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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. Waterline provides the latest data available on stevedoring productivity and landside performance and 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 2010.

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

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

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

Waterline is published twice a year in a streamlined format to ensure that timely data remain available.

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

Landside performance indicators

Container throughput at Australia's largest five container ports increased by 15.6 and 4.6 per cent in September and December quarters of 2010, as compared with the same period in 2009, which indicates much stronger performance in 2010.¹

Productivity of truck turnaround in five ports improved from 34.2 minutes in December quarter of 2009 to 33.9 minutes in the December quarter of 2010. Shift work in trucking containers, as measured by the vehicle booking system, indicated an increase of evening, night and weekend work from 239.9 thousand of timeslots used in December quarter 2009 to 289.7 thousand in the December quarter of 2010. In the same period, a decline in day shift share was noted. This improvement in utilisation of shift work was strongest in Fremantle, Brisbane and Sydney.

Wharfside productivity

The number of containers handled in five Australian ports increased more strongly between the September quarter 2009 and 2010 than between the December quarter 2009 and 2010, by 12.3 and 2.3 per cent. Weaker growth in containers handled in December, compared to the September quarter was particularly pronounced in Brisbane (11.0 and 2.2 per cent), Sydney (14.8 and -4.6 per cent) and Fremantle (12.0 and 4.8 per cent). Melbourne also experienced strong growth in total containers handled, of 11.9 per cent in the September quarter and 8.7 per cent in the December 2010.

Container terminal performance rates in five ports, as measured by crane rates, decreased from 43.8 containers per hour in the December quarter of 2009 to 43.2 containers per hour (-1.4 per cent) in the December quarter of 2010. However, in Brisbane crane rates improved in the same period from 41.0 to 44.9 containers per hour (9.6 per cent) respectively.

Port interface cost index

Between July and December 2010, no dedicated container ships within the category of 15 000 to 20 000 gross tonnes called to Sydney, Melbourne or Brisbane. This trend of reliance on large and very large capacity container ships by shipping lines has been accentuated by recent rises in bunker costs. The structural shift to larger tonnage use in servicing Australian ports may be a result of the world shipping market adjusting to rising costs of fuel.

¹ The indicators of task size for five ports were estimated by BITRE for December quarter 2010 because at Sydney, port complete data were not available for that month due to a computer malfunction at one of the stevedoring companies.

Thus between July and December 2010, the national port interface cost indices for 15 000–20 000 GT were calculated only for Adelaide and Fremantle where these smaller ships are still represented amongst visiting ships.

For imports by container ships in the 35 000–40 000 GT category, the national port interface cost indices in July to December 2010 increased in nominal terms to 857 (5.5 per cent) from 813 in January to June 2010. The real price indices increased to 623 from 602 (3.4 per cent) respectively.

For exports by the same category of ships, costs indices in July to December 2010 increased in nominal terms to 830 (7.2 per cent) from 775 in January to June 2010. The real export cost indices increased to 603 (5.1 per cent) from 574, respectively.

Elapsed berth time for the smaller ship category (monitored GT 17 215) increased in Fremantle from 35 to 38 hours but declined in Adelaide from 27 to 26 hours.

For the larger ship category (GT 37 394), the elapsed berth time declined in Sydney (from 48 to 44 hours), Melbourne (from 33 to 31 hours) and Brisbane (from 29 to 26 hours), but increased in Adelaide (from 24 to 26 hours) and Fremantle (from 26 to 31 hours).

Container ship visits

During the calendar year 2010, the dominating ship size visiting Melbourne and Sydney was 25 000–30 000 GT, with 320 and 290 visits respectively, whereas for Fremantle the dominating size was 35 000–40 000 GT with 103 visits. The average TEUs exchanged per visit has increased in the largest ship categories visiting Australian ports but declined in the remaining ship categories.

Port performance : non-financial indicators

Imports of containerised cargo in five ports, as measured by TEU exchanged, increased from 1.12 in January–June 2010 to 1.44 million TEU in July–December 2010. The total container exchanged increased in all categories in the same period from 2.82 to 3.18 million TEU.

Wharf and ship reliability

Except for Sydney and Melbourne, cargo receipt at major container terminals worsened slightly between July and December 2010, as compared with previous year. Ship arrival indicators indicate slight deterioration over July–December 2010, except for Sydney and Adelaide. Both indicators demonstrate a pronounced seasonal pattern.

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CHAPTER 1

Landside performance indicators

Overview

Chapter 1 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 1.1 and Figures 1.1 to Figures 1.14. 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 1.1.

Explanatory notes

Five ports

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

Road - Total trucks

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

Road - Total containers

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

Road - Total TEUs

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

When shipping schedules permit and volumes demand extra resources, additional labour and extra equipment can be deployed to the landside of a port terminal and extra time slots can be provided. Generally, resources are reallocated in this way one or two days in advance. The VBS indicators measure the supply of VBS time slots at port terminals.

Adjusted vehicle booking system usage rates

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

T1.1 Container terminal landside performance indicators

Port/Indicator	Dec-08	Mar-09	Jun-09	Sep-09	Dec-09	Mar-10	Jun-10	Sep-10	Dec-10
Five ports									
Road									
Total trucks ^a	500 910	412 415	409 456	440 753	499 009	457 146	464 317	518 147	511 283
Total containers ^d	880 899	703 729	712 322	794 784	878 923	814 180	823 382	918 910	919 562
Total TEUS ^d	1 281 033	1 005 743	1 022 930	1 160 132	1 298 126	1 186 355	1 196 169	1 350 251	1 364 386
Truck turnaround time - mins. ^e	36.5	33.9	34.7	34.2	34.2	31.6	33.6	34.1	33.9
Containers per truck ^e	1.8	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8
Avg. container turnaround time - mins. ^e	24.3	22.3	22.9	22.4	23.7	21.9	24.4	24.8	24.6
TEUS per truck ^e	2.4	2.4	2.4	2.5	2.4	2.3	2.3	2.3	2.3
Rail									
Total containers (excl. Adel. and Frem.)	92 120	82 523	85 566	97 279	97 926	83 539	86 894	80 844	74 251
Number of VBS timeslots available									
Overall total	659 686	617 056	575 755	623 485	644 167	616 067	644 087	729 379	686 826
Monday- Friday									
Day (0600-1800)	353 132	337 673	347 817	372 604	365 315	351 597	360 739	391 169	362 971
Evening (1800-2400)	140 626	140 179	125 965	133 834	135 007	133 163	142 925	165 639	153 571
Night (2400 - 0600)	101 428	90 224	67 155	75 701	77 795	72 690	78 749	93 019	84 309
Sub total	595 186	568 076	540 937	582 139	578 117	557 450	582 413	649 827	600 851
Saturday									
Day (0600-1800)	32 417	27 417	19 457	19 498	29 929	25 629	26 888	33 298	30 836
Evening (1800-2400)	4 555	4 142	1 839	1 822	4 610	4 539	5 398	7 567	5 274
Night (2400 - 0600)	7 586	2 737	3 285	3 986	6 357	6 934	7 238	6 983	25 183
Sub total	44 558	34 296	24 581	25 306	40 896	37 102	39 524	47 848	61 293
Sunday									
Day (0600-1800)	4 197	3 393	2 575	4 638	11 950	10 004	10 614	13 780	9 654
Evening (1800-2400)	6 423	2 646	2 406	5 488	6 346	5 851	5 988	9 206	8 071
Night (2400 - 0600)	9 322	8 645	5 256	5 914	6 858	5 660	5 548	8 718	6 957
Sub total	19 942	14 684	10 237	16 040	25 154	21 515	22 150	31 704	24 682
Number of VBS timeslots used									
Overall total	558 788	527 776	506 960	559 740	588 221	554 371	579 833	669 521	636 024
Monday- Friday									
Day (0600-1800)	325 265	315 215	327 292	352 221	348 291	334 119	338 163	371 454	346 342
Evening (1800-2400)	111 958	110 502	96 526	109 347	120 255	116 194	123 927	150 031	138 509
Night (2400 - 0600)	83 317	75 030	58 566	68 685	72 096	66 739	73 852	87 486	78 209
Sub total	520 540	500 746	482 384	530 253	540 642	517 052	535 942	608 971	563 060
Saturday									
Day (0600-1800)	19 452	14 435	13 056	12 933	22 689	17 593	21 360	27 308	26 380
Evening (1800-2400)	1 380	1 210	1 247	1 317	2 258	1 467	2 578	3 993	3 118
Night (2400 - 0600)	5 825	1 733	2 768	3 711	4 422	4 179	4 130	3 930	23 625
Sub total	26 657	17 378	17 071	17 961	29 369	23 239	28 068	35 231	53 123
Sunday									
Day (0600-1800)	2 095	1 053	1 396	2 486	7 921	5 339	6 632	9 771	7 296
Evening (1800-2400)	3 101	1 992	2 079	3 944	4 433	3 949	4 377	7 860	7 191
Night (2400 - 0600)	6 395	6 606	4 030	5 096	5 856	4 792	4 814	7 688	5 354
Sub total	11 591	9 651	7 505	11 526	18 210	14 080	15 823	25 319	19 841
Brisbane									
Road									
Total trucks	75 460	61 434	63 109	66 754	74 285	62 273	62 914	67 310	64 609
Total containers ^d	148 488	110 461	121 257	132 151	143 580	126 845	131 037	148 269	150 381
TEUS ^d	213 936	154 765	171 089	190 140	211 979	184 328	188 537	216 527	222 496
Truck turnaround time - mins. ^{b,e}	47.8	39.9	40.7	39.1	38.2	33.8	37.6	40.0	32.9
Containers per truck ^e	2.0	1.8	1.9	2.0	1.9	2.0	2.1	2.2	2.3
Avg. container turnaround time - mins. ^e	26.2	22.0	21.8	20.9	21.9	19.7	21.5	22.7	18.8
TEUS per truck ^e	2.5	2.5	2.6	2.6	2.5	2.4	2.4	2.5	2.5
Rail									
Total containers ^c	14 747	10 040	10 988	12 510	13 277	6 603	13 303	15 134	9 164
Number of VBS timeslots available									
Overall total	101 717	104 692	74 528	75 718	77 642	84 371	95 820	114 221	127 105
Monday- Friday									
Day (0600-1800)	44 161	48 262	52 252	53 588	55 317	57 733	62 148	69 894	73 486
Evening (1800-2400)	21 564	22 386	16 416	15 826	16 246	20 268	24 763	29 825	33 757
Night (2400 - 0600)	25 296	25 502	2 098	2 182	2 484	2 590	3 915	6 677	9 027
Sub total	91 021	96 150	70 766	71 596	74 047	80 591	90 826	106 396	116 270
Saturday									
Day (0600-1800)	5 507	5 180	3 262	3 063	3 100	3 233	4 191	5 762	6 781
Evening (1800-2400)	0	0	0	0	0	38	286	439	440
Night (2400 - 0600)	2 143	421	0	0	0	0	0	0	0
Sub total	7 650	5 601	3 262	3 063	3 100	3 271	4 477	6 201	7 221
Sunday									
Day (0600-1800)	0	0	0	134	0	0	4	300	1 660
Evening (1800-2400)	3 046	2 941	499	541	459	509	511	737	637
Night (2400 - 0600)	3 046	2 941	500	1 059	495	509	517	1 624	3 614
Sub total	3 046	2 941	500	1 059	495	509	517	1 624	3 614
Number of VBS timeslots used									
Overall total	78 676	83 562	65 083	67 591	73 709	78 553	91 681	111 183	123 582
Monday- Friday									
Day (0600-1800)	39 166	43 491	47 974	50 512	53 777	55 771	60 005	68 414	71 917
Evening (1800-2400)	16 100	17 323	13 326	13 605	15 415	18 408	23 555	28 850	32 600
Night (2400 - 0600)	17 224	17 899	1 923	1 998	2 447	2 372	3 779	6 385	8 552
Sub total	72 491	78 713	63 222	66 115	71 639	76 551	87 339	103 649	113 070
Saturday									
Day (0600-1800)	2 918	2 953	1 497	850	1 622	1 519	3 582	5 513	6 538
Evening (1800-2400)	0	0	0	0	0	38	281	418	406
Night (2400 - 0600)	1 552	146	0	0	0	0	0	0	0
Sub total	4 470	3 099	1 497	850	1 622	1 557	3 863	5 931	6 944
Sunday									
Day (0600-1800)	0	0	0	103	36	0	2	580	1 310
Evening (1800-2400)	0	0	0	35	0	0	4	294	1 632
Night (2400 - 0600)	1 716	1 750	364	488	412	445	473	729	626
Sub total	1 716	1 750	364	626	448	445	479	1 603	3 568

T1.1 Container terminal landside performance indicators V&B&H&I YX****

Port/Indicator	Dec-08	Mar-09	Jun-09	Sep-09	Dec-09	Mar-10	Jun-10	Sep-10	Dec-10
Sydney									
Road									
Total trucks	136 158	113 625	111 935	123 163	144 586	127 177	129 819	151 258	143 299
Total containers ^d	242 330	190 120	186 230	218 899	257 143	226 630	234 419	277 830	270 147
TEUS ^d	363 603	284 720	278 400	332 314	394 624	340 033	352 014	417 430	410 619
Truck turnaround time - mins. ^e	48.7	42.2	45.6	45.5	44.7	38.8	46.2	43.2	45.5
Containers per truck ^e	1.8	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.9
Avg. container turnaround time - mins. ^e	37.9	32.8	35.4	35.0	36.6	32.4	40.3	37.1	39.1
TEUS per truck ^e	2.3	2.2	2.3	2.4	2.3	2.3	2.3	2.2	2.2
Rail									
Total containers	58 862	55 757	57 017	63 498	62 900	56 772	53 938	50 752	49 699
Number of VBS timeslots available									
Overall total	187 112	165 547	141 455	164 745	181 402	166 464	178 200	201 727	155 426
Monday- Friday									
Day (0600-1800)	88 735	79 473	74 182	83 894	80 086	73 345	76 337	84 784	59 477
Evening (1800-2400)	34 639	34 131	28 094	34 100	36 182	31 969	34 874	40 490	27 227
Night (2400 - 0600)	33 959	28 664	27 417	30 075	31 027	28 593	30 399	34 821	23 981
Sub total	157 333	142 268	129 693	148 069	147 295	133 907	141 610	160 095	110 685
Saturday									
Day (0600-1800)	11 852	12 132	5 656	5 760	10 299	9 277	11 102	12 338	8 447
Evening (1800-2400)	2 377	2 551	120	8	2 642	3 102	3 392	3 473	1 525
Night (2400 - 0600)	2 794	2 316	1 296	1 658	4 566	4 372	5 540	5 478	23 701
Sub total	17 023	16 999	7 072	7 426	17 507	16 751	20 034	21 289	33 673
Sunday									
Day (0600-1800)	4 122	1 578	733	2 566	9 286	8 335	8 840	10 479	5 554
Evening (1800-2400)	4 901	1 391	1 136	3 877	4 378	4 453	4 680	6 302	3 740
Night (2400 - 0600)	3 733	3 311	2 821	2 807	2 936	3 018	3 036	3 562	1 774
Sub total	12 756	6 280	4 690	9 250	16 600	15 806	16 556	20 343	11 068
Number of VBS timeslots used									
Overall total	146 922	139 950	123 281	154 169	163 483	144 661	157 595	181 944	142 674
Monday- Friday									
Day (0600-1800)	79 326	74 969	70 781	81 772	77 442	69 502	71 372	80 702	56 109
Evening (1800-2400)	25 977	27 410	21 223	30 802	34 499	30 445	32 426	38 179	25 393
Night (2400 - 0600)	28 074	25 588	21 999	27 479	29 201	25 867	29 000	33 390	22 413
Sub total	133 376	127 967	114 003	140 052	141 141	125 815	132 797	152 272	103 914
Saturday									
Day (0600-1800)	5 228	5 304	4 340	5 347	7 872	6 256	9 091	10 009	7 095
Evening (1800-2400)	33	137	3	5	305	253	1 052	903	261
Night (2400 - 0600)	1 987	1 587	1 228	1 615	2 714	1 821	2 775	2 452	22 354
Sub total	7 248	7 028	5 571	6 967	10 891	8 330	12 918	13 364	29 710
Sunday									
Day (0600-1800)	1 630	879	696	1 868	6 170	4 924	5 998	7 669	4 336
Evening (1800-2400)	1 796	971	992	2 630	2 746	2 836	3 253	5 155	3 121
Night (2400 - 0600)	2 872	3 105	2 019	2 652	2 535	2 756	2 629	3 484	1 593
Sub total	6 298	4 955	3 707	7 150	11 451	10 516	11 880	16 308	9 050
Melbourne									
Road									
Total trucks ^a	209 862	165 562	167 209	181 341	203 071	195 108	201 035	220 245	221 538
Total containers	349 015	286 682	286 158	320 448	340 029	330 962	333 414	350 740	348 268
Total TEUS	502 706	404 365	406 723	460 103	492 353	476 200	479 041	511 430	512 081
Truck turnaround time - mins.	25.8	28.1	27.1	26.6	26.2	27.2	25.7	25.9	25.9
Containers per truck	1.7	1.7	1.7	1.8	1.7	1.7	1.7	1.6	1.6
Avg. container turnaround time -mins.	16.0	17.4	17.0	16.0	16.4	17.0	16.3	16.9	16.8
TEUS per truck	2.4	2.4	2.4	2.5	2.4	2.4	2.4	2.4	2.4
Rail									
Total containers ^c	18 511	16 726	17 561	21 271	21 749	20 164	19 653	14 958	15 388
Number of VBS timeslots available									
Overall total	245 488	222 378	239 268	257 447	259 023	243 045	245 377	279 323	267 200
Monday- Friday									
Day (0600-1800)	133 117	123 712	137 528	147 206	139 652	132 102	135 286	145 068	138 168
Evening (1800-2400)	47 844	45 795	45 145	48 147	49 635	48 128	47 758	56 157	53 336
Night (2400 - 0600)	42 003	36 053	37 640	42 030	43 281	41 171	43 331	49 505	47 941
Sub total	222 964	205 560	220 313	237 383	232 568	221 401	226 375	250 730	239 445
Saturday									
Day (0600-1800)	13 566	9 768	10 271	10 191	14 673	12 483	10 608	13 843	13 150
Evening (1800-2400)	2 174	1 589	1 719	1 814	1 968	1 399	1 720	3 655	3 309
Night (2400 - 0600)	2 649	0	1 989	2 328	1 791	2 562	1 698	1 505	1 482
Sub total	18 389	11 357	13 979	14 333	18 432	16 444	14 026	19 003	17 941
Sunday									
Day (0600-1800)	75	1 813	1 770	1 688	2 592	1 669	1 770	2 707	2 782
Evening (1800-2400)	1 522	1 255	1 270	1 477	1 968	1 398	1 270	2 522	2 577
Night (2400 - 0600)	2 538	2 393	1 936	2 566	3 463	2 133	1 936	4 361	4 455
Sub total	4 135	5 461	4 976	5 731	8 023	5 200	4 976	9 590	9 814
Number of VBS timeslots used									
Overall total	224 096	197 459	220 632	235 683	239 286	223 685	226 025	256 836	245 313
Monday- Friday									
Day (0600-1800)	125 083	115 308	130 838	138 390	132 104	125 420	128 080	136 825	131 423
Evening (1800-2400)	44 322	40 900	42 679	45 489	46 950	44 560	44 788	53 692	50 296
Night (2400 - 0600)	37 853	31 538	34 644	38 609	39 898	38 171	40 005	45 850	44 109
Sub total	207 259	187 746	208 162	222 489	218 953	208 152	212 874	236 367	225 827
Saturday									
Day (0600-1800)	10 099	5 870	6 952	6 551	12 077	9 295	7 817	10 573	10 322
Evening (1800-2400)	1 345	1 071	1 244	1 312	1 953	1 176	1 245	2 672	2 451
Night (2400 - 0600)	2 286	0	1 540	2 096	1 708	2 358	1 355	1 478	1 271
Sub total	13 730	6 941	9 736	9 959	15 738	12 829	10 417	14 723	14 044
Sunday									
Day (0600-1800)									
Evening (1800-2400)	1 305	1 021	1 087	1 279	1 687	1 113	1 087	2 329	2 307
Night (2400 - 0600)	1 802	1 751	1 647	1 956	2 909	1 591	1 647	3 417	3 135
Sub total	3 107	2 772	2 734	3 235	4 596	2 704	2 734	5 746	5 442

