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Foreword

Waterline reports on trends in container handling productivity on the waterfront in Australia as well as the cost of importing and exporting containers. It covers both the unloading of container ships and the transport of containers from container terminals. This *Waterline* provides the latest data available on stevedoring productivity and landside performance. Beginning with this issue, a new wharf side indicator is provided for each port. It measures the average number of crane lifts performed per hour spent in berth by a contained ship.

This journal is published by the 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 port terminals: Brisbane, Sydney, Melbourne, Adelaide and Fremantle. This *Waterline* covers port terminal activity up to the June quarter 2012.

Waterline is prepared in the Infrastructure, Surface Transport and Road Safety Statistics Section by Adam Malarz.

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

- Ports Australia
- individual port authorities and corporations
- shipping lines
- customs brokers
- road transport operators
- pilot, tug and mooring operators; and
- stevedoring companies: Patrick and DP World.

This issue of *Waterline* and back issues, including selected time series data in spreadsheet format, is available from www.bitre.gov.au.

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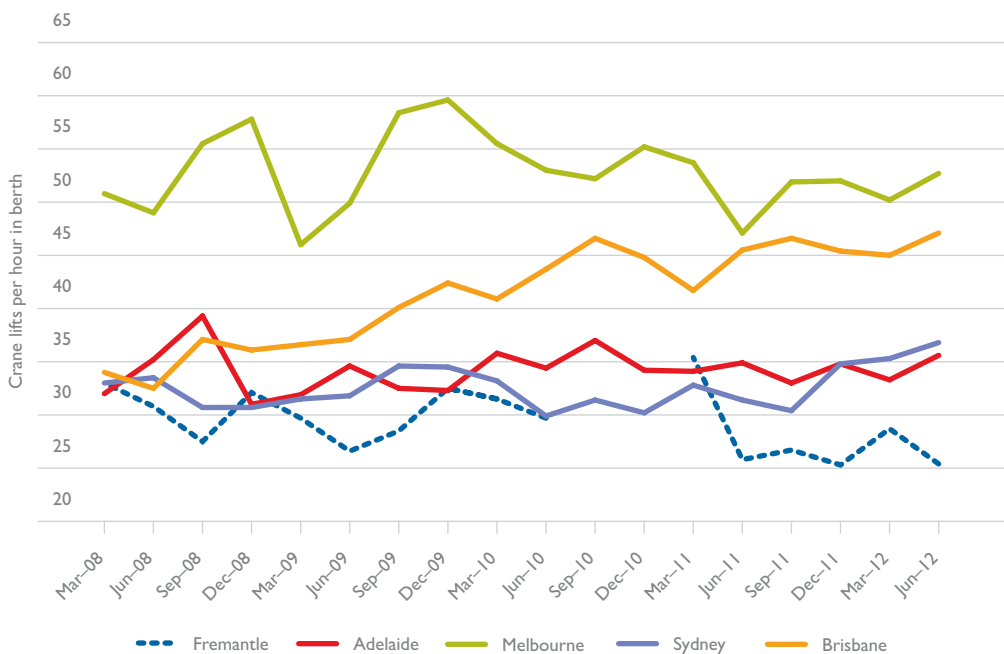
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In-brief

A new performance indicator

This issue of Waterline introduces a new performance indicator for each of the five ports — the average number of crane lifts per hour a container vessel spent in berth. This indicator is computed using data on all container vessels that exchanged containers at that port. The indicator is computed by using total elapsed time between a vessel's arrival time at berth and its departure. Crane lifts per hour in berth is, for the last three years, highest at the Port of Melbourne at over 50 for most quarters between March 2008 and June quarter 2012. Over the same period, the crane lifts per hour at the Port of Brisbane have risen from 34 to 47. The crane lifts per hour in berth at Fremantle, Sydney and Adelaide have been lower, ranging between 25 and 36.

Figure 1.0 Crane lifts per hour a container ship spent in berth, by container port



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

The indicator is strongly influenced by changes in average number of containers exchanged per visiting ship and by the mix of ship sizes during the period. The average number of containers exchanged varies seasonally and cyclically. The mix of ships visiting Australian ports results largely from the shipping lines' operational considerations, such as size of the task (for example, the number of containers to be shipped), trends in the renewal of tonnage and costs of operations, fuel, port fees and charges.

Land-side performance indicators

Container throughput on the land side at Australia's largest five container ports increased by 0.7 per cent in March quarter of 2012, as compared with the same period of 2011. During the financial year 2011–12, total container throughput increased by 4.4 per cent, as compared with 2010–11.

Productivity of truck turnaround in five ports improved slightly from 33.7 minutes in June 2011 to 32.6 in June quarter 2012. Shift work in trucking containers, as measured by the vehicle booking system, indicated an increase of evening, night and weekend work from 359.2 thousand timeslots used in June quarter 2011 to 369.4 thousand in June quarter 2012. In the same period, there was a desirable decline in day shift share from 418.7 to 398.4 thousand timeslots in the respective June quarters of 2011 and 2012. The number of total trucks used increased by 3.2 per cent in March and 2.6 per cent in June quarters of 2012, as compared with respective periods of 2011.

Wharf-side productivity

The number of containers handled in five Australian ports increased in the June quarter 2012 by 3.1 per cent, as compared with June quarter 2011. Growth was particularly pronounced in Fremantle (10.5 per cent) and Melbourne (7.6 per cent). In the same period, Sydney experienced a decline in total containers handled of -5.8 per cent.

Container terminal performance rates in five ports, as measured by *vessel working rates*, increased from 39.4 containers per hour in June quarter of 2011 to 43.6 containers per hour (10.6 per cent) in June quarter of 2012. In Melbourne *vessel working rates* in June quarter 2012 improved by 6.9 per cent.

Port-interface cost index

In the largest category of container ships of 50 000–55 000 GT, between January and June 2012, the exchange of containers was highest in Melbourne (2 515 containers) and lowest in Adelaide (1 340 containers).

Elapsed berth time for this ship category was longest in Fremantle (40 hours) and shortest in Brisbane (22 hours).

For imports by container ships in the 35 000–40 000 GT category the national port interface cost indices in January to June 2012 increased in nominal terms to 902 (1.3 per cent) from 890 in July to December 2011. The real price indices increased to 613 from 610 (0.5 per cent).

For exports by the same category of ships, costs indices in January to June 2012 increased in nominal terms to 870 (up 1.5 per cent) from 857 in July to December 2011. The real export cost indices increased to 592 (0.7 per cent) from 587.

For the ship category 35 000–40 000 GT the elapsed berth time declined in all ports. In Sydney the elapsed berth time declined (from 47 to 36 hours), Melbourne (from 33 to 29 hours), Adelaide (from 29 to 26 hours) and Brisbane (from 27 to 25 hours) for the periods July to December 2011 and January to June 2012.

In the smallest category of container ships of 5 000–20 000 GT, between January and June 2012, the exchange of containers was lowest in Adelaide (117 containers) and highest in Fremantle (2 615 containers).

Container ship visits

Between July 2011 and June 2012, the dominating ship size was 20 001–35 000 GT, followed closely by 35 001–40 000 GT and 40 001–50 000 GT.

Between July 2011 and June 2012, the dominating ship size visiting Melbourne and Sydney was 20 001–35 000 GT, with 343 and 308 visits respectively.

The average number of crane lifts per container ship visit in Melbourne was 1 489 in March quarter and 1 453 in June quarter 2012. The largest number of crane lifts per hour of container ship berthing was also in Melbourne: 50.2 average lifts per hour in March and 52.7 in June quarter 2012.

Port performance – non-financial indicators

Total cargo throughput in the financial year 2011–12 increased by 5.2 per cent, as compared with financial year 2010–11. In January to June 2012 this throughput increased by 7.6 per cent, as compared to the corresponding period in 2011.

In the financial year 2011–12 containerised cargo throughput increased by 5.1 per cent, as compared with the previous financial year with full exports up by 6.5 per cent and full imports up by 5.8 per cent.

Imports of containerised cargo in five ports, as measured by TEUs exchanged, increased by 4.0 per cent from 1.40 in January–June 2011 to 1.46 million TEUs in January–June 2012. The total container exchanged increased in all categories in the same period from 3.02 to 3.15 million TEUs (4.2 per cent).

Port turnaround times (median results) improved during January–June 2012 in Adelaide (21.6 per cent), Sydney (8.4 per cent) and Brisbane (5.1 per cent), but declined in Fremantle (56 per cent) and Melbourne (5.9 per cent), as compared with January–June 2011.

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CHAPTER I

Landside of the port terminal

Overview

Chapter I of Waterline reports on a list of landside of port terminal indicators at the five capital city port terminals: Brisbane, Sydney, Melbourne, Adelaide and Fremantle. The chapter covers three types of indicators:

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

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

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

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

Landside of the port terminal indicators are presented in Table I.1 and Figures I.1 to Figure I.14. The notes below provide explanation of the concepts being measured, the scope of the measurement and highlights any qualifications that should be borne in mind by users of the data. The variables are discussed in the order they appear in Table I.1.

Explanatory notes

Five ports

Data under this heading relate to simple sums of, or other form of aggregation of data for the five capital city port terminals: Brisbane, Sydney, Melbourne, Adelaide and Fremantle.

Road – Total trucks

This is a count of trucks processed through the vehicle booking system and the trucks that perform bulk run deliveries at a container terminal. This indicator shows the total truck-related task performed at a port terminal in a quarter.

Road – Total containers

Counts are based on a combination of the throughput of the vehicle booking system (VBS) at the land interface and the bulk runs of containers outside the VBS. At this stage it is not possible to separate out the bulk runs from the operations under the VBS. Bulk runs tend to be at night; bulk runs also tend to use larger vehicles with higher container or TEUs per truck measures.

Road – Total TEUs

Number of twenty-foot equivalent units (TEUs) processed in a quarter. This task size indicator measures the number of standardised twenty foot equivalent units (TEUs) of containers processed on the landside of port terminals in a quarter.

Average truck turnaround time in the quarter

This is a measure of stevedoring efficiency and shows how fast (expressed in minutes) a stevedoring company processes trucks within a terminal. The indicator measures the length of time that a truck takes from the time it enters a port terminal to the time it exits the port terminal. This measure does not include time a truck waits outside before it enters the gate of the port terminal.

Containers per truck

Count of containers divided by the number of trucks.

TEUs per truck

Count of TEUs divided by the number of trucks. TEUs per truck are a measure of truck efficiency; it encapsulates the 40ft/20ft dimension difference and is consistent with other wharf related TEU measures. For example, suppose on a given day:

- 10 trucks each make a trip to the port terminal empty but leave the terminal with 2 TEUs; and
- 10 trucks each make a trip to the port terminal with 2 TEUs but leave the terminal empty.

Total TEUs moved = 40; total number of trucks = 20. So average TEUs per truck (for a two way (in and out) trip is 2.

Average 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) measures the port's container tracking operations measured in minutes. 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.

Rail – total containers

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.

Time slots for the vehicle booking system

The data for the vehicle booking system (VBS) is presented in Table 1.1 standardised for the day, evening and night shifts at the container terminals at the five ports for the following days of the week: Monday to Friday, Saturday and Sunday. Table 1.1 shows both the number of timeslots made available and the number of slots used. The stevedores at the five port container terminals do not have the same day, evening and night shifts. Thus data has been adjusted to fit into the standardised work shifts shown in Table 1.1 for comparative purposes.

Number of vehicle booking system timeslots available

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 available to receive and deliver containers over a 24 hour period, seven days a week.

When shipping schedules permit and volumes demand extra resources, additional labour 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 measure the supply of VBS time slots at port terminals.

Adjusted vehicle booking system usage rates

The supply of vehicle booking system time slots is not constant across time at any of the port terminals. More slots are supplied during high demand periods. For a given quarter, the usage rates for say the night time slot is given by dividing the total slots used at night by the total number of slots available in the quarter. The usage rates add up to 100 percent for each quarter.

Table I.1 Container terminal landside performance indicators

Port/Indicator	Jun-10	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12
Five ports									
Road									
Total trucks ^a	464 317	518 147	511 283	508 681	521 833	576 833	578 782	524 891	535 413
Total containers ^d	823 382	918 910	919 562	836 995	881 600	960 105	976 864	888 567	888 178
Total TEUs ^d	1 196 169	1 350 251	1 364 386	1 273 253	1 321 308	1 437 951	1 458 221	1 315 317	1 316 298
Truck turnaround time – mins. ^e	33.6	34.1	33.9	32.9	33.7	34.5	34.9	32.4	32.6
Containers per truck ^e	1.8	1.8	1.8	1.6	1.7	1.7	1.7	1.7	1.7
Avg. container turnaround time – mins. ^e	24.4	24.8	24.6	23.0	23.3	25.8	24.0	22.1	21.9
TEUs per truck ^e	2.3	2.3	2.3	3.0	2.9	2.7	2.7	2.4	2.4
Rail									
Total containers (excl. Adelaide)	99 207	94 528	90 389	76 059	89 417	93 328	73 782	77 446	92 766
Number of VBS timeslots available									
Overall total	644 087	729 379	686 826	774 146	822 736	880 187	852 968	813 133	812 125
Monday–Friday									
Day (0600–1800)	360 739	391 169	362 971	430 037	432 753	457 327	424 454	422 139	418 284
Evening (1800–2400)	142 925	165 639	153 571	171 426	180 633	196 599	188 362	187 430	185 128
Night (2400–0600)	78 749	93 019	84 309	90 640	98 908	108 660	113 329	102 308	106 762
Sub total	582 413	649 827	600 851	692 103	712 294	762 586	726 145	711 877	710 174
Saturday									
Day (0600–1800)	26 888	33 298	30 836	40 283	52 677	50 978	57 244	50 209	52 025
Evening (1800–2400)	5 398	7 567	5 274	7 118	11 611	10 335	9 413	6 103	3 141
Night (2400–0600)	7 238	6 983	25 183	3 608	5 558	11 021	12 408	8 416	9 373
Sub total	39 524	47 848	61 293	51 009	69 846	72 334	79 065	64 728	64 539
Sunday									
Day (0600–1800)	10 614	13 780	9 654	13 134	18 103	21 141	25 552	22 226	23 357
Evening (1800–2400)	5 988	9 206	8 071	8 806	9 967	12 360	11 656	9 141	9 448
Night (2400–0600)	5 548	8 718	6 957	9 094	12 526	11 766	10 550	5 161	4 607
Sub total	22 150	31 704	24 682	31 034	40 596	45 267	47 758	36 528	37 412
Number of VBS timeslots used									
Overall total	579 833	669 521	636 024	725 346	777 949	789 301	761 562	752 735	767 748
Monday– Friday									
Day (0600–1800)	338 163	371 454	346 342	412 836	418 712	429 374	392 446	396 845	398 374
Evening (1800–2400)	123 927	150 031	138 509	155 249	167 905	174 546	166 006	171 635	172 274
Night (2400–0600)	73 852	87 486	78 209	85 186	92 513	98 440	100 775	94 605	98 706
Sub total	535 942	608 971	563 060	653 271	679 130	702 361	659 228	663 085	669 354
Saturday									
Day (0600–1800)	21 360	27 308	26 380	35 788	48 341	41 348	50 709	46 708	49 363
Evening (1800–2400)	2 578	3 993	3 118	6 152	9 636	6 064	6 689	2 503	1 945
Night (2400–0600)	4 130	3 930	23 625	3 326	5 275	8 256	9 761	7 870	13 662
Sub total	28 068	35 231	53 123	45 266	63 252	55 668	67 159	57 081	64 970
Sunday									
Day (0600–1800)	6 632	9 771	7 296	10 606	15 428	14 908	19 787	19 922	20 968
Evening (1800–2400)	4 377	7 860	7 191	8 229	9 511	9 502	8 931	8 285	8 632
Night (2400–0600)	4 814	7 688	5 354	7 974	10 628	6 862	6 457	4 362	3 824
Sub total	15 823	25 319	19 841	26 809	35 567	31 272	35 175	32 569	33 424

Table 1.1 Container terminal landside performance indicators (continued)

Port/Indicator	Jun-10	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12
Brisbane									
Road									
Total trucks	62 914	67 310	64 609	55 415	64 298	73 673	73 054	67 988	74 094
Total containers ^d	131 037	148 269	150 381	130 904	144 516	163 687	166 774	147 960	154 380
TEUs ^d	188 537	216 527	222 496	190 582	213 228	243 875	248 464	217 232	229 695
Truck turnaround time – mins. ^{b e}	37.6	40.0	32.9	33.3	37.4	37.4	37.7	37.7	37.0
Containers per truck ^e	2.1	2.2	2.3	2.4	2.2	2.2	2.3	2.2	2.1
Avg. container turnaround time – mins. ^e	21.5	22.7	18.8	18.9	21.1	21.5	21.5	21.8	21.4
TEUs per truck ^e	2.4	2.5	2.5	2.5	2.6	2.6	2.5	2.5	2.5
Rail									
Total containers ^c	13 303	15 134	9 164	5 130	10 542	9 271	7 187	4 579	8 376
Number of VBS timeslots available									
Overall total	95 820	114 221	127 105	126 873	127 193	154 534	160 274	153 202	152 799
Monday– Friday									
Day (0600–1800)	62 148	69 894	73 486	80 055	77 950	90 021	88 155	85 671	84 058
Evening (1800–2400)	24 763	29 825	33 757	31 615	33 032	41 311	39 862	37 034	37 092
Night (2400–0600)	3 915	6 677	9 027	5 613	6 233	10 186	13 276	9 810	12 471
Sub total	90 826	106 396	116 270	117 283	117 215	141 518	141 293	132 515	133 621
Saturday									
Day (0600–1800)	4 191	5 762	6 781	5 951	7 052	9 614	11 859	13 494	12 570
Evening (1800–2400)	286	439	440	525	435	543	533	562	161
Night (2400–0600)	0	0	0	0	0	2	290	482	884
Sub total	4 477	6 201	7 221	6 476	7 487	10 159	12 682	14 538	13 615
Sunday									
Day (0600–1800)									
Evening (1800–2400)	4	300	1 660	1 157	538	1 136	1 895	620	274
Night (2400–0600)	511	737	637	908	506	756	989	734	763
Sub total	517	1 624	3 614	3 114	2 491	2 857	6 299	6 149	5 563
Number of VBS timeslots used									
Overall total	91 681	111 183	123 582	124 060	124 814	148 049	150 726	148 112	148 739
Monday– Friday									
Day (0600–1800)	60 005	68 414	71 917	78 856	76 710	87 887	84 595	83 688	82 143
Evening (1800–2400)	23 555	28 850	32 600	30 510	32 170	38 146	36 334	35 634	35 725
Night (2400–0600)	3 779	6 385	8 552	5 474	6 135	9 608	11 817	9 466	12 037
Sub total	87 339	103 649	113 070	114 840	115 015	135 641	132 746	128 788	129 905
Saturday									
Day (0600–1800)	3 582	5 513	6 538	5 652	6 904	9 122	11 060	12 905	12 377
Evening (1800–2400)	281	418	406	516	425	473	507	400	151
Night (2400–0600)	0	0	0	0	0	2	270	414	868
Sub total	3 863	5 931	6 944	6 168	7 329	9 597	11 837	13 719	13 396
Sunday									
Day (0600–1800)	2	580	1 310	1 049	1 447	949	3 370	4 409	4 482
Evening (1800–2400)	4	294	1 632	1 137	522	1 109	1 807	476	269
Night (2400–0600)	473	729	626	866	501	753	966	720	687
Sub total	479	1 603	3 568	3 052	2 470	2 811	6 143	5 605	5 438

Table I.1 Container terminal landside performance indicators (continued)

Port/Indicator	Jun-10	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12
Sydney									
Road									
Total trucks	129 819	151 258	143 299	178 232	180 096	192 911	197 166	172 093	172 636
Total containers ^d	234 419	277 830	270 147	242 479	262 387	274 523	284 285	255 378	250 001
TEUs ^d	352 014	417 430	410 619	412 505	418 370	425 899	439 007	391 855	382 998
Truck turnaround time – mins. ^e	46.2	43.2	45.5	40.1	35.6	36.2	33.8	30.2	30.5
Containers per truck ^e	1.8	1.8	1.9	1.4	1.5	1.4	1.4	1.5	1.4
Avg. container turnaround time – mins. ^e	40.3	37.1	39.1	35.6	31.1	30.8	28.4	24.9	25.2
TEUs per truck ^e	2.3	2.2	2.2	4.3	4.1	3.5	3.4	2.2	2.2
Rail									
Total containers	53 938	50 752	49 699	48 872	49 768	53 152	34 489	43 287	51 492
Number of VBS timeslots available									
Overall total	178 200	201 727	155 426	241 417	267 581	250 158	236 752	204 774	202 853
Monday– Friday									
Day (0600–1800)	76 337	84 784	59 477	115 533	119 576	102 941	92 942	91 636	89 046
Evening (1800–2400)	34 874	40 490	27 227	46 951	50 955	45 204	42 157	41 552	40 567
Night (2400–0600)	30 399	34 821	23 981	38 959	43 169	42 169	41 944	36 847	36 345
Sub total	141 610	160 095	110 685	201 443	213 700	190 314	177 043	170 035	165 958
Saturday									
Day (0600–1800)	11 102	12 338	8 447	16 582	21 747	16 865	17 377	11 145	12 063
Evening (1800–2400)	3 392	3 473	1 525	3 899	5 720	6 079	6 108	1 684	1 457
Night (2400–0600)	5 540	5 478	23 701	2 272	3 529	8 361	8 942	4 524	4 571
Sub total	20 034	21 289	33 673	22 753	30 996	31 305	32 427	17 353	18 091
Sunday									
Day (0600–1800)	08 840	10 479	05 554	8 226	11 081	15 676	14 970	8 802	10 400
Evening (1800–2400)	4 680	6 302	3 740	4 901	5 873	7 463	6 725	4 695	5 021
Night (2400–0600)	3 036	3 562	1 774	4 094	5 931	5 400	5 587	3 889	3 383
Sub total	16 556	20 343	11 068	17 221	22 885	28 539	27 282	17 386	18 804
Number of VBS timeslots used									
Overall total	157 595	181 944	142 674	226 219	251 568	211 348	187 401	191 560	189 934
Monday– Friday									
Day (0600–1800)	71 372	80 702	56 109	110 642	115 042	93 907	79 370	86 495	85 047
Evening (1800–2400)	32 426	38 179	25 393	45 090	49 178	40 584	35 370	38 801	37 563
Night (2400–0600)	29 000	33 390	22 413	36 064	39 830	38 099	33 694	33 792	32 860
Sub total	132 797	152 272	103 914	191 796	204 050	172 590	148 434	159 088	155 470
Saturday									
Day (0600–1800)	9 091	10 009	7 095	14 601	19 773	12 234	13 595	10 504	11 332
Evening (1800–2400)	1 052	0 903	0 261	2 917	4 692	2 329	2 774	1 597	1 298
Night (2400–0600)	2 775	2 452	22 354	2 051	3 022	6 033	6 864	4 215	4 274
Sub total	12 918	13 364	29 710	19 569	27 487	20 596	23 233	16 316	16 904
Sunday									
Day (0600–1800)	5 998	7 669	4 336	6 757	9 448	10 964	9 942	8 430	9 774
Evening (1800–2400)	3 253	5 155	3 121	4 542	5 602	5 123	4 155	4 379	4 751
Night (2400–0600)	2 629	3 484	1 593	3 555	4 981	2 075	1 637	3 347	3 035
Sub total	11 880	16 308	9 050	14 854	20 031	18 162	15 734	16 156	17 560

Table 1.1 Container terminal landside performance indicators (continued)

