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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.

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 December quarter 2012.

Waterline is prepared in the Infrastructure and Surface Transport Statistics Section by Adam Malarz. Peter Kain assisted with compiling the maps in Appendix A.

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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In-brief

Land-side performance indicators

Container throughput on the land side at Australia's largest five container ports increased slightly in December quarter of 2012 to 980 thousand containers. During the calendar year 2012, total container throughput increased by less than half a per cent to about 3.7 million containers.

Productivity of truck turnaround in five ports has remained stable at about 35 minutes between December quarter 2011 and December quarter 2012. Shift work in trucking containers, as measured by the vehicle booking system, indicated an increase of evening, night and weekend work from about 267 thousand timeslots used in December quarter 2011 to 300 thousand in December quarter 2012. A desirable shift of activity away from the peak periods is continuing to occur. For example, in December 2011 about 52 per cent of vehicle booking system slots used were during the Monday to Friday day shift. In December 2012 about 47 per cent of vehicle booking system slots used were during the Monday to Friday day shift.

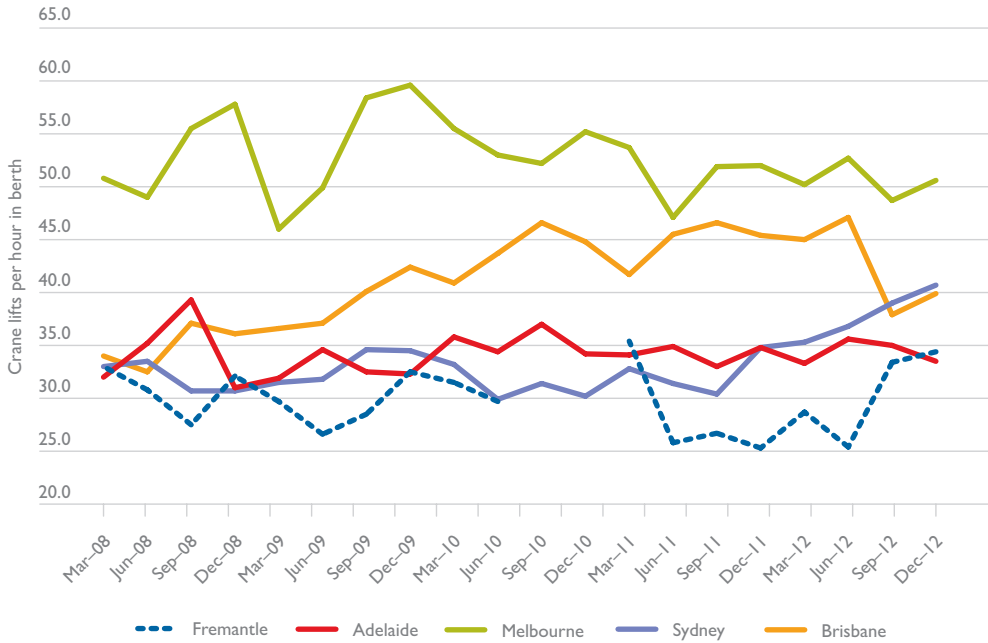
Despite the increase in the number of containers handled, the number of total trucks processed declined by -5.6 per cent between September quarter 2011 and September quarter 2012; and by -2.8 per cent between December quarter 2011 and December quarter 2012. The number of containers carried by rail increased over the same period.

Wharf-side productivity

In December quarter 2012, crane lifts per hour a vessel spent in berth were:

- 50.6 in Melbourne;
- 40.7 in Sydney;
- 39.9 in Brisbane;
- 34.4 in Fremantle; and
- 33.5 in Adelaide.

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 number of containers handled in five Australian ports increased in the December quarter 2012 by 4.3 per cent, as compared with December quarter 2011. Growth was particularly pronounced in Adelaide (12.7 per cent) and Sydney (9.4 per cent). In the same period, Melbourne experienced a decline in total containers handled of -3.2 per cent.

Container terminal performance rates in five ports, as measured by vessel working rates, increased from 41.0 containers per hour in December quarter of 2011 to 45.1 containers per hour (9.1 per cent) in December quarter of 2012. In Fremantle, vessel working rates in December quarter 2012 improved by 26.9 per cent and in Sydney by 14.5 per cent respectively.

Port-interface cost index

In the largest category of container ships of 50 000–55 000 GT, between July and December 2012, the exchange of containers was highest in Melbourne (2 702 TEUs) and lowest in Adelaide (1 275 TEUs).

Elapsed berth time for this ship category was longest in Sydney (36 hours) and shortest in Brisbane (23 hours).

For imports by container ships in the 35 000–40 000 GT category the national port interface cost indices in July to December 2012 increased in nominal terms to 912 (1.1 per cent) from 902 in January to June 2012. The real price indices increased to 628 from 617 (1.7 per cent).

For exports by the same category of ships, costs indices in July to December 2012 increased in nominal terms to 879 (up 1.0 per cent) from 870 in January to June 2012. The real export cost indices increased to 606 (1.7 per cent) from 596.

For the ship category 35 000–40 000 GT the elapsed berth time declined in all ports except for Brisbane and Adelaide. In Fremantle the elapsed berth time declined (from 38 to 27 hours), Melbourne (from 29 to 28 hours), Sydney (from 36 to 35 hours) while in Adelaide the elapsed berth time increased (from 21 to 22 hours) and in Brisbane (from 25 to 26 hours) for the periods January to June 2012 and July to December 2012.

In the smallest category of container ships of 5 000–20 000 GT, between July and December 2012, the exchange of containers was lowest in Sydney (344 containers) and highest in Fremantle (2 757 containers). No container ships in this size category visited Adelaide during this period.

Container ship visits

Of the container vessels visiting the five container ports, the ships in the 40 001–50 000 GT category were the most common between January and December 2012, followed by ships in 35 001–40 000 GT and 20 001–35 000 GT categories.

Between July 2011 and June 2012, the most common vessels visiting Melbourne and Sydney were in 40 001–50 000 GT size category, with 346 and 323 visits respectively.

Port performance – non-financial indicators

Compared with calendar year 2011 total cargo throughput in the calendar year 2012 increased by 7.0 per cent. In July to December 2012 the throughput increased by 6.3 per cent, as compared to the corresponding period in 2011.

In the calendar year 2012 containerised cargo throughput increased by 3.2 per cent, as compared with the previous calendar year with full exports up by 2.6 per cent, full imports up by 2.9 per cent and exports of empty containers up by 6.0 per cent.

Port turnaround times (median results) worsened in all ports during July–December 2012 in Adelaide (-17.5 per cent), Melbourne (-10.7 per cent), Sydney (-9.5 per cent), Fremantle (-2.0 per cent) and Brisbane (-1.3 per cent), as compared with July–December 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 forms 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 numbers of containers or TEUs per truck.

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 seven day week.

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/20 ft 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 I.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 I.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 I.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. Bulk runs announced for loading decisions issued 'in the last moment' before ship's departure may not be advertised and therefore they can use any truck available for work.

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 'adjusted' 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 adjusted 'Monday to Friday' day usage rates plus the week-end adjusted usage rates add up to 100 percent for each quarter.

Table I.1 Container terminal landside performance indicators

Port/Indicator	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12	Sep-12	Dec-12
Five ports									
Road									
Total trucks ^a	511 283	508 681	521 833	576 833	578 782	524 891	535 413	544 367	562 423
Total containers ^d	919 562	836 995	881 600	960 105	976 864	888 567	888 178	941 872	980 610
Total TEUS ^d	1 364 386	1 273 253	1 321 308	1 437 951	1 458 221	1 315 317	1 316 298	1 413 303	1 468 148
Truck turnaround time – mins. ^e	33.9	32.9	33.7	34.5	34.9	32.4	32.6	34.4	35.3
Containers per truck ^e	1.8	1.6	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Avg. container turnaround time – mins. ^e	24.6	23.0	23.3	25.8	24.0	22.1	21.9	25.3	25.6
TEUS per truck ^e	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.3
Rail									
Total containers (excl. Adel. and Frem.)	90 389	76 059	89 417	93 328	92 294	77 446	92 766	95 486	112 965
Number of VBS timeslots available									
Overall total	686 826	774 146	822 736	880 187	852 968	813 133	812 125	837 863	884 023
Monday – Friday									
Day (0600–1800)	362 971	430 037	432 753	457 327	424 454	422 139	418 284	410 076	411 469
Evening (1800–2400)	153 571	171 426	180 633	196 599	188 362	187 430	185 128	185 878	194 277
Night (2400–0600)	84 309	90 640	98 908	108 660	113 329	102 308	106 762	107 720	120 569
Sub total	600 851	692 103	712 294	762 586	726 145	711 877	710 174	703 674	726 315
Saturday									
Day (0600–1800)	30 836	40 283	52 677	50 978	57 244	50 209	52 025	49 777	60 739
Evening (1800–2400)	5 274	7 118	11 611	10 335	9 413	6 103	3 141	7 589	8 228
Night (2400–0600)	25 183	3 608	5 558	11 021	12 408	8 416	9 373	13 555	14 173
Sub total	61 293	51 009	69 846	72 334	79 065	64 728	64 539	70 921	83 140
Sunday									
Day (0600–1800)	9 654	13 134	18 103	21 141	25 552	22 226	23 357	39 308	47 119
Evening (1800–2400)	8 071	8 806	9 967	12 360	11 656	9 141	9 448	13 708	15 320
Night (2400–0600)	6 957	9 094	12 526	11 766	10 550	5 161	4 607	10 252	12 129
Sub total	24 682	31 034	40 596	45 267	47 758	36 528	37 412	63 268	74 568
Number of VBS timeslots used									
Overall total	636 024	725 346	777 949	789 301	761 562	752 735	767 748	805 409	848 993
Monday – Friday									
Day (0600–1800)	346 342	412 836	418 712	429 374	392 446	396 845	398 374	401 848	402 747
Evening (1800–2400)	138 509	155 249	167 905	174 546	166 006	171 635	172 274	178 145	183 216
Night (2400–0600)	78 209	85 186	92 513	98 440	100 775	94 605	98 706	104 211	116 999
Sub total	563 060	653 271	679 130	702 361	659 228	663 085	669 354	684 203	702 962
Saturday									
Day (0600–1800)	26 380	35 788	48 341	41 348	50 709	46 708	49 363	48 413	59 506
Evening (1800–2400)	3 118	6 152	9 636	6 064	6 689	2 503	1 945	6 613	8 150
Night (2400–0600)	23 625	3 326	5 275	8 256	9 761	7 870	13 662	12 258	13 527
Sub total	53 123	45 266	63 252	55 668	67 159	57 081	64 970	67 284	81 183
Sunday									
Day (0600–1800)	7 296	10 606	15 428	14 908	19 787	19 922	20 968	32 176	39 780
Evening (1800–2400)	7 191	8 229	9 511	9 502	8 931	8 285	8 632	11 645	13 572
Night (2400–0600)	5 354	7 974	10 628	6 862	6 457	4 362	3 824	10 101	11 496
Sub total	19 841	26 809	35 567	31 272	35 175	32 569	33 424	53 922	64 848

Table 1.1 Container terminal landside performance indicators (continued)

Port/Indicator	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12	Sep-12	Dec-12
Brisbane									
Road									
Total trucks	64 609	55 415	64 298	73 673	73 054	67 988	74 094	79 411	82 977
Total containers ^d	150 381	130 904	144 516	163 687	166 774	147 960	154 380	158 211	169 753
TEUS ^d	222 496	190 582	213 228	243 875	248 464	217 232	229 695	246 378	259 769
Truck turnaround time – mins. ^{b e}	32.9	33.3	37.4	37.4	37.7	37.7	37.0	38.5	42.2
Containers per truck ^e	2.3	2.4	2.2	2.2	2.3	2.2	2.1	2.0	2.0
Avg. container turnaround time – mins. ^e	18.8	18.9	21.1	21.5	21.5	21.8	21.4	23.7	25.3
TEUS per truck ^e	2.5	2.5	2.6	2.6	2.5	2.5	2.5	2.5	2.5
Rail									
Total containers ^c	9 164	5 130	10 542	9 271	7 187	4 579	8 376	9 881	9 299
Number of VBS timeslots available									
Overall total	127 105	126 873	127 193	154 534	160 274	153 202	152 799	164 062	172 656
Monday–Friday									
Day (0600–1800)	73 486	80 055	77 950	90 021	88 155	85 671	84 058	82 726	82 067
Evening (1800–2400)	33 757	31 615	33 032	41 311	39 862	37 034	37 092	38 899	40 192
Night (2400–0600)	9 027	5 613	6 233	10 186	13 276	9 810	12 471	17 724	21 535
Sub total	116 270	117 283	117 215	141 518	141 293	132 515	133 621	139 349	143 794
Saturday									
Day (0600–1800)	6 781	5 951	7 052	9 614	11 859	13 494	12 570	12 083	12 617
Evening (1800–2400)	440	525	435	543	533	562	161	276	165
Night (2400–0600)	0	0	0	2	290	482	884	1 642	1 416
Sub total	7 221	6 476	7 487	10 159	12 682	14 538	13 615	14 001	14 198
Sunday									
Day (0600–1800)									
Evening (1800–2400)	1 660	1 157	538	1 136	1 895	620	274	523	1 207
Night (2400–0600)	637	908	506	756	989	734	763	1 025	2 869
Sub total	3 614	3 114	2 491	2 857	6 299	6 149	5 563	10 712	14 664
Number of VBS timeslots used									
Overall total	123 582	124 060	124 814	148 049	150 726	148 112	148 739	159 295	167 366
Monday–Friday									
Day (0600–1800)	71 917	78 856	76 710	87 887	84 595	83 688	82 143	80 883	80 411
Evening (1800–2400)	32 600	30 510	32 170	38 146	36 334	35 634	35 725	37 914	39 150
Night (2400–0600)	8 552	5 474	6 135	9 608	11 817	9 466	12 037	17 225	20 733
Sub total	113 070	114 840	115 015	135 641	132 746	128 788	129 905	136 022	140 294
Saturday									
Day (0600–1800)	6 538	5 652	6 904	9 122	11 060	12 905	12 377	11 746	12 296
Evening (1800–2400)	406	516	425	473	507	400	151	259	165
Night (2400–0600)	0	0	0	2	270	414	868	1 504	1 401
Sub total	6 944	6 168	7 329	9 597	11 837	13 719	13 396	13 509	13 862
Sunday									
Day (0600–1800)	1 310	1 049	1 447	949	3 370	4 409	4 482	8 425	9 986
Evening (1800–2400)	1 632	1 137	522	1 109	1 807	476	269	342	869
Night (2400–0600)	626	866	501	753	966	720	687	997	2 355
Sub total	3 568	3 052	2 470	2 811	6 143	5 605	5 438	9 764	13 210

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

Port/Indicator	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12	Sep-12	Dec-12
Sydney									
Road									
Total trucks	143 299	178 232	180 096	192 911	197 166	172 093	172 636	154 781	169 790
Total containers ^d	270 147	242 479	262 387	274 523	284 285	255 378	250 001	262 275	292 947
TEUS ^d	410 619	412 505	418 370	425 899	439 007	391 855	382 998	398 190	447 983
Truck turnaround time – mins. ^e	45.5	40.1	35.6	36.2	33.8	30.2	30.5	40.2	39.4
Containers per truck ^e	1.9	1.4	1.5	1.4	1.4	1.5	1.4	1.7	1.7
Avge. container turnaround time – mins. ^e	39.1	35.6	31.1	30.8	28.4	24.9	25.2	36.5	35.6
TEUS per truck ^e	2.2	2.3	2.3	2.2	2.2	2.2	2.2	2.1	2.1
Rail									
Total containers	49 699	48 872	49 768	53 152	53 001	43 287	51 492	52 333	54 365
Number of VBS timeslots available									
Overall total	155 426	241 417	267 581	250 158	236 752	204 774	202 853	214 873	231 162
Monday–Friday									
Day (0600–1800)	59 477	115 533	119 576	102 941	92 942	91 636	89 046	89 987	92 998
Evening (1800–2400)	27 227	46 951	50 955	45 204	42 157	41 552	40 567	41 491	42 898
Night (2400–0600)	23 981	38 959	43 169	42 169	41 944	36 847	36 345	36 040	38 937
Sub total	110 685	201 443	213 700	190 314	177 043	170 035	165 958	167 518	174 833
Saturday									
Day (0600–1800)	08 447	16 582	21 747	16 865	17 377	11 145	12 063	11 351	15 156
Evening (1800–2400)	1 525	3 899	5 720	6 079	6 108	1 684	1 457	3 073	3 724
Night (2400–0600)	23 701	2 272	3 529	8 361	8 942	4 524	4 571	7 097	7 830
Sub total	33 673	22 753	30 996	31 305	32 427	17 353	18 091	21 521	26 710
Sunday									
Day (0600–1800)	5 554	8 226	11 081	15 676	14 970	8 802	10 400	14 574	17 860
Evening (1800–2400)	3 740	4 901	5 873	7 463	6 725	4 695	5 021	7 677	7 938
Night (2400–0600)	1 774	4 094	5 931	5 400	5 587	3 889	3 383	3 583	3 821
Sub total	11 068	17 221	22 885	28 539	27 282	17 386	18 804	25 834	29 619
Number of VBS timeslots used									
Overall total	142 674	226 219	251 568	211 348	187 401	191 560	189 934	203 543	222 111
Monday–Friday									
Day (0600–1800)	56 109	110 642	115 042	93 907	79 370	86 495	85 047	86 355	89 922
Evening (1800–2400)	25 393	45 090	49 178	40 584	35 370	38 801	37 563	39 059	41 477
Night (2400–0600)	22 413	36 064	39 830	38 099	33 694	33 792	32 860	33 541	36 828
Sub total	103 914	191 796	204 050	172 590	148 434	159 088	155 470	158 955	168 227
Saturday									
Day (0600–1800)	7 095	14 601	19 773	12 234	13 595	10 504	11 332	10 650	14 558
Evening (1800–2400)	261	2 917	4 692	2 329	2 774	1 597	1 298	2 821	3 502
Night (2400–0600)	22 354	2 051	3 022	6 033	6 864	4 215	4 274	6 129	7 283
Sub total	29 710	19 569	27 487	20 596	23 233	16 316	16 904	19 600	25 343
Sunday									
Day (0600–1800)	4 336	6 757	9 448	10 964	9 942	8 430	9 774	14 109	17 233
Evening (1800–2400)	3 121	4 542	5 602	5 123	4 155	4 379	4 751	7 419	7 606
Night (2400–0600)	1 593	3 555	4 981	2 075	1 637	3 347	3 035	3 460	3 702
Sub total	9 050	14 854	20 031	18 162	15 734	16 156	17 560	24 988	28 541

Table 1.1 Container terminal landside performance indicators (continued)

Port/Indicator	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12	Sep-12	Dec-12
Melbourne									
Road									
Total trucks ^a	221 538	199 857	200 625	223 885	222 294	202 906	203 057	217 671	218 326
Total containers	348 268	321 755	336 289	365 938	364 662	333 131	335 347	352 374	354 362
Total TEUS	512 081	467 319	489 840	538 739	533 768	486 122	489 026	518 018	520 861
Truck turnaround time – mins.	25.9	25.4	31.0	32.1	34.6	33.7	33.4	32.4	34.0
Containers per truck	1.6	1.6	1.7	1.6	1.6	1.6	1.7	1.6	1.6
Avg. container turnaround time – mins.	16.8	16.4	19.7	26.4	22.9	22.0	21.6	21.6	22.2
TEUS per truck	2.3	2.3	2.4	2.4	2.4	2.4	2.4	2.4	2.4
Rail									
Total containers ^c	15 388	11 630	16 929	16 806	17 741	14 242	15 236	15 609	31 637
Number of VBS timeslots available									
Overall total	267 200	265 130	285 647	313 938	289 594	305 189	306 887	300 256	326 480
Monday–Friday									
Day (0600–1800)	138 168	137 041	139 390	157 050	140 905	152 406	154 692	148 503	149 729
Evening (1800–2400)	53 336	54 104	56 979	65 024	60 199	66 055	66 024	64 861	72 783
Night (2400–0600)	47 941	44 600	47 900	52 748	49 856	51 816	51 705	46 269	53 289
Sub total	239 445	235 745	244 269	274 822	250 960	270 277	272 421	259 633	275 801
Saturday									
Day (0600–1800)	13 150	14 656	18 998	19 169	20 654	18 066	19 954	19 184	25 987
Evening (1800–2400)	3 309	2 694	5 251	3 663	2 768	3 725	1 517	4 209	4 339
Night (2400–0600)	1 482	1 336	2 029	2 656	2 883	2 928	3 034	3 174	3 511
Sub total	17 941	18 686	26 278	25 488	26 305	24 719	24 505	26 567	33 837
Sunday									
Day (0600–1800)	2 782	3 859	5 570	4 336	5 490	5 881	5 347	4 298	6 456
Evening (1800–2400)	2 577	2 748	3 502	3 682	2 865	3 774	4 153	4 206	4 947
Night (2400–0600)	4 455	4 092	6 028	5 610	3 974	538	461	5 552	5 439
Sub total	9 814	10 699	15 100	13 628	12 329	10 193	9 961	14 056	16 842
Number of VBS timeslots used									
Overall total	245 313	251 948	269 388	281 538	269 827	273 125	284 478	292 695	312 774
Monday–Friday									
Day (0600–1800)	131 423	133 935	136 211	145 349	132 886	140 487	144 481	148 079	148 783
Evening (1800–2400)	50 296	52 858	55 957	60 685	56 440	62 020	61 936	63 713	67 031
Night (2400–0600)	44 109	42 205	44 965	47 673	48 410	47 692	47 872	45 989	52 842
Sub total	225 827	228 998	237 133	253 707	237 736	250 199	254 289	257 781	268 656
Saturday									
Day (0600–1800)	10 322	12 853	17 266	15 120	19 621	16 050	18 333	19 065	25 862
Evening (1800–2400)	2 451	2 719	4 318	3 257	3 407	374	490	3 503	4 483
Night (2400–0600)	1 271	1 275	2 253	2 219	2 354	2 827	7 652	3 121	3 442
Sub total	14 044	16 847	23 837	20 596	25 382	19 251	26 475	25 689	33 787
Sunday									
Day (0600–1800)	2 307	2 550	3 333	3 201	2 855	3 380	3 612	3 673	4 892
Evening (1800–2400)	3 135	3 553	5 085	4 034	3 854	295	102	5 552	5 439
Sub total	5 442	6 103	8 418	7 235	6 709	3 675	3 714	9 225	10 331