Port/Indicator

Port/Indicator	Dec-08	Mar-09	Jun-09	Sep-09	Dec-09	Mar-10	Jun-10	Sep-10	Dec-10
Adelaide									
Road									
Total trucks	19 239	21 094	18 289	19 754	19 924	20 230	20 409	24 930	25 134
Total containers ^d	30 924	33 118	28 327	30 697	32 029	30 692	31 061	38 691	39 837
TEUS ^d	41 741	44 236	38 528	42 709	44 621	41 719	42 222	52 939	55 295
Truck turnaround time - mins. ^e	37.8	29.2	28.6	32.8	34.2	28.3	28.6	32.5	41.4
Containers per truck ^e	1.6	1.6	1.6	1.6	1.6	1.5	1.5	1.6	1.6
Avg. container turnaround time - mins. ^e	23.5	18.6	18.4	21.1	21.3	18.6	18.8	20.9	26.1
TEUS per truck ^e	2.2	2.1	2.1	2.2	2.2	2.1	2.1	2.1	2.2
Rail									
Total containers	na	na	na	na	na	na	na	na	na
Number of VBS timeslots available									
Overall total	38 033	40 661	37 492	40 738	39 156	37 869	38 008	41 587	39 523
Monday- Friday									
Day (0700-1400)	22 891	24 239	22 297	23 869	23 491	22 324	22 355	24 542	23 523
Evening (1400-2200)	15 142	16 422	15 195	16 869	15 665	15 545	15 653	17 045	16 000
Night (2200 - 0700)	0	0	0	0	0	0	0	0	0
Sub total	38 033	40 661	37 492	40 738	39 156	37 869	38 008	41 587	39 523
Number of VBS timeslots used									
Overall total	30 786	31 601	25 081	27 541	28 797	27 400	27 490	33 891	34 232
Monday- Friday									
Day (0700-1400)	21 106	22 101	18 297	19 847	20 017	18 931	19 371	22 812	22 629
Evening (1400-2200)	9 680	9 500	6 785	7 694	8 780	8 469	8 119	11 079	11 603
Night (2200 - 0700)	0	0	0	0	0	0	0	0	0
Sub total	30 786	31 601	25 081	27 541	28 797	27 400	27 490	33 891	34 232
Fremantle									
Road									
Total trucks	60 191	50 700	48 914	49 741	57 143	52 358	50 140	54 404	56 703
Total containers ^d	110 142	83 348	90 350	92 589	106 142	99 051	93 451	103 380	110 929
TEUS ^d	159 047	117 657	128 190	134 866	154 550	144 075	134 355	151 925	163 895
Truck turnaround time - mins. ^e	29.6	28.7	30.5	28.3	30.7	29.2	31.9	37.3	34.6
Containers per truck ^e	1.8	1.6	1.8	1.9	1.9	1.9	1.9	1.9	2.0
Avg. container turnaround time - mins. ^e	18.3	17.5	18.4	17.2	19.1	18.2	19.7	23.1	21.1
TEUS per truck ^e	2.3	2.3	2.3	2.4	2.3	2.3	2.3	2.4	2.4
Rail									
Total containers	na	na	na	na	na	na	na	na	na
Number of VBS timeslots available									
Overall total	87 336	83 778	83 012	84 837	86 944	84 318	86 682	92 521	97 572
Monday- Friday									
Day (0600-1800)	64 228	61 987	61 558	64 047	66 769	66 093	64 613	66 881	68 317
Evening (1800-2400)	21 437	21 445	21 115	18 892	17 279	17 253	19 877	22 122	23 251
Night (2400 - 0600)	170	5	0	1 414	1 003	336	1 104	2 016	3 360
Sub total	85 835	83 437	82 673	84 353	85 051	83 682	85 594	91 019	94 928
Saturday									
Day (0600-1800)	1 492	337	268	484	1 857	636	987	1 355	2 458
Evening (1800-2400)	4	2	0	0	0	0	0	0	0
Night (2400 - 0600)	0	0	0	0	0	0	0	0	0
Sub total	1 496	339	268	484	1 857	636	987	1 355	2 458
Sunday									
Day (0600-1800)	0	2	71	0	36	0	2	7	1
Evening (1800-2400)	0	0	0	0	0	0	34	82	94
Night (2400 - 0600)	5	0	0	0	0	0	65	58	91
Sub total	5	2	71	0	36	0	101	147	186
Number of VBS timeslots used									
Overall total	77 669	75 024	72 252	73 642	80 717	79 329	75 280	82 233	85 493
Monday- Friday									
Day (0600-1800)	60 584	59 345	59 402	61 700	64 952	64 495	59 336	62 700	64 264
Evening (1800-2400)	15 879	15 369	12 514	11 757	14 611	14 311	15 039	18 231	18 617
Night (2400 - 0600)	0	0	0	0	0	0	0	0	0
Sub total	76 462	74 714	71 915	73 457	79 563	78 806	74 375	80 931	82 882
Saturday									
Day (0600-1800)	1 207	308	267	185	1 118	523	870	1 213	2 425
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	1 207	308	267	185	1 118	523	870	1 213	2 425
Sunday									
Day (0600-1800)	0	2	70	0	36	0	2	7	55
Evening (1800-2400)	0	0	0	0	0	0	33	82	131
Night (2400 - 0600)	0	0	0	0	0	0	0	0	0
Sub total	0	2	70	0	36	0	35	89	186

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. Contains both VBS and bulk runs.

e. Based on VBS counts only.

Note1. 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.

2. 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.

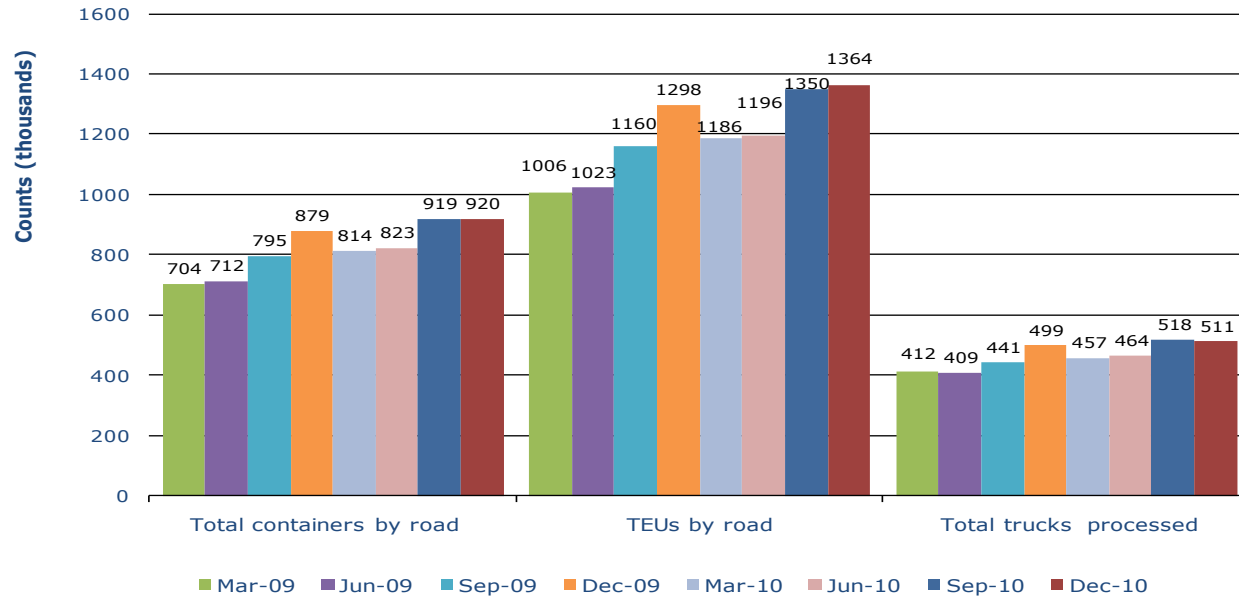
The only complete rail figures are for the Sydney, Port Botany Container Terminal which has an on-dock rail siding..

3. The concepts used in compiling these indicators are defined in the explanatory notes.

4. All terminals are open Monday - Friday. Only Adelaide is not open on Saturday or Sunday.

Sources: Patrick, DP World.

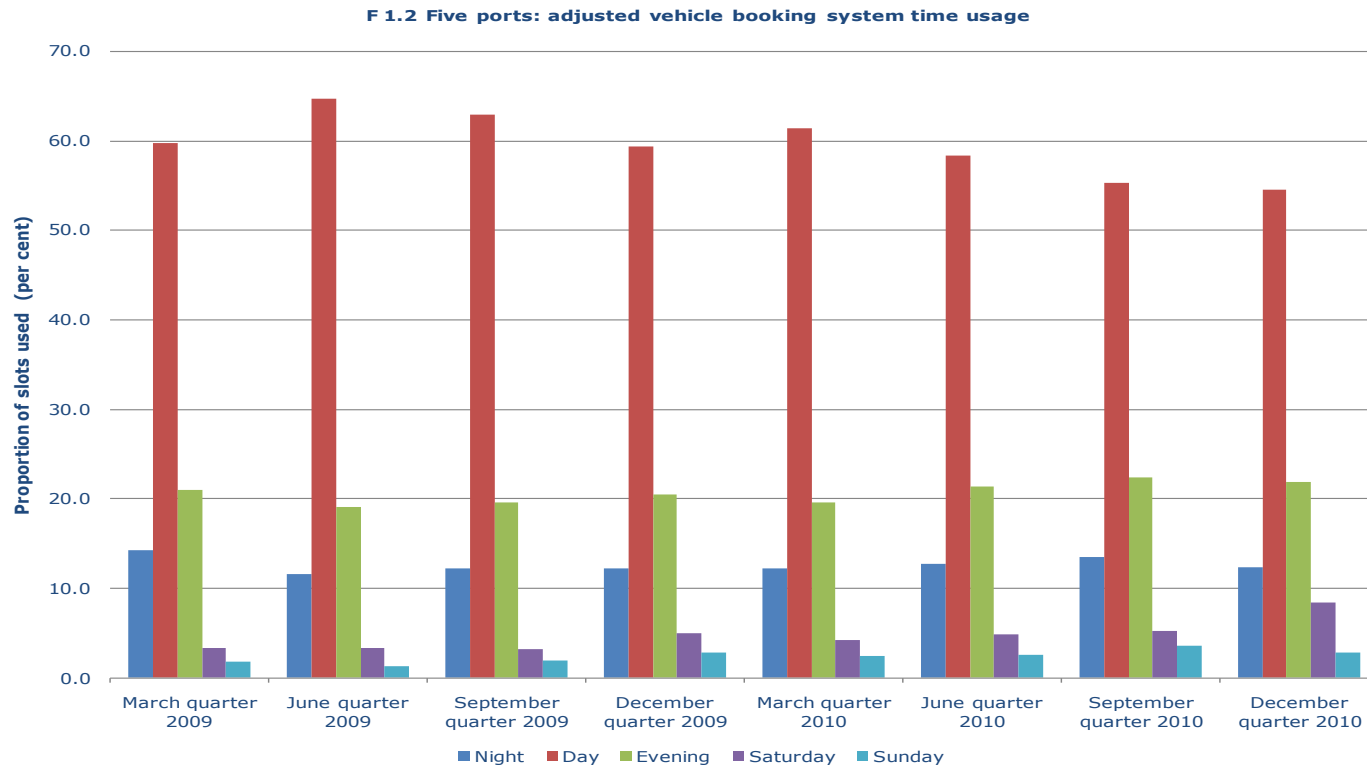
F 1.1 Five major ports landside of container terminal size of task indicators



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

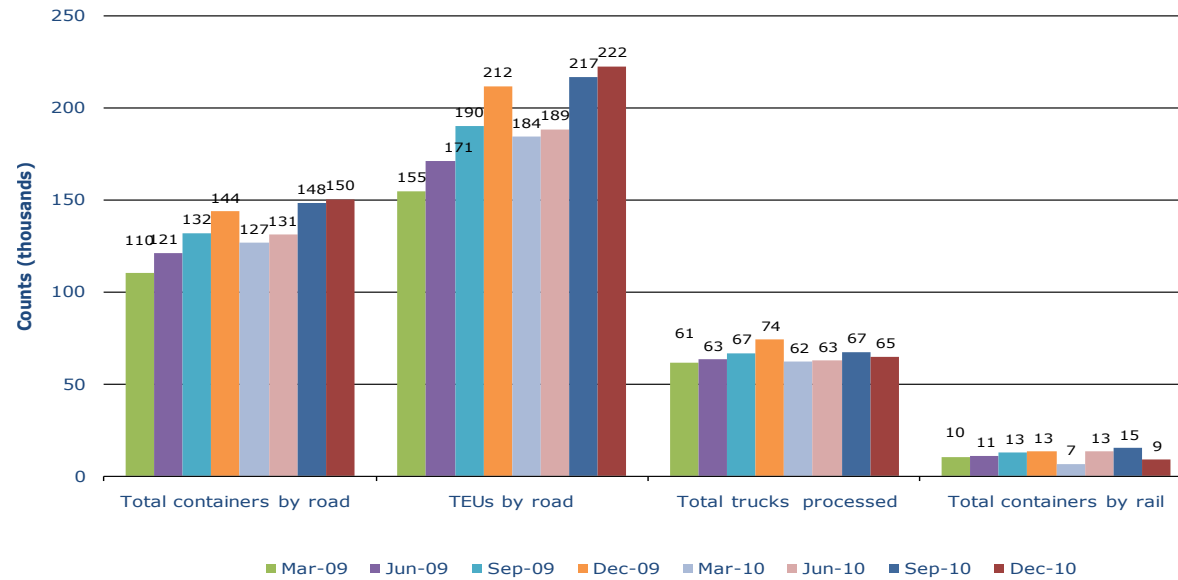
2. For Sydney BITRE estimates for Dec. quarter 2010 were used, as one of the stevedores landside data was not provided from the 7th Nov. to 31 Dec. 2010 due to computer problems.

Sources: Patrick and DP World.