Port/Indicator	Jun-10	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12
Melbourne									
Road									
Total trucks ^a	201 035	220 245	221 538	199 857	200 625	223 885	222 294	202 906	203 057
Total containers	333 414	350 740	348 268	321 755	336 289	365 938	364 662	333 131	335 347
Total TEUs	479 041	511 430	512 081	467 319	489 840	538 739	533 768	486 122	489 026
Truck turnaround time – mins.	25.7	25.9	25.9	25.4	31.0	32.1	34.6	33.7	33.4
Containers per truck	1.7	1.6	1.6	1.6	1.7	1.6	1.6	1.6	1.7
Avg. container turnaround time –mins.	16.3	16.9	16.8	16.4	19.7	26.4	22.9	22.0	21.6
TEUs per truck	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Rail									
Total containers ^c	19 653	14 958	15 388	11 630	16 929	16 806	17 741	14 242	15 236
Number of VBS timeslots available									
Overall total	245 377	279 323	267 200	265 130	285 647	313 938	289 594	305 189	306 887
Monday– Friday									
Day (0600–1800)	135 286	145 068	138 168	137 041	139 390	157 050	140 905	152 406	154 692
Evening (1800–2400)	47 758	56 157	53 336	54 104	56 979	65 024	60 199	66 055	66 024
Night (2400–0600)	43 331	49 505	47 941	44 600	47 900	52 748	49 856	51 816	51 705
Sub total	226 375	250 730	239 445	235 745	244 269	274 822	250 960	270 277	272 421
Saturday									
Day (0600–1800)	10 608	13 843	13 150	14 656	18 998	19 169	20 654	18 066	19 954
Evening (1800–2400)	1 720	3 655	3 309	2 694	5 251	3 663	2 768	3 725	1 517
Night (2400–0600)	1 698	1 505	1 482	1 336	2 029	2 656	2 883	2 928	3 034
Sub total	14 026	19 003	17 941	18 686	26 278	25 488	26 305	24 719	24 505
Sunday									
Day (0600–1800)	1 770	2 707	2 782	3 859	5 570	4 336	5 490	5 881	5 347
Evening (1800–2400)	1 270	2 522	2 577	2 748	3 502	3 682	2 865	3 774	4 153
Night (2400–0600)	1 936	4 361	4 455	4 092	6 028	5 610	3 974	538	461
Sub total	4 976	9 590	9 814	10 699	15 100	13 628	12 329	10 193	9 961
Number of VBS timeslots used									
Overall total	226 025	256 836	245 313	251 948	269 388	281 538	269 827	273 125	284 478
Monday– Friday									
Day (0600–1800)	128 080	136 825	131 423	133 935	136 211	145 349	132 886	140 487	144 481
Evening (1800–2400)	44 788	53 692	50 296	52 858	55 957	60 685	56 440	62 020	61 936
Night (2400–0600)	40 005	45 850	44 109	42 205	44 965	47 673	48 410	47 692	47 872
Sub total	212 874	236 367	225 827	228 998	237 133	253 707	237 736	250 199	254 289
Saturday									
Day (0600–1800)	7 817	10 573	10 322	12 853	17 266	15 120	19 621	16 050	18 333
Evening (1800–2400)	1 245	2 672	2 451	2 719	4 318	3 257	3 407	374	490
Night (2400–0600)	1 355	1 478	1 271	1 275	2 253	2 219	2 354	2 827	7 652
Sub total	10 417	14 723	14 044	16 847	23 837	20 596	25 382	19 251	26 475
Sunday									
Day (0600–1800)									
Evening (1800–2400)	1 087	2 329	2 307	2 550	3 333	3 201	2 855	3 380	3 612
Night (2400–0600)	1 647	3 417	3 135	3 553	5 085	4 034	3 854	295	102
Sub total	2 734	5 746	5 442	6 103	8 418	7 235	6 709	3 675	3 714

Table I.1 Container terminal landside performance indicators (continued)

Port/Indicator	Jun-10	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12
Adelaide									
Road									
Total trucks	20 409	24 930	25 134	23 798	25 762	28 734	27 385	25 261	27 710
Total containers ^d	31 061	38 691	39 837	38 642	40 105	46 641	46 653	42 025	45 486
TEUs ^d	42 222	52 939	55 295	52 542	55 827	65 453	64 685	57 653	63 082
Truck turnaround time – mins. ^e	28.6	32.5	41.4	31.8	26.9	31.3	29.6	24.7	32.0
Containers per truck ^e	1.5	1.6	1.6	1.6	1.6	1.6	1.7	1.7	1.6
Avg. container turnaround time – mins. ^e	18.8	20.9	26.1	19.6	17.3	19.3	17.4	14.9	19.5
TEUs per truck ^e	2.1	2.1	2.2	2.2	2.2	2.3	2.4	2.3	2.3
Rail									
Total containers	na	na	na	na	na	na	na	na	na
Number of VBS timeslots available									
Overall total	38 008	41 587	39 523	37 869	42 107	45 006	44 263	44 575	43 828
Monday– Friday									
Day (0700–1400)	22 355	24 542	23 523	22 324	24 896	25 393	24 407	24 625	23 841
Evening (1400–2200)	15 653	17 045	16 000	15 545	17 211	19 613	19 856	19 950	19 987
Night (2200 – 0700)	0	0	0	0	0	0	0	0	0
Sub total	38 008	41 587	39 523	37 869	42 107	45 006	44 263	44 575	43 828
Number of VBS timeslots used									
Overall total	27 490	33 891	34 232	27 400	34 885	39 869	38 840	37 308	39 063
Monday– Friday									
Day (0700–1400)	19 371	22 812	22 629	18 931	22 972	24 123	22 210	21 771	22 358
Evening (1400–2200)	8 119	11 079	11 603	8 469	11 913	15 745	16 629	15 537	16 705
Night (2200 – 0700)	0	0	0	0	0	0	0	0	0
Sub total	27 490	33 891	34 232	27 400	34 885	39 869	38 840	37 308	39 063

Table 1.1 Container terminal landside performance indicators (continued)

Port/Indicator	Jun-10	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12
Fremantle									
Road									
Total trucks	50 140	54 404	56 703	51 379	51 052	57 630	58 883	56 643	57 916
Total containers ^d	103 851	114 796	120 980	111 097	111 235	121 273	131 583	124 107	123 799
TEUs ^d	134 355	151 925	163 895	150 306	144 043	163 985	172 297	162 454	151 497
Truck turnaround time – mins. ^e	31.9	37.3	34.6	33.8	34.6	35.0	38.4	32.6	29.8
Containers per truck ^e	1.9	1.9	2.0	2.0	1.9	1.9	1.9	1.9	1.8
Avg. container turnaround time – mins. ^e	19.7	23.1	21.1	20.4	20.7	20.9	22.7	18.6	16.7
TEUs per truck ^e	2.3	2.4	2.4	2.4	2.4	2.5	2.5	2.6	2.6
Rail									
Total containers	12 313	13 684	16 138	10 427	12 178	14 099	14 365	15 338	17 662
Number of VBS timeslots available									
Overall total	86 682	92 521	97 572	102 857	100 208	116 551	122 085	105 393	105 758
Monday– Friday									
Day (0600–1800)	64 613	66 881	68 317	75 084	70 941	81 922	78 045	67 801	66 647
Evening (1800–2400)	19 877	22 122	23 251	23 211	22 456	25 447	26 288	22 839	21 458
Night (2400–0600)	1 104	2 016	3 360	1 468	1 606	3 557	8 253	3 835	6 241
Sub total	85 594	91 019	94 928	99 763	95 003	110 926	112 586	94 475	94 346
Saturday									
Day (0600–1800)	987	1 355	2 458	3 094	4 880	5 330	7 354	7 504	7 438
Evening (1800–2400)	0	0	0	0	205	50	4	132	6
Night (2400–0600)	0	0	0	0	0	2	293	482	884
Sub total	987	1 355	2 458	3 094	5 085	5 382	7 651	8 118	8 328
Sunday									
Day (0600–1800)	2	7	1	0	5	164	1 677	2 748	3 084
Evening (1800–2400)	34	82	94	0	54	79	171	52	0
Night (2400–0600)	65	58	91	0	61	0	0	0	0
Sub total	101	147	186	0	120	243	1 848	2 800	3 084
Number of VBS timeslots used									
Overall total	75 280	82 233	85 493	91 476	90 921	102 583	102 809	93 922	95 076
Monday– Friday									
Day (0600–1800)	59 336	62 700	64 264	70 472	67 777	78 108	73 385	64 404	64 345
Evening (1800–2400)	15 039	18 231	18 617	18 322	18 687	19 386	21 233	19 643	20 345
Night (2400–0600)	0	0	0	0	0	0	0	0	0
Sub total	74 375	80 931	82 882	88 794	86 464	97 494	94 618	84 047	84 690
Saturday									
Day (0600–1800)	870	1 213	2 425	2 682	4 398	4 872	6 433	7 249	7 321
Evening (1800–2400)	0	0	0	0	0	0	0	0	0
Night (2400–0600)	0	0	0	0	0	0	0	0	0
Sub total	870	1 213	2 425	2 682	4 398	4 872	6 433	7 249	7 321
Sunday									
Day (0600–1800)	2	7	55	0	5	148	1 644	2 576	3 065
Evening (1800–2400)	33	82	131	0	54	69	114	50	0
Night (2400–0600)	0	0	0	0	0	0	0	0	0
Sub total	35	89	186	0	59	217	1 758	2 626	3 065

Notes to table 1.1

na not available

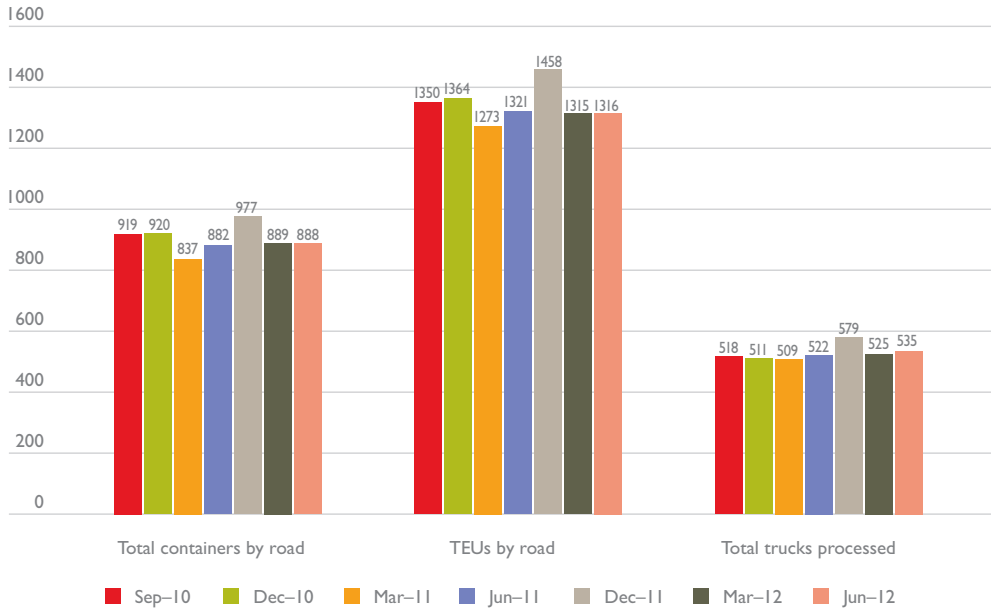
VBS stands for vehicle booking system.

- a. For Sydney, Brisbane, Adelaide and Fremantle, only trucks participating in VBS system are reported. For Melbourne, trucks working in bulk runs are reported and added to totals.
- b. Truck turnaround time in Brisbane includes some truck waiting time outside the terminal gate.
- c. This data is incomplete because stevedores do not collect all rail data.
- d. At Brisbane, Sydney and Melbourne counts of containers are provided by stevedoring companies and include both VBS counts and bulk runs.
At Fremantle, container counts are provided by the Fremantle Port Authority and cover VBS counts, bulk runs and containers hauled by rail which were previously not counted.
- e. Based on VBS counts only.

- 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, DP World.

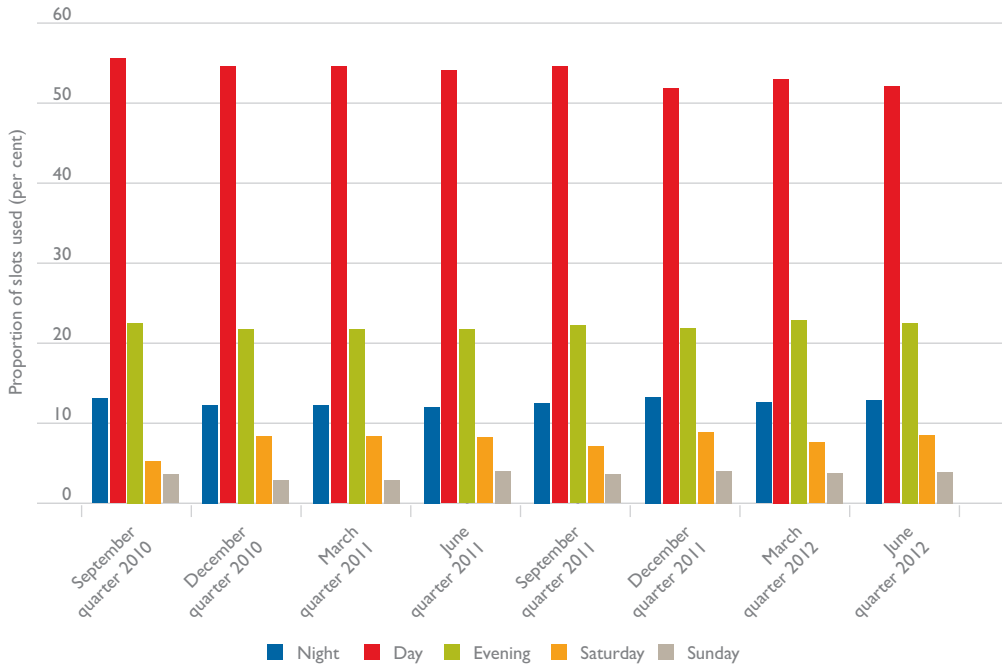
Figure 1.1 Five major ports: landside of container terminal – size of task indicators



- Note :
1. The counts of containers by road, TEUs by road and trucks processed include operations under the vehicle booking system and bulk runs.
 2. For Sydney BITRE estimates for Dec. quarter 2010 were used, as one of the stevedores landside data was not provided from the 7th Nov. to 31 Dec. 2010 due to computer problems.

Sources: Patrick and DP World.

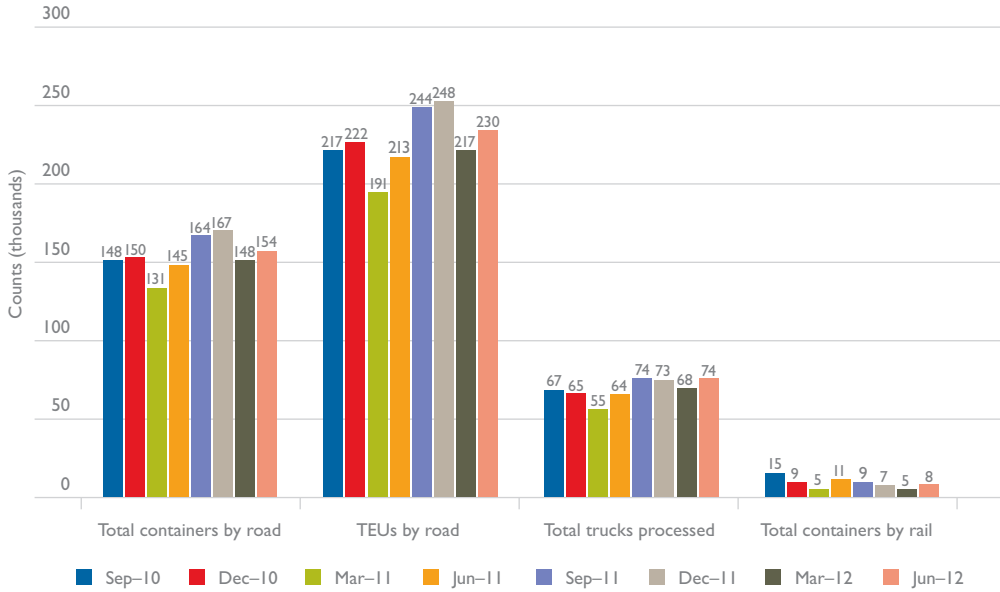
Figure I.2 Five ports: adjusted vehicle booking system time usage



- Note:
1. The definitions of the time windows are as follows: Night (2400–0600 Monday to Friday), Day (0600–1800 Monday to Friday) and Evening (1800–2400 Monday to Friday).
 2. For Sydney BITRE estimates for Dec. quarter 2010 were used, as one of the stevedores landside data was not provided from the 7th Nov. to 31 Dec. 2010 due to computer problems.

Sources: Patrick and DP World.

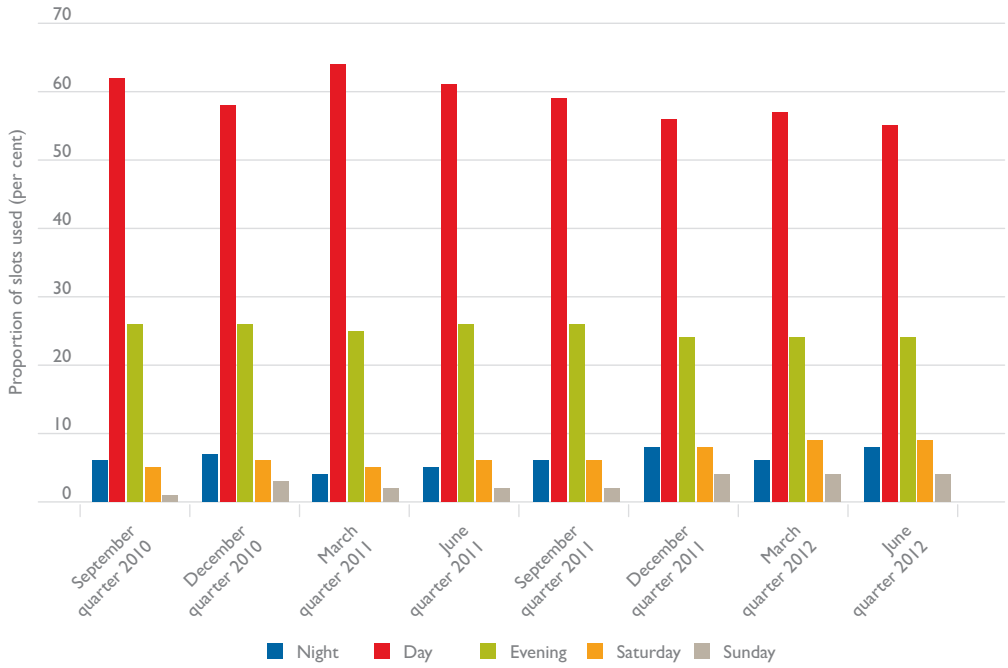
Figure I.3 Brisbane: landside of container terminal – size of task indicators



Note: 1. The counts of containers by road, TEUs by road and trucks processed include operations under the vehicle booking system and bulk runs.

Sources: Patrick and DPWorld.

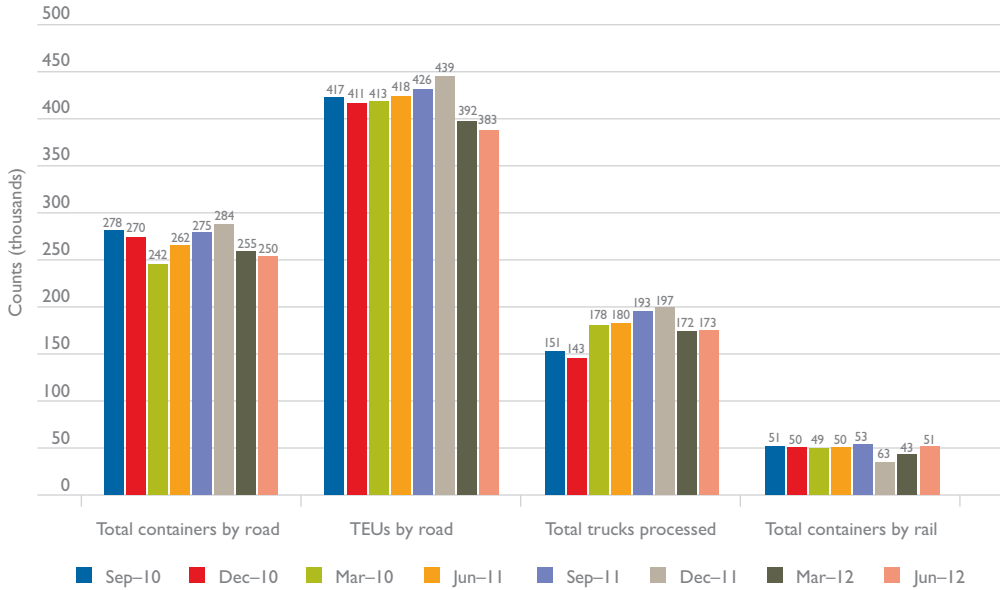
Figure I.4 Brisbane: adjusted vehicle booking system time usage



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

Sources: Patrick and DP World.

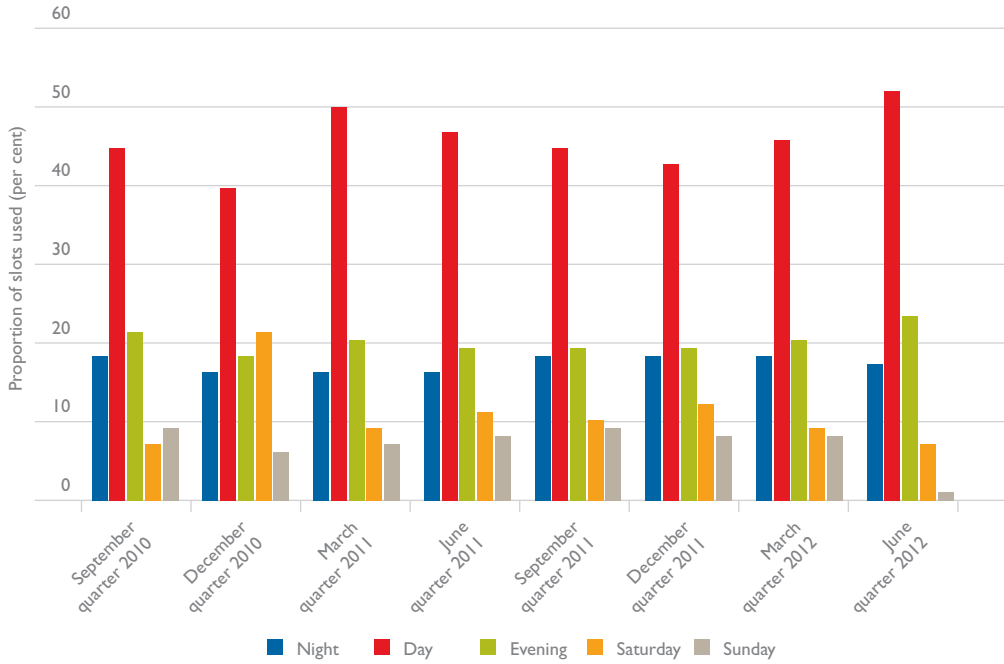
Figure I.5 Sydney: landside of container terminal – size of task indicators



- Note:
1. The counts of containers by road, TEUs by road and trucks processed include operations under the vehicle booking system and bulk runs.
 2. For Sydney BITRE estimates for Dec. quarter 2010 were used, as one of the stevedores landside data was not provided from the 7th Nov. to 31 Dec. 2010 due to computer problems.

Sources: Patrick and DP World.

