring companies and between ports. represent overall practice.
3. Stevedoring companies count containers moved by rail only when they are hauled to an 'on dock' rail siding. They do not count containers moved by rail to a 'near dock' rail siding.

   "On dock" refers to situations where the rail siding is on dock in a port terminal.

   Near dock' rail sidings are in the neighbourhood of the port terminal but not on the dock.

   The rail sidings in Brisbane, Fremantle, Adelaide and DP World, Melbourne are near dock.

   The only complete rail figures are for the Sydney, Port Botany Container Terminal which has an on–dock rail siding..
4. The concepts used in compiling these indicators are defined in the explanatory notes.
5. All terminals are open Monday–Friday. Only Adelaide is not open on Saturday or Sunday.

Sources: Patrick 2008a, DP World 2008.

Chapter 2 Stevedoring productivity

Stevedoring productivity in this chapter refers to the productivity of 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 essentially the number of containers a dockside crane operator lifts on or off a container ship in an hour. The vessel working rate is a measure of the productivity of the stevedorers who are involved on board a container ship in the process of loading and unloading containers. The ship rate is rate at which a ship is unloaded and is the crane rate multiplied by crane intensity. 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 26.5 containers per hour in the September quarter 2007 (1.9 per cent lower than the September quarter 2006 rate of 27.0). In the December quarter 2007, the crane rate increased to 27.2 containers per hour (1.7 per cent higher than the December quarter 2006 rate of 26.8).

Table 2.1 presents the June quarter 2006 to December quarter 2007 indicators of stevedoring productivity at the five major Australian container ports, expressed in container moves per hour. Figures 2.1 to 2.6 present these data over the June quarter 1996 to December quarter 2007 period. The data are weighted averages of responses from stevedores operating at the respective container terminals.

In summary:

- the five–port average crane rate (average productivity per crane while the ship is worked) was 27.0 in the March quarter 2007, 27.2 in the June quarter 2007, 26.5 in the September quarter 2007, and 27.2 containers per hour for the December quarter 2007
- the five port total of container moves increased from 950 996 in the September quarter 2007 to 1 027 779 moves in the December quarter 2007. The data for the December quarter 2007 is up 11.3 per cent on the December quarter 2006 figure
- the five–port average vessel working rate (productivity per ship based on the time labour is aboard the ship) was 36.7 in the March quarter 2007, 37.4 in the June quarter 2007, 37.7 in the September quarter 2007, and 38.4 containers per hour in the December quarter 2007. The December quarter 2007 rate was 6.4 per cent greater than the December quarter 2006 rate.

The Brisbane average crane rate was 23.0 in both the June quarter 2007 and the September quarter 2007, and increased to 24.5 containers per hour in the December quarter 2007. The vessel working rate changed from 26.2 containers per hour in the June quarter 2007 to 26.3 in the September quarter 2007, and then to 30.1 in the December quarter 2007.

The Sydney average crane rate decreased from 26.9 in the June quarter 2007 to 24.9 in the September quarter 2007, and increased again to 25.8 containers per hour in the December quarter 2007. The vessel working rate changed from 36.1 containers per hour in the June quarter 2007 to 36.4 in the September quarter 2007, and then to 37.6 in the December quarter 2007.

The Melbourne average crane rate decreased from 28.5 in the June quarter 2007 to 28.6 in the September quarter 2007, and increased again to 29.3 containers per hour in the December quarter 2007. The vessel working rate changed from 44.8 containers per hour in the June quarter 2007 to 46.0 in the September quarter 2007, and then to 45.6 in the December quarter 2007.

The Adelaide average crane rate decreased from 30.0 in the June quarter 2007 to 29.8 in the September quarter 2007 and to 29.7 containers per hour in the December quarter 2007. The vessel working rate changed from 33.9 containers per hour in the June quarter 2007 to 35.5 in the September quarter 2007, and then to 29.8 in the December quarter 2007.

The Fremantle average crane rate decreased from 29.0 in the June quarter 2007 to 28.4 in the September quarter 2007, and to 28.0 containers per hour in the December quarter 2007. The vessel working rate changed from 35.3 containers per hour in the June quarter 2007 to 33.8 in the September quarter 2007, and then to 34.9 in the December quarter 2007.

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 1995 and the December quarter 2007. Figure 2.7 indicates that the fastest crane rate was achieved in September 2006. The average crane rate has changed very little since September 2003. Figure 2.8 continues to show an upward trend in the fastest and average ship rate.

TEUs per hour

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

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

Port/Indicator	*Jun–06*	*Sep–06*	*Dec–06*	*Mar–07*	*Jun–07*	*Sep–07*	*Dec–07*
Five ports							
Ships handled	1 075	1 117	1 094	1 075	1 110	1 154	1 138
Total containers	795 252	864 475	923 755	880 552	874 269	950 996	1 027 779
Crane rate	27.0	27.0	26.8	27.0	27.2	26.5	27.2
Vessel working rate	35.3	35.2	36.1	36.7	37.4	37.7	38.4
Crane time not worked (per cent)	22	23	23	22	21	20	20
40–foot containers (per cent)	41	42	44	42	41	43	44
Ship rate	45.2	46.0	46.8	47.3	47.1	47.2	48.0
Throughput pbm	111	121	129	123	123	133	144
Brisbane							
Ships handled	257	280	271	270	262	267	254
Total containers	129 537	149 996	157 725	153 481	146 916	164 803	177 766
Crane rate	24.0	23.6	23.0	22.8	23.1	23.0	24.5
Vessel working rate	27.0	25.9	25.1	26.7	26.2	26.3	30.1
Crane time not worked (per cent)	24	29	31	27	28	22	21
40–foot containers (per cent)	42	39	43	42	41	43	46
Stevedoring variability (per cent)	50	59	52	63	52	49	47
Ship rate	35.6	36.5	36.5	36.7	36.6	33.7	37.9
Throughput pbm	81	93	98	96	91	103	111
Sydney							
Ships handled	307	318	322	305	317	338	342
Total containers	249 580	274 042	299 864	274 937	271 655	299 142	327 858
Crane rate	26.7	26.5	26.4	26.2	26.9	24.9	25.8
Vessel working rate	33.9	34.2	34.6	35.8	36.1	36.4	37.6
Crane time not worked (per cent)	25	26	24	24	24	21	22
40–foot containers (per cent)	44	46	47	45	44	46	47
Stevedoring variability (per cent)	54	50	55	55	48	47	43
Ship rate	45.0	46.3	45.7	46.9	47.6	46.1	48.5
Throughput pbm	129	141	154	142	140	154	169
Melbourne							
Ships handled	318	321	314	316	326	333	331
Total containers	297 877	314 900	330 896	320 426	315 181	334 640	361 085
Crane rate	28.2	28.3	28.1	28.7	28.5	28.6	29.3
Vessel working rate	40.5	41.2	43.5	43.2	44.8	46.0	45.6
Crane time not worked (per cent)	19	20	19	19	15	18	17
40–foot containers (per cent)	40	42	42	42	41	44	43
Stevedoring variability (per cent)	57	59	59	54	56	51	51
Ship rate	50.1	51.4	53.4	53.5	52.5	55.9	55.2
Throughput pbm	163	172	181	175	173	183	198

continued

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

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

na not available

pbm per berth metre

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

Sources: Patrick 2008b, DP World 2008.