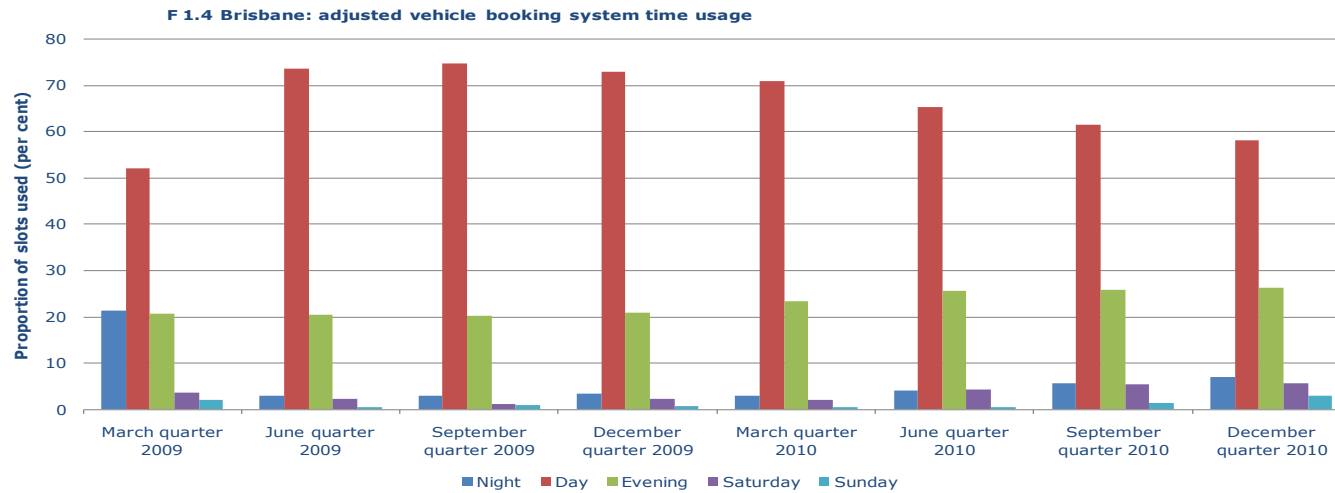
Note: 1.The definitions of the time windows are as follows: Night (2400--0600 Monday to Friday), Day (0600-1800 Monday to Friday) and Evening (1800-2400 Monday to Friday).
 2. For Sydney BITRE estimates for Dec. quarter 2010 were used, as one of the stevedores landside data was not provided from the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

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

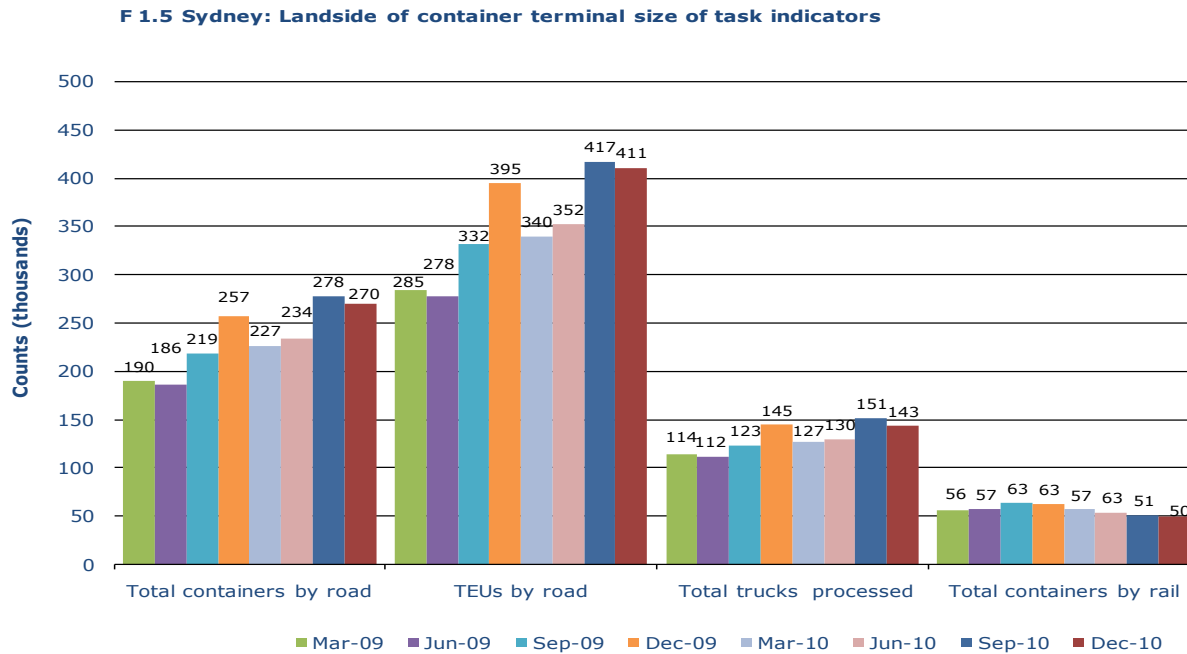


Note : 1. The counts of containers by road, TEUs by road and trucks processed include operations under the vehicle booking system and bulk runs.

Sources: Patrick and DP World.



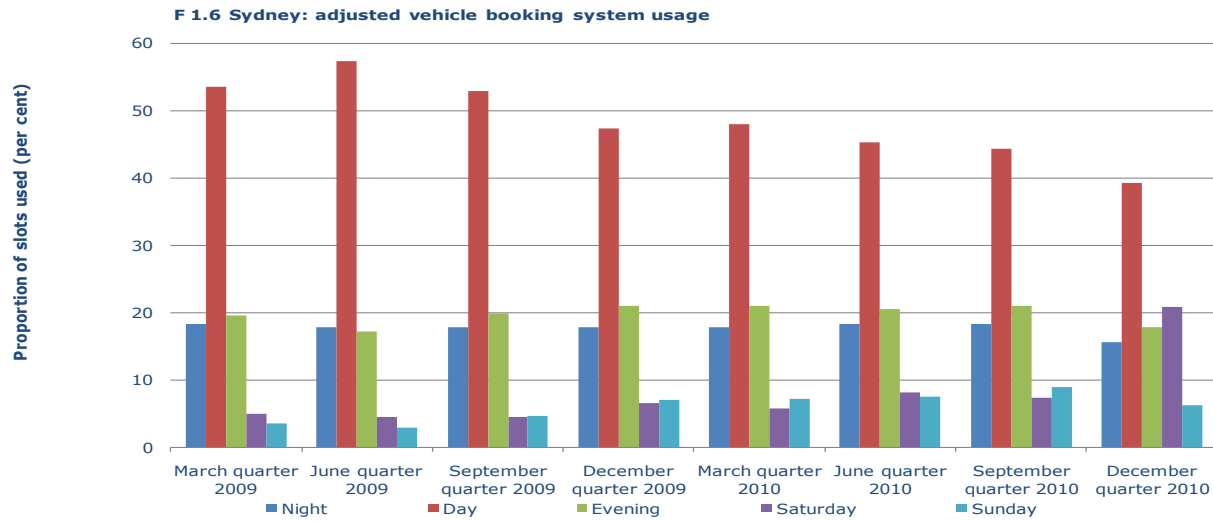
Note: The definitions of the time windows are as follows: Night (2400–0600 Monday to Friday), Day (0600–1800 Monday to Friday) and Evening (1800–2400 Monday to Friday).
 Sources: Patrick and DP World.



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.

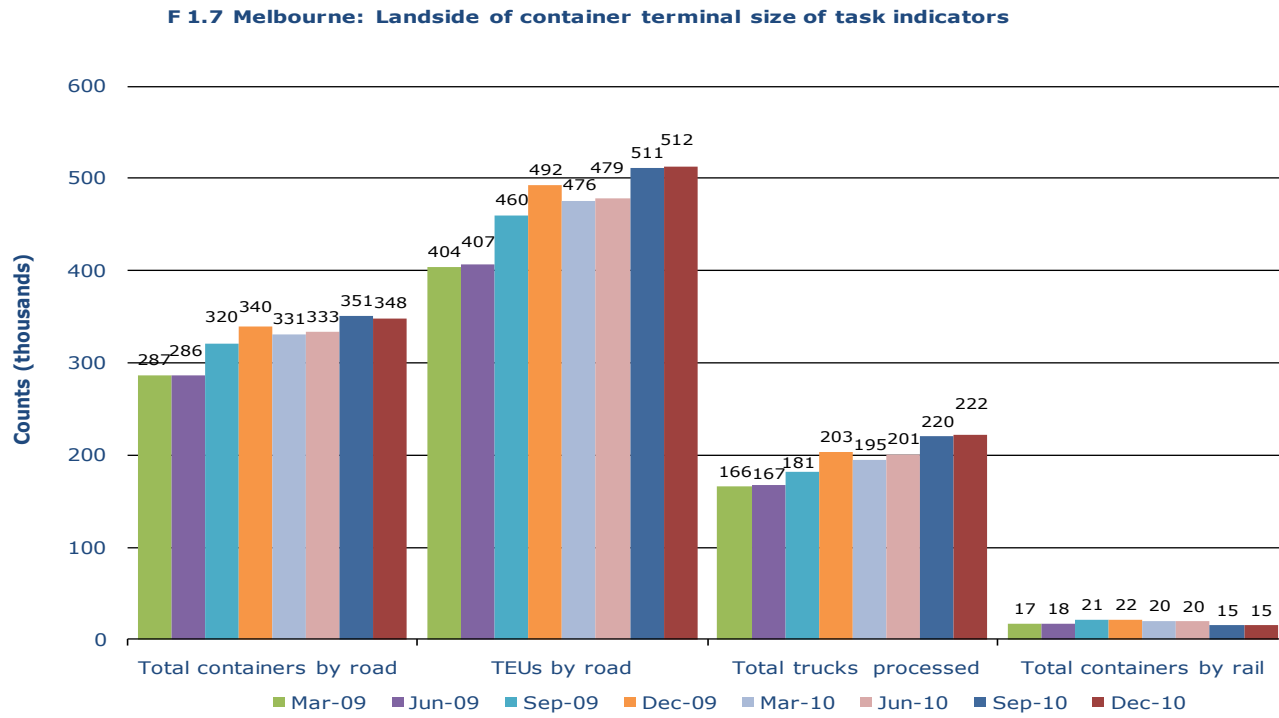
Sources: Patrick and DP World.



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).

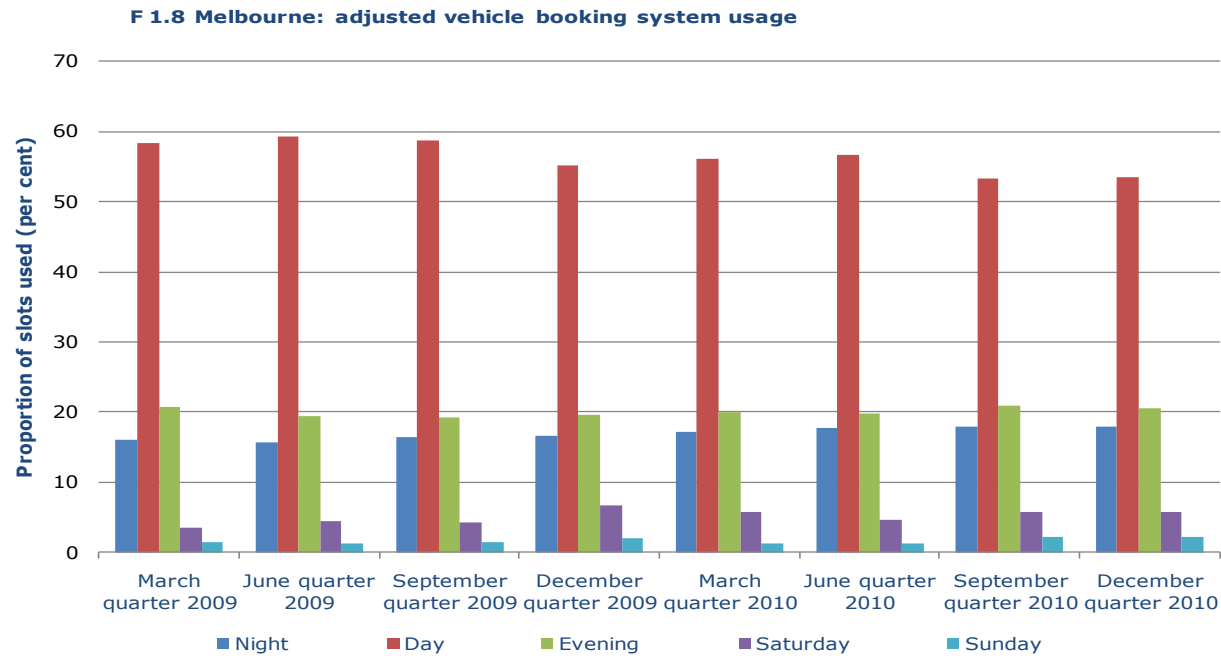
2. For Sydney BITRE estimates for Dec. quarter 2010 were used, as one of the stevedores landside data was not provided from the 7th Nov. to 31 Dec. 2010 due to computer problems.

Sources: Patrick and DP World.



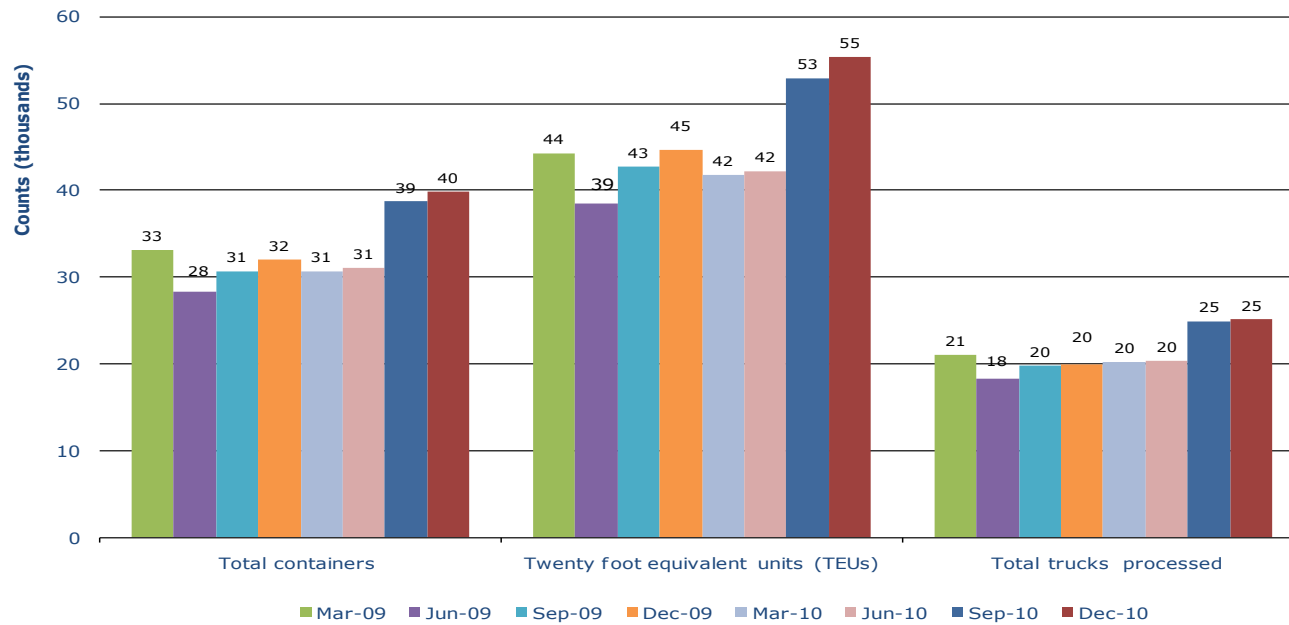
Note : The counts of containers by road, TEUs by road and trucks processed include operations under the vehicle booking system and bulk runs.

Sources: Patrick and DP World.



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.

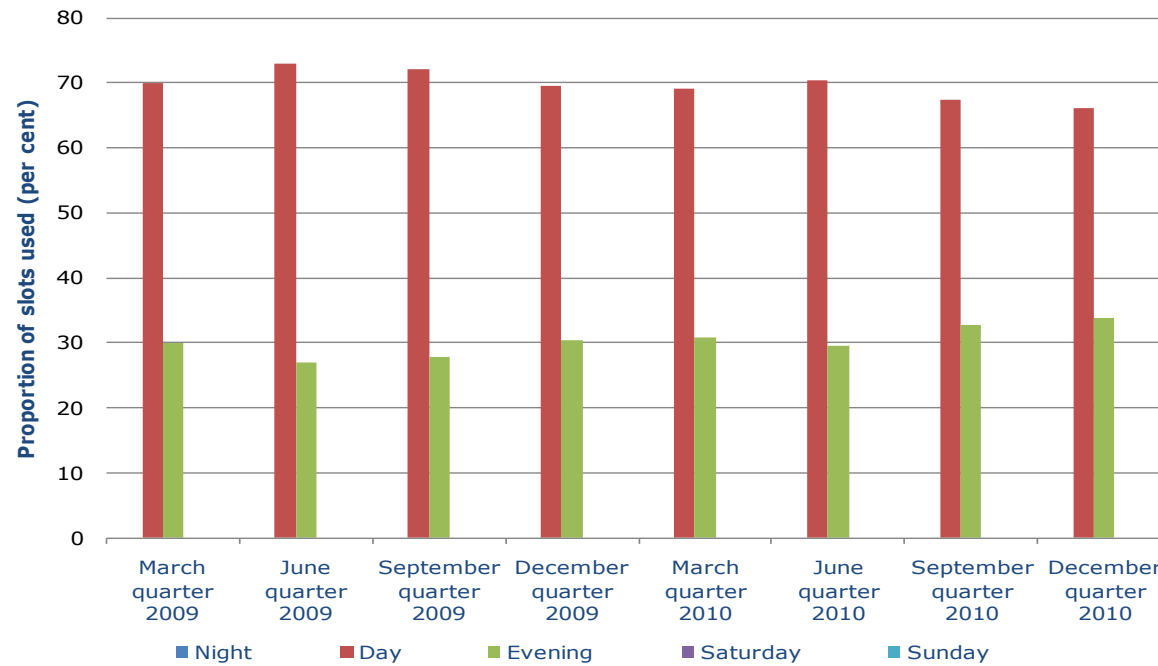
F 1.9 Adelaide: Landside of container terminal size of task indicators



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.