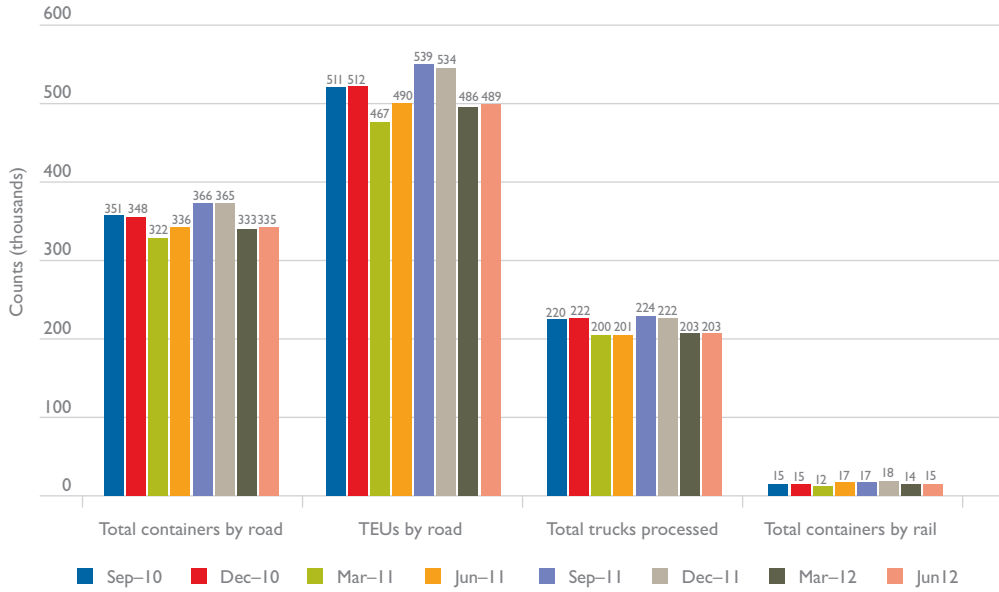
Figure I.6 Sydney: adjusted vehicle booking system usage



Note: 1. The definitions of the time windows are as follows: Night (2400–0600 Monday to Friday), Day (0600–1800 Monday to Friday) and Evening (1800–2400 Monday to Friday).
 2. For Sydney BITRE estimates for Dec. quarter 2010 were used, as one of the stevedores landside data was not provided from the 7th Nov. to 31 Dec. 2010 due to computer problems.

Sources: Patrick and DP World.

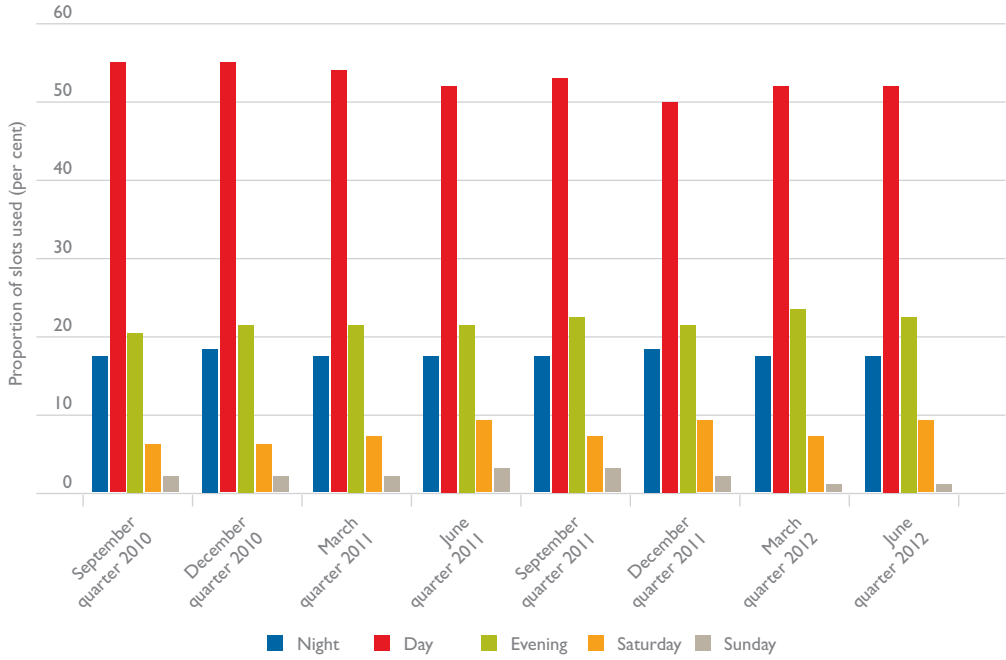
Figure I.7 Melbourne: landside of container terminal – size of task indicators



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

Source: Patrick and DP World.

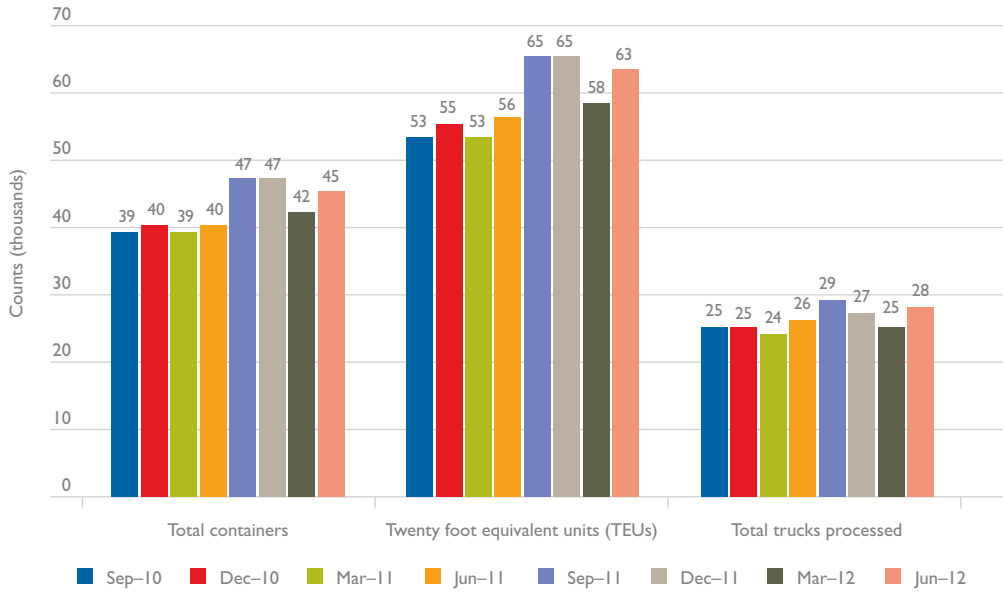
Figure I.8 Melbourne: adjusted vehicle booking system usage



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

Sources: Patrick and DP World.

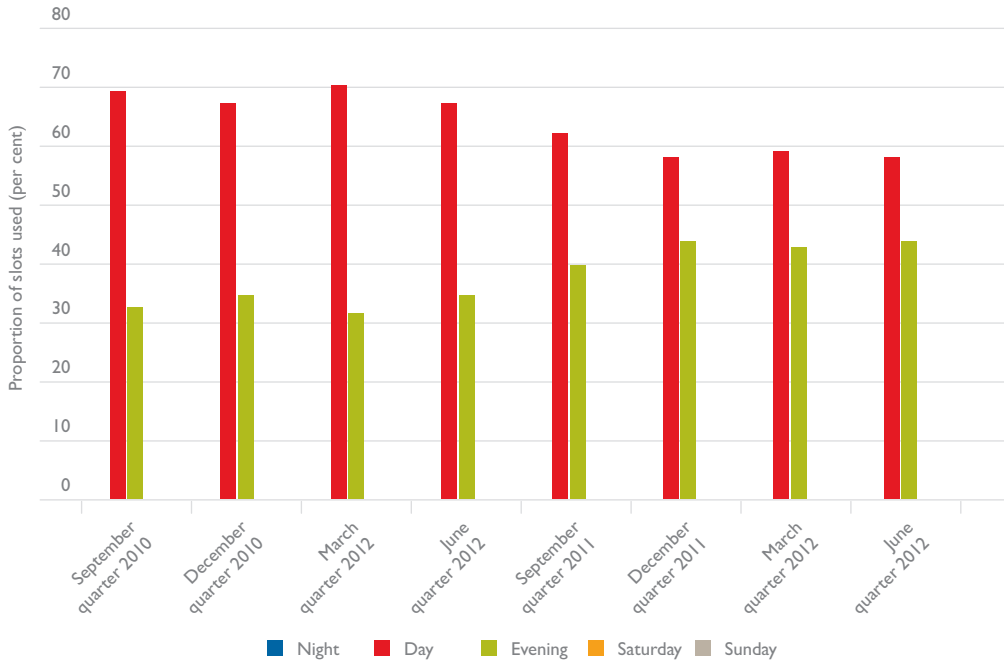
Figure I.9 Adelaide: landside of container terminal – size of task indicators



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

Sources: Patrick and DP World.

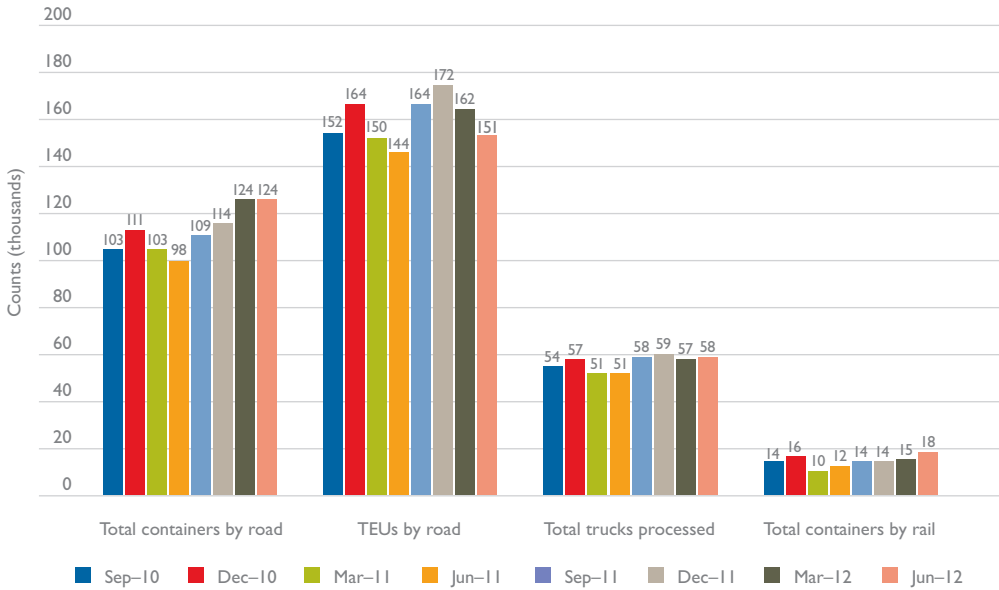
Figure 1.10 Adelaide: adjusted vehicle booking system usage



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

Sources: Patrick and DP World.

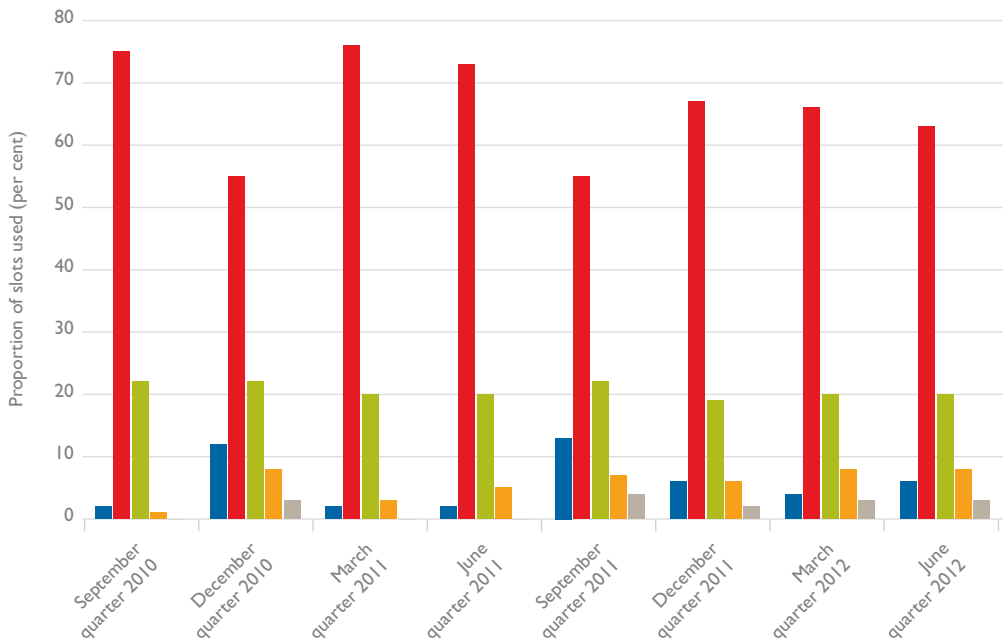
Figure I.11 Fremantle: landside of container terminal – size of task indicators



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

Sources: Patrick and DP World.

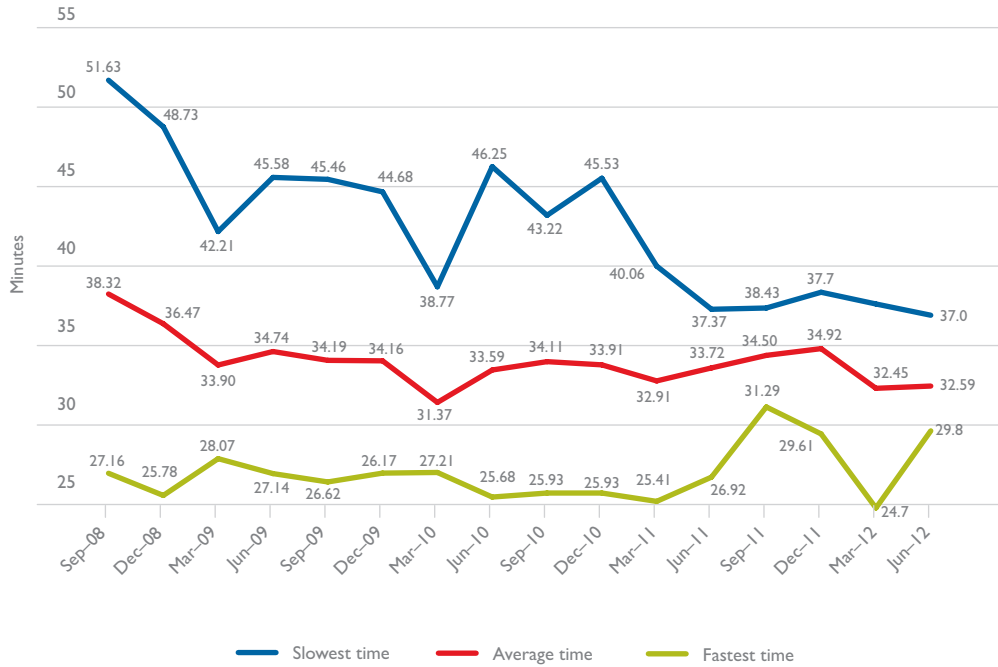
Figure I.12 Fremantle: adjusted vehicle booking system usage



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

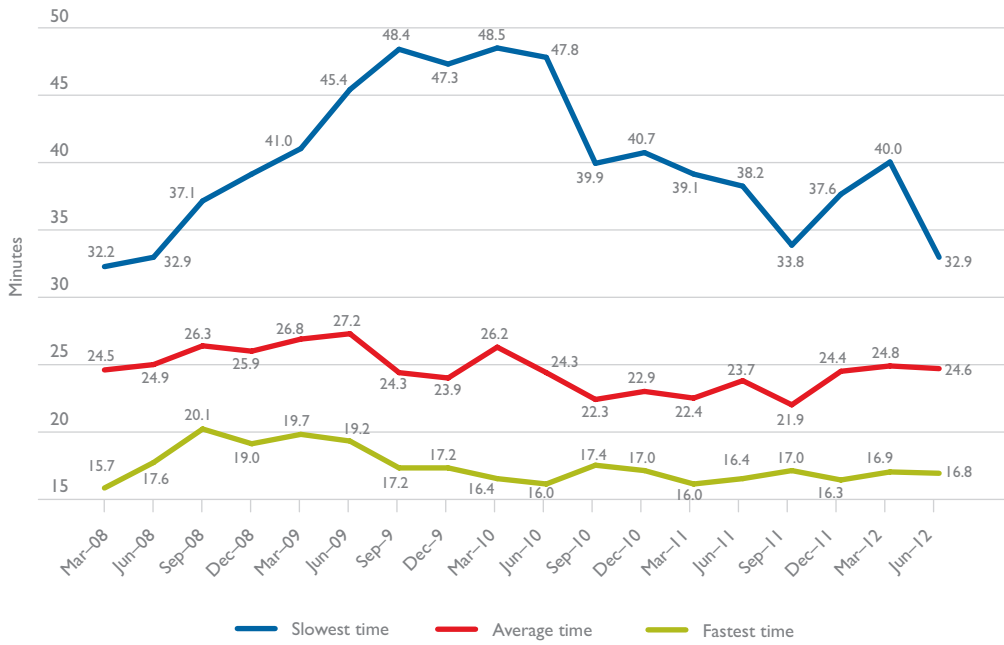
Sources: Patrick and DP World.

Figure I.13 Productivity of truck turnaround – five ports: fastest, average and slowest times achieved



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

Figure I.14 Productivity in terms of container turnaround – five ports: fastest, average and slowest times achieved



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

Sources: Patrick and DP World.

CHAPTER 2

Stevedoring productivity

Overview

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 measures of productivity are the crane rate, the vessel working rate and the ship rate. The crane rate is the number of containers a dockside crane operator lifts on or off a container ship in an hour. The vessel working rate is a measure of the productivity of the stevedores on board a container ship in loading and unloading containers. The ship rate is the rate at which a ship is unloaded.

Stevedoring productivity indicators are presented in Table 2.1 Table 2.2 and Figures 2.1 to Figure 2.8. The notes below provide explanation of the concepts being measured, the scope of the measurement and highlights any qualifications that should be borne in mind by users of the data. The variables are discussed in the order they appear in Table 2.1.

The three measures look at different aspects of this productivity, although all are measured in containers per hour:

The *crane rate* is the number of containers a dockside crane lifts on or off a container ship in an hour (this is a measure of the productivity of capital – how many containers a crane moves in an hour).

The *vessel working rate* is the number of containers the stevedores on board a container ship move in loading and unloading a ship divided by the amount of labour time (this is a measure of the productivity of labour – how many containers a person moves in an hour).

The *ship rate* is the rate at which a ship is unloaded (this is estimated as the product of the crane rate and the number of cranes working a vessel – how many containers are moved on or off a ship in an hour).

All measures exclude periods when work stops (for instance because of bad weather) from the hours counted. The measures can be expressed as either containers per hour or a standardised measure of Twenty-foot Equivalent Units (TEUs) an hour.

Explanatory notes

Five ports

Data under this heading relate to simple sums of, or other form of aggregation of data for the five capital city port terminals: Brisbane, Sydney, Melbourne, Adelaide and Fremantle.

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. A stevedoring company also may contract with a terminal owner to manage all terminal operations. Many large container ship operators have established in-house stevedoring operations to handle cargo at their own terminals and to provide stevedoring services to other container carriers. In Australia, the two major stevedoring companies are Toll/Patrick and PO Ports/Dubai Ports World.

Ships handled

Only fully cellular ships used as such are included in calculations. Fully cellular ships are defined as purpose built container ships equipped with 40-foot cell guides below deck as a minimum. Such vessels are excluded if used for mixed cargoes of containers and general cargo.

Total containers handled

This is the total number of containers lifted on/off fully cellular ships in a given period. They should not be confused with TEUs. "Twenty foot equivalent units" is universally recognised as a measure of containers which aggregates both twenty foot and forty foot containers into twenty foot units for statistical purposes. Counts include transhipped containers and thus total container count on the wharf-side tends to be more than those on the landside of the container terminal.

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. Counts include transhipped containers and thus total container count on the wharf-side tends to be more than those on the landside of the container terminal. Table 2.2 presents the stevedoring productivity indicators in terms of TEUs per hour. These are not directly comparable with the data in Table 2.1 because indicators based on TEUs per hour are affected by changes in the mix of 20-foot and 40-foot containers from one period to the next.

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 (defined below).

Elapsed Crane Time

This is defined as the total allocated crane hours, less operational and non-operational delays. This is the total allocated crane hours, assuming that the vessel is ready for working, less the following operational and non-operational delays:

- No labour allocated
- Closed-port holiday
- Port-wide industrial stoppage
- Total crane time spent handling break-bulk cargo and containers that require manual intervention, e.g. use of wires, chains, non-rigid spreaders or other handling gear
- Award or enterprise agreement breaks as applicable
- Adverse weather
- Delays caused by the ship or its agent
- All breakdowns, including spreader changes
- Other equipment breakdowns which stop crane operations
- Booming up for passing ships
- Handling hatch covers
- Cage work and lashing/unlashing where crane operations are affected
- Crane long-travelling between hatches and crossing accommodation

- Labour withdrawn without operator's agreement including enterprise agreement related industrial stoppages
- Over-dimensional containers requiring additional (rigid) spreader
- Spreader changes
- Waiting for export cargo
- Defective ship's gear (e.g. jammed twist-locks, broken cell guides, ballast pumps unable to maintain list/trim, etc.).

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.

Vessel working rate (containers per hour)

This indicator measures labour productivity at a port terminal and is computed as the total containers handled divided by the elapsed labour time (in hours), defined below. Sometimes the vessel working rate is referred to as the 'elapsed labour rate'.

Elapsed Labour Time

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

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

For a given worker, the elapsed labour time is estimated as the difference between the time when workers first board the ship and the time when they last leave the ship, less the time when the workers have not worked for whatever reason.

Ship rate (containers per hour)

This 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 product of the net crane rate and the crane intensity, defined below.

Crane Intensity

Crane intensity is the total number allocated crane hours, divided by the elapsed labour time.

Stevedoring variability

This is sometimes called the stevedoring rate. It is the percentage of vessels where the crane rate is within ± 2 units per hour of the terminal average.

Throughput pbm (TEUs per berth metre)

This is the number of TEUs handled per metre of berth. 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.