Figure 2.1 Five ports: productivity in containers per hour

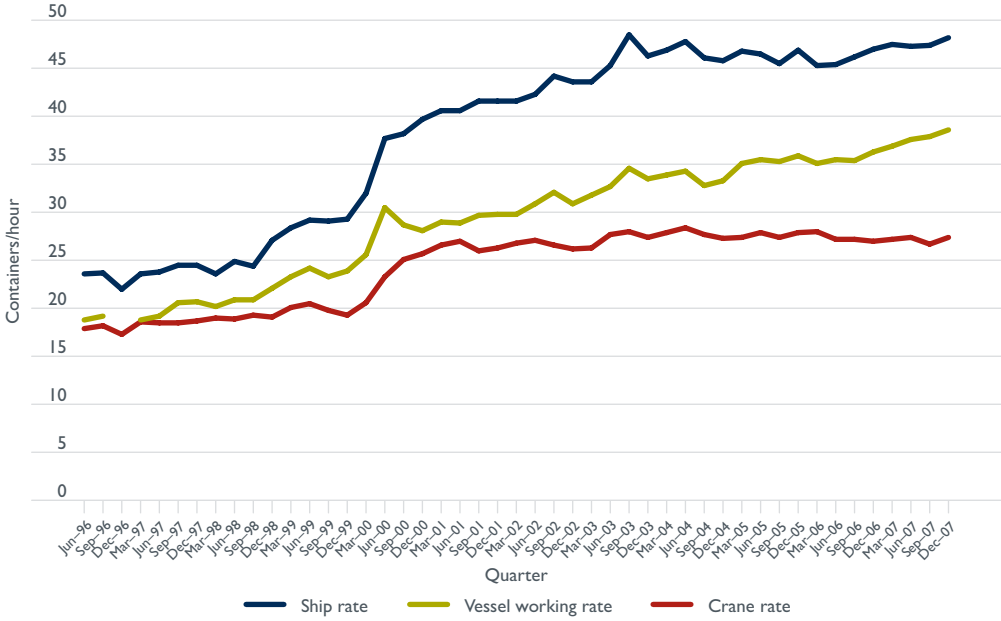


Figure 2.2 Brisbane: productivity in containers per hour

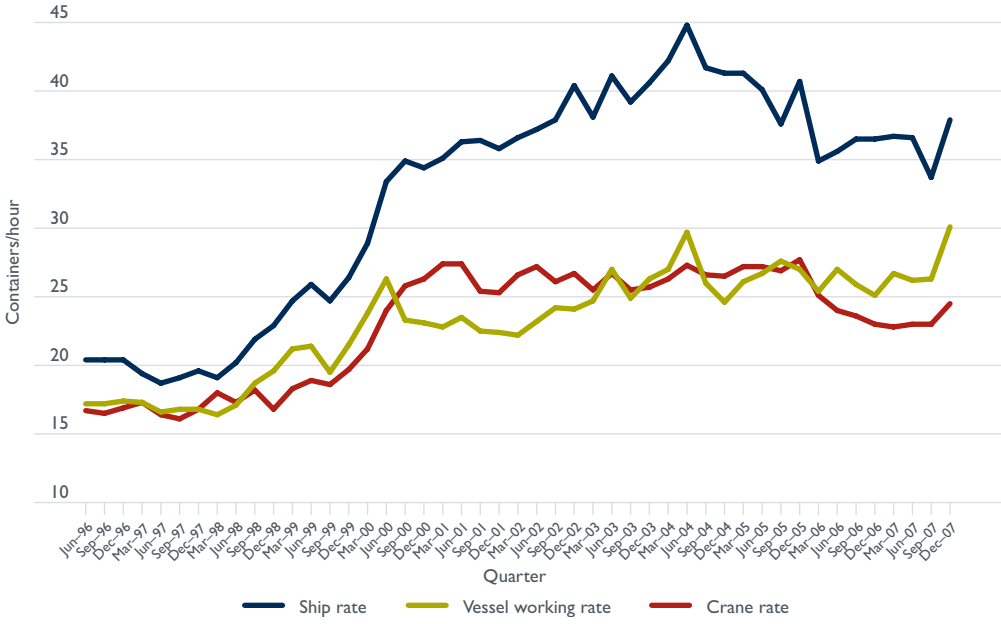


Figure 2.3 Sydney: productivity in containers per hour

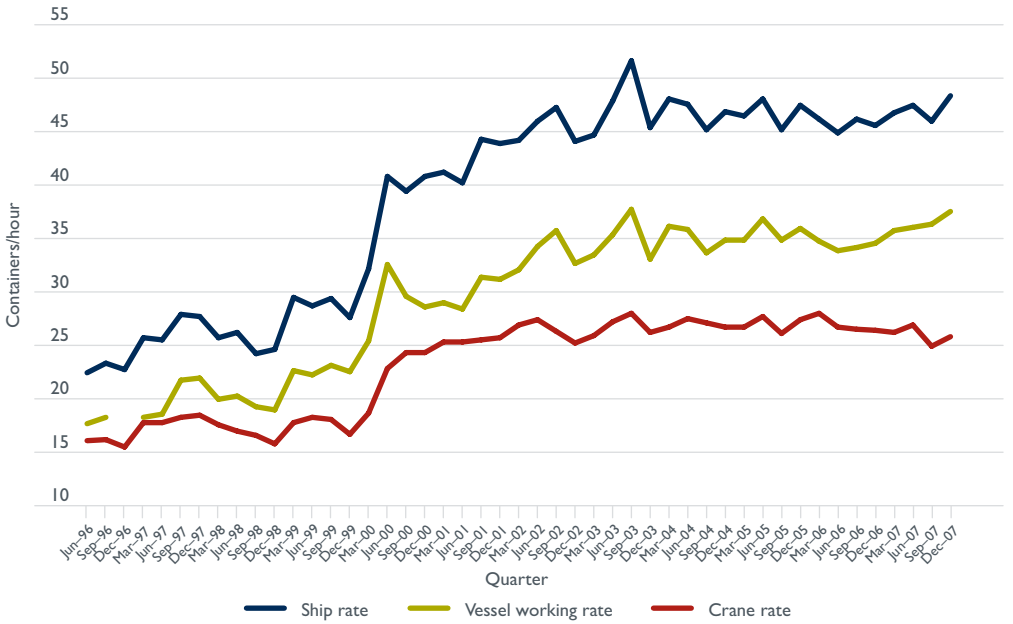


Figure 2.4 Melbourne: productivity in containers per hour

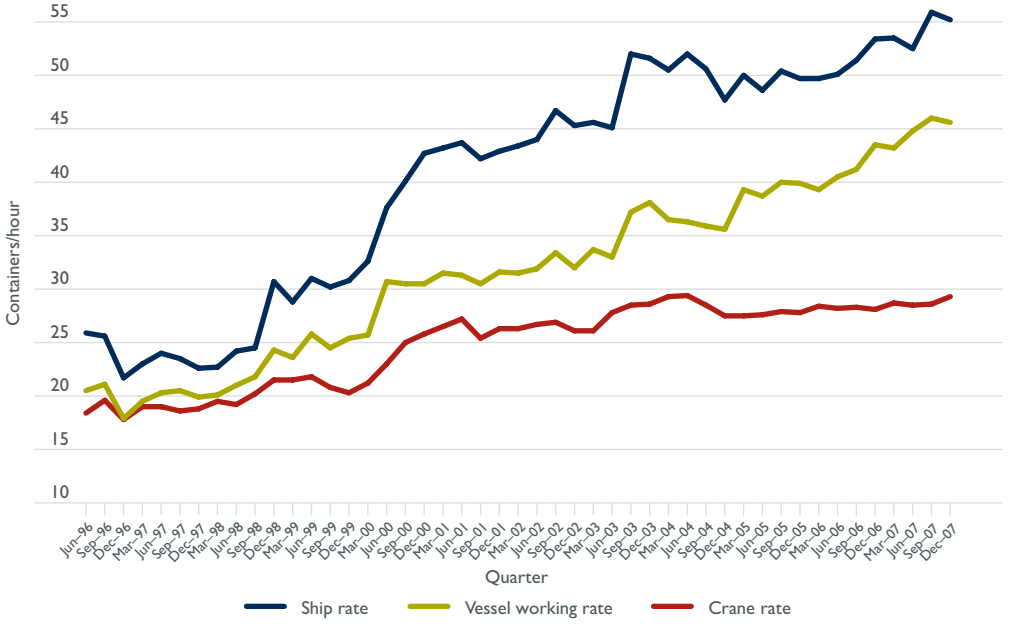


Figure 2.5 Adelaide: productivity in containers per hour[1]

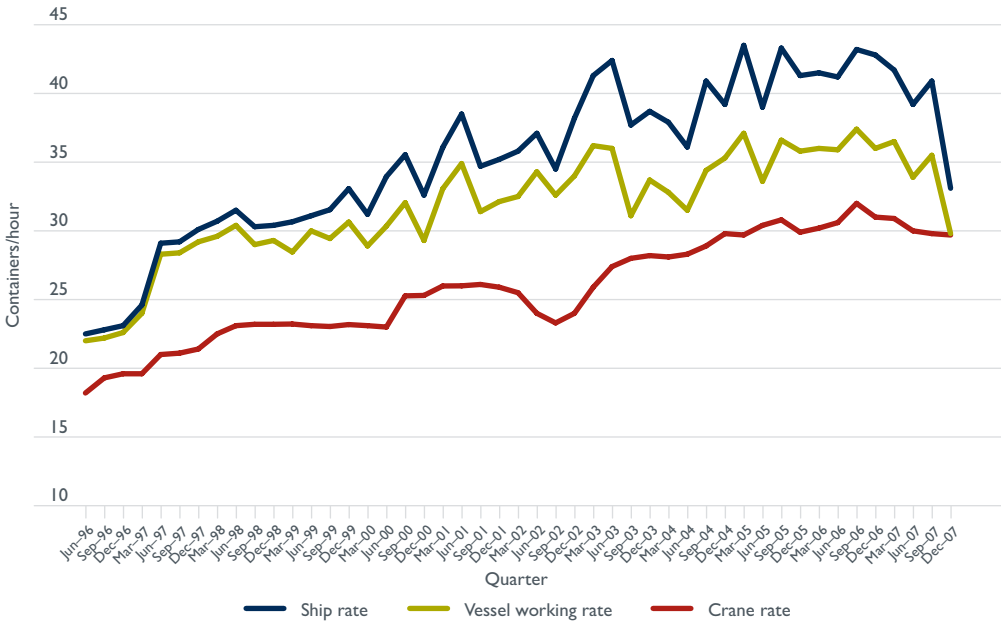
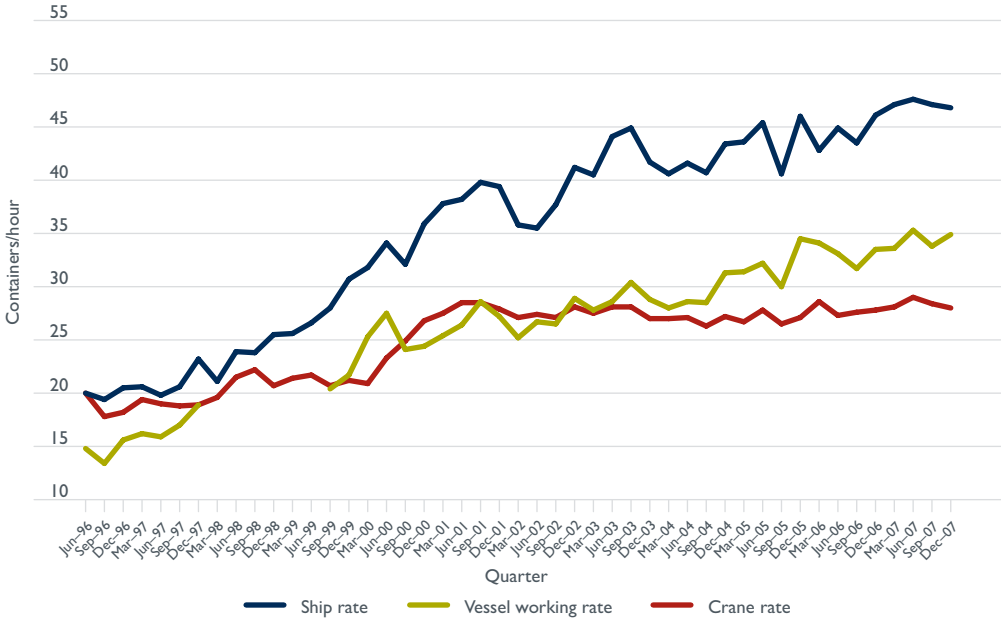


Figure 2.6 Fremantle: productivity in containers per hour



1. The drop in productivity shown in Figure 2.5 for the September and December quarters is on account of the need to unload and then reload containers on board ship in order to access the containers for discharge at Adelaide.