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

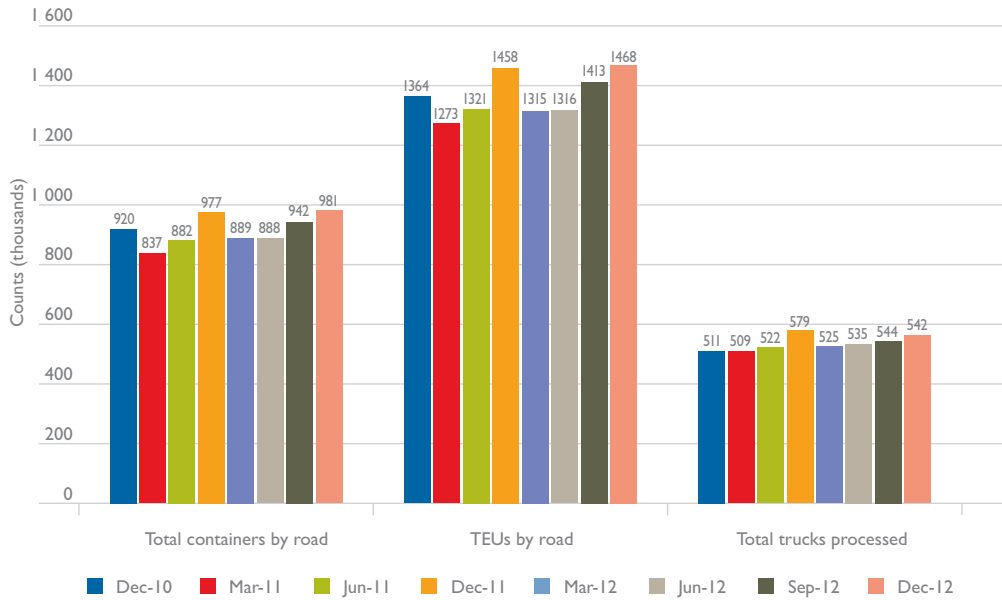
Port/Indicator	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12	Sep-12	Dec-12
Adelaide									
Road									
Total trucks	25 134	23 798	25 762	28 734	27 385	25 261	27 710	29 564	28 404
Total containers ^d	39 837	38 642	40 105	46 641	46 653	42 025	45 486	49 574	45 908
TEUS ^d	55 295	52 542	55 827	65 453	64 685	57 653	63 082	70 337	65 580
Truck turnaround time – mins. ^e	41.4	31.8	26.9	31.3	29.6	24.7	32.0	27.7	27.1
Containers per truck ^e	1.6	1.6	1.6	1.6	1.7	1.7	1.6	1.7	1.6
Avg. container turnaround time – mins. ^e	26.1	19.6	17.3	19.3	17.4	14.9	19.5	16.5	16.8
TEUS per truck ^e	2.2	2.2	2.2	2.3	2.4	2.3	2.3	2.4	2.3
Rail									
Total containers	na	na	na	na	na	na	na	na	na
Number of VBS timeslots available									
Overall total	39 523	37 869	42 107	45 006	44 263	44 575	43 828	45 370	43 203
Monday–Friday									
Day (0700–1400)	23 523	22 324	24 896	25 393	24 407	24 625	23 841	26 249	24 921
Evening (1400–2200)	16 000	15 545	17 211	19 613	19 856	19 950	19 987	19 121	18 282
Night (2200–0700)	0	0	0	0	0	0	0	0	0
Sub total	39 523	37 869	42 107	45 006	44 263	44 575	43 828	45 370	43 203
Number of VBS timeslots used									
Overall total	34 232	27 400	34 885	39 869	38 840	37 308	39 063	42 338	39 926
Monday–Friday									
Day (0700–1400)	22 629	18 931	22 972	24 123	22 210	21 771	22 358	25 774	23 807
Evening (1400–2200)	11 603	8 469	11 913	15 745	16 629	15 537	16 705	16 565	16 119
Night (2200–0700)	0	0	0	0	0	0	0	0	0
Sub total	34 232	27 400	34 885	39 869	38 840	37 308	39 063	42 338	39 926

Table 1.1 Container terminal landside performance indicators (continued)

Port/Indicator	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12	Sep-12	Dec-12
Fremantle									
Road									
Total trucks	56 703	51 379	51 052	57 630	58 883	56 643	57 916	62 940	62 926
Total containers ^d	120 980	111 097	111 235	121 273	131 583	124 107	123 799	123 800	123 801
TEUS ^d	163 895	150 306	144 043	163 985	172 297	162 454	151 497	180 380	173 955
Truck turnaround time – mins. ^e	34.6	33.8	34.6	35.0	38.4	32.6	29.8	29.2	25.9
Containers per truck ^e	2.0	2.0	1.9	1.9	1.9	1.9	1.8	1.9	1.9
Avge. container turnaround time – mins. ^e	21.1	20.4	20.7	20.9	22.7	18.6	16.7	16.9	15.0
TEUS per truck ^e	2.4	2.4	2.4	2.5	2.5	2.6	2.6	2.6	2.5
Rail									
Total containers	16 138	10 427	12 178	14 099	14 365	15 338	17 662	17 663	17 664
Number of VBS timeslots available									
Overall total	97 572	102 857	100 208	116 551	122 085	105 393	105 758	113 302	110 522
Monday–Friday									
Day (0600–1800)	68 317	75 084	70 941	81 922	78 045	67 801	66 647	62 611	61 754
Evening (1800–2400)	23 251	23 211	22 456	25 447	26 288	22 839	21 458	21 506	20 122
Night (2400–0600)	3 360	1 468	1 606	3 557	8 253	3 835	6 241	7 687	6 808
Sub total	94 928	99 763	95 003	110 926	112 586	94 475	94 346	91 804	88 684
Saturday									
Day (0600–1800)	2 458	3 094	4 880	5 330	7 354	7 504	7 438	7 159	6 979
Evening (1800–2400)	0	0	205	50	4	132	6	31	0
Night (2400–0600)	0	0	0	2	293	482	884	1 642	1 416
Sub total	2 458	3 094	5 085	5 382	7 651	8 118	8 328	8 832	8 395
Sunday									
Day (0600–1800)	1	0	5	164	1 677	2 748	3 084	11 272	12 215
Evening (1800–2400)	94	0	54	79	171	52	0	1 302	1 228
Night (2400–0600)	91	0	61	0	0	0	0	92	0
Sub total	186	0	120	243	1 848	2 800	3 084	12 666	13 443
Number of VBS timeslots used									
Overall total	85 493	91 476	90 921	102 583	102 809	93 922	95 076	94 213	92 435
Monday–Friday									
Day (0600–1800)	64 264	70 472	67 777	78 108	73 385	64 404	64 345	60 757	59 824
Evening (1800–2400)	18 617	18 322	18 687	19 386	21 233	19 643	20 345	20 894	19 439
Night (2400–0600)	0	0	0	0	0	0	0	0	0
Sub total	82 882	88 794	86 464	97 494	94 618	84 047	84 690	81 651	79 263
Saturday									
Day (0600–1800)	2 425	2 682	4 398	4 872	6 433	7 249	7 321	6 952	6 790
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	2 425	2 682	4 398	4 872	6 433	7 249	7 321	6 952	6 790
Sunday									
Day (0600–1800)	55	0	5	148	1 644	2 576	3 065	5 399	6 177
Evening (1800–2400)	131	0	54	69	114	50	0	211	205
Night (2400–0600)	0	0	0	0	0	0	0	0	0
Sub total	186	0	59	217	1 758	2 626	3 065	5 610	6 382

- 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. Appendix provides more information about rail container movements.
 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.

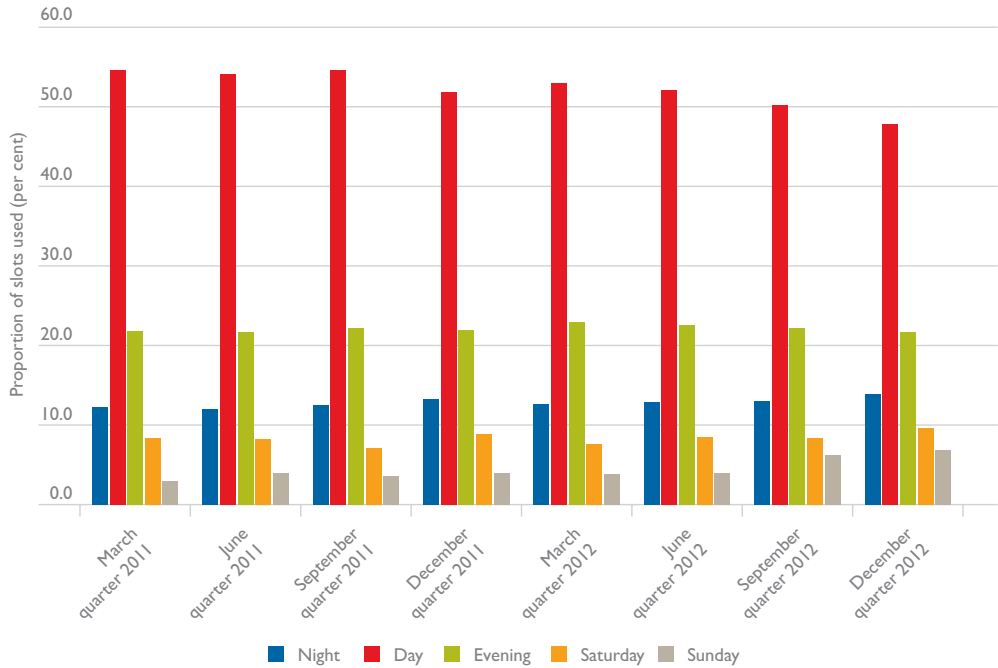
Figure 1.1 Five major ports landside of container terminal size of task indicators



- 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

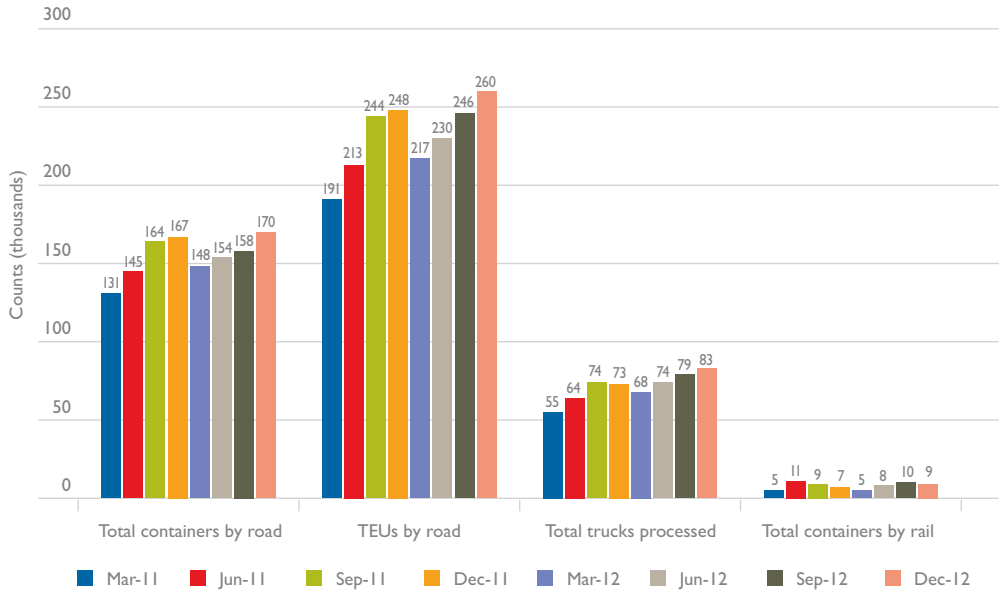


Note: 1. The definitions of the time windows are as follows: Night (2400–0600 Monday to Friday), Day (0600–1800 Monday to Friday) and Evening (1800–2400 Monday to Friday).
 2. For Sydney BITRE estimates for Dec. quarter 2010 were used, as one of the stevedores landside data was not provided from the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

Sources: Patrick and DP World.

Figure I.3

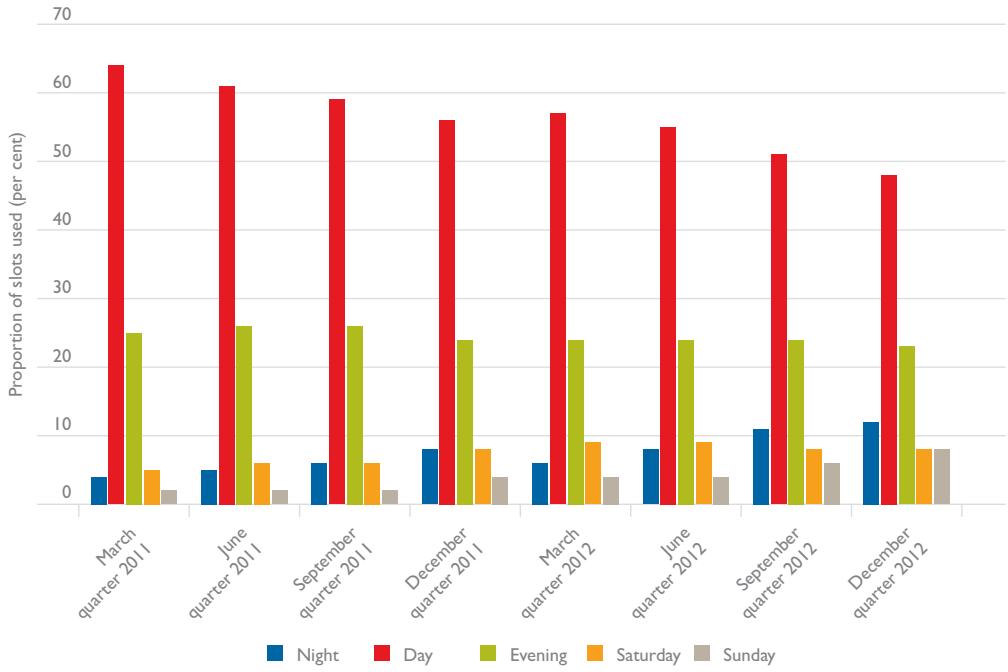
Brisbane: landside of container terminal size of task indicators



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 DP World/

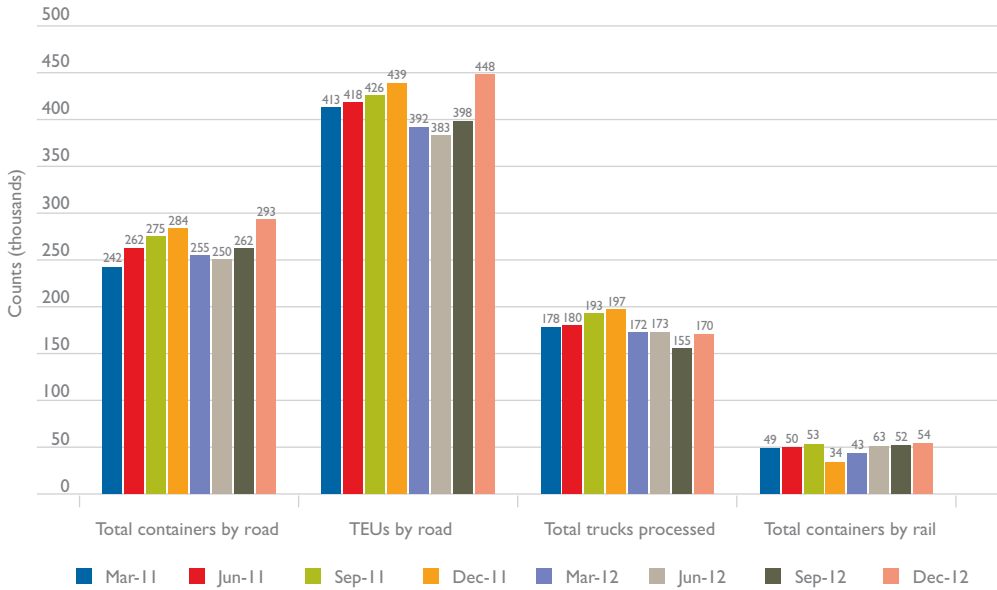
Figure 1.4 Brisbane: adjusted vehicle booking system time usage



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 DPWorld.

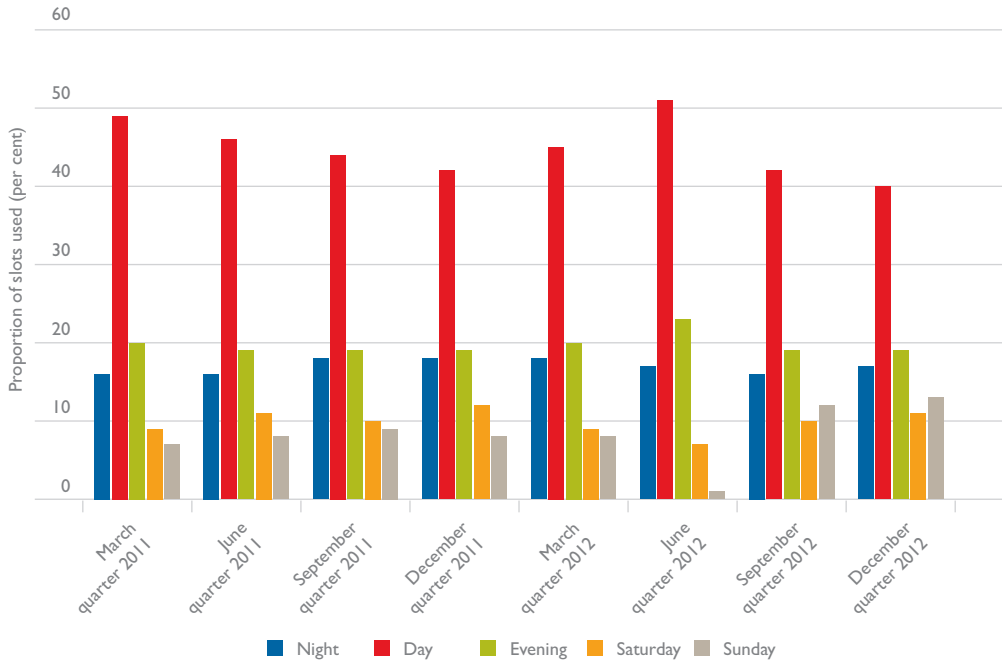
Figure 1.5 Sydney: Landside of container terminal size of task indicators



- 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 1.6 Sydney: adjusted vehicle booking system usage

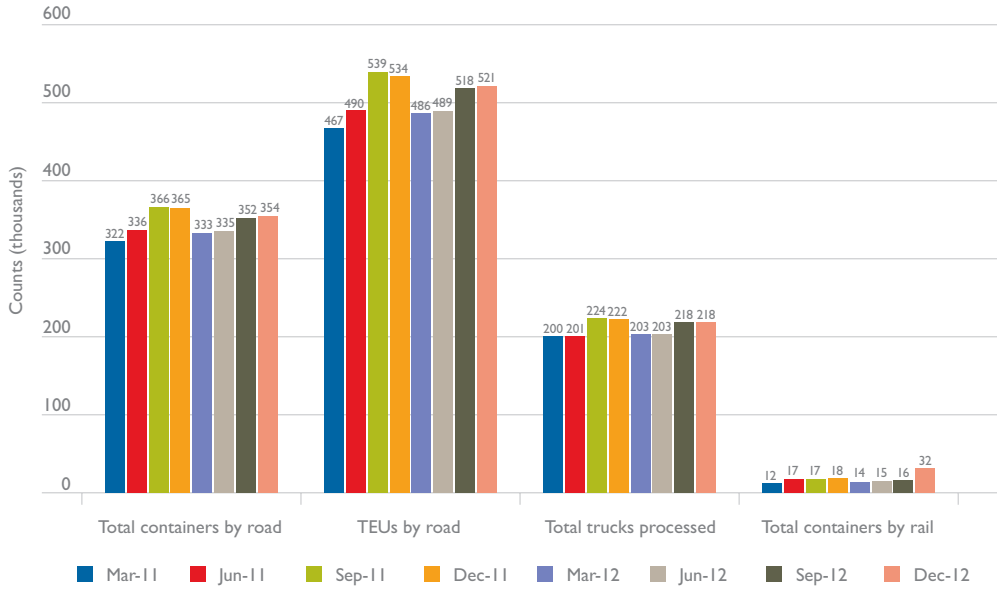


Note: 1. The definitions of the time windows are as follows: Night (2400–0600 Monday to Friday), Day (0600–1800 Monday to Friday) and Evening (1800–2400 Monday to Friday).
 2. For Sydney BITRE estimates for Dec. quarter 2010 were used, as one of the stevedores landside data was not provided from the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

Sources: Patrick and DP World.