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

Port / Indicator	Jun-09	Sep-09	Dec-09	Mar-10	Jun-10	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12
Five ports													
Ships handled	925	932	940	878	880	971	1 003	959	963	1 027	1 066	974	983
Total containers	853 558	933 578	1 037 498	933 580	958 584	1 048 214	1 061 560	961 423	998 301	1 094 859	1 100 375	1 001 363	1 029 588
Crane rate	29.8	29.9	29.5	29.0	28.7	29.1	29.4	29.9	28.2	28.5	29.1	28.6	30.1
Vessel working rate	39.4	41.7	42.2	42.2	40.6	41.7	41.8	42.6	39.4	38.7	41.0	34.9	43.6
Crane time not worked (per cent)	18.9	20.2	19.8	18.9	19.5	19.9	20.4	20.1	20.5	22.4	20.9	33.1	23.9
40-foot containers (per cent)	42.0	46.2	47.9	46.0	45.3	46.6	46.7	46.5	47.0	48.7	48.0	47.5	48.1
Ship rate	48.5	52.2	52.6	52.0	50.4	52.1	52.5	53.3	49.6	49.9	51.8	52.2	57.3
Throughput pbm	120	131	145	131	134	147	149	135	140	153	154	140	144
Brisbane													
Ships handled	191	188	202	182	181	214	208	197	202	236	248	225	225
Total containers	137 896	152 392	168 978	141 210	155 133	169 162	172 728	146 382	164 176	178 200	179 995	158 231	169 935
Crane rate	26.9	27.2	27.6	27.3	28.8	30.9	31.8	32.0	30.9	30.7	30.6	31.0	30.7
Vessel working rate	30.8	33.3	34.7	35.6	38.7	38.5	39.8	39.4	38.9	38.3	37.5	38.1	38.1
Crane time not worked (per cent)	21.2	22.5	22.5	21.8	18.8	19.6	19.1	20.9	20.6	21.8	21.6	21.0	22.2
40-foot containers (per cent)	43.4	47.1	49.5	47.3	44.6	46.1	40.4	47.4	47.3	49.0	48.0	48.4	49.5
Stevedoring variability (per cent)	50.2	33.9	37.1	36.1	36.5	42.0	37.0	35.7	39.8	37.8	38.8	38.2	33.2
Ship rate	39.1	42.9	44.7	45.5	47.7	47.9	49.2	49.8	49.1	49.0	47.9	48.3	49.0
Throughput pbm	86	95	105	88	97	105	107	91	102	111	112	98	106

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

Port / Indicator	Jun-09	Sep-09	Dec-09	Mar-10	Jun-10	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12
Sydney													
Ships handled	275	276	279	257	255	286	280	275	263	282	293	271	264
Total containers	283 416	315 905	361 971	314 600	327 800	362 560	345 408	329 003	333 463	354 464	351 323	320 752	314 187
Crane rate	29.9	29.9	28.2	27.4	26.2	27.1	27.0	27.3	26.6	25.8	27.1	27.9	29.9
Vessel working rate	37.7	39.3	38.8	38.2	34.1	38.5	39.4	37.2	35.7	32.5	38.0	39.3	43.9
Crane time not worked (per cent)	21.2	21.8	20.5	20.2	22.9	20.5	20.8	22.6	22.7	28.0	24.0	20.6	28.4
40-foot containers (per cent)	44.0	47.3	49.7	47.2	47.3	47.8	48.0	47.8	48.4	49.9	49.7	48.8	48.9
Stevedoring variability (per cent)	47.2	46.0	49.3	38.5	43.9	49.5	28.7	57.8	56.6	55.3	48.2	51.3	47.9
Ship rate	47.9	50.3	48.9	47.9	44.2	48.5	49.8	48.1	46.2	45.2	50.0	49.5	61.3
Throughput pbm	146	163	186	162	169	187	178	169	172	183	181	165	162
Melbourne													
Ships handled	266	274	275	253	253	285	300	277	286	309	312	286	293
Total containers	293 258	321 229	348 091	329 944	332 501	359 440	378 290	332 413	347 209	390 931	399 633	361 526	373 632
Crane rate	31.4	31.9	32.0	32.1	31.9	31.3	31.2	32.0	28.8	30.4	30.9	28.9	30.1
Vessel working rate	49.2	52.4	52.8	52.1	51.4	50.5	47.2	52.1	46.7	48.1	49.6	30.8	49.9
Crane time not worked (per cent)	15.2	17.1	16.9	16.4	16.8	18.5	19.0	16.5	17.6	18.0	17.5	48.9	18.0
40-foot containers (per cent)	40.7	46.3	47.8	45.6	45.3	46.8	49.1	46.7	46.9	48.5	47.3	48.8	48.9
Stevedoring variability (per cent)	41.3	39.0	42.7	45.1	47.2	49.2	50.1	52.3	53.1	53.1	54.0	45.1	48.8
Ship rate	58.0	63.2	63.5	62.3	61.7	61.9	58.2	62.4	56.7	58.7	60.1	60.2	60.8
Throughput pbm	160.6	175.9	190.6	180.7	182.1	196.8	207.2	182.0	190.1	214.1	218.9	198.0	204.6

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

Port / Indicator	Jun-09	Sep-09	Dec-09	Mar-10	Jun-10	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12
Adelaide													
Ships handled	60	59	59	58	59	59	71	72	75	76	75	75	83
Total containers	49 912	51 500	53 632	50 824	50 352	53 405	55 304	55 779	54 429	61 979	54 429	53 456	62 407
Crane rate	26.9	25.2	26.4	25.7	25.4	27.6	27.5	28.0	27.7	26.7	27.7	25.9	26.0
Vessel working rate	31.8	33.3	35.2	38.4	34.1	37.8	35.8	37.3	38.8	35.9	38.8	38.1	39.7
Crane time not worked (per cent)	7.6	14.2	15.8	11.1	10.7	12.4	14.7	15.0	14.4	15.3	14.4	11.4	12.6
40-foot containers (per cent)	35.0	37.4	36.0	36.2	37.3	37.1	39.2	35.9	38.4	38.9	38.4	38.6	37.6
Stevedoring variability (per cent)	na	na	na	na	na	na	na	na	na	na	na	na	na
Ship rate	34.4	38.8	41.8	43.2	38.2	43.2	42.0	43.8	45.3	42.3	45.3	43.0	45.5
Throughput pbm	106	110	114	108	107	114	118	119	116	132	116	114	133
Fremantle													
Ships handled	133	135	125	128	132	127	144	138	137	124	138	117	118
Total containers	89 076	92 552	104 826	97 002	92 798	103 647	109 830	97 846	99 024	109 285	114 995	107 398	109 427
Crane rate	29.9	29.8	30.3	27.6	27.5	26.5	27.9	29.7	27.3	27.8	27.6	27.4	31.9
Vessel working rate	29.7	31.3	34.4	32.9	31.9	29.6	36.8	35.8	27.5	27.7	26.5	29.0	32.2
Crane time not worked (per cent)	28.6	28.3	27.9	25.6	26.5	29.1	28.7	28.9	29.7	30.3	29.5	33.0	40.1
40-foot containers (per cent)	41.9	45.8	45.7	46.7	44.2	47.3	47.9	46.1	46.3	50.3	50.1	42.3	47.1
Stevedoring variability (per cent)	46.7	38.7	43.4	47.0	41.7	42.0	36.1	42.0	47.9	40.8	49.7	35.6	33.1
Ship rate	41.6	43.6	47.8	44.2	43.4	41.8	51.6	50.3	39.1	39.7	37.6	43.2	53.8
Throughput pbm	69.0	71.7	81.2	75.1	71.9	80.3	85.0	75.8	76.7	84.6	89.0	83.2	84.7

na not available

r revised

pbm per berth metre

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

Sources: Patrick, DPWorld.

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

Port / Indicator	Jun-09	Sep-09	Dec-09	Mar-10	Jun-10	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12
Five Ports													
Ships handled	925	932	940	878	880	971	1 003	959	963	1 027	1 066	974	983
Total teus	1 212 340	1 364 981	1 534 762	1 363 332	1 393 150	1 536 512	1 556 991	1 408 291	1 467 073	1 627 936	1 628 966	1 476 816	1 524 739
Crane rate	42.7	43.7	43.8	42.3	41.6	42.7	43.2	43.8	41.4	42.3	43.2	42.2	44.5
Vessel working rate	55.9	61.0	62.5	61.6	59.1	61.2	62.0	56.9	58.0	58.4	60.6	61.3	64.7
Ship rate	69.6	76.4	78.2	76.0	73.4	76.4	77.3	78.1	73.0	74.3	76.7	77.1	85.1
Brisbane													
Ships handled	191	188	202	182	181	214	208	197	202	236	248	225	225
Total teus	197 793	224 152	252 673	208 060	224 323	247 098	242 492	215 812	241 798	265 590	266 453	234 738	253 982
Crane rate	38.4	39.8	41.0	40.2	41.6	45.2	44.9	47.2	45.4	45.8	45.3	46.0	45.9
Vessel working rate	44.1	48.9	51.8	52.6	55.9	56.2	59.1	58.0	57.3	57.0	55.5	56.5	57.0
Ship rate	55.8	62.9	66.8	67.3	69.0	70.0	69.8	73.4	72.3	73.0	70.9	71.6	73.3
Sydney													
Ships handled	275	276	279	257	255	286	280	275	263	282	293	271	264
Total teus	408 159	465 307	541 938	463 230	482 719	535 848	511 070	486 205	494 873	531 410	525 877	477 315	467 678
Crane rate	43.4	43.8	42.5	40.3	38.5	40.0	39.9	40.3	39.4	38.6	40.6	41.1	44.3
Vessel working rate	54.3	58.0	58.1	56.3	50.2	56.9	58.2	55.0	53.1	51.1	56.9	58.2	65.2
Ship rate	69.4	73.7	73.7	70.6	65.0	71.6	73.5	71.0	68.6	67.7	74.9	73.4	91.4
Melbourne													
Ships handled	266	274	275	253	253	285	300	277	286	309	312	286	293
Total teus	412 653	469 802	514 533	480 498	483 141	527 714	564 005	487 574	510 151	580 553	588 727	537 864	556 222
Crane rate	45.2	46.8	47.4	46.7	46.3	46.0	46.6	46.9	42.3	45.0	45.5	43.0	44.8
Vessel working rate	69.3	76.5	78.0	75.9	74.9	74.2	70.3	60.6	68.8	71.7	73.2	72.9	74.3
Ship rate	83.5	92.6	94.1	90.7	89.9	91.1	86.8	91.6	83.5	87.3	88.7	89.6	90.5

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

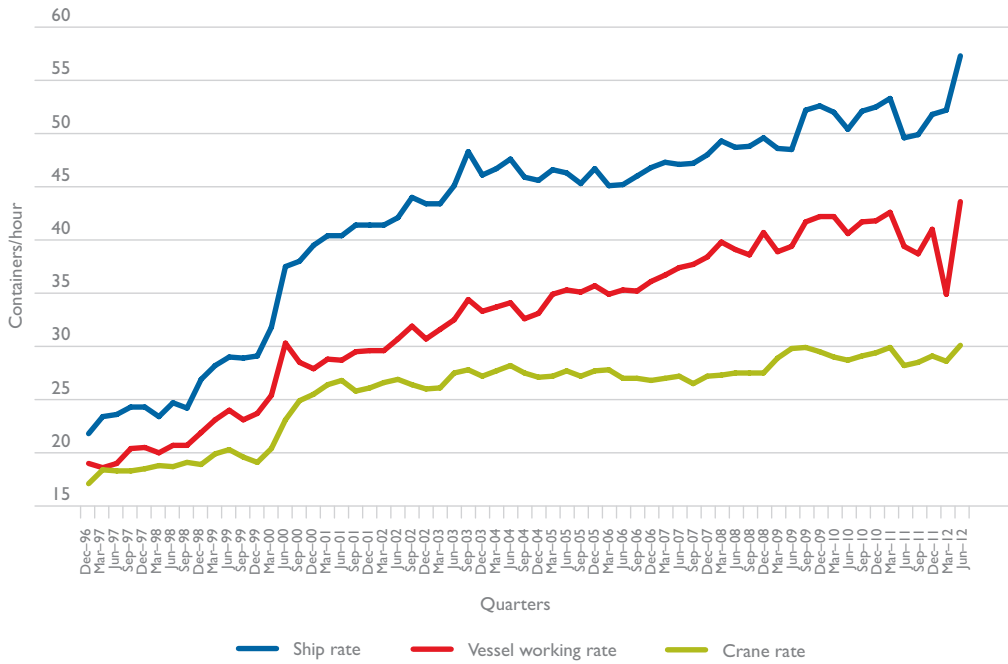
Port / Indicator	Jun-09	Sep-09	Dec-09	Mar-10	Jun-10	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12
Adelaide													
Ships handled	60	59	59	58	59	59	71	72	75	76	75	75	83
Total teus	67 378	70 747	72 937	69 230	69 135	73 225	76 968	75 779	75 348	86 092	75 348	74 087	85 885
Crane rate	36.3	34.7	35.9	35.0	34.9	37.8	38.3	38.0	38.3	37.1	38.3	36.0	35.8
Vessel working rate	42.9	45.7	47.9	52.3	46.9	51.9	49.8	50.6	53.7	49.8	53.7	52.8	54.7
Ship rate	46.4	53.3	56.9	58.8	52.5	59.2	58.4	59.6	62.7	58.8	62.7	59.6	62.6
Fremantle													
Ships handled	133	135	125	128	132	127	144	138	137	124	138	117	118
Total teus	126 357	134 973	152 681	142 314	133 832	152 627	162 456	142 921	144 903	164 291	172 561	152 812	160 972
Crane rate	42.4	43.5	44.1	40.2	39.7	39.1	41.3	43.3	39.9	41.8	41.6	39.5	47.0
Vessel working rate	42.1	45.7	50.3	48.2	46.0	43.6	54.5	52.3	40.3	41.4	39.8	41.7	47.5
Ship rate	59.0	63.9	69.8	64.4	62.7	61.6	76.4	73.5	57.2	59.5	56.4	61.8	79.1

na not available

Notes 1. Data from CSX World Terminals at Brisbane are incorporated from the December quarter 1999 onwards.

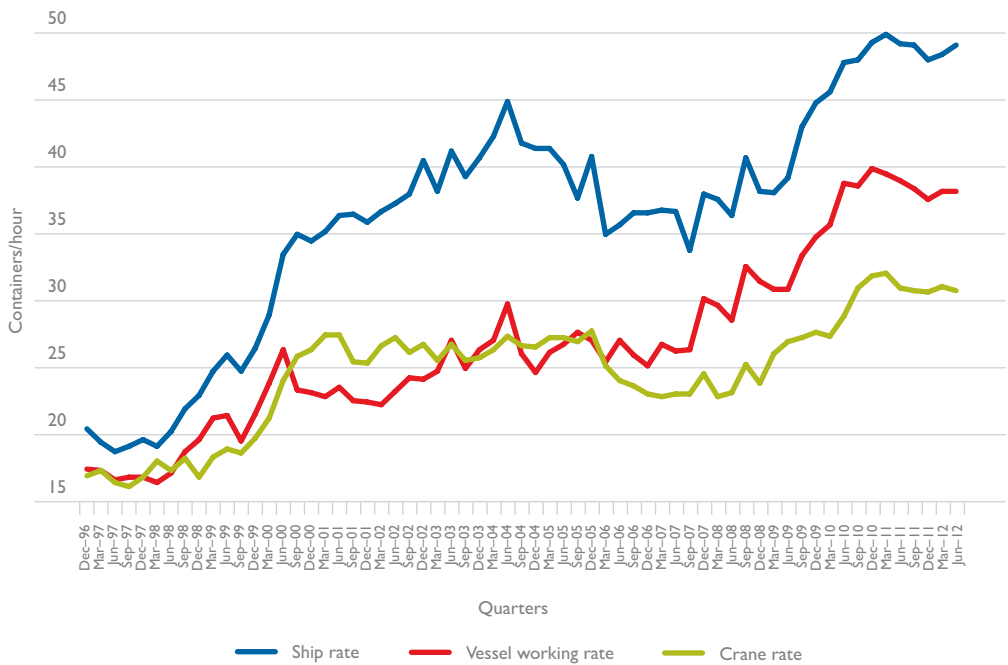
Sources: Patrick DP World.

Figure 2.1 Five ports: productivity in containers per hour



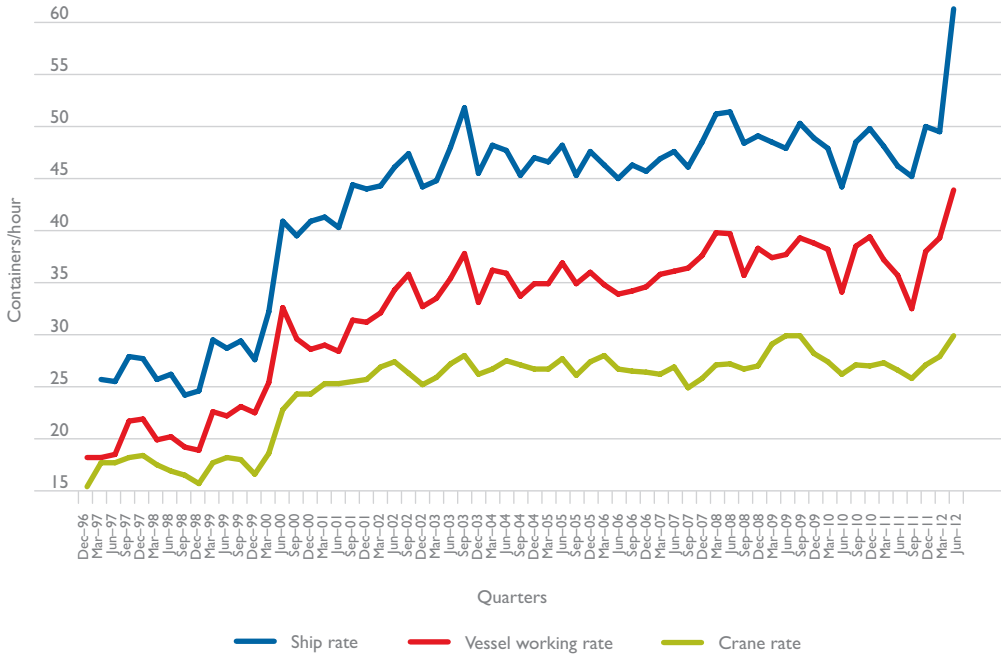
Note: These figures are based on data in Table 2.1. See explanatory notes for definition of terms.
Sources: Patrick and DP World.

Figure 2.2 Brisbane: productivity in containers per hour



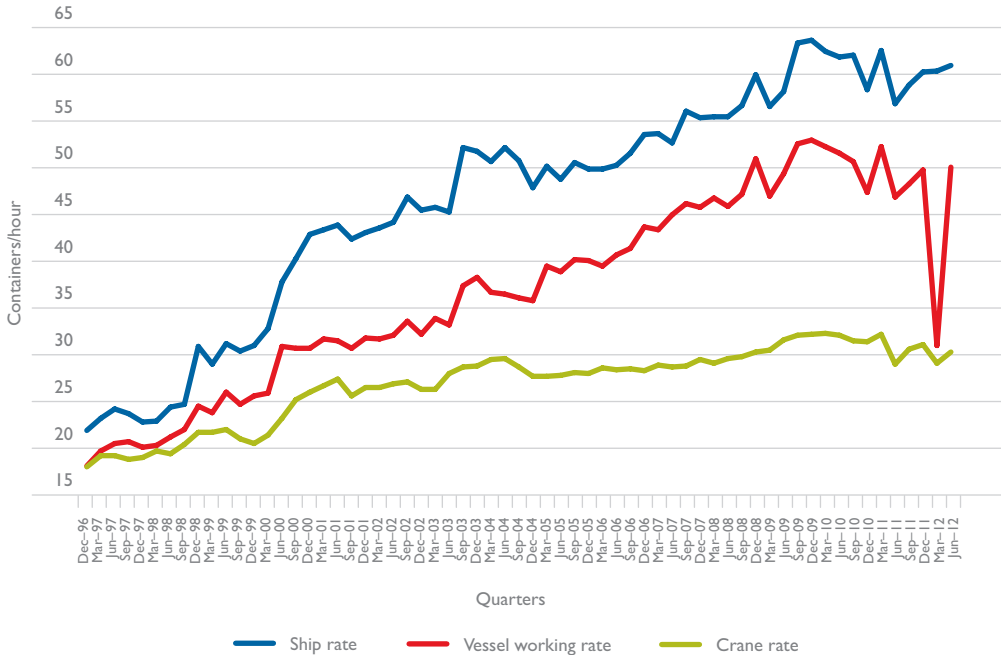
Note: These figures are based on data in Table 2.1. See explanatory notes for definition of terms.
Sources: Patrick and DP World.

Figure 2.3 Sydney: productivity in containers per hour



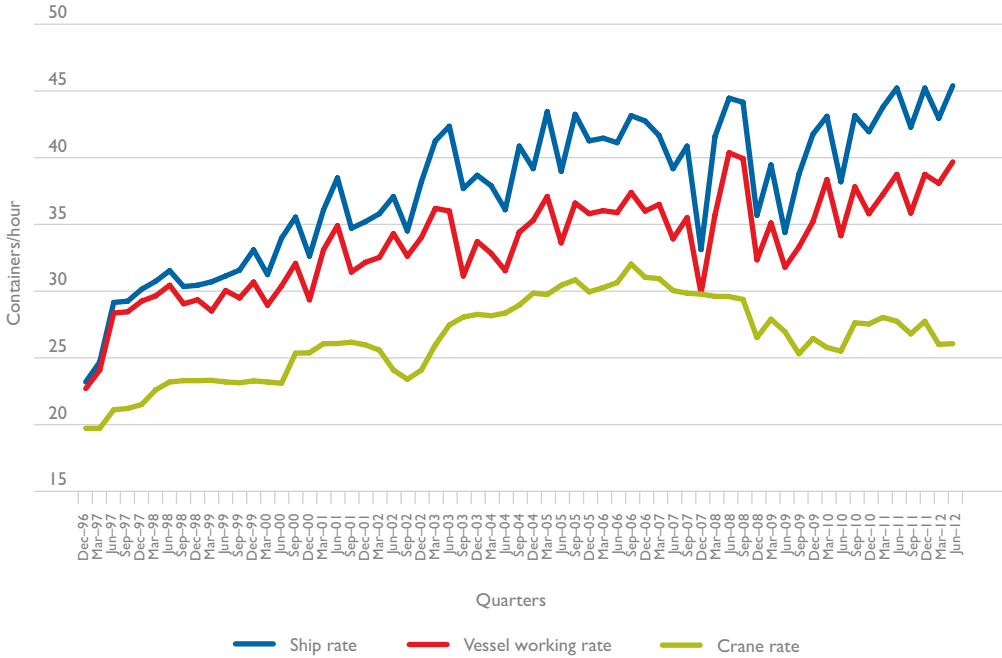
Note: These figures are based on data in Table 2.1. See explanatory notes for definition of terms.
 Sources: Patrick and DP World.

Figure 2.4 Melbourne: productivity in containers per hour



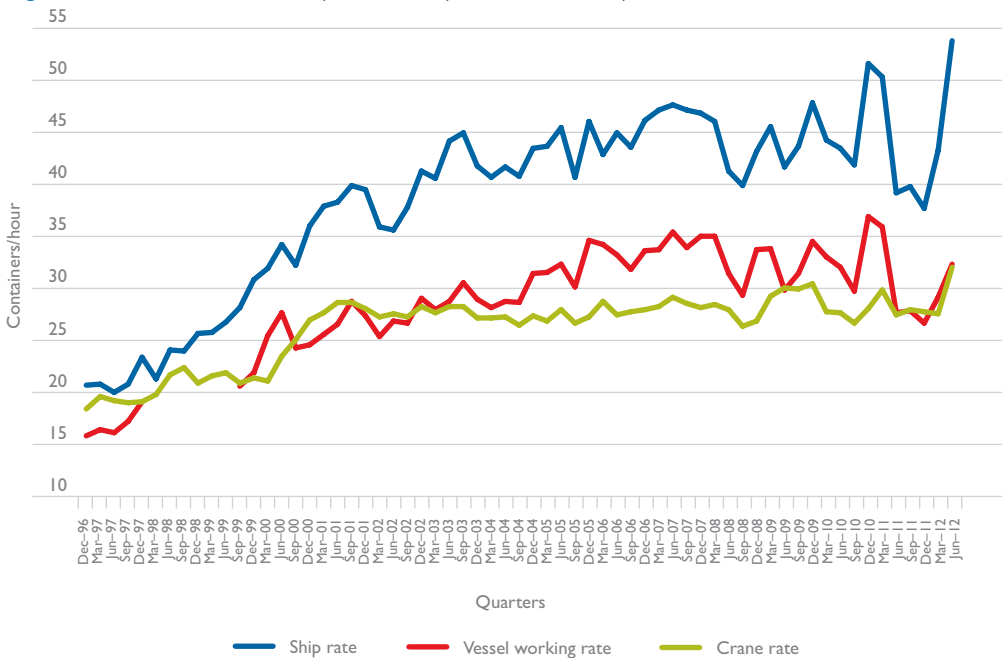
Note: These figures are based on data in Table 2.1. See explanatory notes for definition of terms.
 Sources: Patrick and DP World.