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

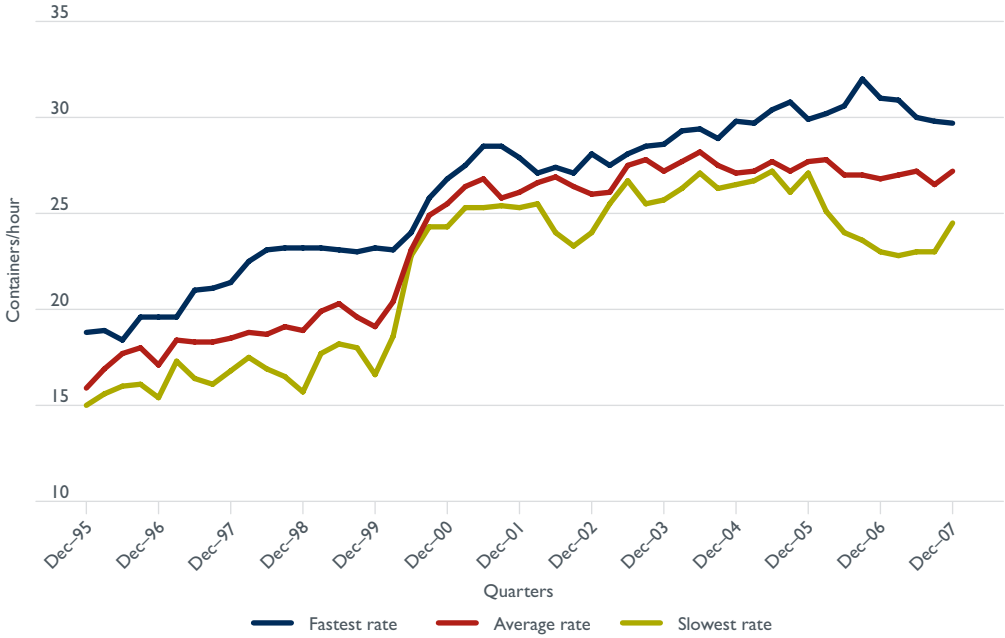


Figure 2.8 Productivity—five ports: fastest, average and slowest ship rates achieved

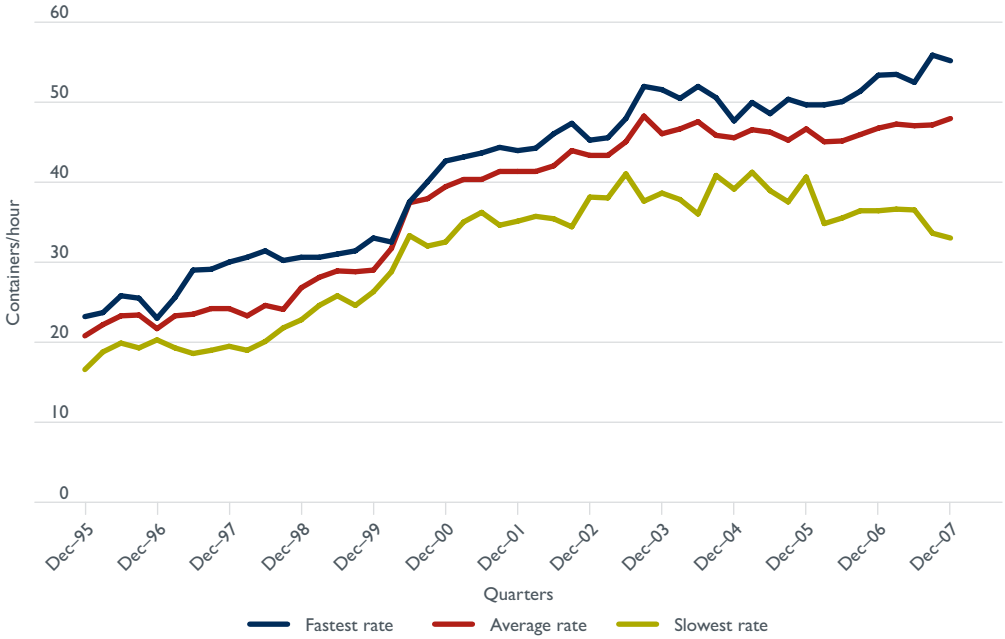


Table 2.2 Container terminal performance indicators: productivity in TEUs per hour

	Jun–06	*Sep–06*	*Dec–06*	*Mar–07*	*Jun–07*	*Sep–07*	*Dec–07*
Five Ports							
Ships handled	1 075	1 117	1 094	1 075	1 110	1 154	1 138
Total TEUs	1 120 123	1 229 340	1 329 707	1 253 983	1 234 276	1 363 144	1 479 205
Crane rate	38.0	38.4	38.5	38.3	38.4	37.9	39.1
Vessel working rate	49.6	50.1	51.9	52.3	52.9	54.1	55.3
Ship rate	63.7	65.6	67.4	67.4	66.6	67.6	69.2
Throughput pbm (TEUs per metre)	157.0	172.3	186.3	175.7	173.0	191.0	207.3
Brisbane							
Ships handled	257	280	271	270	262	267	254
Total TEUs	184 468	208 853	226 197	218 323	207 120	236 083	258 726
Crane rate	34.4	32.7	33.0	32.3	32.4	32.8	35.6
Vessel working rate	38.8	35.9	36.0	37.9	36.9	37.5	43.7
Ship rate	51.1	50.6	52.4	52.1	51.5	48.1	55.2
Throughput pbm (TEUs per metre)	114.8	130.0	140.8	135.9	128.9	146.9	161.0
Sydney							
Ships handled	307	318	322	305	317	338	342
Total TEUs	358 563	399 648	441 497	399 924	392 505	437 332	481 442
Crane rate	38.2	38.7	38.9	38.2	38.8	36.5	37.9
Vessel working rate	48.8	50.0	51.0	52.1	52.2	53.1	55.2
Ship rate	64.6	67.5	67.4	68.2	68.8	67.2	71.1
Throughput pbm (TEUs per metre)	184.6	205.8	227.3	205.9	202.1	225.2	247.9
Melbourne							
Ships handled	318	321	314	316	326	333	331
Total TEUs	415 981	445 767	470 823	455 538	445 563	482 599	516 425
Crane rate	39.3	40.1	40.0	40.8	40.2	41.0	41.9
Vessel working rate	56.5	58.4	61.9	61.5	63.4	66.2	65.2
Ship rate	70.0	72.8	76.1	76.1	74.2	80.1	78.9
Throughput pbm (TEUs per metre)	227.8	244.1	257.8	249.5	244.0	264.3	282.8
Adelaide							
Ships handled	67	68	65	67	74	86	82
Total TEUs	49 296	51 899	55 227	56 739	60 134	68 175	70 647
Crane rate	40.14	42.3	41.8	40.4	39.0	38.6	39.3
Vessel working rate	47.07	49.5	48.6	47.8	43.9	45.9	39.4
Ship rate	53.99	57.2	57.8	54.5	50.8	52.9	43.8
Throughput pbm (TEUs per metre)	104.9	110.4	117.5	120.7	127.9	145.1	150.3

continued

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

	Jun–06	*Sep–06*	*Dec–06*	*Mar–07*	*Jun–07*	*Sep–07*	*Dec–07*
Fremantle							
Ships handled	126	130	122	117	131	130	129
Total TEUs	111 815	123 173	135 963	123 459	128 954	138 955	151 965
Crane rate	37.6	39.4	40.0	39.2	39.9	39.6	39.5
Vessel working rate	45.9	45.2	48.3	47.0	48.4	47.2	49.4
Ship rate	62.2	62.0	66.6	65.9	65.3	65.7	66.2
Throughput pbm (TEUs per metre)	86.6	95.4	105.3	95.6	99.8	107.6	117.7

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 2008b, DP World 2008.

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 2007 and

July–December 2007 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 in current and constant (2001) prices in dollars per TEU. This is the final result and provides an estimate of how much it takes to import or export one TEU.

Port and related charges

Table 3.1 provides the parameters used to determine the port and related charges in Tables 3.2 and 3.3. These parameters relate to a representative port call by container ships using the Lloyd's ship classification unitized cellular container ship (UCC). For the 15 000 to 20 000 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 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 2007 and July–December 2007. Port and related charges comprise ship–based charges and cargo–based charges.

1. Based on numbers for Australian ports published by 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 2007, there were some significant changes in charges per TEU, mainly reflecting the variation in the average number of TEUs exchanged per ship call.

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

- Brisbane 24 per cent decrease
- Sydney slight decrease
- Melbourne 8 per cent increase
- Adelaide 17 per cent increase
- Fremantle 16 per cent decrease.

For ships in this range, compared to January–June 2007, the average number of TEUs exchanged increased by 32 per cent at Brisbane and by 20 per cent at Fremantle. They did not change at Sydney. The TEUs exchanged decreased by 6 per cent at Melbourne and by 16 per cent at Adelaide, compared to the January–June 2007 period.

Compared to the previous period, the overall changes in total ship–based charges per TEU in July–December 2007 for ships in the 35 000 to 40 000 GT range were:

- Brisbane 13 per cent decrease
- Sydney 9 per cent decrease
- Melbourne 2 per cent decrease
- Adelaide 4 per cent decrease
- Fremantle 3 per cent decrease.

In the 35 000 to 40 000 GT range, the average number of TEUs exchanged increased at all ports in July–December 2007 period when compared to the previous period. In Sydney they increased by 10 per cent and in Adelaide by 5 per cent and in Brisbane by 15 per cent. In Fremantle they increased by 4 per cent and Melbourne by 7 per cent.

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

Cargo–based charges

There have been increases in cargo–based charges in the 15 000–20 000 GT range and in the 35 000–40 000 GT range in Sydney, Melbourne, Adelaide and Fremantle in this period.

Compared to the previous period January–June 2007, the overall changes in total cargo–based charges per TEU in July–December 2007 for ships in the 15 000 to 20 000 and 35 000 to 40 000 GT range were:

- Brisbane no change
- Sydney 16 per cent increase
- Melbourne 4 per cent increase
- Adelaide 4 per cent increase
- Fremantle 4 per cent decrease.

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 2007). These charges are $173.27 per TEU.

Land–based charges per TEU

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

Customs brokers' fees for imports are higher than fees for exports, reflecting the more complex clearance procedures for import containers. During January–June 2007 the average customs brokers fee for imports increased by 26 per cent for Brisbane, 2 per cent for Adelaide and 12 per cent for Fremantle. It remained the same for Sydney and decreased by one per cent for Melbourne. For exports the average fee decreased by 14 per cent Brisbane. It remained the same for Sydney and increased by 12 per cent for Melbourne, 35 per cent for Adelaide and by 9 per cent for Fremantle.

Road transport charges decreased by 5 per cent at Brisbane and Adelaide and by 10 per cent for Melbourne. They increased by 14 per cent at Sydney and 6 per cent at Fremantle. One of the parameters used to estimate road transport charges is the time taken to move containers between the wharf and the customer's warehouse. Both distance and traffic congestion impact on this parameter and, therefore, help explain the significant difference between road transport charges at Melbourne and Sydney compared with Brisbane, Adelaide and Fremantle.