Figure I.7

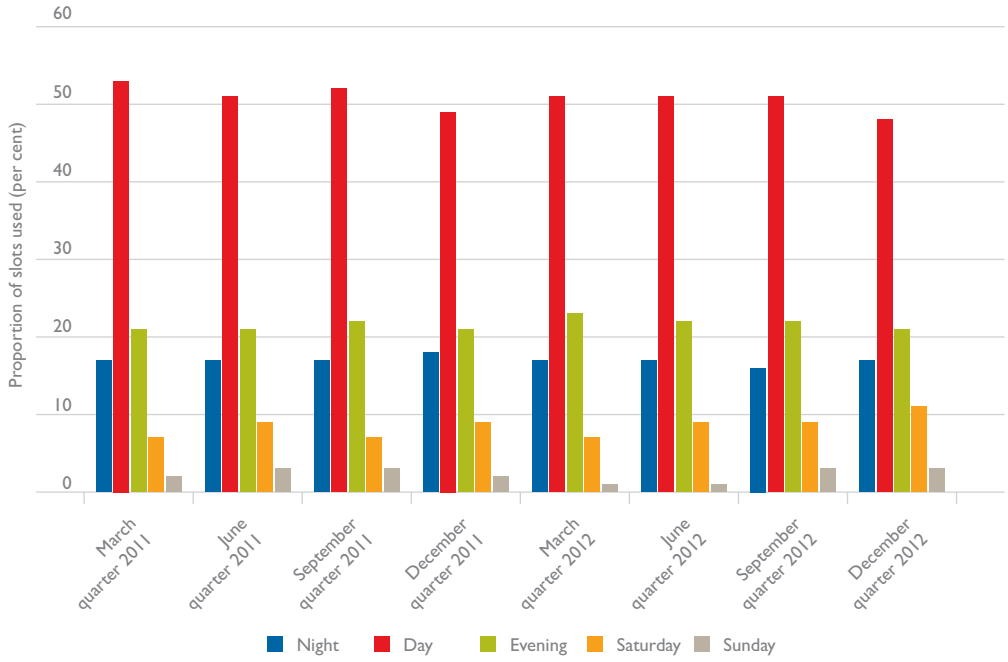
Melbourne: Landside of container terminal size of task indicators



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

Sources: Patrick and DP World.

Figure 1.8 Melbourne: adjusted vehicle booking system usage

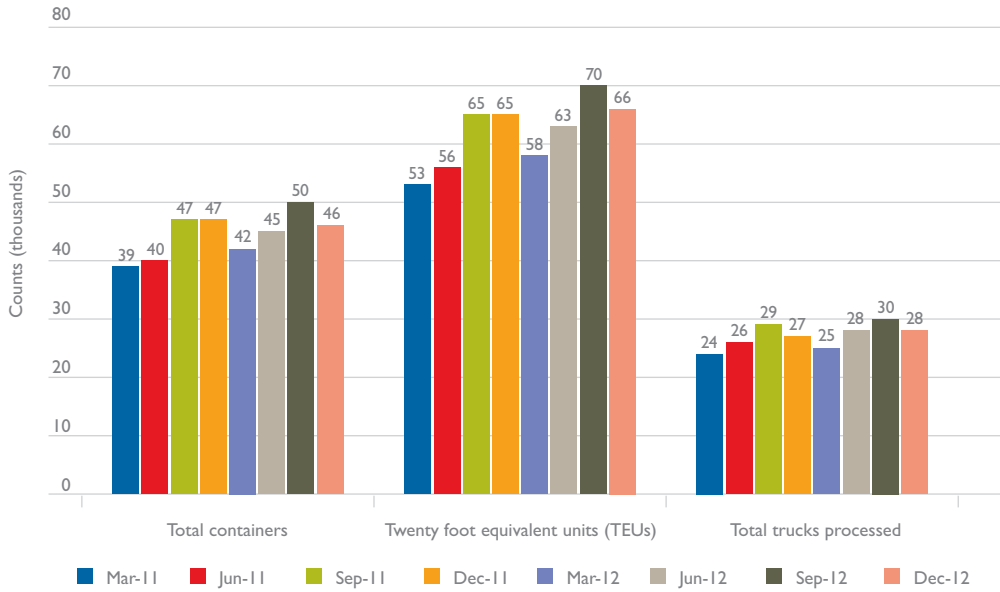


Note: The definitions of the time windows are as follows: Night (2400–0600 Monday to Friday), Day (0600–1800 Monday to Friday) and Evening (1800–2400 Monday to Friday).

Sources: Patrick and DP World.

Figure 1.9

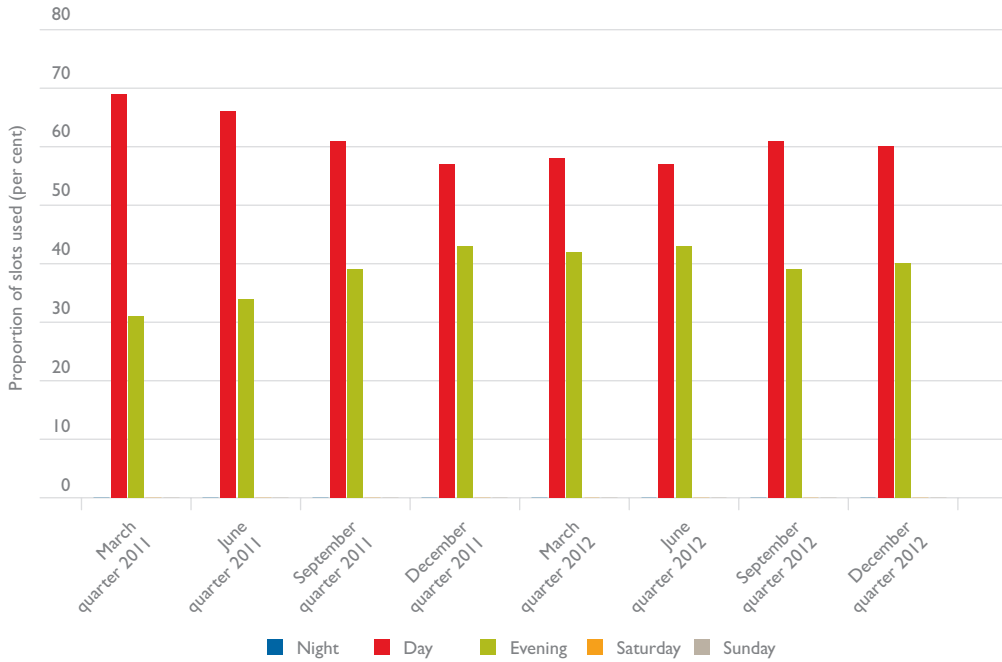
Adelaide: Landside of container terminal size of task indicators



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

Sources: Patrick and DP World.

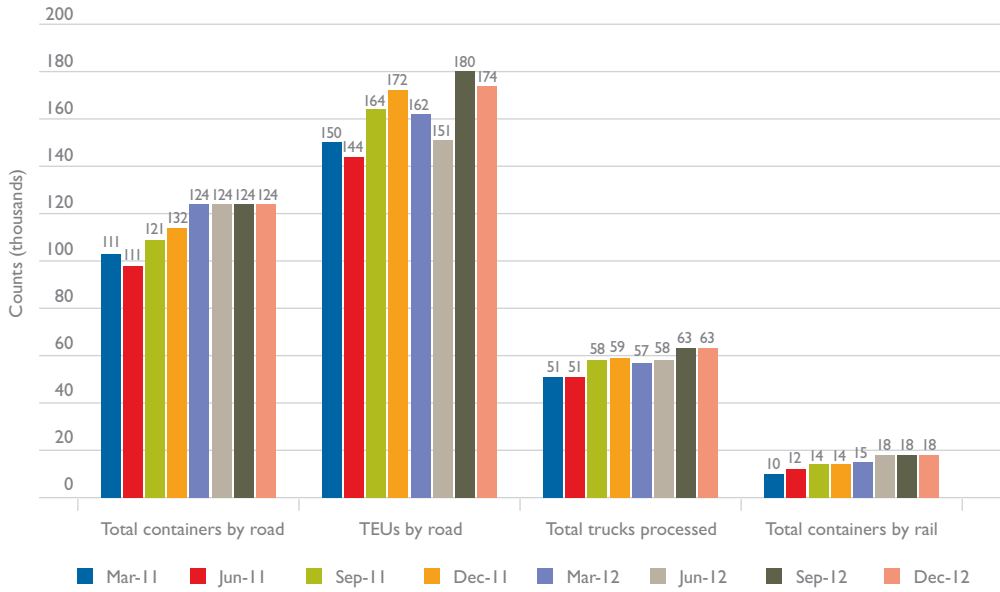
Figure I.10 Adelaide: adjusted vehicle booking system usage



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.

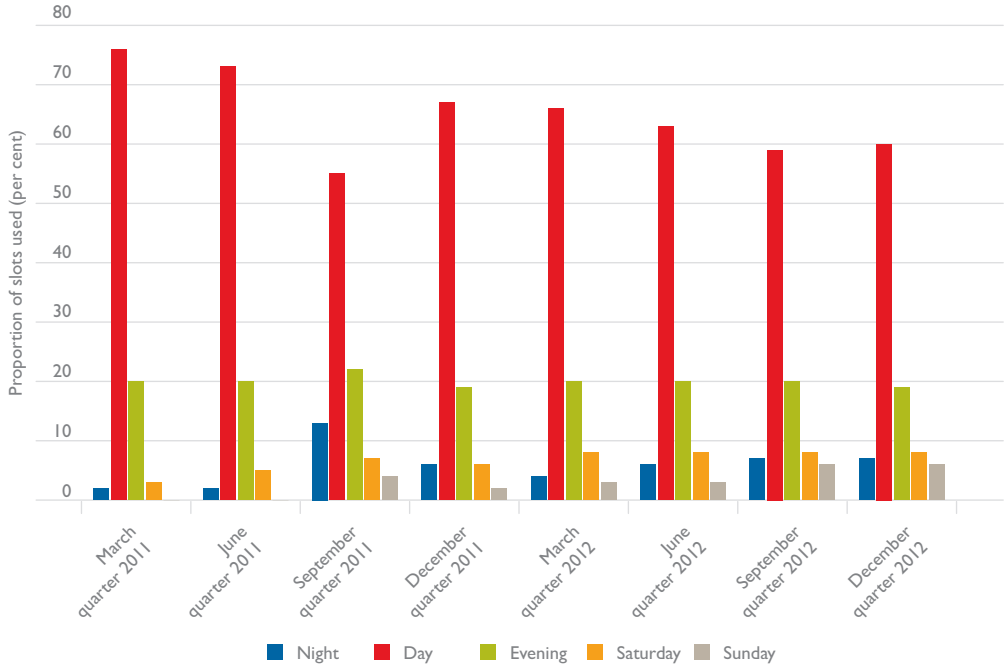
Figure 1.11 Fremantle: Landside of container terminal – size of task indicators



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

Sources: Patrick and DP World.

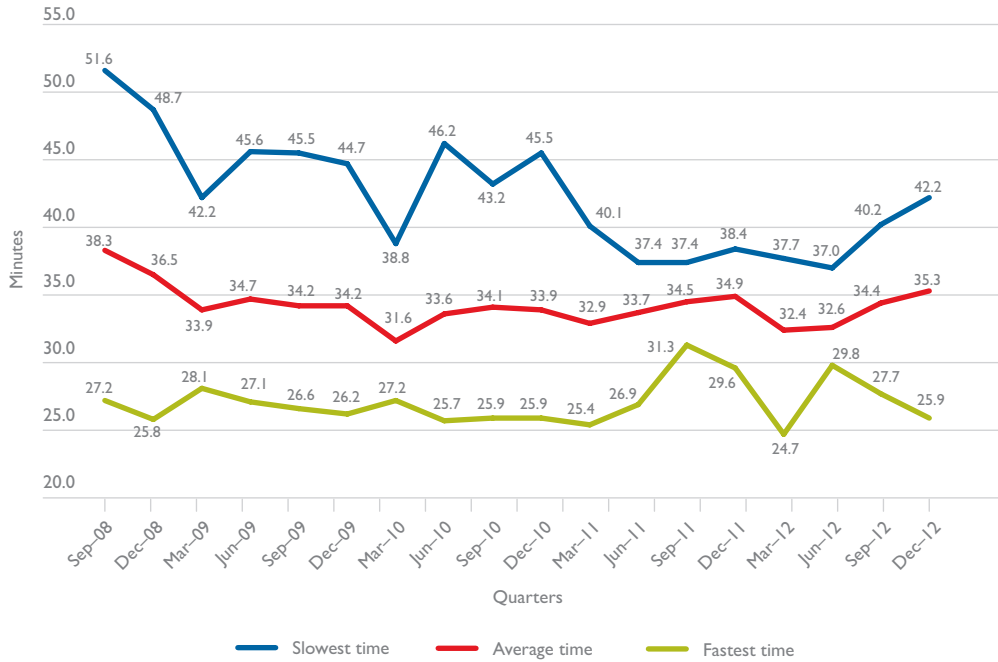
Figure I.12 Fremantle: adjusted vehicle booking system usage



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).

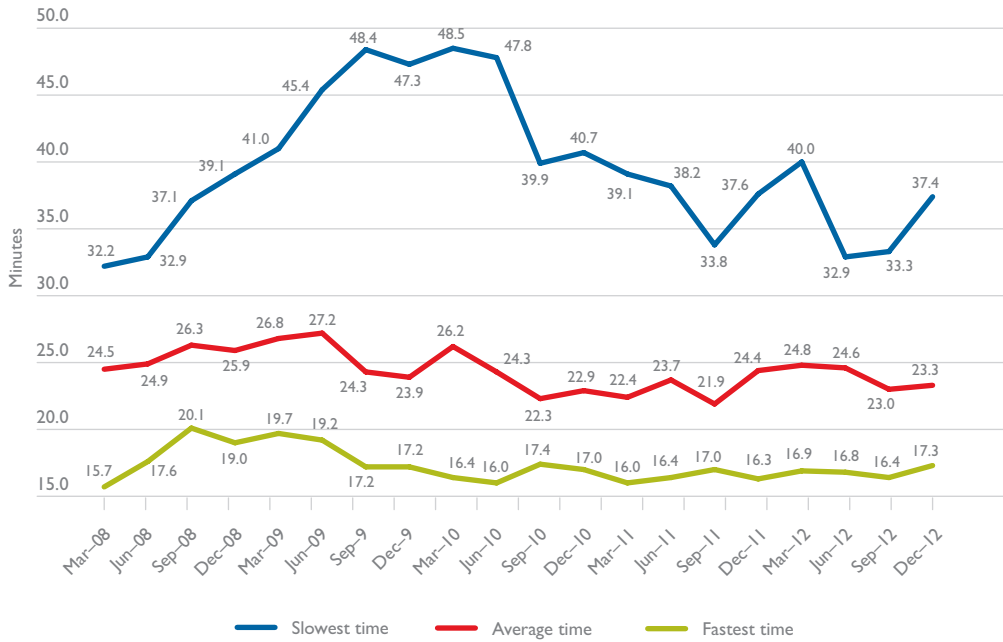
Sources: Patrick and DPWorld.

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 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, eg. 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.

Throughput pbm (tonnes per berth area expressed in square metres)

This is the quantity of container and non-container cargo which passes through the port container terminals and is measured in tonnes per berth's area in square metres. 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	Dec-09	Mar-10	Jun-10	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12	Sep-12	Dec-12
Five ports													
Ships handled	940	878	880	971	1 003	959	963	1 027	1 066	974	983	980	1 022
Total containers	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	1 103 763	1 149 856
Crane rate	29.5	29.0	28.7	29.1	29.4	29.9	28.2	28.5	29.1	28.6	30.1	28.5	29.0
Vessel working rate	42.2	42.2	40.6	41.7	41.8	42.6	39.4	38.7	41.0	34.9	43.6	44.6	45.1
Crane time not worked (per cent)	19.8	18.9	19.5	19.9	20.4	20.1	20.5	22.4	20.9	33.1	23.9	20.2	20.1
40-foot containers (per cent)	47.9	46.0	45.3	46.6	46.7	46.5	47.0	48.7	48.0	47.5	48.1	49.9	50.8
Ship rate	52.6	52.0	50.4	52.1	52.5	53.3	49.6	49.9	51.8	52.2	57.3	55.8	56.4
Throughput pbm	145	131	134	147	149	135	140	153	154	140	144	155	161
Brisbane													
Ships handled	202	182	181	214	208	197	202	236	248	225	225	234	241
Total containers	168 978	141 210	155 133	169 162	172 728	146 382	164 176	178 200	179 995	158 231	169 935	182 138	193 685
Crane rate	27.6	27.3	28.8	30.9	31.8	32.0	30.9	30.7	30.6	31.0	30.7	28.6	28.2
Vessel working rate	34.7	35.6	38.7	38.5	39.8	39.4	38.9	38.3	37.5	38.1	38.1	34.7	35.7
Crane time not worked (per cent)	22.5	21.8	18.8	19.6	19.1	20.9	20.6	21.8	21.6	21.0	22.2	23.7	28.0
40-foot containers (per cent)	49.5	47.3	44.6	46.1	40.4	47.4	47.3	49.0	48.0	48.4	49.5	50.2	50.6
Stevedoring variability (per cent)	37.1	36.1	36.5	42.0	37.0	35.7	39.8	37.8	38.8	38.2	33.2	45.3	44.3
Ship rate	44.7	45.5	47.7	47.9	49.2	49.8	49.1	49.0	47.9	48.3	49.0	45.5	49.6
Throughput pbm	105	88	97	105	107	91	102	111	112	98	106	113	121

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

Port / Indicator	Dec-09	Mar-10	Jun-10	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12	Sep-12	Dec-12
Sydney													
Ships handled	279	257	255	286	280	275	263	282	293	276	274	266	290
Total containers	361 971	314 600	327 800	362 560	345 408	329 003	333 463	354 464	351 323	327 413	328 453	355 237	387 689
Crane rate	28.2	27.4	26.2	27.1	27.0	27.3	26.6	25.8	27.1	26.6	29.4	27.1	28.3
Vessel working rate	38.8	38.2	34.1	38.5	39.4	37.2	35.7	32.5	38.0	38.2	40.6	40.9	44.5
Crane time not worked (per cent)	20.5	20.2	22.9	20.5	20.8	22.6	22.7	28.0	24.0	23.2	31.3	27.7	24.9
40-foot containers (per cent)	49.7	47.2	47.3	47.8	48.0	47.8	48.4	49.9	49.7	50.3	50.0	51.7	52.8
Stevedoring variability (per cent)	49.3	38.5	43.9	49.5	28.7	57.8	56.6	55.3	48.2	51.1	47.4	55.8	55.4
Ship rate	48.9	47.9	44.2	48.5	49.8	48.1	46.2	45.2	50.0	49.8	59.2	56.6	59.2
Throughput pbm	186	162	169	187	178	169	172	183	181	169	169	183	200
Melbourne													
Ships handled	275	253	253	285	300	277	286	309	312	281	283	273	281
Total containers	348 091	329 944	332 501	359 440	378 290	332 413	347 209	390 931	399 633	354 865	359 366	382 206	387 105
Crane rate	32.0	32.1	31.9	31.3	31.2	32.0	28.8	30.4	30.9	30.1	30.6	29.8	30.1
Vessel working rate	52.8	52.1	51.4	50.5	47.2	52.1	46.7	48.1	49.6	31.6	53.0	57.6	54.5
Crane time not worked (per cent)	16.9	16.4	16.8	18.5	19.0	16.5	17.6	18.0	17.5	47.4	15.4	9.8	11.8
40-foot containers (per cent)	47.8	45.6	45.3	46.8	49.1	46.7	46.9	48.5	47.3	47.4	47.8	49.8	50.7
Stevedoring variability (per cent)	42.7	45.1	47.2	49.2	50.1	52.3	53.1	53.1	54.0	45.4	49.3	51.7	41.8
Ship rate	63.5	62.3	61.7	61.9	58.2	62.4	56.7	58.7	60.1	60.2	62.7	63.8	61.7
Throughput pbm	190.6	180.7	182.1	196.8	207.2	182.0	190.1	214.1	218.9	194.3	196.8	209.3	212.0