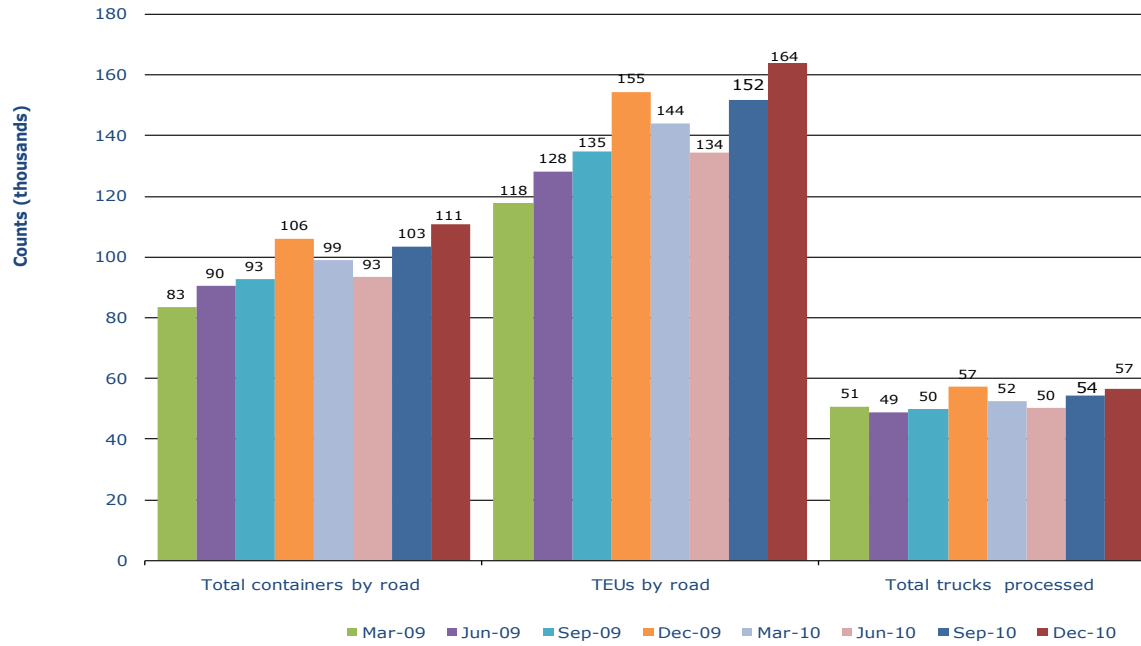
F 1.10 Adelaide: adjusted vehicle booking system usage



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

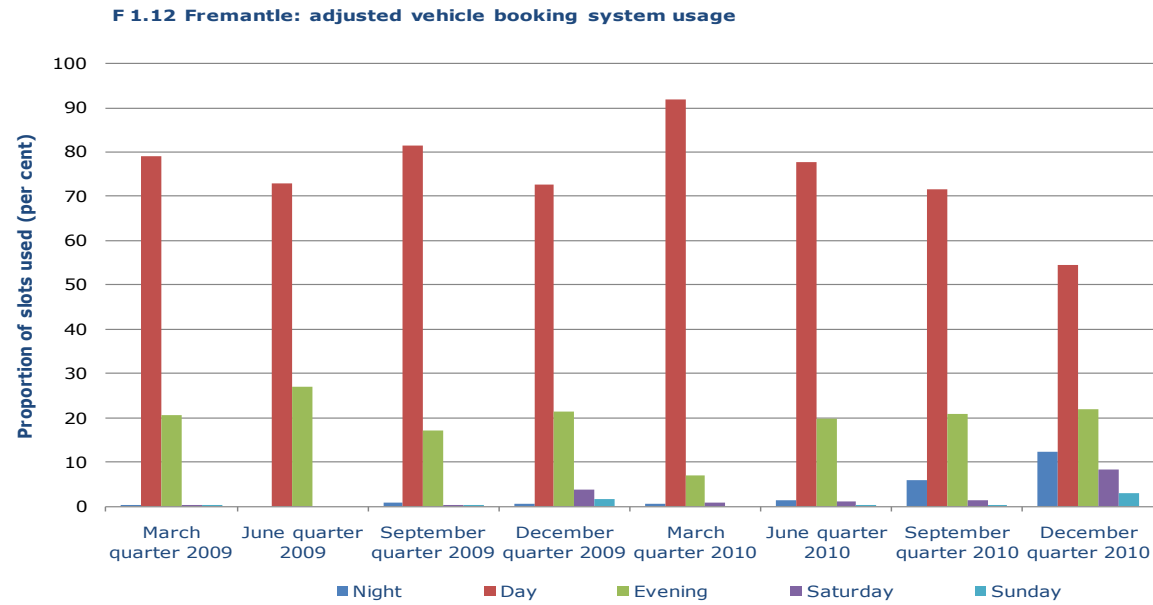
Sources: Patrick and DP World.

F 1.11 Fremantle: Landside of container terminal size of task indicators



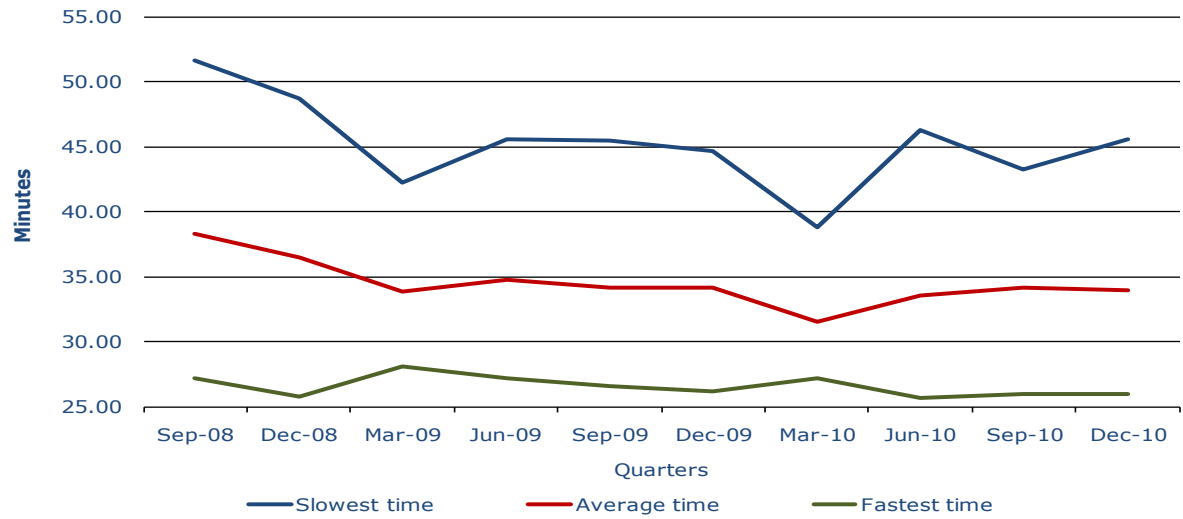
Note : The counts of containers by road, TEUs by road and trucks processed include operations under the vehicle booking system and bulk runs.

Sources: Patrick and DP World.

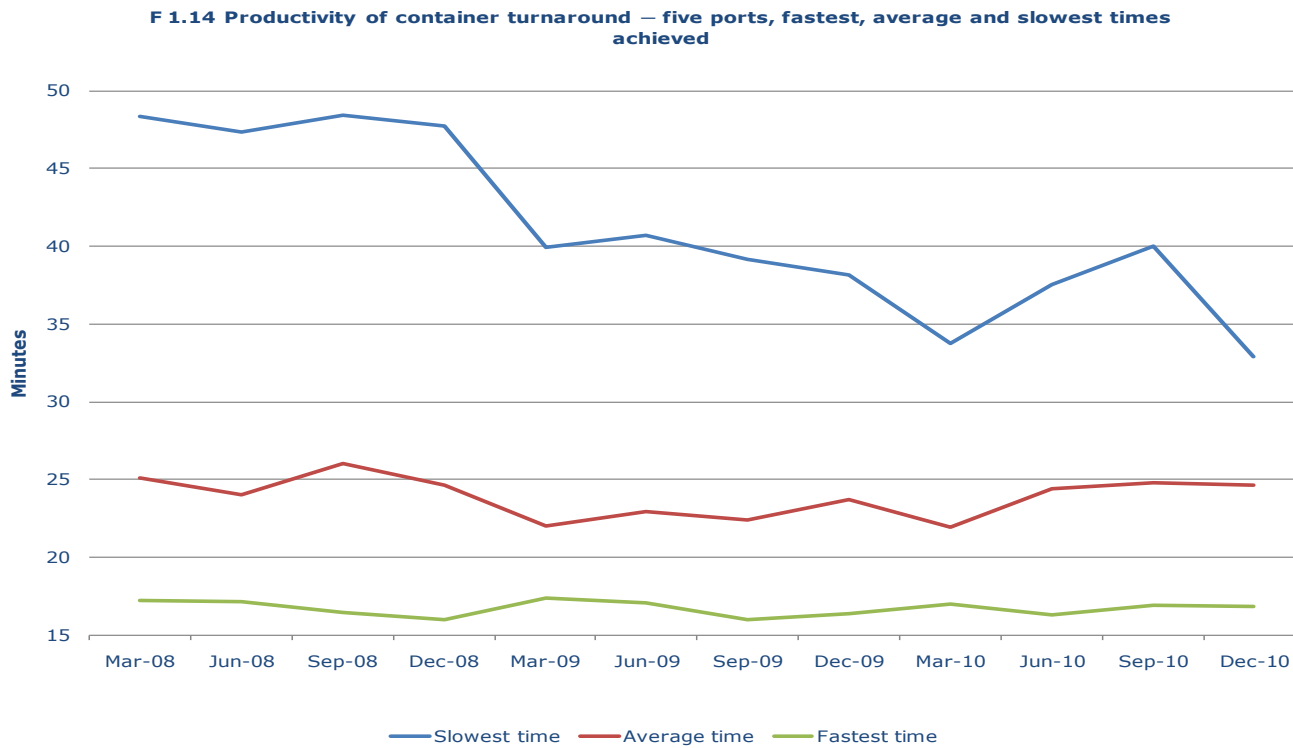


Note: The definitions of the time windows are as follows: Night (2400–0600 Monday to Friday), Day (0600–1800 Monday to Friday) and Evening (1800–2400 Monday to Friday).
 Sources: Patrick and DP World.

F 1.13 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.



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.

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.

T2.1 Container terminal performance indicators: productivity in containers per hour

Port / Indicator	Dec-07	Mar-08	Jun-08	Sep-08	Dec-08	Mar-09	Jun-09	Sep-09	Dec-09	Mar-10	Jun-10	Sep-10	Dec-10
Five ports													
Ships handled	1 138	1 107	1 156	1 156	1073	927	925	932	940	878	880	971	1003
Total containers	1 027 779	949 324	977 870	1 043 867	1 036 375	833 663	853 558	933 578	1 037 498	933 580	958 584	1048 214	1061 560
Crane rate	27.2	27.3	27.5	27.5	27.5	28.9	29.8	29.9	29.5	29.0	28.7	29.1	29.4
Vessel working rate	38.4	39.8	39.1	38.6	40.7	38.9	39.4	41.7	42.2	42.2	40.6	41.7	41.8
Crane time not worked (per cent)	20	19.3	19.8	20.8	18.1	19.9	18.9	20.2	19.8	18.9	19.5	19.9	20.4
40-foot containers (per cent)	44	42.9	42.7	44.7	44.8	43.7	42.0	46.2	47.9	46.0	45.3	46.6	46.7
Ship rate	48.0	49.3	48.7	48.8	49.6	48.6	48.5	52.2	52.6	52.0	50.4	52.1	52.5
Throughput pbm	144	133	137	146	145	117	120	131	145	131	134	147	149
Brisbane													
Ships handled	254	248	255	243	231	199	191	188	202	182	181	214	208
Total containers	177 766	153 170	162 475	172 604	171 674	138 155	137 896	152 392	168 978	141 210	155 133	169 162	172 728
Crane rate	24.5	22.8	23.1	25.2	23.8	26.0	26.9	27.2	27.6	27.3	28.8	30.9	31.8
Vessel working rate	30.1	29.6	28.5	32.5	31.4	30.8	30.8	33.3	34.7	35.6	38.7	38.5	39.8
Crane time not worked (per cent)	21	21.0	21.3	20.0	17.6	18.9	21.2	22.5	22.5	21.8	18.8	19.6	19.1
40-foot containers (per cent)	46	44.6	43.1	44.5	44.6	43.1	43.4	47.1	49.5	47.3	44.6	46.1	40.4
Stevedoring variability (per cent)	47	53.6	46.1	39.5	46.3	44.8	50.2	33.9	37.1	36.1	36.5	42.0	37.0
Ship rate	37.9	37.5	36.3	40.6	38.1	38.0	39.1	42.9	44.7	45.5	47.7	47.9	49.2
Throughput pbm	111	95	101	107	107	86	86	95	105	88	97	105	107
Sydney													
Ships handled	342	321	343	351	321	274	275	276	279	257	255	286	280
Total containers	327 858	302 223	308 660	342 522	346 663	277 606	283 416	315 905	361 971	314 600	327 800	362 560	345 408
Crane rate	25.8	27.1	27.2	26.7	27.0	29.1	29.9	29.9	28.2	27.4	26.2	27.1	27.0
Vessel working rate	37.6	39.8	39.7	35.7	38.3	37.4	37.7	39.3	38.8	38.2	34.1	38.5	39.4
Crane time not worked (per cent)	22	22.1	22.8	26.1	22.0	22.8	21.2	21.8	20.5	20.2	22.9	20.5	20.8
40-foot containers (per cent)	47	45.5	45.4	46.4	46.6	45.7	44.0	47.3	49.7	47.2	47.3	47.8	48.0
Stevedoring variability (per cent)	43	49.2	47.6	50.4	56.7	46.1	47.2	46.0	49.3	38.5	43.9	49.5	28.7
Ship rate	48.5	51.2	51.4	48.4	49.1	48.5	47.9	50.3	48.9	47.9	44.2	48.5	49.8
Throughput pbm	169	156	159	176	179	143	146	163	186	162	169	187	178
Melbourne													
Ships handled	331	326	346	353	316	268	266	274	275	253	253	285	300
Total containers	361 085	332 443	340 140	363 079	355 915	280 218	293 258	321 229	348 091	329 944	332 501	359 440	378 290
Crane rate	29.3	28.9	29.4	29.6	30.1	30.3	31.4	31.9	32.0	32.1	31.9	31.3	31.2
Vessel working rate	45.6	46.6	45.7	47.0	50.8	46.8	49.2	52.4	52.8	52.1	51.4	50.5	47.2
Crane time not worked (per cent)	17.3	15.7	17.4	16.8	15.1	17.0	15.2	17.1	16.9	16.4	16.8	18.5	19.0
40-foot containers (per cent)	43.0	43.4	43.6	45.8	45.1	44.7	40.7	46.3	47.8	45.6	45.3	46.8	49.1
Stevedoring variability (per cent)	51.0	54.9	40.5	60.9	44.3	52.5	41.3	39.0	42.7	45.1	47.2	49.2	50.1
Ship rate	55.2	55.3	55.3	56.5	59.8	56.4	58.0	63.2	63.5	62.3	61.7	61.9	58.2
Throughput pbm	198	182.1	186.3	198.8	194.9	153.5	160.6	175.9	190.6	180.7	182.1	196.8	207.2

T2.1 Container terminal performance indicators: productivity in containers per hour continued...

Port / Indicator	Dec-07	Mar-08	Jun-08	Sep-08	Dec-08	Mar-09	Jun-09	Sep-09	Dec-09	Mar-10	Jun-10	Sep-10	Dec-10
Adelaide													
Ships handled	82	84	77	68	67	56	60	59	59	58	59	59	71
Total containers	53 486	54 357	59 584	56 250	54 905	43 294	49 912	51 500	53 632	50 824	50 352	53 405	55 304
Crane rate	29.7	29.6	29.6	29.3	26.5	27.8	26.9	25.2	26.4	25.7	25.4	27.6	27.5
Vessel working rate	29.8	35.7	40.4	40.0	32.3	35.1	31.8	33.3	35.2	38.4	34.1	37.8	35.8
Crane time not worked (per cent)	10	14.2	9.3	9.6	9.4	11.1	7.6	14.2	15.8	11.1	10.7	12.4	14.7
40-foot containers (per cent)	32	30.7	31.6	32.6	32.8	33.7	35.0	37.4	36.0	36.2	37.3	37.1	39.2
Stevedoring variability (per cent)	na	na	na	na	na	na	na	na	na	na	na	na	na
Ship rate	33.1	41.6	44.5	44.2	35.7	39.5	34.4	38.8	41.8	43.2	38.2	43.2	42.0
Throughput pbm	114	116	127	120	117	92	106	110	114	108	107	114	118
Fremantle													
Ships handled	129	128	135	141	138	130	133	135	125	128	132	127	144
Total containers	107 584	107 131	107 011	109 412	107 218	94 390	89 076	92 552	104 826	97 002	92 798	103 647	109 830
Crane rate	28.0	28.3	27.8	26.2	26.7	29.1	29.9	29.8	30.3	27.6	27.5	26.5	27.9
Vessel working rate	34.9	34.9	31.3	29.2	33.6	33.7	29.7	31.3	34.4	32.9	31.9	29.6	36.8
Crane time not worked (per cent)	25	24.1	24.1	26.7	22.1	26.0	28.6	28.3	27.9	25.6	26.5	29.1	28.7
40-foot containers (per cent)	41	38.0	37.7	42.2	44.0	40.1	41.9	45.8	45.7	46.7	44.2	47.3	47.9
Stevedoring variability (per cent)	63	56.3	46.8	66.7	53.6	55.2	46.7	38.7	43.4	47.0	41.7	42.0	36.1
Ship rate	46.8	46.0	41.2	39.8	43.1	45.5	41.6	43.6	47.8	44.2	43.4	41.8	51.6
Throughput pbm	83	83.0	82.9	84.7	83.0	73.1	69.0	71.7	81.2	75.1	71.9	80.3	85.0

na not available
r revised
pbm per berth metre

- Notes
1. The definitions used in compiling the stevedoring productivity data are detailed in explanatory notes at the end of the journal.
 2. The data in this table are expressed in container moves per hour and therefore are not directly comparable with the 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.