Indices for individual ports

Table 3.4 indicates that for ships in the 15 000 to 20 000 GT range, between January–June 2007 and July–December 2007, costs per TEU for import containers increased by one per cent at Brisbane, 10 per cent at Sydney and 6 percent at Fremantle. They decreased by 5 per cent at Melbourne one per cent at Adelaide. For exports they decreased by 6 per cent for Brisbane and 3 per cent for Melbourne. They increased by 8 per cent for Sydney, 4 per cent at Adelaide and 5 per cent for Fremantle.

Table 3.5 indicates that for ships in the 35 000 to 40 000 GT range, between January–June 2007 and July–December 2007 costs for import containers increased by one per

cent at Brisbane and decreased by 5 per cent at Melbourne and 2 per cent at Adelaide. They increased by 10 per cent at Sydney, one percent at Brisbane and 6 per cent at Fremantle. Export costs decreased by 5 per cent at Brisbane and by 4 per cent at Melbourne. They increased by 8 per cent at Sydney, 2 per cent at Adelaide and 5 per cent at Fremantle.

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

National index

Figure 3.1 provides the national 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 $772 per in January–June 2007 to $789 in July–December 2007 , and the index for exports increased from $733 per TEU to $740 per TEU.

In real terms (2001 prices), the national cost index per import increased from $629 per TEU to $638 per TEU and for exports from $596 to $598 per TEU.

Table 3.6 shows the national port interface cost index from January–June 2003 for ships in the 35 000 to 40 000 GT range. The national index for imports increased from $766 per TEU in January–June 2007 to $781 per TEU in July–December 2007 in current prices. The index for exports increased from $726 per TEU to $732 per TEU in current prices.

In real terms (2001 prices), the national cost index for imports increased from $623 per TEU to $631 per TEU and for exports from $591 to $592 per TEU.

Table 3.1 Parameters used in the port interface cost indices, 2007

	Brisbane		*Sydney*		*Melbourne*		*Adelaide*		*Fremantle*	
	Jan–Jun 2007	*Jul–Dec 2007*	*Jan–Jun 2007*	*Jul–Dec 2007*	*Jan–Jun 2007*	*Jul–Dec 2007*	*Jan–Jun 2007*	*Jul–Dec 2007*	*Jan–Jun 2007*	*Jul–Dec 2007*
Vessel size GT 17 215										
Average TEUs exchanged[a]										
All	580	765	884	885	860	810	776	650	1 506	1 813
Loaded	399	529	656	606	751	632	451	351	1 354	1 542
Empty	180	236	227	279	110	178	324	299	152	271
Loaded inwards	225	339	402	465	332	413	114	79	646	848
Loaded outwards	175	190	255	140	419	218	338	271	708	694
Ship call parameters[a]										
Number of port calls	5	1	4	3	3	3	2	2	7	9
Elapsed berth time (hrs)	23	25	26	30	23	20	42	38	12	41
Vessel size GT 37 394										
Average TEUs exchanged[b]										
All	1 080	1 246	2 025	2 234	1 972	2 113	889	931	1 255	1304
Loaded	709	848	1 386	1 569	1 483	1 603	694	710	870	825
Empty	372	398	639	665	489	510	194	221	386	479
Loaded inwards	425	565	989	1 178	573	1 038	259	266	439	417
Loaded outwards	284	283	397	392	910	565	436	444	431	409
Ship call parameters[b]										
Number of port calls	4	1	3	3	3	3	2	2	2	3
Elapsed berth time (hrs)	28	27	36	38	31	30	37	40	12	33

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

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

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

Table 3.2 Port and related charges for ships in the 15 000–20 000 GT range, 2007

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jan–Jun 2007	Jul–Dec 2007	Jan–Jun 2007	Jul–Dec 2007	Jan–Jun 2007	Jul–Dec 2007	Jan–Jun 2007	Jul–Dec 2007	Jan–Jun 2007	Jul–Dec 2007
Ship–based charges ($/TEU)										
Conservancy	4.78	3.74	–	–	–	–	3.40	3.55	–	–
Tonnage	–	–	8.36	8.35	6.06	6.59	9.25	10.63	1.94	1.62
Pilotage	12.14	9.20	3.75	3.75	8.53	9.35	5.67	6.90	1.60	1.43
Towagea	16.62	12.60	11.32	11.30	11.60	12.32	15.61	18.64	6.75	5.61
Mooring, unmooring	3.73	2.94	3.31	3.31	1.57	1.71	–	–	0.61	0.54
Berth hire[b]	–	–	–	–	–	–	–	–	–	–
Total[c]	37.27	28.48	26.73	26.70	27.76	29.98	33.93	39.72	10.91	9.20
Cargo–based charges ($/TEU)										
Wharfage										
Imports	28.60	28.60	67.65	89.65	37.40	39.05	63.17	64.31	53.59	56.53
Exports	28.60	28.60	51.15	51.15	37.40	39.05	63.17	64.31	53.59	56.53
Harbour dues	46.20	46.20	–	–	–	–	–	–	–	–
Berth charge	–	–	–	–	–	–	–	–	16.05	15.29
Total port and related charges ($/TEU)[c]										
Loaded imports	112.07	103.28	94.38	116.35	65.16	69.03	97.10	104.02	80.54	82.66
Loaded exports	112.07	103.28	77.88	77.85	65.16	69.03	97.10	104.02	80.54	82.66
Charges per ship visit ($/visit)										
Total ship–based charges	21 609	21 779	23 624	23 624	23 886	24 286	26 321	25 797	16 429	16 678
Empty TEUs[d]	2 819	3 689	0	3 068	995	1 766	0	0	1 229	2 308

– not applicable

r. revised

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

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

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

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

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

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

Table 3.3 Port and related charges for ships in the 35 000–40 000 GT range, 2007

	Brisbane		*Sydney*		*Melbourne*		*Adelaide*		*Fremantle*	
	Jan–Jun 2007	*Jul–Dec 2007*	*Jan–Jun 2007*	*Jul–Dec 2007*	*Jan–Jun 2007*	*Jul–Dec 2007*	*Jan–Jun 2007*	*Jul–Dec 2007*	*Jan–Jun 2007*	*Jul–Dec 2007*
Ship–based charges ($/TEU)										
Conservancy	5.57	4.98	–	–	–	–	5.25	4.37	–	–
Tonnage	–	–	7.92	7.18	5.74	7.18	12.14	12.32	5.06	4.90
Pilotage	15.51	13.45	2.97	2.69	4.73	2.69	4.95	4.81	1.92	1.99
Towage[a]	11.27	9.77	5.23	4.74	5.42	4.74	17.54	16.74	12.02	11.58
Mooring, unmooring	2.00	1.80	1.86	1.68	0.68	1.68	–	–	0.74	0.75
Berth hire[b]	–	–	–	–	–	–	–	–	–	–
Total[c]	34.36	30.01	17.99	16.30	16.58	16.30	39.88	38.24	19.74	19.22
Cargo–based charges ($/TEU)										
Wharfage										
Imports	28.60	28.60	67.65	89.65	37.40	39.05	63.17	64.31	53.59	56.53
Exports	28.60	28.60	51.15	51.15	37.40	39.05	63.17	64.31	53.59	56.53
Harbour dues	46.20	46.20	–	–	–	–	–	–	–	–
Berth charge	–	–	–	–	–	–	–	–	16.05	16.93
Total port and related charges ($/TEU)[c]										
Loaded imports	109.16	104.81	85.64	105.95	53.98	54.81	103.05	102.54	89.38	92.68
Loaded exports	109.16	104.81	69.14	67.45	53.98	54.81	103.05	102.54	89.38	92.68
Charges per ship visit ($/visit)										
Total ship–based charges	37 122	37 393	36 416	36 416	32 695	33 311	35 446	35 614	24 787	25 056
Empty TEUs[d]	5 805	6 224	0	7 315	4 434	5051	0	0	3121	4 082

– not applicable

r. revised

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

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

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

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

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

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

Table 3.4 Port interface costs for ships in the 15 000–20 000 GT range, 2007

	Brisbane		*Sydney*		*Melbourne*		*Adelaide*		*Fremantle*	
	Jan–Jun 2007	*Jul–Dec 2007*	*Jan–Jun 2007*	*Jul–Dec 2007*	*Jan–Jun 2007*	*Jul–Dec 2007*	*Jan–Jun 2007*	*Jul–Dec 2007*	*Jan–Jun 2007*	*Jul–Dec 2007*
					$/TEU					
Import										
Ship–based charges	37	28	27	27	28	30	34	40	11	9
Cargo–based charges	75	75	68	90	37	39	63	64	70	73
Stevedoring[p]	173	173	173	173	173	173	173	173	173	173
Customs brokers' fees	110	139	135	135	140	138	136	139	167	187
Road transport charges	311	297	424	485	391	353	256	242	328	349
Import total[a]	707	713	827	910	769	734	662	658	749	791
Export										
Ship–based charges	37	28	27	27	28	30	34	40	11	9
Cargo–based charges	75	75	51	51	37	39	63	64	70	73
Stevedoring[p]	173	173	173	173	173	173	173	173	173	173
Customs brokers' fees	136	117	107	107	97	108	84	113	91	99
Road transport charges	311	297	424	485	391	353	256	242	328	349
Export total[a]	733	690	782	843	726	704	610	633	673	704

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 over time. They should not be used for inter–port comparisons, as sample characteristics may vary between ports.
3. The stevedoring charge used in *Waterline* is monitored by the ACCC and is the weighted average for Brisbane, Sydney, Melbourne, Adelaide, Fremantle and Burnie. Stevedoring charges vary between ports but detailed data for individual ports are not publicly available.

Sources : BITRE estimates based on: ship call data supplied by relevant port authorities/corporations; price schedules of relevant port authorities/corporations, towage operators and pilotage service providers; surveys of customs brokers and road transport operators; stevedoring charge data supplied by the ACCC 2007; and ABS 2008.