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

Port / Indicator	Dec-09	Mar-10	Jun-10	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12	Sep-12	Dec-12
Adelaide													
Ships handled	59	58	59	59	71	72	75	76	75	75	83	82	86
Total containers	53 632	50 824	50 352	53 405	55 304	55 779	54 429	61 979	54 429	53 456	62 407	63 009	62 361
Crane rate	26.4	25.7	25.4	27.6	27.5	28.0	27.7	26.7	27.7	25.9	26.0	26.4	26.1
Vessel working rate	35.2	38.4	34.1	37.8	35.8	37.3	38.8	35.9	38.8	38.1	39.7	38.1	37.0
Crane time not worked (per cent)	15.8	11.1	10.7	12.4	14.7	15.0	14.4	15.3	14.4	11.4	12.6	15.6	15.9
40-foot containers (per cent)	36.0	36.2	37.3	37.1	39.2	35.9	38.4	38.9	38.4	38.6	37.6	39.7	40.9
Stevedoring variability (per cent)	na	na	na	na	na	na	na	na	na	na	na	na	na
Ship rate	41.8	43.2	38.2	43.2	42.0	43.8	45.3	42.3	45.3	43.0	45.5	45.2	44.0
Throughput pbm	114	108	107	114	118	119	116	132	116	114	133	134	133
Fremantle													
Ships handled	125	128	132	127	144	138	137	124	138	117	118	125	124
Total containers	104 826	97 002	92 798	103 647	109 830	97 846	99 024	109 285	114 995	107 398	109 427	121 173	119 016
Crane rate	30.3	27.6	27.5	26.5	27.9	29.7	27.3	27.8	27.6	27.4	31.9	29.8	30.6
Vessel working rate	34.4	32.9	31.9	29.6	36.8	35.8	27.5	27.7	26.5	29.0	32.2	32.4	36.3
Crane time not worked (per cent)	27.9	25.6	26.5	29.1	28.7	28.9	29.7	30.3	29.5	33.0	40.1	34.6	24.1
40-foot containers (per cent)	45.7	46.7	44.2	47.3	47.9	46.1	46.3	50.3	50.1	42.3	47.1	49.6	49.8
Stevedoring variability (per cent)	43.4	47.0	41.7	42.0	36.1	42.0	47.9	40.8	49.7	35.6	33.1	44.8	47.6
Ship rate	47.8	44.2	43.4	41.8	51.6	50.3	39.1	39.7	37.6	43.2	53.8	49.6	47.8
Throughput pbm	81.2	75.1	71.9	80.3	85.0	75.8	76.7	84.6	89.0	83.2	84.7	93.8	92.2

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, DP World.

Table 2.2 Container terminal performance indicators – productivity in teus per hour

Port / Indicator	Dec-09	Mar-10	Jun-10	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12	Sep-12	Dec-12
Five Ports													
Ships handled	940	878	880	971	1 003	959	963	1 027	1 066	974	983	980	1 022
Total teus	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	1 654 626	1 733 968
Crane rate	43.8	42.3	41.6	42.7	43.2	43.8	41.4	42.3	43.2	42.2	44.5	42.8	43.8
Vessel working rate	62.5	61.6	59.1	61.2	62.0	56.9	58.0	58.4	60.6	61.3	64.7	66.8	68.1
Ship rate	78.2	76.0	73.4	76.4	77.3	78.1	73.0	74.3	76.7	77.1	85.1	83.8	85.3
Brisbane													
Ships handled	202	182	181	214	208	197	202	236	248	225	225	234	241
Total teus	252 673	208 060	224 323	247 098	242 492	215 812	241 798	265 590	266 453	234 738	253 982	273 646	291 746
Crane rate	41.0	40.2	41.6	45.2	44.9	47.2	45.4	45.8	45.3	46.0	45.9	42.9	42.5
Vessel working rate	51.8	52.6	55.9	56.2	59.1	58.0	57.3	57.0	55.5	56.5	57.0	52.0	54.0
Ship rate	66.8	67.3	69.0	70.0	69.8	73.4	72.3	73.0	70.9	71.6	73.3	68.3	74.9
Sydney													
Ships handled	279	257	255	286	280	275	263	282	293	276	274	266	290
Total teus	541 938	463 230	482 719	535 848	511 070	486 205	494 873	531 410	525 877	492 260	492 779	538 969	592 482
Crane rate	42.5	40.3	38.5	40.0	39.9	40.3	39.4	38.6	40.6	39.8	44.0	41.0	43.2
Vessel working rate	58.1	56.3	50.2	56.9	58.2	55.0	53.1	51.1	56.9	57.3	61.0	62.0	67.8
Ship rate	73.7	70.6	65.0	71.6	73.5	71.0	68.6	67.7	74.9	74.7	88.9	85.8	90.6
Melbourne													
Ships handled	275	253	253	285	300	277	286	309	312	281	283	273	281
Total teus	514 533	480 498	483 141	527 714	564 005	487 574	510 151	580 553	588 727	522 919	531 121	572 688	583 510
Crane rate	47.4	46.7	46.3	46.0	46.6	46.9	42.3	45.0	45.5	44.3	45.1	44.7	45.3
Vessel working rate	78.0	75.9	74.9	74.2	70.3	60.6	68.8	71.7	73.2	74.2	78.6	86.3	82.1
Ship rate	94.1	90.7	89.9	91.1	86.8	91.6	83.5	87.3	88.7	88.8	92.8	95.6	93.1

Table 2.2 Container terminal performance indicators – productivity in teus per hour (continued)

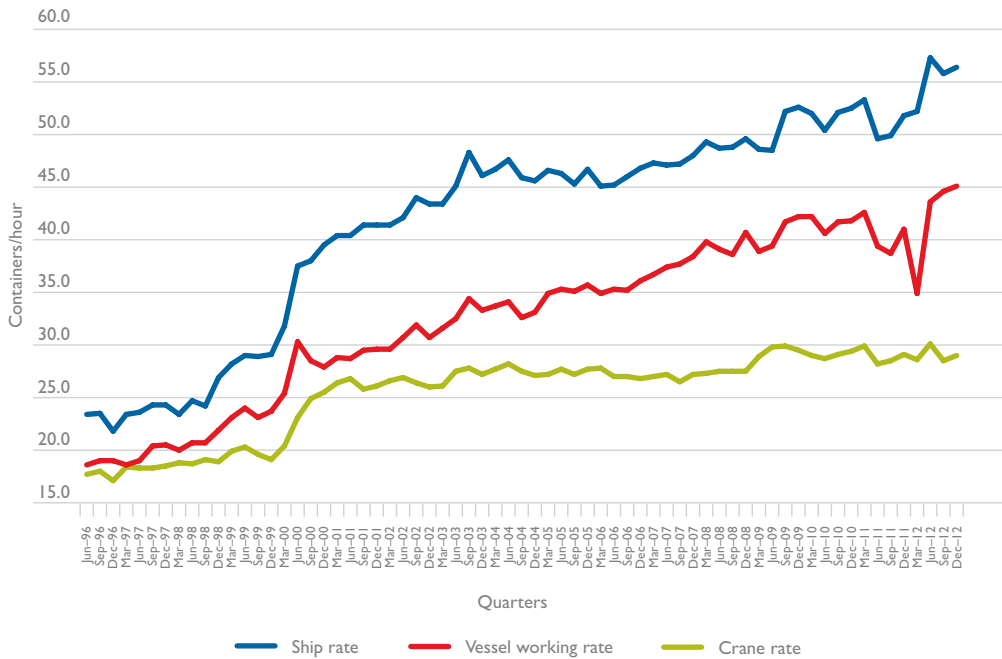
Port / Indicator	Dec-09	Mar-10	Jun-10	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12	Sep-12	Dec-12
Adelaide													
Ships handled	59	58	59	59	71	72	75	76	75	75	83	82	86
Total teus	72 937	69 230	69 135	73 225	76 968	75 779	75 348	86 092	75 348	74 087	85 885	88 035	87 897
Crane rate	35.9	35.0	34.9	37.8	38.3	38.0	38.3	37.1	38.3	36.0	35.8	36.9	36.8
Vessel working rate	47.9	52.3	46.9	51.9	49.8	50.6	53.7	49.8	53.7	52.8	54.7	53.2	52.2
Ship rate	56.9	58.8	52.5	59.2	58.4	59.6	62.7	58.8	62.7	59.6	62.6	63.1	62.0
Fremantle													
Ships handled	125	128	132	127	144	138	137	124	138	117	118	125	124
Total teus	152 681	142 314	133 832	152 627	162 456	142 921	144 903	164 291	172 561	152 812	160 972	181 288	178 333
Crane rate	44.1	40.2	39.7	39.1	41.3	43.3	39.9	41.8	41.6	39.5	47.0	44.7	46.0
Vessel working rate	50.3	48.2	46.0	43.6	54.5	52.3	40.3	41.4	39.8	41.7	47.5	48.6	54.5
Ship rate	69.8	64.4	62.7	61.6	76.4	73.5	57.2	59.5	56.4	61.8	79.1	73.7	71.0

na not available

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

Sources: Patrick, DP World.

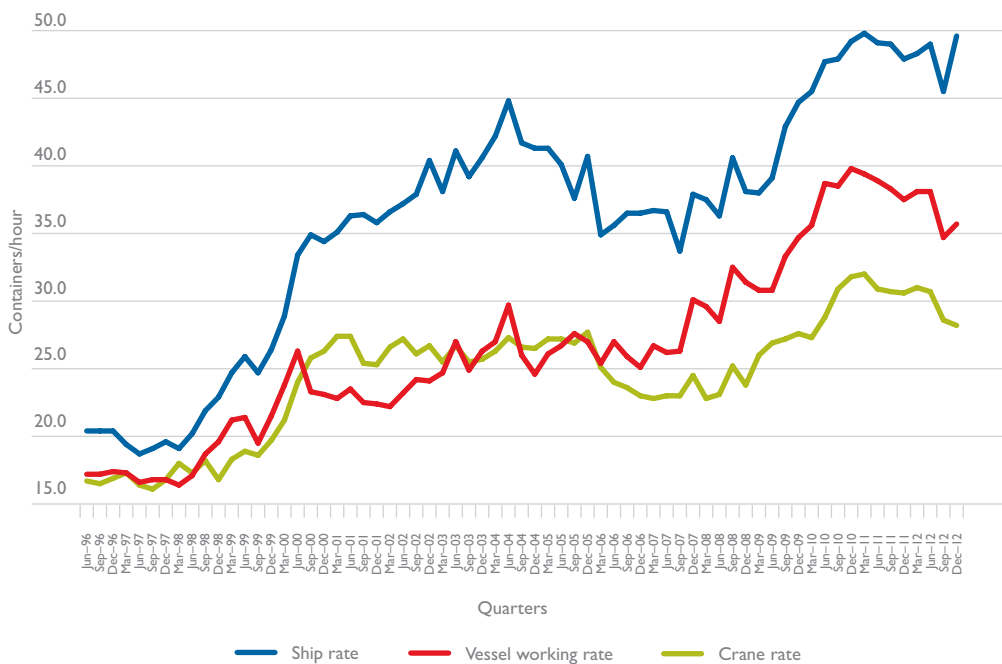
Figure 2.1 Five ports: productivity in containers per hour



Note: a. These figures are based on data in Table 2.1. See explanatory notes for definition of terms.
 b. The dip in the vessel working rate for 'Five ports' in March quarter 2012 is partly due to industrial action and stoppages at various container port wharves in the country during the quarter.

Sources: Patrick and DP World.

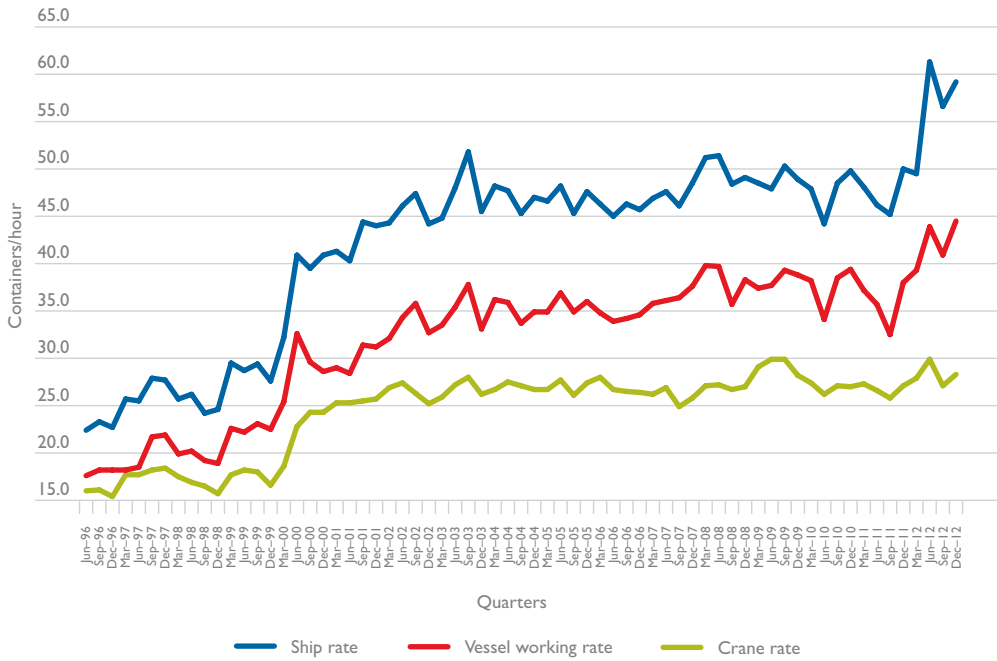
Figure 2.2 Brisbane: productivity in containers per hour



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

Sources: Patrick and DP World.

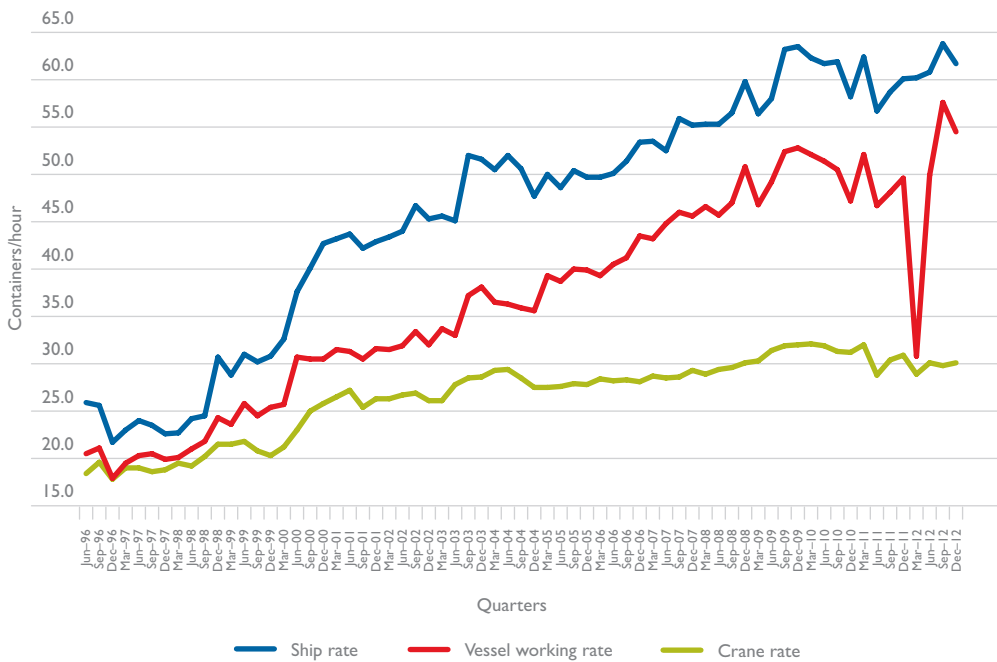
Figure 2.3 Sydney: productivity in containers per hour



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

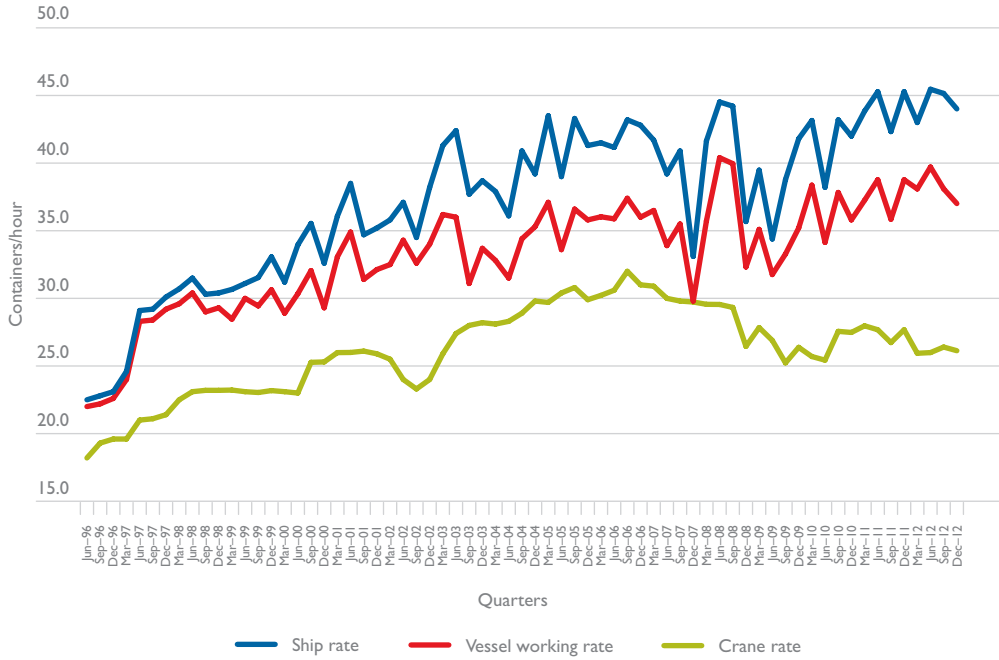


Notes: a. These figures are based on data in Table 2.1. See explanatory notes for definition of terms.

b. The sharp dip in the vessel working rate for Melbourne in March quarter 2012 is partly due to industrial action and stoppages at the container port during the quarter.

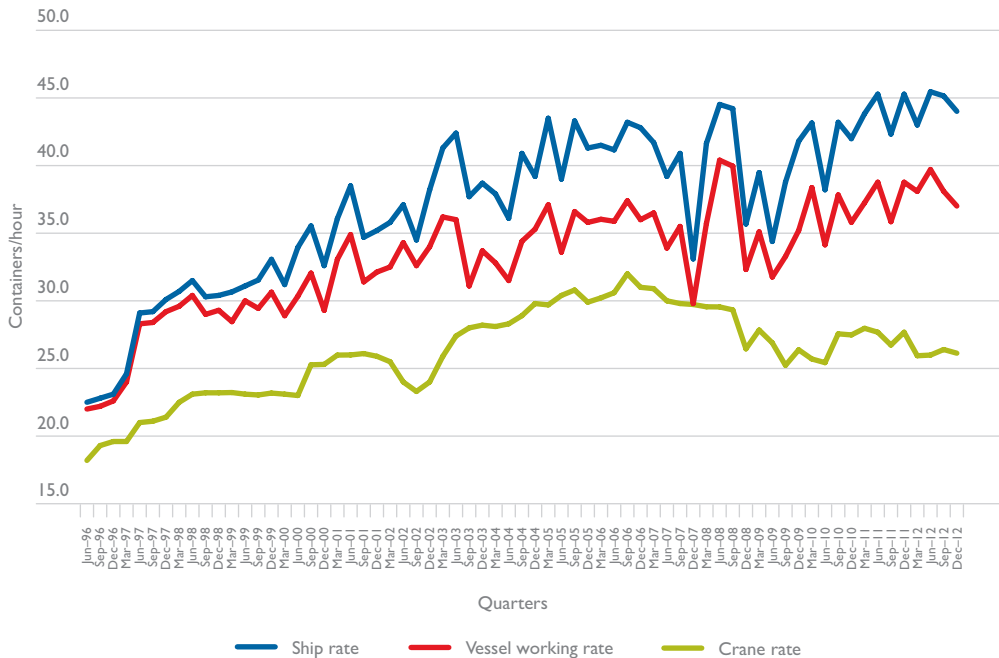
Sources: Patrick and DP World.