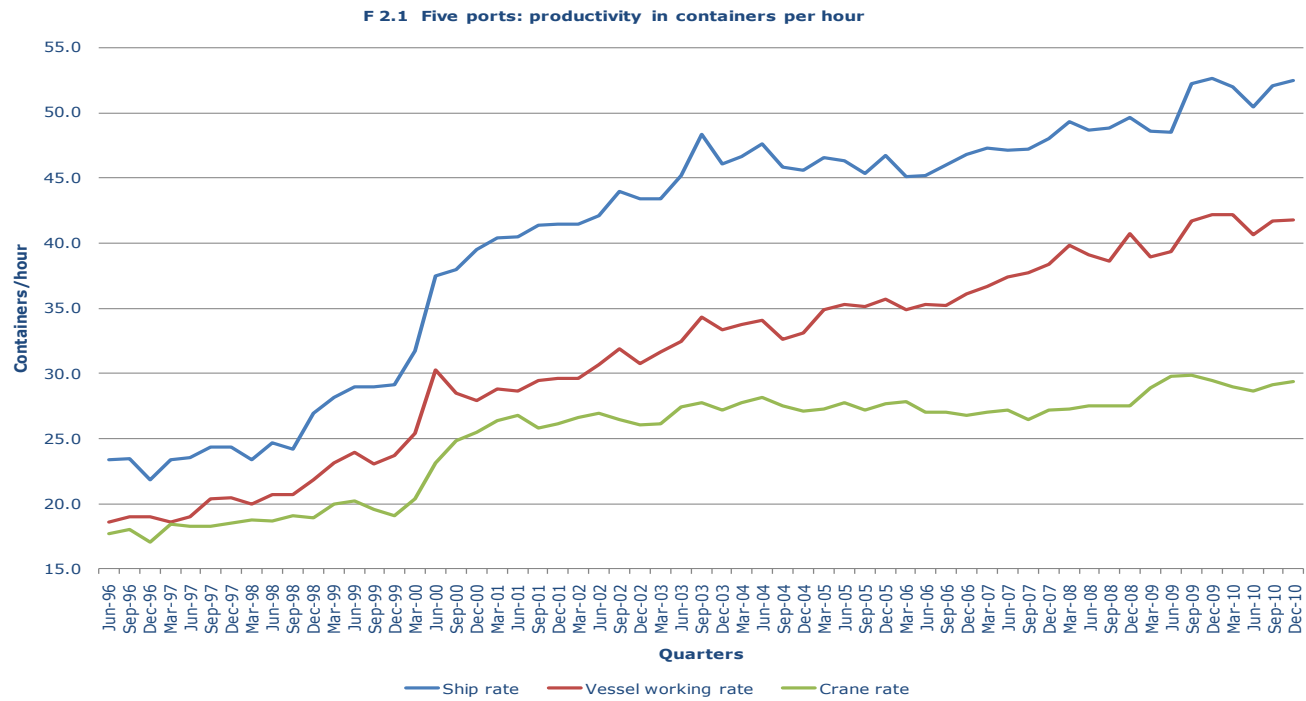
T2.2 Container terminal performance indicators - productivity in teus per hour

Port / Indicator	Dec-07	Mar-08	Jun-08	Sep-08	Dec-08	Mar-09	Jun-09	Sep-09	Dec-09	Mar-10	Jun-10	Sep-10	Dec-10
Five Ports													
Ships handled	1 138	1 107	1 156	1 156	1 073	0 927	0 925	932	940	878	880	971	1003
Total teus	1 479 205	1 356 859	1 395 650	1 510 291	1 500 175	1 197 845	1 212 340	1 364 981	1 534 762	1 363 332	1 393 150	1 536 512	1 556 991
Crane rate	39.1	39.0	39.2	39.9	39.8	41.4	42.7	43.7	43.8	42.3	41.6	42.7	43.2
Vessel working rate	55.3	57.0	55.9	56.0	59.0	56.0	55.9	61.0	62.5	61.6	59.1	61.2	62.0
Ship rate	69.2	70.6	69.8	70.8	72.1	69.6	69.6	76.4	78.2	76.0	73.4	76.4	77.3
Brisbane													
Ships handled	254	248	255	243	231	199	191	188	202	182	181	214	208
Total teus	258 726	221 515	232 442	249 372	248 183	197 645	197 793	224 152	252 673	208 060	224 323	247 098	242 492
Crane rate	35.6	32.9	32.9	36.4	34.5	37.2	38.4	39.8	41.0	40.2	41.6	45.2	44.9
Vessel working rate	43.7	42.8	40.7	46.9	45.5	44.0	44.1	48.9	51.8	52.6	55.9	56.2	59.1
Ship rate	55.2	54.3	51.8	58.7	55.1	54.5	55.8	62.9	66.8	67.3	69.0	70.0	69.8
Sydney													
Ships handled	342	321	343	351	321	274	275	276	279	257	255	286	280
Total teus	481 442	439 755	448 857	501 480	508 196	404 554	408 159	465 307	541 938	463 230	482 719	535 848	511 070
Crane rate	37.9	39.5	39.5	39.1	39.5	42.2	43.4	43.8	42.5	40.3	38.5	40.0	39.9
Vessel working rate	55.2	58.1	57.8	52.4	56.2	54.6	54.3	58.0	58.1	56.3	50.2	56.9	58.2
Ship rate	71.1	74.5	74.9	70.9	72.0	70.2	69.4	73.7	73.7	70.6	65.0	71.6	73.5
Melbourne													
Ships handled	331	326	346	353	316	268	266	274	275	253	253	285	300
Total teus	516 425	476 655	488 594	529 223	516 431	405 493	412 653	469 802	514 533	480 498	483 141	527 714	564 005
Crane rate	41.9	41.4	42.2	43.2	43.7	43.4	45.2	46.8	47.4	46.7	46.3	46.0	46.6
Vessel working rate	65.2	66.9	65.6	68.5	73.7	67.6	69.3	76.5	78.0	75.9	74.9	74.2	70.3
Ship rate	78.9	79.3	79.5	82.3	86.8	80.6	83.5	92.6	94.1	90.7	89.9	91.1	86.8
Adelaide													
Ships handled	82	84	77	68	67	56	60	59	59	58	59	59	71
Total teus	70 647	71 066	78 420	74 603	72 937	57 903	67 378	70 747	72 937	69 230	69 135	73 225	76 968
Crane rate	39.3	38.7	38.9	38.9	35.1	37.2	36.3	34.7	35.9	35.0	34.9	37.8	38.3
Vessel working rate	39.4	46.7	52.7	53.0	42.9	46.9	42.9	45.7	47.9	52.3	46.9	51.9	49.8
Ship rate	43.8	54.4	58.6	58.6	47.4	52.8	46.4	53.3	56.9	58.8	52.5	59.2	58.4
Fremantle													
Ships handled	129	128	135	141	138	130	133	135	125	128	132	127	144
Total teus	151 965	147 868	147 337	155 613	154 428	132 250	126 357	134 973	152 681	142 314	133 832	152 627	162 456
Crane rate	39.5	38.7	38.3	37.3	38.5	41.0	42.4	43.5	44.1	40.2	39.7	39.1	41.3
Vessel working rate	49.4	48.3	43.1	41.5	48.4	47.2	42.1	45.7	50.3	48.2	46.0	43.6	54.5
Ship rate	66.2	63.5	56.8	56.6	62.1	64.0	59.0	63.9	69.8	64.4	62.7	61.6	76.4

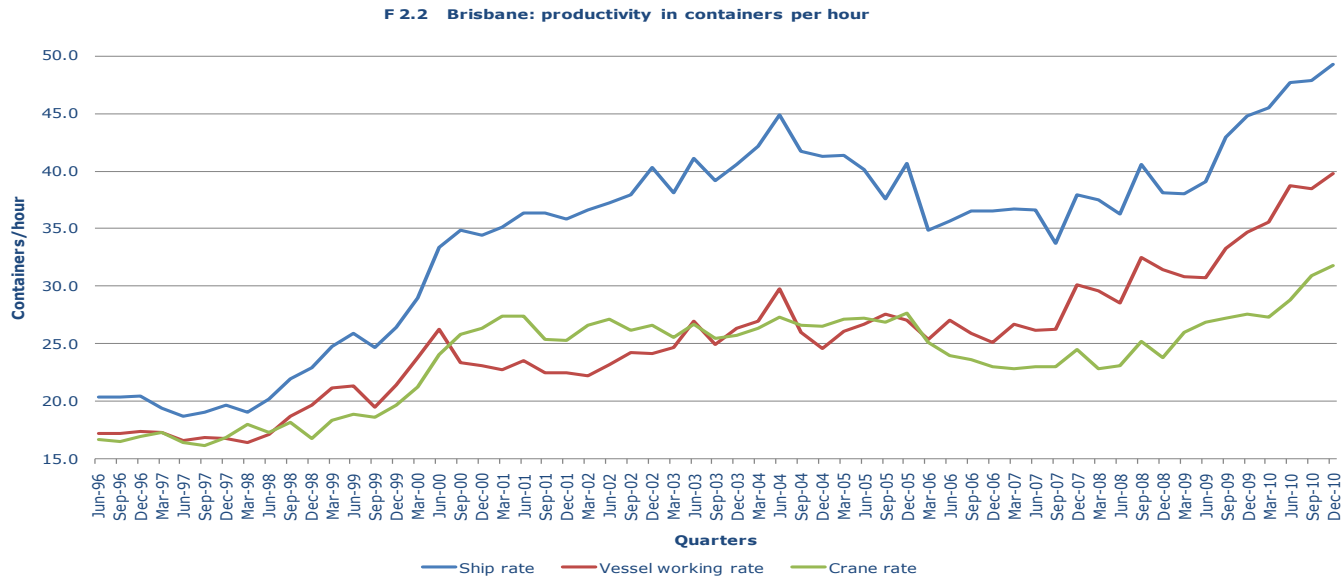
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Notes 1. Data from CSX World Terminals at Brisbane are incorporated from the December quarter 1999 onwards.

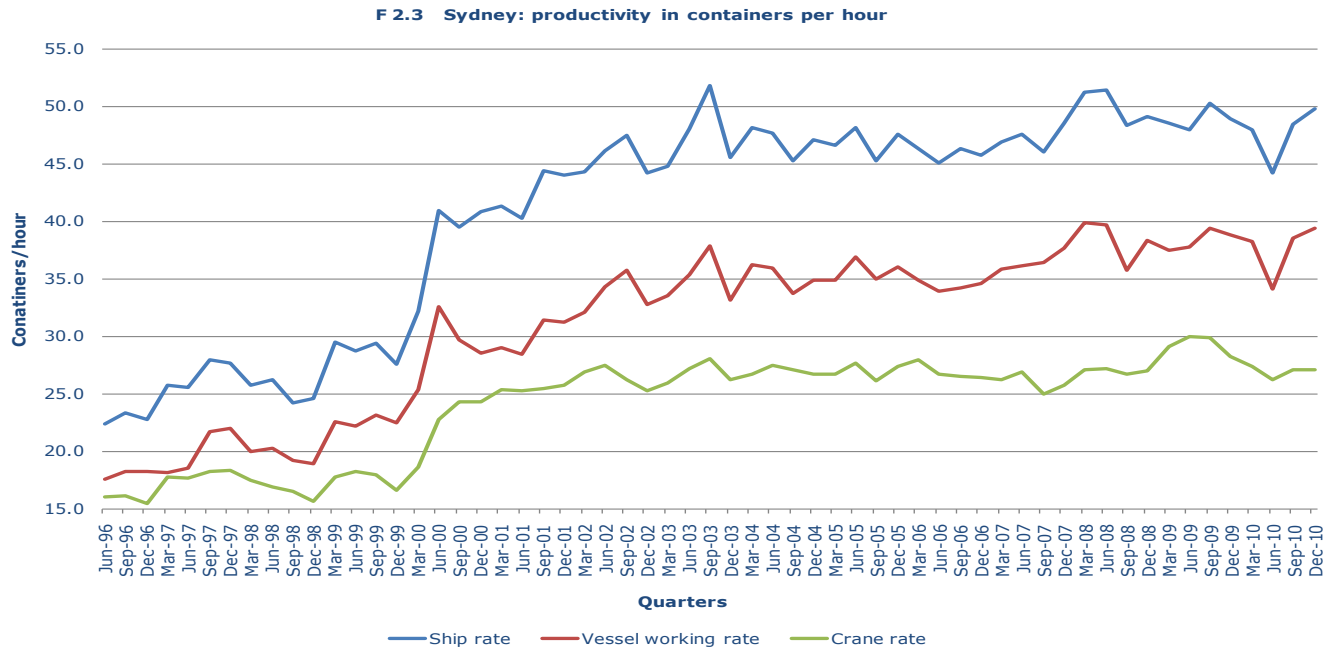
Sources Patrick, DP World.



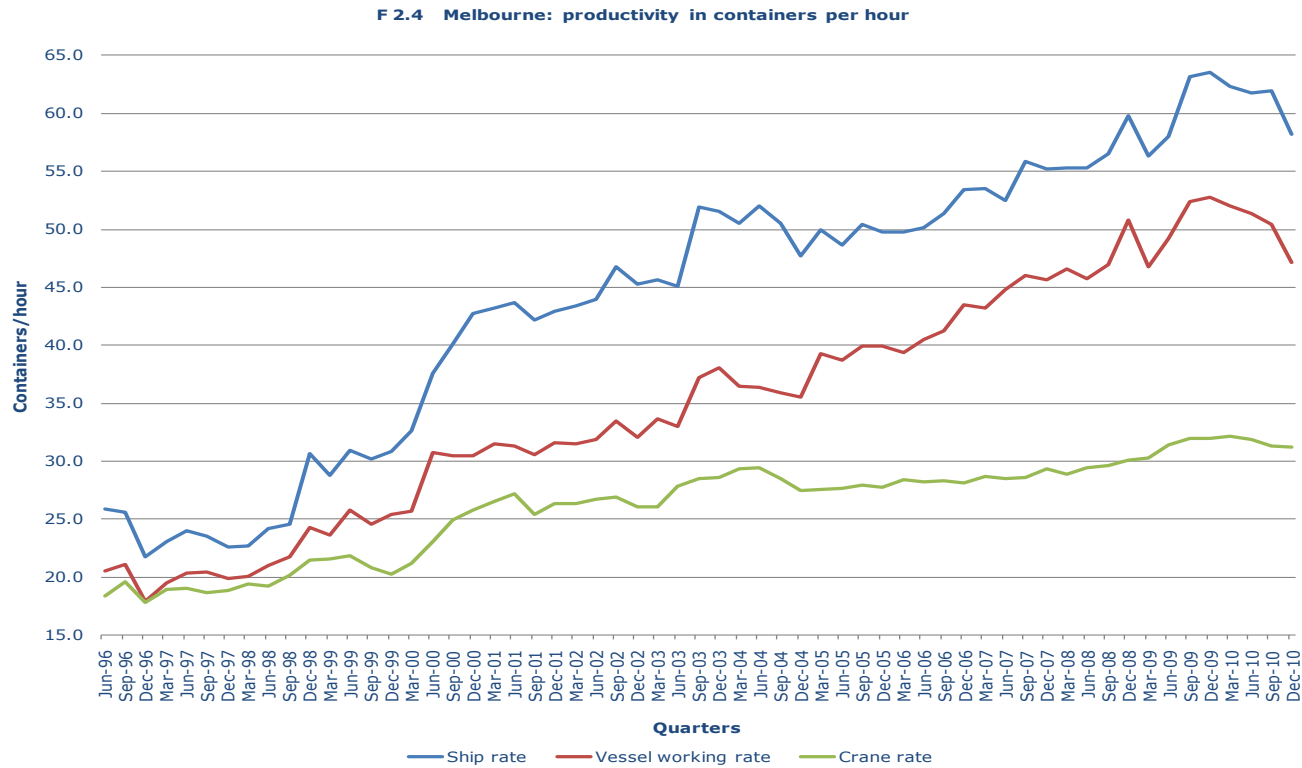
Note: These figures are based on data in Table 2.1. See explanatory notes for definition of terms.
Sources: Patrick and DP World.



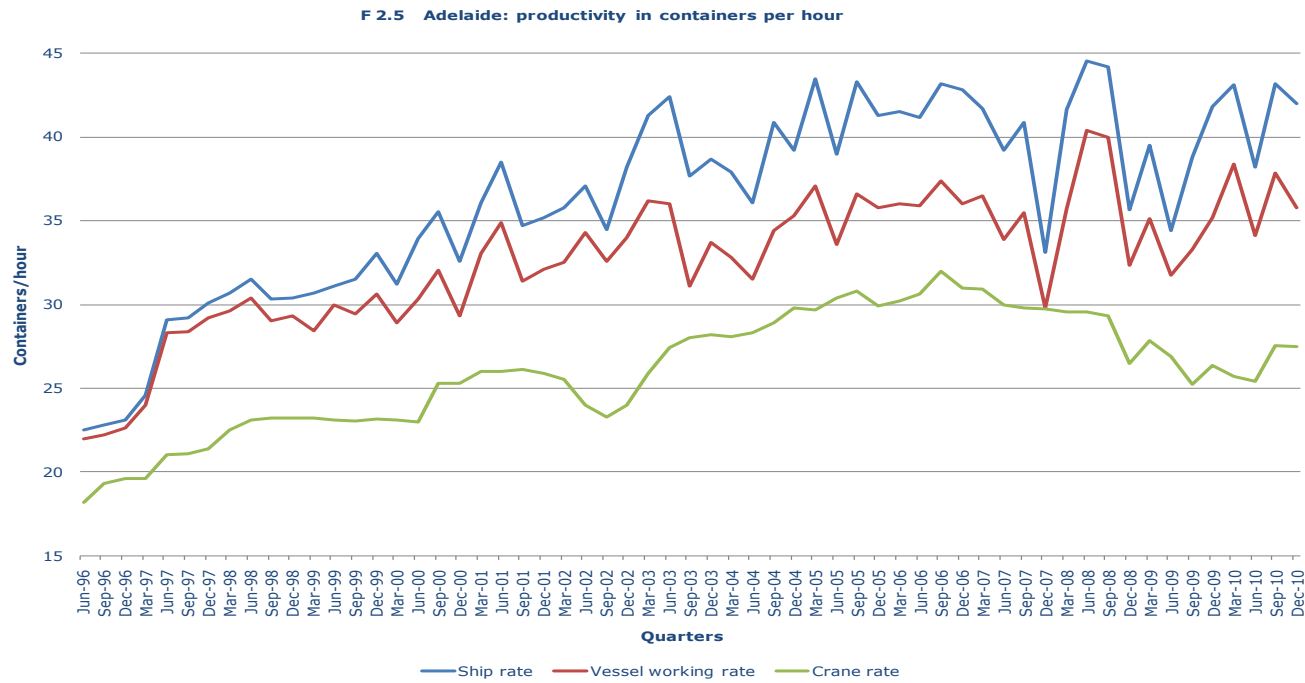
Note: These figures are based on data in Table 2.1. See explanatory notes for definition of terms.
 Sources: Patrick and DP World.