Table 3.5 Port interface costs for ships in the 35 000–40 000 GT range, 2007

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jan–Jun 2007	Jul–Dec 2007	Jan–Jun 2007	Jul–Dec 2007	Jan–Jun 2007	Jul–Dec 2007	Jan–Jun 2007	Jul–Dec 2007	Jan–Jun 2007	Jul–Dec 2007
	$/TEU									
Import										
Ship–based charges	34	30	18	16	17	16	40	38	20	19
Cargo–based charges	75	75	68	90	37	39	63	64	70	73
Stevedoring[p]	173	173	173	173	173	173	173	173	173	173
Customs brokers' fees	110	139	135	135	140	138	136	139	167	187
Road transport charges	311	297	424	485	391	353	256	242	328	349
Import total[a]	704	714	818	899	758	720	668	657	758	801
Export										
Ship–based charges	34	30	18	16	17	16	40	38	20	19
Cargo–based charges	75	75	51	51	37	39	63	64	70	73
Stevedoring[p]	173	173	173	173	173	173	173	173	173	173
Customs brokers' fees	136	117	107	107	97	108	84	113	91	99
Road transport charges	311	297	424	485	391	353	256	242	328	349
Export total[a]	730	692	773	833	715	690	616	631	682	714

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 over time. They should not be used for inter–port comparisons, as sample characteristics may vary between ports.
3. The stevedoring charge used in *Waterline* is monitored by the ACCC and is the weighted average for Brisbane, Sydney, Melbourne, Adelaide, Fremantle and Burnie. Stevedoring charges vary between ports but detailed data for individual ports are not publicly available.

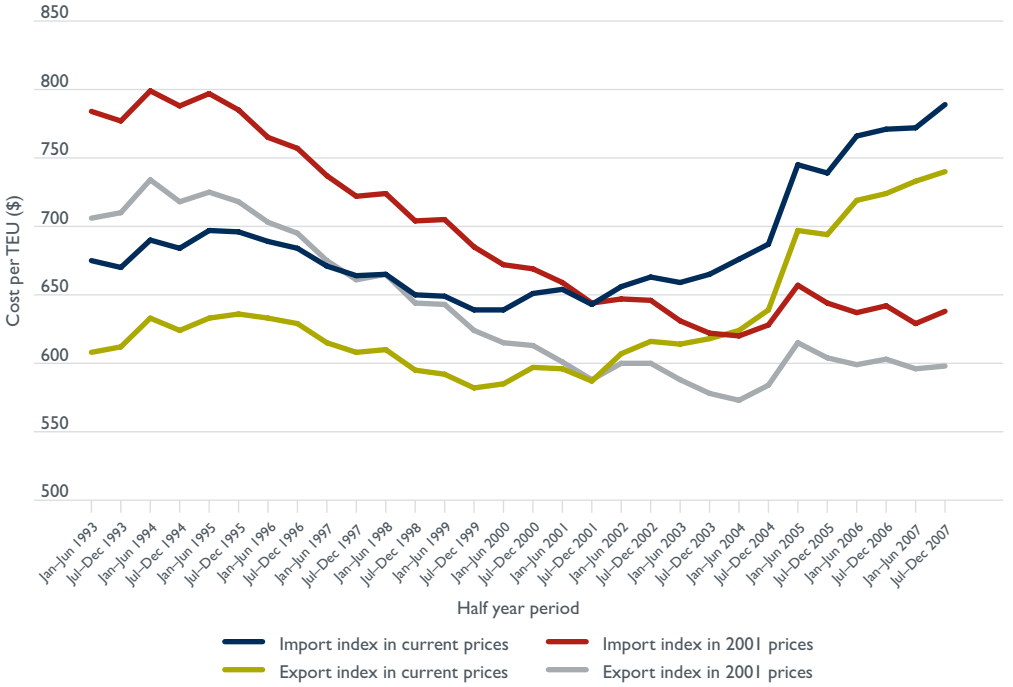
Sources: BITRE estimates based on: ship call data supplied by relevant port authorities/corporations; price schedules of relevant port authorities/corporations, towage operators and pilotage service providers; surveys of customs brokers and road transport operators; stevedoring charge data supplied by the ACCC 2007; ABS 2008.

Table 3.6 The national port interface cost index for ships in the 35 000–40 000 GT range, 2003–2007

	Jan–Jun 2003	Jul–Dec 2003	Jan–Jun 2004	Jul–Dec 2004	Jan–Jun 2005	Jul–Dec 2005	Jan–Jun 2006	Jul–Dec 2006	Jan–Jun 2007	Jul–Dec 2007
	$/TEU									
Imports in current prices	653	661	674	684	739	737	764	773	766	781
Imports in 2001 prices	625	618	619	625	652	642	650	643	623	631
Exports in current prices	608	614	623	636	691	692	717	726	726	732
Exports in 2001 prices	583	574	572	581	610	602	610	604	591	592

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 2007; and ABS 2008.

Figure 3.1 National port interface index for ships in the 15 000–20 000 GT range, 1993–2007



Chapter 4 Ship visits

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

Table 4.1 provides the five port total number of ship visits and the average number of TEUs exchanged per ship visit for container vessels with sizes ranging from 5 000–60 000 GT.

Average TEUs rose in 2007 throughout almost all ship sizes in 2007. Most of the rises were in the second half of 2007. They rose most steeply in the 25 000–30 000 GT and the 55 000–60 000 GT ranges.

Total ship visits increased by 2.0 per cent in calendar year 2007 compared with the preceding year, with ship visits peaking at 2207 for the six months to December 2007. There was little variation in ship visits between the six month periods to June 2007 and December 2007. The largest increases were in the 25 000–30 000 GT range and 30 000–35 000 GT range where there were increases of 60 and 58 visits respectively.

On a five port basis Table 4.2 shows the distribution of ship visits by vessel gross tonnage. The median for Sydney and Melbourne was in the 20 000–25 000 GT range. For Adelaide it was in the 50 000–55 000 GT range and for Fremantle in the 30 000–35 000 GT and for Brisbane in the 5 000–10 000 GT range.

For Sydney, the 75th percentile ship visit occurred in the 25 000–30 000 GT range, for Brisbane in the 15 000–20 000 GT range, for Melbourne in the 30 000–35 000 GT range, for Adelaide in the 40 000–45 000 GT range and for Fremantle also in the 40 000–45 000 GT range.

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

GT	*Jun–02*	*Dec–02*	*Jun–03*	*Dec–03*	*Jun–04*	*Dec–04*	*Jun–05*	*Dec–05*	*Jun–06*	*Dec–06*	*Jun–07*	*Dec–07*
5 000–10 000												
Average TEUs exchanged	239	187	161	193	333	204	283	368	267	560	391	402
Total ship visits	66	78	75	72	93	80	71	67	93	108	144	131
10 000–15 000												
Average TEUs exchanged	712	424	405	485	688	628	554	506	464	656	711	863
Total ship visits	79	59	53	54	40	84	89	106	136	108	116	125
15 000–20 000												
Average TEUs exchanged	763	839	839	826	971	885	693	800	685	890	873	1 122
Total ship visits	285	223	181	191	153	266	316	439	406	430	224	209
20 000–25 000												
Average TEUs exchanged	762	818	902	990	1014	935	818	859	685	925	878	936
Total ship visits	233	241	182	214	199	306	321	294	374	256	163	148
25 000–30 000												
Average TEUs exchanged	888	1 070	1 027	1 031	959	1 071	956	1 021	882	1 101	991	2 447
Total ship visits	186	252	286	323	344	185	332	377	395	475	558	618
30 000–35 000												
Average TEUs exchanged	1 014	1 149	1 262	1 374	1 478	896	1 216	1 434	1 152	1 329	1 185	1 291
Total ship visits	216	232	175	257	247	191	223	141	198	156	177	235
35 000–40 000												
Average TEUs exchanged	1 262	1 403	1 408	1 445	1 474	1 385	1 394	1 454	1 137	1 383	1 345	1 482
Total ship visits	203	223	214	189	225	228	227	225	178	223	313	303
40 000–45 000												
Average TEUs exchanged	1 228	1 465	1 450	1 558	1 601	1 098	1 511	1 653	1 177	1 435	1 630	1 813
Total ship visits	195	172	162	186	181	143	196	165	223	249	212	173
45 000–50 000												
Average TEUs exchanged	808	938	1 201	1 270	1 379	0 853	1 279	1 433	914	1 029	1 236	1 647
Total ship visits	5	38	72	77	75	32	65	77	88	81	154	153
50 000–55 000												
Average TEUs exchanged	1 134	1 027	995	1 044	1 366	795	1 735	1 250	1 321	1 373	1 232	1 804
Total ship visits	60	55	61	69	22	71	89	60	55	55	110	101
55 000–60 000												
Average TEUs exchanged	1 069	1 166	1 252	0	0	681	537	0	0	596	659	1452
Total ship visits	15	14	3	0	0	6	8	0	0	2	1	11
Total ship visits	1 543	1 587	1 464	1 632	1 579	1 592	1 937	1 951	2 146	2 143	2 172	2 207

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

Table 4.2 Ship visits by port, 2007

Number of ship visits	*Brisbane*	*Sydney*	*Melbourne*	*Adelaide*	*Fremantle*	*Total*
5000–10 000	95	139	41	0	0	275
10 000–15 000	85	67	58	0	31	241
15 000–20 000	132	127	109	43	22	433
20 000–25 000	96	87	97	16	15	311
25 000–30 000	245	359	383	78	111	1 176
30 000–35 000	107	123	120	23	39	412
35 000–40 000	142	136	201	69	68	616
40 000–45 000	74	78	106	43	84	385
45 000–50 000	62	60	60	42	83	307
50 000–55 000	29	53	52	24	53	211
Above 55 000	0	4	2	2	4	12
Total	1 067	1 233	1 229	340	510	4 379

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 2007 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 62.6 million tonnes for July–December 2007, compared with 60.0 million tonnes for the previous half-year January–June 2007 and 60.7 million tonnes for July–December 2006. This represented an increase of 3.1 per cent in total cargo throughput for the five ports compared with July–December 2006 and an increase of 4.4 per cent compared with January–June 2007.

Compared with July–December 2006, total cargo throughput in July–December 2007 increased by 7.7 per cent at Brisbane, and by 6.1 per cent at Sydney, by 1.8 per cent at Melbourne and decreased by 3.8 per cent at Adelaide and by 0.9 per cent at Fremantle.

Non-containerised general cargo throughput at the five ports was 2.701 million tonnes for July–December 2007, which represents a decrease of 2.4 per cent on the 2.768 million tonnes throughput for January–June 2007 and an increase of 7.1 per cent on the 2.522 million tonnes throughput for July–December 2006.

Total container traffic throughput for the five ports was 2.970 million TEUs for July–December 2007, which represents a increase of 13.2 per cent on the 2.624 million TEUs throughput for January–June 2007 and an increase of 10.5 per cent on the 2.689 million TEUs throughput for July–December 2006.