Figure 2.5 Adelaide: productivity in containers per hour



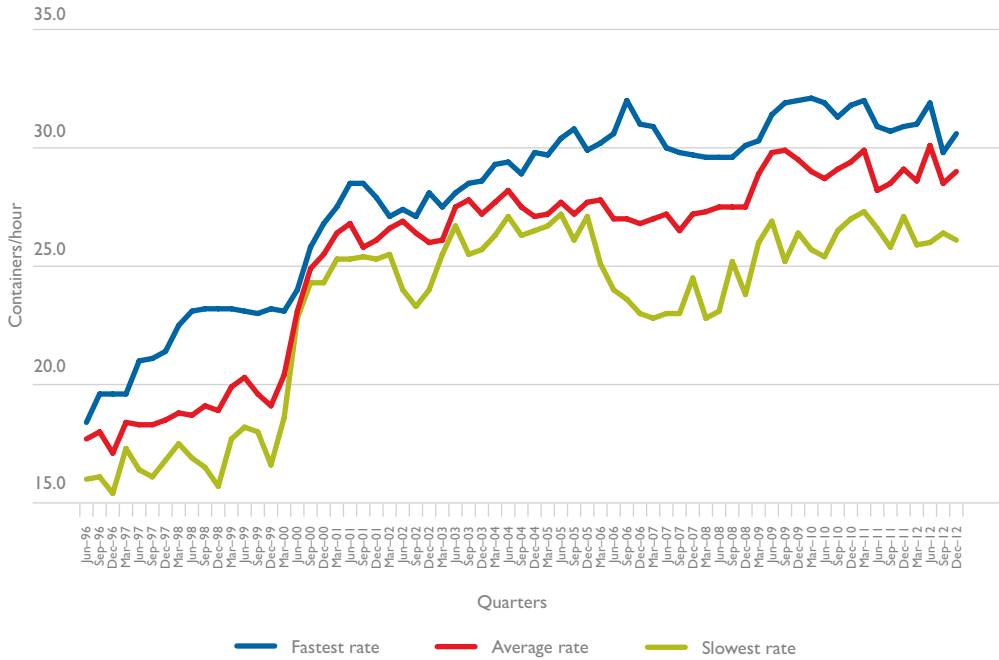
Note: These figures are based on data in Table 2.1. See explanatory notes for definition of terms.
 Sources: Patrick and DP World.

Figure 2.6 Fremantle: productivity in containers per hour



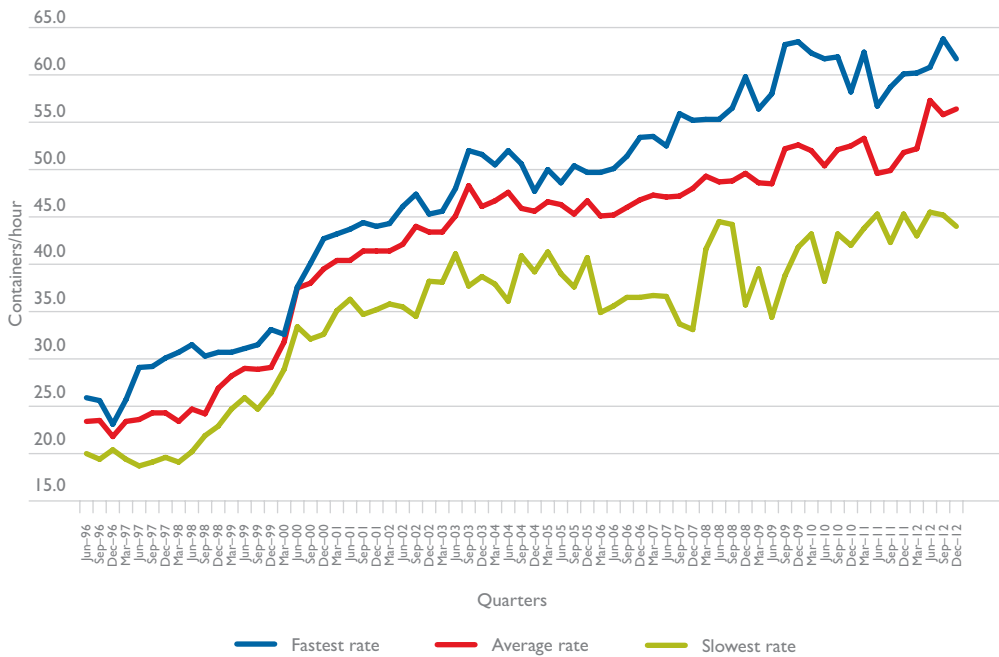
Note: These figures are based on data in Table 2.1. See explanatory notes for definition of terms.
 Sources: Patrick and DP World.

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 a typical container ship of 35 000 – 40 000 GT.

Table 3.1 Parameters used in the port interface cost indices

	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
	2012	2012	2012	2012	2012	2012	2012	2012	2012	2012
Vessel size GT 9 991										
Average Teus exchanged ^a										
All	377	615	275	344	347	350	0	0	2 615	2 757
Loaded	350	196	246	283	267	302	0	0	2 255	2 190
Empty	27	419	29	61	80	48	0	0	360	566
Loaded inwards	126	98	121	150	175	214	0	0	1 276	1 366
Loaded outwards	223	98	125	133	93	88	0	0	979	824
Ship call parameters ^a										
Number of port calls	4	4	4	3	4	3	0	0	12	8
Elapsed berth time (hrs)	17	25	16	33	24	41	0	0	43	46
Vessel size GT 37 394										
Average Teus exchanged ^b										
All	1 199	1 503	1 861	2 023	1 761	1 901	926	943	1 002	1 025
Loaded	956	620	1 201	1 368	1 426	1 524	726	744	734	773
Empty	242	883	660	655	336	376	200	199	267	252
Loaded inwards	347	417	883	1023	833	931	332	363	537	587
Loaded outwards	609	203	318	345	593	593	394	381	197	186
Ship call parameters ^b										
Number of port calls	3	3	3	3	3	2	2	3	3	3
Elapsed berth time (hrs)	25	26	36	35	29	28	21	22	38	27

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
	2012	2012	2012	2012	2012	2012	2012	2012	2012	2012
Vessel size GT 53 324										
Average Teus exchanged ^c										
All	1 373	1 746	2 128	2 388	2 515	2 702	1 340	1 275	1 478	1 646
Loaded	877	909	1 499	1 652	2 036	2 159	1 069	981	1 087	1 172
Empty	497	838	629	736	479	542	271	295	391	474
Loaded inwards	347	581	1 111	1 234	1 155	1 263	530	517	735	800
Loaded outwards	471	327	388	418	881	897	539	464	352	372
Ship call parameters ^c										
Number of port calls	3	3	3	3	2	3	2	2	3	7
Elapsed berth time (hrs)	22	23	38	36	34	32	29	26	40	31

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	
	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2012	Jul–Dec 2012	Jan–Jun 2012	Jul–Dec 2012
Ship-based charges (\$/TEU)										
Conservancy	5.06	3.11	-	-	-	-	-	-	-	-
Tonnage	-	-	17.29	14.28	10.44	15.28	-	-	0.74	0.71
Pilotage	20.01	12.34	5.80	4.79	20.74	21.11	-	-	1.21	1.52
Towage ^a	23.11	15.29	35.96	30.22	29.51	30.74	-	-	1.49	1.52
Moorings, unmooring ^b	6.03	3.75	9.11	7.29	2.30	2.29	-	-	0.43	0.39
Berth hire ^c	-	-	-	-	-	-	-	-	-	-
Total ^c	54.21	34.48	68.16	56.59	62.99	69.42	-	-	3.86	4.13
Cargo-based charges (\$/TEU)										
Wharfage										
Imports	31.24	32.21	110.51	113.94	44.11	67.32	-	-	64.86	61.92
Exports	31.24	32.21	67.73	69.77	44.11	67.32	-	-	64.86	61.92
Harbour dues	67.64	61.66	-	-	-	-	-	-	-	-
Berth charge	-	-	-	-	-	-	-	-	19.43	18.55
Channel infrastructure fees					41.65	42.65				
Total port and related charges (\$/TEU) ^d	153.09	128.35	178.67	170.53	144.61	175.35	-	-	88.16	84.59
Loaded imports	153.09	128.35	135.89	126.36	144.61	175.35	-	-	88.16	84.59
Charges per ship visit (\$/visit)										
Total ship-based charges	20 445	21 208	18 763	19 464	18 763	19 464	-	-	10 106	11 384
Empty TEUs ^e	706	7 800	356	764	878	805	-	-	3 525	5 292

- not applicable

r. revised

a. After enquiries at all ports the number of tugs required for towage in Adelaide and Fremantle used in PICl 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.

Note1: Port and related charges are based on the parameters described in table 3.1

Note2: This table relates to a new category of vessel size represented by container ship of 9 991 GT.

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

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

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jan-Jun 2012	Jul-Dec 2012	Jan-Jun 2012	Jul-Dec 2012	Jan-Jun 2012	Jul-Dec 2012	Jan-Jun 2012	Jul-Dec 2012	Jan-Jun 2012	Jul-Dec 2012
Ship-based charges (\$/TEU)										
Conservancy	5.96	4.76	-	-	-	-	5.83	5.05	-	-
Tonnage	-	-	9.57	9.09	7.71	10.53	9.21	9.60	7.19	7.10
Pilotage	11.93	9.56	2.10	2.14	6.81	6.47	5.97	6.03	3.16	4.09
Towage ^a	12.76	10.69	7.15	6.90	7.84	7.63	19.75	20.54	16.65	17.48
Mooring, unmooring ^b	1.90	1.53	2.20	2.02	0.51	0.47	-	-	1.12	1.04
Berth hire ^c	-	-	-	-	-	-	-	-	-	-
Total ^c	32.55	26.55	21.02	20.16	22.86	25.09	40.76	41.21	28.12	29.71
Cargo-based charges (\$/TEU)										
Wharfage										
Imports	31.24	32.21	110.51	113.94	44.11	67.32	77.77	79.20	64.86	61.92
Exports	31.24	32.21	67.73	69.77	44.11	67.32	77.77	79.20	64.86	61.92
Harbour dues	59.80	61.66	-	-	-	-	-	-	-	-
Berth charge	-	-	-	-	-	-	-	-	19.43	18.55
Channel infrastructure fees	-	-	-	-	41.65	42.65	-	-	-	-
Total port and related charges (\$/TEU) ^d										
Loaded imports	131.43	120.42	131.53	134.10	104.48	131.02	124.91	126.90	112.42	110.18
Loaded exports	131.43	120.42	88.75	89.93	104.48	131.02	124.91	126.90	112.42	110.18
Charges per ship visit (\$/visit)										
Total ship-based charges	39 016	39 902	39 103	40 770	40 267	47 692	37 738	38 873	28 166	30 447
Empty TEUs ^e	6 269	16 438	8 055	8 262	3 694	6 294	1 275	1 293	2 616	2 356

- not applicable

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

b. 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	
	Jan-2012	Jun-Dec 2012	Jan-Jun 2012	Jun-Dec 2012	Jan-Jun 2012	Jun-Dec 2012	Jan-Jun 2012	Jun-Dec 2012	Jan-Jun 2012	Jun-Dec 2012
Ship-based charges (\$/TEU)										
Conservancy	7.42	5.84	-	-	-	-	4.64	5.01	-	-
Tonnage	-	-	11.93	10.98	7.70	10.56	9.98	9.76	6.95	6.31
Pilotage	12.21	9.65	1.97	1.81	5.17	4.94	4.12	4.46	2.14	2.54
Towage ^a	12.38	10.22	6.64	6.20	5.68	5.56	14.95	16.64	12.83	12.38
Mooring, unmooring ^b	1.65	1.34	2.26	2.02	0.38	0.35	-	-	0.76	0.65
Berth hire ^c	-	-	-	-	-	-	-	-	-	-
Total ^c	33.66	27.05	22.81	21.01	18.92	21.41	33.69	35.87	22.68	21.88
Cargo-based charges (\$/TEU)										
Wharfage										
Imports	31.24	32.21	110.51	113.94	44.11	67.32	77.77	79.20	64.86	61.92
Exports	31.24	32.21	67.73	69.77	44.11	67.32	77.77	79.20	64.86	61.92
Harbour dues	59.80	61.66	-	-	40.65	41.65	-	-	-	-
Berth charge	-	-	-	-	-	-	-	-	19.43	18.55
Channel infrastructure fees										
Total port and related charges (\$/TEU) ^d	124.70	120.92	110.51	113.94	100.54	127.34	117.84	121.56	106.97	102.34
Loaded exports										
Charges per ship visit (\$/visit)	124.70	120.92	67.73	69.77	100.54	127.34	117.84	121.56	106.97	102.34
Total ship-based charges										
Empty TEU/e	46 225	47 247	48 543	50 187	47 598	57 837	45 138	45 751	33 522	36 013
	8 972	15 587	7 683	9 284	5 272	9 068	1 728	1 911	3 825	4 434

- not applicable

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

b. 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	
	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec
	2012	2012	2012	2012	2012	2012	2012	2012	2012	2012
Import										
Ship-based charges	33	27	21	20	23	25	41	41	28	30
Cargo-based charges	99	94	111	114	82	106	84	86	95	91
Stevedoring ^P	177	177	177	177	177	177	177	177	177	177
Customs brokers' fees	146	146	139	139	153	153	149	148	156	156
Road transport charges	401	401	485	485	485	484	308	312	397	409
Import total ^a	855	844	933	936	919	945	759	764	854	863
Export										
Ship-based charges	33	27	21	20	23	25	41	41	28	30
Cargo-based charges	99	94	68	70	82	106	84	86	95	91
Stevedoring ^P	177	177	177	177	177	177	177	177	177	177
Customs brokers' fees	152	152	137	137	134	134	102	103	84	84
Road transport charges	401	401	485	485	485	484	308	312	397	409
Export total ^a	861	850	888	889	901	926	712	719	782	791

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

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

Notes: 1. Based on parameters described in table 3.2.

2. Waterline data on customs brokers' fees and road transport charges are collected for the purpose of monitoring trends in charges overtime. They should not be used for inter-port comparisons, as sample characteristics 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 2012; ABS 2013.

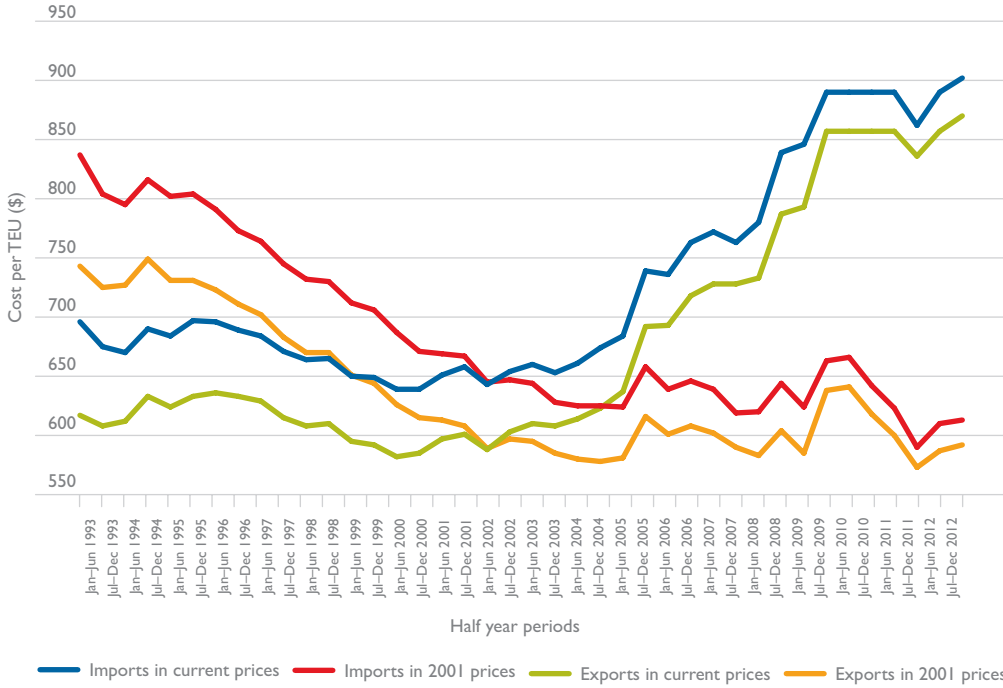
Table 3.6 The national port interface cost index for ships in the 35 000–40 000 GT range

	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	Jul–Dec 2012
Imports in current prices	763	772	763	780	839	846	890	890	890	890	862	890	902	913
Imports in 2001 prices	646	639	619	620	644	624	664	667	642	623	592	606	617	628
Exports in current prices	718	728	728	733	787	793	857	857	857	857	836	857	870	880
Exports in 2001 prices	608	602	590	583	605	585	639	642	618	600	574	583	596	606

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 2012; and ABS 2013.

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, TEUs 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 exchanges and hours spent in berth, by ship size

Gross tonnage	Indicator	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12	Sep-12	Dec-12
All UCC vessels											
	Total ship visits	229	217	208	206	198	210	221	224	240	244
	Total TEUs exchanged in period	249 896	252 957	215 822	237 079	220 731	236 322	230 066	241 618	294 740	317 796
	Sum of hours ships spent in berth	5 358	5 645	5 174	5 206	4 736	5 211	5 112	5 125	5 821	5 948
	TEUs exchanged per hour spent in berth	46.6	44.8	41.7	45.5	46.6	45.4	45.0	47.1	50.6	53.4
	Per cent of 40 foot containers	46.1	40.4	47.4	47.3	49.0	48.0	48.4	49.5	50.2	50.6
	Per cent of 20 foot containers	53.9	59.6	52.6	52.7	51.0	52.0	51.6	50.5	49.8	49.4
	Total number of lift	192 330	201 873	164 639	181 034	166 607	179 565	174 446	181 868	220 700	237 347
	Average lifts per hour spent in berth	35.9	35.8	31.8	34.8	35.2	34.5	34.1	35.5	37.9	39.9
	Average lifts per ship visit	840	930	792	879	841	855	789	812	920	973
5000–20000											
	Total ship visits	39	44	48	45	40	30	42	45	50	52
	Total TEUs exchanged in period	11 019	14 580	15 191	18 370	14 629	9 662	15 161	17 430	16 901	18 776
	Sum of hours ships spent in berth	785	1 185	1 112	1 180	948	739	1 032	1 019	1 256	1 269
	TEUs exchanged per hour spent in berth	14.0	12.3	13.7	15.6	15.4	13.1	14.7	17.1	13.5	14.8
20001–35000											
	Total ship visits	59	51	51	37	32	44	42	35	42	38
	Total TEUs exchanged in period	54 027	45 921	42 037	32 421	26 925	41 766	35 891	27 807	36 931	39 197
	Sum of hours ships spent in berth	1 319	1 147	1 272	745	655	935	788	543	764	739
	TEUs exchanged per hour spent in berth	41.0	40.0	33.1	43.5	41.1	44.7	45.6	51.2	48.4	53.0
35001–40000											
	Total ship visits	54	52	44	57	56	53	57	52	52	56
	Total TEUs exchanged in period	68 173	68 228	52 310	70 541	74 170	66 943	67 254	63 388	78 361	83 496
	Sum of hours ships spent in berth	1 304	1 447	1 111	1 458	1 421	1 530	1 431	1 305	1 329	1 435
	TEUs exchanged per hour spent in berth	52.3	47.2	47.1	48.4	52.2	43.7	47.0	48.6	59.0	58.2
40001–50000											
	Total ship visits	48	39	35	33	34	39	37	60	66	63
	Total TEUs exchanged in period	61 444	57 366	44 355	49 096	50 561	56 211	54 273	86 644	109 505	111 474
	Sum of hours ships spent in berth	1 037	920	802	775	824	1 000	914	1 563	1 780	1 706
	TEUs exchanged per hour spent in berth	59.2	62.4	55.3	63.4	61.3	56.2	59.4	55.4	61.5	65.4
50001 and above											
	Total ship visits	29	31	30	34	36	44	43	32	30	35
	Total TEUs exchanged in period	55 233	66 862	61 929	66 651	54 446	61 740	57 487	46 349	53 042	64 853
	Sum of hours ships spent in berth	913	947	878	1049	888	1 006	947	696	692	800
	TEUs exchanged per hour spent in berth	60.5	70.6	70.6	63.6	61.3	61.4	60.7	66.6	76.6	81.1