Figure 2.5 Adelaide: productivity in containers per hour



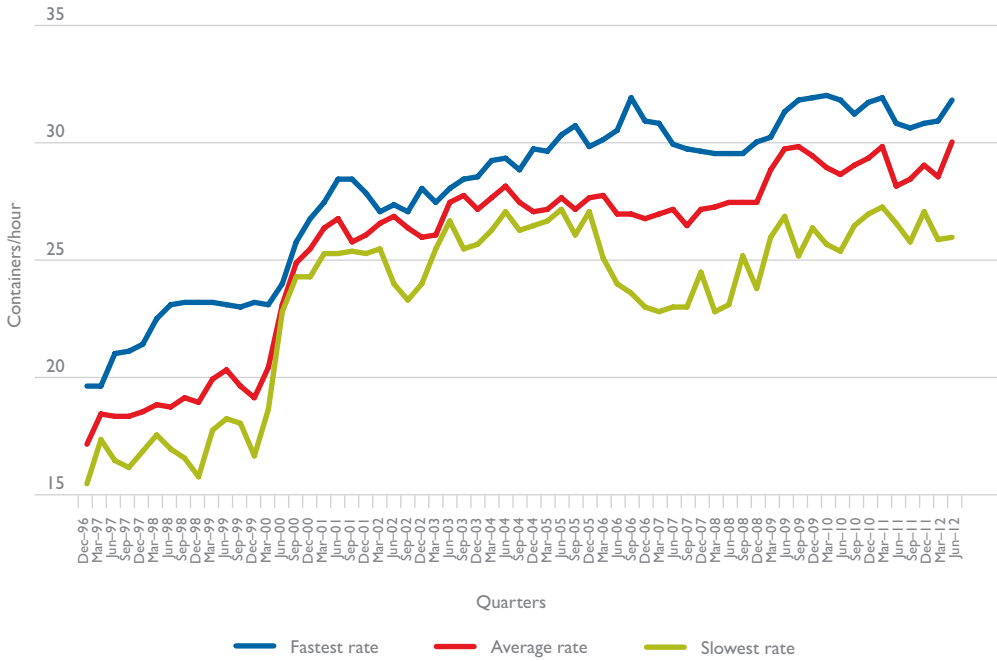
Note: These figures are based on data in Table 2.1. See explanatory notes for definition of terms.
 Sources: Patrick and DP World.

Figure 2.6 Fremantle: productivity in containers per hour



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

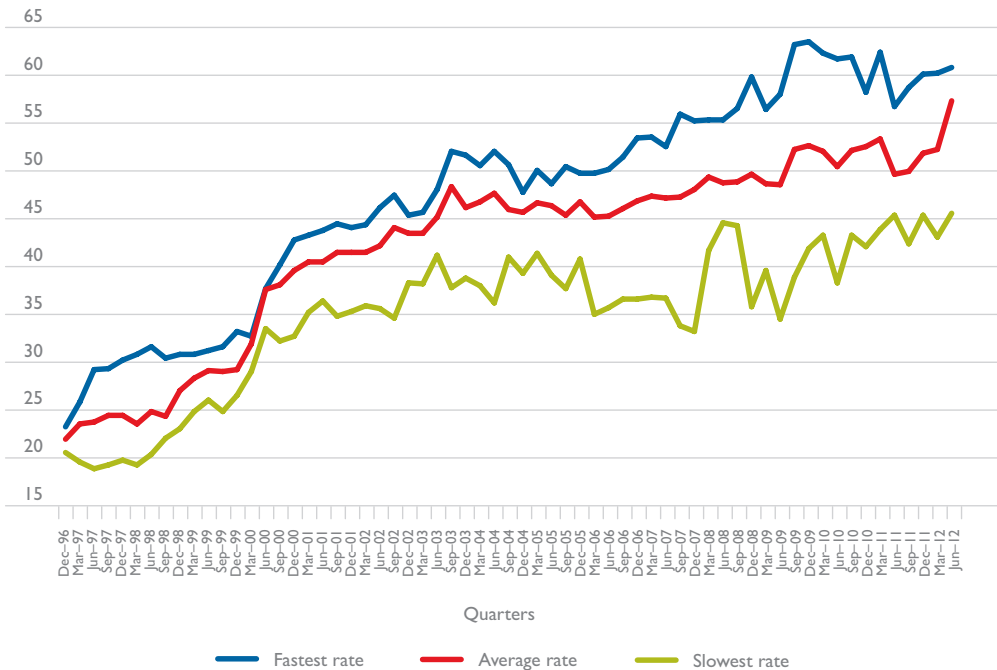
Figure 2.7 Productivity – five ports fastest, average and slowest crane rates achieved



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

Sources: Patrick and DP World.

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



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

Sources: Patrick and DP World.

CHAPTER 3

Port interface cost index

Overview

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. Data 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.

Explanatory notes

Vessel size

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

Parameters

The Port Interface Cost Index (PICI) has as its starting point the estimation of parameters for two typical sizes of container ships:

- 9 991 GT vessel represents all vessels of sizes ranging from 5 000 to 20 000;
- 37 394 GT vessel represents all vessels of sizes ranging from 35 000 to 40 000
- 53 324 GT vessel represents all vessels of sizes ranging from 50 000 to 55 000.

These parameters enable the PICI charges to be estimated on a per TEU basis. The parameters are summarised in Table 3.1 and they are:

- Average TEU exchanged for each vessel size;
- Average number of port calls; and
- Elapsed berth time (hours).

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 3.4. 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 Table 3.5 for the 35 000–40 000 GT ship category. 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. Together 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 costs to import or export one TEU.

What PICI measures

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.

Data sources

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.

TEUs

This is an industry standard measure of shipping containers. TEUs are twenty foot equivalent units.

TEUs loaded

Twenty foot equivalent container units loaded with goods.

TEUs empty

Twenty foot equivalent empty containers.

TEUs loaded inwards

These are imported twenty foot equivalent containers.

TEUs loaded outwards

These are exported twenty foot equivalent containers.

Number of port calls

This the average numbers of visits of vessels in a particular GT range.

Elapsed berth time (hours)

This is the average time between arrival at, and departure from, their berth of all vessels in a particular GT range.

Ship-based charges

These charges are levied on container ships once they come into harbour. These include the following items:

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

Cargo-based charges

These 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, such as channel infrastructure fees,
- 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.

Table 3.1 Parameters used in the port interface cost indices

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun
	2011	2012	2011	2012	2011	2012	2011	2012	2011	2012
Vessel size GT 9 991										
Average Teus exchanged ^a										
All	287	377	245	275	264	347	116	117	2 520	2 615
Loaded	272	350	201	246	205	267	112	113	2 022	2 255
Empty	15	27	44	29	59	80	3	4	499	360
Loaded inwards	197	126	77	121	113	175	3	4	1 233	1 276
Loaded outwards	76	223	123	125	92	93	112	113	789	979
Ship call parameters ^a										
Number of port calls	3	4	4	4	3	4	3	4	13	12
Elapsed berth time (hrs)	13	17	15	16	13	14	8	9	54	43
Vessel size GT 37 394										
Average Teus exchanged ^b										
All	1 295	1 199	2 146	1 861	2 021	1 761	1 232	926	1 028	1 002
Loaded	1 063	956	1 497	1 201	1 623	1 426	1 009	726	743	734
Empty	232	242	649	660	398	336	223	200	285	267
Loaded inwards	670	347	1 146	883	981	833	508	332	556	537
Loaded outwards	393	609	350	318	643	593	501	394	187	197
Ship call parameters ^b										
Number of port calls	3	3	3	3	3	3	34	2	3	3
Elapsed berth time (hrs)	27	25	47	36	33	29	26	21	39	38

Table 3.1 Parameters used in the port interface cost indices (continued)

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec
	2011	2011	2011	2011	2011	2011	2011	2011	2011	2011
Vessel size GT 53 324										
Average Teus exchanged ^c										
All	1 452	1 373	2 363	2 128	2 747	2 515	1 691	1 340	1 641	1 478
Loaded	972	877	1 639	1 499	2 139	2 036	1 407	1 069	1 247	1 087
Empty	481	497	724	629	608	479	285	271	394	391
Loaded inwards	670	347	1 225	1 111	1 291	1 155	724	530	885	735
Loaded outwards	451	471	415	388	848	881	683	539	362	352
Ship call parameters ^c										
Number of port calls	3	3	3	3	4	2	4	2	4	3
Elapsed berth time (hrs)	24	22	44	38	37	34	37	29	41	40

na not available

- a. Mean value for ships between 5 000 and 20 000 GT.
- b. Mean value for ships between 35 000 and 40 000 GT.
- c. Mean value for ships between 50 000 and 55 000 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 5 000–20 000 GT range

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jul-Dec 2011	Jan-Jun 2012	Jul-Dec 2011	Jan-Jun 2012	Jul-Dec 2011	Jan-Jun 2012	Jul-Dec 2011	Jan-Jun 2012	Jul-Dec 2011	Jan-Jun 2012
Ship-based charges (\$/TEU)										
Conservancy	6.65	5.06	-	-	-	-	1.37	2.31	-	-
Tonnage	-	-	19.44	17.29	13.75	10.44	3.87	3.93	0.76	0.74
Pilotage	26.29	20.01	6.52	5.80	27.31	20.74	4.00	5.75	1.26	1.21
Towage ^a	29.88	23.11	49.88	35.96	36.50	29.51	8.37	12.06	1.55	1.49
Mooring, unmooring ^b	8.37	6.03	10.25	9.11	3.03	2.30	-	-	0.45	0.43
Berth hire	-	-	-	-	-	-	-	-	-	-
Total ^c	71.18	54.21	86.09	68.16	80.60	62.99	17.61	24.04	4.01	3.86
Cargo-based charges (\$/TEU)										
Wharfage	-	-	-	-	-	-	-	-	-	-
Imports	31.24	31.24	110.51	110.51	44.11	44.11	77.77	77.77	64.86	64.86
Exports	31.24	31.24	67.73	67.73	44.11	44.11	77.77	77.77	64.86	64.86
Harbour dues	51.97	67.64	-	-	-	-	-	-	-	-
Berth charge	-	-	-	-	-	-	-	-	19.43	19.43
Channel infrastructure fees	-	-	-	-	40.65	41.65	-	-	-	-
Total port and related charges (\$/TEU) ^d										
Loaded imports	154.39	153.09	196.60	178.67	162.22	144.61	101.76	108.19	88.31	88.16
Loaded exports	154.39	153.09	153.82	135.89	162.22	144.61	101.76	108.19	88.31	88.16
Charges per ship visit (\$/visit)	20 440	20 445	21 074	18 763	21 074	18 763	24 334	23 092	10 106	10 106
Total ship-based charges	265	706	539	356	646	878	3 128	1 876	4 880	3 525
Empty TEUs ^e										

- not applicable

r. revised

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

b. Due to lack of data from operators mooring and unmooring charges for Brisbane are BITRE estimates.

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

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

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

Note 1. 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.

Note 2. This is a new category represented by container ship of 9 991 GT.

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

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jan–Jun 2011	Jan–Jun 2012	Jan–Jun 2011	Jan–Jun 2012	Jan–Jun 2011	Jan–Jun 2012	Jan–Jun 2011	Jan–Jun 2012	Jan–Jun 2011	Jan–Jun 2012
Ship-based charges (\$/TEU)										
Conservancy	5.52	5.96	-	-	-	-	0.37	5.83	-	-
Tonnage	-	-	8.30	9.57	6.72	7.71	8.00	9.21	7.01	7.19
Pilotage	11.05	11.93	1.82	2.10	5.93	6.81	4.48	5.97	3.08	3.16
Towage ^a	11.70	12.76	6.14	7.15	6.41	7.84	14.81	19.75	16.23	16.65
Mooring, unmooring ^b	1.86	1.90	1.91	2.20	0.45	0.51	-	-	1.09	1.12
Berth hire	-	-	-	-	-	-	-	-	-	-
Total ^c	30.12	32.55	18.16	21.02	19.50	22.86	27.65	40.76	27.41	28.12
Cargo-based charges (\$/TEU)										
Wharfage										
Imports	31.24	31.24	110.51	110.51	44.11	44.11	77.77	77.77	64.86	64.86
Exports	31.24	31.24	67.73	67.73	44.11	44.11	77.77	77.77	64.86	64.86
Harbour dues	51.97	59.80	-	-	-	-	-	-	-	-
Berth charge	-	-	-	-	-	-	-	-	19.43	19.43
Channel infrastructure fees	-	-	-	-	40.65	41.65	-	-	-	-
Total port and related charges (\$/TEU) ^d	113.33	131.43	128.67	131.53	101.12	104.48	111.80	124.91	111.71	112.42
Loaded imports	113.33	131.43	85.89	88.75	101.12	104.48	111.80	124.91	111.71	112.42
Charges per ship visit (\$/visit)										
Total ship-based charges	38 994	39 016	38 972	39 103	39 416	40 267	34 072	37 738	28 166	28 166
Empty TEUs ^e	4 188	6 269	7 925	8 055	4 381	3 694	1 424	1 275	2 785	2 616

- not applicable

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

b. Due to lack of data from operators mooring and unmooring charges for Brisbane are BITRE estimates.

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

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

e. 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 3.4 Port and related charges for ships in the 50 000–55 000 GT range

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jun-Dec 2011	Jan-Jun 2012	Jun-Dec 2011	Jan-Jun 2012	Jun-Dec 2011	Jan-Jun 2012	Jun-Dec 2011	Jan-Jun 2012	Jun-Dec 2011	Jan-Jun 2012
Ship-based charges (\$/TEU)										
Conservancy	7.01	7.42	-	-	-	-	3.06	4.64	-	-
Tonnage	-	-	10.75	11.93	7.05	7.70	9.41	9.98	6.26	6.95
Pilotage	1.55	1.21	1.78	1.97	4.74	5.17	3.27	4.12	1.93	2.14
Towage ^a	11.59	12.38	5.92	6.64	4.88	5.68	11.82	14.95	11.56	12.83
Mooring, unmooring ^b	1.65	1.65	2.04	2.26	0.35	0.38	-	-	0.68	0.76
Berth hire	-	-	-	-	-	-	-	-	-	-
Total ^c	31.80	33.66	20.48	22.81	17.00	18.92	27.55	33.69	20.43	22.68
Cargo-based charges (\$/TEU)										
Wharfage										
Imports	31.24	31.24	110.51	110.51	44.11	44.11	77.77	77.77	64.86	64.86
Exports	31.24	31.24	67.73	67.73	44.11	44.11	77.77	77.77	64.86	64.86
Harbour dues	51.97	59.80	-	-	39.65	40.65	-	-	-	-
Berth charge	-	-	-	-	-	-	-	-	19.43	19.43
Channel infrastructure fees										
Total port and related charges (\$/TEU) ^d	-	-	-	-	39.65	40.65	-	-	-	-
Loaded imports										
Loaded imports	115.01	124.70	110.51	110.51	98.62	100.54	111.70	117.84	104.72	106.97
Loaded exports										
Loaded exports	115.01	124.70	67.73	67.73	98.62	100.54	111.70	117.84	104.72	106.97
Charges per ship visit (\$/visit)										
Total ship-based charges	46 187	46 225	48 407	48 543	46 710	47 598	46 602	45 138	33 522	33 522
Empty TEUs ^e	8 682	8 972	8 842	7 683	6 688	5 272	1 815	1 728	3 861	3 825

- not applicable

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

b. Due to lack of data from operators mooring and unmooring charges for Brisbane are BITRE estimates.

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

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

e. 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 3.5 Port interface costs for ships in the 35 000–40 000 GT range

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jul-Dec 2011	Jan-Jun 2012	Jul-Dec 2011	Jan-Jun 2012	Jul-Dec 2011	Jan-Jun 2012	Jul-Dec 2011	Jan-Jun 2012	Jul-Dec 2011	Jan-Jun 2012
\$/TEU										
Import										
Ship-based charges	30	33	18	21	19	23	28	41	27	28
Cargo-based charges	83	99	111	111	82	82	84	84	95	95
Stevedoring ^P	173	177	173	177	173	177	173	177	173	177
Customs brokers' fees	151	146	139	139	152	153	153	149	156	156
Road transport charges	393	401	478	485	485	485	308	308	397	397
Import total ^a	830	855	920	933	912	919	746	759	850	854
Export										
Ship-based charges	30	33	18	21	19	23	28	41	27	28
Cargo-based charges	83	99	68	68	82	82	84	84	95	95
Stevedoring ^P	173	177	173	177	173	177	173	177	173	177
Customs brokers' fees	159	152	137	137	131	134	103	102	84	84
Road transport charges	393	401	478	485	485	485	308	308	397	397
Export total ^a	838	861	874	888	891	901	696	712	778	782

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 are based on findings contained in *Port interface cost index* (BTCE 1993, Report 84) and further updates done in 2001 and 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 2011; ABS 2012.

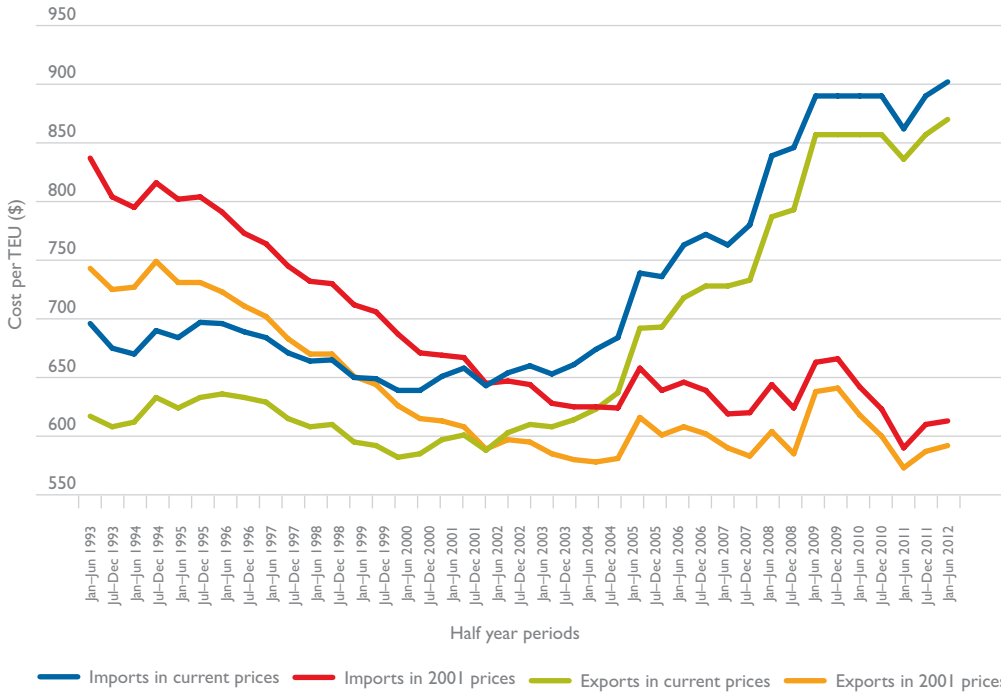
Table 3.6 The national port interface cost index for ships in the 35 000–40 000 GT range

	Jul-Dec 2005	Jan-Jun 2006	Jul-Dec 2006	Jan-Jun 2007	Jul-Dec 2007	Jan-Jun 2008	Jul-Dec 2008	Jan-Jun 2009	Jul-Dec 2009	Jan-Jun 2010	Jul-Dec 2010	Jan-Jun 2011	Jul-Dec 2011	Jan-Jun 2012
Imports in current prices	736	763	772	763	780	839	846	890	890	890	890	862	890	902
Imports in 2001 prices	639	646	639	619	620	644	624	663	666	642	623	590	610	613
Exports in current prices	693	718	728	728	733	787	793	857	857	857	857	836	857	870
Exports in 2001 prices	601	608	602	590	583	604	585	638	641	618	600	573	587	592

Note: Exports and imports in constant 2001 dollars are calculated by using deflator based on trend series of non-farm GDP chain volume and current prices of the seasonally adjusted series.

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 2011; and ABS 2012.

Figure 3.1 National port interface cost indices for ships in the 35 000–40 000 GT range



Sources: BITRE estimates based on: ship call data supplied by port authorities/corporations; price schedules of port authorities/corporations, towage operators and pilotage service providers; surveys of customs brokers and road transport operators; stevedoring charges data supplied by the ACCC and industry sources; and ABS 5206.041 National Accounts table.

CHAPTER 4

Ship visits, crane lifts per hour spent in berth

Overview

This issue of Waterline introduces a new performance indicator for each of the five ports — the average number of crane lifts per hour a container vessel spent in berth. This indicator is computed using data that relates to only dedicated container vessels (UCC) that exchanged containers at that port. The indicator is computed by dividing total crane lifts performed by total elapsed time between a vessel's arrival time in berth and its departure from that berth.

The indicator is strongly influenced by changes in average number of containers exchanged per visiting ships and by the mix of ship sizes during the period. The average number of containers exchanged varies seasonally and cyclically. The mix of ships visiting Australian ports results largely from the shipping lines' operational considerations, such as size of the task (for example, the number of containers to be shipped), trends in the renewal of tonnage and costs of operations, fuel, port fees and charges.

Tables 4.1–4.6 provide quarterly total number of container ship visits, total numbers of TEUs exchanged per quarter, sum of hours spent by ships in berth, TUEs exchanged per hour spent in berth, per cent of 40 foot containers, per cent of 20 foot containers, total number of crane lifts (for all ship sizes only), average number of crane lifts per hour spent in berth and average number of lifts per ship visit.

For container ships grouped by ship size the tables provide total number of ship visits and the average number of TEUs exchanged per ship visit for container vessels with sizes ranging from 5 000 to 50 001 GT and above.

Figures 4.1–4.5 illustrate quarterly crane lifts per hour in berth, average lifts per visiting ship and average container ship size (GT).

Data contained in Tables 4.1–4.5 for each port for the period beginning in March quarter 2008 is available at www.bitre.gov.au.

Explanatory notes

Ship calls

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 port calls.

Data sources

The estimates reported are based on ship call data supplied by port authorities for Brisbane, Sydney, Melbourne, Adelaide and Fremantle.

Hours spent in berth

This is the elapsed time between the time ship arrives at berth and the time of its departure from berth. The berth time is reported by port authorities together with data on container handling by individual container ship. The berth time is a “gross value” as it includes all reasons for spending time at berth, including waiting time, maintenance and supply operations, waiting for suitable weather for loading/unloading, leaving the port, etc.