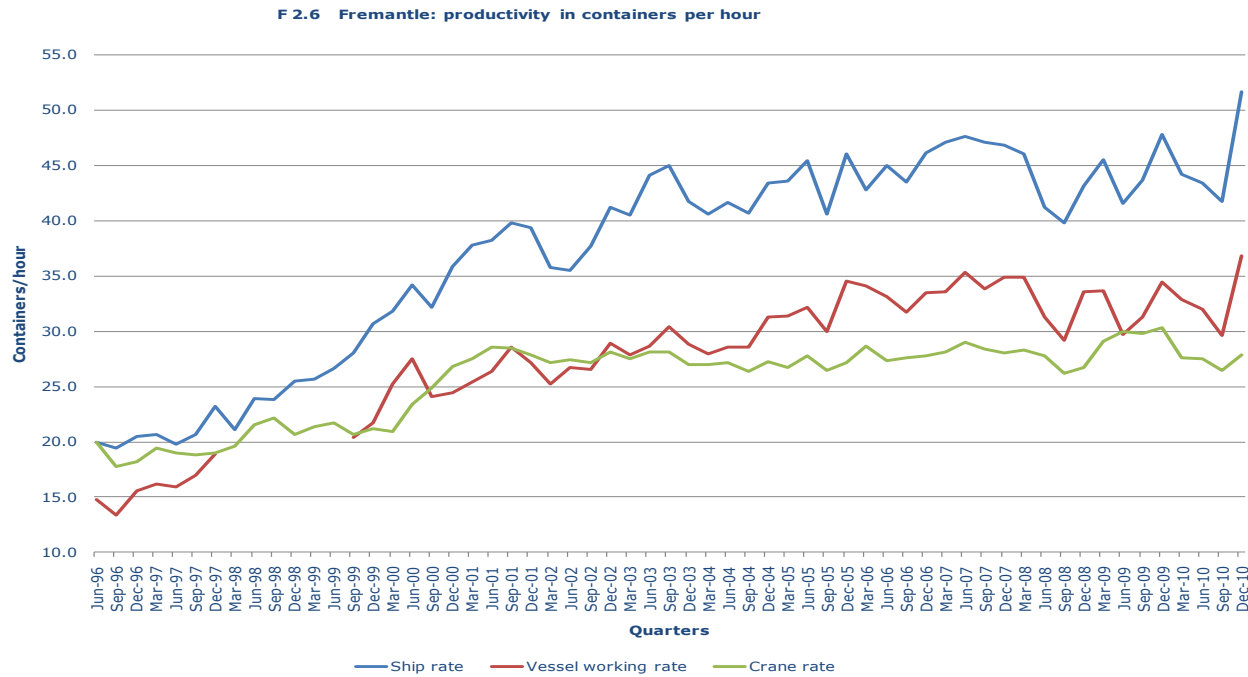
Note: These figures are based on data in Table 2.1. See explanatory notes for definition of terms.
 Sources: Patrick and DP World.



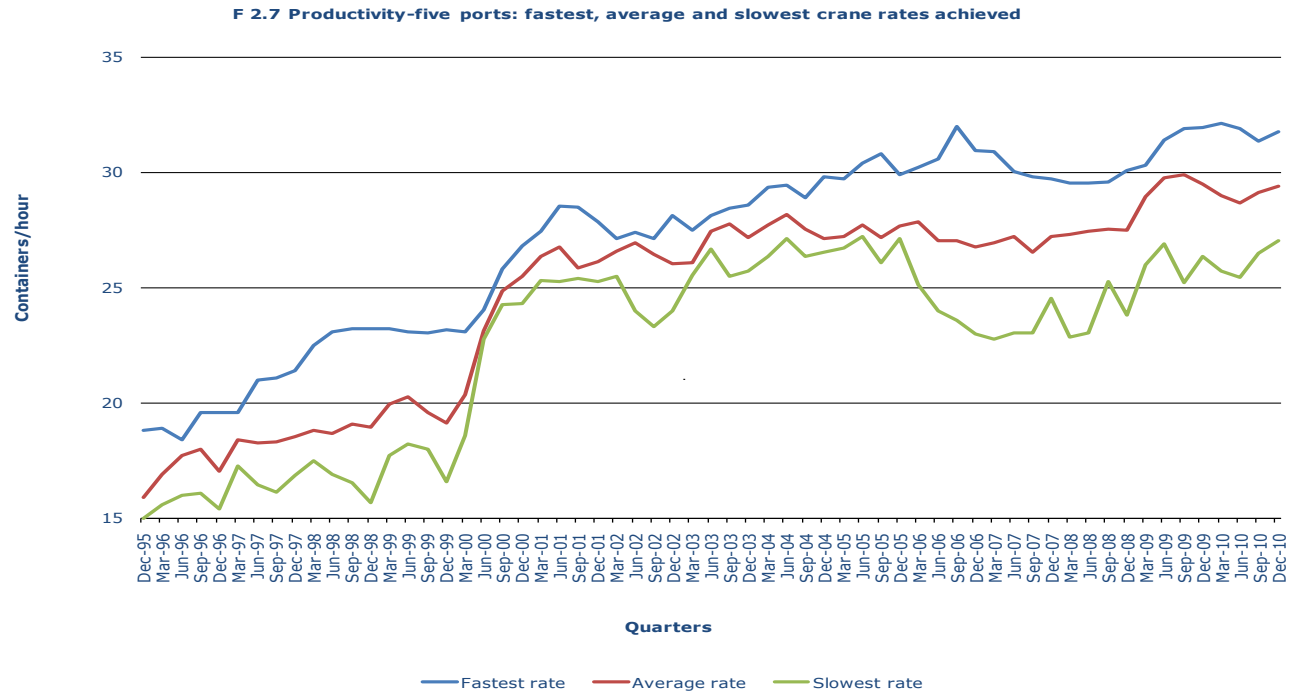
Note: These figures are based on data in Table 2.1. See explanatory notes for definition of terms.
Sources: Patrick and DP World.



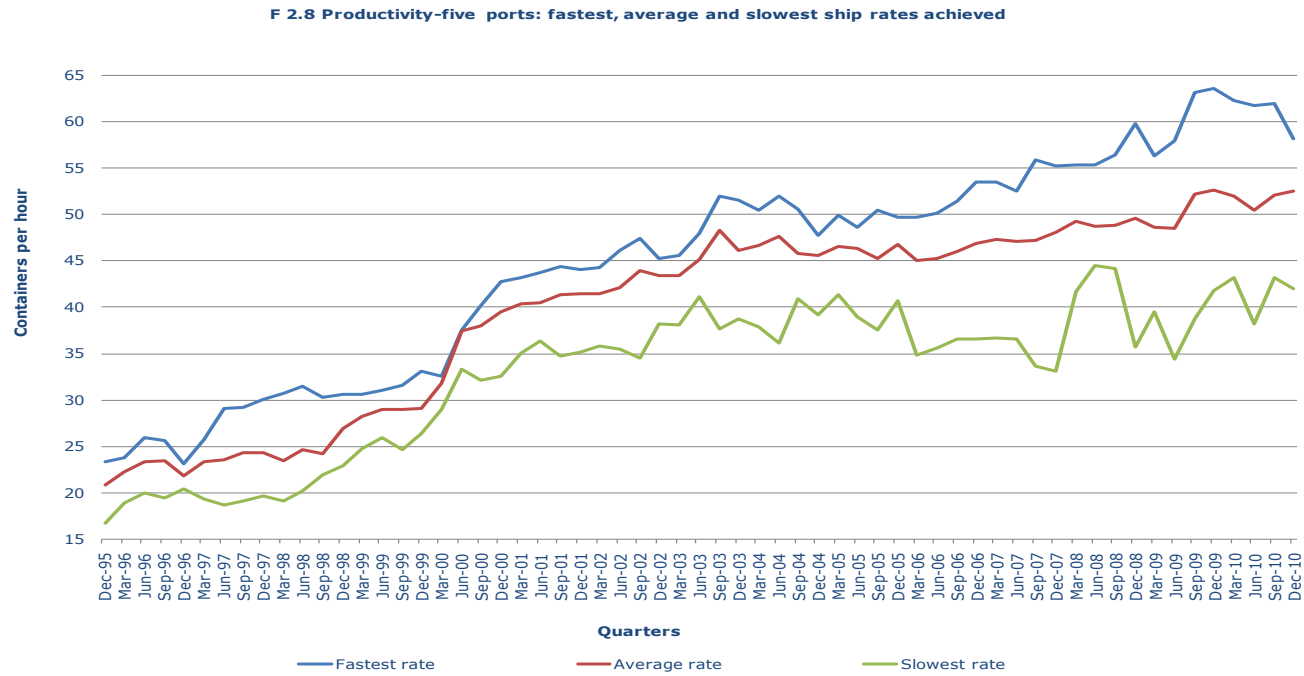
Note: These figures are based on data in Table 2.1. See explanatory notes for definition of terms.
 Sources: Patrick and DP World.



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



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



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 3.8. 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:

- 17 215 GT vessel represents all vessels of sizes ranging from 15 000 to 20 000
- 37 394 GT vessel represents all vessels of sizes ranging from 35 000 to 40 000.

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
- 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 3.3. Ship based charges are the charges vessel owners pay for a port visit by the vessel. Cargo based charges are the charges levied on the actual cargo of containers.

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

What PICI measures

The port interface cost index is a measure of shore-based shipping costs or charges for containers moved through mainland capital city ports. These are called 'shore-based' because they are that part of the charges paid by importers and exporters of containers which are directly related to the activity which occurs in the port and on the wharf. They do not include the total price for importing or exporting goods carried in containers paid by customers to customs brokers and freight forwarders.

The index is a measure of the movements in costs to users of waterfront and related services and, therefore, whether the cost is increasing or decreasing. The waterfront is defined as the interface between seaports and land transport, hence the term port interface cost index.

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

The Port Interface Cost Index provides estimates in the changes in five major cost elements by port for exports and imports. The five cost components covered are: (a) Ship based charges (b) Cargo-based charges (c) Stevedoring costs (d) Customs brokers' fees (e) road transport costs.

Data sources

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

TEUs

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

TEUs loaded

Twenty foot equivalent container units loaded with goods.

TEUs empty

Twenty foot equivalent empty containers.

TEUs loaded inwards

These are imported twenty foot equivalent containers.

TEUs loaded outwards

These are exported twenty foot equivalent containers.

Number of port calls

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

Elapsed berth time (hours)

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

Ship-based charges

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

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

Cargo-based charges

These include the following items:

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

Port Interface Costs

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

Stevedoring charges

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

Customs brokers' fees

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

Road transport charges

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

Individual port index

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

National Index

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

T3.1 Parameters used in the port interface cost indices

	<i>Brisbane</i>		<i>Sydney</i>		<i>Melbourne</i>		<i>Adelaide</i>		<i>Fremantle^c</i>	
	<i>Jan-June</i>	<i>Jul-Dec</i>	<i>Jan-June</i>	<i>Jul-Dec</i>	<i>Jan-June</i>	<i>Jul-Dec</i>	<i>Jan-June</i>	<i>Jul-Dec</i>	<i>Jan-June</i>	<i>Jul-Dec</i>
	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010
Vessel size GT 17 215										
Average Teus exchanged ^a										
All	699	0	998	0	1 130	0	967	1 099	1 785	4 554
Loaded	412	0	778	0	1 003	0	556	718	1 487	3 404
Empty	287	0	219	0	127	0	410	380	299	1 150
Loaded inwards	219	0	509	0	587	0	206	261	740	1 872
Loaded outwards	193	0	269	0	416	0	351	457	747	1 532
Ship call parameters ^a										
Number of port calls	3	0	6	0	5	0	2	4	8	4
Elapsed berth time (hrs)	19	0	36	0	25	0	27	26	35	38
Vessel size GT 37 394										
Average Teus exchanged ^b										
All	1 271	1 287	2 148	2 028	2 139	1 996	1 101	1 195	925	1 898
Loaded	968	951	1 488	1 358	1 753	1 581	903	952	698	1 467
Empty	303	336	660	670	387	415	198	243	227	432
Loaded inwards	620	614	1 090	1 039	980	953	408	514	445	902
Loaded outwards	348	337	398	319	773	628	495	438	254	564
Ship call parameters ^b										
Number of port calls	2	1	3	3	3	3	3	2	2	2
Elapsed berth time (hrs)	29	26	48	44	33	31	24	26	26	31

na not available

a. Mean value for ships between 15 000 and 20 000 GT. In September and December quarters no ships in this category called in ports of Brisbane, Sydney and Melbourne.

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

c. The estimates for Fremantle for 17 215 GT category are based on small number of vessels (4) which are the only ones reported to have visited the port terminal but which exchanged above average number of containers for this category of vessels.

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

T3.2 Port and related charges for ships in the 15 000–20 000 GT, range

	<i>Brisbane</i>		<i>Sydney</i>		<i>Melbourne</i>		<i>Adelaide</i>		<i>Fremantle^f</i>	
	<i>Jan-Jun</i>	<i>Jul-Dec</i>	<i>Jan-Jun</i>	<i>Jul-Dec</i>	<i>Jan-Jun</i>	<i>Jul-Dec</i>	<i>Jan-Jun</i>	<i>Jul-Dec</i>	<i>Jan-Jun</i>	<i>Jul-Dec</i>
	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010
Ship-based charges (\$/TEU)										
Conservancy	4.41	0	-	-	-	-	2.97	1.92	-	-
Tonnage	-	-	7.86	0	5.09	0	6.45	5.74	1.83	0.75
Pilotage	11.67	0	3.57	0	7.63	0	5.21	4.75	1.68	0.67
Towage ^a	15.07	0	10.92	0	9.61	0	13.76	11.59	5.94	2.46
Mooring, unmooring ^b	3.19	0	3.20	0	0.71	0	-	-	0.60	0.24
Berth hire ^c	-	-	-	-	-	-	-	-	-	-
Total ^c	34.34	0	25.55	0	23.04	0	28.39	24.00	10.05	4.13
Cargo-based charges (\$/TEU)										
Wharfage										
Imports	30.32	0	95.07	0	40.04	0	73.26	75.13	61.44	62.98
Exports	30.32	0	54.18	0	40.04	0	73.26	75.13	61.44	62.98
Harbour dues	50.43	0	-	-	-	-	-	-	-	-
Berth charge	-	-	-	-	-	-	-	-	18.40	18.87
Channel infrastructure fees					37.65	0				
Total port and related charges (\$/TEU) ^d										
Loaded imports	115.08	0	120.62	0	98.61	0	101.65	99.13	89.89	85.98
Loaded exports	115.08	0	79.73	0	98.61	0	101.65	99.13	89.89	85.98
Charges per ship visit (\$/visit)										
Total ship-based charges	23 985	0	25 484	0	25 484	0	27 447	26 367	17 936	18 791
Empty TEUs ^e	5 162	0	2 558	0	1 283	0	0	0	2 768	10 927

- not applicable

r. revised

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

b. 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.

f. The estimates for Fremantle for 17 215 GT category are based on small number of vessels (4) which are the only ones reported to have visited the port terminal but which exchanged above average number of containers for this category of vessels.

Note 1: Port and related charges are based on the parameters described in table 3.

Note 2: In September and December quarters no ships in this category called in ports of Brisbane, Sydney and Melbourne.

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.

T3.3 Port and related charges for ships in the 35 000–40 000 GT range

	<i>Brisbane</i>		<i>Sydney</i>		<i>Melbourne</i>		<i>Adelaide</i>		<i>Fremantle</i>	
	<i>Jan-Jun</i>	<i>Jul-Dec</i>	<i>Jan-Jun</i>	<i>Jul-Dec</i>	<i>Jan-Jun</i>	<i>Jul-Dec</i>	<i>Jan-Jun</i>	<i>Jul-Dec</i>	<i>Jan-Jun</i>	<i>Jul-Dec</i>
	2010	2010	2010	2010	2010	2010	2010	2010	2010	2010
Ship-based charges (\$/TEU)										
Conservancy	5.27	5.29	-	-	-	-	3.95	3.74	-	-
Tonnage	-	-	7.93	8.58	5.83	6.25	8.03	7.82	7.68	3.90
Pilotage	8.79	9.58	0.62	2.84	5.06	5.72	4.58	4.36	3.24	1.62
Towage ^a	10.46	11.05	5.36	5.96	5.44	6.09	15.52	14.44	17.03	8.78
Mooring, unmooring ^b	1.75	1.77	1.90	2.02	0.37	0.45	-	-	1.15	0.57
Berth hire ^c	-	-	-	-	-	-	-	-	-	-
Total ^c	26.27	27.69	15.81	19.40	16.70	18.51	32.08	30.36	29.10	14.88
Cargo-based charges (\$/TEU)										
Wharfage										
Imports	30.32	30.32	95.07	108.05	40.04	42.24	73.26	75.13	61.44	62.98
Exports	30.32	30.32	54.18	66.26	40.04	42.24	73.26	75.13	61.44	62.98
Harbour dues	48.97	48.97	-	-	-	-	-	-	-	-
Berth charge	-	-	-	-	-	-	-	-	18.40	18.87
Channel infrastructure fees	-	-	-	-	37.65	38.65	-	-	-	-
Total port and related charges (\$/TEU) ^d										
Loaded imports	107.02	108.43	110.88	127.45	92.27	97.16	105.34	105.49	108.94	96.73
Loaded exports	107.02	108.43	69.99	85.66	92.27	97.16	105.34	105.49	108.94	96.73
Charges per ship visit (\$/visit)										
Total ship-based charges	33 396	35 628	33 963	39 336	35 738	36 956	35 327	36 289	26 918	28 243
Empty TEUs ^e	5 461	6 050	7 705	7 981	3 912	4 386	0	0	2 101	4 101

- 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.

T3.4 Port interface costs for ships in the 15 000–20 000 GT range

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jan-June 2010	Jul-Dec 2010	Jan-June 2010	Jul-Dec 2010	Jan-June 2010	Jul-Dec 2010	Jan-June 2010	Jul-Dec 2010	Jan-June 2010	Jul-Dec 2010
	\$/TEU									
Import										
Ship-based charges	34	0	26	0	23	0	28	24	10	4
Cargo-based charges	81	81	95	108	76	79	73	75	80	82
Stevedoring ^p	171	171	171	171	171	171	171	171	171	171
Customs brokers' fees	137	199	140	136	154	154	146	171	160	157
Road transport charges	337	373	375	455	448	436	299	297	319	377
Import total ^a	761	-	806	-	873	-	718	738	740	790
Export										
Ship-based charges	34	0	26	0	23	0	28	24	10	4
Cargo-based charges	81	81	54	66	76	79	73	75	80	82
Stevedoring ^p	171	171	171	171	171	171	171	171	171	171
Customs brokers' fees	127	219	122	135	133	136	132	122	97	90
Road transport charges	337	373	375	455	448	436	299	297	319	377
Export total ^a	750	-	748	-	852	-	704	689	677	723

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

a. components may not sum to totals due to rounding; no ships in this category called to ports of Brisbane, Sydney and Melbourne between July and December 2010 and no ship-based charges could be calculated for these ports.

- Notes
1. Based on parameters described in table 3.2.
 2. Waterline data on customs brokers' fees and road transport charges are collected for the purpose of monitoring trends in charges over time. They should not be used for inter-port comparisons, as sample characteristics are based on findings contained in *Port interface cost index (BTCE 1993, Report 84)* and further updates done in 2001 and may vary between ports.
 3. The stevedoring charge used in Waterline is monitored by the ACCC and is the weighted average for Brisbane, Sydney, Melbourne, Adelaide, Fremantle and Burnie. Stevedoring charges vary between ports but detailed data for individual ports are not publicly available.