Source: BITRE

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

Gross tonnage	Indicator	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12	Sep-12	Dec-12
All UCC vessels											
	Total ship visits	247	247	269	256	277	284	275	273	268	289
	Total TEUs exchanged in period	381 604	395 130	414 119	422 368	464 640	488 307	430 547	437 182	492 866	543 524
	Sum of hours ships spent in berth	9 255	9 951	9 595	10 183	11 478	10 561	9 224	8 971	9 366	9 832
	TEUs exchanged per hour spent in berth	41.2	39.7	43.2	41.5	40.5	46.2	46.7	48.7	52.6	55.3
	Per cent of 40 foot containers	47.8	48.0	47.8	48.4	49.9	49.7	48.8	48.9	51.7	52.8
	Per cent of 20 foot containers	52.2	52.0	52.2	51.6	50.1	50.3	51.2	51.1	48.3	47.2
	Total number of lifts	290 409	300 375	315 183	320 146	348 667	367 000	325 469	330 393	365 408	399 968
	Average lifts per hour spent in berth	31.4	30.2	32.8	31.4	30.4	34.8	35.3	36.8	39.0	40.7
	Average lifts per ship visit	1176	1216	1172	1251	1259	1292	1184	1210	1363	1384
5001–20000											
	Total ship visits	32	28	28	21	37	34	37	37	22	32
	Total TEUs exchanged in period	7 956	6 183	7 133	6 071	10 848	11 838	10 661	9 979	6 114	8 464
	Sum of hours ships spent in berth	682	598	651	683	999	758	811	790	652	757
	TEUs exchanged per hour spent in berth	11.7	10.3	11.0	8.9	10.9	15.6	13.1	12.6	9.4	11.2
20001–35000											
	Total ship visits	106	105	110	96	86	90	71	61	60	61
	Total TEUs exchanged in period	144 999	141 521	146 839	123 788	110 576	121 292	90 899	75 261	74 867	82 509
	Sum of hours ships spent in berth	3 687	4 040	3 672	3 280	3 005	3 095	2 176	1 831	1 793	1 756
	TEUs exchanged per hour spent in berth	39.3	35.0	40.0	37.7	36.8	39.2	41.8	41.1	41.8	47.0
35001–40000											
	Total ship visits	58	56	52	56	56	55	64	56	58	64
	Total TEUs exchanged in period	117 644	113 557	94 414	114 164	122 884	115 275	115 860	107 422	110 731	134 916
	Sum of hours ships spent in berth	2 499	2 521	2 201	2 624	2 870	2 294	2 387	1 882	1 974	2 322
	TEUs exchanged per hour spent in berth	47.1	45.0	42.9	43.5	42.8	50.3	48.5	57.1	56.1	58.1
40001–50000											
	Total ship visits	44	44	36	38	53	54	57	79	96	91
	Total TEUs exchanged in period	96 452	100 299	73 884	76 487	115 786	117 559	109 258	164 337	223 664	219 016
	Sum of hours ships spent in berth	2 070	2 165	1 487	1 485	2 412	2 356	2 141	2 944	3 758	3 544
	TEUs exchanged per hour spent in berth	46.6	46.3	49.7	51.5	48.0	49.9	51.0	55.8	59.5	61.8
50001 and above											
	Total ship visits	7	14	43	45	45	51	46	40	32	41
	Total TEUs exchanged in period	14 553	33 570	91 849	101 858	104 546	122 343	103 869	80 183	77 490	98 619
	Sum of hours ships spent in berth	317	627	1584	2111	2 192	2 058	1 708	1 524	1 189	1 453
	TEUs exchanged per hour spent in berth	45.9	53.5	58.0	48.3	47.7	59.4	60.8	52.6	65.2	67.9

Source: BITRE

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

Gross tonnage	Indicator	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12	Sep-12	Dec-12
All UCC vessels											
	Total ship visits	295	299	294	292	306	318	294	297	303	297
	Total TEUs exchanged in period	597 223	614 925	539 275	552 608	652 958	679 454	578 915	571 111	579 805	569 705
	Sum of hours ships spent in berth	8 759	8 401	7 704	8 988	9 537	9 970	8 713	8 190	8 947	8 411
	TEUs exchanged per hour spent in berth	68.2	73.2	70.0	61.5	68.5	68.1	66.4	69.7	64.8	67.7
	Per cent of 40 foot containers	46.8	49.1	46.7	46.9	48.5	47.3	48.8	48.9	49.8	50.7
	Per cent of 20 foot containers	53.2	50.9	53.3	53.1	51.5	52.7	51.2	51.1	50.2	49.3
	Total number of lifts	457 426	463 982	413 416	422 941	494 599	518 706	437 729	431 563	435 325	425 180
	Average lifts per hour spent in berth	52.2	55.2	53.7	47.1	51.9	52.0	50.2	52.7	48.7	50.6
	Average lifts per ship visit	1 551	1 552	1 406	1 448	1 616	1 631	1 489	1 453	1 437	1 432
5000–20000											
	Total ship visits	19	19	33	27	25	38	36	40	32	31
	Total TEUs exchanged in period	9 996	8 009	7 635	8 065	8 533	17 733	15 207	17 233	14 862	16 385
	Sum of hours ships spent in berth	495	386	669	658	591	995	872	935	1 045	971
	TEUs exchanged per hour spent in berth	20.2	20.8	11.4	12.3	14.4	17.8	17.4	18.4	14.2	16.9
20001–35000											
	Total ship visits	114	118	112	115	102	108	70	63	63	62
	Total TEUs exchanged in period	170 663	183 102	169 591	168 109	165 146	174 291	117 936	98 860	98 843	93 353
	Sum of hours ships spent in berth	2 848	3 032	2 646	2 943	2 853	2 935	1 805	1 596	1 697	1 516
	TEUs exchanged per hour spent in berth	59.9	60.4	64.1	57.1	57.9	59.4	65.4	62.0	58.2	61.6
35001–40000											
	Total ship visits	64	60	57	55	65	56	73	63	69	67
	Total TEUs exchanged in period	152 077	135 720	114 791	121 813	149 393	136 092	150 803	121 422	132 979	124 330
	Sum of hours ships spent in berth	2 071	1 779	1 684	1 853	2 149	1 819	2 348	1 613	1 901	1 834
	TEUs exchanged per hour spent in berth	73.4	76.3	68.2	65.7	69.5	74.8	64.2	75.3	70.0	67.8
40001–50000											
	Total ship visits	53	52	44	43	58	58	65	89	94	98
	Total TEUs exchanged in period	138 138	136 168	115 477	101 810	152 329	165 217	151 180	220 040	212 366	228 317
	Sum of hours ships spent in berth	1 865	1 634	1 339	1 496	1 899	2 051	1 989	2 648	2 854	2 827
	TEUs exchanged per hour spent in berth	74.1	83.3	86.2	68.1	80.2	80.6	76.0	83.1	74.4	80.8
50001 and above											
	Total ship visits	45	50	48	52	56	58	50	42	45	39
	Total TEUs exchanged in period	126 349	151 926	131 781	152 811	177 557	186 121	143 789	113 556	120 755	107 320
	Sum of hours ships spent in berth	1 479	1 571	1 365	2 038	2 044	2 170	1 700	1 398	1 451	1 263
	TEUs exchanged per hour spent in berth	85.4	96.7	96.5	75.0	86.9	85.8	84.6	81.2	83.2	85.0

Source: BITRE

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

Gross tonnage	Indicator	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
All UCC vessels													
	Total ship visits	61	68	68	69	71	63	74	80	82	84		
	Total TEUs exchanged in period	75 310	74 249	72 801	71 388	84 583	79 518	72 395	81 771	87 204	84 248		
	Sum of hours ships spent in berth	1 657	1 743	1 754	1 653	2 066	1 847	1 755	1 866	1 997	1 998		
	TEUs exchanged per hour spent in berth	45.5	42.5	41.3	43.1	41.0	42.4	41.2	43.5	43.5	43.5		
	Per cent of 40 foot containers	37.1	39.2	35.9	38.4	38.9	38.4	38.6	37.6	39.7	40.9		
	Per cent of 20 foot containers	62.9	60.8	64.1	61.6	61.1	61.6	61.4	62.4	60.3	59.1		
	Total number of lifts	61 335	59 706	59 749	57 670	68 129	64 237	58 425	66 390	69 886	66 999		
	Average lifts per hour spent in berth	37.0	34.2	34.1	34.9	33.0	34.8	33.3	35.6	35.0	33.5		
	Average lifts per ship visit	1 005	878	879	836	960	1 020	790	830	852	798		
5000–20000													
	Total ship visits	0	0	1	0	0	0	0	0	0	0		
	Total TEUs exchanged in period			115									
	Sum of hours ships spent in berth			6.75									
	TEUs exchanged per hour spent in berth			17.0									
20001–35000													
	Total ship visits	21	30	30	30	30	24	18	12	12	9		
	Total TEUs exchanged in period	24 267	28 177	27 478	26 334	30 403	24 481	14 350	10 621	11 602	8 529		
	Sum of hours ships spent in berth	603	720	735	690	816	647	355	273	281	232		
	TEUs exchanged per hour spent in berth	40.3	39.1	37.4	38.2	37.3	37.9	40.4	39.0	41.4	36.7		
35001–40000													
	Total ship visits	18	16	18	18	19	15	22	27	32	36		
	Total TEUs exchanged in period	21 823	18 817	19 198	19 334	22 600	19 291	17 902	27 466	29 347	33 262		
	Sum of hours ships spent in berth	463	410	469	436	517	380	450	563	702	802		
	TEUs exchanged per hour spent in berth	47.1	45.9	40.9	44.3	43.7	50.7	39.8	48.8	41.8	41.5		
40001–50000													
	Total ship visits	16	16	13	12	13	15	24	32	32	34		
	Total TEUs exchanged in period	19 436	19 511	16 635	13 717	16 762	20 122	25 490	32 883	38 543	35 744		
	Sum of hours ships spent in berth	411	468	346	278	406	482	637	788	856	835		
	TEUs exchanged per hour spent in berth	47.3	41.7	48.1	49.4	41.3	41.7	40.0	41.7	45.0	42.8		
50001 and above													
	Total ship visits	6	6	7	8	9	9	10	9	6	5		
	Total TEUs exchanged in period	9 784	7 744	9 490	11 888	14 818	15 624	14 653	10 801	7 712	6 713		
	Sum of hours ships spent in berth	180	145	205	242	327	338	313	242	158	128		
	TEUs per hour spent in berth	54.2	53.6	46.4	49.2	45.3	46.2	46.9	44.5	48.7	52.4		

Source: BITRE

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

Gross tonnage	Indicator	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12	Sep-12	Dec-12
All UCC vessel sizes											
	Total ship visits	na	na	136	136	119	122	117	113	123	126
	Total TEUs exchanged in period	na	na	141 082	140 181	156 681	169 457	155 859	152 910	178 145	174 192
	Sum of hours ships spent in berth	na	na	3 066	4 168	4 385	5 018	4 282	4 598	4 007	3 807
	TEUs exchanged per hour spent in berth	na	na	46.0	33.6	35.7	33.8	36.4	33.3	44.5	45.8
	Per cent of 40 foot containers	na	na	46.1	46.3	50.3	50.1	42.3	47.1	49.6	49.8
	Per cent of 20 foot containers	na	na	53.9	53.7	49.7	49.9	57.7	52.9	50.4	50.2
	Total number of lifts	na	na	108 586	107 707	117 250	127 042	122 906	116 896	133 955	130 784
	Average lifts per hour spent in berth	na	na	35.4	25.8	26.7	25.3	28.7	25.4	33.4	34.4
	Average lifts per ship visit	na	na	798	792	985	1041	1050	1 034	1 089	1 038
5000–20000											
	Total ship visits	na	na	12	15	13	13	12	11	12	14
	Total TEUs exchanged in period	na	na	25 171	25 343	30 916	34 605	29 796	30 657	32 300	34 109
	Sum of hours ships spent in berth	na	na	454	661	572	825	381	545	575	600
	TEUs exchanged per hour spent in berth	na	na	55.4	38.3	54.1	42.0	78.1	56.2	56.2	56.9
20001–35000											
	Total ship visits	na	na	31	30	20	13	4	2	2	1
	Total TEUs exchanged in period	na	na	17 407	15 121	11 844	5 382	2 987	1 728	1 043	744
	Sum of hours ships spent in berth	na	na	493	641	498	325	115	77	54	39
	TEUs exchanged per hour spent in berth	na	na	35.3	23.6	23.8	16.6	26.0	22.6	19.5	18.9
35001–40000											
	Total ship visits	na	na	33	35	28	34	34	30	36	44
	Total TEUs exchanged in period	na	na	28 345	31 105	28 417	35 293	34 470	29 627	37 639	43 868
	Sum of hours ships spent in berth	na	na	676	1 116	1 109	1 289	1 244	1 159	1 044	1 132
	TEUs exchanged per hour spent in berth	na	na	41.9	27.9	25.6	27.4	27.7	25.6	36.0	38.8
40001–50000											
	Total ship visits	na	na	20	18	20	24	27	36	37	35
	Total TEUs exchanged in period	na	na	20 553	18 358	24 146	30 813	30 943	39 180	47 242	43 460
	Sum of hours ships spent in berth	na	na	466	586	680	952	938	1 445	1 188	1 062
	TEUs exchanged per hour spent in berth	na	na	44.1	31.3	35.5	32.4	33.0	27.1	39.8	40.9
50001 and above											
	Total ship visits	na	na	40	38	38	38	40	34	36	32
	Total TEUs exchanged in period	na	na	49 606	50 254	61 358	63 364	57 663	51 718	59 921	52 011
	Sum of hours ships spent in berth	na	na	977	1 164	1 526	1 628	1 603	1 373	1 146	974
	TEUs exchanged per hour spent in berth	na	na	50.8	43.2	40.2	38.9	36.0	37.7	52.3	53.4

Note: In September and December quarters of 2010 only part of ship movement statistics was available for processing and so estimates for these quarters are not reported.

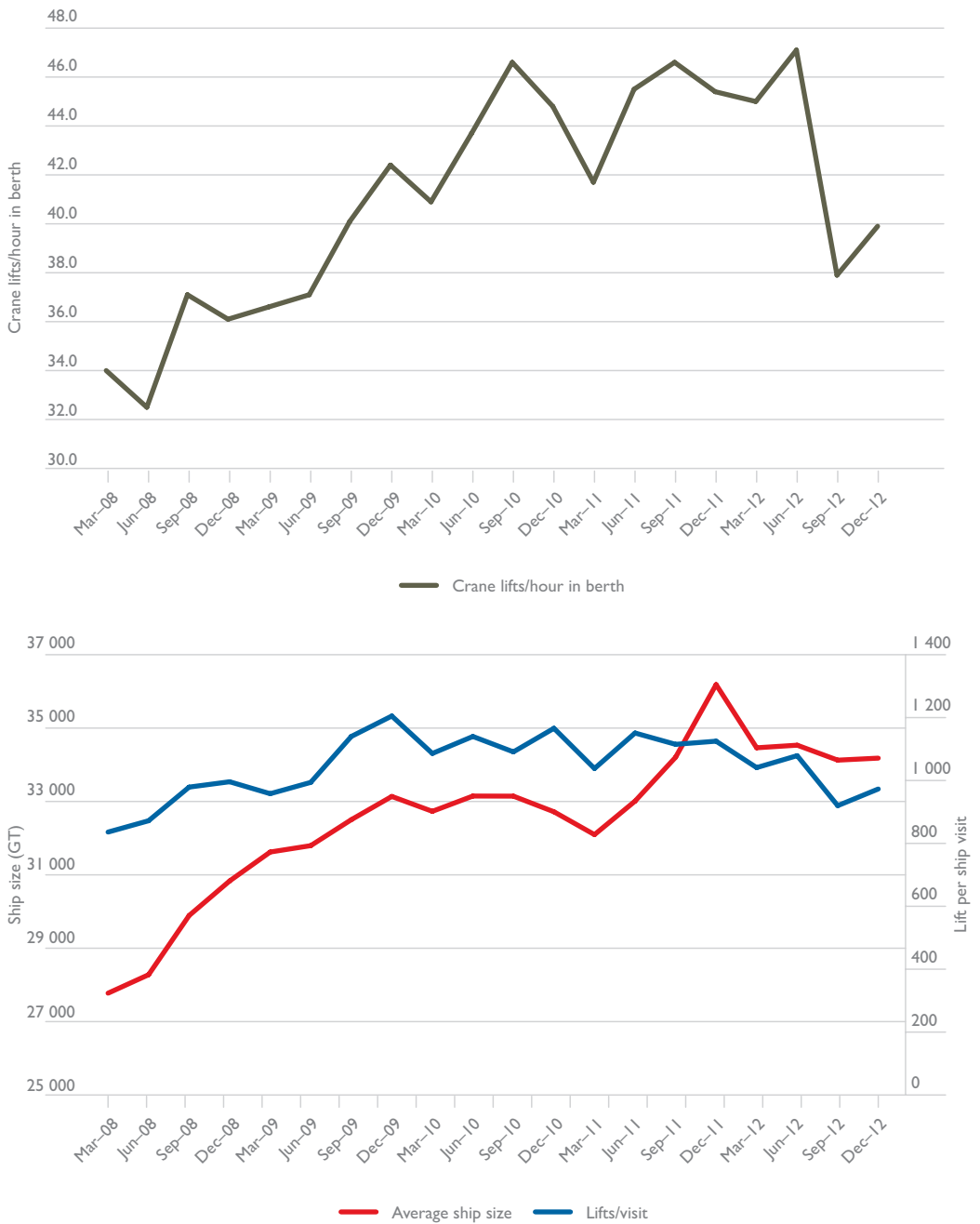
Source: BITRE.

Table 4.6 Container ship visits by port

	Brisbane	Sydney	Melbourne	Adelaide	Fremantle	Total
Gross tonnage	January 2012 – December 2012					
5000–20000	189	133	139	0	49	510
20001–35000	157	253	258	51	9	728
35001–40000	217	242	272	117	144	992
40001–50000	226	323	346	122	135	1 152
50001 and above	140	159	176	30	142	647
All ship sizes	929	1 105	1 191	320	479	4 024