Compared with July–December 2006, loaded TEUs at the five ports increased by 7.6 per cent, with loaded imports increasing by 11.8 per cent and loaded exports increasing by 1.2 per cent.

Table 5.1 Non-financial performance indicators, selected Australian ports, 2004–2007

	Jul–Dec 2004	*Jan–Jun 2005*	*Jul–Dec 2005*	*Jan–Jun 2006*	*Jul–Dec 2006*	*Jan–Jun 2007*	*Jul–Dec 2007*
Five ports[a]							
Total cargo throughput ('000 tonnes)	58 593	57 064	57 776	58 358	60 694	59 953	62 591
Non-containerised general cargo ('000 tonnes)[b]	2 338	2 518	2 572	2 506	2 522	2 768	2 701
Containerised cargo (TEUs exchanged)							
Full import	1104 324	978 300	1 139 342	1 028 263	1 242 921	1 166 116	1 389 211
Empty import	125 158	135 088	129 224	199 487	137 911	139 096	136 768
Full export	721 595	719 329	755 826	686 673	807 702	778 137	817 213
Empty export	455 000	411 302	445 509	402 163	500 511	540 582	627 401
Total	2 406 077	2 244 019	2 469 901	2 316 586	2 689 045	2 623 931	2 970 593
Average total employment[c]	934	967	1 036	1 056	1076	1114	1141
Port turnaround time (hrs)[d]							
Median result	-	-	-	-	-	-	-
95th percentile	-	-	-	-	-	-	-
Brisbane							
Total cargo throughput ('000 tonnes)	13 006	12 967	13 531	13 226	13 936	14 130	15 006
Non-containerised general cargo ('000 tonnes)[b]	373	447	461	459	466	546	516
Containerised cargo (TEUs exchanged)							
Full import	158 781	133 594	172 175	149 226	186 666	177 073	216 280
Empty import	37 379	34 136	33 218	34 164	40 400	38 023	32 133
Full export	114 029	113 090	130 459	115 564	136 672	120 261	125 275
Empty export	73 495	61 643	60 349	71 123	75 844	100 106	114 465
Total	383 684	342 463	396 201	370 077	439 582	435 463	488 153
Average total employment[c]	238	248	253	256	258	293	312
Port turnaround time (hrs)[d]							
Median result	35	28	27	30	36	33	35
95th percentile	57	54	53	51	57	54	54
Sydney							
Total cargo throughput ('000 tonnes)	13 215	12 635	13 219	13 505	14 024	13 772	14 886
Non-containerised general cargo ('000 tonnes)[b]	299	329	312	304	331	347	270
Containerised cargo (TEUs exchanged)							
Full import	366 037	320 732	378 451	342 216	419 784	380 056	459 364
Empty import	5 262	7 670	9 929	9 490	9 616	9 762	9 796
Full export	161 310	158 342	171 320	173 932	192 703	176 919	188 416
Empty export	185 558	170 699	191 297	168 830	213 006	218 275	248 943
Total	718 167	657 443	750 997	694 468	835 109	785 012	906 519
Average total employment[c]	198	200	241	243	246	244	240
Port turnaround time (hrs)[d]	718 167						
Median result	33	28	29	28	30	30	30
95th percentile	55	51	50	48	56	53	57

continued

Table 5.1 Non-financial performance indicators, selected Australian ports, 2004–2007 (continued)

	Jul–Dec 2004	*Jan–Jun 2005*	*Jul–Dec 2005*	*Jan–Jun 2006*	*Jul–Dec 2006*	*Jan–Jun 2007*	*Jul–Dec 2007*
Melbourne							
Total cargo throughput ('000 tonnes)	14 115	14 211	13 978	13 781	14 884	14 628	15 159
Non-containerised general cargo ('000 tonnes)[b]	1 015	1 126	1 060	1 081	1 061	1 175	1 184
Containerised cargo (TEUs exchanged)							
Full import	446 960	406 623	456 345	416 323	485 828	463 052	542 218
Empty import	51 113	59 334	51 035	60 806	55 592	54 843	47 900
Full export	323 454	329 766	330 003	339 949	355 544	343 064	354 504
Empty export	152 055	141 136	149 346	126 118	158 613	177 075	205 955
Total	973 582	936 859	986 729	943196	1 055 577	1 038 034	1 150 577
Average total employment[c]	171	184	191	199	196	201	209.3
Port turnaround time (hrs)[d]							
Median result	39	33	32	30	31	31	32
95th percentile	78	60	54	52	62	63	65
Adelaide							
Total cargo throughput ('000 tonnes)	5 273	4 699	4 832	5 137	5 212	5 072	5 014
Non-containerised general cargo ('000 tonnes)[b]	263	207	282	193	181	180	196
Containerised cargo (TEUs exchanged)							
Full import	20 564	19 785	24 201	23 483	30 277	31 441	38 144
Empty import	16 774	19 663	21 280	18 024	21 342	23 583	28 340
Full export	39 277	40 259	46 933	43 954	46 606	50 233	57 587
Empty export	7 503	6 760	6 562	4 954	7 979	7 656	12 710
Total	84 118	86 467	98 976	90 415	106 204	112 913	136 781
Average total employment[c]	97	95	94	97	97	99	103
Port turnaround time (hrs)[d]							
Median result	23	22	21	19	20	44	43
95th percentile	60	41	34	32	32	56	55
Fremantle							
Total cargo throughput ('000 tonnes)	12 984	12 551	12 217	12 709	12 638	12 352	12 525
Non-containerised general cargo ('000 tonnes)[b]	389	409	457	468	482	520	535
Containerised cargo (TEUs exchanged)							
Full import	111 982	97 566	108 170	97 015	120 366	114 494	133 205
Empty import	14 630	14 285	13 762	13 274	10 961	12 885	18 599
Full export	83 525	77 872	77 111	77 003	76 177	87 660	91 431
Empty export	36 389	31 064	37 955	31 138	45 069	37 470	45 328
Total	246 526	220 787	236 998	218 430	252 573	252 509	288 563
Average total employment[c]	230	241	258	261	280	277	277
Port turnaround time (hrs)[d]							
Median result	31	24	23	21	25	27	26
95th percentile	60	51	56	48	54	55	51

– 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: AAPMA 2008.

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 12 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 2007 decreased at Sydney, Brisbane and Fremantle compared to the previous quarter. It increased at Melbourne and was not available for Adelaide. Stevedoring reliability in the December quarter 2007 decreased for Brisbane, Melbourne and Fremantle and increased at Sydney 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 2007 indicator rose at Brisbane and Adelaide. It was not available for Melbourne and fell at Sydney and Fremantle. In the December quarter 2007, the indicator rose Brisbane and Fremantle and fell at Sydney. It remained unchanged for Adelaide and 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 2007, this indicator rose at Adelaide and Fremantle and fell at Brisbane and Sydney. It was not available for Melbourne. In the December quarter 2007 this indicator rose at Sydney, Brisbane and Fremantle, while it remained unchanged at Adelaide. It was not available for Melbourne.

Table 6.1 Stevedoring and ship arrival reliability indicators, September and December quarters 2007

	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	95.0	84.4	89.7	96.6	87.9	83.6	0.0	0.0	93.0	91.7
Ship arrival										
Advice at 24 hrs	46.6	50.2	39.6	36.8	na	na	100.0	100.0	49.6	63.1
Advice inside 24 hrs	95.1	96.4	92.7	94.8	na	na	100.0	100.0	91.2	93.8

na not available

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

Chapter 7 Coastal shipping permits

In order for foreign vessels to trade on the Australian coast it is necessary for them to obtain shipping permits. Permits can be obtained for a single voyage 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 increased from 15.0 million tonnes in 2006 to 15.3 million tonnes in 2007 (Figure 7.1).

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 2007. The number of SVPs issued in July–December 2007 decreased by 6.4 per cent compared with January–June 2007 and by 6.7 per cent compared with the July–December 2006 period. The associated estimated tonnes of cargo to be carried decreased by 1.0 per cent compared with January–June 2007, and decreased by 7.3 per cent compared with July–December 2006.

On a calendar year basis the total number of SVPs issued in 2007 was 962 compared with 805 in 2006. This represented a increase of 19.5 per cent. Over the same period estimated SVP cargo increased by 4.9 per cent from 13 297 thousand tonnes to 13 944 thousand tonnes.

Table 7.1 gives a breakdown of SVPs by cargo types for July–December 2007. General cargo (including containerised cargo) permits now represent 1.7 per cent by weight, while making up 34.6 per cent of total permits issued. Bulk cargo accounts for 98.3 per cent of the total tonnage moved under SVPs.

Continuing voyage permits

Although CVPs were available prior to 1998, they were rarely requested or issued during this period. Since 1998, there have been significant fluctuations in both the number of permits issued and the tonnage to be carried, as shown in Figure 7.3. In July–December 2007, a total of 624 thousand tonnes of cargo were to be carried under CVPs, compared with 689 thousand tonnes in January–June 2007 and 814 thousand tonnes in July–December 2006.

CVPs issued since the start of 2006 have been for 3 months maximum duration rather than the 6 months allowed previously. One CVP is estimated to be equivalent to three SVPs on average.

In July–December 2007 there were 70 CVPs issued compared with 61 in the same period in 2006, an increase of 14.8 per cent.

More information on coastal permits can be found on the Department of Infrastructure Transport, Regional Development and Local Government internet site at <http://www.infrastructure.gov.au/maritime/freight/licences/index.aspx>.

Table 7.1 Summary of single voyage permits issued, July–December 2007

Cargo Category	*Permits*	*Tonnes*
Bulk Cargo		
Petroleum Products	80	1 608 906
Liquefied Gas	13	46 280
Other Bulk Liquids	18	87 414
Dry Bulk	193	5 074 909
General Cargo	161	118 775
Total	465	6 936 284

Note: Tonnages are the pre-voyage estimated tonnes to be carried.
Source: Department of Infrastructure, Transport, Regional Development and Local Government 2008a.