Sources BITRE estimates based on: ship call data supplied by relevant port authorities/corporations; price schedules of relevant port authorities/corporations, towage operators and pilotage service providers; surveys of customs brokers and road transport operators; stevedoring charge data supplied by the ACCC 2010; ABS 2010.

T3.5 Port interface costs for ships in the 35 000–40 000 GT range

	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jan-Jun 2010	Jul-Dec 2010	Jan-Jun 2010	Jul-Dec 2010	Jan-Jun 2010	Jul-Dec 2010	Jan-Jun 2010	Jul-Dec 2010	Jan-Jun 2010	Jul-Dec 2010
	\$/TEU									
Import										
Ship-based charges	26	28	16	19	17	19	32	30	29	15
Cargo-based charges	81	81	95	108	76	79	73	75	80	82
Stevedoring ^p	171	171	171	171	171	171	171	171	171	171
Customs brokers' fees	137	199	140	136	154	154	146	171	160	157
Road transport charges	337	373	375	455	448	436	299	297	319	377
Import total^a	752	851	797	867	867	858	722	744	760	801
Export										
Ship-based charges	26	28	16	19	17	19	32	30	29	15
Cargo-based charges	81	81	54	66	76	79	73	75	80	82
Stevedoring ^p	171	171	171	171	171	171	171	171	171	171
Customs brokers' fees	127	219	122	135	133	136	132	122	97	90
Road transport charges	337	373	375	455	448	436	299	297	319	377
Export total^a	742	871	738	837	845	840	708	695	696	734

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

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

- Notes
1. Based on parameters described in table 3.2.
 2. Waterline data on customs brokers' fees and road transport charges are collected for the purpose of monitoring trends in charges over time. They should not be used for inter-port comparisons, as sample characteristics are based on findings contained in *Port interface cost index* (BTCE 1993, Report 84) and further updates done in 2001 and may vary between ports.
 3. The stevedoring charge used in Waterline is monitored by the ACCC and is the weighted average for Brisbane, Sydney, Melbourne, Adelaide, Fremantle and Burnie. Stevedoring charges vary between ports but detailed data for individual ports are not publicly available.

Sources BITRE estimates based on: ship call data supplied by relevant port authorities/corporations; price schedules of relevant port authorities/corporations, towage operators and pilotage service providers; surveys of customs brokers and road transport operators; stevedoring charge data supplied by the ACCC 2010; ABS 2010.

T3.6 The national port interface cost index for ships in the 35 000–40 000 GT range

	<i>Jan-Jun 2004</i>	<i>Jul-Dec 2004</i>	<i>Jan-Jun 2005</i>	<i>Jul-Dec 2005</i>	<i>Jan-Jun 2006</i>	<i>Jul-Dec 2006</i>	<i>Jan-Jun 2007</i>	<i>Jul-Dec 2007</i>	<i>Jan-Jun 2008</i>	<i>Jul-Dec 2008</i>	<i>Jan-Jun 2009</i>	<i>Jul-Dec 2009</i>	<i>Jan-Jun 2010</i>	<i>Jul-Dec 2010</i>
Imports in current prices	674	684	739	736	763	772	763	780	839	846	802	805	813	857
Imports in 2001 prices	623	621	655	636	643	634	615	615	640	622	599	605	602	623
Exports in current prices	623	637	692	693	718	728	728	733	787	793	760	760	775	830
Exports in 2001 prices	576	578	614	599	605	597	586	578	600	584	568	572	574	603

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 2010; and ABS 2010.

T3.7

The national port interface cost index for ships in the 15 000–20 000 GT range

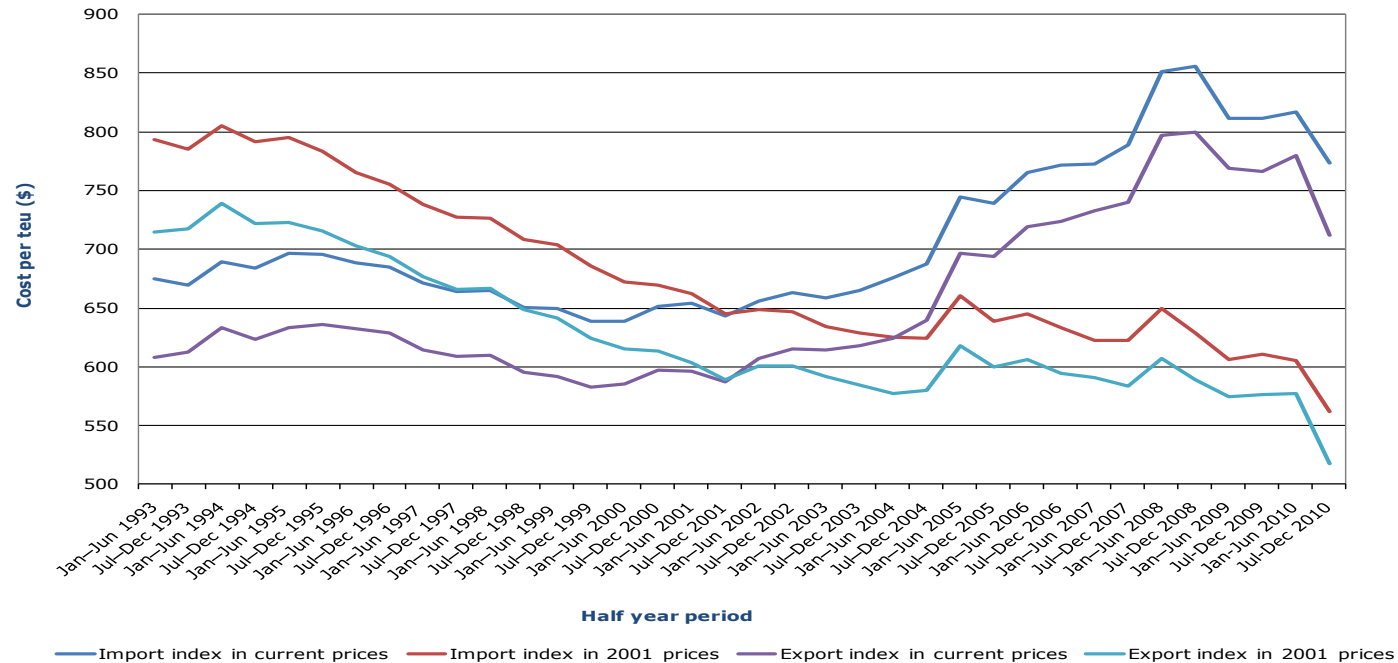
	<i>Jul-Dec</i> 2003	<i>Jan-Jun</i> 2004	<i>Jul-Dec</i> 2004	<i>Jan-Jun</i> 2005	<i>Jul-Dec</i> 2005	<i>Jan-Jun</i> 2006	<i>Jul-Dec</i> 2006	<i>Jan-Jun</i> 2007	<i>Jul-Dec</i> 2007	<i>Jan-Jun</i> 2008	<i>Jul-Dec</i> 2008	<i>Jan-Jun</i> 2009	<i>Jul-Dec</i> 2009	<i>Jan-Jun</i> 2010	<i>Jul-Dec</i> 2010
Imports in current prices	665	676	687	745	739	766	771	772	789	852	855	811	811	817	774
Imports in 2001 constant prices	628	625	624	660	639	645	633	622	622	649	629	606	610	605	562
Exports in current prices	618	624	639	697	694	719	724	733	740	797	800	769	767	780	712
Exports in 2001 constant prices	584	577	580	618	600	606	594	590	584	607	589	575	577	578	517

Note1 : 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 sesonally adjusted series.

Note2: Export and import cost for the period July to December 2010 were calculated on limited sample from Adelaide and Fremantle ports only where ships in this category were reported.

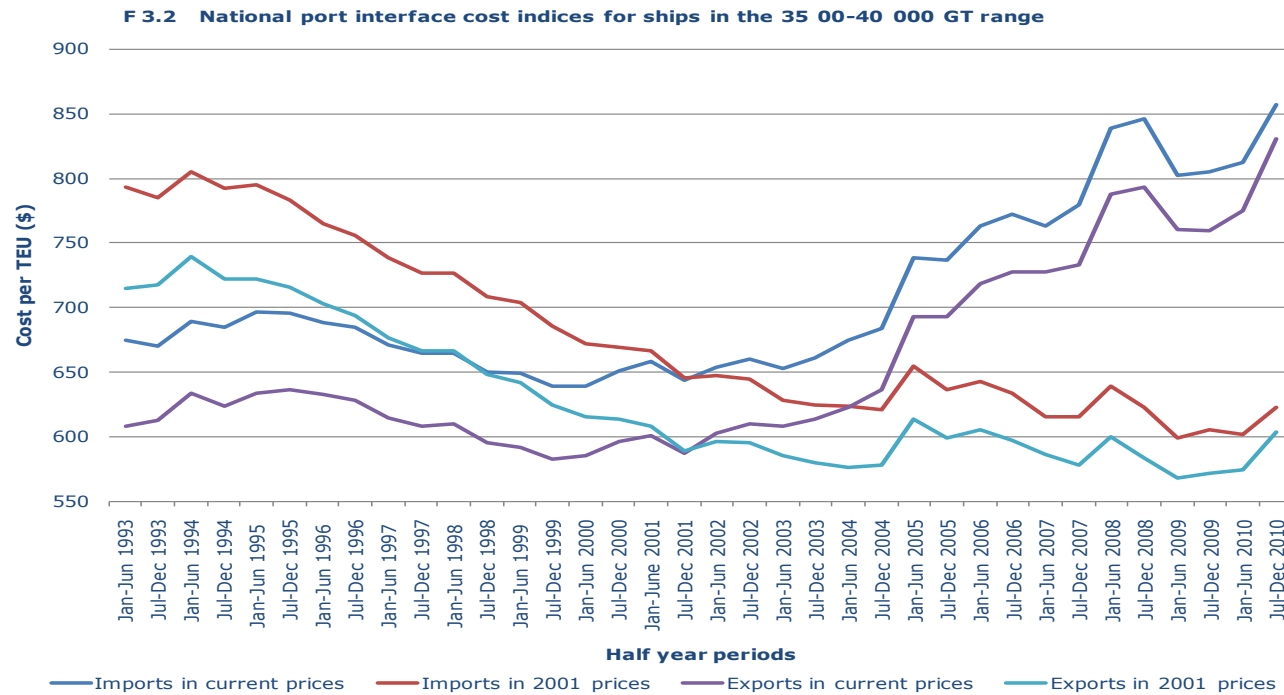
Sources: BITRE estimates based on: ship call data supplied by port authorities/corporations; price schedules of port authorities/corporations, towage operators and pilotage service providers; surveys of customs brokers and road transport operators; stevedoring charges data supplied by the ACCC and industry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

F 3.1 National port interface cost indices for ships in the 15 000–20 000 GT range



Note: Export and import cost for the period July to December 2010 were calculated for Adelaide and Fremantle ports where ships in this category were reported.

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 (seasonally adjusted).



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

Overview

This chapter illustrates trends in container ship size over time for ships which visit the five ports covered by *Waterline*.

Table 4.1 provides the five port total number of ship visits and the average number of TEUs exchanged per ship visit for container vessels with sizes ranging from 5 000 to 60 000 GT. Table 4.2 lists the distribution of ship visits by vessel gross tonnage on a five port basis.

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.

T4.1 Five port average number of TEUs exchanged and total ship visits per 6 month period for selected GT ranges weighted by number of ships

Gross tonnage	Jan-June 2003	Jul-Dec 2003	Jan-June 2004	Jul-Dec 2004	Jan-June 2005	Jul-Dec 2005	Jan-June 2006	Jul-Dec 2006	Jan-June 2007	Jul-Dec 2007	Jan-June 2008	Jul-Dec 2008	Jan-June 2009	Jul-Dec 2009	Jan-June 2010	Jul-Dec 2010
5 000-10 000																
Average TEUs exchanged	161	193	333	204	283	368	267	564	391	402	319	554	352	445	309	272
Total ship visits	75	72	93	80	71	67	93	108	144	131	159	158	120	123	137	134
10 000-15 000																
Average TEUs exchanged	405	485	688	628	554	506	464	653	711	864	511	554	414	420	283	344
Total ship visits	53	54	40	84	89	106	136	108	116	125	103	63	46	42	31	48
15 000 - 20 000																
Average TEUs exchanged	839	826	971	885	693	800	685	889	873	1 116	845	918	978	994	1 028	643
Total ship visits	181	191	153	266	316	439	406	430	224	209	189	210	81	84	52	11
20 000 - 25 000																
Average TEUs exchanged	902	990	1 014	935	818	858	685	923	878	942	857	904	918	1 117	977	930
Total ship visits	182	214	199	306	321	294	374	256	163	148	207	220	134	138	87	53
25 000 - 30 000																
Average TEUs exchanged	1 027	1 031	959	1 071	956	1 021	882	1 099	991	2 528	1 049	1 163	1 210	1 217	1 138	1 178
Total ship visits	286	323	344	185	332	377	395	475	558	618	545	458	362	356	381	474
30 000 - 35 000																
Average TEUs exchanged	1 262	1 374	1 478	896	1 215	1 433	1 151	1 324	1 185	1 296	806	1 041	1 063	1 059	1 081	1 155
Total ship visits	175	257	247	191	223	141	198	156	177	235	243	205	139	131	112	107
35 000 - 40 000																
Average TEUs exchanged	1 408	1 445	1 474	1 385	1 394	1 454	1 137	1 377	1 605	1 867	1 643	1 760	1 872	1 869	1 731	1 784
Total ship visits	214	189	225	228	227	225	178	223	313	357	333	379	320	334	375	407
40 000 - 45 000																
Average TEUs exchanged	1 450	1 558	1 601	1 098	1 511	1 653	1 177	1 428	1 630	1 819	1 773	1 776	1 773	1 798	1 865	1 951
Total ship visits	162	186	181	143	196	165	223	249	212	173	136	139	177	184	199	281
45 000 - 50 000																
Average TEUs exchanged	1 201	1 270	1 379	853	1 279	1 433	914	1 027	1 236	1 651	1 536	1 675	1 847	1 883	1 851	1 797
Total ship visits	72	77	75	32	65	77	88	81	154	153	145	123	129	112	98	54
50 000 - 55 000																
Average TEUs exchanged	995	1 044	1 366	795	1 735	1 247	1 321	1 362	1 232	1 807	1 606	1 761	2 273	2 367	2 226	2 121
Total ship visits	61	69	22	71	89	60	55	55	110	101	166	225	269	270	332	201
55 000 and above																
Average TEUs exchanged	1 252	0	0	681	1 308	88	0	695	659	1 457	0	290	796	579	2 538	0
Total ship visits	3	0	0	6	10	4	0	19	1	11	0	1	3	3	4	0
Total ship visits	1 464	1 632	1 579	1 592	1 939	1 955	2 146	2 160	2 172	2 261	2 226	2 181	1 780	1 777	1 808	1 770

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

T4.2 Container ship visits by port, January - December 2010

Number of ship visits	Brisbane	Sydney	Melbourne	Adelaide	Fremantle	Total
5000 -10 000	110	98	63	0	0	271
10 000-15 000	37	28	14	0	0	79
15 000 - 20 000	10	9	8	8	28	63
20 000 - 25 000	44	46	46	4	0	140
25 000 - 30 000	130	290	320	63	52	855
30 000 - 35 000	34	66	76	15	28	219
35 000 - 40 000	188	201	218	72	103	782
40 000 - 45 000	104	111	144	56	65	480
45 000 - 50 000	62	41	44	1	4	152
50 000 - 55 000	107	143	179	12	92	533
above 55 000	1	2	1	0	0	4
Total	827	1 035	1 113	231	372	3 578

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

CHAPTER 5

Port performance—non financial 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.

T5.1 Port performance – non-financial indicators, selected Australian ports, 2006-2010

	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
Five ports^a									
Total cargo throughput ('000 tonnes)	60 694	59 953	62 591	63 756	64 049	61 063	61 831	64 979	69 817
Non-containerised general cargo ('000 tonnes) ^a	2 522	2 768	2 701	2 826	2 855	1 842	2 153	2 321	11 754
Containerised cargo (teus exchanged)									
Full import	1 242 921	1 166 116	1 389 211	1 305 203	1 449 281	1 121 703	1 345 190	1 252 358	1 437 021
Empty import	137 911	139 096	136 768	142 714	140 312	155 333	129 206	124 477	127 401
Full export	807 702	778 137	817 213	849 152	876 847	857 981	880 174	884 712	929 540
Empty export	500 511	540 582	627 401	563 815	666 821	411 197	588 658	563 320	687 216
TOTAL	2 689 045	2 623 931	2 970 593	2 858 884	3 133 261	2 546 214	2 943 228	2 824 867	3 181 179
Average total employment ^b	1 076	1 114	1 141	1 154	1 222	1 254	1 251	1 260	1 267
Port turnaround time (hrs) ^c									
Median result	-	-	-	-	-	-	-	-	-
95th percentile	-	-	-	-	-	-	-	-	-
Brisbane									
Total cargo throughput ('000 tonnes)	13 936	14 130	15 006	14 716	15 808	16 086	15 697	15 911	17 099
Non-containerised general cargo ('000 tonnes) ^a	466	546	516	542	670	316	458	551	582
Containerised cargo (teus exchanged)									
Full import	186 666	177 073	216 280	196 074	218 787	158 988	133 943	124 430	144 304
Empty import	40 400	38 023	32 133	33 613	37 363	37 174	30 456	27 458	32 063
Full export	136 672	120 261	125 275	130 028	139 042	131 578	133 943	124 430	144 304
Empty export	75 844	100 106	114 465	92 892	104 798	68 437	100 812	96 928	109 197
TOTAL	439 582	435 463	488 153	452 607	499 990	396 177	399 154	373 246	429 868
Average total employment ^b	258	293	312	312	342	353	350	337	323
Port turnaround time (hrs) ^c									
Median result	36	33	35	33	26	32	33	32	30
95th percentile	57	54	54	51	45	70	76	61	62
Sydney									
Total cargo throughput ('000 tonnes)	14 024	13 772	14 886	14 558	14 715	13 099	14 169	13 992	14 976
Non-containerised general cargo ('000 tonnes) ^a	331	347	270	262	142	1	0	0	1
Containerised cargo (teus exchanged)									
Full import	419 784	380 056	459 364	428 179	489 703	386 403	496 239	454 790	521 027
Empty import	9 616	9 762	9 796	9 224	10 840	15 580	12 962	12 232	9 861
Full export	192 703	176 919	188 416	196 678	222 367	220 061	223 290	219 277	231 724
Empty export	213 006	218 275	248 943	237 825	262 222	176 744	261 042	247 688	289 416
TOTAL	835 109	785 012	906 519	871 906	985 132	798 788	993 533	933 987	1 052 028
Average total employment ^b	246	244	240	223	244	260	267	298	309
Port turnaround time (hrs) ^c									
Median result	29.5	29.6	29.8	27.9	29.6	29.0	34.6	37.9	39.8
95th percentile	56	53	57	47	56	54	63	72	65
Melbourne									
Total cargo throughput ('000 tonnes)	14 884	14 628	15 159	15 665	15 542	13 560	14 995	15 299	16 096
Non-containerised general cargo ('000 tonnes) ^a	1 061	1 175	1 184	1 251	1 273	1 028	1 055	1 130	1 167
Containerised cargo (teus exchanged)									
Full import	485 828	463 052	542 218	508 357	557 940	422 482	532 350	502 392	566 876
Empty import	55 592	54 843	47 900	50 920	48 483	59 685	47 694	50 621	54 369
Full export	355 544	343 064	354 504	372 536	359 377	353 155	375 205	391 422	402 698
Empty export	158 613	177 075	205 955	174 254	231 319	124 911	170 507	166 444	216 133
TOTAL	1 055 577	1 038 034	1 150 577	1 106 067	1 197 119	960 233	1 125 756	1 110 879	1 240 077
Average total employment ^b	196	201	209	223	228	224	217	210	205
Port turnaround time (hrs) ^c									
Median result	31	31	32	30	31	30	30	32	32
95th percentile	62	63	65	56	62	56	62	70	67

T5.1 Port performance – non-financial indicators, selected Australian ports, 2006-2010 continued...