Converting TEUs exchanged to lifts

$$\text{Crane lifts} = (\text{TEUs exchanged} * \text{Per cent of 20 foot containers in TEUs exchanged}) + (\text{Per cent of 40 foot containers} * \text{TEUs exchanged}) / 2$$

Table 4.1 Brisbane: Container ship visits, crane lifts, TEUs exchanged and hours spent in berth, by ship size

Gross tonnage	Indicator	Mar-10	Jun-10	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12
All UCC vessels											
	Total ship visits	188	193	229	217	208	206	198	210	221	224
	Total TEUs exchanged in period	204 080	219 974	249 896	252 957	215 822	237 079	220 731	236 322	230 066	241 618
	Sum of hours ships spent in berth	4 984	5 030	5 358	5 645	5 174	5 206	4 736	5 211	5 112	5 125
	TEUs per hour spent in berth	40.9	43.7	46.6	44.8	41.7	45.5	46.6	45.4	45.0	47.1
	Per cent of 40 foot containers	47.3	44.6	46.1	40.4	47.4	47.3	49.0	48.0	48.4	49.5
	Per cent of 20 foot containers	52.7	55.4	53.9	59.6	52.6	52.7	51.0	52.0	51.6	50.5
	Total number of lift	155 774	170 919	192 330	201 873	164 639	181 034	166 607	179 565	174 446	181 868
	Average lifts per hour spent in berth	31.3	34.0	35.9	35.8	31.8	34.8	35.2	34.5	34.1	35.5
	Average lifts per ship visit	829	886	840	930	792	879	841	855	789	812
5 000–20 000											
	Total ship visits	37	37	39	44	48	45	40	30	42	45
	Total TEUs exchanged in period	13 020	13 405	11 019	14 580	15 191	18 370	14 629	9 662	15 161	17 430
	Sum of hours ships spent in berth	1 044	924	785	1 185	1 112	1 180	948	739	1 032	1 019
	TEUs per hour spent in berth	12.5	14.5	14.0	12.3	13.7	15.6	15.4	13.1	14.7	17.1
20 001–35 000											
	Total ship visits	48	50	59	51	51	37	32	44	42	35
	Total TEUs exchanged in period	41 886	45 990	54 027	45 921	42 037	32 421	26 925	41 766	35 891	27 807
	Sum of hours ships spent in berth	1 077	1 174	1 319	1 147	1 272	745	655	935	788	543
	TEUs per hour spent in berth	38.9	39.2	41.0	40.0	33.1	43.5	41.1	44.7	45.6	51.2
35 001–40 000											
	Total ship visits	44	38	54	52	44	57	56	53	57	52
	Total TEUs exchanged in period	53 761	50 479	68 173	68 228	52 310	70 541	74 170	66 943	67 254	63 388
	Sum of hours ships spent in berth	1 324	1 014	1 304	1 447	1 111	1 458	1 421	1 530	1 431	1 305
	TEUs per hour spent in berth	40.6	49.8	52.3	47.2	47.1	48.4	52.2	43.7	47.0	48.6
40 001–50 000											
	Total ship visits	38	41	48	39	35	33	34	39	37	60
	Total TEUs exchanged in period	44 865	51 994	61 444	57 366	44 355	49 096	50 561	56 211	54 273	86 644
	Sum of hours ships spent in berth	804	981	1 037	920	802	775	824	1 000	914	1 563
	TEUs per hour spent in berth	55.8	53.0	59.2	62.4	55.3	63.4	61.3	56.2	59.4	55.4
50 001 and above											
	Total ship visits	21	27	29	31	30	34	36	44	43	32
	Total TEUs exchanged in period	50 548	58 106	55 233	66 862	61 929	66 651	54 446	61 740	57 487	46 349
	Sum of hours ships spent in berth	736	937	913	947	878	1 049	888	1 006	947	696
	TEUs per hour spent in berth	68.7	62.0	60.5	70.6	70.6	63.6	61.3	61.4	60.7	66.6

Source: BITRE estimates

Table 4.2 Sydney: Container ship visits, crane lifts, TEUs exchanged and hours spent in berth, by ship size

Gross tonnage	Indicator	Mar-10	Jun-10	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12
All UCC vessels											
	Total ship visits	245	249	247	247	269	256	277	284	275	273
	Total TEUs exchanged in period	393 344	407 203	381 604	395 130	414 119	422 368	464 640	488 307	430 547	437 182
	Sum of hours ships spent in berth	9 051	10 402	9 255	9 951	9 595	10 183	11 478	10 561	9 224	8 971
	TEUs per hour spent in berth	43.5	39.1	41.2	39.7	43.2	41.5	40.5	46.2	46.7	48.7
	Per cent of 40 foot containers	47.2	47.3	47.8	48.0	47.8	48.4	49.9	49.7	48.8	48.9
	Per cent of 20 foot containers	52.8	52.7	52.2	52.0	52.2	51.6	50.1	50.3	51.2	51.1
	Total number of lifts	303 150	312 843	335 496	336 629	317 571	324 692	352 083	371 059	328 118	333 249
	Average lifts per hour spent in berth	33.5	30.1	36.2	33.8	33.1	31.9	30.7	35.1	35.6	37.1
	Average lifts per ship visit	1237	1256	1358	1363	1181	1268	1271	1307	1193	1221
5 001–20 000											
	Total ship visits	39	36	32	28	28	21	37	34	37	37
	Total TEUs exchanged in period	13 563	13 385	7 956	6 183	7 133	6 071	10 848	11 838	10 661	9 979
	Sum of hours ships spent in berth	892	903	682	598	651	683	999	758	811	790
	TEUs per hour spent in berth	15.2	14.8	11.7	10.3	11.0	8.9	10.9	15.6	13.1	12.6
20 001–35 000											
	Total ship visits	94	97	106	105	110	96	86	90	71	61
	Total TEUs exchanged in period	125 427	131 816	144 999	141 521	146 839	123 788	110 576	121 292	90 899	75 261
	Sum of hours ships spent in berth	3 089	3 813	3 687	4 040	3 672	3 280	3 005	3 095	2 176	1 831
	TEUs per hour spent in berth	40.6	34.6	39.3	35.0	40.0	37.7	36.8	39.2	41.8	41.1
35 001–40 000											
	Total ship visits	43	44	58	56	52	56	56	55	64	56
	Total TEUs exchanged in period	93 863	93 048	117 644	113 557	94 414	114 164	122 884	115 275	115 860	107 422
	Sum of hours ships spent in berth	1 886	2 301	2 499	2 521	2 201	2 624	2 870	2 294	2 387	1 882
	TEUs per hour spent in berth	49.8	40.4	47.1	45.0	42.9	43.5	42.8	50.3	48.5	57.1
40 001–50 000											
	Total ship visits	31	33	44	44	36	38	53	54	57	79
	Total TEUs exchanged in period	72 012	77 230	96 452	100 299	73 884	76 487	115 786	117 559	109 258	164 337
	Sum of hours ships spent in berth	1 375	1 542	2 070	2 165	1 487	1 485	2 412	2 356	2 141	2 944
	TEUs per hour spent in berth	52.4	50.1	46.6	46.3	49.7	51.5	48.0	49.9	51.0	55.8
50 001 and above											
	Total ship visits	38	39	7	14	43	45	45	51	46	40
	Total TEUs exchanged in period	88 479	91 724	14 553	33 570	91 849	101 858	104 546	122 343	103 869	80 183
	Sum of hours ships spent in berth	1 808	1 842	317	627	1 584	2 111	2 192	2 058	1 708	1 524
	TEUs per hour spent in berth	48.9	49.8	45.9	53.5	58.0	48.3	47.7	59.4	60.8	52.6

Source: BITRE estimates

Table 4.3 Melbourne: Container ship visits, crane lifts, TEUs exchanged and hours spent in berth, by ship size

Gross tonnage	Indicator	Mar-10	Jun-10	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12
All UCC vessels											
	Total ship visits	258	259	295	299	294	292	306	318	294	297
	Total TEUs exchanged in period	531 134	522 323	597 223	614 925	539 275	552 608	652 958	679 454	578 915	571 111
	Sum of hours ships spent in berth	7 392	7 629	8 759	8 401	7 704	8 988	9 537	9 970	8 713	8 190
	TEUs per hour spent in berth	71.9	68.5	68.2	73.2	70.0	61.5	68.5	68.1	66.4	69.7
	Per cent of 40 foot containers	45.6	45.3	46.8	49.1	46.7	46.9	48.5	47.3	48.8	48.9
	Per cent of 20 foot containers	54.4	54.7	53.2	50.9	53.3	53.1	51.5	52.7	51.2	51.1
	Total number of lifts	409 955	404 003	457 426	463 982	413 416	422 941	494 599	518 706	437 729	431 563
	Average lifts per hour spent in berth	55.5	53.0	52.2	55.2	53.7	47.1	51.9	52.0	50.2	52.7
	Average lifts per ship visit	1 589	1 560	1 551	1 552	1 406	1 448	1 616	1 631	1 489	1 453
5 000–20 000											
	Total ship visits	24	22	19	19	33	27	25	38	36	40
	Total TEUs exchanged in period	14 150	15 756	9 996	8 009	7 635	8 065	8 533	17 733	15 207	17 233
	Sum of hours ships spent in berth	522	550	495	386	669	658	591	995	872	935
	TEUs per hour spent in berth	27.1	28.6	20.2	20.8	11.4	12.3	14.4	17.8	17.4	18.4
20 001–35 000											
	Total ship visits	101	109	114	118	112	115	102	108	70	63
	Total TEUs exchanged in period	159 909	153 604	170 663	183 102	169 591	168 109	165 146	174 291	117 936	98 860
	Sum of hours ships spent in berth	2 507	2 530	2 848	3 032	2 646	2 943	2 853	2 935	1 805	1 596
	TEUs per hour spent in berth	63.8	60.7	59.9	60.4	64.1	57.1	57.9	59.4	65.4	62.0
35 001–40 000											
	Total ship visits	47	47	64	60	57	55	65	56	73	63
	Total TEUs exchanged in period	111 056	109 521	152 077	135 720	114 791	121 813	149 393	136 092	150 803	121 422
	Sum of hours ships spent in berth	1 547	1 548	2 071	1 779	1 684	1 853	2 149	1 819	2 348	1 613
	TEUs per hour spent in berth	71.8	70.8	73.4	76.3	68.2	65.7	69.5	74.8	64.2	75.3
40 001–50 000											
	Total ship visits	44	39	53	52	44	43	58	58	65	89
	Total TEUs exchanged in period	115 253	110 748	138 138	136 168	115 477	101 810	152 329	165 217	151 180	220 040
	Sum of hours ships spent in berth	1 493	1 443	1 865	1 634	1 339	1 496	1 899	2 051	1 989	2 648
	TEUs per hour spent in berth	77.2	76.7	74.1	83.3	86.2	68.1	80.2	80.6	76.0	83.1
50 001 and above											
	Total ship visits	42	42	45	50	48	52	56	58	50	42
	Total TEUs exchanged in period	130 766	132 694	126 349	151 926	131 781	152 811	177 557	186 121	143 789	113 556
	Sum of hours ships spent in berth	1 323	1 558	1 479	1 571	1 365	2 038	2 044	2 170	1 700	1 398
	TEUs per hour spent in berth	98.8	85.2	85.4	96.7	96.5	75.0	86.9	85.8	84.6	81.2

Source: BITRE estimates

Table 4.4 Adelaide: Container ship visits, crane lifts, TEUs exchanged and hours spent in berth, by ship size

Gross tonnage	Indicator	Mar-10	Jun-10	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12
All UCC vessels											
	Total ship visits	56	60	61	68	68	69	71	63	74	80
	Total TEUs exchanged in period	66 433	68 513	75 310	74 249	72 801	71 388	84 583	79 518	72 395	81 771
	Sum of hours ships spent in berth	1 521	1 623	1 657	1 743	1 754	1 653	2 066	1 847	1 755	1 866
	TEUs per hour spent in berth	43.6	42.0	45.5	42.5	41.3	43.1	41.0	42.4	41.2	43.5
	Per cent of 40 foot containers	36.2	37.3	37.1	39.2	35.9	38.4	38.9	38.4	38.6	37.6
	Per cent of 20 foot containers	63.8	62.7	62.9	60.8	64.1	61.6	61.1	61.6	61.4	62.4
	Total number of lifts	54 404	55 734	61 335	59 706	59 749	57 670	68 129	64 237	58 425	66 390
	Average lifts per hour spent in berth	35.8	34.4	37.0	34.2	34.1	34.9	33.0	34.8	33.3	35.6
	Average lifts per ship visit	971	929	1 005	878	879	836	960	1 020	790	830
5 000–20 000											
	Total ship visits	1	0	0	0	1	0	0	0	0	0
	Total TEUs exchanged in period	441				115					
	Sum of hours ships spent in berth	27				7					
	TEUs per hour spent in berth	16.5				17.0					
20 001–35 000											
	Total ship visits	18	20	21	30	30	30	30	24	18	12
	Total TEUs exchanged in period	19 628	21 285	24 267	28 177	27 478	26 334	30 403	24 481	14 350	10 621
	Sum of hours ships spent in berth	514	583	603	720	735	690	816	647	355	273
	TEUs per hour spent in berth	38.2	36.5	40.3	39.1	37.4	38.2	37.3	37.9	40.4	39.0
35 001–40 000											
	Total ship visits	18	20	18	16	18	18	19	15	22	27
	Total TEUs exchanged in period	20 610	21 239	21 823	18 817	19 198	19 334	22 600	19 291	17 902	27 466
	Sum of hours ships spent in berth	455	467	463	410	469	436	517	380	450	563
	TEUs per hour spent in berth	45.3	45.4	47.1	45.9	40.9	44.3	43.7	50.7	39.8	48.8
40 001–50 000											
	Total ship visits	14	13	16	16	13	12	13	15	24	32
	Total TEUs exchanged in period	18 642	17 522	19 436	19 511	16 635	13 717	16 762	20 122	25 490	32 883
	Sum of hours ships spent in berth	408	393	411	468	346	278	406	482	637	788
	TEUs per hour spent in berth	45.6	44.6	47.3	41.7	48.1	49.4	41.3	41.7	40.0	41.7
50 001 and above											
	Total ship visits	6	6	6	6	7	8	9	9	10	9
	Total TEUs exchanged in period	7 553	8 026	9 784	7 744	9 490	11 888	14 818	15 624	14 653	10 801
	Sum of hours ships spent in berth	143	153	180	145	205	242	327	338	313	242
	TEUs per hour spent in berth	52.8	52.5	54.2	53.6	46.4	49.2	45.3	46.2	46.9	44.5

Source: BITRE estimates

Table 4.5 Fremantle: Container ship visits, crane lifts, TEUs exchanged and hours spent in berth, by ship size

Gross tonnage	Indicator	Mar-10	Jun-10	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12
All UCC vessel sizes											
	Total ship visits	127	131	50	67	136	136	119	122	117	113
	Total TEUs exchanged in period	137 622	126 793	88 816	121 012	141 082	140 181	156 681	169 457	155 859	152 910
	Sum of hours ships spent in berth	3 351	3 326	1 477	1 398	3 066	4 168	4 385	5 018	4 282	4 598
	TEUs per hour spent in berth	41.1	38.1	60.1	86.6	46.0	33.6	35.7	33.8	36.4	33.3
	Per cent of 40 foot containers	46.7	44.2	47.3	47.9	46.1	46.3	50.3	50.1	42.3	47.1
	Per cent of 20 foot containers	53.3	55.8	52.7	52.1	53.9	53.7	49.7	49.9	57.7	52.9
	Total number of lifts	105 479	98 760	67 830	92 020	108 586	107 707	117 250	127 042	122 906	116 896
	Average lifts per hour spent in berth	31.5	29.7	45.9	65.8	35.4	25.8	26.7	25.3	28.7	25.4
	Average lifts per ship visit	83.1	75.4	1 357	1 373	798	792	985	1 041	1 050	1 034
5 000–20 000											
	Total ship visits	12	12	1	3	12	15	13	13	12	11
	Total TEUs exchanged in period	21 902	20 948	4 643	13 574	25 171	25 343	30 916	34 605	29 796	30 657
	Sum of hours ships spent in berth	429	404	47	105	454	661	572	825	381	545
	TEUs per hour spent in berth	51.1	51.9	99.8	129.5	55.4	38.3	54.1	42.0	78.1	56.2
20 001–35 000											
	Total ship visits	19	24	13	24	31	30	20	13	4	2
	Total TEUs exchanged in period	11 732	9 671	12 798	27 769	17 407	15 121	11 844	5 382	2 987	1 728
	Sum of hours ships spent in berth	395	494	282	365	493	641	498	325	115	77
	TEUs per hour spent in berth	29.7	19.6	45.4	76.0	35.3	23.6	23.8	16.6	26.0	22.6
35 001–40 000											
	Total ship visits	38	36	17	12	33	35	28	34	34	30
	Total TEUs exchanged in period	35 423	33 038	32 504	22 545	28 345	31 105	28 417	35 293	34 470	29 627
	Sum of hours ships spent in berth	999	912	621	267	676	1 116	1 109	1 289	1 244	1 159
	TEUs per hour spent in berth	35.5	36.2	52.4	84.5	41.9	27.9	25.6	27.4	27.7	25.6
40 001–50 000											
	Total ship visits	21	25	9	14	20	18	20	24	27	36
	Total TEUs exchanged in period	21 753	24 369	16 527	26 286	20 553	18 358	24 146	30 813	30 943	39 180
	Sum of hours ships spent in berth	525	673	223	322	466	586	680	952	938	1 445
	TEUs per hour spent in berth	41.4	36.2	74.0	81.7	44.1	31.3	35.5	32.4	33.0	27.1
50 001 and above											
	Total ship visits	37	34	10	14	40	38	38	38	40	34
	Total TEUs exchanged in period	46 812	38 767	22 344	30 838	49 606	50 254	61 358	63 364	57 663	51 718
	Sum of hours ships spent in berth	1 005	844	305	339	977	1 164	1 526	1 628	1 603	1 373
	TEUs per hour spent in berth	46.6	46.0	73.2	90.9	50.8	43.2	40.2	38.9	36.0	37.7

Source: BITRE estimates

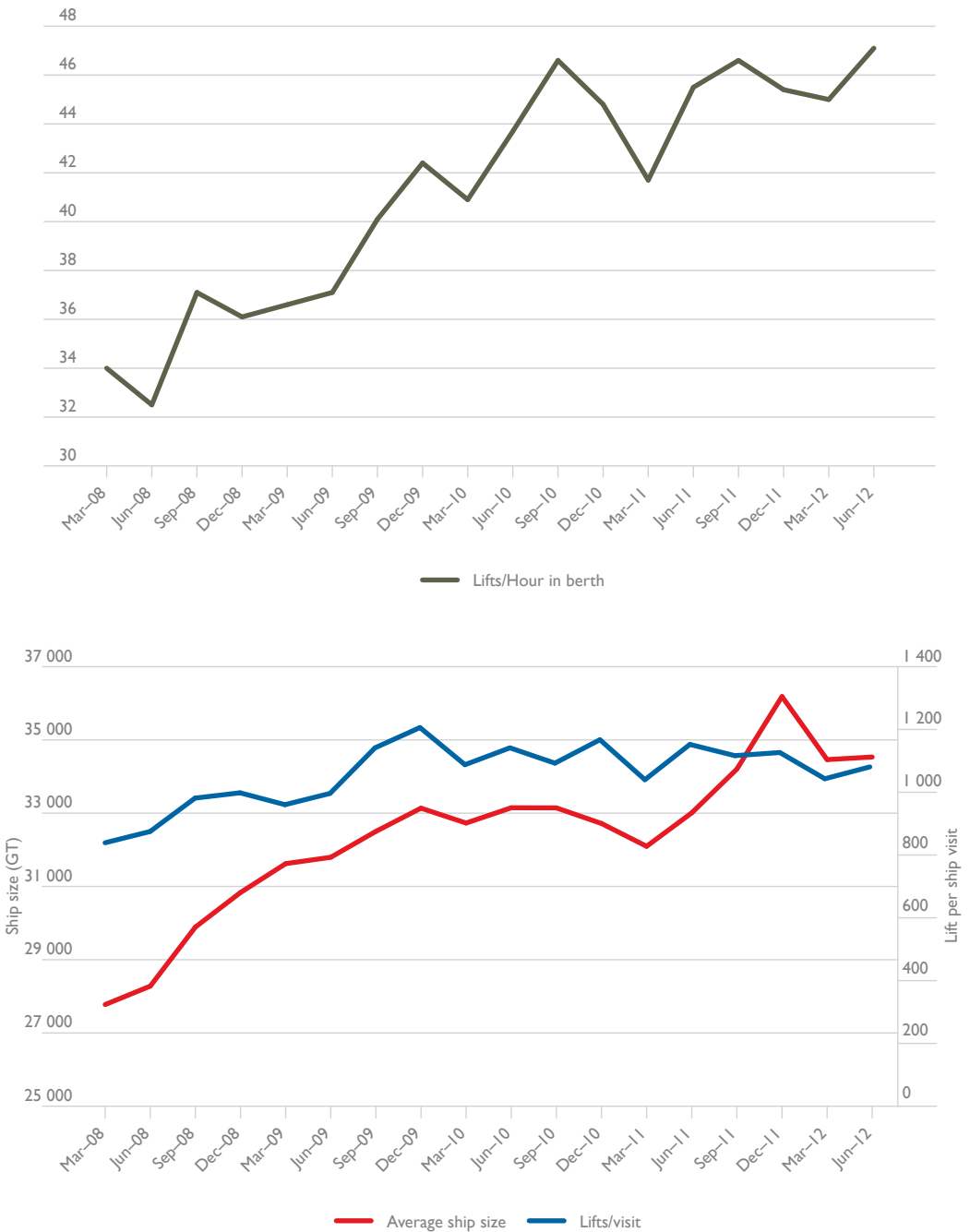
Note: In September and December quarters of 2010 only part of ship movement statistics was available for processing.

Table 4.6 Container ship visits by port

Gross tonnage category	Number of ship visits					Total
	Brisbane	Sydney	Melbourne	Adelaide	Fremantle	
	July 2011 – June 2012					
5000 – 20 000	157	145	139	0	49	490
20 001 – 35 000	153	308	343	84	39	927
35 001 – 40 000	218	231	257	83	126	915
40 001 – 50 000	170	243	270	84	107	874
above 50 001	155	182	206	37	150	730
All ship sizes	853	1 109	1 215	288	471	3 936

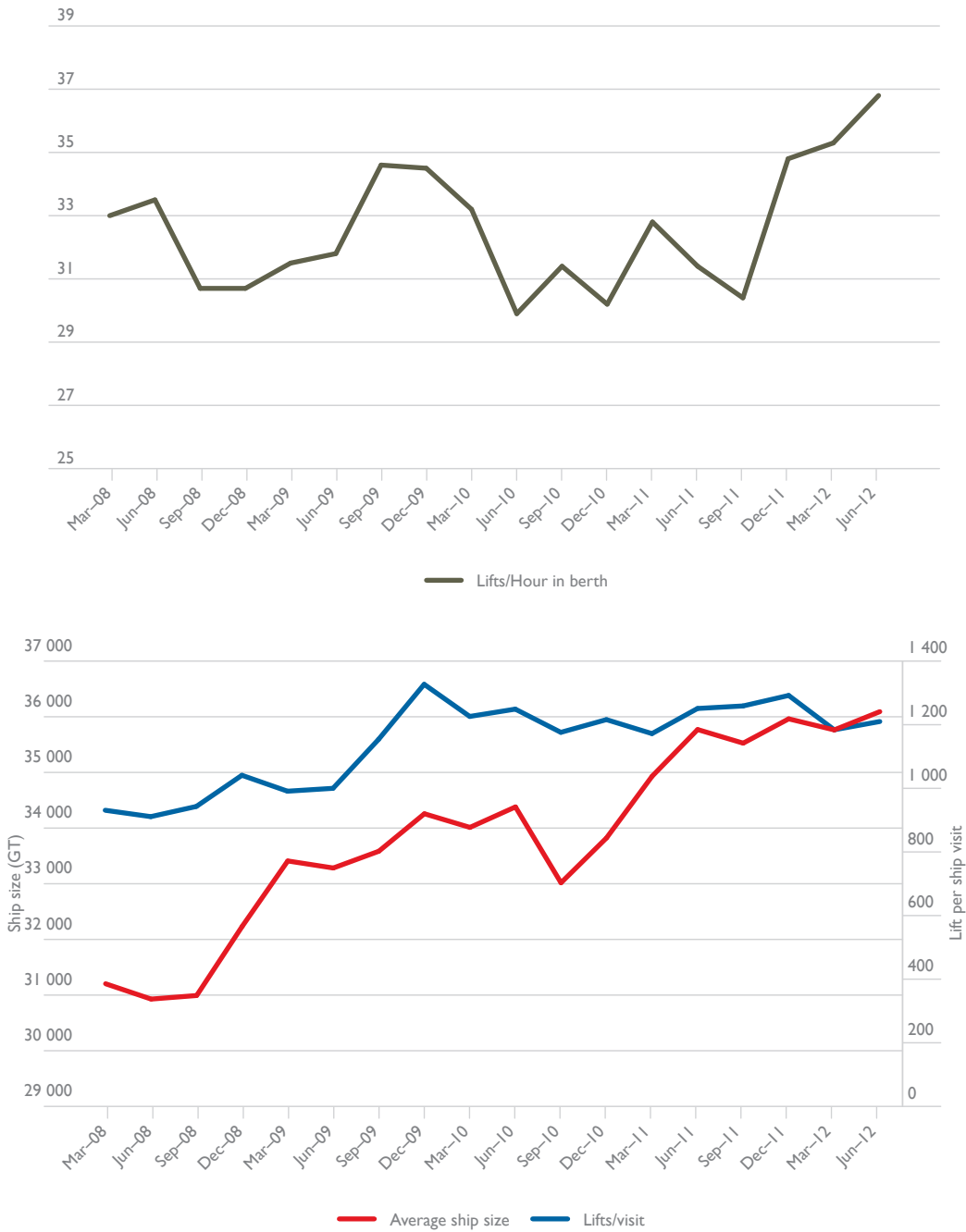
Source: BITRE estimates

Figure 4.1 Brisbane: Crane lifts per hour in berth, lifts per container ship visit and average ship size