Figure 7.1 Total coastal trade and permit tonnages, 1990–91 to 2006–07

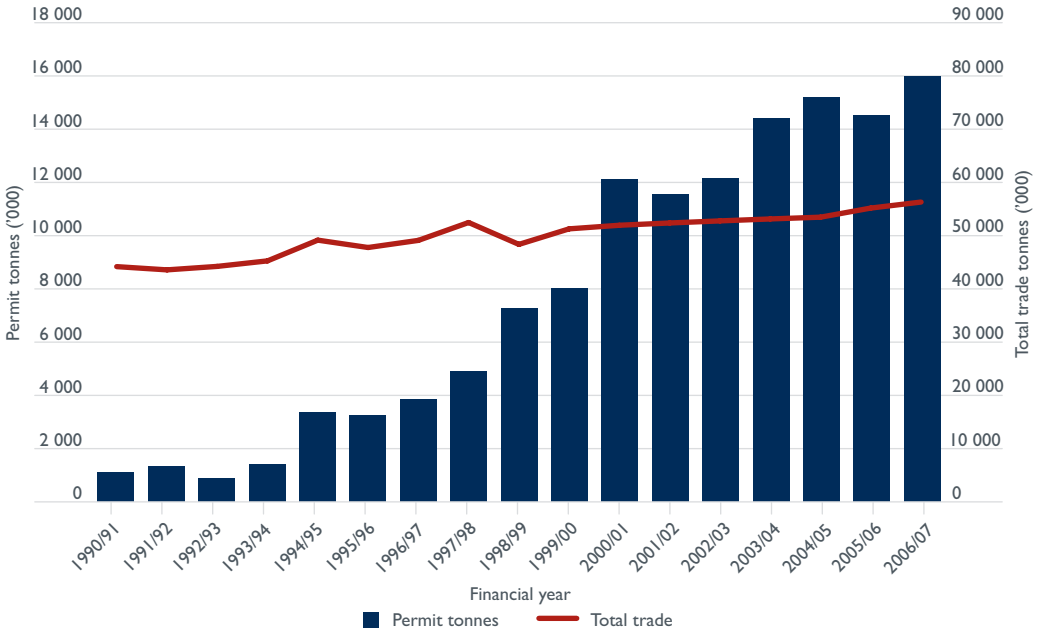


Figure 7.2 Number of SVPs and tonnes planned to be carried via SVPs, December 1990 to December 2007

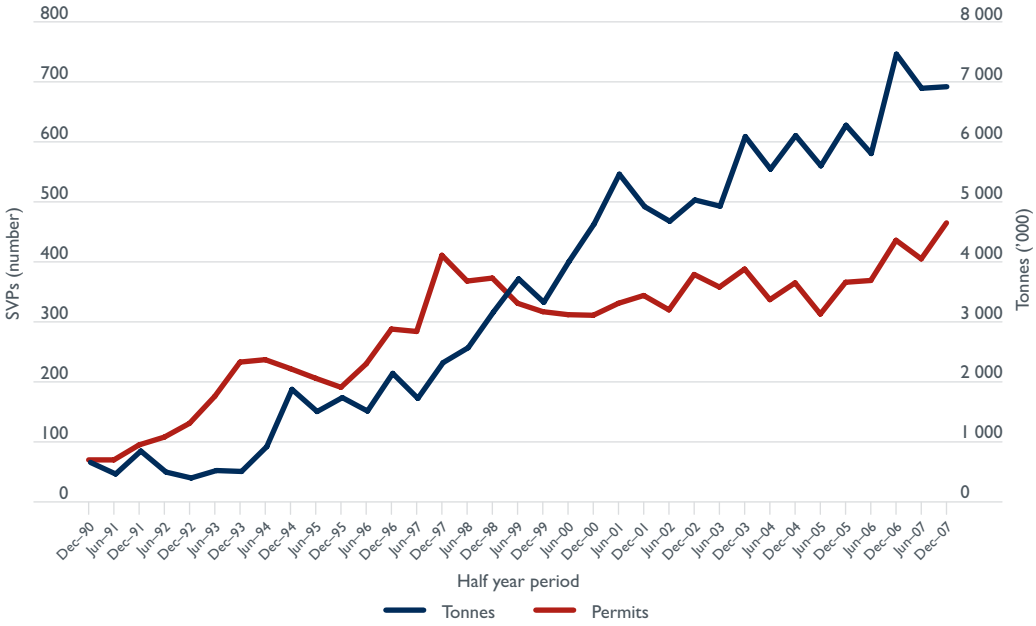
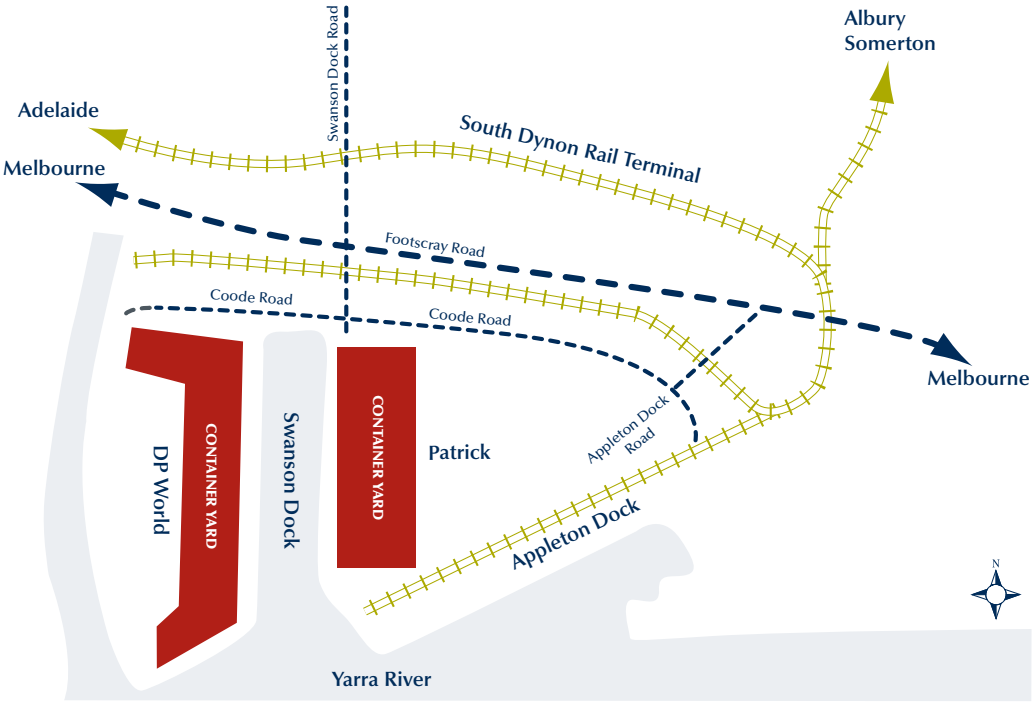


Figure 7.3 Number of CVPs and tonnes planned to be carried via CVPs, December 1998 to December 2007

Appendix A Diagrams of five major Australian container port terminals

Figure A.1 Patrick and DP World terminals—Swanson dock, Port Melbourne, Victoria

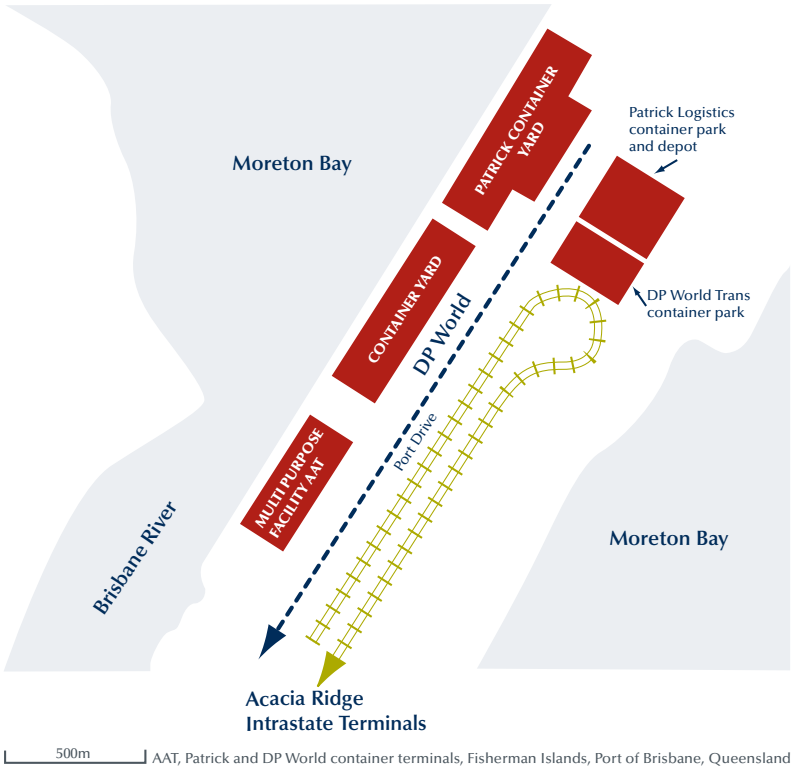


Patrick and DP World container terminals, Swanson Dock, Port Melbourne, Victoria

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

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

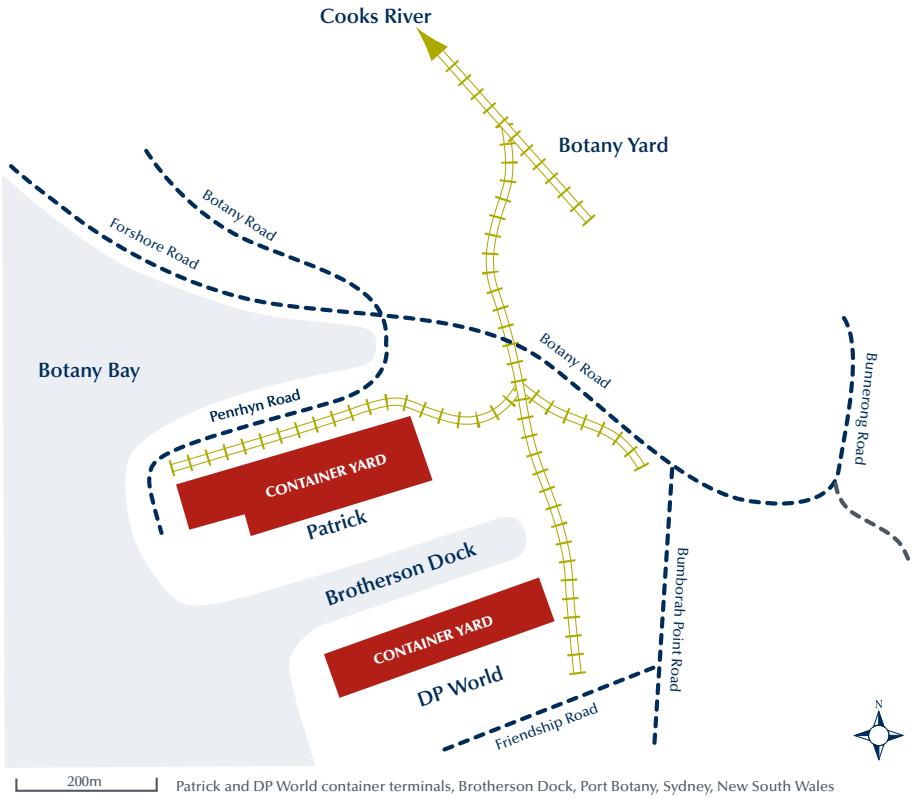
Figure A.2 Patrick and DP World terminals—Fisherman Islands, Port of Brisbane, Queensland



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 (2007c), Port of Brisbane (2007).