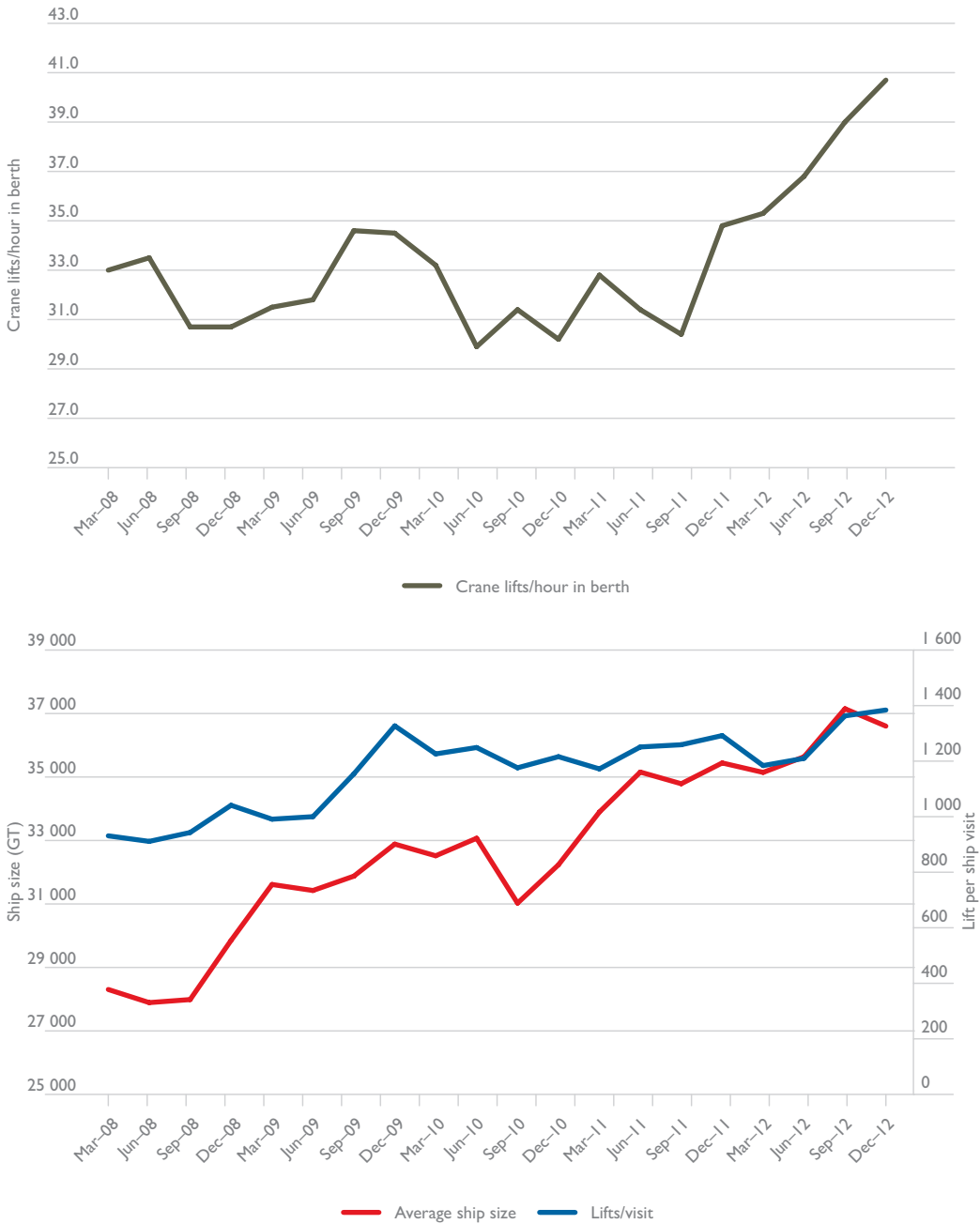
Source: BITRE

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



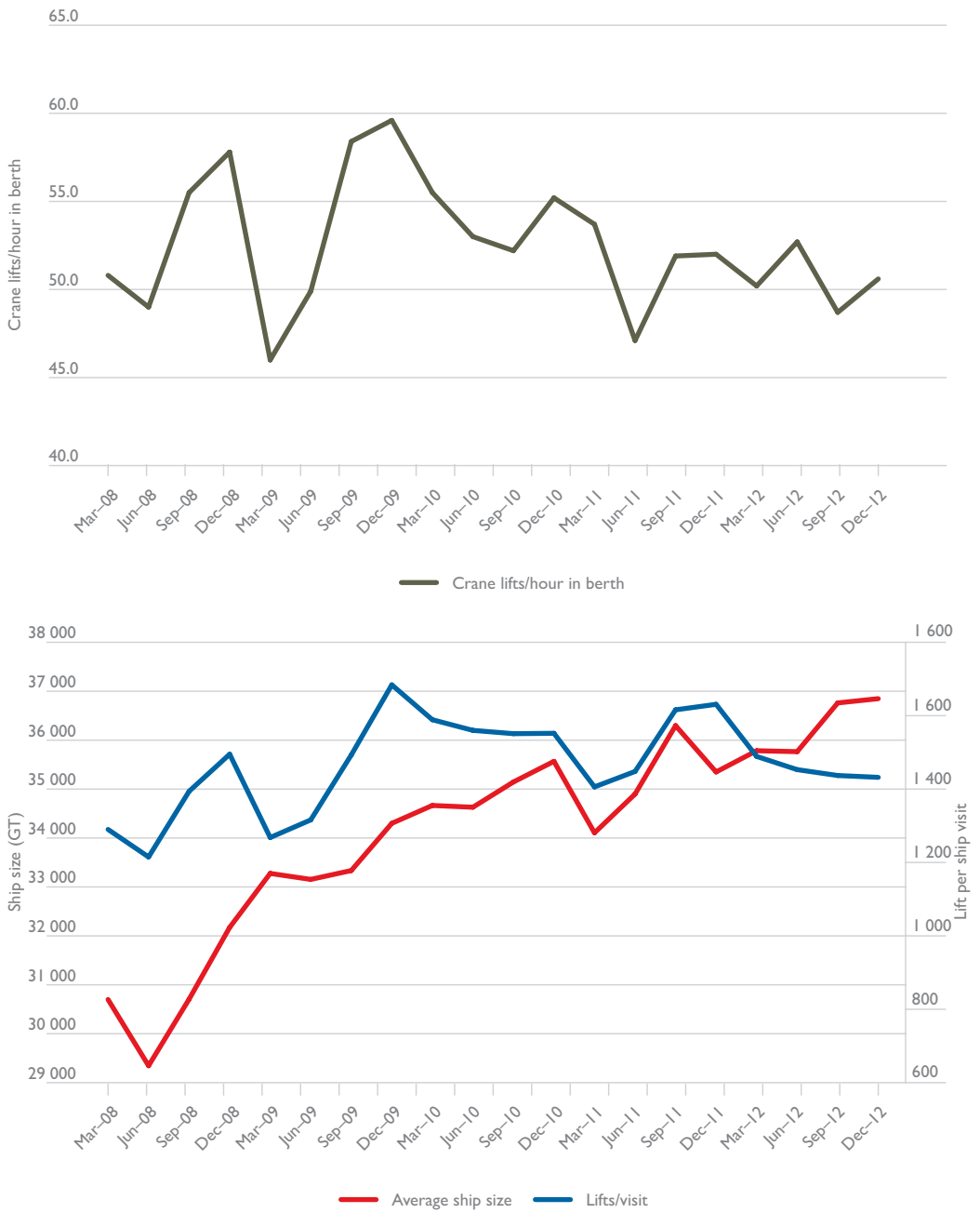
Source: BITRE:

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



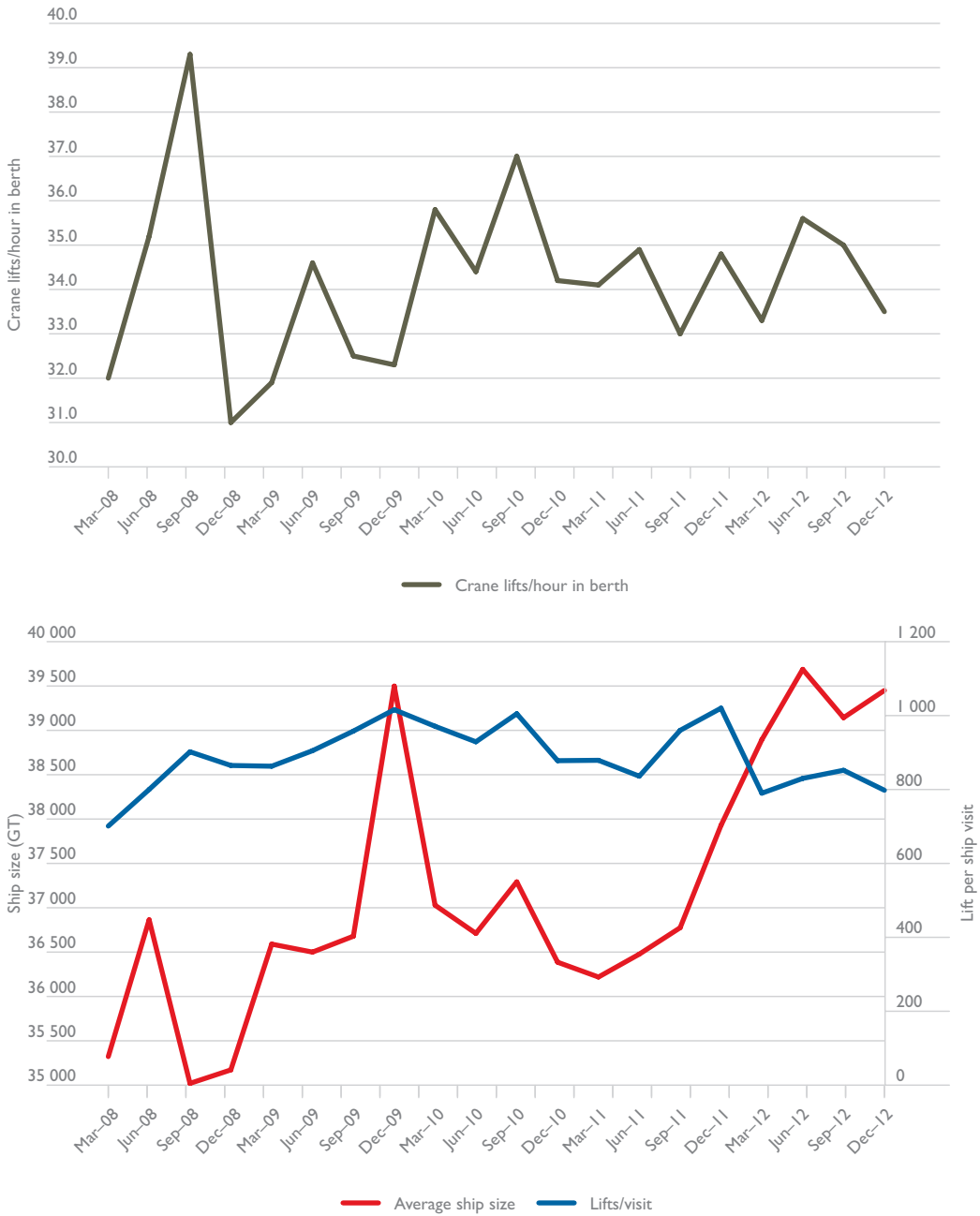
Source: BITRE

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



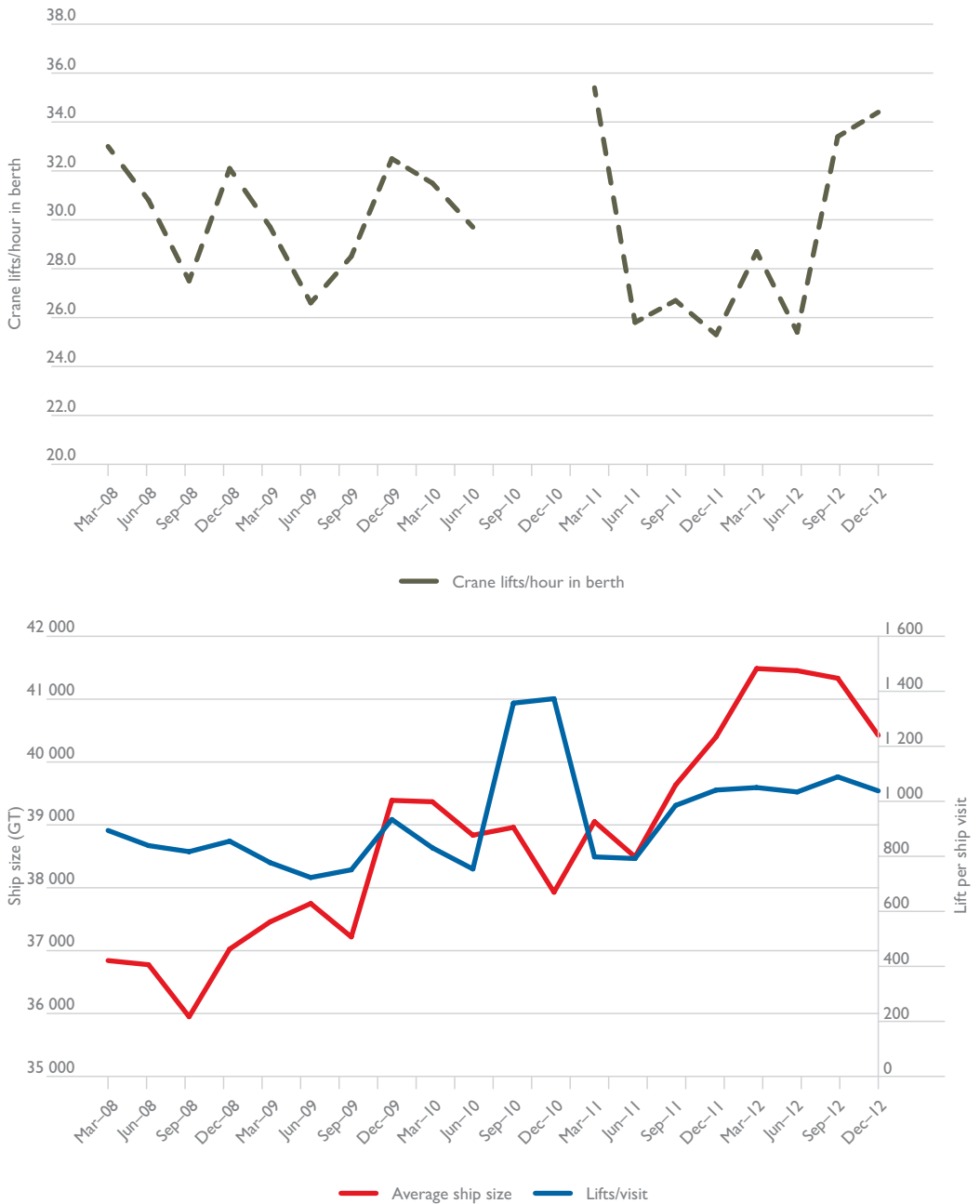
Source: BITRE

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



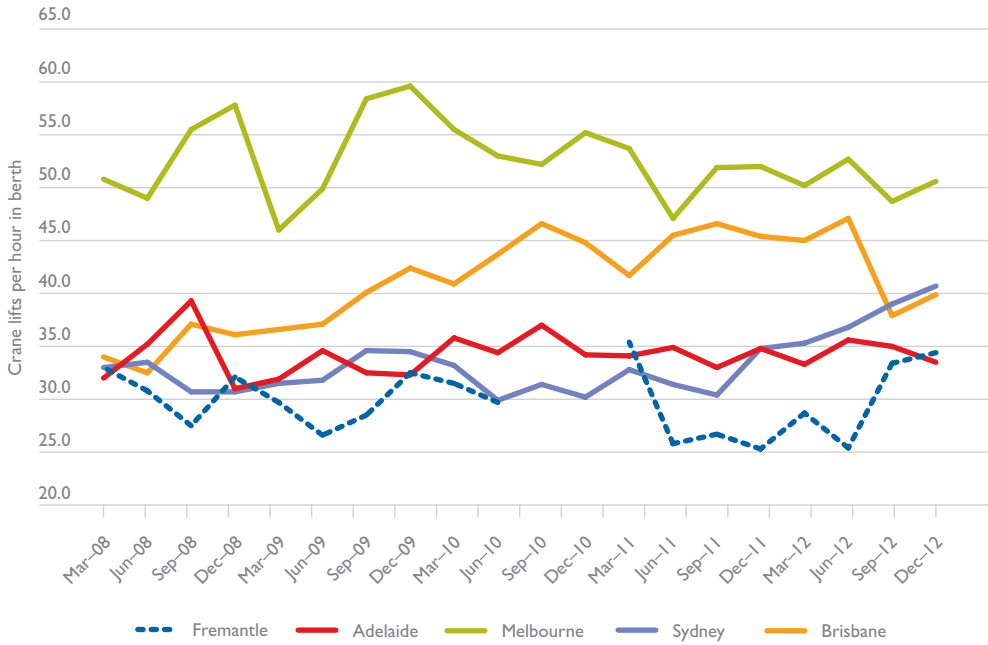
Source: BITRE

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



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

Figure 4.6 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.

Source: BITRE

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

	Jul-Dec 2008	Jan-Jun 2009	Jul-Dec 2009	Jan-Jun 2010	Jul-Dec 2010	Jan-Jun 2011	Jul-Dec 2011	Jan-Jun 2012	Jul-Dec 2012
Five ports^e									
Total cargo throughput ('000 tonnes)	64 049	61 063	61 831	67 645	69 817	70 504	71 752	75 883	76 300
Non-containerised general cargo ('000 tonnes) ^a	2 855	1 842	2 153	11 723	11 754	11 978	2 417	2 663	2 872
Containerised cargo (teus exchanged)									
Full import	1 449 281	1 121 703	1 426 802	1 440 758	1 480 153	1 400 353	1 634 362	1 456 416	1 667 787
Empty import	140 312	155 333	129 206	123 182	127 787	128 880	125 560	129 017	127 840
Full export	876 847	857 981	880 174	905 012	924 886	913 054	1 006 146	955 984	1 013 637
Empty export	666 821	411 197	588 658	636 929	649 198	579 673	694 679	618 819	732 086
Total	3 133 261	2 546 214	3 024 840	3 105 882	3 182 025	3 021 961	3 460 747	3 149 302	3 541 350
Average total employment ^b	1 222	1 254	1 238	1 269	1 267	1 216	1 200	1 232	1 444
Port turnaround time (hrs) ^c	-	-	-	-	-	-	-	-	-
Median result	-	-	-	-	-	-	-	-	-
95th percentile	-	-	-	-	-	-	-	-	-
Brisbane									
Total cargo throughput ('000 tonnes)	15 808	16 086	15 697	15 911	17 099	16 132	18 386	18 817	19 774
Non-containerised general cargo ('000 tonnes) ^a	670	316	458	551	582	498	550	670	928
Containerised cargo (teus exchanged)									
Full import	2 118 787	1 58 988	2 15 555	1 89 660	2 29 055	2 04 719	2 42 897	2 15 999	2 55 542
Empty import	37 363	37 174	30 456	27 458	32 063	30 186	30 165	26 705	34 031
Full export	139 042	131 578	133 943	124 430	144 304	139 035	170 361	153 061	187 579
Empty export	104 798	68 437	100 812	96 928	109 197	90 255	98 953	86 928	90 476
Total	499 990	396 177	480 766	438 476	514 619	464 196	542 376	482 693	567 628
Average total employment ^b	342	353	337	337	323	268	238	227	214
Port turnaround time (hrs) ^c									
Median result	26	32	33	32	30	32	32	30	31
95th percentile	45	70	76	61	62	69	64	52	58

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

	Jul-Dec 2008	Jan-Jun 2009	Jul-Dec 2009	Jan-Jun 2010	Jul-Dec 2010	Jan-Jun 2011	Jul-Dec 2011	Jan-Jun 2012	Jul-Dec 2012
Sydney									
Total cargo throughput ('000 tonnes)	14 715	13 099	14 169	13 992	14 976	14 752	15 245	15 383	15 802
Non-containerised general cargo ('000 tonnes) ^a	142	1	0	0	1	2	3	4	5
Containerised cargo (teus exchanged)									
Full import	489 703	386 403	496 239	479 408	479 408	479 408	535 336	481 620	564 066
Empty import	10 840	15 580	12 962	10 247	10 247	10 247	4 731	5 665	2 933
Full export	222 367	220 061	223 290	227 070	227 070	227 070	232 907	222 469	234 371
Empty export	262 222	176 744	261 042	251 398	251 398	251 398	287 163	266 173	317 158
Total	985 132	798 788	993 533	968 123	968 123	968 123	1 060 137	975 927	1 118 528
Average total employment ^b	244	260	267	298	309	318	324	336	328
Port turnaround time (hrs) ^c									
Median result	29.6	29.0	34.6	37.9	39.8	36.9	38.2	33.8	34.5
95th percentile	56	54	63	72	65	65	73	57	55
Melbourne									
Total cargo throughput ('000 tonnes)	15 542	13 560	14 995	16 096	16 096	16 233	18 077	17 800	17 833
Non-containerised general cargo ('000 tonnes) ^a	1 273	1 028	1 055	1 167	1 167	1 151	1 179	1 214	1 159
Containerised cargo (teus exchanged)									
Full import	557 940	422 482	532 350	566 876	566 876	523 361	622 698	544 439	605 449
Empty import	48 483	59 685	47 694	54 369	54 369	58 205	63 050	68 286	64 114
Full export	359 377	353 155	375 205	402 698	402 698	403 631	454 615	430 531	435 612
Empty export	231 319	124 911	170 507	216 133	216 133	167 700	213 477	182 002	217 200
Total	1 197 119	960 233	1 125 756	1 240 077	1 240 077	1 152 897	1 353 840	1 214 324	1 322 375
Average total employment ^b	228	224	217	205	205	197	204	219	243
Port turnaround time (hrs) ^c									
Median result	31	30	30	32	32	30	35	32	32
95th percentile	62	56	62	67	67	69	76	60	67

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

	Jul-Dec 2008	Jan-Jun 2009	Jul-Dec 2009	Jan-Jun 2010	Jul-Dec 2010	Jan-Jun 2011	Jul-Dec 2011	Jan-Jun 2012	Jul-Dec 2012
Adelaide									
Total cargo throughput ('000 tonnes)	4 952	4 767	4 713	8 763	8 763	10 340	7 698	7 984	7 242
Non-containerised general cargo ('000 tonnes) ^a	190	73	105	134	134	115	162	115	174
Containerised cargo (teus exchanged)									
Full import	40 260	40 656	47 581	53 095	53 095	51 821	60 602	57 188	66 507
Empty import	27 862	26 461	24 052	22 143	22 143	21 907	21 482	20 009	19 528
Full export	59 382	59 075	59 748	60 929	60 929	64 351	70 190	67 262	69 176
Empty export	16 724	6 125	10 379	13 888	13 888	9 567	14 532	12 569	18 378
Total	144 228	132 317	141 760	150 055	150 055	147 646	166 806	157 028	173 589
Average total employment ^b	107	109	112	110	110	114	114	120	375
Port turnaround time (hrs) ^c									
Median result	25	24	28	26	25	28	27	22	22
95th percentile	39	48	54	42	40	21	53	39	41
Fremantle									
Total cargo throughput ('000 tonnes)	13 032	13 550	12 258	12 883	12 883	13 047	12 345	15 899	15 648
Non-containerised general cargo ('000 tonnes) ^a	580	423	535	9 871	9 871	10 214	526	663	611
Containerised cargo (teus exchanged)									
Full import	142 591	113 174	135 077	151 719	151 719	141 044	172 829	157 170	176 223
Empty import	15 764	16 433	14 042	8 965	8 965	8 335	6 132	8 352	7 234
Full export	96 679	94 112	87 988	89 885	89 885	78 967	78 073	82 661	86 899
Empty export	51 758	34 980	45 918	58 582	58 582	60 753	80 554	71 147	88 874
Total	306 792	258 699	283 025	309 151	309 151	289 099	337 588	319 330	359 230
Average total employment ^b	302	309	305	320	320	319	320	331	284
Port turnaround time (hrs) ^c									
Median result	31	28	26	21	21	24	36	37	35
95th percentile	67	57	46	47	47	51	77	81	65

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. Beginning from the second part of 2012, Adelaide employment numbers include some previously independent service providers, now part of the Flinders Ports.
- c. Comparisons between ports are not appropriate because each port authority/corporation has a different structure.
- d. Port turnaround times refer only to ships calling at container terminals. Comparisons between ports are not appropriate because each port has a different set of parameters to measure the turnaround time. Normally, only inter-temporal comparison at individual ports is of use.
- e. 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.