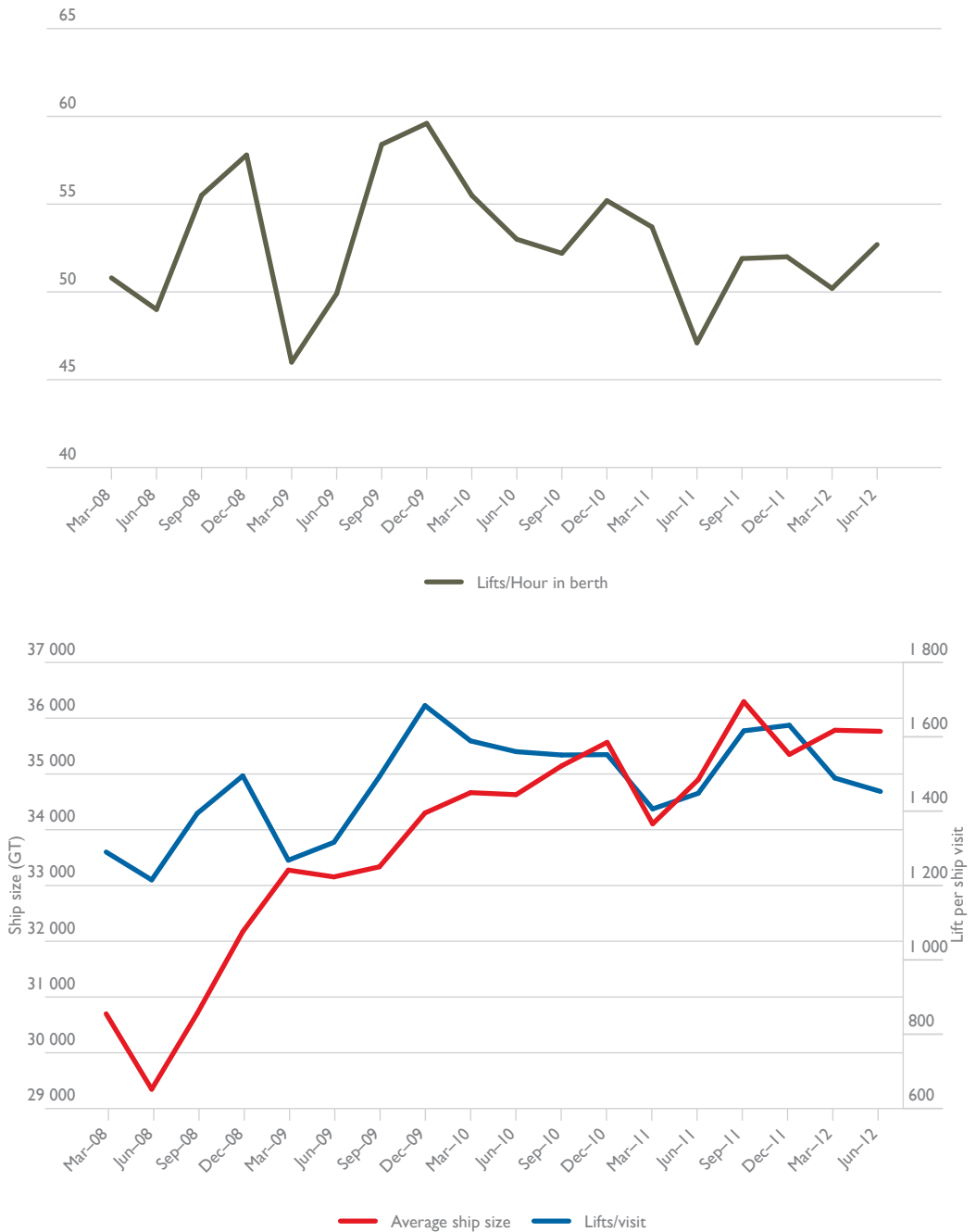
Source: BITRE estimates

Figure 4.2 Sydney: Crane lifts per hour in berth, lifts per container ship visit and average ship size



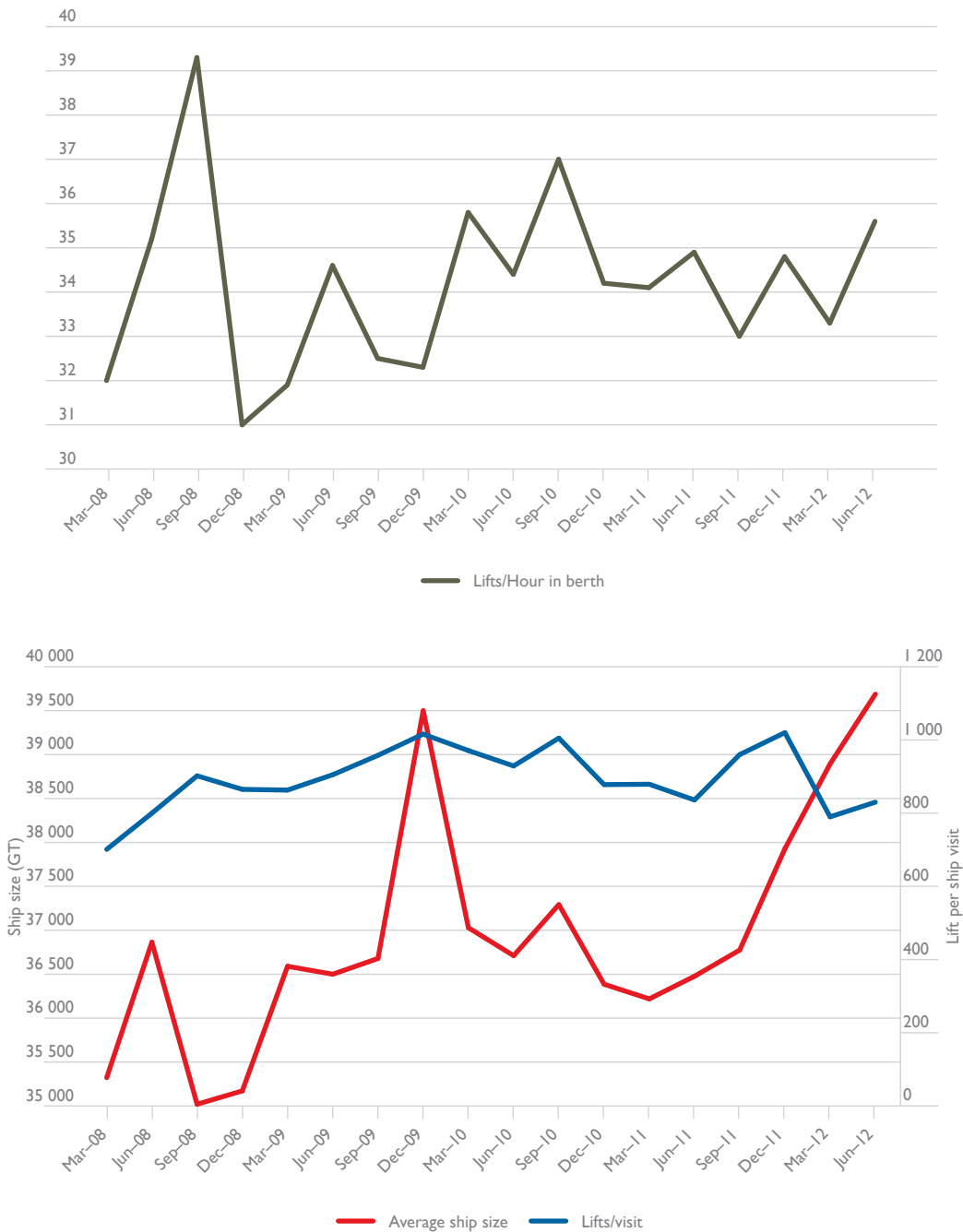
Source: BITRE estimates

Figure 4.3 Melbourne: Crane lifts per hour in berth, lifts per container ship visit and average ship size



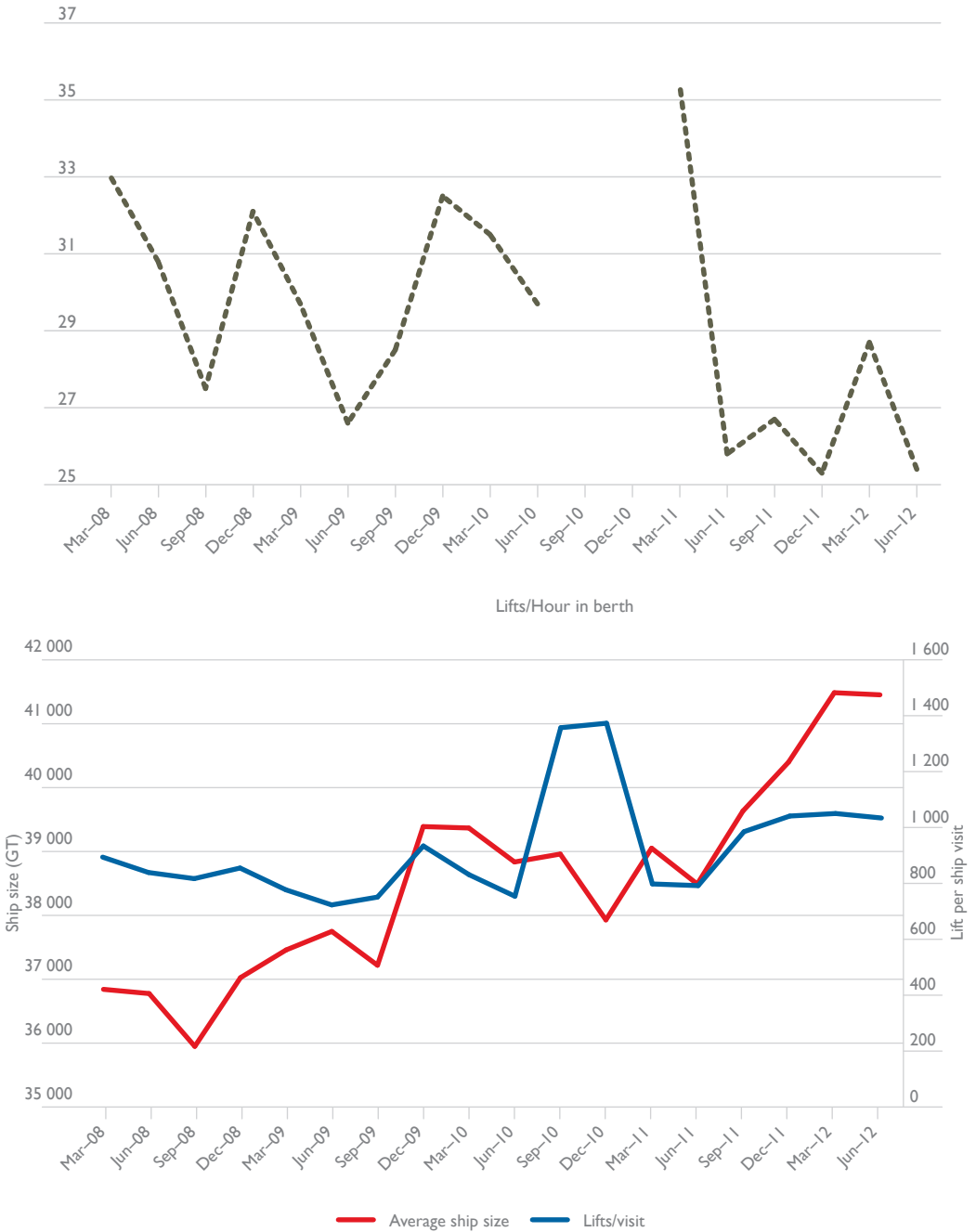
Source: BITRE estimates

Figure 4.4 Adelaide: Crane lifts per hour in berth, lifts per container ship visit and average ship size



Source: BITRE estimates

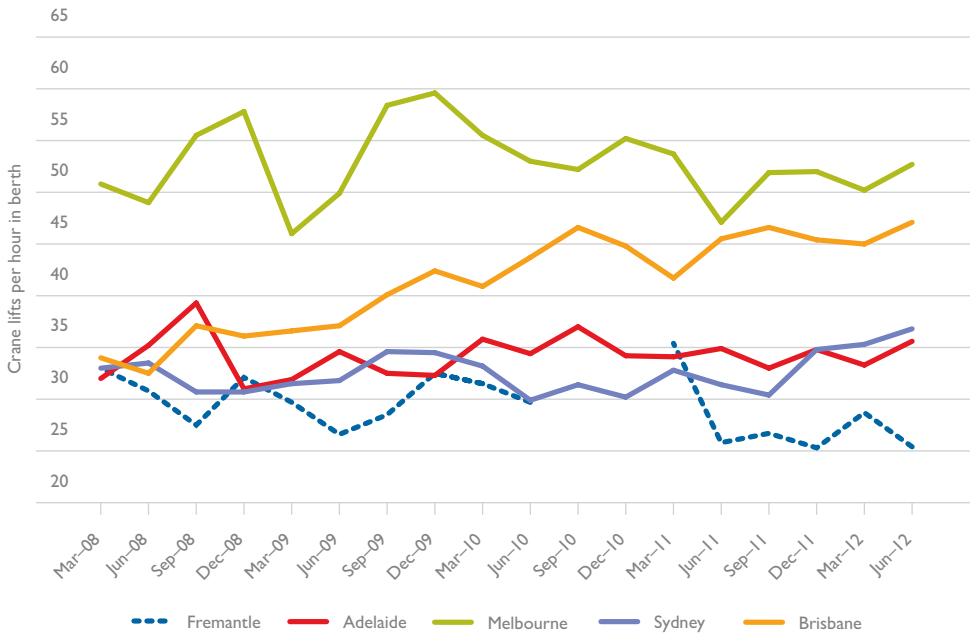
Figure 4.5 Fremantle: Crane lifts per hour in berth, lifts per container ship visit and average ship size



Source: BITRE estimates

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

Figure 4.6 Crane lifts per hour a container ship spent in berth, by container port



Source: BITRE estimates

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

CHAPTER 5

Non-financial performance indicators

Overview

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 and July–December 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

Explanatory notes

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 and other companies providing port services.

Port turnaround times (hours)

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

Table 5.1 Non-financial performance indicators, selected Australian ports.

	Jan-Jun 2008	Jul-Dec 2008	Jan-Jun 2009	Jul-Dec 2009	Jan-Jun 2010	Jul-Dec 2010	Jan-Jun 2011	Jul-Dec 2011	Jan-Jun 2012
Five ports^e									
Total cargo throughput ('000 tonnes)	63 756	64 049	61 063	61 831	64 979	69 817	70 504	71 752	75 883
Non-containerised general cargo ('000 tonnes) ^a	2 826	2 855	1 842	2 153	2 321	1 1 754	1 1 978	2 417	2 663
Containerised cargo (teus exchanged)									
Full import	1 305 203	1 449 281	1 121 703	1 345 190	1 252 358	1 437 021	1 334 669	1 634 362	1 456 416
Empty import	142 714	140 312	155 333	129 206	124 477	127 401	128 880	125 560	129 017
Full export	849 152	876 847	857 981	880 174	884 712	929 540	913 054	1 006 146	955 984
Empty export	563 815	666 821	411 197	588 658	563 320	687 216	579 673	694 679	618 819
Total	2 858 884	3 133 261	2 546 214	2 943 228	2 824 867	3 181 179	2 956 276	3 460 747	3 149 302
Average total employment ^b	1 154	1 222	1 254	1 251	1 260	1 267	1 211	1 200	1 232
Port turnaround time (hrs) ^c	-	-	-	-	-	-	-	-	-
Median result	-	-	-	-	-	-	-	-	-
95th percentile	-	-	-	-	-	-	-	-	-
Brisbane									
Total cargo throughput ('000 tonnes)	14 716	15 808	16 086	15 697	15 911	17 099	16 132	18 386	18 817
Non-containerised general cargo ('000 tonnes) ^a	542	670	316	458	551	582	498	550	670
Containerised cargo (teus exchanged)									
Full import	196 074	218 787	158 988	133 943	124 430	144 304	139 035	242 897	215 999
Empty import	33 613	37 363	37 174	30 456	27 458	32 063	30 186	30 165	26 705
Full export	130 028	139 042	131 578	133 943	124 430	144 304	139 035	170 361	153 061
Empty export	92 892	104 798	68 437	100 812	96 928	109 197	90 255	98 953	86 928
Total	452 607	499 990	396 177	399 154	373 246	429 868	398 511	542 376	482 693
Average total employment ^b	312	342	353	350	337	323	268	238	227
Port turnaround time (hrs) ^c									
Median result	33	26	32	33	32	30	32	32	30
95th percentile	51	45	70	76	61	62	69	64	52

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

	Jan-Jun 2008	Jul-Dec 2008	Jan-Jun 2009	Jul-Dec 2009	Jan-Jun 2010	Jul-Dec 2010	Jan-Jun 2011	Jul-Dec 2011	Jan-Jun 2012
Sydney									
Total cargo throughput ('000 tonnes)	14 558	14 715	13 099	14 169	13 992	14 976	14 752	15 245	15 383
Non-containerised general cargo ('000 tonnes) ^a	262	142	1	0	0	1	2	3	4
Containerised cargo (teus exchanged)									
Full import	428 179	489 703	386 403	496 239	454 790	521 027	479 408	535 336	481 620
Empty import	9 224	10 840	15 580	12 962	12 232	9 861	10 247	4 731	5 665
Full export	196 678	222 367	220 061	223 290	219 277	231 724	227 070	232 907	222 469
Empty export	237 825	262 222	176 744	261 042	247 688	289 416	251 398	287 163	266 173
Total	871 906	985 132	798 788	993 533	933 987	1 052 028	968 123	1 060 137	975 927
Average total employment ^b	223	244	260	267	298	309	318	324	336
Port turnaround time (hrs) ^c									
Median result	27.9	29.6	29.0	34.6	37.9	39.8	36.9	38.2	33.8
95th percentile	47	56	54	63	72	65	65	73	57
Melbourne									
Total cargo throughput ('000 tonnes)	15 665	15 542	13 560	14 995	15 299	16 096	16 233	18 077	17 800
Non-containerised general cargo ('000 tonnes) ^a	1 251	1 273	1 028	1 055	1 130	1 167	1 151	1 179	1 214
Containerised cargo (teus exchanged)									
Full import	508 357	557 940	422 482	532 350	502 392	566 876	523 361	622 698	544 439
Empty import	50 920	48 483	59 685	47 694	50 621	54 369	58 205	63 050	68 286
Full export	372 536	359 377	353 155	375 205	391 422	402 698	403 631	454 615	430 531
Empty export	174 254	231 319	124 911	170 507	166 444	216 133	167 700	213 477	182 002
Total	1 106 067	1 197 119	960 233	1 125 756	1 110 879	1 240 077	1 152 897	1 353 840	1 214 324
Average total employment ^b	223	228	224	217	210	205	197	204	219
Port turnaround time (hrs) ^c									
Median result	30	31	30	30	32	32	30	35	32
95th percentile	56	62	56	62	70	67	69	76	60

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

	Jan-Jun 2008	Jul-Dec 2008	Jan-Jun 2009	Jul-Dec 2009	Jan-Jun 2010	Jul-Dec 2010	Jan-Jun 2011	Jul-Dec 2011	Jan-Jun 2012
Adelaide									
Total cargo throughput ('000 tonnes)	5 283	4 952	4 767	4 713	5 887	8 763	10 340	7 698	7 984
Non-containerised general cargo ('000 tonnes) ^a	187	190	73	105	128	134	115	162	115
Containerised cargo (teus exchanged)									
Full import	40 656	40 260	40 656	47 581	42 201	53 095	51 821	60 602	57 188
Empty import	29 018	27 862	26 461	24 052	23 564	22 143	21 907	21 482	20 009
Full export	59 075	59 382	59 075	59 748	58 801	60 929	64 351	70 190	67 262
Empty export	14 591	16 724	6 125	10 379	8 175	13 888	9 567	14 532	12 569
Total	143 340	144 228	132 317	141 760	132 741	150 055	147 646	166 806	157 028
Average total employment ^b	107	107	109	112	111	110	108	114	120
Port turnaround time (hrs) ^c									
Median result	21	25	24	0	26	25	25	27	22
95th percentile	35	39	48	0	42	40	40	53	39
Fremantle									
Total cargo throughput ('000 tonnes)	13 534	13 032	13 550	12 258	13 890	12 883	13 047	12 345	15 899
Non-containerised general cargo ('000 tonnes) ^a	585	580	423	535	512	9 871	10 214	526	663
Containerised cargo (teus exchanged)									
Full import	131 937	142 591	113 174	135 077	128 545	151 719	141 044	172 829	157 170
Empty import	19 939	15 764	16 433	14 042	10 602	8 965	8 335	6 132	8 352
Full export	90 835	96 679	94 112	87 988	90 782	89 885	78 967	78 073	82 661
Empty export	44 253	51 758	34 980	45 918	44 085	58 582	60 753	80 554	71 147
Total	284 964	306 792	258 699	283 025	274 014	309 151	289 099	337 588	319 330
Average total employment ^b	289	302	309	305	305	320	319	320	331
Port turnaround time (hrs) ^c									
Median result	29	31	28	26	29	21	24	36	37
95th percentile	62	67	57	46	60	47	51	77	81

Notes to table 5.1

- not applicable
 - a. Excludes bulk cargoes and refers to break bulk commodities including machinery, iron and steel products, timber, paper and timber products and other general products. Break bulk trade dropped significantly at Sydney Ports as the result of cessation of trade when the Darling Harbour berths closed at the end of September 2007.
 - b. Comparisons between ports are not appropriate because each port authority/corporation has a different structure.
 - c. 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.
 - d. Components may not sum to totals due to rounding.
- Source: Ports Australia

CHAPTER 6

Stevedoring and ship arrival reliability

Overview

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

Explanatory notes

Stevedoring-cargo receipt

Table 6.1 present the information on cargo receipt 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 data was not available for Adelaide.