	<i>Jul-Dec</i> 2006	<i>Jan-Jun</i> 2007	<i>Jul-Dec</i> 2007	<i>Jan-Jun</i> 2008	<i>Jul-Dec</i> 2008	<i>Jan-Jun</i> 2009	<i>Jul-Dec</i> 2009	<i>Jan-Jun</i> 2010	<i>Jul-Dec</i> 2010
Adelaide									
Total cargo throughput ('000 tonnes)	5 212	5 072	5 014	5 283	4 952	4 767	4 713	5 887	8 763
Non-containerised general cargo ('000 tonnes) ^a	181	180	196	187	190	73	105	128	134
Containerised cargo (teus exchanged)									
Full import	30 277	31 441	38 144	40 656	40 260	40 656	47 581	42 201	53 095
Empty import	21 342	23 583	28 340	29 018	27 862	26 461	24 052	23 564	22 143
Full export	46 606	50 233	57 587	59 075	59 382	59 075	59 748	58 801	60 929
Empty export	7 979	7 656	12 710	14 591	16 724	6 125	10 379	8 175	13 888
TOTAL	106 204	112 913	136 781	143 340	144 228	132 317	141 760	132 741	150 055
Average total employment ^b	97	99	103	107	107	109	112	111	110
Port turnaround time (hrs) ^c									
Median result	20	21	20	21	25	24	28	26	25
95th percentile	32	35	34	35	39	48	54	42	40
Fremantle									
Total cargo throughput ('000 tonnes)	12 638	12 352	12 525	13 534	13 032	13 550	12 258	13 890	12 883
Non-containerised general cargo ('000 tonnes) ^a	482	520	535	585	580	423	535	512	9 871
Containerised cargo (teus exchanged)									
Full import	120 366	114 494	133 205	131 937	142 591	113 174	135 077	128 545	151 719
Empty import	10 961	12 885	18 599	19 939	15 764	16 433	14 042	10 602	8 965
Full export	76 177	87 660	91 431	90 835	96 679	94 112	87 988	90 782	89 885
Empty export	45 069	37 470	45 328	44 253	51 758	34 980	45 918	44 085	58 582
TOTAL	252 573	252 509	288 563	284 964	306 792	258 699	283 025	274 014	309 151
Average total employment ^b	280	277	277	289	302	309	305	305	320
Port turnaround time (hrs) ^c									
Median result	25	27	26	29	31	28	26	29	21
95th percentile	54	55	51	62	67	57	46	60	47

- 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.

b. 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.

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

Tables 6.1a & 6.1b 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

Tables 6.1a & 6.1b 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.

T6.1 Stevedoring and ship arrival reliability indicators, September and December quarters 2010

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	89.7	89.1	77.6	84.0	95.2	93.7	0.0	0.0	91.1	93.6
Ship arrival										
Advice at 24 hrs	96.9	97.9	33.3	31.4	na	na	100.0	100.0	na	na
Advice inside 24 hrs	94.6	91.2	92.0	91.21	na	na	100.0	100	na	na

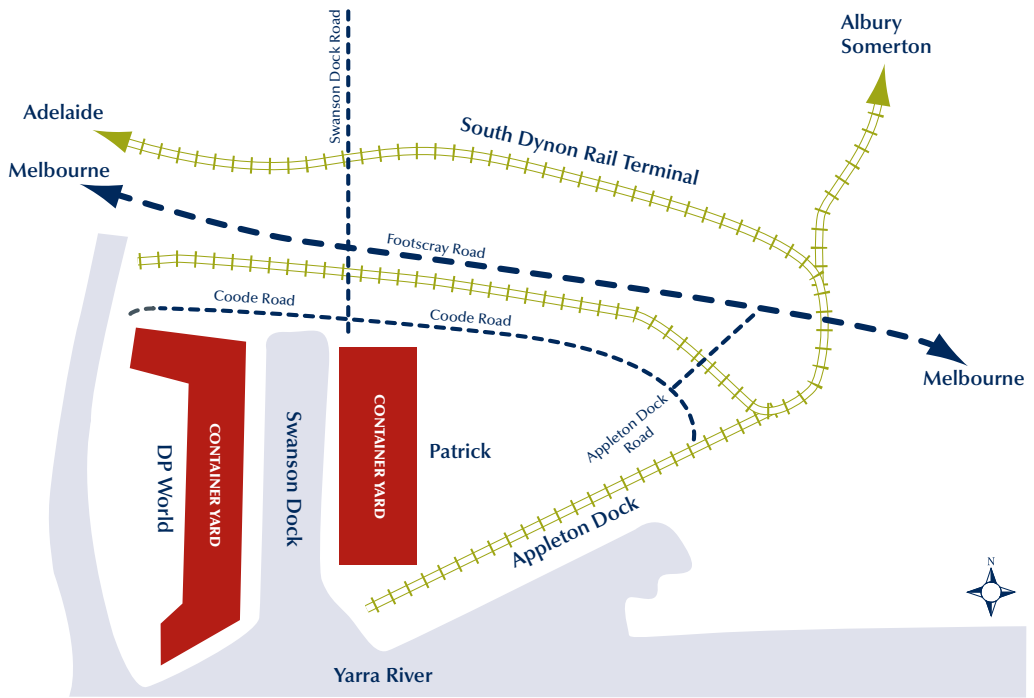
na not available

Sources: Ports Australia, Patrick, DP World Terminals

APPENDIX A

Diagrams of five major Australian container port terminals

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

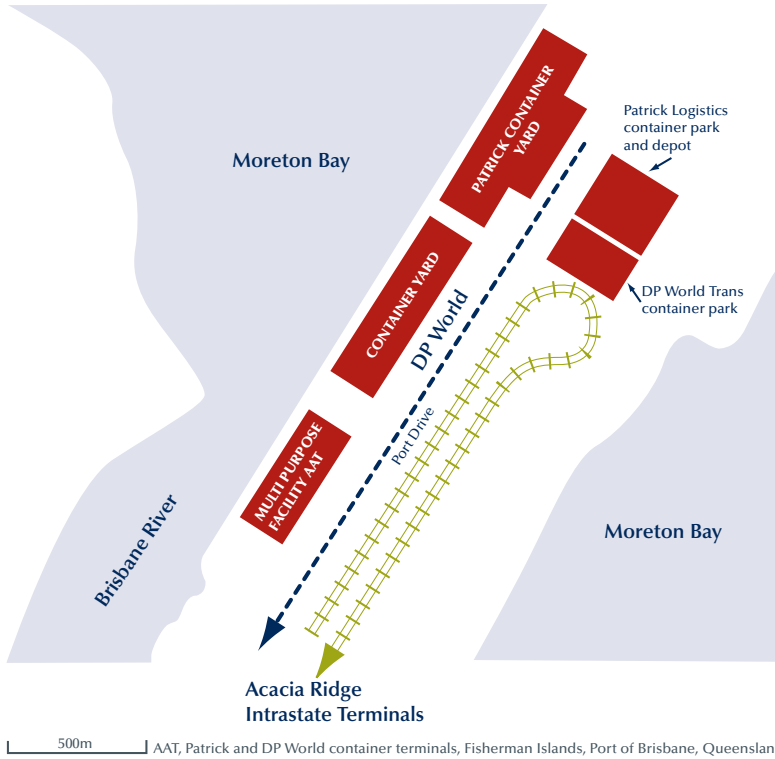


200m Patrick and DP World container terminals, Swanson Dock, Port Melbourne, Victoria

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

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

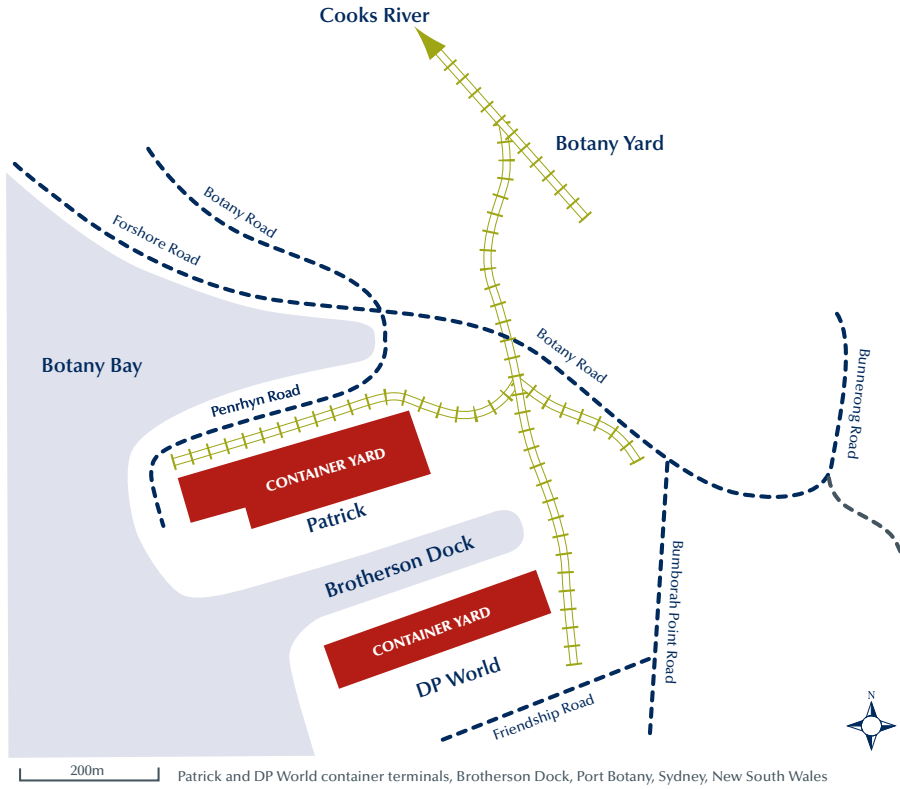
FA2 Patrick and DP World terminals—Fisherman Islands, Port of Brisbane, Queensland



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

Source: DPWorld (2007b), Google Maps Australia (2007), DOTARS (2006), Patrick (2007b), Port of Brisbane (2007).

FA3 Patrick and DP World terminals—Brogherson dock, Port Botany, Sydney, New South Wales

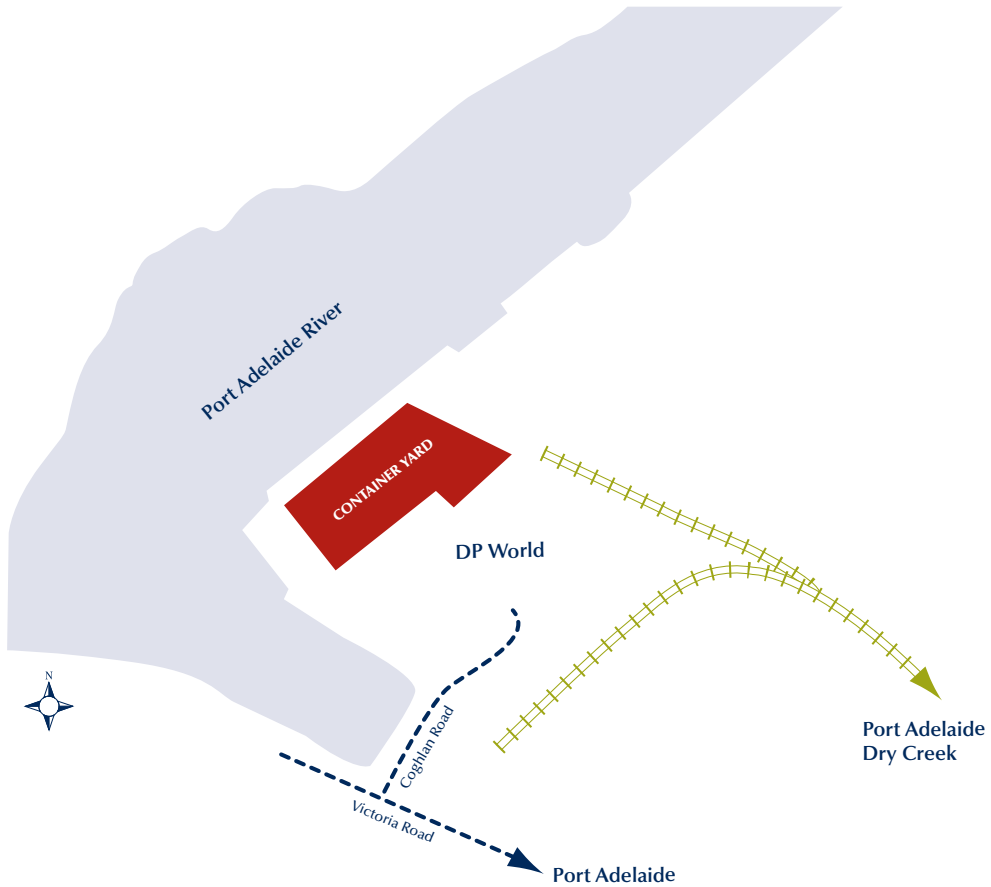


Patrick and DP World container terminals, Brogherson Dock, Port Botany, Sydney, New South Wales

Note: Port Botany has on-dock rail terminals. Access for both DP World and Patrick is directly adjacent to the container yards making it easier to load containers directly on to trains. Trains with containers for both the stevedores are split up at the Botany Rail Yard which is adjacent to the container terminal at Brogherson dock. DP World Transport has an intermodal terminal adjacent to the Port Botany container terminals which is used primarily for empty containers. Further down (about 8 kilometres) along the Botany Freight Rail Line, the Cooks River terminal is also used for empty containers. To the west of the metropolitan area are intermodal terminals at Yennora, Leightonfield, Minto and Camellia. Development of the Port Botany rail link is planned as part of an Auslink National Project. The diagram is correct as at March 2007.

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

FA4 DP World terminal—Outer Harbour, Adelaide

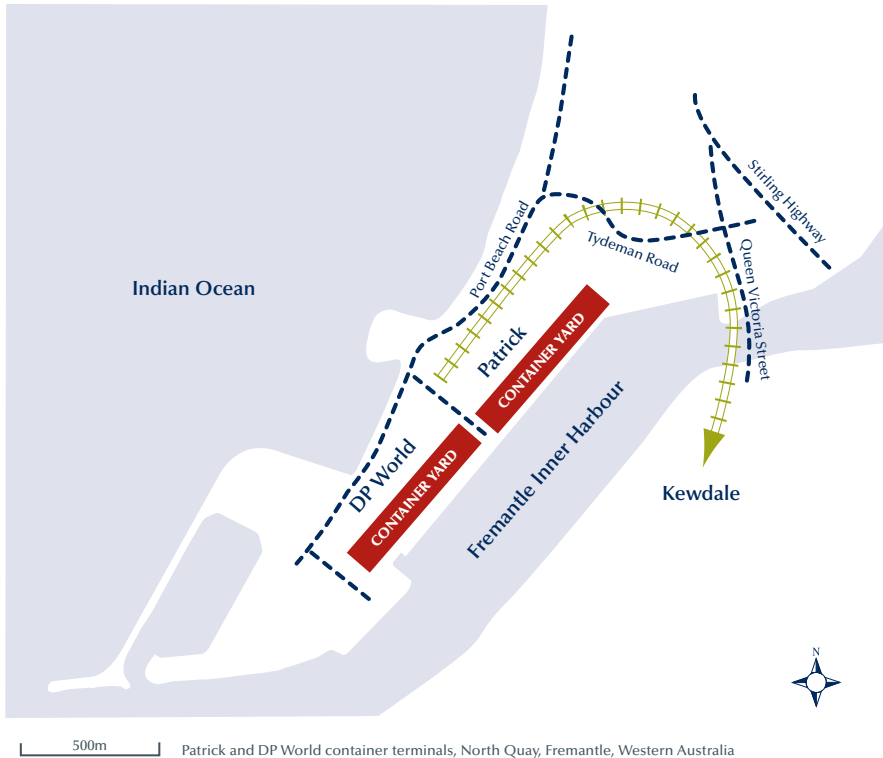


200m DP World container terminal Outer Harbour, Adelaide, South Australia

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

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

FA5 Patrick and DP World container terminals—North Quay, Fremantle



500m Patrick and DP World container terminals, North Quay, Fremantle, Western Australia

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

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

Abbreviations

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

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