Figure A.3 Patrick and DP World terminals—Brotherson dock, Port Botany, Sydney, New South Wales

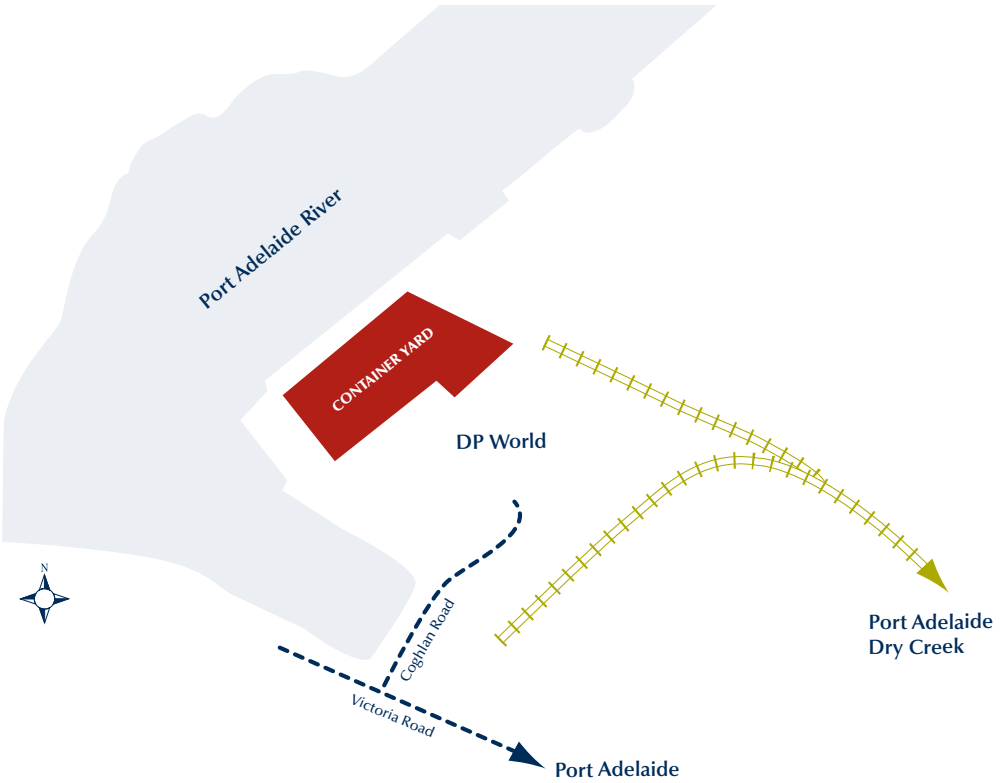


Patrick and DP World container terminals, Brotherson Dock, Port Botany, Sydney, New South Wales

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

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

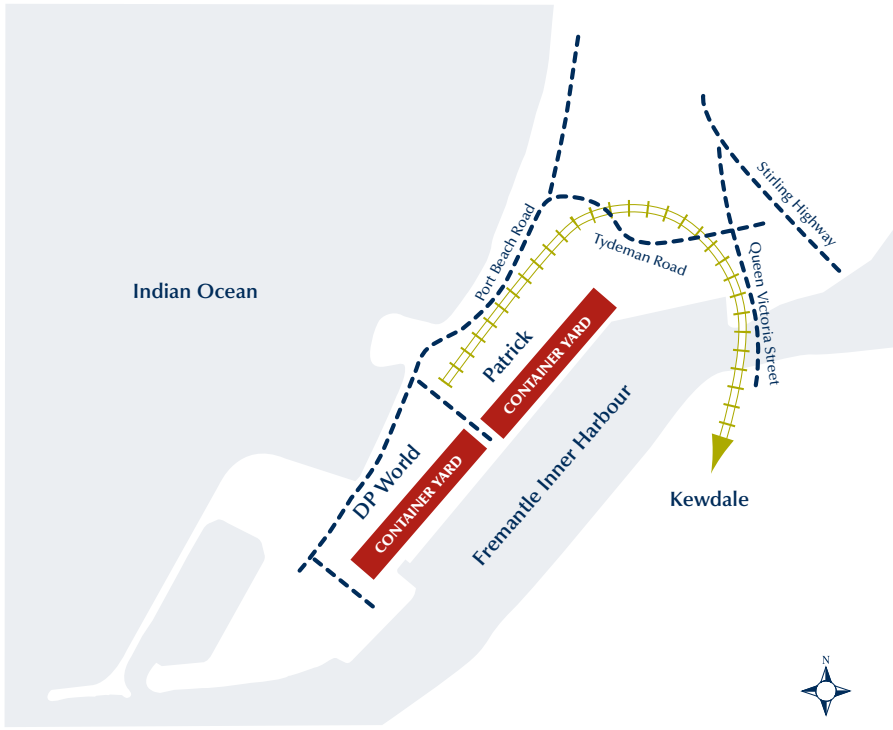
Figure A.4 DP World terminal—Outer Harbour, Adelaide



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

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

Figure A.5 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 gauge providing access for narrow gauge trains to the terminal. Containers travelling by rail have as origin/destination the Perth metropolitan area, regional Western Australia or are land bridged to Adelaide. However interstate containers (land bridge) are not dispatched directly from the Inner Harbour rail terminal but from Kewdale, which is Perth's only intermodal terminal. The diagram is correct as at March 2007.

Source: Department of Planning and Infrastructure (2004), DOTARS (2006), DP World (2007b), Fremantle Ports (2007), Google Maps Australia (2007), DOTARS (2007d), Patrick (2007c).

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 to 45 000 GT range, which itself is almost 85 per cent of all ship visits to these ports in 2005.

Two measures of output are used in *Waterline*

Containers handled—this is the total number of containers lifted on/off fully cellular ships.

Twenty foot equivalent units (TEUs)—this is the number of containers calculated as twenty foot equivalent units. This means that a twenty foot container is counted as one container or TEU and a forty foot container is counted as two twenty foot containers or two TEUs. By definition for any given period TEUs handled are more than containers handled.

Landside of the port terminal definitions as used in Chapter 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)—his 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 TEUs. 'Twenty foot equivalent units' is universally recognised a measure of containers which aggregates both twenty foot and forty foot containers into twenty foot units for statistical purposes.

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 TEUs per hour, overstates the actual productivity. With TEUs per hour used as the measure one container lift becomes two lifts. This is why the table which tabulates containers in TEUs should not be used for measuring productivity.

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

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.

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.

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 where crane intensity is (total number of allocated crane hours/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:

Stage 1: involves the determination of the vessel sizes to represent all vessels of interest that are used to transport containerised cargo. Two vessel sizes are used to represent all vessels of interest. These are: vessel size of gross tonnage equal to 17 215 represents all vessels of sizes ranging from 15 000 to 20 000; and vessel size of gross tonnage equal to 37 394 represents all vessels of sizes ranging from 35 000 to 40 000. This size determination was calculated at the commencement of the *Waterline* series and is still used. These two ranges are selected to provide the standard representative ships used in the calculations.

Stage 2: The BITRE calculates key parameters for containers carried by the two representative vessels from data provided by port authorities.

Stage 3: The 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.

T**EUs:** This is an industry standard measure of shipping containers.

> **TEUs** are twenty foot equivalent units.
> **TEUs loaded** means containers loaded with goods.
> **TEUs empty** means empty containers.
> **TEUs loaded inwards** means imported.
> **TEUs loaded outwards** means exported.

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

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

Port and Related Charges

Ship-based charges include the following items: these charges are levied on container ships once they come into harbour. They include:

- Conservancy charges which are navigation service charges levied by the government of the state in which the port is situated.
- Tonnage charges that are based on the Gross Tonnage of the vessel. They are port service charges levied by the port authority.
- Pilotage charge to cover services for piloting the ship.
- Towage charges levied by the tug boat operator.
- Mooring and Unmooring—charge levied either by the port authority or the stevedoring company,
- Berth hires charges sometimes charged by the Stevedores.

Cargo-based charges include the following items:

- wharfage charges that are levied on each container by the port authorities,
- harbour dues that are levied on each container by the port authorities,
- berth charges that are sometimes charged by port authorities.

Port Interface Costs

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

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

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

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

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

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

Ship visits as used in Chapter 4

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

Non-Financial performance Indicators definitions as used in Chapter 5

Cargo throughput (tonnes)—this is the quantity of container and non-container cargo which passes through the port and is measured in tonnes.

Non-containerised general cargo (tonnes)—this is cargo which is not carried in containers.

Containerised cargo (TEUs exchanged)—this is the cargo which is carried in containers normalised as twenty foot equivalent containers.

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

Port turnaround times (hours)—this is the time in hours a container ship is in a port. It is measured as a median of all the container ships in port over a six month period. It is also measured as the 95 th 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.

Appendix C Stevedoring productivity definitions

Containers handled	The total number of containers lifted on/off fully cellular ships.
Crane intensity	This is the total number of allocated crane hours, divided by the elapsed time from labour first boarding the ship to labour last leaving the ship.
Crane rate	The total containers/TEUs handled divided by the Elapsed Crane Time.
Elapsed crane time	The total allocated crane hours, less operational and non-operational delays.
Elapsed labour time	This is the elapsed time between labour first boarding the ship and labour last leaving the ship, less non-operational delays.
Ship rate	The Crane Rate multiplied by Crane Intensity (as defined above).
Ships	Only fully cellular ships 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, and exclude such vessels if used for mixed cargoes of containers and general cargo.
TEUs 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.
Vessel working rate	The total containers/TEUs handled divided by the Elapsed Labour Time.

Abbreviations

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

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