Ship arrival

Table 6.1 also include 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. Data 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. Data was not available for Melbourne. Abbreviations

Table 6.1 Stevedoring and ship arrival reliability indicators

Indicator	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jan–Mar	Apr–June	Jan–Mar	Apr–June	Jan–Mar	Apr–June	Jan–Mar	Apr–June	Jan–Mar	Apr–June
	2012	2012	2012	2012	2012	2012	2012	2012	2012	2012
Stevedoring										
Cargo receipt	89.9	89.7	66.7	66.8	95.6	93.5	0.0	0.0	91.8	92.0
Ship arrival										
Advice at 24 hrs	89.9	89.7	66.7	66.8	95.6	93.5	0.0	0.0	91.8	92.0
Advice inside 24 hrs	98.0	95.0	90.0	94	na	na	100.0	97.4	93.9	86.4

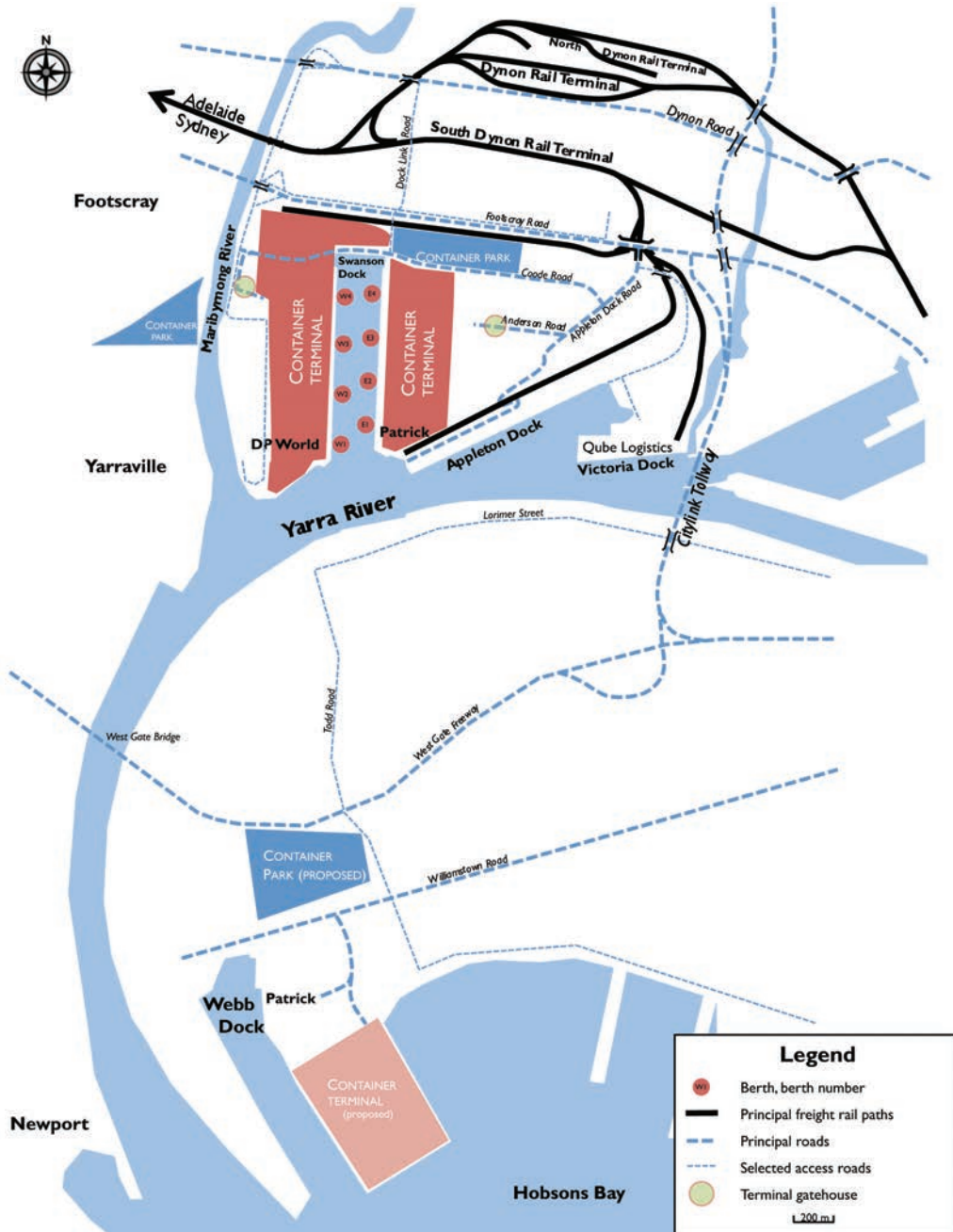
na not available

Sources: Ports Australia, Patrick, DP World Terminals

APPENDIX A

Maps of five major Australian container ports

Melbourne



June 2012

Melbourne (“Swanson Dock” at the confluence of the Yarra and Maribyrnong Rivers)

Dockside

- **Stevedores.** DP World’s container terminal is at Swanson Dock West, with four berths. Patrick’s container terminal is across the dock at Swanson Dock East, also with four berths.
- A new container terminal is currently proposed at Webb Dock
- **Equipment.** The Patrick terminal has 8 cranes, including 3 post-Panamax; the DP World terminal has 8 cranes, including 3 post-Panamax. Patrick has 42 straddle carriers while DP World has 48 straddle carriers. (<http://www.portofmelbourne.com/publications/~media/Global/Docs/Custom-Handbook.ashx>)

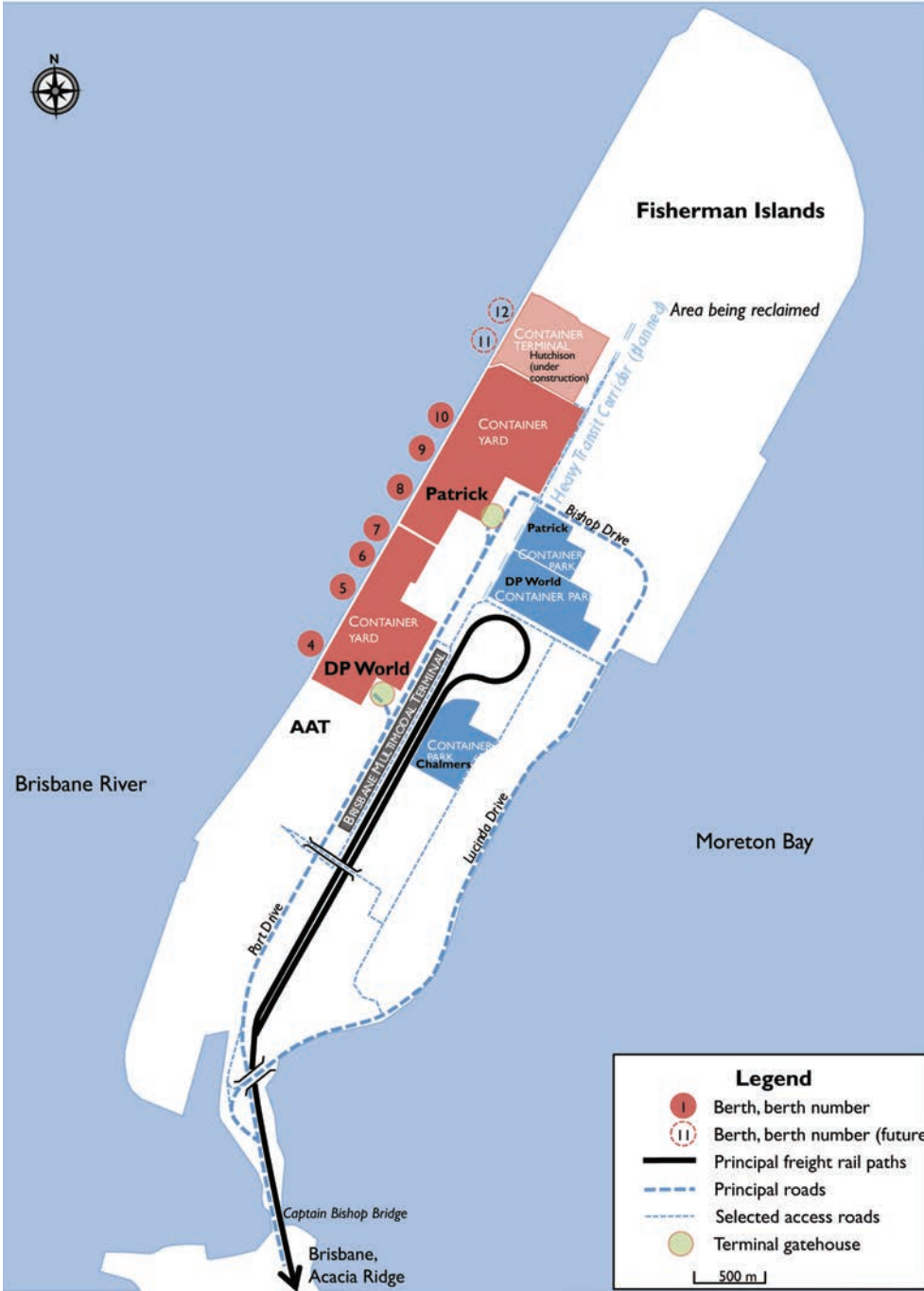
Road

- Access to the Patrick East Swanson Dock terminal is made via Appleton Dock Road/Anderson Road. Access to the DP World West Swanson Dock terminal is via Coode Road.

Rail

- **Operations.** Import and export containers are rail-served to near the dockside at Appleton Park Rail Terminal (Patrick), Victoria Dock (Qube) and West Swanson Intermodal Terminal (DP World). All near dockside rail are dual gauge tracks and scheduled trains run directly from near dockside to:
 - Adelaide, Griffith, Horsham and Portland (standard gauge);
 - Warrnambool, Maryvale, Deniliquin, Tocumwal, Mildura/Merbein and Donald (broad gauge).
- **Services.** The DP World Intermodal Terminal at Swanson Dock West is served by a single dual-gauge siding of 510 metres, running just to the south of Footscray Road.
- Victoria Dock’s recently-built track is shown. This is operated by Qube. There are two dual-gauge sidings, with 630 metre lengths.
- The Patrick East Swanson Dock terminal is served by “Appleton Park Rail Terminal’s two dual-gauge sidings of 640 metres and a locomotive run-around track.
- Other trains using Appleton Dock (with dedicated sidings) include trains serving the dry bulk terminal of Australian Bulk Alliance (Sumitomo Corporation) at Appleton Dock.
- Common-user sidings are also provided at Appleton Dock to provide train operations and marshalling.
- Containers are also railed to the port, terminating at South Dynon Rail Terminal (Pacific National) and Dynon Rail Terminal (used by QR National and Qube), from where the containers may then be conveyed to/from the dockside by road shuttles.

Brisbane



June 2012

Brisbane (“Fisherman Islands”)

Dockside

- **Stevedores.** The map shows the existing (DP World and Patrick) container terminals as well as the Hutchison container terminal that is currently under construction. Some containers are also handled by Australian Amalgamated Terminals (AAT), who provide a multi-purpose, multi-user facility that is based at Berths 1–3, to the west of the DP World container yard.
- **Berths.** DP World operates from container berths 4–7. The Patrick container berths are 8–10. The Hutchison berths will be Berth 11 (from 2012) and Berth 12 (from 2014).
- **Equipment.** DP World has 6 cranes, including 2 post-Panamax cranes and 2 Super post-Panamax cranes. Patrick has 5 cranes, consisting of 3 Panamax cranes and 2 post-Panamax cranes; in addition, Patrick has 27 automated straddle carriers.

Road

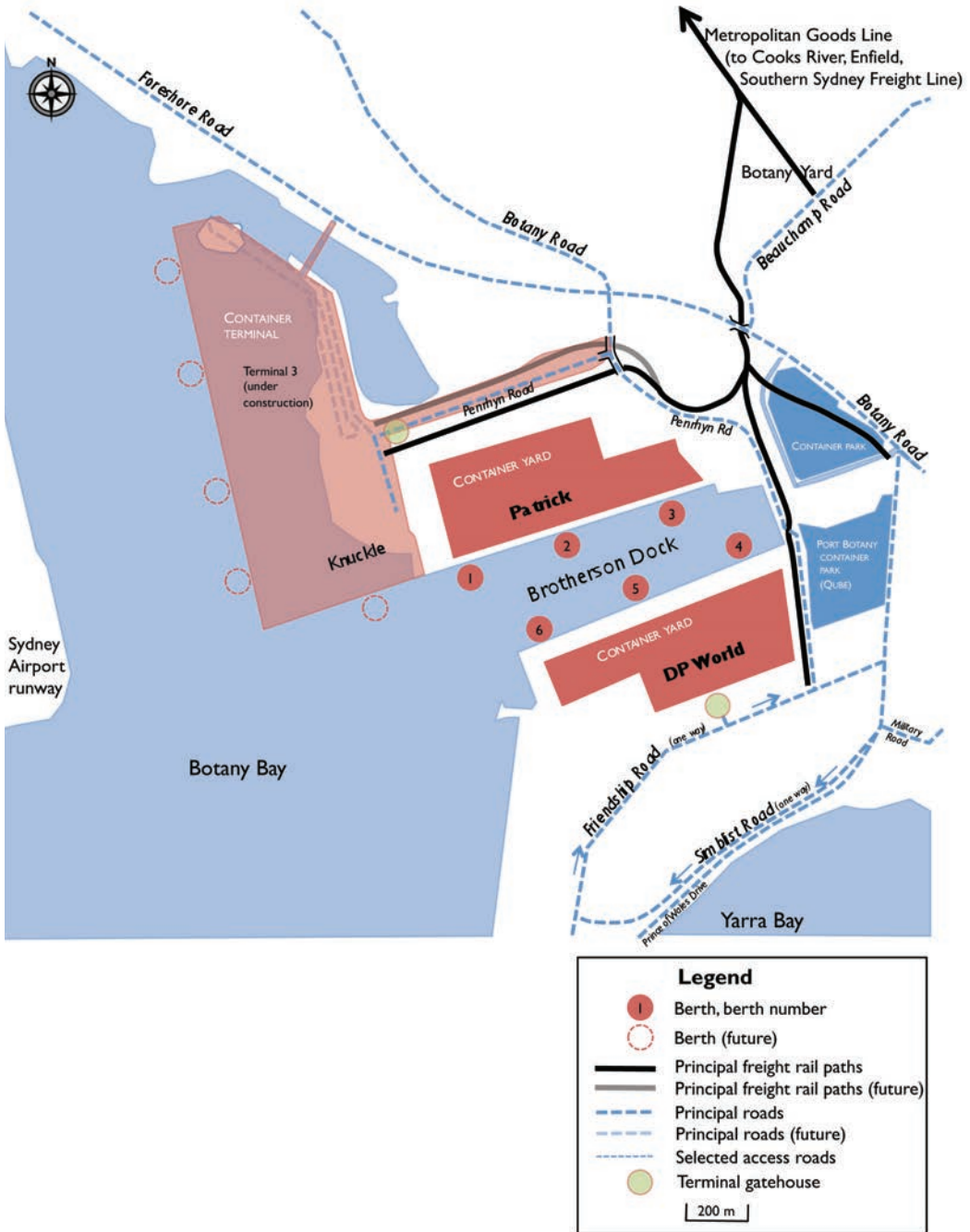
- Road access is via the bridge to Fisherman Islands, over the Captain Bishop Bridge. Access to the terminals is via Port Drive.

Rail

- **Operations.** A near-dock intermodal facility is provided on Fisherman Islands, the Brisbane Multimodal Terminal. Train lengths of up to 850 metres are permitted. Containers are shifted by road between that terminal and the container terminals. In that context, rail access is classed as having “near-dock” facilities.
- **Services.** Rail services to Fisherman Islands include:
 - coal trains from West Moreton (narrow gauge);
 - grain trains (narrow gauge);
 - on a seasonal basis, containers are brought by (narrow-gauge) trains from Goondiwindi and Dalby (carrying cotton), for export;
 - reefer containers containing meat from northern abattoirs are brought by (narrow-gauge) trains;
 - some containers are taken from Fisherman Islands—the presumption is that they are mainly empty containers;
 - there are no scheduled standard-gauge container trains to the Brisbane Multi Modal Terminal.

National rail connections. Dual narrow and (national) standard gauge tracks are installed between Fisherman Islands and the interstate/intrastate intermodal terminal at Acacia Ridge.

Sydney



June 2012

Sydney (Brotherson Dock, at Port Botany in Botany Bay)

Dockside

- **Stevedores.** The two existing container terminals at Port Botany are served by Patrick and DP World stevedores. The terminals face into Brotherson Dock.
- **Berths.** Patrick and DP World each has three berths.
- Terminal 3 is currently under construction, with five berths to be provided. Four of the berths at the terminal will be operated by a third stevedore, Hutchison. The fifth berth, in the area known as the Knuckle, will be operated by Patrick.
- **Equipment.** DP World equipment includes 3 twin-lift quay cranes and 4 single-lift quay cranes. Patrick equipment includes 5 twin-lift quay cranes and 3 single-lift quay cranes.

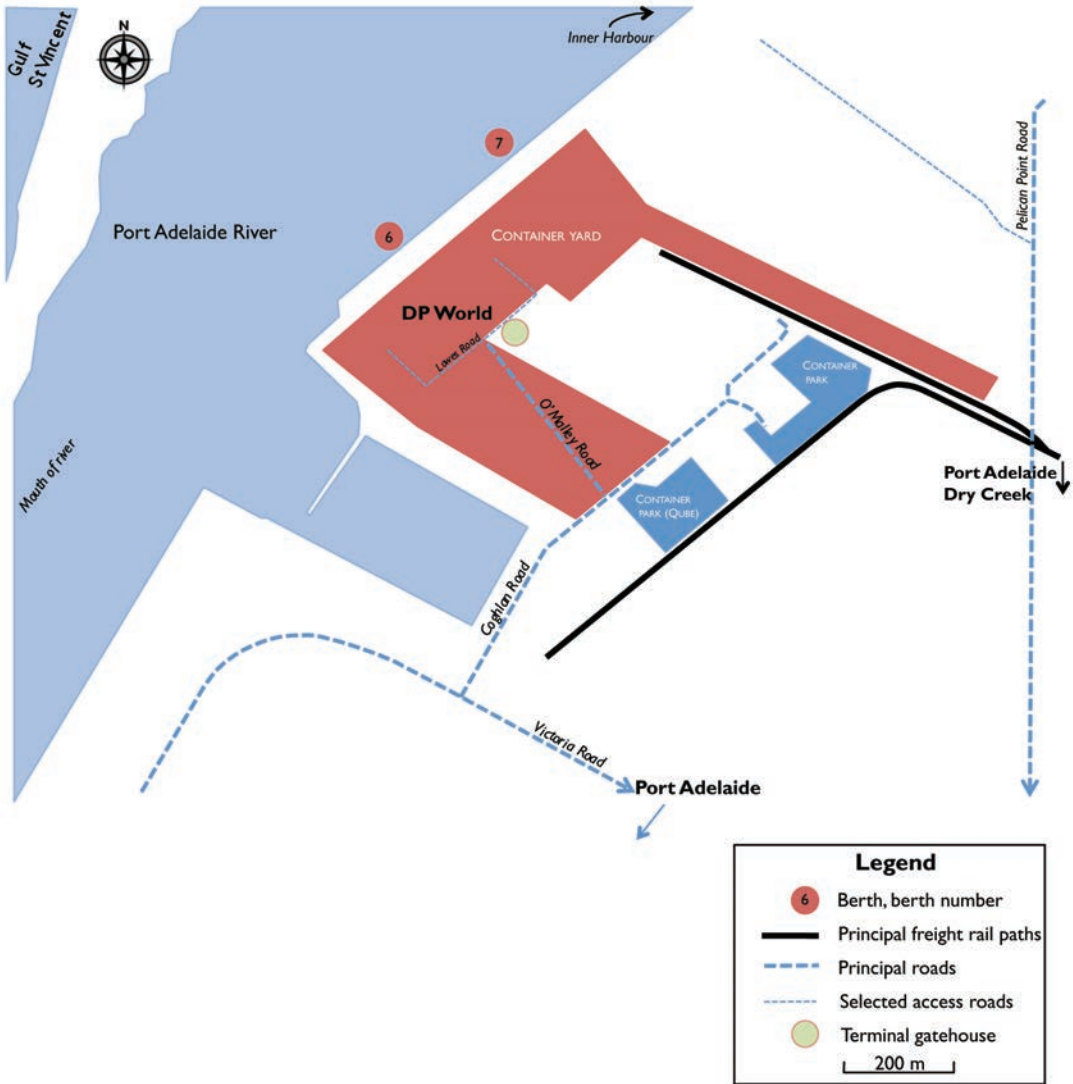
Road

- Access to DP World terminal is via Friendship Road (one-way). The Patrick terminal is accessed from Penrhyn Road.
- The map shows the road configuration being completed during 2012. Road connections to Terminal 3 are shown, notably the access via Penrhyn Road and access over a bridge from Foreshore Road.

Rail

- **Operations.** Stevedores have rail tracks to their terminals, as will the Hutchison terminal.
- DP World has 3 tracks of 600 metre length (as of March 2012). Patrick has 2 sidings of 650 metre length. (The *Sydney Ports Corporation Handbook* does not mention run-around track for the locomotive.)
- A new siding (grade-separated at Penrhyn Road) will link to Terminal 3, paralleling Penrhyn Road and the existing Patrick sidings. There is provision for additional rail access (not shown) to Terminal 3; this would access the terminal via a track paralleling Foreshore Road (approaching from the west) and entering the container yard via a new bridge across the sea inlet.
- **Services.** Rail container services between Botany and the hinterland include:
 - Sydney destinations (Yennora terminal, operated by Qube; Cooks River, operated by Qube; Minto [MIST], operated by Independent Railways; Clyde, operated by Independent Railways) [ex-Griffith containers]; and
 - non-urban terminals at Blayney (Independent Railways), Narrabri [cotton] (Qube; Freightliner) and Broadmeadow/Bullock Island (Qube).
 - Grain handled at Port Botany moves in containers, including by (unscheduled) rail services.
- **Rail access.** Railway sidings at Botany Yard are used to regulate train access to the port (as a holding point), to split trains for onwards movements to the port and marshal trains from port-originating wagons, for movements to Enfield/Chullora and beyond.
- **National rail connections.** The port is linked to the interstate rail network, including the Southern Sydney Freight Line, via the Metropolitan Goods Line/Port Botany Line.

Adelaide



June 2012

Adelaide (“Adelaide Container Terminal”, at Outer Harbor/Pelican Point, on the Port Adelaide River)

Dockside

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

Road

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

Rail

- **Operations.** The Outer Harbor terminal has two sets of rail sidings. Two sidings, each of 640 metre length, serve the DP World container terminal (dual standard and broad gauge track). The other set of sidings serve the Mackenzie (now Qube) logistics terminal and container park (with broad gauge).
- **Services.** Railed movements to the dockside (all by standard rather than broad gauge) include:
 - containers railed from Rankin Dam siding, moving iron ore that is mined at Cairn Hill. The ore is but emptied from the containers directly into the hold of the vessels.
 - A regular train from Port Pirie and Bowmans operates to the DP World terminal via Port Flat terminal. Containers for the landbridge service to Melbourne are removed at Port Flat. Containers on the train include lead (from Port Pirie) and agricultural produce (from the Balco joint venture at Bowmans).
 - Grain is brought to Port Adelaide by rail in hopper wagons; some is then loaded into containers at Viterria’s (ABB) container grain loader (inverter) and then exported.
- **Rail linkages.** The Outer Harbor facility is at the extremity of a freight-only railway between Outer Harbor, Port Adelaide and Dry Creek. The line is dual standard- and broad-gauge, with some sections of double-track.
- **National rail connections.** The Outer Harbor–Dry Creek line connects with the interstate network at Dry Creek. Nearby intermodal terminals include the Asciano terminal at Islington and the SCT Logistics terminal at Direk.

Fremantle



June 2012

Fremantle (North Quay in the “Inner Harbour” on the Swan River)

Dockside

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

Road

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

Rail

- **Operations.** North Quay Rail Terminal, to the west of the Patrick terminal, serves *both* Patrick and DP World container terminals. The sidings at that location are around 450 metres in length; there are plans to lengthen them so as to accommodate blocks of 600 metre-length trains. The Rail Terminal is dual-gauge.
- **Services.** Rail services to the port include the following (standard-gauge) trains:
 - Qube (South Spur) operates between the CBH Metro Grain Centre/Intermodal Logistics container terminal at Forrestfield, and Fremantle. The port handles bulk grain (at the Outer Harbour) and containerised grain (at North Quay); it is unclear whether this train is a container or hopper-wagon train.
 - Qube (South Spur) operates the “Fremantle Shuttle” (or “SeaTrain”) container train between Kewdale and North Quay; the service is operated by contract from the State government. The service frequency is unknown.
 - ARG (QR National) operates a weekday container service between Kalgoorlie and Fremantle; the contents of the containers is nickel matte, for the WMC Resources (part of BHP Billiton).
 - Lead (from Magellan Metals) is railed to the port in containers from Kalgoorlie via Forrestfield Container Terminal.
- **Rail linkages.** Trains access the Rail Terminal on a dual narrow- and standard-gauge freight-only track from Midland. Freight and passenger trains share a track on the bridge over the Swan River.
- **National rail connections.** The rail link to Midland, on the interstate network, includes spur tracks to interstate intermodal terminals at Kewdale and Forrestfield.

Abbreviations

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
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 and Transport
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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