Table 6.1 Stevedoring and ship arrival reliability indicators, September and December quarters 2012

Indicator	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jul-Sep	Oct-Dec	Jul-Sep	Oct-Dec	Jul-Sep	Oct-Dec	Jul-Sep	Oct-Dec	Jul-Sep	Oct-Dec
Stevedoring										
Cargo receipt	88.3	85.6	66.2	65.8	94.0	90.2	na	na	86.0	88.3
Ship arrival										
Advice at 24 hrs	100.0	96.0	41.0	45.0	na	na	95.3	100.0	57.0	62.0
Advice inside 24 hrs	94.0	94.0	94.0	97.0	na	na	97.8	97.9	95.0	86.0

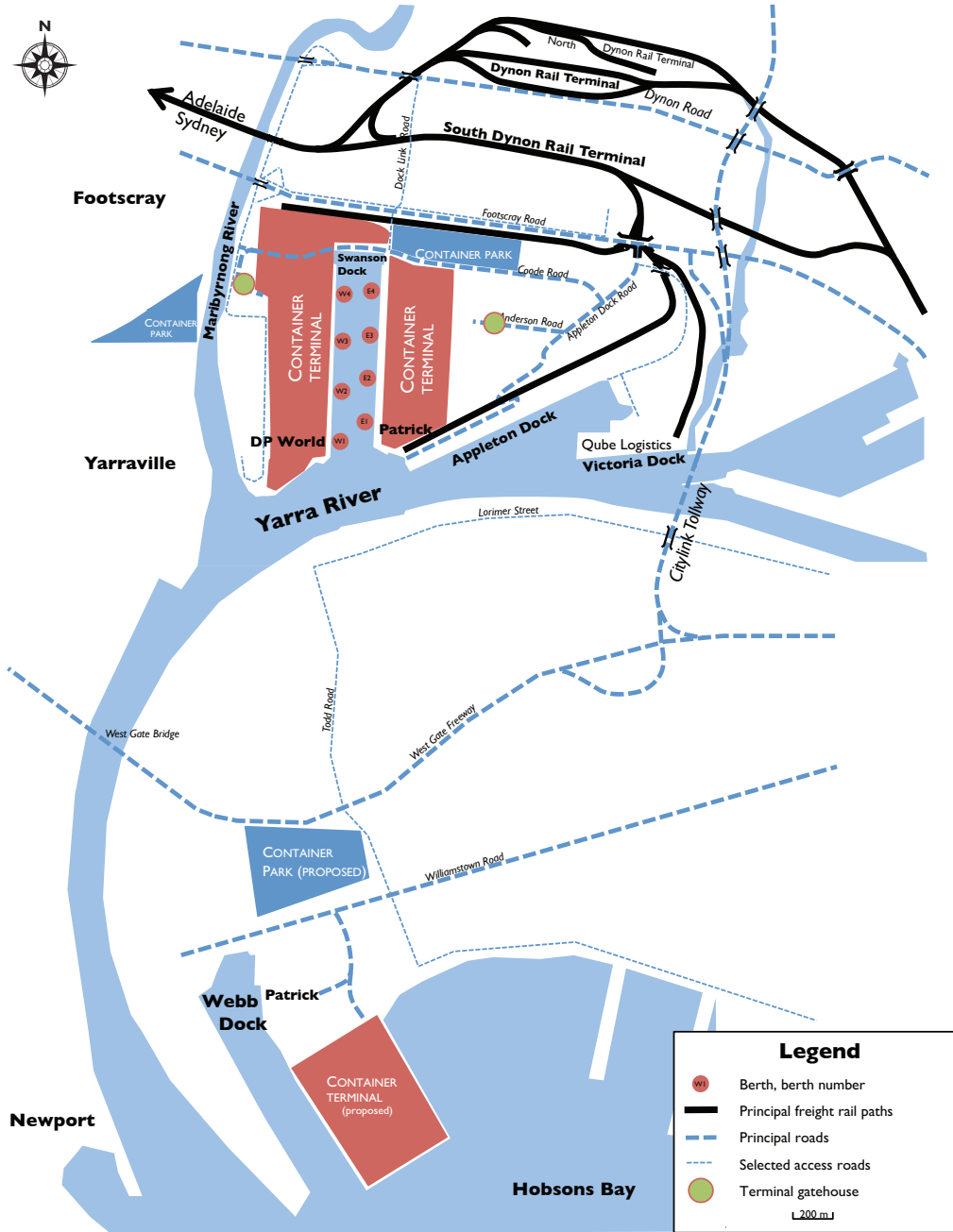
na not available

Sources: Ports Australia, Patrick, DP World Terminals

APPENDIX A

Maps of five major Australian container ports

Melbourne



February 2013

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>)

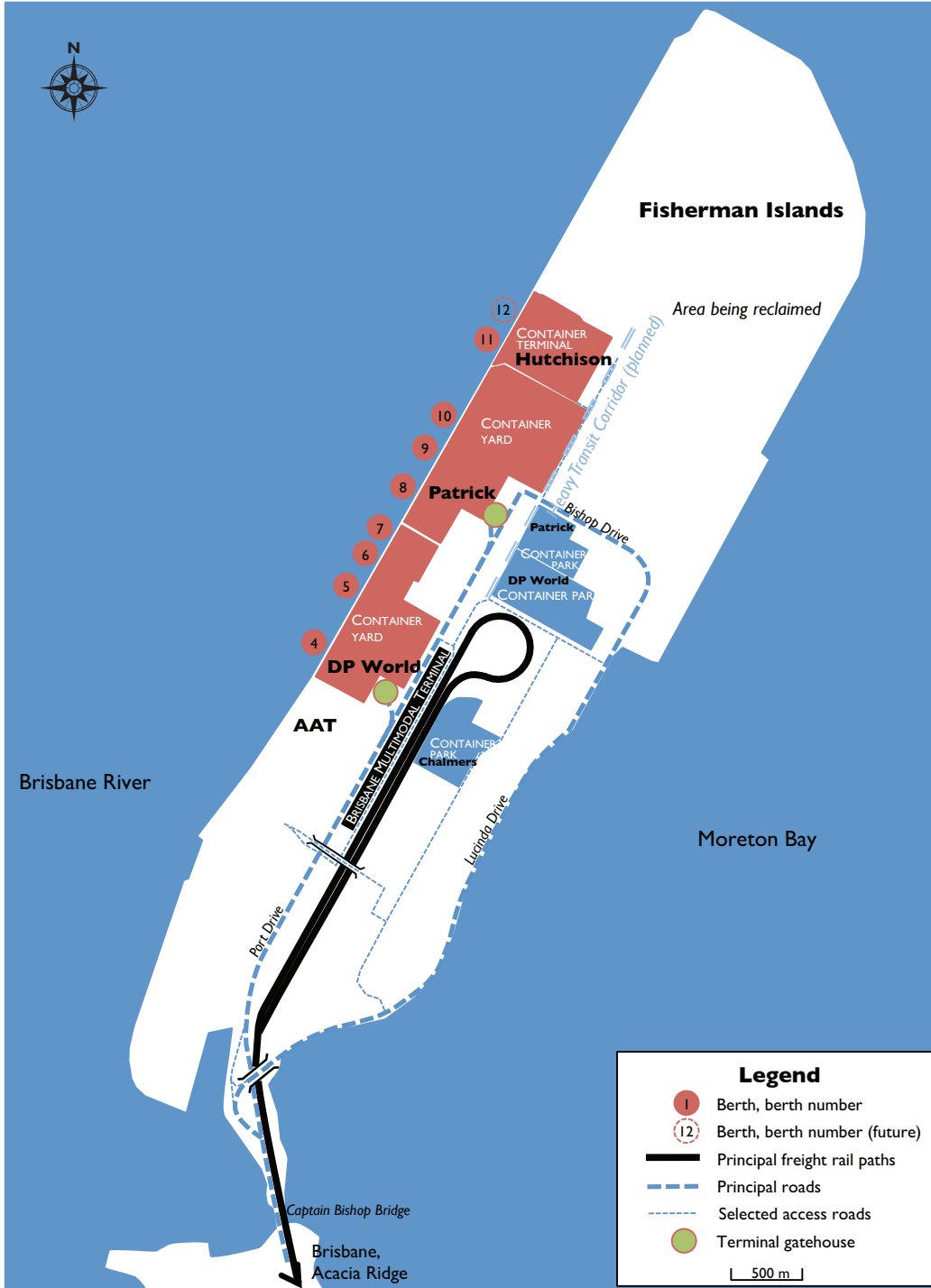
Road

- 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



February 2013

Brisbane (“Fisherman Islands”)

Dockside

- **Stevedores.** The map shows the DP World and Patrick container terminals as well as the new Hutchison container terminal. 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 are Berth 11 (from 2013) 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

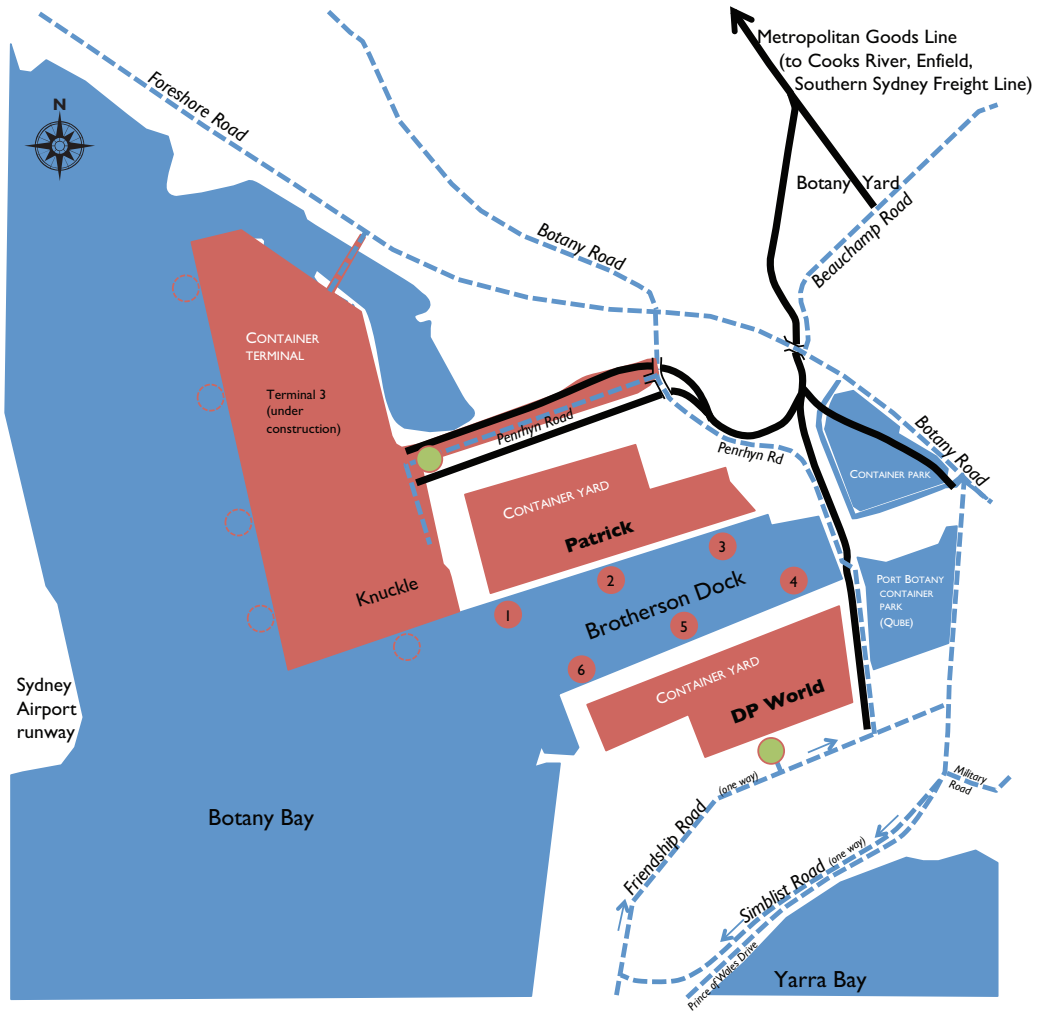
- Road access is via the bridge to Fisherman Islands, over the Captain Bishop Bridge. Access to the terminals is via Port Drive.

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



Legend

- Berth, berth number
- Berth (future)
- Principal freight rail paths
- Principal freight rail paths (future)
- Principal roads
- Principal roads (future)
- Selected access roads
- Terminal gatehouse

[200 m]

February 2013

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.

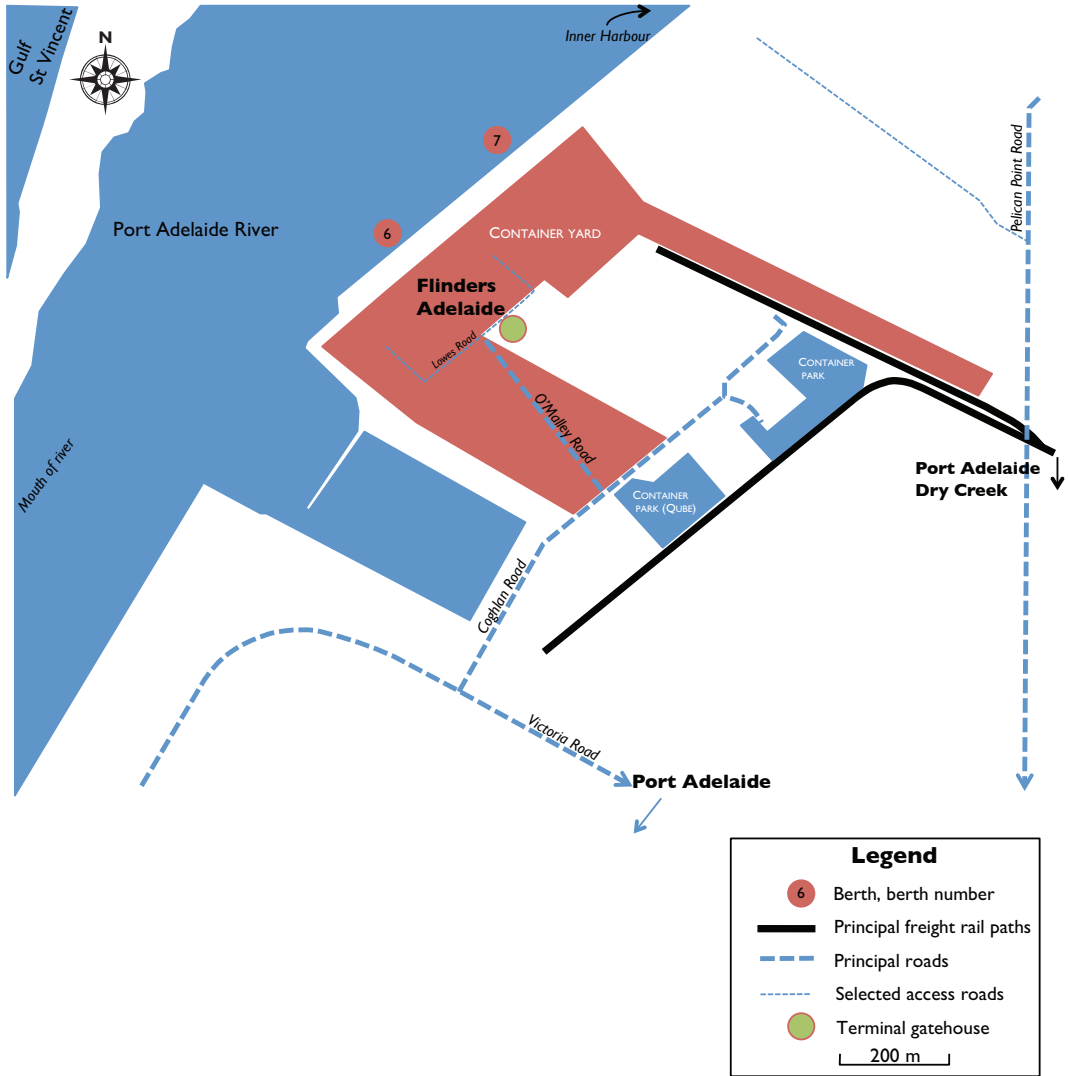
Road

- 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 Qube; Clyde, operated by Qube) [ex-Griffith containers]; and
 - non-urban terminals at Blayney (Qube), 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



February 2013

Adelaide (“Flinders 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 Flinders Ports, 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).

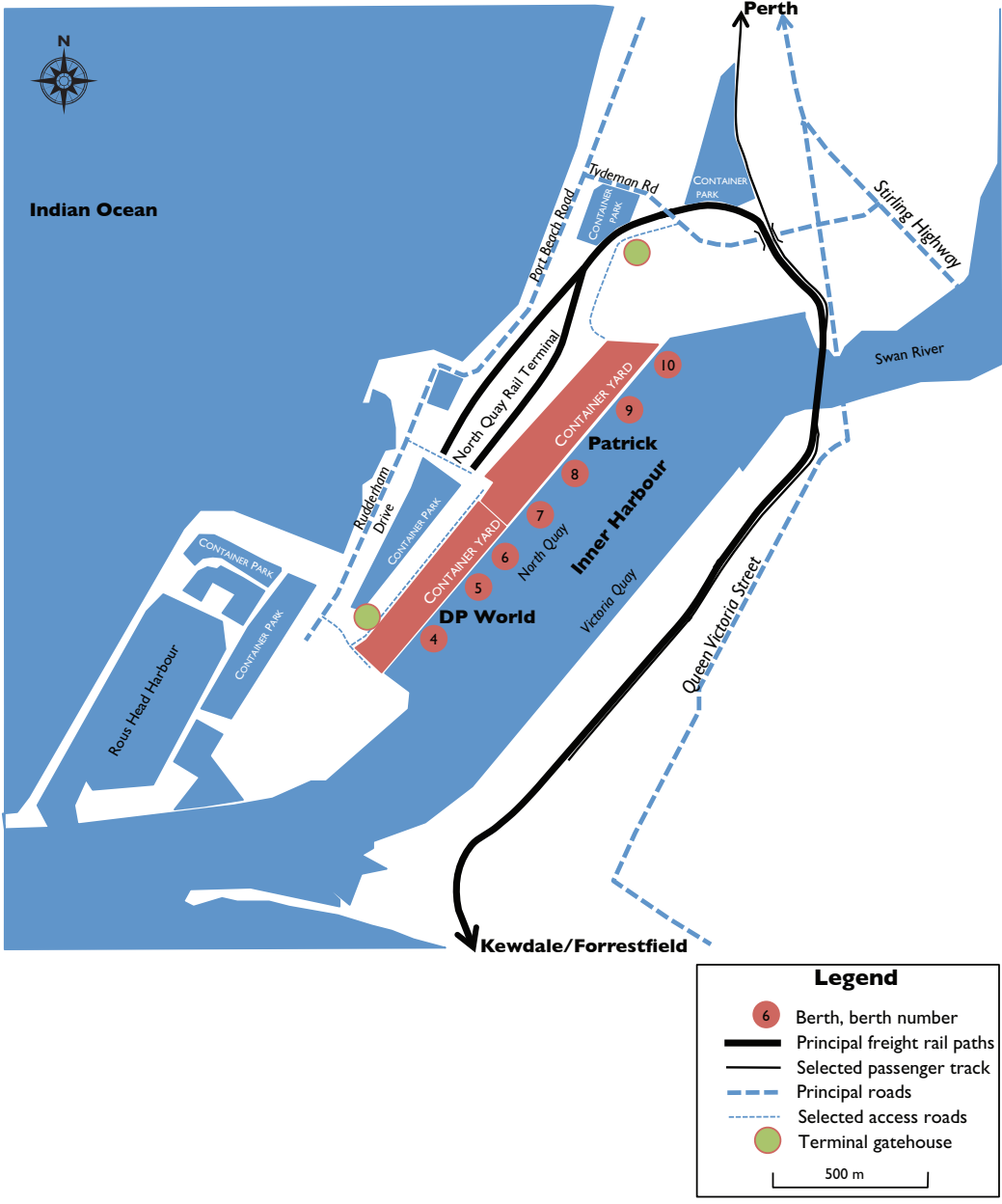
Road

- Flinders 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 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 container 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 Viterra’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



February 2013

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
TEUS	Twenty-foot equivalent units
TTT	Truck turnaround time
UCC	Unitized Cellular Container vessel
VBS	Vehicle Booking System

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